

**TECHNICAL MANUAL
OPERATOR'S ORGANIZATIONAL
DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
FOR
250 6PM MINI-PUMPER FIREFIGHTING TRUCK
MODEL NO.: CM-KFT-3
NSN: 4210-01-026-2567**

This copy is a reprint which includes pages from change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY

12 NOVEMBER 1986

SAFETY SUMMARY

The following cautions and warnings apply to this technical manual. The applicable caution and warning is repeated within this text.

GENERAL

WARNING

This vehicle contains many parts dimensioned in the metric system. Most fasteners are metric and many are very close in dimension to familiar customary measurements in the inch system. However, it is important to note that, during any vehicle maintenance procedures, replacement fasteners must have the same measurements as those removed, whether metric or customary. Mismatched or incorrect fasteners can result in vehicle damage or malfunction, or possible personal injury. Therefore, fasteners removed from the vehicle should be saved for re-use whenever possible. Where the fasteners are not satisfactory for re-use, care should be taken to select a replacement that matches the original.

WARNING

High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions. Learn the areas containing high voltage in each piece of equipment. Be careful not to contact high voltage connections when installing or operating this equipment. Before working inside the equipment, turn power off and ground points of high potential before touching them.

For Artificial Respiration, refer to FM 21-11.

WARNING

Trichloroethylene is toxic to skin, eyes, and respiratory tract. Avoid all exposure. Skin and eye protection, and exhaust hood are required. Prior to use of trichloroethylene, user will contact bioenvironmental or safety office for local procedure or regulations concerning the use of trichloroethylene. Keep away from open flame.

WARNING

Diesel fuel is toxic and flammable. Skin and eye protection is required. Good general ventilation is normally adequate. Keep away from open flame and other ignition sources.

WARNING

Welding and brazing operations produce heat, toxic fumes, radiation, metal slag, and carbon particles. Welding and brazing goggles with the proper tinted lenses, with gloves, apron or jacket, and welders boots are required.

WARNING

Cleaning solvent, Federal Specification P-D-680, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flames.

WARNING

Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 KPa). Wearing of goggles is required to avoid injury to personnel.

WARNING

Remove watches, rings, and all other jewelry while working on or near this equipment. These items could result in injury or death to personnel, or damage to equipment.

WARNING

Mineral spirits are flammable and toxic. Skin and eye protection is Mineral spirits are flammable and toxic. Skin and eye protection is required. Good general ventilation is normally adequate. Keep away from open flame or other ignition sources.

WARNING

Deadly fumes are discharged by this equipment in operation. Death by suffocation may result if operated indoors, without exhaust gases being ducted outdoors. Make sure that air intake is free of debris and is large enough not to restrict air flow.

WARNING

When lifting an object, make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

CAUTION

It is impossible to anticipate every possible potential hazard. Common sense must prevail. The operator must satisfy himself that a particular procedure, service tool, or work method is safe.

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CHANGE }
No. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 December 1987

Operator's, Organizational,
Direct Support and General Support Maintenance Manual
(Including Repair Parts and Special Tools List)

for

250 GPM MINI-PUMPER FIREFIGHTING TRUCK
MODEL NO.: CM-KFT-3
NSN: 4210-01-026-2567

TM 5-4210-224-14&P, 12 November 1986, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages

1-13 and 1-14
2-5 and 2-6
2-51 and 2-52
4-359 through 4-361/4-362
Index-1 and Index-2

Insert pages

1-13 and 1-14
2-5 and 2-6
2-51 and 2-52
4-359 through 4-362
Index-1 and Index-2

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

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

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

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**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT
 and GENERAL SUPPORT MAINTENANCE MANUAL
 for
 (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
 250 GPM MINI-PUMPER FIREFIGHTING TRUCK
 MODEL NO.: CM-KFT-3
 NSN: 4210-01-026-2567**

REPORTING OF 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 directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished to you.

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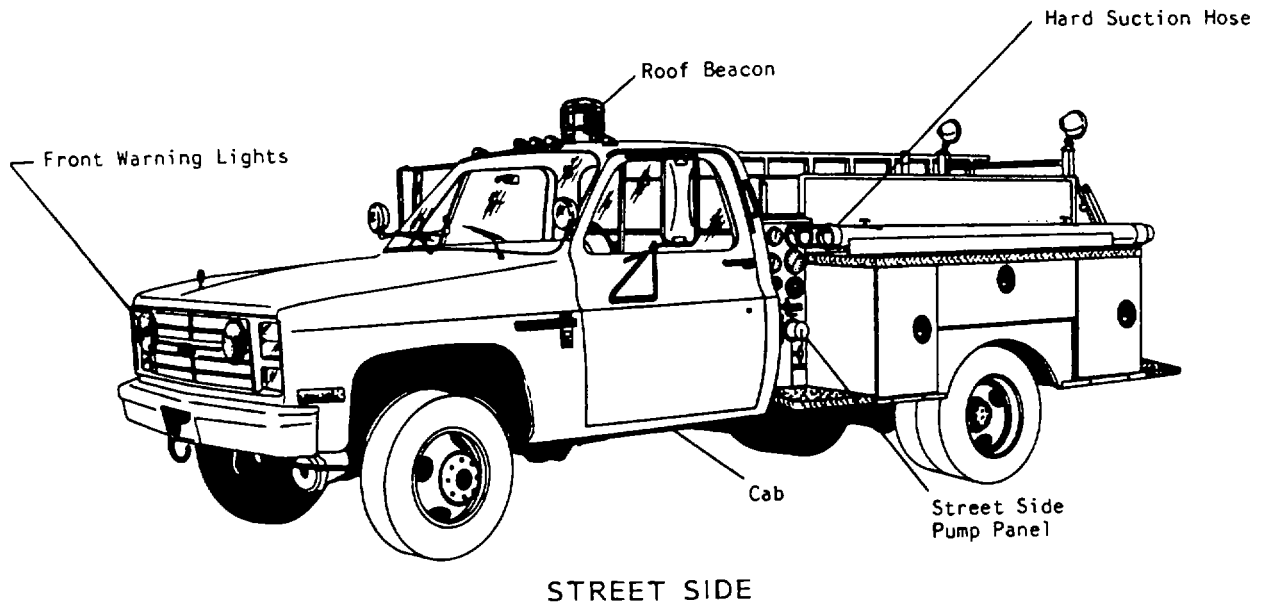
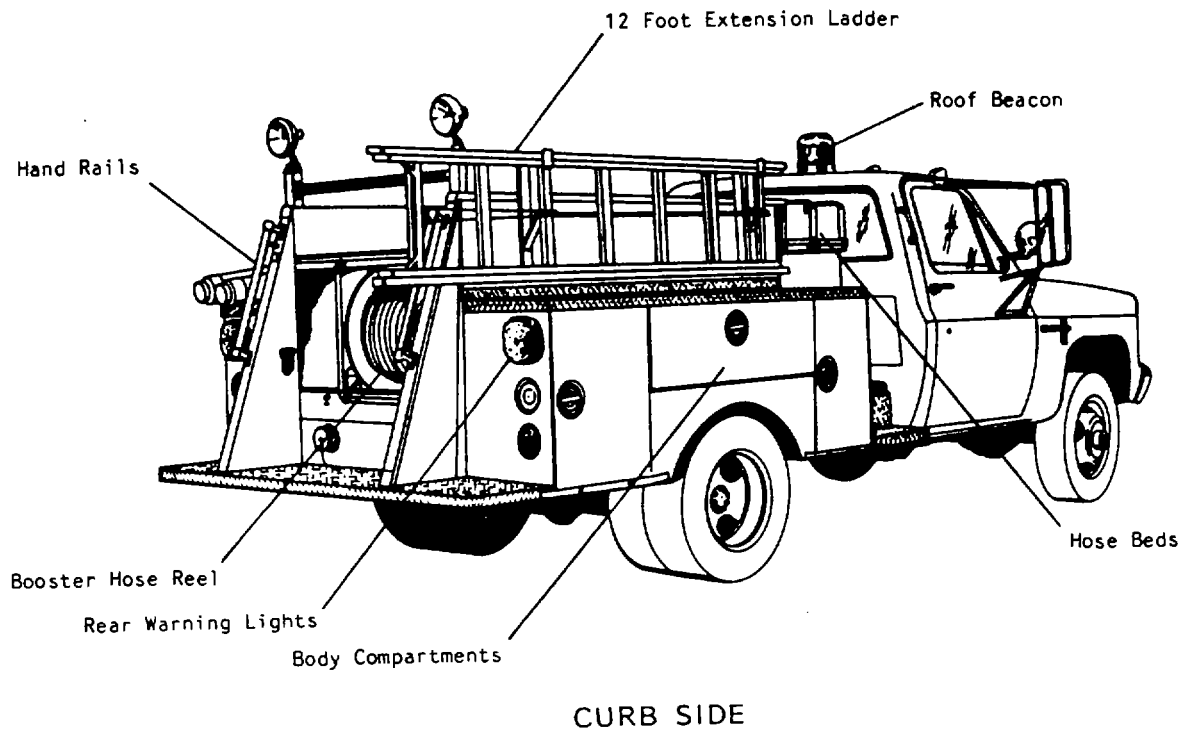


FIGURE 1-1. MINI-PUMPER FIREFIGHTING TRUCK

**CHAPTER 1
INTRODUCTION**

**Section I. GENERAL INFORMATION
Section II. EQUIPMENT DESCRIPTION**

Section I. GENERAL INFORMATION

	Para.		Para.
Destruction of Army Material To Prevent Enemy Use	1-6	Reporting of Equipment Improvement Recommendations	1-3
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1-1. SCOPE.

- a. *Type of Manual.* Operator's, Organizational, Direct Support and General Support Maintenance Manual, including Repair Parts and Special Tools List.
- b. *Model Number and Equipment Name.* Model CM-KFT-3, 250 GPM Mini-Pumper Firefighting Truck.
- c. *Purpose of Equipment.* The CM-KFT-3 Firefighting Truck is designed to provide initial attack operations on brush and structural fires. The truck will accomplish the firefighting mission by providing water in a pump and roll operation at a supply rate of 250 GPM.
- d. *Special Limitations of Equipment.* There are no special limitations on this firetruck.

1-2. MAINTENANCE FORMS AND RECORDS.

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

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's).

If your 250 GPM Mini-Pumper Firefighting Truck needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. We'll send you a reply.

1-4. WARRANTY INFORMATION.

The 250 GPM Mini-Pumper Firefighting Truck is warranted for one year after date of acceptance by the Government. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your organizational maintenance shop.

1-5. LIST OF ABBREVIATIONS.

AAL	Additional Authorization List	max	maximum
AR	As Required	mfg	manufacturing
BII	Basic Issue Items	min	minimum or minute
C	Celsius	mm	millimeters
CDR	Crankshaft Depression Regulator	MPH	Miles Per Hour
COEIL	Components of End Item List	N-m	Newton-meters
cont	continued	No.	Number(s)
DA	Department of the Army	NSN	National Stock Number
DS	Direct Support	NSS	Not Sold/Service Separately
EIRs	Equipment Improvement Recommendations	P/N	Part Number
ES&ML	Expendable Supplies and Materials List	para.	paragraph(s)
F	Fahrenheit	PMCS	Preventive Maintenance Checks and Services
FM	Field Manual	PSI	Pounds Per Square Inch
GPM	Gallons Per Minute	qty	quantity
Hz	Hertz	RH	Right Hand
Km	Kilometers	rpm	revolutions per minute
Km/h	Kilometers/hr	TAMMS	The Army Maintenance Management System
l	liters	TB	Technical Bulletin
LH	Left Hand	TM	Technical Manual
LO	Lubricated Order	TMDE	Test Measurement and Diagnostic Equipment
m	meters	U/M	Unit of Measure
		VAC	Volts Alternating Current
		wt	weight

1-6. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

Command decision, in accordance with the tactical situation will determine when destruction of the 250 GPM Mini-Pumper Firefighting Truck will be accomplished. For general destruction procedures for this equipment, refer to TM 750-244-3, "Procedures for Destruction of Equipment to Prevent Enemy Use."

1-7. PREPARATION FOR STORAGE OR SHIPMENT.

Refer to Chapter 4 for preparation of the equipment for storage or shipment.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

Equipment Characteristics, Capabilities and Features	Para. 1-8	Equipment Data	Para. 1-10
		Location and Description of Major Components	1-9

1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

- a *Description.* Model CM-KFT-3 is a commercial type, 4x4, front wheelsteer, truck cab and chassis fire truck powered by a 6.2 liter diesel engine. The fire truck is equipped with a mid-ship mounted 250 GPM pump which is driven by the truck engine. A frame mounted 250 gallon water tank is also installed on the truck.
- b. *Capabilities.* The fire truck is capable of satisfactory performance in any ambient temperature from +125°F (69.4°C) to 25°F (13.8°C). The truck will deliver the following rated pumping capacities at any elevation to 3,000 feet (914.4m) at the above stated temperatures.

<u>GALLONS PER MINUTE</u>	<u>PRESSURE P.S.I.</u>
250	150
175	200
125	250

The truck, when fully loaded with all specified equipment, filled water tank, fuel tank, and crew, is capable of the following road performance at sea level: (1) Parking brakes holding the truck on a 30% grade, in both ascending and descending positions, with the fire pump operating and discharging 80% of the water tank capacity at a flow rate of not less than 20 GPM at a pressure of not less than 100 PSIG.

- (2) Service brakes holding the truck on a 30% grade in both ascending and descending positions.
- (3) Service brakes bringing the truck to a stop within a braking distance of 30 feet (9.14m) from a speed of 20 MPH (32.2 km/h) on a dry, smooth, level surface free from loose material.
- (4) Maintaining a maximum speed of not less than 55 MPH (88.5 km/h) on dry, level, paved roadway.
- (5) Accelerating on a level road from a standing start to a speed of 35 MPH (56.3 km/h) in 25 seconds.
- (6) Maintaining a sustained speed when ascending a 30% grade in low speed range.

1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES. (Continued)

- (7) There will be no evidence of body distortion, water leakage, tire and body contact, malfunction of components. Irregular chassis noise, vibration or sway when subjected to road test of 100 miles (160.9 km) over paved roadway at speeds up to 55 MPH (88.5 km/h); 50 miles (80.5 km) over graded dirt roadway at not less than 25 MPH (40.2 km/h).
- (8) Pump and roll at speeds of 3 to 7 MPH (4.8 to 11.3 km/h) while pumping water from the tank to pump and back through the tank fill line at a pump pressure of not less than 100 PSI and 20 GPM.
- (9) Negotiating side slopes up to 30% on a surface reasonably hard and free from loose material.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

a. *General Description.* The 250 GPM Mini-Pumper Firefighting Truck (Figures 1-2 through 1-19) is complete with all primary and support equipment required for initial firefighting purposes. The vehicle consists of the following major components:

- | | |
|----------------------------|---------------------------|
| (1) Cab | (10) Booster Hose Reel |
| (2) Chassis | (11) Engine |
| (3) Service Brakes | (12) Transmission |
| (4) Body | (13) Front and Rear Axles |
| (5) Firefighting System | (14) Suspension System |
| (6) Pump Compartment | (15) Wheels and Tires |
| (7) Water Tank | (16) Steering System |
| (8) Fire Pump | (17) Exhaust System |
| (9) Street Side Pump Panel | (18) Electrical System |

b. *Detailed Description.* Throughout this manual, the term "curb side" means the right side, while the term "street side" means the left side of the vehicle as viewed from the rear. The following paragraphs briefly describe each major component of the 250 GPM Mini-Pumper Firefighting Truck.

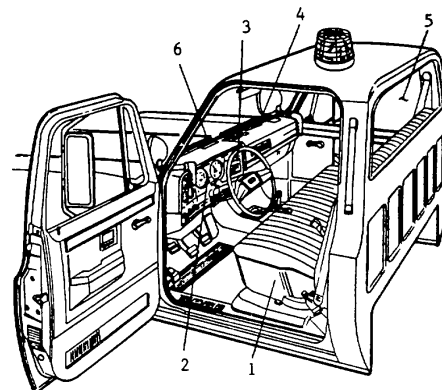
1-9.. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

(1) *Cab.* The cab is a standard closed compartment forward type.

(a) *Seating.* Seating is provided for 3 crew members inside the cab. Seat belts are provided for all crew members.

(b) *Controls.* The instrument panel provides the controls, indicators and instruments necessary to control, monitor, and operate the vehicle operation.

(c) *Heater.* A fresh air cab heater is provided for use in cooler climates. The amount of heat can be regulated by a two-speed heater fan.



- 1. Seating
- 2. Controls
- 3. Heater
- 4. Defroster
- 5. Windows
- 6. Windshield Washers

FIGURE 1-2. CAB

(d) *Defroster.* The windshield defroster is part of the cab heater and has controls to regulate temperature and volume of air used for defrosting the windshield.

(e) *Windows.* All windows are made of safety plate glass. Two windshield wipers are provided for the windshield. The system has a motor and is controlled by a single two speed switch located on the left side of the steering column.

(f) *Windshield Washers.* Windshield washers are provided to keep the windshield clear of dust, soot, insect debris, etc. The washers are activated by a control on the steering column. The reservoir for the washer fluid is mounted under the engine compartment hood.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

(2) *Chassis.* The chassis is a six-wheel, 4-wheel or rear drive, with front engine mounting. The front axle is a hypoid gear axle equipped with steering knuckles and a manual locking hub, with double acting shock absorbers. The rear axle is a full floating type with a hypoid ring gear and drive pinion with a limited slip differential. Both axles have leaf springs with spring stops to cushion contact of the spring with the frame.

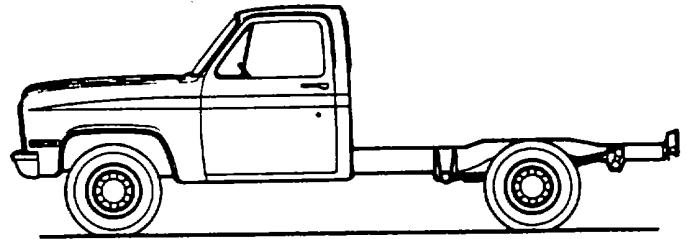


FIGURE 1-3. CHASSIS

(3) *Service Brakes.* The truck is equipped with power assisted hydraulic activated, fourwheel, service brakes, using silicon brake fluid.

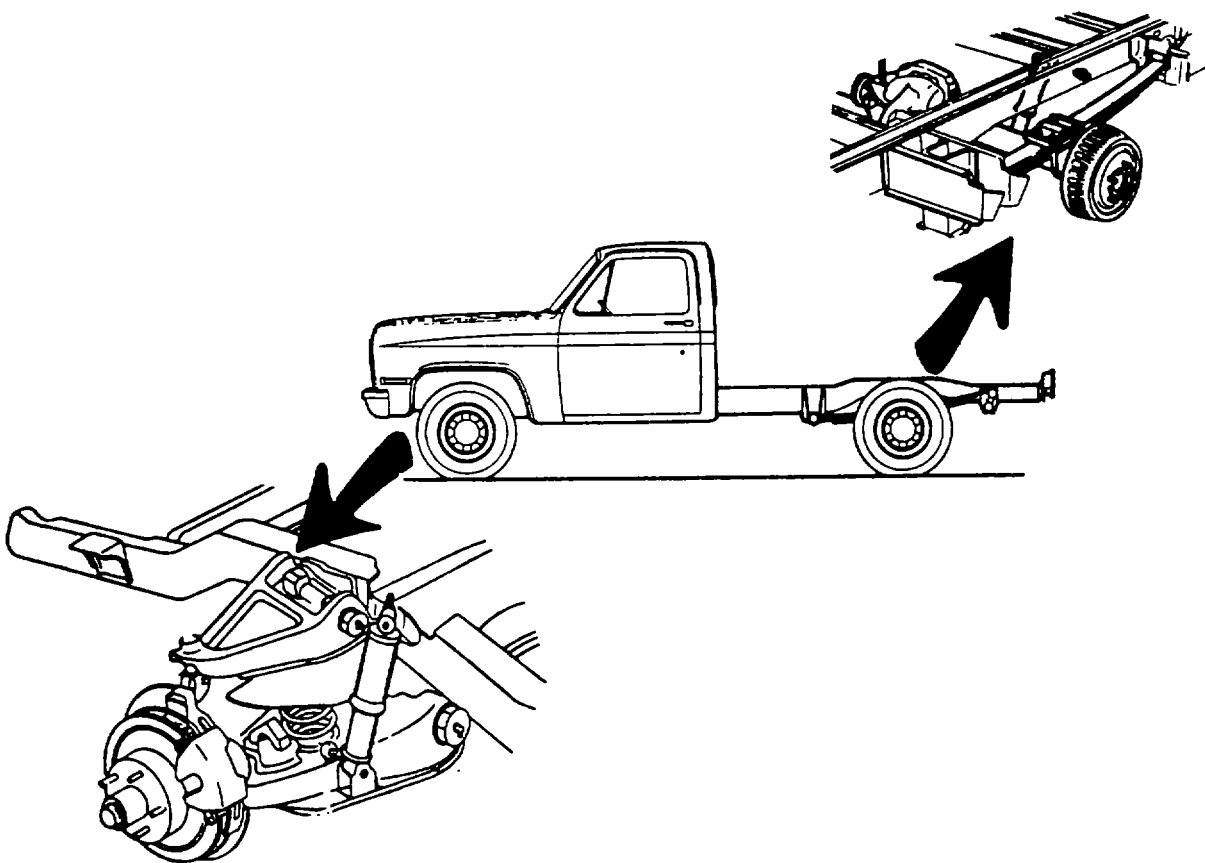
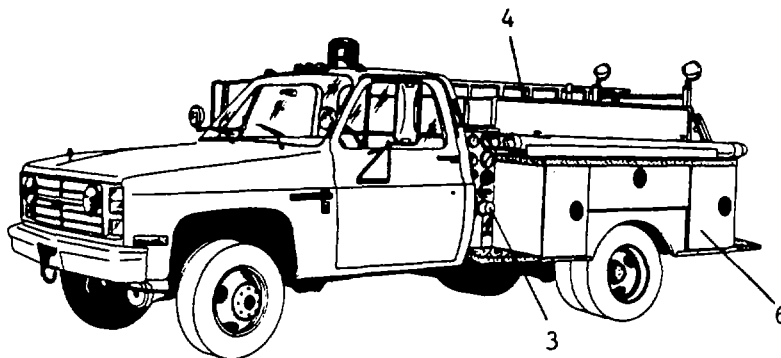


FIGURE 1-4. SERVICE BRAKES

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

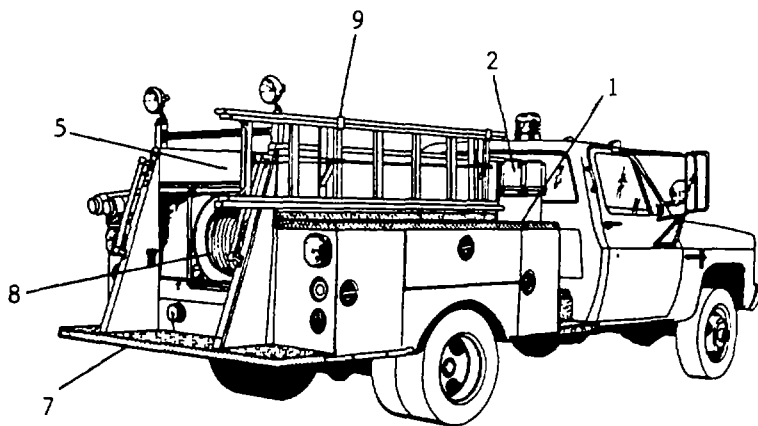
- (4) *Body.* The body, which is separate from the cab, incorporates the fire pump housing, hose stowage bins, street side pump panel, water tank, hose bed, equipment cabinets, rear platform, booster hose reel, and mounting brackets for the auxiliary firefighting equipment.



STREET SIDE

LEGEND

- 1. FIRE PUMP HOUSING
- 2. HOSE STOWAGE BINS
- 3. STREET SIDE PUMP PANEL
- 4. WATER TANK
- 5. HOSE BED
- 6. EQUIPMENT CABINETS
- 7. REAR PLATFORM
- 8. BOOSTER HOSE REEL
- 9. MOUNTING BRACKETS



CURB SIDE

FIGURE 1-5. BODY

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

(5) *Firefighting System.* The firefighting system consists of a water tank, booster hose reel, pump, piping and controls for discharging, filling, draining, and flushing the firefighting system.

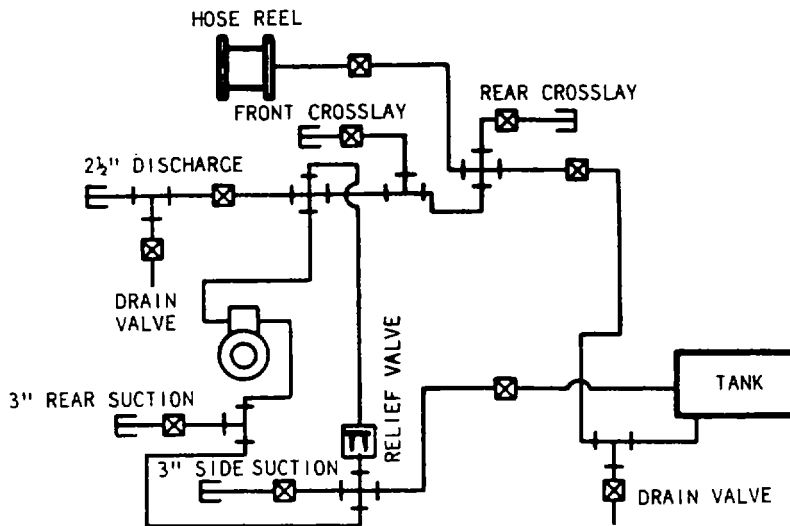


FIGURE 1-6. FIREFIGHTING SYSTEM

(6) *Fire Pump Compartment.* The pump compartment houses the fire pump and all valves, controls, and indicators necessary to operate the firefighting system.

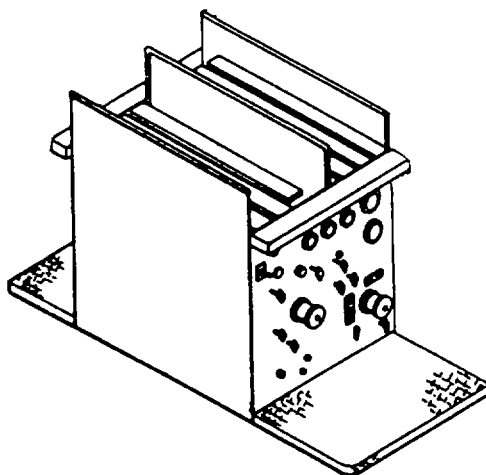


FIGURE 1-7. FIRE PUMP COMPARTMENT

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

(7) *Water Tank.* The water tank holds 250 gallons. Baffle partitions in the tank prevent surges on side sway while the truck is maneuvering with the tank filled or partially filled. The tank is provided with a top fill tube, gasket and a cover. The fill tube is designed so a 21 inch hose can be placed in the opening so the tank can be filled without the hose being held by the operator. The fill opening also includes a removable strainer to prevent foreign matter entering the tank during filling operations. The tank can also be filled by pressure through the 3 inch fire pump suction inlet.

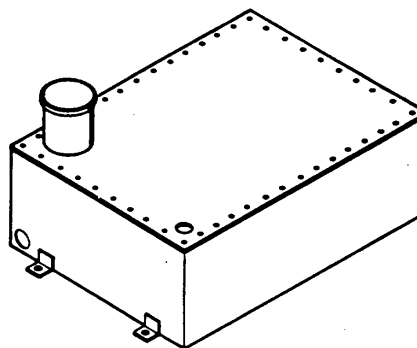


FIGURE 1-8. WATER TANK

(8) *Fire Pump.* The pump is a high-speed, bronze-fitted, single stage centrifugal type, with volute discharges. It can operate from either draft, hydrant or water tank. The pump is designed to operate at 250 GPM @ 150 PSI.

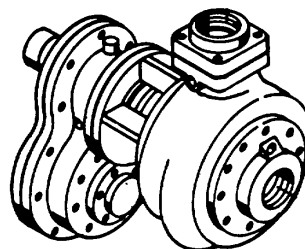


FIGURE 1-9. FIRE PUMP

(9) *Street Side Pump Panel.* The street side pump panel is located on the left side of the truck. Pump pressure and suction gauges are connected to the pump manifold. One 2 inch and two 1 1/2 inch discharge gauges are connected to the hose line side of each of the discharge valves and pre-connects. The gauges are flush mounted of the glycerin filled type, and operate in temperatures as low as -25°F. (13.8°C). The panel is illuminated for night operation.

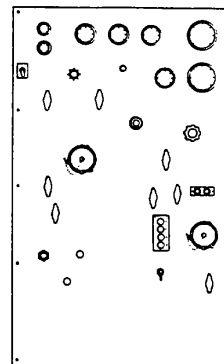


FIGURE 1-10. STREET SIDE PUMP PANEL

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

(10) *Booster Hose Reel.* One booster hose reel is mounted in the rear compartment of the truck. Three 50-foot lengths of one inch inside diameter hose are installed on the hose reel. A one inch combination adjustable fog spray and straight stream handline nozzle is provided with the booster hose. An electric motor rewinds the hose. A manual crank is provided in case of motor failure.

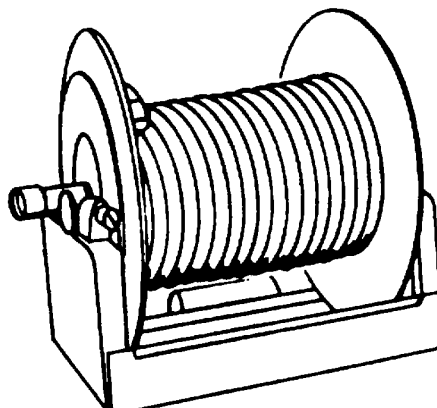


FIGURE 1-11. BOOSTER HOSE REEL

(11) *Engine.* The engine is a 4 cycle, 6.2 liter, 379 Cu. In. V-8 diesel, rated at 246 horsepower at 2,000 RPM. The engine is equipped with an oil cooler, full flow oil filter, fuel oil strainer, fuel oil filter, air cleaner, fan, emission control system, starting motor, and a dual exhaust system.

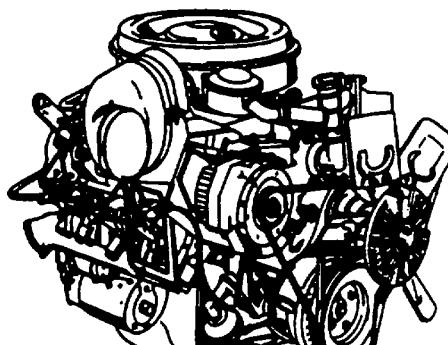


FIGURE 1-12. ENGINE

(12) *Transmission.* The transmission provides four forward speeds and one reverse, using a constant mesh first gear and synchronized second, third and fourth gears. Gear shifting is done with a transmission cover mounted shift lever. The transmission also provides a transfer case which is located behind the transmission and allows drive torque to be transmitted in a proportional split to both the front and rear axles, resulting in four wheel drive. The shift control lever for the transfer case is floor mounted in the cab.

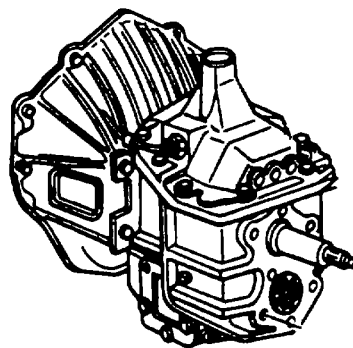
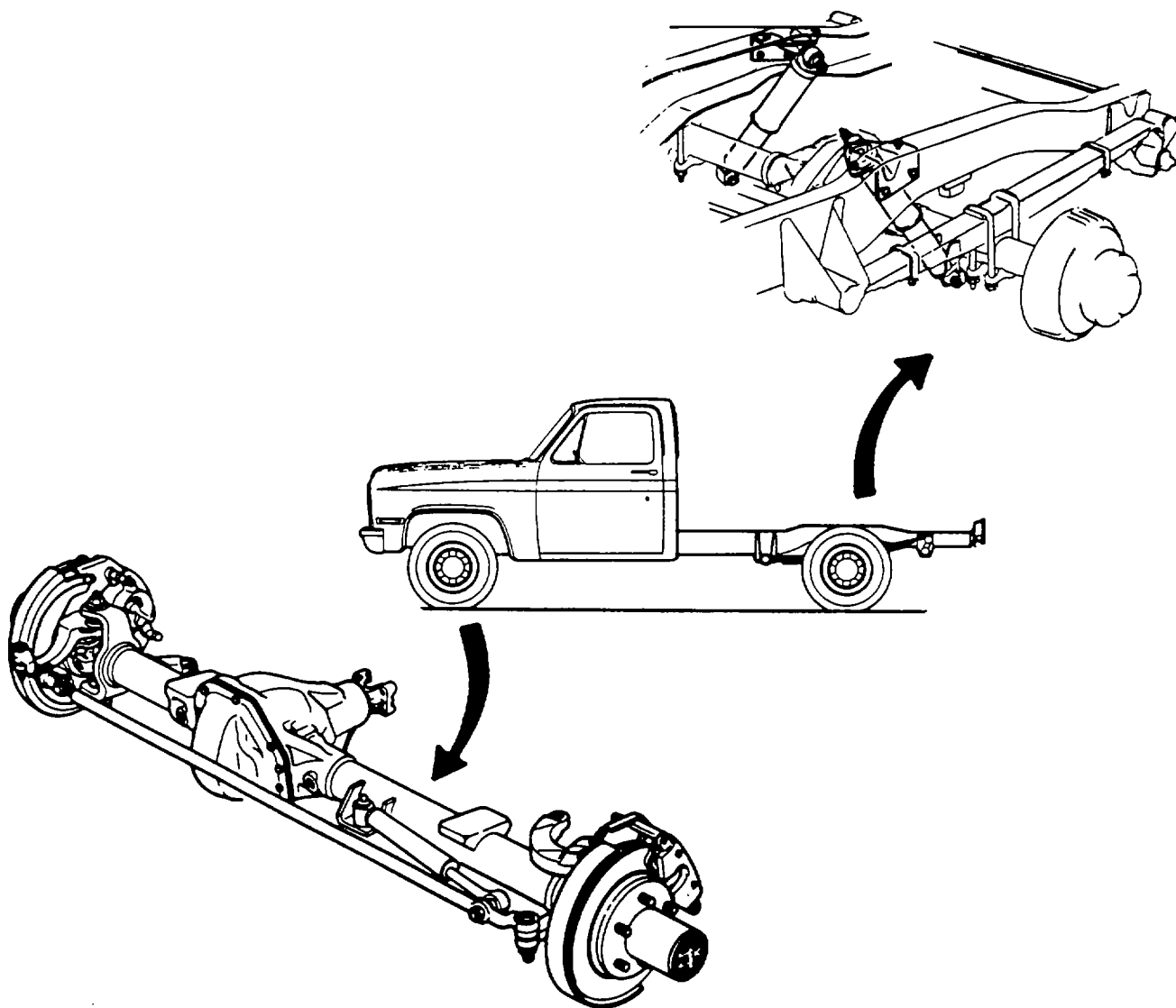


FIGURE 1-13. TRANSMISSION

1-9. -LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

- (13) *Front and Rear Axles.* The front axle is a hypoid gear axle equipped with steering knuckles and a manual locking hub, with double acting shock absorbers. The rear axle is a full floating type with a hypoid ring gear and drive pinion with a limited slip differential. Both axles have leaf springs with spring stops to cushion contact of the spring with the frame.

**FIGURE 1-14. FRONT AND REAR AXLES**

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Continued)

- (14) *Suspension.* The front and rear suspension are single axle type with leaf springs.

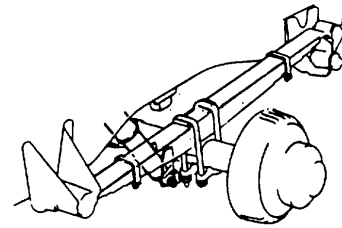


FIGURE 1-15. SUSPENSION

- (15) *Wheels and Tires.* Single wheels and tires are provided on the front, and dual wheels on the rear of the truck. Tires are tube type, steel belted radial with non-directional threads.

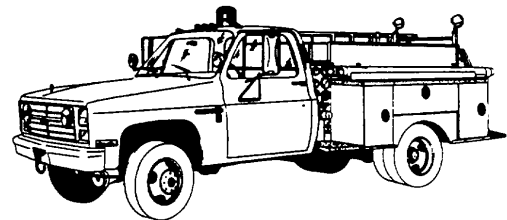


FIGURE 1-16. WHEELS AND TIRES

- (16) *Steering System.* The steering system is a powerassisted, hydraulic type, steering mechanism capable of steering the vehicle under normal or power-assist failure operations.

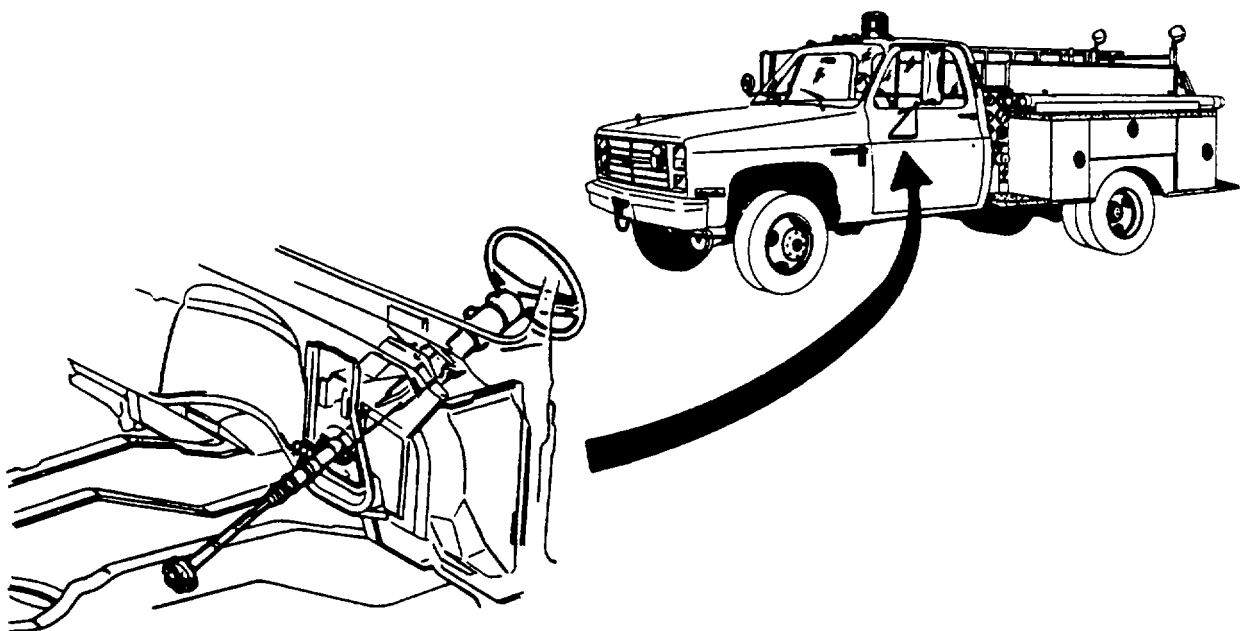


FIGURE 1-17. STEERING SYSTEM

(17) *Exhaust System.* The dual exhaust system includes mufflers, tail pipes and piping to remove exhaust gasses and other discharges from the vehicle.

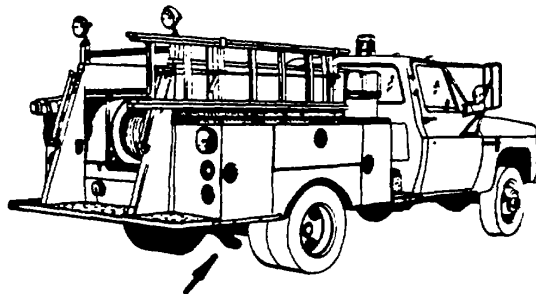
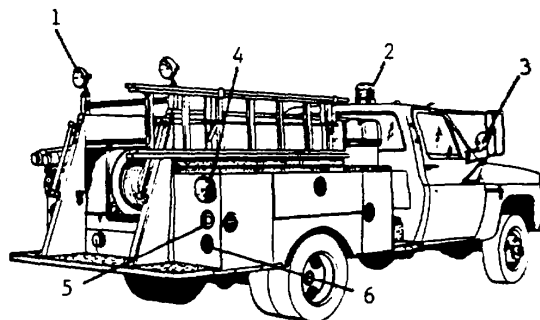


FIGURE 1-18. EXHAUST SYSTEM

(18) *Electrical System.* The truck is equipped with a complete 12 volt, negative ground, starting and lighting system. The alternator provided with the vehicle includes a rectifier and regulator capable of supplying 12 volt 140 ampere power.



- LEGEND
- 1. HOSE BED PICK-UP LIGHT
 - 2. ROOF BEACON LIGHT
 - 3. CAB SPOT LIGHT
 - 4. REAR WARNING LIGHT
 - 5. REAR BACK-UP LIGHT
 - 6. TAIL LIGHT

FIGURE 1-19. ELECTRICAL SYSTEM

1-10. EQUIPMENT DATA

a. *Information Plate.* The information plate is affixed to the forward inside wall of the cab. The plate gives information and identification concerning the 250 GPM Mini-Pumper Firefighting Truck. The information plate is shown on Figure 1-20.

U.S. ARMY					
MODEL		CONTR NO			
SER		CAPACITY			
REG NO		GVW	LB	LG	IN
FSN		DATE MFD		HGT	IN
ENG SER		SHIP WT	LB	W	IN
WARRANTY		MO OR		MI	URE
DATE SHIPPED		DATE INSP		SIP STAMP	
MFD BY					

FIGURE 1-20. INFORMATION PLATE

1-10. EQUIPMENT DATA. (Continued)

b. Tabulated Data.

GENERAL

Type Truck, Firefighting, Mini-Pumper, 250 GPM
 Federal Stock Number NSN 4210-01-026-2567
 Serial Number Range CN2767 thru CN2776 and 73-02871
 Manufacturer Kovatch Corporation
 Model CM-KFT-3
 Contract Number DAAK01-85-C-B220 and DAAK01-87-C-A039
 Truck Length 230 Inches (5.84 m)
 Truck Width 93 Inches (2.36 m)
 Truck Height 82 Inches (2.08 m)
 Capacity or Payload 10,990 Pounds (4985 kg) (Loaded)
 Shipping Weight 6,990 Pounds (3130 kg) (Empty)
 Ground Clearance 16 Inches (406.4 mm) to Hooks at Bumper

CAB

Manufacturer Chevrolet
 Model ZW9/B3J
 Capacity 3 Persons

CHASSIS

Manufacturer Chevrolet
 Model K30/3500
 Wheel Base 135.5 In. (344.17 CM)

ENGINE

Manufacturer Chevrolet
 Model 6.2L
 Fuel Diesel

TRANSMISSION

Manufacturer Chevrolet
 Model RPO-MM4
 Type 4-Speed

FIREFIGHTING WATER PUMP

Manufacturer W.S. Darley Company
 Model HM 250
 Capacity 250 @ 150 PSI

PRIMER PUMP

Manufacturer W.S. Darley Company
 Model VGEA1
 Type Electric

BOOSTER HOSE REEL

Manufacturer Kovatch Corporation
 Model FR-AA-8057
 Capacity 150 ft. (45.72 m) - One Inch Hose
 Rewind Electric
 Voltage 12 VDC

1-10. EQUIPMENT DATA. (Continued)

ELECTRICAL SYSTEM

Type 12 VDC

BEACON LIGHT

Manufacturer Federal Signal
 Model Series 14 012CSB-R
 Voltage 12 VDC

SPOTLIGHTS

Manufacturer Unity
 Model 225GM
 Voltage 12 VDC

HOSE PICK-UP LIGHTS

Manufacturer Unity
 Model AG-R-4413
 Voltage 12 VDC

RED WARNING LIGHTS, FRONT

Manufacturer Signal-Stat
 Model CE-600-1R
 Voltage 12 VDC

RED WARNING LIGHTS, REAR

Manufacturer Signal-Stat
 Model CE-600-1R
 Voltage 12 VDC

BATTERIES (CHASSIS)

Manufacturer Delco
 Model 105
 Ampere Hours 175 @ 20 Hr.
 Voltage 12
 Capacity Non-Serviceable

ELECTRONIC SIREN

Manufacturer Public Safety Equipment
 Model 3693
 Amplifier Power 200 Watts
 Voltage 12 VDC

CAPACITIES

Water Tank 250 Gallons (946.35 Liters)
 Fuel Tank 16 Gallons (61 Liters)
 Front Axle 3 Quarts (2.8 Liters)
 Cooling System 25 Quarts (23 Liters)
 Crankcase 7 Quarts (6.5 Liters)
 Pump Gear Case 1 Pint (0.473 Liters)
 Pump Priming Tank 6 Quarts (5.68 Liters)
 Transfer Case 2.5 Quarts (2.4 Liters)

**CHAPTER 2
OPERATING INSTRUCTIONS**

Section I.	DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS
Section II.	OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)
Section III.	OPERATION UNDER USUAL CONDITIONS
Section IV.	OPERATION UNDER UNUSUAL CONDITIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

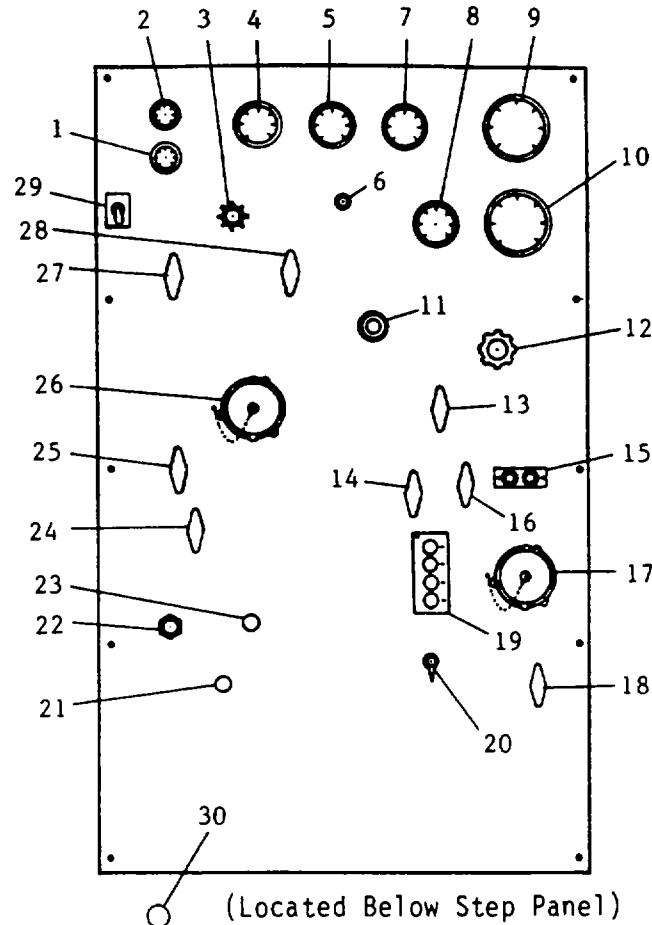
	Para.		Para.
Description and Use of Controls and Indicators	2-2	General	2-1

2-1. GENERAL.

This section describes, locates, and illustrates the controls and indicators for you. Enough information about the use of the various controls and indicators is given to help you get the best performance from the 250 GPM Mini-Pumper Firefighting Truck.

2-2. DESCRIPTION AND USE OF CONTROLS AND INDICATORS.

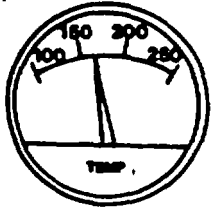
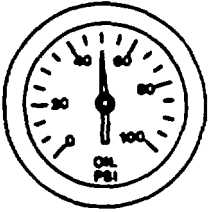

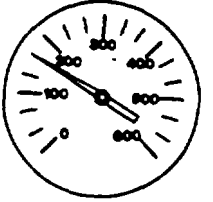
Tables and illustrations 2-1 through 2-4 illustrate and describe the functional use and show you the location of the controls and indicators on the 250 GPM Mini-Pumper Firefighting Truck. The controls and indicators will allow you to get the best performance from the vehicle if used properly. The "Key" number column in the tables tells you the number of the control or indicator you should look for in the illustration within a particular table.



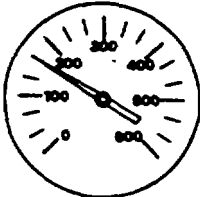

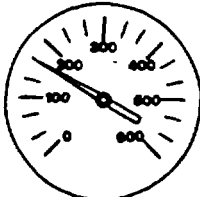
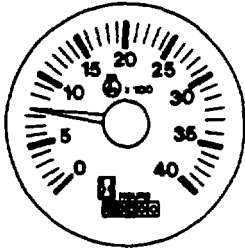
- | | |
|--|---|
| 1. Oil Temperature Gauge | 17. 3 Inch Suction Inlet |
| 2. Oil Pressure Gauge | 18. Rear 3 Inch Suction Inlet Control Handle |
| 3. Engine Throttle Control Knob | 19. Water Tank Level Gauge |
| 4. 2½ Inch Discharge Outlet Pressure Gauge | 20. Heat Exchanger Control Switch |
| 5. #1 Preconnect Discharge Outlet Pressure Gauge | 21. Water Tank Drain Knob |
| 6. Tachometer Calibration Port | 22. Primer Control Knob |
| 7. #2 Preconnect Discharge Outlet Pressure Gauge | 23. 2½ Inch Discharge Outlet Drain Knob |
| 8. Tachometer/Hourmeter | 24. Booster Hose Outlet Control Handle |
| 9. Master Pressure Gauge | 25. 2½ Inch Discharge Outlet Control Handle |
| 10. Compound Pressure Gauge | 26. 2½ Inch Discharge Outlet |
| 11. Relief Valve Control Flush Knob | 27. #1 Preconnect Discharge Outlet Control Handle |
| 12. Pressure Relief Control Knob | 28. #2 Preconnect Discharge Outlet Control Handle |
| 13. Tank-To-Pump Valve Control Handle | 29. Pump Panel Light Control Switch |
| 14. Tank Fill Control Handle | 30. Master Pump Drain Control Knob |
| 15. U.L. Vacuum and Pressure Test Panel | |
| 16. 3 Inch Suction Inlet Control Handle | |

FIGURE 2-1. STREET SIDE PUMP PANEL

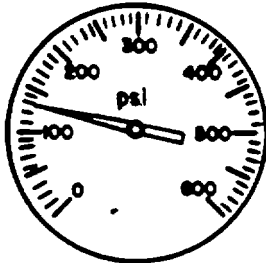
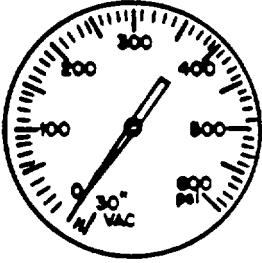

**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Fire fighting Truck
(Refer to Figure 2-1)**

Key	Control or Indicator	Function
1.	Oil Temperature Gauge.	The Oil Temperature Gauge indicates engine coolant temperature (100°F. to 250° F.) (55.5°C to 138.8°C).
		
2.	Oil Pressure Gauge.	The Oil Pressure Gauge indicates engine oil pressure (0 to 100 PSI).
		
3.	Engine Throttle Control Knob.	The Engine Throttle Control Knob regulates the engine speed from the operator's control panel. Turn counterclockwise to increase engine speed. Turn clockwise to decrease engine speed.
		
4.	2 1/2 Inch Discharge Outlet	The 21 Inch Discharge Outlet Gauge indicates water pressure (0 to 600 Pressure Gauge. PSI) at the 2 1/2 inch discharge outlet.
		

**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

<i>Key</i>	<i>Control or Indicator</i>	<i>Function</i>
5.	#1 Preconnect Discharge Outlet Pressure Gauge.	The #1 Preconnect Discharge Outlet Pressure Gauge indicates water pressure (0 to 600 PSI) at the #1 preconnect outlet. 
6.	Tachometer Calibration Port.	The Tachometer Calibration Port is used to test the accuracy of the engine tachometer. 
7.	#2 Preconnect Discharge Outlet Pressure Gauge.	The #2 Preconnect Discharge Outlet Pressure Gauge indicates water pressure (0 to 600 PSI) at the #2 preconnect outlet. 
8.	Tachometer/Hourmeter.	The Tachometer/Hourmeter is used to measure engine revolutions per minute in hundredths (0 to 40 RPM). It also records actual operating hours. 


**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

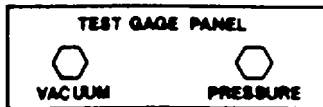
Key	Control or Indicator	Function
9.	Master Pressure Gauge.	The Master Pressure Gauge indicates the amount of pressure on the discharge side of the pump. (0 to 600 PSI).
		
10.	Compound Pressure Gauge.	The Compound Pressure Gauge indicates the amount of suction on the suction side of the pump (0 to 600 PSI).
		
11.	Relief Valve Control Flush Knob.	<p>The Relief Valve Control Flush Knob is used to flush sediment from the relief valve.</p> <p>Turn the knob left (counterclockwise) to flush. Turn the knob to the right (clockwise) to close.</p>
		

**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**




Key	Control or Indicator	Function
12.	Pressure Relief Control Knob.	<p>The Pressure Relief Control Knob is used to increase or decrease the desired pump operating pressure.</p> <p>The relief valve functions to prevent excessive build-up of pump pressure when a hose line is shut-off, by automatically bypassing the extra water from the discharge side to the suction side of the pump. The relief valve is capable of controlling pump pressure from 0 to 300 PSI.</p> <p>Turning the pressure relief control knob to the left (counterclockwise) decreases pump pressure. Turning it to the right (clockwise) increases pump pressure.</p> <div data-bbox="963 716 1159 911" data-label="Image"> </div>
13.	Tank-To-Pump Valve Control Handle.	<p>The Tank-To-Pump Valve Control Handle is used to allow water to flow from the water tank to the pump.</p> <p>To operate, pull the handle all the way out, allowing the water to flow from the tank.</p> <p>Push the handle in to close.</p> <div data-bbox="980 1220 1118 1344" data-label="Image"> </div>

**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

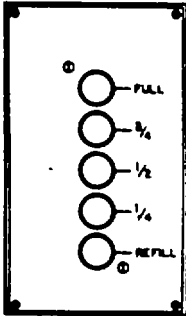


Key	Control or Indicator	Function
14.	Tank Fill Control Handle.	<p>The Tank Fill Control Handle is used to fill the water tank from a pump.</p> <p>To operate, pull the handle all the way out. This allows water to flow to the tank from the pump.</p> <p>Push the handle in to close.</p>
		
15.	U.L. Vacuum and Pressure Test Panel.	<p>The U.L. Test Panel contains vacuum and pressure test ports which are used to attach test gauges to check the accuracy of the vacuum and pressure master gauges.</p> <p>The vacuum test port contains a 1/4 inch plug. The plug is removed by turning to the left (counter-clockwise) using a 9/16-inch box-end wrench. The test gauge is attached to the port by turning to the right (clockwise).</p> <p>The pressure test port contains a 1/4 inch plug. The plug is removed by turning to the left (counter-clockwise) using a 9/16-inch box-end wrench. The test gauge is attached to the port by turning to the right (clockwise).</p>






**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mint-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

Key	Control or Indicator	Function
16.	3 Inch Suction Inlet Control Handle.	<p>The 3 Inch Suction Inlet Control Handle is used to operate the 3 inch suction inlet.</p> <p>To operate, pull out to open the valve.</p> <p>To discontinue operation, push in to close.</p> 
17.	3 Inch Suction Inlet.	<p>The 3 Inch Suction Inlet is used for connection of the 3 inch suction hose for firefighting operations.</p> <p>It is provided with a protective cap.</p> <p>To remove the cap, turn it to the left (counterclockwise).</p> <p>To attach the hose, turn it to the right (clockwise).</p> <p>To disconnect the hose, turn it to the left (counterclockwise).</p> <p>To install the suction inlet cap, turn it to the right (clockwise).</p> 
18.	Rear 3 Inch Suction Inlet Control Handle.	<p>The Rear 3 Inch Suction Inlet Control Handle operates the 3 inch rear suction valve.</p> <p>Pull the handle to begin operations.</p> <p>Push to close.</p> 


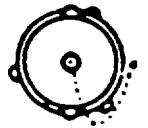


**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

Key	Control or Indicator	Function
19.	Water Tank Level Gauge.	<p>The Water Tank Level Gauge is used to measure the amount of water in the water tank.</p> <p>The gauge measures in increment readings of FULL, 3/4, 1/2, 1/4, and REFILL.</p> <p>The level is indicated by reading the level next to the highest illuminated light.</p> 
20.	Heat Exchanger Control Switch.	<p>The Heat Exchanger Control Switch operates the heat exchanger valve which supplies coolant water from fire pump to engine and transmission.</p> <p>To operate, turn switch lever to the left (counterclockwise).</p> <p>Turn the switch to the right (clockwise) to close.</p> 
21.	Water Tank Drain Knob.	<p>The Water Tank Drain Knob is used to drain the 250 gallon water tank. Pull the knob all the way out to drain the water tank. Push the knob in to close the drain.</p> 



**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

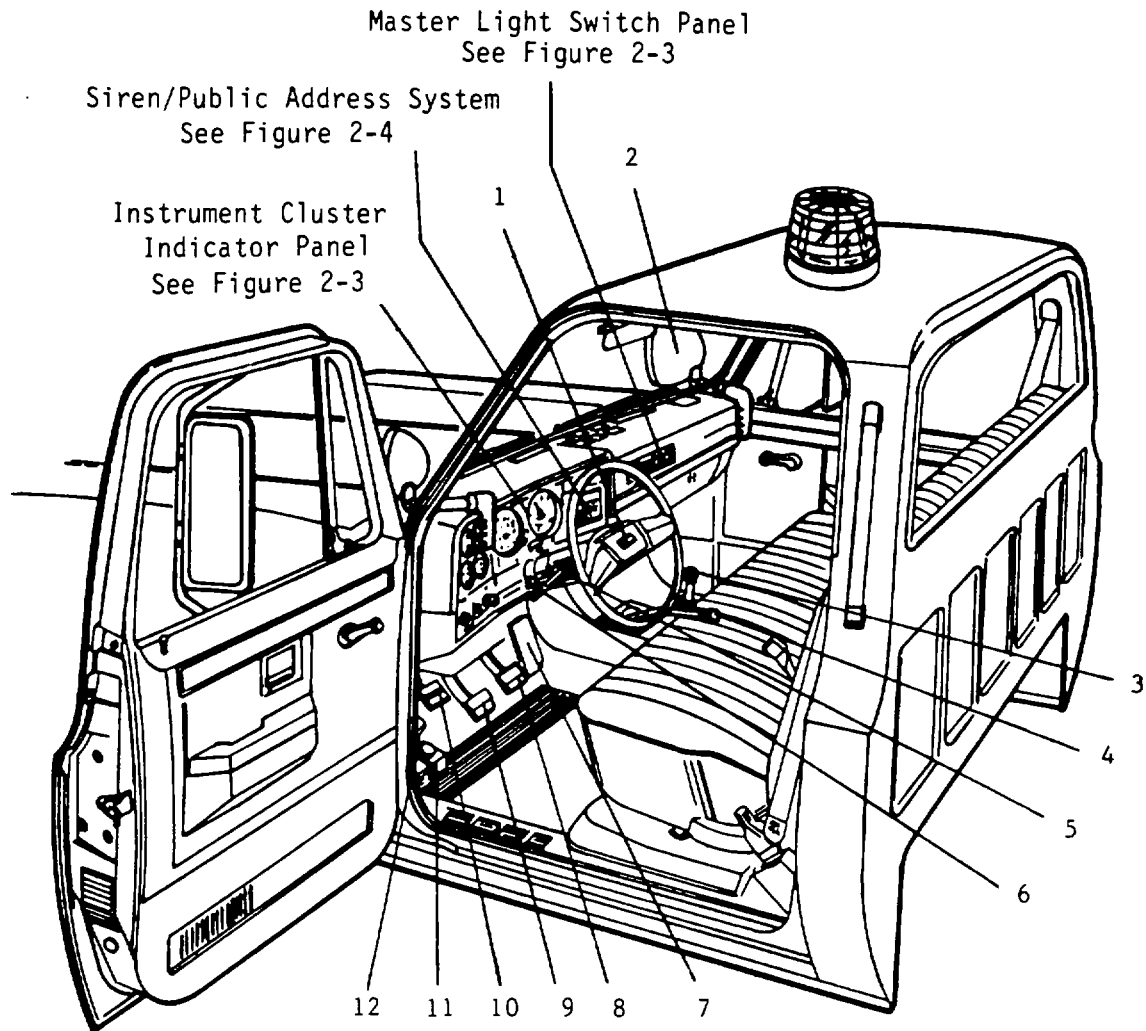
Key	Control or Indicator	Function
22.	Primer Control Knob.	<p>The Primer Control Knob is used to electrically activate the automatic primer control valve and primer pump which allows air to be drawn from the pump and replaced with water.</p> <p>Increase engine speed, pull out primer control knob and hold out until pressure on master pump pressure gauge appears. After pressure is achieved, release knob and increase engine RPM to desired operating pressure.</p> 
23.	2 1/2 Inch Discharge Outlet Drain Knob.	<p>The 2 1/2 Inch Discharge Outlet is used to drain the 21 inch discharge outlet. To operate, pull the knob all the way out to drain the outlet. Push the knob in to close the drain.</p> 
24.	Booster Hose Outlet Control Handle.	<p>The Booster Hose Outlet Control Handle controls the flow of water from the pump to the rear hose reel.</p> <p>To operate the valve, pull the handle to open the valve. This allows water to flow to the hose reel.</p> <p>To stop the flow of water to the hose reel, push the handle all the way in to close the valve.</p> 

**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

Key	Control or Indicator	Function
25	2 1/2 Inch Discharge Outlet Control Handle.	<p>The 2 1/2 Inch Discharge Outlet Control Handle controls the water to the 2 1/2 inch discharge outlet.</p> <p>Pull the handle to begin operations. Push the handle in to close.</p> 
26.	2 1/2 Inch Discharge Outlet.	<p>The 2 1/2 Inch Discharge Outlet is used for primary or secondary fire fighting operations.</p> 
27.	#1 Preconnect Discharge Outlet Control Handle.	<p>The #1 Preconnect Discharge Outlet Control Handle controls the flow of water to the #1 preconnected hose.</p> <p>Pulling the handle all the way out provides water to the hose.</p> <p>Pushing the handle in shuts off the water to the hose.</p> 
28.	#2 Preconnect Discharge Outlet Control Handle.	<p>The #2 Preconnect Discharge Outlet Control Handle controls the flow of water to the #2 preconnected hose.</p> <p>Pulling the handle all the way out provides water to the hose.</p> <p>Pushing the handle in shuts off the water to the hose.</p> 

**Table 2-1. Street Side Operator's Controls and Indicators
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-1)**

Key	Control or Indicator	Function
29.	Pump Panel Light Control Switch.	<p>The Pump Panel Light Control Switch is used to activate the pump panel light for night operations.</p> <p>Push up to illuminate.</p> <p>Push down to turn off.</p> 
30.	Master Pump Drain Control Knob.	<p>The Master Pump Drain Control Knob is used to drain the entire pumping system. This control knob does not drain the tank.</p> <p>Pulling the handle out begins operation.</p> <p>Pushing the handle stops the operation.</p> 



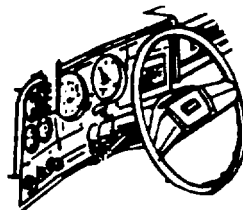
- | | |
|---|----------------------------------|
| 1. Horn | 7. Accelerator Pedal |
| 2. Spotlight Switch | 8. Brake Pedal |
| 3. 4-Wheel Drive Selector | 9. Clutch Pedal |
| 4. Transmission Gear Selector | 10. Parking Brake Pedal |
| 5. Hazard Warning Flasher Switch | 11. Mechanical Siren Foot Switch |
| 6. Combination Turn Signal/
Washer/Wiper Lever | 12. Hood Release Lever |

FIGURE 2-2. CAB CONTROLS AND INSTRUMENTS

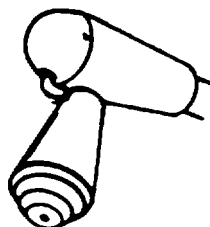
**Table 2-2. Cab Controls and Instruments
250 GPM Mini-Pumper Firefighting Truck
(Refer to Figure 2-2)**

Key	Control or Indicator	Function
-----	----------------------	----------

- | | | |
|----|-------|--|
| 1. | Horn. | The Horn is used as an auxiliary warning system. To actuate the horn, press firmly on the pad in the center of the steering wheel. |
|----|-------|--|

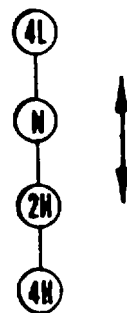


- | | | |
|----|--|---|
| 2. | Spotlight Switch
(Located in Handle). | The Spotlight Switch activates the spotlight assembly to assist in firefighting operations. |
|----|--|---|



- | | | |
|----|-------------------------|--|
| 3. | 4-Wheel Drive Selector. | The 4-Wheel Drive Selector operates the transfer case when the terrain or driving surface becomes difficult to travel. |
|----|-------------------------|--|

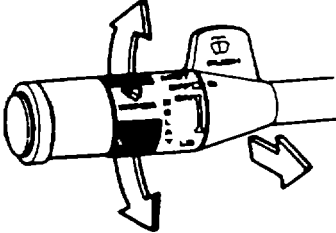


The 4-wheel drive shift lever positions are located on the selector knob.






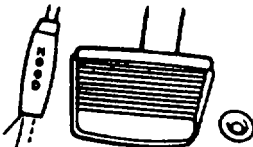
**Table 2-2. Cab Controls and Instruments
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-2)**

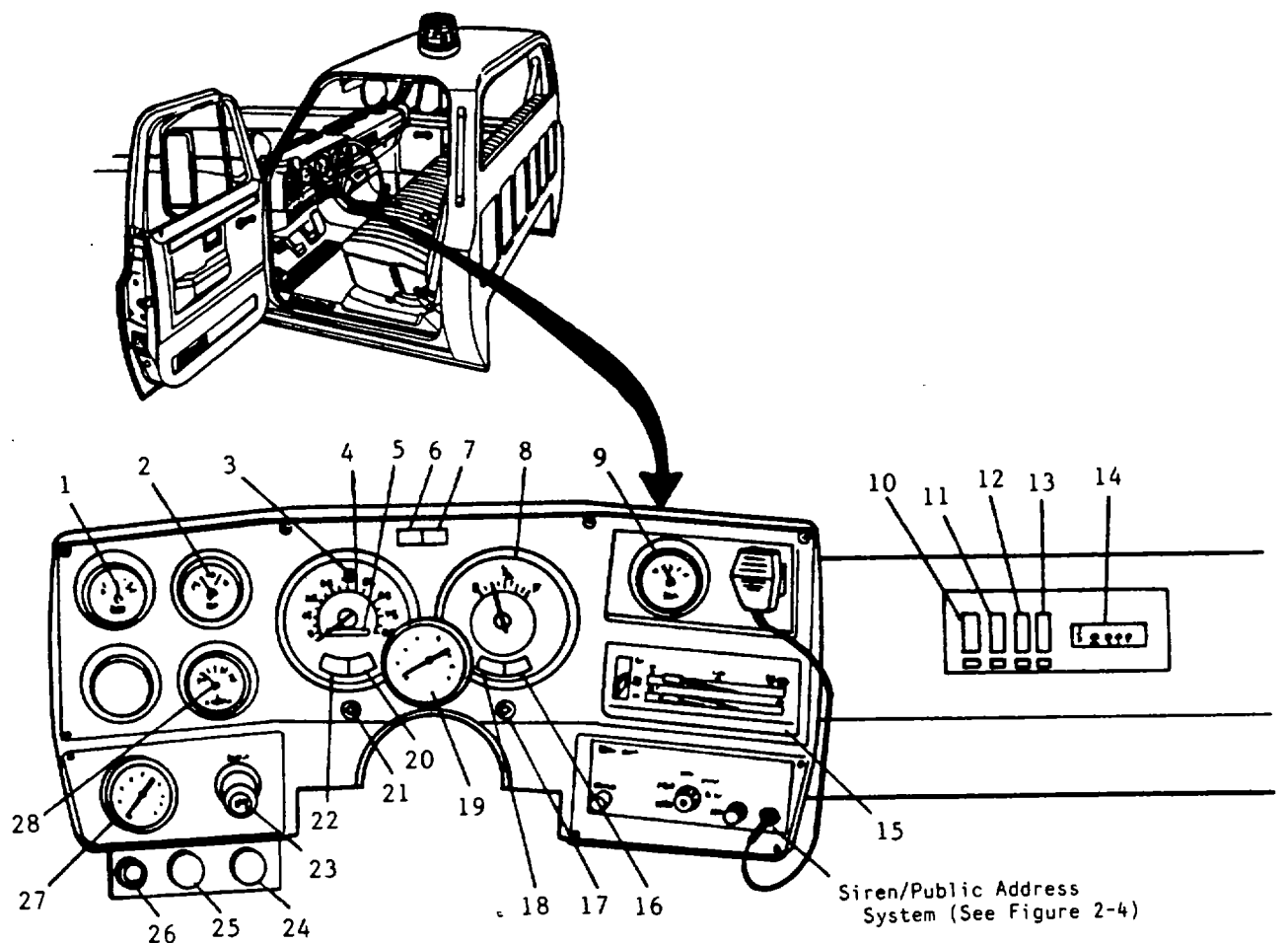
Key	Control or Indicator	Function
4.	Transmission Gear Selector.	<p>The Transmission Gear Selector is used to shift the transmission gears to the desired position.</p> <p>The transmission gear selector is located on the transmission cover mound at the center of the cab floor.</p> <div data-bbox="1036 611 1187 764" data-label="Diagram"> </div>
5.	Hazard Warning Flasher Switch.	<p>The Hazard Warning Flasher Switch is located on the right hand side of the steering column and is used to warn other drivers any time your vehicle becomes a traffic hazard.</p> <p>To activate the system, push in the button (inside the collar) on the steering column.</p> <p>To turn off the flasher, pull the button collar out.</p> <div data-bbox="992 1037 1235 1213" data-label="Diagram"> </div>
6.	Combination Turn Signal/Washer/Wiper Lever	<p>The Combination Turn Signal/Washer/Wiper Lever is located on the left side of the steering column. It also controls the headlight low and high beams.</p> <p>To activate the turn signal, move the lever up for a right turn and down for a left turn. A green light on the instrument panel will indicate that the signal lights are working.</p>

**Table 2-2. Cab Controls and Instruments
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-2)**

Key	Control or Indicator	Function
6.	Combination Turn Signal/	<p>To activate the high beams, pull Washer/Wiper Lever the lever toward you until you hear (Continued). a click, then release the lever.</p> <p>To turn off the high beams, repeat the procedure.</p> <p>To activate the windshield wipers/ washer, turn the band away from you to the first stop. For high speed operation, turn the band to the next stop. Turn the band back to "OFF" to turn off the wipers.</p>
		
7.	Accelerator Pedal.	<p>The Accelerator Pedal increases) engine RPM by depressing the pedal with the right foot.</p>
		
8.	Brake Pedal.	<p>The Brake Pedal slows the vehicle by the hydraulic brakes.</p> <p>To operate, depress brake pedal with right foot.</p>
		
9.	Clutch Pedal.	<p>The Clutch Pedal engages or disengages the clutch, thereby connecting or disconnecting the engine from the transmission.</p>

**Table 2-2. Cab Controls and Instruments
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-2)**

Key	Control or Indicator	Function
9.	Clutch Pedal (Continued).	<p>To shift the transmission into the desired gear, depress clutch pedal, shift and release pedal.</p> 
10.	Parking Brake Pedal.	<p>The Parking Brake Pedal activates the parking brake cable assembly to hold the vehicle in a stationary position.</p> <p>To activate the parking brake system, depress pedal until it stops.</p> <p>To release the parking brake, pull brake release handle (at the lower left side of the instrument panel).</p> 
11.	Mechanical Siren Foot Switch	<p>The Mechanical Siren Foot Switch. activates the mechanical siren mode of the electronic siren.</p> <p>To activate, depress siren foot switch.</p> 
12.	Hood Release Lever.	<p>The hood release lever releases the hood latch assembly allowing entry to the engine compartment.</p> 





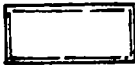
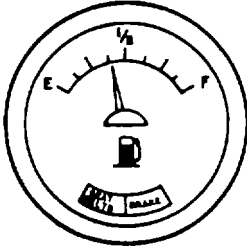
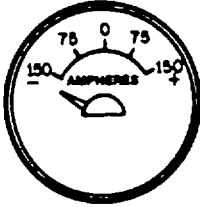
- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Voltmeter 2. Engine Oil Pressure Gauge 3. Headlight High Beam Indicator Light 4. Speedometer 5. Odometer 6. Diesel Glow Plug Indicator Light 7. Water in Fuel Indicator Light 8. Fuel Gauge 9. Ammeter 10. Engine Compartment Lights Control Switch 11. Cab Beacon Control Switch 12. Front Flashers Control Switch 13. Rear Flashers Control Switch 14. Water Tank Level Gauge 15. Heater/Defroster Controls | <ul style="list-style-type: none"> 16. Brake Warning Indicator Light 17. Right Turn Signal Indicator Light 18. Fasten Seat Belt Indicator Light 19. Tachometer/Hourmeter 20. Low Coolant Warning Indicator Light 21. Left Turn Signal Indicator Light 22. 4-Wheel Drive Indicator Light 23. Headlight Control Switch 24. Micro-Lock Brake Control Knob 25. Pump/PTO Control Knob 26. Pump/PTO Engaged Indicator Light 27. Pump Pressure Gauge 28. Engine Coolant Temperature Gauge |
|--|---|

FIGURE 2-3. INSTRUMENT PANEL AND CONTROLS



**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck
(Refer to Figure 2-3)**

Key	Control or Indicator	Function
1.	Voltmeter.	The Voltmeter indicates the charging system voltage. During minimum electrical load, the pointer will read to the right of center.
2.	Engine Oil Pressure Gauge.	The Engine Oil Pressure Gauge indicates the pressure at which oil is being delivered to the various parts of the engine requiring lubrication.
3.	Headlight High Beam Indicator Light.	The Headlight High Beam Indicator Light will be activated whenever the high beams or "brights" are in use.
4.	Speedometer.	The Speedometer indicates vehicle speed in miles per hour and kilometers per hour.

**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)**

Key	Control or Indicator	Function
5.	Odometer.	The Odometer indicates the accumulated mileage in miles or kilometers.
		
6.	Diesel Glow Plug Indicator Light	The Diesel Glow Plug Indicator. Light indicates that the engine is ready to be started.
		
7.	Water in Fuel Indicator Light	The Water in Fuel Indicator Light activates when there is excessive water in the diesel fuel system.
		
8.	Fuel Gauge.	The Fuel Gauge registers the approximate fuel level in the fuel tank, when the ignition is in the run position.
		
9.	Ammeter.	The Ammeter indicates the rate of charge of electric current supplied by the alternator to the battery.
		

**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)**

Key	Control or Indicator	Function
10.	Engine Compartment Lights Control Switch.	<p>The Engine Compartment Lights Control Switch activates the engine compartment maintenance lights during night time operations.</p> <p>The switch is a rocker-type ON/OFF switch with a built-in light.</p> <p>To activate the engine compartment lights, push the top portion of the switch.</p> <p>To turn off the engine compartment lights, push the bottom portion of the switch.</p> 
11.	Cab Beacon Control Switch.	<p>The Cab Beacon Control Switch activates the cab beacon warning light during firefighting operations.</p> <p>The switch is a rocker-type ON/OFF switch with a built-in light.</p> <p>To activate the cab beacon warning light, push the top portion of the switch.</p> <p>To turn off the cab beacon warning light, push the bottom portion of the switch.</p> 

**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)**

Key	Control or Indicator	Function
12.	Front Flashers Control Switch	<p>The Front Flashers Control Switch. activates the front flashing warning lights during firefighting operations.</p> <p>The switch is a rocker-type ON/OFF switch with a built-in light.</p> <p>To activate the front flashing warning lights, push the top portion of the switch.</p> <p>To turn off the front flashing warning lights, push the bottom portion of the switch.</p>

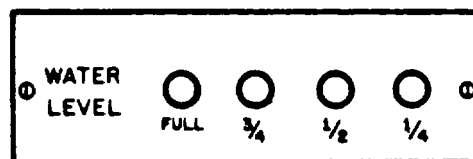


13.	Rear Flashers Control Switch	<p>The Rear Flashers Control Switch. activates the rear flashing warning lights during firefighting operations.</p> <p>The switch is a rocker-type ON/OFF switch with a built-in light.</p> <p>To activate the rear flashing warning lights, push the top portion of the switch.</p> <p>To turn off the rear flashing warning lights, push the bottom portion of the switch.</p>
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**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)**

Key	Control or Indicator	Function
14.	Water Tank Level Gauge.	<p>The Water Tank Level Gauge measures the amount of water in the water tank when the vehicle is operating in the pump and roll mode.</p> <p>The gauge measures in increment readings of FULL, 3/4, 1/2, and 1/4.</p> <p>The level is indicated by reading the level next to the highest illuminated light.</p>



15. Heater/Defroster Controls

The Heater/Defroster Controls regulate the heater and defroster systems when used in cooler climates.

FAN LEVER This lever ("OFF-HI") controls the fan speed in all air selector lever positions.

TEMPERATURE CONTROL LEVER This lever regulates the temperature of the air entering the vehicle. The far right position ("HOT") provides the maximum heated air, and the far left position ("COLD") provides minimum heated air.

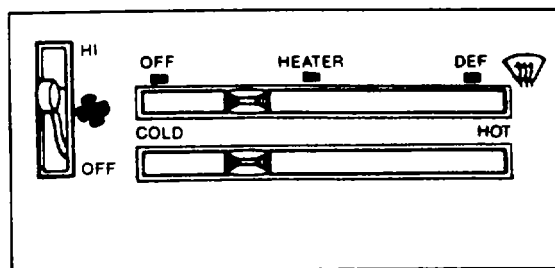


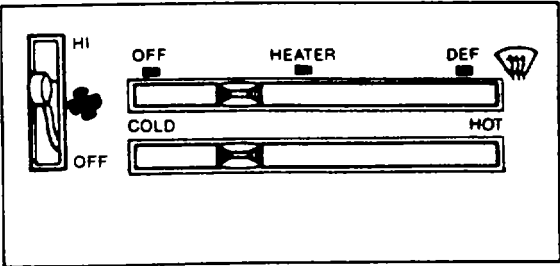
Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)

Key	Control or Indicator	Function
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Heater/Defroster
Controls. (Continued)

AIR SELECTOR LEVER This lever activates the heater or defroster systems:

- "OFF" The system is off.
- "HEATER" In this position, most of the air is delivered through the heater outlet with some air flow to the windshield (defroster) outlets.
- "DEF" (Defrost) In this position, most of the air is delivered to the windshield with a small amount to the floor outlets.



16. Brake Warning Indicator Light.

The Brake Warning Indicator Light activates when there is a loss of hydraulic pressure in the brake system.


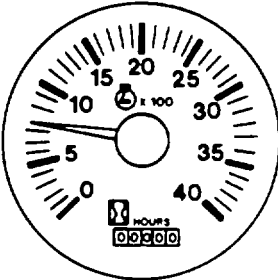




17. Right Turn Signal Indicator Light.



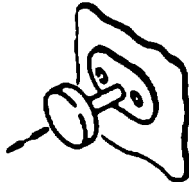
The Right Turn Signal Indicator Light activates when the combination turn signal/washer/wiper lever is moved up to the second stop indicating a right hand turn.



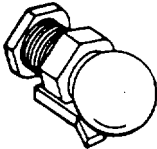
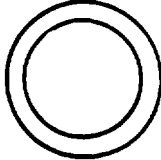
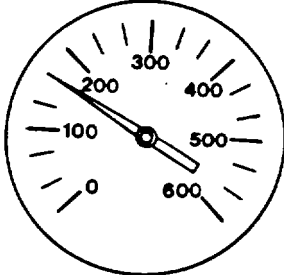
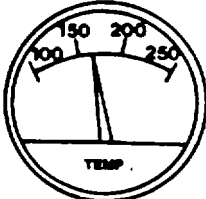
**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)**

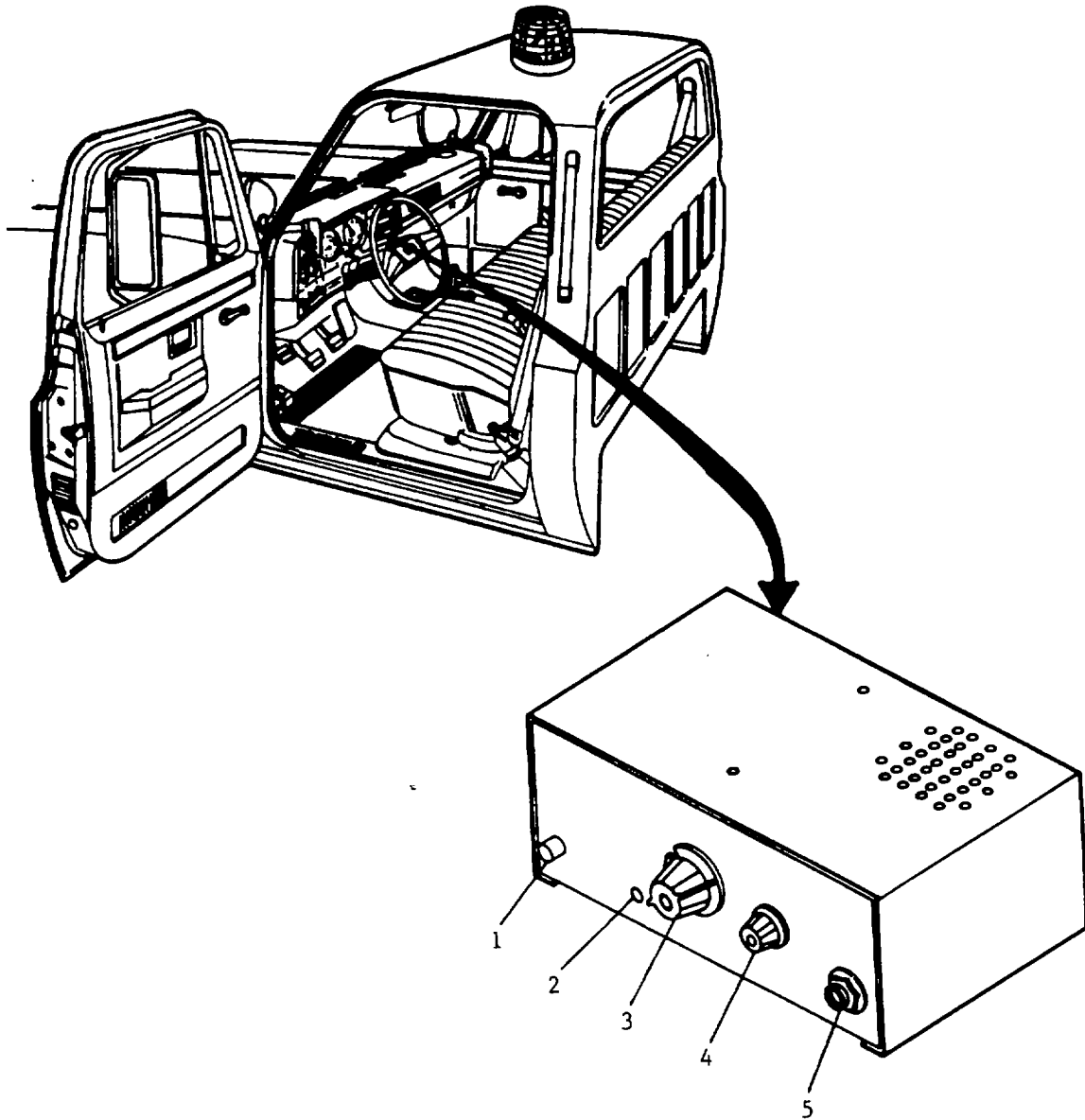
Key	Control or Indicator	Function
18.	Fasten Seat Belts Indicator	The Fasten Seat Belts Indicator Light. Light will activate when the key is turned to the start position. The light will come on for four to eight seconds to remind personnel to fasten their seat belts. Unless the driver's seat belt is buckled, a buzzer will sound at the same time.
		
19.	Tachometer/Hourmeter.	The Tachometer/Hourmeter is used to measure engine revolutions per minute in hundredths (0 to 40 RPM). It also records actual operating hours.
		
20.	Low Coolant Warning Indicator	The Low Coolant Warning Indicator Light. Light is designed to activate during engine starting to serve as a bulb check. Once the engine starts, however, the light should go out. If the light does not go out, or if it comes on while driving, have the radiator coolant level checked.
		
21.	Left Turn Signal Indicator Light.	The Left Turn Signal Indicator Light activates when the combination turn signal/washer/wiper lever is moved down to the second stop indicating a left hand turn.
		

**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)**

Key	Control or Indicator	Function
22.	4-Wheel Drive Indicator Light.	<p>The 4-Wheel Drive Indicator Light informs the operator when the vehicle is in (4L) or (4H) position. The indicator light will remain on until the transfer case is placed in either Neutral (N) or (2H).</p> 
23.	Headlight Control Switch.	<p>The Headlight Control Switch is a three position light switch which controls the headlights, tail lights, parking lights, side marker lights, instrument dash lights and dome light. Instrument light intensity can be varied by turning knob clockwise or counterclockwise. Full counterclockwise position activates the interior light.</p> 
24.	Micro-Lock Brake Control Knob	<p>The Micro-Lock Brake Control Knob. activates the Hydro Boost Brake System when operating the vehicle in a stationary firefighting mode.</p> <p>The control knob is a push/pull type. Pull out knob to engage the brake system.</p> <p>Push in the knob to disengage the brake system.</p> 

**Table 2-3. Instrument Panel and Controls
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-3)**

Key	Control or Indicator	Function
25.	Pump/PTO Control Knob.	<p>The Pump/PTO Control Knob engages the pump/PTO during firefighting operations.</p> <p>Pull out the knob to engage the pump/PTO.</p> <p>Push in the knob to disengage the pump/PTO.</p>
		
26.	Pump/PTO Engaged Indicator Light	<p>The Pump/PTO Engaged Indicator Light. activates when the pump/PTO is engaged.</p>
		
27.	Pump Pressure Gauge.	<p>The Pump Pressure Gauge indicates the amount of pump discharge pressure (0 to 600 PSI).</p>
		
28.	Engine Coolant Temperature Gauge	<p>The Engine Coolant Temperature Gauge. indicates engine coolant temperature.</p>
		

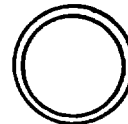


1. Manual Pushbutton
2. Red Pilot LED
3. Selector Switch
4. ON/OFF - PA Volume Control
5. Microphone Jack

FIGURE 2-4. ELECTRONIC SIREN CONTROLS

**Table 2-2. Electronics Siren Controls
250 GPM Mini-Pumper Firefighting Truck
(Refer to Figure 2-4)**

<i>Key</i>	<i>Control or Indicator</i>	<i>Function</i>
1.	Manual Pushbutton.	<p>The Siren/Public Address System provides three siren signals with manual or automatic operation and PA system and amplifier to direct personnel outside of the cab.</p> <p>The Manual Pushbutton operates the electronic siren in the manual operation mode. The push button has no effect when the selector switch is in RADIO.</p> <p>It produces the WAIL tone when the selector switch is in STANDBY.</p> <p>It produces the YELP tone when the selector switch is in WAIL.</p> <p>It has no effect when the selector switch is in YELP.</p> <p>It produces the YELP tone when the selector switch is in HI-LO.</p> <p>A mechanical siren foot switch can also be used for the above modes when the vehicle is in motion.</p>
2.	Red Pilot LED.	<p>The Red Pilot LED indicator illuminates when the selector switch is in the PA position and the microphone is being used.</p>



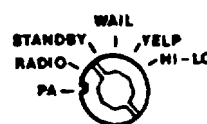
**Table 2-2. Cab Controls and Instruments
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-2)**

Key	Control or Indicator	Function
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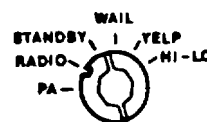
3. Selector Switch.

The Selector Switch is a six-position rotary switch used to select the mode of operation. The following are the positions on the Selector Switch.

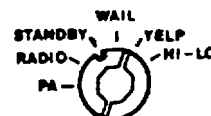
PA - Allows operation of the public address system through the common microphone. When the switch is in this position, the red pilot LED is illuminated.



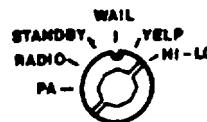
RADIO - In this position, incoming radio messages are amplified by the siren and rebroadcast over the external speaker. Siren tones (WAIL, YELP, HI-LO) do not operate in this position.



STANDBY In this position, it is possible to operate the siren by activating the manual pushbutton or mechanical siren foot switch. A WAIL tone will be produced using either the manual pushbutton or mechanical foot switch.



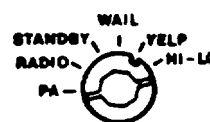
WAIL In this position, the siren produces a continuous WAILING sound up and down in frequency. Depressing the manual pushbutton will produce the YELP tone.



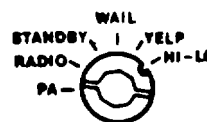
**Table 2-2. Cab Controls and Instruments
250 GPM Mini-Pumper Firefighting Truck (Continued)
(Refer to Figure 2-2)**

Key	Control or Indicator	Function
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YELP In this position, a continuous rapid "warbled" tone is generated. Depressing the manual pushbutton will have no effect.



HI-LO In this position, a two-tone sound will be heard. Depressing the manual pushbutton will produce the YELP tone.



4. ON/OFF PA Volume Control.

The ON/OFF PA Volume Control is used to turn the siren on and off.

It is also used to control the volume when the siren is used for public address or radio amplification.

Clockwise rotation of the knob increases voice volume in the public address or radio amplification mode.

The volume control does not control the volume of the siren signals.



5. Microphone Jack.

The Microphone Jack is designed for common microphone use.



**Section II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES
(PMCS)-**

	Para.		Para.
General.....	2-3	Operator's PMCS Procedure.....	2-4

2-3. GENERAL.

- a. The necessary preventive maintenance checks and services (PMCS) that are to be performed by the operator are listed and described in Table 2-5.
Intervals are nominal periods based on normal operating conditions. Intervals should be adjusted accordingly for extremes of temperature or other adverse operating conditions. Strict adherence to the specified schedule based on the vehicle's operating conditions will result in the elimination of many hours of vehicle downtime by calling attention to defective components before their condition results in a failure.
The critical nature of the service for which this vehicle is intended, demands that the vehicle be maintained in a fully serviceable condition at all times.
- b. Do your Daily (D) PREVENTIVE MAINTENANCE every day. Pay attention to the WARNINGS and CAUTIONS.

Perform Weekly as well as Daily PREVENTIVE MAINTENANCE if:
 - (1) You are the assigned operator and have not operated the item since the last weekly.
 - (2) You are operating the item for the first time.
- c. Do your After (A) PREVENTIVE MAINTENANCE immediately after operation.
Pay attention to the WARNINGS and CAUTIONS.
- d. Do your Weekly (W) PREVENTIVE MAINTENANCE once a week. Pay attention to the WARNINGS and CAUTIONS.
- e. Do your Monthly (M) PREVENTIVE MAINTENANCE once a month. Pay attention to the WARNINGS and CAUTIONS.
- f. If something doesn't work, troubleshoot it with the instructions in this manual and notify your supervisor.
- g. Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.
- h. If anything looks wrong and you can't fix it, write it on the DA Form 2404. If you find something seriously wrong, report it to organizational maintenance RIGHT NOW.
- i. If your equipment fails to operate, troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-750.

- j.* When you do your PREVENTIVE MAINTENANCE, always take along the tools you'll need to make all the checks. You'll always need a rag or two.

WARNING

Cleaning solvent, Federal Specification P-D-680, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

- k.* Keep it clean: Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use cleaning solvent (Appendix D, item 44) on all metal surfaces. Use soap and water when you clean cloth, rubber or plastic material.
- l.* Bolts, nuts, and screws: Check them all for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around the bolt and nut heads. If you find one you think is loose, tighten it or report it to organizational maintenance if you can't tighten it.
- m.* Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to organizational maintenance.
- n.* Electric wires and connectors: Look for cracked or broken insulators, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.
- o.* Leakage: Leakage definitions for operator/crew PMCS shall be classified as follows:
 - Class I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
 - Class II Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
 - Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.

CAUTION

When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS.

Class III leaks should be reported to your supervisor or organizational maintenance.

2-4. OPERATOR PMCS PROCEDURES.

- a. *Purpose.* Your Preventive Maintenance Checks and Services table lists the inspections and care of your equipment required to keep it in good operating condition.
- b. *Interval Column.* The interval column tells you when to perform a certain check or service.
- c. *Item To Be Inspected.* The item to be inspected column lists the components or assemblies of the vehicle to be inspected.
- d. *Procedure Column.* The procedure column for your PMCS table tells you how to do the required checks and services. Carefully follow these instructions. If you do not have the tools, or if the procedure tells you to, have organizational maintenance do the work.
- e. *Reporting or Correcting Deficiencies.* If your equipment does not perform as required, refer to Chapter 3 under Troubleshooting for possible problems. Report any malfunctions or failures on the proper DA Form 2404, or refer to DA PAM 738-750.
- f. *Equipment Is Not Ready/Available If:* This column tells you when and why your equipment cannot be used.

NOTE

The terms Ready/Available and Mission Capable refer to the same status: Equipment is on hand and is able to perform its combat missions (See DA PAM 738-750).

Table 2-5 Operator Preventive Maintenance Checks and Services

ITEM NO.	D - Daily				W - Weekly	A - After	M - Monthly	EQUIPMENT IS NOT READY/ AVAILABLE IF
	INTERVAL							
	D	A	W	M				
1	●	●			Hard Suction Hoses	<p>ACCESSORIES</p> <p>Check male and female ends for thread damage. Check hose for cuts or tears. Visually inspect hose per Federal Standard 162A, "Visual Inspection for Rubber Hoses." Check seals for physical damage. Visually inspect female threads for damage. Inspect screen for blockage, cracks, or distortion. Visually inspect ladder, pawls, latch, and mounting feet for damage. Check the rope for tears or fraying. Visually inspect tire jack, lug wrench and hand-crank for damage.</p>		
2	●	●			Strainer			
3	●	●			12 Foot Extension Ladder			
4				●	Tire Jack, Lug Wrench and Hand Crank			
5	●	●			Hose Reel Assembly	<p>HOSE REEL ASSEMBLY</p> <p>Inspect hose reel assembly for proper operation and structural damage. Inspect all fittings for freedom of movement. Inspect hose and hose nozzle for cracks, corrosion, or other damage.</p>		
6	●	●			Hose Bed	<p>PUMP COMPARTMENT ASSEMBLY</p> <p>Visually inspect hose bed floor, rollers, and dividers - for structural damage. Inspect for loose or missing hardware.</p>		
7			●		Curb Side Door Assembly	Visually inspect curbside door assembly for structural - damage. Inspect for loose or missing hardware.		
8	●	●			Lights	Perform operational checks on street side pump panel lights and curb side pump compartment light. Inspect - lights for defective bulbs or damaged lenses.		
9	●	●			Engine Throttle Control	Perform operational check. Refer to next higher level of maintenance for replacement.	Engine throttle control not operating.-	
10			●		Gauges, Control Knobs, and Switches	Visually inspect all gauges and switches for damage inspect control knobs for damage.	Gauges or switches are damaged. Control knobs damaged.	
11	●	●			Suction and Discharge Connections	Inspect suction and discharge connections for damage or distortion.	Suction or discharge connections - are damaged	

Table 2-5 Operator Preventive Maintenance Checks and Services - Continued

ITEM NO.	D - Daily				ITEM TO BE INSPECTED	PROCEDURES Check for and have repaired or adjusted as necessary	EQUIPMENT IS NOT READY/ AVAILABLE IF
	D	A	W	M			
12	●	●			Panels, Front Street Side, and Step Assemblies Primer Tank	Visually inspect panels and step assemblies for structural damage.	Oil level is low.
13	●	●				Visually inspect primer tank for leaks and structural damage. Check oil level in primer tank. Level should be approximately one inch below full level. Replenish as necessary using SAE-30 oil.	
14			●		Handrails and Mounting Brackets	<p style="text-align: center;">HOSE BODY ASSEMBLY</p> Visually inspect handrails and mounting brackets for structural damage.	Tail lights are defective.
15	●	●			Lights	Perform operational checks on hose bed pick-up lights, rear warning lights, tail lights and compartment lights. Inspect lights for defective lamps, bulbs, or damaged lenses. Refer to next higher level of maintenance for replacement or repair.	
16	●	●			Doors	Check operation and general condition of compartment doors.	Priming pump not operating. Priming pump damaged.
17	●	●			Panels, Side, Compartment and Tread Plates	Visually inspect panels and tread plates for structural damage.	
18	●	●			Rear Compartment and Platform Assembly	Visually inspect rear compartment and rear platform assembly for structural damage. Perform operational checks on rear back-up alarm and rear platform signal switch. Visually inspect rear station charger for structural damage.	Fire pump not operating. Fire pump damaged.
19	●	●			Hose Bed Assembly	Visually inspect hose bed fill tower bracket, floor, and supports for structural damage.	
20			●		Priming Pump	Perform operational check on priming pump motor. Visually inspect pump for corrosion or structural damage. Refer to next higher level of maintenance if any defects are found.	Tank, valves, control rods or piping are damaged.
21			●		Fire Pump	Perform operational check on fire pump. Visually inspect pump for corrosion or structural damage. Refer to next higher level of maintenance if any defects are found.	
22	●	●			Tank, Valves, Control Rods, and Piping	Visually inspect tank, valves, control rods and piping for corrosion or structural damage. Refer to next higher level of maintenance if any defects are found.	

Table 2-5 Operator Preventive Maintenance Checks and Services - Continued

ITEM NO.	INTERVAL				ITEM TO BE INSPECTED	PROCEDURES Check for and have repaired or adjusted as necessary	EQUIPMENT IS NOT READY/ AVAILABLE IF
	D - Daily	W - Weekly	A - After	M - Monthly			
23	●	●			Fan and Drive Belts	<p>ENGINE COOLING SYSTEM</p> <p>Visually inspect fan and drive belts for fraying, proper tension, and structural damage. Refer to next higher level of maintenance for adjustment or replacement.</p>	Fan damaged. Drive belts worn. Not properly tightened.
24	●	●			Coolant Level	<p>WARNING</p> <p>Allow engine to cool 15 minutes before removing filler cap.</p> <p>Visually inspect coolant for rust or impurities. Appearance of rust indicates that the corrosion inhibitor has lost its effectiveness. Check coolant level. Coolant level should be slightly above the "COLD" mark on the recovery tank. Refer to next higher level of maintenance for service.</p>	Coolant level is low.
25	●	●			Radiator, Heat Exchanger, Hoses and Piping	Visually inspect radiator, heat exchanger, hoses and piping for corrosion and structural damage.	
26			●		Water Pump	Visually inspect water pump and connections for corrosion and structural damage. Refer to next higher level of maintenance if any defects are found.	Water pump is damaged.
27			●		Air Cleaner	<p>ENGINE FUEL SYSTEM</p> <p>Visually inspect air filter filament for dirt, corrosion, or damage.</p>	
28			●		Fuel Line and Filter	Visually inspect fuel lines for damage or loose connections. Visually inspect filter elements and exterior of fuel filter for corrosion or structural damage.	
29			●		Fuel Tank, Fill Pipe and Cap	Visually inspect fuel tank, fill pipe, and cap for corrosion or structural damage. Visually inspect cap seals for deterioration. Refer to next higher level of maintenance if any defects are found.	Fuel tank is damaged.
30			●		Fuel Pump,	Visually inspect fuel pump for corrosion and structural damage. Refer to next higher level of maintenance if any defects are found	Fuel pump is damaged.
31			●		Injection Pump and Lines	<p>DIESEL FUEL INJECTION SYSTEM</p> <p>Visually inspect injection pump and injection lines for corrosion or structural damage. Refer to next higher level of maintenance if any defects are found.</p>	Injection pump is damaged.

Table 2-5 Operator Preventive Maintenance Checks and Services - Continued

ITEM NO.	INTERVAL				ITEM TO BE INSPECTED	PROCEDURES Check for and have repaired or adjusted as necessary	EQUIPMENT IS NOT READY/ AVAILABLE IF
	D - Daily	W - Weekly	A - After	M - Monthly			
32				●	Pump, CDR Valve, Tubing and Hoses	EMISSION CONTROL SYSTEM Visually inspect the vacuum pump, CDR valve, tubing and hoses for corrosion or structural damage.	
33				●	Batteries	ENGINE ACCESSORIES Visually inspect battery terminals for corrosion. Clean as necessary. Visually inspect battery hold down for tightness and corrosion.	
34				●	Oil Pan	Visually inspect oil pan for corrosion or structural damage. Check for signs of leakage around drain plug.	
35			●		Windshield Washer Fluid	ENGINE COMPARTMENT FLUID LEVELS Check windshield washer fluid reservoir level. Replenish windshield washer fluid as necessary.	
36	●	●			Brake Fluid	Check master cylinder fluid level in both reservoirs. Brake fluid level should be filled to a point about x inch (6mm) below lowest edge. Refer to next higher level of maintenance for service.	Fluid level is low.
37	●	●		·	Oil Level	Check engine oil level. If oil level is below "ADD" line, refer to next higher level of maintenance for service.	Oil level is low.
38	●	●		·	Power Steering Fluid Level	Check power steering fluid level. If the power steering fluid is warm, the fluid level should be between the "HOT" and "COLD" marks on the filler cap indicator. If cool, the fluid level should be between the "ADD" and "COLD" marks. Refer to next higher level of maintenance for service.	
39			●		Transmission Fluid Level	Check the transmission fluid level. Fluid level in the clutch master cylinder reservoir should reach the bottom of the diaphragm when it is in place in the reservoir. Refer to next higher level of maintenance for service.	Fluid level is low.
40	●	●			Mirrors	CAB ASSEMBLY Inspect mirrors for cracks, dents, or other damage. Inspect for loose or missing attaching hardware.	
41		●		●	*Doors	Check operation and general condition of cab doors. Inspect door seals for tears, cracks, or loose sealing gaskets.	

Table 2-5 Operator Preventive Maintenance Checks and Services - Continued

ITEM NO.	INTERVAL				ITEM TO BE INSPECTED	PROCEDURES Check for and have repaired or adjusted as necessary	EQUIPMENT IS NOT READY/ AVAILABLE IF
	D - Daily	W - Weekly	A - After	M - Monthly			
42	●	●			Class	Inspect all cab glass for breaks or discoloration. Check operation of door windows in cab.	
43			●		Seat	Inspect seat for torn or ripped upholstery. Inspect seat for proper operation. Check seat and seat adjusting mechanism for loose or missing attaching hardware.	
44			●		Seat Belts	Inspect seat belts for tears. Check operation and condition of seat belt mechanism.	
45	●	●			Cab	Inspect cab panels for rust, dents, or areas requiring touch-up painting. Refer to next higher level of maintenance for painting.	
46	●	●			Service Brakes	Check service brakes for proper operation. Brake pedal free travel is the distance the pedal moves toward the floor from a full released position. Refer to next higher level of maintenance if any defects are found.	Service brake won't stop vehicle.
47	●	●			Parking Brake	Perform operational check on parking brake.	Does not go in or out of gear.
48	●	●			Transmission Gear Selector	Perform operational check on transmission gear selector. Visually inspect lever and boot for damage. Refer to next higher level of maintenance - if any defects are found.	
49	●	●			Clutch	Perform operational check on clutch. Clutch pedal free travel is the distance pedal moves before feeling resistance. Refer to next higher level of maintenance if any defects are found.	No free travel. Clutch slips.
50	●	●			4-WD Selector	Perform operational check on 4-WD selector lever. Visually inspect lever and boot for damage. Refer to next higher level of maintenance if any defects are found.	Does not go in or out of gear.
51	●	●			Controls, Indicators, and Gauges	<p align="center">WARNING</p> <p>Deadly fumes are discharged by this equipment when in operation. Death by suffocation may result if operated indoors, without exhaust gases being ducted outdoors. Make sure that air intake is free of debris and is large enough not to restrict air flow.</p> <p>With engine running and parking brake secure, perform operational check of electrical controls, indicators, and gauges. Refer to next higher level of maintenance if any defects are found.</p>	Controls, indicators or gauges not operating. Defective
52	●	●			Fuel Level	Perform operational check on fuel level gauge. Replenish fuel as necessary.	

Table 2-5 Operator Preventive Maintenance Checks and Services - Continued

ITEM NO.	INTERVAL				ITEM TO BE INSPECTED	PROCEDURES Check for and have repaired or adjusted as necessary	EQUIPMENT IS NOT READY/ AVAILABLE IF
	D - Daily	W - Weekly	A - After	M - Monthly			
53	●	●			Lights	Perform operational check on headlights, parking lights, turn signal lights, spotlights, front warning lights, and roof beacon light. Visually inspect all lights for defective lamps or bulbs. Inspect for cracked or damaged lenses. Refer to next higher level of maintenance for replacement or repair.	Lights are damaged. Not operating.
54			●		Windshield Wipers/Washer	Perform operational check on windshield wipers and washers. Inspect wiper blades for damage.	
55	●	●			Siren/Public Address System	Perform operational check on siren public address system. Visually inspect siren and external speaker for damage. Refer to next higher level of maintenance for replacement.	Siren not operating.
CHASSIS							
56			●		Exhaust	Inspect exhaust system and hardware for damage, wear, and corrosion.	
57			●		Propeller Shafts	Inspect propeller shafts for damage, wear, misalignment, and unusual noises. Refer to next higher level of maintenance if defects are found.	Propeller shafts are damaged.
58			●		Differentials	Inspect for damage and oil leaks. Refer to next higher level of maintenance if defects are found.	Differentials are damaged.
59	●	●			Wheels and Tires	Check for proper tire pressure. (30 PSI) (207 kPa). Inspect tires for uneven wear, gouges, cuts and bruises. Check tightness of wheel mounting bolts. (88 ft.-lbs.) Inspect rims for damage. Refer to next higher level of maintenance if defects are found.	Tires and rims are damaged. Tire is flat.
60			●		Hub Locks rust.	Inspect 4-wheel drive hub locks for damage and Perform operational check on hub locks. Refer to next higher level of maintenance if defects are found.	Hub locks are damaged.

Section III. OPERATION UNDER USUAL CONDITIONS

	Para.		Para.
Disengaging Fire Pump.....	2-17	Operating From Water Tank	
Driving the Vehicle	2-9	(Pump and Roll Mode).....	2-19
Draining Water From Fire Pump	2-25	Operating Procedures.....	2-14
Draining Water From Tank.....	2-24	Operation of Accessory Fire-	
Engaging Fire Pump	2-15	fighting Equipment	2-11
Filling Water Tank From Hydrant		Operation of Booster Hose Reel.....	2-22
or Pressure Source.....	2-26	Operation of Lighting and Vision	
General.....	2-5	Equipment.....	2-12
Mobile Operation of Mini-Pumper		Operation of Siren/Public Address	
Firefighting Truck.....	2-7	System.....	2-13
Operating From Draft	2-20	Post Operational Procedures.....	2-23
Operating from Fire Hydrant.....	2-21	Priming Fire Pump.....	2-16
Operating from Water Tank		Scope.....	2-6
(Stationary Mode)	2-18	Shutdown	2-10
		Starting the Engine.....	2-8

2-5. GENERAL.

- a. The following instructions are for the information and guidance of personnel responsible for the proper operation of the Mini-Pumper Firefighting Truck.
- b. The operator must know how to perform every operation of which the firefighting truck is capable. This section contains instructions on the mobile operation of the firefighting truck, and on coordinating the basic operating procedures to perform the specific tasks for which the firefighting truck was designed. Since nearly every firefighting operation presents a different problem, the operator may at times vary given procedures to fit the individual situation.

2-6. SCOPE.

Operating instructions are divided into the following categories:

- a. *Mobile Operation.* Information and instructions for starting and driving the firefighting truck under normal conditions.
- b. *Operation of Accessories.* Operation and use of lighting and vision equipment, siren, etc.
- c. *Operating Procedures.* Equipment operating instructions for the Mini-pumper Firefighting Truck.
- d. *Post Operational Procedures.* Basic checks and services of the firefighting truck immediately after a firefighting mission.

2-7. MOBILE OPERATION OF MINI-PUMPER FIREFIGHTING TRUCK.

Mobile operation of the firefighting truck is similar for conventionally equipped 4x4 diesel trucks. The vehicle is equipped with hydraulic power steering and brakes. A manual 4-speed transmission, with a 4-wheel drive feature is also provided. Controls and instruments necessary for mobile operation and firefighting are within easy reach of the driver's normal seated position. These controls and indicators are illustrated and described in figures 2-2 through 2-4.

2-8. STARTING THE ENGINE.

- a. Perform daily inspections as required.
- b. Apply parking brake (10, figure 2-2).

NOTE

A starter safety device is designed to keep the starter from operating if the clutch pedal is not pushed down all the way.

- c. Push clutch pedal (9, figure 2-2) to floor and shift transmission gear selector (4) to neutral (N) position.
- d. Turn ignition key to "RUN." Do not turn it to "START." With ignition in "RUN", the diesel glow plugs indicator light (6, figure 2-3) will come on. When the engine is ready to start the indicator light will go out.

CAUTION

Do not operate starter continuously for longer than 15 seconds. After cranking for 15 seconds, allow starter to cool for one minute before trying to start the engine. If after several attempts the engine will not start, consult the Troubleshooting Chart, Chapter 3.

- e. Press down accelerator pedal (7, figure 2-2) halfway and hold. Crank engine by turning ignition key to "START." Release key and accelerator pedal when the engine starts.

2-9. DRIVING THE VEHICLE.

- a. Observe all gauges and indicators (figure 2-3) for normal operation.
- b. Depress brake pedal (8, figure 2-2). Release parking brake (10) and micro-lock brake control (24, figure 2-3).
- c. Push clutch pedal (9, figure 2-2) to floor and shift transmission gear selector (4) to desired gear.

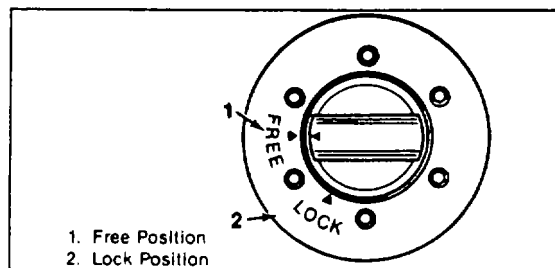
- d. Release brake pedal (8, figure 2-2) and gradually depress accelerator pedal (7) to increase engine speed.

CAUTION

Operating in a partially engaged position can damage the hub locks.

NOTE

To operate the vehicle in 4-wheel drive, the **MANUAL HUB LOCKS** located on the front axle must be in the "LOCK" position and the 4-wheel drive selector (3, figure 2-2) in the "4L" or "4H" position.



2-10. SHUTDOWN.

Observe the following procedures when shutting down the firefighting truck:

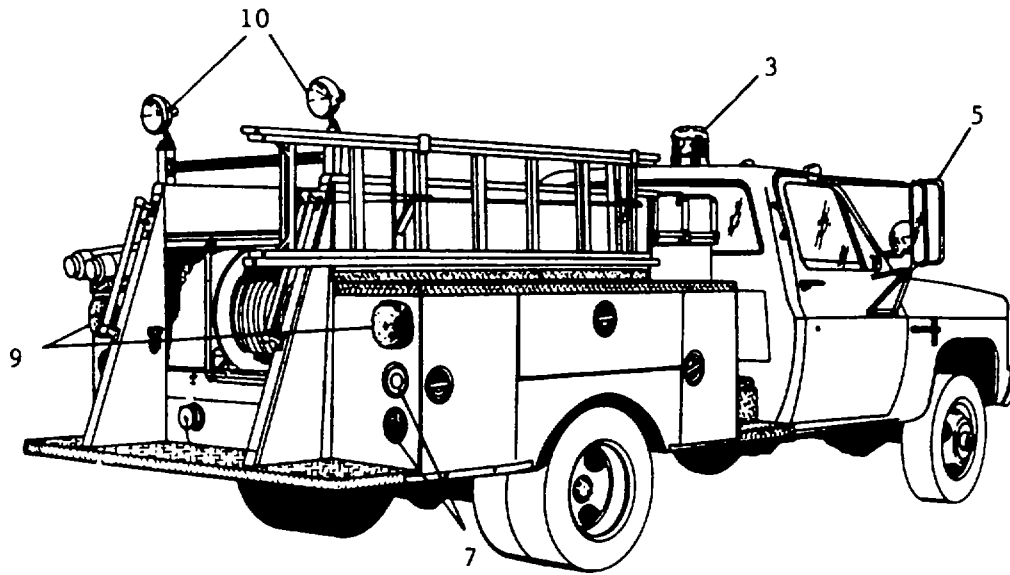
- Depress brake pedal (8, figure 2-2) with steady downward pressure to stop truck.
- Place transmission gear selector (4, figure 2-2) in the neutral (N) position. Apply parking brake (10) and micro-lock brake control (24, figure 2-3).
- Shut-off all lights and accessory controls.
- Turn ignition to "OFF".

NOTE

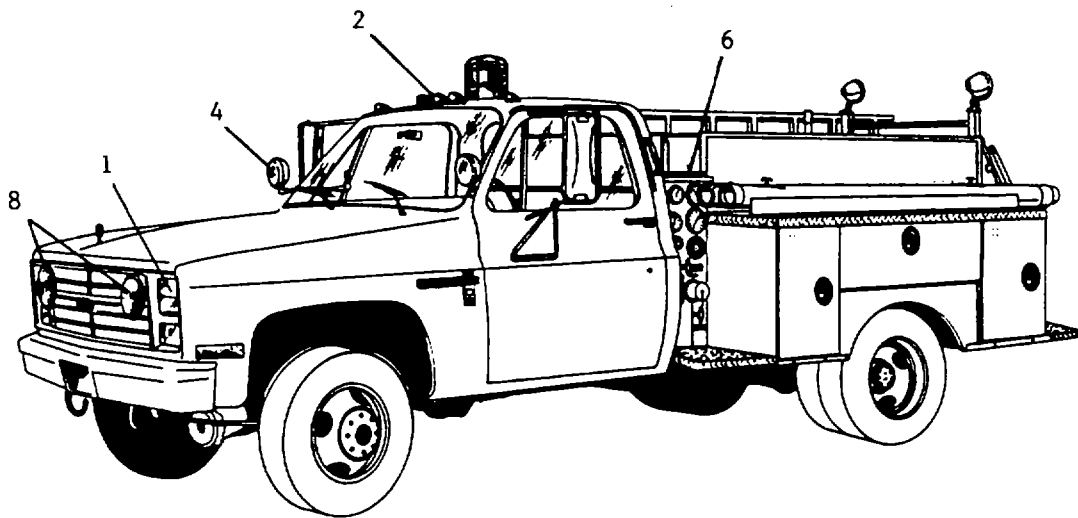
If the vehicle has been operated in the 4-wheel drive mode, the **MANUAL HUB LOCKS** located on the front axle must be returned to the "FREE" position and the 4-wheel drive selector (3, figure 2-2) returned to the "2-H" position.

2-11. OPERATION OF ACCESSORY FIREFIGHTING EQUIPMENT.

The following paragraphs will locate and describe procedures for operating the accessory firefighting equipment.



CURB SIDE



STREET SIDE

LEGEND

- | | |
|----------------------|-------------------------|
| 1. HEADLIGHTS | 6. PUMP PANEL LIGHT |
| 2. CLEARANCE LIGHTS | 7. TAIL LIGHTS |
| 3. ROOF BEACON LIGHT | 8. FRONT WARNING LIGHTS |
| 4. SPOT LIGHTS | 9. REAR WARNING LIGHTS |
| 5. REAR VIEW MIRRORS | 10. HOSE BED LIGHTS |

FIGURE 2-5. LIGHTING AND VISION EQUIPMENT

2-12. OPERATION OF LIGHTING AND VISION EQUIPMENT.

- a. *Rear View Mirrors.* Rear view mirrors (5, figure 2-5) should be adjusted to provide the driver with a clear unobstructed view of the areas immediately to the side and rear of the truck.
- b. *Cab Spotlights.* Each cab spotlight (4, figure 2-5) is aimed with its control handle (2, figure 2-2) located inside the cab on both curb and street sided of the windshield. The "ON/OFF" switch is located on each handle.
- c. *Headlights, Tail Lights, and Clearance Lights.* Headlights (1, figure 2-5), tail lights (7), and clearance lights (2) are controlled by the headlight control switch (23, figure 2-3).
- d. *Front Warning Lights.* Front warning lights (8, figure 2-5) are controlled by the front flashers control switch (12, figure 2-3).
- e. *Hose Bed Lights.* Each hose bed light (10, figure 2-5) is aimed by the handle attached to the light body. The "ON/OFF" switch is also mounted on the light body.
- f. *Pump Panel Lights.* Pump panel lights (6, figure 2-5) are controlled by an "ON/OFF" switch (29, figure 2-1), located on the street side pump panel.
- g. *Front Warning Lights.* Front warning lights (8, figure 2-5) are controlled by the front flashers control switch (12, figure 2-3).
- h. *Rear Warning Lights.* Rear warning lights (9, figure 2-5) are controlled by the rear flashers control switch (13, figure 2-3).
- i. *Compartment Lights.* Lights in all truck equipment compartments are activated by an automatic compartment light switch when the respective compartment door is opened.

2-13. OPERATION OF SIREN/PUBLIC ADDRESS SYSTEM.

The siren/public address system provides three siren signals with manual or automatic operation, and a PA system and external speaker to direct personnel outside the cab. Operation of the system is as follows:

CAUTION

Do not turn on siren amplifier unless front mounted speaker siren wires are connected.

- a. Rotate "ON/OFF" PA volume control knob (4, figure 2-4) clockwise to activate siren/public address system. Further rotation of the knob increases voice volume when the amplifier is used for PA or radio amplification. The control knob does not control siren volume. Red pilot LED (2) illuminates when selector switch (3) is in PA position and microphone is used.

2-13. OPERATION OF SIREN/PUBLIC ADDRESS SYSTEM (Continued).

- b. For siren operation, select desired tone on selector switch (3, figure 2-4). The selector switch has six positions:
- (1) PA Allows operation of the public address system through the common microphone. When the switch is in this position, the red pilot LED (2, figure 2-4) is illuminated.
 - (2) RADIO In this position, incoming radio messages are amplified by the siren and rebroadcast over the external speaker. Siren tones (WAIL, YELP, HI-LO) do not operate in this position.
 - (3) STANDBY In this position, it is possible to operate the siren by activating the manual pushbutton or mechanical siren foot switch. A WAIL tone will be produced using either the manual pushbutton or mechanical foot switch.
 - (4) WAIL In this position, the siren produces a continuous WAILING sound up and down in frequency. Depressing the manual pushbutton will produce the YELP tone.
 - (5) YELP In this position, a continuous rapid "warbled" tone is generated. Depressing the manual pushbutton will have no effect.
 - (6) HI-LO In this position, a two-tone sound will be heard. Depressing the manual pushbutton will produce the YELP tone.
- c. The Manual Pushbutton (1, figure 2-4) operates the electronic siren in the manual operation mode. The push button has no effect when the selector switch (3) is in RADIO.
- (1) It produces the WAIL tone when the selector switch is in STANDBY.
 - (2) It produces the YELP tone when the selector switch is in WAIL.
 - (3) It has no effect when the selector switch is in YELP.
 - (4) It produces the YELP tone when the selector switch is in HI-LO.
 - (5) A mechanical siren foot switch can also be used for the above modes when the vehicle is in motion.

2-14. OPERATING PROCEDURES.

The following paragraphs will describe operating procedures necessary for all basic firefighting missions for which the firefighting truck was designed.

2-15. ENGAGING FIRE PUMP.**WARNING**

The vehicle is equipped with a manual transmission. A danger exists that should the operator forget to activate the micro-lock brake control knob (24, figure 2-3), the vehicle could overcome the parking brake and accidentally move the truck causing a hazard to personnel in the area.

- a. Bring truck to a complete stop. With engine running at idle speed, engage parking brake (10, figure 2-2) and micro-lock brake control knob (24, figure 2-3).
- b. Place manual transmission gear selector (3, figure 2-2) in the neutral (N) position.

CAUTION

When vehicle is stationary, do not accelerate engine with accelerator pedal (7, figure 2-2) while fire pump is engaged.

- c. Depress clutch and pull pump/PTO control knob (25, figure 2-3) out to engage fire pump. Pump/PTO engaged indicator light (26) will be illuminated when pump/PTO is engaged

2-16. PRIMING FIRE PUMP**NOTE**

Priming pump operation is only necessary when using the firefighting system in a draft mode of operation.

- a. Start the engine as described in paragraph 2-8.
- b. Engage the fire pump as described in paragraph 2-15.
- c. Close all drain valves and discharge valves control knobs (figure 2-1).

2-16. PRIMING FIRE PUMP (Continued).**CAUTION**

Do not operate priming pump motor continuously for more than 30 seconds. If priming pump does not prime fire pump and discharge a solid stream of water in 30 seconds, stop both priming pump and fire pump and check for leaks. Allow at least a two-minute cool-off period before operating the primer again.

- d.* At street side operator control panel, pull out the primer valve control knob (22, figure 2-1) to start priming. Operate priming pump until it emits a solid stream of water through its discharge pipe. When pump is primed, release the primer valve control knob (22).

2-17. DISENGAGING FIRE PUMP.

- a.* Leave parking brake (10, figure 2-2) and micro-lock brake control (24, figure 2-3) engaged. Wait until tachometer (19, figure 2-3) reading is between 500-700 rpm. before disengaging fire pump. Damage to pump may result if engine speed is too rapid.

CAUTION

Wait until tachometer (19, figure 2-3) reading is between 500-700 rpm. Before disengaging fire pump. Damage to pump may result if engine speed is too rapid.

- b.* Depress clutch pedal and push pump/PTO control knob (25, figure 2-3) in to disengage fire pump. Pump/PTO indicator light (26) will de-activate.
- c.* Depress brake pedal (8, figure 2-2). Move manual transmission gear selector (4) to desired drive position.
- d.* Release parking brake (10, figure 2-2) and micro-lock brake control (24, figure 2-3).

2-18. OPERATING FROM WATER TANK (STATIONARY MODE).

- a. Engage fire pump as described in paragraph 2-15.
- b. Close all drain and valve controls.
- c. Open tank to pump valve control handle (13, figure 2-1) to allow water to flow from tank to pump.
- d. Turn heat exchanger control switch (20, figure 2-1) to the "ON" position.
- e. Pull open desired discharge valve control(s).
- f. Turn engine throttle control knob (3, figure 2-1) counterclockwise to accelerate engine until master pressure gauge (9) indicates desired discharge pressure.
- g. Turn pressure relief control knob (12, figure 2-1) counterclockwise to decrease pump discharge operating pressure, clockwise to increase pump operating pressure.

CAUTION

Fire pump will heat up rapidly if pump is operated with all discharge valves closed. Prolonged operation will cause damage from overheating.

NOTE

Periodically check engine temperature gauge (1, figure 2-1) for normal engine-operating temperature range of 100° F (55.5° C) to 250° F (138.8° C).

If a shutdown is required for changing hoses or any other reason, slow the engine to decrease water pressure to 30 psi and close the discharge valves. Open tank-to-pump valve control handle (13, figure 2-1) and tank fill control handle (14) to recirculate the water.

- h. Shut down fire pump by turning engine throttle control knob (3, figure 2-1) clockwise to throttle engine down.
- i. Turn heat exchanger control switch (20, figure 2-1) to the "OFF" position.
- j. Turn pressure relief control knob (12, figure 2-1) clockwise until tight.
- k. Close discharge valves and tank-to-pump valve control handle (13, figure 2-1).
- l. Disengage fire pump as described in paragraph 2-17.

2-19. OPERATING FROM WATER TANK (PUMP AND ROLL MODE).

- a. Engage fire pump as described in paragraph 2-15.
- b. Close all drain and valve controls.
- c. Open tank-to-pump valve control handle (13, figure 2-1) to allow water to flow from tank-to-pump.
- d. Turn heat exchanger control switch (20, figure 2-1) to the "ON" position.
- e. Pull open desired discharge valve control(s).
- f. Return to cab, depress brake pedal (8, figure 2-2). Release parking brake (10) and micro-lock brake control (24, figure 2-3).
- g. Depress clutch pedal (9, figure 2-2) to floor and shift transmission gear selector (4) to low gear (L) or first gear (1).

CAUTION

While in the pump and roll mode of operation, the transmission must not be shifted while the vehicle is in motion. Vehicle speed in the pump and roll mode should not exceed 7 MPH (11.3 km/h) . Exceeding the speed limit will cause the horn signal alarm to sound.

- h. Release brake pedal (8, figure 2-2) and gradually depress accelerator pedal (7) to increase speed.
- i. Bring truck to a complete stop. With engine running at idle speed, engage parking brake (10, figure 2-2) and micro-lock brake control knob (24, figure 2-3).
- j. Place manual transmission gear selector (3, figure 2-2) in the neutral (N) position.
- k. Turn heat exchanger control switch (20, figure 2-1) to the "OFF" position.
- l. Close discharge valves and tank-to-pump valve control handle (13, figure 2-1).
- m. Disengage fire pump as described in paragraph 2-17.

2-20. OPERATING FROM DRAFT.

- a. Position fire truck as near to water source as possible.

CAUTION

Fire pump will heat up rapidly if pump is operated with all discharge valves closed. Prolonged operation will cause damage from overheating.

- b. Attach strainer to the other end of the suction hose and submerge in water source.
- c. Engage fire pump as described in paragraph 2-15.
- d. Prime fire pump as described in paragraph 2-16.

NOTE

If possible, submerge the strainer at least two feet below the surface of the water and keep the strainer off the bottom. Use every precaution to keep sand, leaves, or other foreign material away from the strainer to prevent restriction of flow. Make sure suction connections are tight. AVOID BUMPS OR SHARP BENDS IN SUCTION HOSE. Make sure no part of hose is higher than pump suction inlet. Air pockets in suction hose will cause loss of prime, or erratic pump action, which will reduce pump capacity.

- e. Pull open desired discharge valve control(s).
- f. Turn engine throttle control knob (3, figure 2-1) counterclockwise to accelerate engine until master pressure gauge (9) indicates desired discharge pressure.
- g. Turn heat exchanger control switch (20, figure 2-1) to the "ON" position.
- h. Turn pressure relief control knob (12, figure 2-1) counterclockwise to decrease pump discharge operating pressure, clockwise to increase pump operating pressure.

NOTE

Periodically check engine temperature gauge (1, figure 2-1) for normal engine-operating temperature range of 100° F (55.5° C) to 250° F (138.8° C).

2-20. OPERATING FROM DRAFT (Continued).**NOTE**

If a shutdown is required for changing hoses or any other reason, slow the engine to decrease water pressure to 30 psi and close the discharge valves. Open tank-to-pump valve control handle (13, figure 2-1) and tank fill control handle (14) to recirculate the water.

- j.* Shut down pump by turning engine throttle control knob (3, figure 2-1) clockwise to throttle engine down.
- k.* Turn heat exchanger control switch (20, figure 2-1) to the "OFF" position.
- l.* Turn pressure relief control knob (12, figure 2-1) clockwise until tight.
- m.* Close discharge valves and tank-to-pump valve control handle (13, figure 2-1). Remove and store hard suction hose and strainer.
- n.* Disengage fire pump as described in paragraph 2-17.

2-21. OPERATING FROM FIRE HYDRANT.**NOTE**

To operate from hydrant requires the use of a 2½ inch hose and suitable couplings.

- a.* Engage fire pump as described in paragraph 2-15.
- b.* Close all drain and valve controls.
- c.* Remove cap from desired 3 inch suction inlet. Connect 2½ inch hose with adapter to suction inlet and hydrant.
- d.* Connect 2½ inch hose to discharge outlet (26, figure 2-1) or use the two preconnected hoses located in the small hose beds.
- e.* Using hydrant wrench, open hydrant supply slowly and observe pressure readings on master pressure gauge (9, figure 2-1) and compound pressure gauge (10).
- f.* Check for proper hose lay and nozzle setting.
- g.* Turn heat exchanger control switch (20, figure 2-1) to the "ON" position.
- h.* Pull open desired discharge valve control(s).

2-21. OPERATING FROM FIRE HYDRANT (Continued).

- i.* Turn engine throttle control knob (3, figure 2-1) counterclockwise to accelerate engine until master pressure gauge (9) indicates desired discharge pressure.

CAUTION

As a precautionary measure, the master pressure gauge reading (9, figure 2-1) should not be permitted to drop below 10 psig. This will permit a 5 psig error in gauge accuracy with the danger of collapsing a water main. It may be necessary to sacrifice the discharge pressure in order to prevent damage to a water main.

- j.* Turn pressure relief control knob (12, figure 2-1) counterclockwise to decrease pump discharge operating pressure, clockwise to increase pump operating pressure.

CAUTION

Fire pump will heat up rapidly if pump is operated with all discharge valves closed. Prolonged operation will cause damage from overheating.

NOTE

Periodically check engine temperature gauge (1, figure 2-1) for normal engine-operating temperature range of 100° F (55.5° C) to 250° F (138.8° C).

If a shutdown is required for changing hoses or any other reason, slow the engine to decrease water pressure to 30 psi and close the discharge valves. Open tank-to-pump valve control handle (13, figure 2-1) and tank fill control handle (14) to recirculate the water.

- k.* Shut down fire pump by turning engine throttle control knob (3, figure 2-1) clockwise to throttle engine down.
- l.* Turn heat exchanger control switch (20, figure 2-1) to the "OFF" position.

2-21. OPERATING FROM FIRE HYDRANT (Continued).

- m.* Turn pressure relief control knob (12, figure 2-1) clockwise until tight.
- n.* Close discharge valve control(s) o. Using hydrant wrench, close hydrant supply and disconnect hose. Replace hydrant and suction inlet caps.
- p.* Disengage fire pump as described in paragraph 2-17.

2-22. OPERATION OF BOOSTER HOSE REEL.

- a.* Engage fire pump as described in paragraph 2-15.
- b.* Open tank-to-pump valve control handle (13, figure 2-1) to allow water to flow from tank-to-pump.
- c.* Release hand brake and unwind hose from the hose reel.
- d.* Turn heat exchanger control switch (20, figure 2-1) to the "ON" position.
- e.* Open booster hose outlet control handle (24, figure 2-1).
- f.* Turn engine throttle control knob (3, figure 2-1) counterclockwise to accelerate engine until master pressure gauge (9) indicates desired discharge pressure
- g.* Turn pressure relief control knob (12, figure 2-1) counterclockwise to decrease pump discharge operating pressure, clockwise to increase pump operating pressure.

CAUTION

Fire pump will heat up rapidly if pump is operated with all discharge valves closed. Prolonged operation will cause damage from overheating.

NOTE

Periodically check engine temperature gauge (1, figure 2-1) for normal engine-operating temperature range of 100° F (55.5° C) to 250° F (138.8° C).

If a shutdown is required for changing hoses or any other reason, slow the engine to decrease water pressure to 30 psi and close the discharge valves. Open tank-to pump valve control handle (13, figure 2-1) and tank fill control handle (14) to recirculate the water.

2-22.- OPERATION OF BOOSTER HOSE REEL (Continued).

- h. Shut down pump by turning engine throttle control knob (3, figure 2-1) clockwise to throttle engine down.
- i. Turn heat exchanger control switch (20, figure 2-1) to the "OFF" position.
- j. Turn pressure relief control knob (12, figure 2-1) clockwise until tight.
- k. Rewind hose onto hose reel and secure hand brake.

2-23. POST OPERATIONAL PROCEDURES.

- a. Immediately upon return from a fire fighting mission, service and check the truck.
- b. Determine if any physical damage has occurred to the truck or components/accessories during the mission.

2-24. DRAINING WATER FROM TANK.

- a. The water tank can be drained onto the ground beneath the truck by manually opening the water tank drain knob.
- b. Pull out water tank drain knob (21, figure 2-1) to open the drain valve. Make up air will enter the tank through the fill tower on top of the truck.

2-25. DRAINING WATER FROM FIRE PUMP.**NOTE**

For operation under usual conditions, drain the fire pump after each firefighting operation as indicated below.

- a. Open 2 1/2 inch discharge outlet drain knob (23, figure 2-1).
- b. Remove cap from 3 inch suction inlet (17, figure 2-1).
- c. Remove cap from 2½ inch discharge outlet (26, figure 2-1).
- d. Open all discharge outlet control handles (24, 25, 27 and 28, figure 2-1).
- e. Open master pump drain control knob (30, figure 2-1) to drain fire pump.

2-26. FILLING WATER TANK FROM HYDRANT OR PRESSURE SOURCE.

NOTE

Filling from hydrant requires the use of a 2 1/2 inch hose and suitable couplings.

- a. Open tank fill cover.
- b. Remove cap and connect 2 1/2 inch hose with adapter to 3 inch suction inlet connection (17, figure 2-1) on the street side operator's control panel.
- c. Connect hose to hydrant outlet.
- d. Using hydrant wrench, open hydrant supply.
- e. Open 3 inch suction inlet control handle (16, figure 2-1).
- f. Open tank fill control handle (14, figure 2-1). Monitor display on water tank level gauge (19) on street side operator's control panel.
- g. Shut off hydrant supply when tank is filled. Close tank fill control handle (14, figure 2-1).
- h. Close 3-inch suction inlet control handle (16, figure 2-1).

NOTE

Some water spillage will occur when hose is disconnected as the water in the fill line drains out.

- i. Disconnect hose from hydrant. Install cap on 3-inch suction inlet connection (17, figure 2-1).

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

Operation at High Altitudes	Para. 2-35	Operation in Mud	Para 2-34
Operation in Dusty or Sandy Areas	2-30	Operation in Salt Water Areas.....	2-32
Operation in Extreme Heat.....	2-29	Operation in Snow	2-33
Operation in Intermediate Cold (to -25° F.)	2-28	Operation Under Rainy or Humid Conditions	2-31
		Scope	2-27

2-27. SCOPE.

This section covers the necessary operating instructions, in addition to those previously covered, that are necessary for the components of the Mini-Pumper Firefighting Truck to function properly under unusual conditions, such as in extreme heat or cold and in dusty and sandy areas.

2-28. OPERATION IN INTERMEDIATE COLD (to -25° F.)

CAUTION

Moisture accumulating in the pump gear case can damage the internal parts. Do not allow water to spray over the body of the fire truck, as the compartment doors will freeze shut.

When operating in an intermediate cold climate, take the necessary precautions to prevent the truck from freezing. Immediately after each firefighting operation, drain the water from the fire pump and water tank. In addition to the draining procedures indicated in paragraphs 2-24 and 2-25 open water tank fillvalve control handle (14, figure 2-1) and tank-to-pump valve control handle (13) to allow water to drain from the fire pump piping. During the firefighting operation, run the fire pump at least 20 minutes to warm up gear case and drive out moisture.

2-29. OPERATION IN EXTREME HEAT.

When operating in extreme heat, particular attention must be paid to the lubrication and cooling system of the fire truck. Protect the fire truck from the direct rays of the sun as much as possible. The fire pump is not affected by extreme heat.

2-30. OPERATION IN DUSTY OR SANDY AREAS.

When operating in dusty or sandy areas, keep all lubrication points clean and well lubricated. Lubricate sparingly, but more frequently than under normal conditions. Wipe fittings thoroughly before applying grease. Clean all oily or greasy surfaces. Service the engine air cleaner, breather and oil filter more frequently than under normal conditions. Service the radiator, fuel tank, and fuel filter.

2-31. OPERATION UNDER RAINY OR HUMID CONDITIONS.

When operating under rainy or humid conditions, the high humidity causes rusting and corrosive action on exposed metal surfaces. Coat all exposed metal surfaces with engine oil or appropriate protective coating. Keep the fuel tank as full as possible to eliminate condensation.

2-32. OPERATION IN SALT WATER AREAS.

- a. General. When operating in salt water areas, deterioration and corrosion of exposed metal surfaces is greatly accelerated. Coat all exposed metal surfaces with engine oil. When the fire truck has been partially immersed or sprayed with salt water, wash down the fire truck thoroughly with fresh water.
- b. Pumping Salt Water. Do not use salt water except in case of an extreme emergency. At the earliest opportunity after pumping salt water, flush the fire pump and piping thoroughly with fresh water. After flushing, drain the fire pump in accordance with paragraph 2-25.

2-33. OPERATION IN SNOW.

Operating in snow presents special problems due to snow collecting and freezing on metal surfaces. At the earliest opportunity, remove snow from top of pump compartment, equipment compartments, hose beds, and rear step.

2-34. OPERATION IN MUD.

When operating in mud, particular attention must be paid to the overall cleanliness of the fire truck. At the earliest opportunity, wash the fire truck and remove the mud.

2-35. OPERATION AT HIGH ALTITUDES.**CAUTION**

Due to low atmospheric pressure, engine horsepower decreases about 3 percent for every 1,000 feet (304.8m) increase in altitude above sea level. This loss in engine horsepower may result in a loss of pump efficiency. To compensate for this loss in engine horsepower, it may be necessary to operate the fire pump at greater rpm's than when operating under normal conditions.

Operation at high altitudes presents special problems due to lower atmospheric pressure and a wide difference in temperatures. Protect the fire truck at all times from the lowest anticipated temperature.

**CHAPTER 3
OPERATOR MAINTENANCE INSTRUCTIONS**

Section I.	OPERATOR TROUBLESHOOTING PROCEDURES
Section II.	MAINTENANCE OF HOSE REEL ASSEMBLY
Section III.	MAINTENANCE OF PUMP COMPARTMENT ASSEMBLY
Section IV.	MAINTENANCE OF FIRE PUMP, PIPING SYSTEM, VALVES, AND CONTROL RODS
Section V.	MAINTENANCE OF CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
Section VI.	MAINTENANCE OF WHEEL ASSEMBLY

Section I. OPERATOR TROUBLESHOOTING PROCEDURES

General	Para. 3-1	Symptom Index	Para 3-2
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3-1. GENERAL.

- a. The table in this section lists the common malfunctions which may occur during the operation or maintenance of the Mini-Pumper Firefighting or components. The troubleshooting should be performed in the order given in each malfunction.
- b. This manual cannot list all malfunctions that may occur nor all tests, inspections, or corrective actions. If a malfunction is not listed or it is not corrected by the listed corrective actions notify your supervisor.

3-2. SYMPTOM INDEX.

SYMPTOM	PAGE
FIRE PUMP, PIPING SYSTEM, VALVES AND CONTROL RODS	
Water Pressure Is Too High (Over 150 PSI) Or Too Low	3-3
Fire Pump Will Not Engage	3-3
Fire Pump Will Not Prime Or Loses Prime	3-3
Insufficient Fire Pump Capacity	3-4
Excessive Engine Speed Is Required To Achieve Required Fire Pump Pressure Or Capacity	3-4
Engine Speeds Too High For Required Fire Pump Capacity Or Pressure.....	3-5
Pressure Relief Valve Does Not Relieve Pressure When Valves Are Closed.....	3-5
Unable to Attain Proper Setting On Pressure Relief Valve	3-5
Water Pressure Is Too High Or Too Low	3-5
ENGINE COOLING SYSTEM	
Engine Overheating	3-5

3-2. SYMPTOM INDEX (Continued).

SYMPTOM	PAGE
ENGINE FUEL SYSTEM	
Engine Will Not Start	3-5
Uneven Running And/Or Frequent Stalling.....	3-5
ENGINE AND ACCESSORIES	
No Battery Voltage	3-5
CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS	
Windshield Washer Doesn't Work	3-6
TRANSMISSION ASSEMBLY	
No Drive In Any Gear	3-6
CLUTCH ASSEMBLY	
Slow Or No Clutch Engagement	3-6
BRAKE SYSTEM	
Brakes "Grab"; Truck Pulls To One Side On Brake Application	3-6
Erratic, Uneven Braking	3-6
STEERING ASSEMBLY	
Wheel Steering Hard In One Or Both Directions	3-6
Erratic Steering	3-6
FRONT AXLE ASEMBLY	
Manual Locking Hubs Do Not Engage	3-6

NOTE

Before you use the troubleshooting tables, be sure you have performed all applicable operating checks and verified that a malfunction exists. When a corrective action is performed, verify that the action has corrected the malfunction. All malfunctions deferred to the next higher level of maintenance must be reported according to the instructions given in DA PAM 738-750.

Table 3-1. Operator Troubleshooting Chart

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

FIRE PUMP, PIPING SYSTEM, VALVES, AND CONTROL RODS

1. WATER PRESSURE IS TOO HIGH (OVER 150 PSI) OR TOO LOW.

Check to see if pressure relief valve is set too high.

Adjust pressure relief valve as required.

2. FIRE PUMP WILL NOT ENGAGE.

Step 1. Check if pump shift was attempted before the vehicle was brought to a complete stop.

Release the braking system momentarily, reset and repeat pump shift procedures (paragraph 2-15).

Step 2. Check if parking brake was applied before the vehicle was brought to a complete stop.

Release the braking system momentarily, reset and repeat pump shift procedures (paragraph 2-15).

3. FIRE PUMP WILL NOT PRIME OR LOSES PRIME.

Step 1. Check oil level in priming tank.

Refill priming tank with SAE-30 oil.

Step 2. Check if suction lift is too high (exceeding ten feet (3.1m)).

Reposition vehicle as necessary to achieve suction lift of less than ten feet.

Step 3. Check that suction strainer is at least two feet below water surface.

Reposition as necessary.

Step 4. Check suction hose strainer for blockage.

Remove obstruction from strainer, do not allow suction hose strainer to rest on bottom of water supply, keep strainer at least two feet below surface of the water supply.

Step 5. Check hard suction hose for loose connections or defects.

Tighten suction hose connections as required. Refer to next higher level of maintenance if hard suction hose is defective.

Table 3-1. Operator Troubleshooting Chart (Continued).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

3. FIRE PUMP WILL NOT PRIME OR LOSES PRIME (Continued).

Step 6. Check if primer was operated long enough.

NOTE

Do not run primer longer than 30 seconds. Open discharge valve slowly during completion of prime.

Follow proper priming procedures (paragraph 2-16). Do not release primer control before assurance of complete prime.

Step 7. Check that suction hose has been laid with a continuous slope down to water supply and has no air traps.

Adjust suction hose as required. Repeat priming may be necessary to eliminate air pocket in suction hose (paragraph 2-16).

Step 8. Check if pump pressure is too low when nozzle is opened.

Reprime pump and maintain higher pump pressure while opening discharge valve slowly (paragraph 2-16).

4. INSUFFICIENT FIRE PUMP CAPACITY.

Step 1. Check for insufficient engine power.

Adjust engine throttle control. If still insufficient notify next higher level of maintenance.

Step 2. Check is pressure relief valve is set at too low a pressure.

Adjust pressure relief valve control to desired pressure.

5. EXCESSIVE ENGINE SPEED IS REQUIRED TO ACHIEVE REQUIRED FIRE PUMP PRESSURE OR CAPACITY.

Step 1. Check for blockage of suction hose strainer.

Remove obstruction from strainer. Do not allow suction hose strainer to reset on bottom of water supply, but keep it at least two feet (0.61m) below the surface of the water.

Step 2. Check for defective suction hose by trying a different suction hose on the same pump test mode.

The inner liner of the first suction hose may be collapsed in which case the defective hose should be replaced.

Step 3. Check for high vacuum and rough operation caused by higher than normal lift or suction hose too small.

A larger suction hose should be used.

Table 3-1. Operator Troubleshooting Chart (Continued).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

6. ENGINE SPEEDS TOO HIGH FOR REQUIRED FIRE PUMP CAPACITY OR PRESSURE.

Check for transmission in wrong range.

Repeat recommended shifting procedure (paragraph 2-9).

7. PRESSURE RELIEF VALVE DOES NOT RELIEVE PRESSURE WHEN VALVES ARE CLOSED.

- Step 1. Check if control valve is set incorrectly.
Repeat procedures for setting relief valve (paragraph 2-18).
- Step 2. Check if relief valve is inoperative.
Refer to next higher level of maintenance.

8. UNABLE TO ATTAIN PROPER SETTING ON PRESSURE RELIEF VALVE.

Check if correct setting procedures have been followed.
Repeat procedures for setting relief valve (paragraph 2-18).

9. WATER PRESSURE IS TOO HIGH OR TOO LOW.

Check if pressure relief valve is set too high.
Adjust pressure relief valve.

ENGINE COOLING SYSTEM

10. ENGINE OVERHEATING.

- Step 1. Inspect for loose or missing fan belt.
Refer to next higher level of maintenance.
- Step 2. Inspect coolant level.
Refer to next higher level of maintenance for service.

ENGINE FUEL SYSTEM

11. ENGINE WILL NOT START.

Check for low fuel supply.
Replenish fuel supply as necessary.

12. UNEVEN RUNNING AND/OR FREQUENT STALLING.

Check for low fuel supply.
Replenish fuel supply as necessary.

ENGINE AND ACCESSORIES

13. NO BATTERY VOLTAGE.

Inspect battery cables for cracks, fraying and looseness.
Refer to next higher level of maintenance for replacement.

Table 3-1. Operator Troubleshooting Chart (Continued).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS		
14. WINDSHIELD WASHER DOESN'T WORK.	Check fluid level in windshield washer reservoir.	Fill reservoir to the proper level with windshield washer fluid.
TRANSMISSION ASSEMBLY		
15. NO DRIVE IN ANY GEAR.	Check fluid level.	Refer to next higher level of maintenance.
CLUTCH ASSEMBLY		
16. SLOW OR NO CLUTCH ENGAGEMENT.	Check fluid level.	Refer to next higher level of maintenance.
BRAKE SYSTEM		
17. BRAKES "GRAB"; TRUCK PULLS TO ONE SIDE ON BRAKE APPLICATION.	Improperly inflated tires.	Inflate to correct pressure (paragraph 3-12)
18. ERRATIC, UNEVEN BRAKING.	Soft tire.	Inflate to proper pressure (paragraph 3-12)
STEERING ASSEMBLY		
19. WHEEL STEERING HARD IN ONE OR BOTH DIRECTIONS.	Check fluid level in reservoir.	Refer to next higher level of maintenance.
20. ERRATIC STEERING.	Check fluid level in reservoir.	Refer to next higher level of maintenance.
FRONT AXLE ASSEMBLY		
21. MANUAL LOCKING HUBS DO NOT ENGAGE.	Inspect hubs for proper operation.	Repeat hub engagement procedures (paragraph 2-9).

Section II. MAINTENANCE OF HOSE REEL ASSEMBLY

General	Para. 3-3	Hose Reel Service	Para. 3-4
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3-3. GENERAL.

This section contains information on the maintenance of the hose reel assembly. that are maintainable at the Crew/Operator level.

3-4. HOSE REEL ASSEMBLY.

This task covers: Service

INITIAL SETUP

Tools

Pressure Gun

Materials/Parts

Grease, Lubricating
(Appendix D, Item 15)

General Safety Instructions

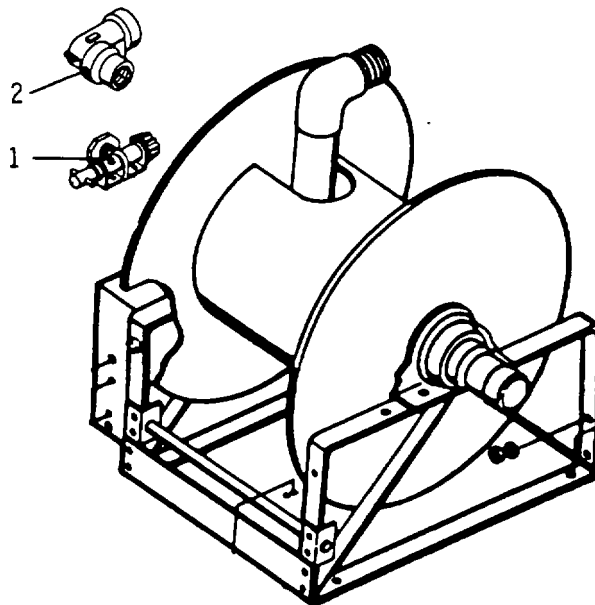
Engine OFF.

Transmission in neutral.

Parking brake and mirco-brake lock set.

SERVICE

- a. Lubricate grease fitting (1) on the brake handle assembly. Pressure gun should be held on the fitting until grease appears.
- b. Lubricate grease fitting (2) on the swivel joint. Pressure gun should be pumped approximately 5 times for proper servicing.



Section III. MAINTENANCE OF PUMP COMPARTMENT ASSEMBLY

General	Para. 3-5	Priming Tank Service	Para. 3-6
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3-5. GENERAL.

This section contains information on the maintenance of the pump compartment assembly that are maintainable at the Crew/Operator level.

3-6. PRIMING TANK SERVICE.

This task covers: Service

INITIAL SETUP

Tools

Pressure Gun

Materials/Parts

SAE-30 Oil
(Appendix D, Item 31)

General Safety Instructions

Engine OFF.
Transmission in neutral.
Parking brake and micro-brake lock set.

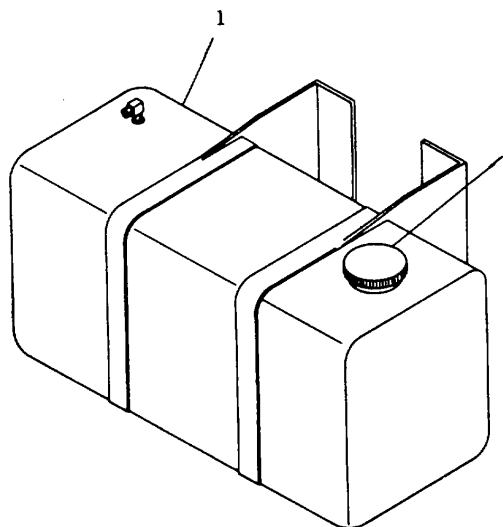
SERVICE

- a. Check oil level in primer tank (1) by removing cap (2).

NOTE

**Oil level should be approximately
1 inch below full level.**

- b. Add oil as necessary.



**Section IV. MAINTENANCE OF FIRE PUMP, PIPING SYSTEM,
VALVES, AND CONTROL RODS**

General	Para. 3-7	Fire Pump Service	Para. 3-8
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3-7. GENERAL.

This section contains information on the maintenance of the fire pump, piping system, valves, and control rods that are maintainable at the Crew/Operator level.

3-8. FIRE PUMP SERVICE.

This task covers: Service

INITIAL SETUP

Tools

Pressure Gun

Materials/Parts

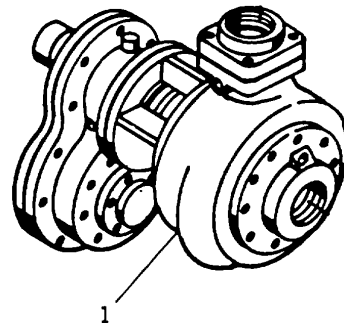
Grease, Lubricating
(Appendix D, Item15)

General Safety Instructions

Engine OFF.
Transmission in neutral.
Parking brake and micro-brake lock set.

SERVICE

- a. Lubricate grease fitting (1) located under the fire pump.
- b. Pressure gun should be pumped approximately 5 times for proper servicing.



**Section V. MAINTENANCE OF CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS**

General	Para. 3-9	Windshield Washer/Wiper Service.....	Para. 3-10
---------------	--------------	--------------------------------------	---------------

3-9. GENERAL.

This section contains information on the maintenance of the cab assembly, lights, switches, gauges, controls and indicators that are maintainable at the Crew/Operator level.

3-10. WINDSHIELD WASHER/WIPER SERVICE.

This task covers: Service

INITIAL SETUP

Materials/Parts

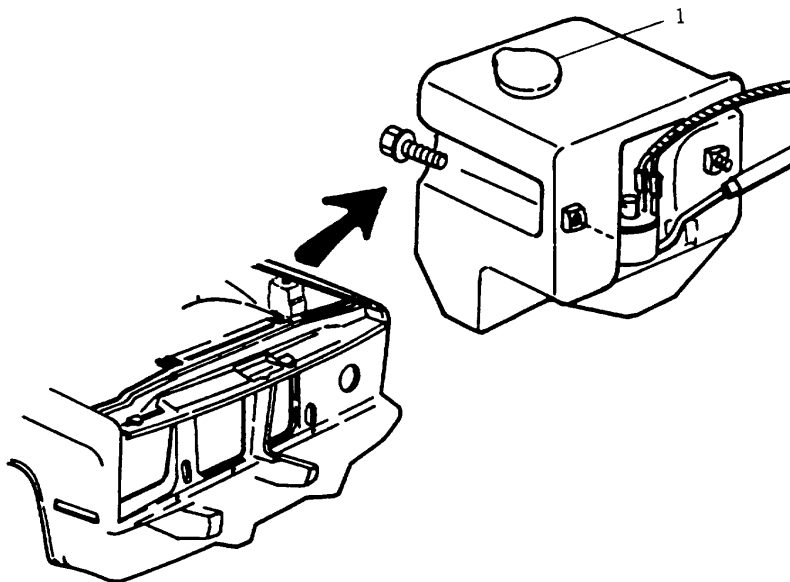
Windshield Washer Fluid

General Safety Instructions

- Engine OFF.
 - Transmission in neutral.
 - Parking brake and micro-brake lock set.
-

SERVICE

- Remove cap (1) from reservoir located at the street side front of the engine compartment.
- Fill reservoir to capacity with windshield washer fluid.
- Replace cap (1).



Section VI. MAINTENANCE OF WHEEL ASSEMBLY

General	Para. 3-11	Tire Service	Para. 3-12
---------------	---------------	--------------------	---------------

3-11. GENERAL.

This section contains information on the maintenance of the wheel assembly that are maintainable at the Crew/Operator level.

3-12. TIRE SERVICE.

This task covers: Service

INITIAL SETUP

Tools

Tire Air Pressure Gauge

General Safety Instructions

Engine OFF.
Transmission in neutral.
Parking brake and micro-brake lock set

SERVICE

- a. Check air pressure in tires.
- b. Front tire pressure should be 30 psi (207 kPA). Add air as needed.
- c. Rear tire pressure should be 30 psi (207 kPA). Add air as needed.

3-11/3-12 (Blank)

**CHAPTER 4
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS**

- Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT
- Section II. SERVICE UPON RECEIPT
- Section III. ORGANIZATIONAL PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS)
- Section IV. LUBRICATION INSTRUCTIONS
- Section V. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES
- Section VI. MAINTENANCE OF ACCESSORIES
- Section VII. MAINTENANCE OF HOSE REEL ASSEMBLY
- Section VIII. MAINTENANCE OF PUMP COMPARTMENT ASSEMBLY
- Section IX. MAINTENANCE OF HOSE BODY ASSEMBLY
- Section X. MAINTENANCE OF WATER TANK ASSEMBLY
- Section XI. MAINTENANCE OF FIRE PUMP, PIPING SYSTEM, VALVES, AND CONTROL RODS
- Section XII. MAINTENANCE OF ENGINE COOLING SYSTEM
- Section XIII. MAINTENANCE OF ENGINE FUEL SYSTEM
- Section XIV. MAINTENANCE OF DIESEL FUEL INJECTION SYSTEM
- Section XV. MAINTENANCE OF EMISSION CONTROL SYSTEM
- Section XVI. MAINTENANCE OF ENGINE EXHAUST SYSTEM
- Section XVII. MAINTENANCE OF ENGINE AND ACCESSORIES
- Section XVIII. MAINTENANCE OF CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
- Section XIX. MAINTENANCE OF ELECTRICAL SYSTEM
- Section XX. MAINTENANCE OF PROPELLER SHAFT ASSEMBLY
- Section XXI. MAINTENANCE OF TRANSMISSION ASSEMBLY
- Section XXII. MAINTENANCE OF CLUTCH ASSEMBLY
- Section XXIII. MAINTENANCE OF TRANSFER CASE ASSEMBLY
- Section XXIV. MAINTENANCE OF WHEEL ASSEMBLY
- Section XXV. MAINTENANCE OF BRAKE SYSTEM
- Section XXVI. MAINTENANCE OF STEERING ASSEMBLY
- Section XXVII. MAINTENANCE OF POWER STEERING SYSTEM
- Section XXVIII. MAINTENANCE OF FRONT SUSPENSION ASSEMBLY
- Section XXIX. MAINTENANCE OF REAR SUSPENSION ASSEMBLY
- Section XXX. MAINTENANCE OF REAR AXLE ASSEMBLY
- Section XXXI. MAINTENANCE OF FRONT AXLE ASSEMBLY
- Section XXXII. MAINTENANCE OF FRAME ASSEMBLY
- Section XXXIII. PREPARATION FOR STORAGE OR SHIPMENT

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

Repair Parts	Para. 4-1	Special Tools, TMDE, and Support Equipment	Para. 4-2
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4-1. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list, Appendix E, covering organizational, direct support and

4-1. REPAIR PARTS (Continued).

general support maintenance for the 250 GPM Mini-Pumper Firefighting Truck.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Special tools, TMDE, and support equipment required to maintain the 250 GPM Mini-Pumper Firefighting Truck are listed in Appendix B, Section III.

Section II. SERVICE UPON RECEIPT

	Para.		Para.
Introduction	4-3	Visual Inspection	4-5
Lubrication	4-4		

4-3. INTRODUCTION.

This section provides instructions for readying the 250 GPM Mini-Pumper Firefighting Truck for use after initial receipt by the using facility.

4-4. LUBRICATION.

Each truck has been completely serviced prior to shipment, with lubricants as specified for the climatic conditions at the point of origin. Further lubrication, other than replenishment of lubricant quantities found to be deficient due to leakage, spillage, or consumption, should not be necessary unless climatic conditions differ greatly from those of the point of origin at the time of shipment. If such is the case, drain, flush, or otherwise remove all lubricants and service.

4-5. VISUAL INSPECTION.

Each truck has received a thorough inspection and complete operational check prior to shipment. Regardless of precautions taken, some damage may occur to the truck during shipment. It is therefore necessary that a complete visual inspection be carried out upon receipt. Refer to Table 4-1 for inspections to be performed prior to use. Record all deficiencies disclosed during the inspection procedure. Such deficiencies should be corrected if possible, or otherwise reported.

CAUTION

Due to the critical nature of the service for which this truck is intended, no truck should be placed in service if there is any doubt or evidence of improper or inadequate function of any of the components or systems. Such conditions must be reported to the supplying organization for disposition.

Table 4-1. Inspection Prior To Use.

DESCRIPTION	INSPECTION TO BE PERFORMED
Truck Body	<ul style="list-style-type: none"> a. Inspect body for evidence of damage during shipment. b. Check to see that all compartment doors, latches, and hinges operate properly. c. Check mounting hardware and tighten if necessary.
Truck Cab	<ul style="list-style-type: none"> a. Inspect cab for evidence of damage during shipment. b. Check door latches, hinges and windows for proper operation. c. Check seat and belts to see that they are properly installed, and that the seat is adjustable.
Controls and Instruments	<ul style="list-style-type: none"> a. Check all controls for freedom of operation. b. Refer to operation instructions and check all instruments for normal readings and proper operation (Chapter 2 Section III).
Fire Fighting System and Accessories	<ul style="list-style-type: none"> a. Inspect handline reel, rewind motor and swivel joint for proper installation and operation. Unwind handline fully and rewind halfway by manual means and halfway by use of the rewind motor. b. Check operation of all water system valves. Insure that drain valves are closed. c. Check all external suction, inlet, and discharge connections to see that caps are in place and secure.
Engine	<ul style="list-style-type: none"> a. Check crankcase oil level and inspect oil on dipstick for cleanliness. b. Examine air cleaner element for dirty or restricted condition. c. Examine mounting hardware and tighten as necessary. d. Inspect engine and piping connections for evidence of leakage. Repair leaks and replenish lost fluid. e. Clean away any obstruction to cooling air flow to radiator.

Table 4-1. Inspection Prior To Use (Continued).

DESCRIPTION	INSPECTION TO BE PERFORMED
Engine (Continued)	<ul style="list-style-type: none"> f. Check cooling system level and antifreeze protection if required. g. Check engine, starter and instrumentation wiring for proper connections and condition of wiring insulation. h. Check tension of fan and alternator drive belts. Belts should be tight enough to allow ½ inch deflection midway between the pulleys.
Transmission Clutch and Transfer Case	<ul style="list-style-type: none"> a. Check fluid levels, adding fluid as required. b. Check external hydraulic lines for evidence of leakage, Tighten or replace loose or defective fittings. c. Check operation of shift selectors.
Electrical System	<ul style="list-style-type: none"> a. Check battery electrolyte level and state of charge. b. Check battery cable connections. Tighten and clean. c. Check the siren/speaker system for proper operation. d. Check the emergency beacon for proper operation. e. Check all lights for burned out bulbs, loose connections, and dirty or broken lenses. f. Check to insure all circuits function properly.
Steering System level.	<ul style="list-style-type: none"> a. Check steering reservoir for proper fluid b. Check axle vents to insure freedom from obstruction. c. Examine steering hose connections for evidence of leakage. Tighten as required. d. Check steering stop adjustment. Adjust if required. e. Check steering system for proper operation during road test.
Chassis and Running Gear	<ul style="list-style-type: none"> a. Check all lubricant levels. b. Check tire inflation.

Table 4-1. Inspection Prior To Use (Continued).

DESCRIPTION	INSPECTION TO BE PERFORMED
Chassis and Running Gear (Continued)	<ul style="list-style-type: none"> d. Inspect tires for serious cuts or bruises. Remove foreign objects lodged in the tread. e. Check all wheel mounting nuts for proper torque. f. Check front and rear suspension for proper mounting.
Fuel System	<ul style="list-style-type: none"> a. Check fuel level and replenish if necessary. b. Drain sediment from filter housing and check condition of fuel filter. c. Inspect fuel line connections for evidence of leakage. Tighten as required. d. During cold weather, drain moisture accumulation from fuel tank before operation of vehicle.
Brake System	<ul style="list-style-type: none"> a. Check fluid level, and replenish if necessary. b. Inspect brake lines for evidence of leakage. Tighten or replace loose or defective fittings. c. Check operation of brakes.

**Section III. ORGANIZATIONAL PREVENTIVE
MAINTENANCE CHECKS AND SERVICES (PMCS)**

General	Para. 4-6	Organizational PMCS Procedures	Para. 4-7
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4-6. GENERAL.

- a. The necessary preventive maintenance checks and services (PMCS) that are to be performed at the organizational level are listed and described in Table 4-2. To insure that the 250 GPM Mini-Pumper is ready for operation at all times, the vehicle must be systematically inspected so that defects can be discovered and corrected before they result in equipment damage or failure.
- b. The preventive maintenance checks and services (PMCS) in Table 4-2 are arranged in a logical sequence requiring minimum time and motion on the part of the person(s) performing the check or service.

4-7. ORGANIZATIONAL PMCS PROCEDURES.

- a. *Purpose.* Your preventive maintenance checks and services table lists the inspections and care of your equipment required to keep it in good operating condition.
- b. *Interval Column.* The interval column tells you when to perform a certain check or service.
- c. *Item To Be Inspected Column.* The item to be inspected column lists the components or assemblies of the vehicle to be inspected or serviced.
- d. *Procedure Column.* The procedure column for your PMCS table tells you how to do the required checks and services. Carefully follow these instructions.
- e. *Reporting Or Correcting Deficiencies.* Defects discovered during operation of the vehicle should be noted for future maintenance as soon as the operation has ceased. Stop operation immediately if a deficiency is noted which would damage the equipment if operation is continued. Report any malfunctions or failures on the proper DA Form 2404, or refer to DA PAM 738-750.

Table 4-2. Organizational Preventative Maintenance Checks and Services (PMCS)

		W - Weekly					Q - QUARTERLY	A - ANNUALLY	M - Monthly	S - SEMI ANNUALLY
ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE			
	W	M	Q	S	A					
1.		●				Firehose Nozzle	<p align="center">HOSE REEL ASSEMBLY</p> Visually inspect gasket, bumper, and O-ring for deformation, brittleness, or wear. Inspect baffle on sleeve for structural damage which might cause a improper spray pattern. Inspect threads on base and sleeve for damage. Repair or replace defective parts.			
2.		●				Gauges, Control Knobs, and Switches	<p align="center">PUMP COMPARTMENT ASSEMBLY</p> Perform operational check on all gauges, control knobs, and switches. Visually inspect all gauges, control knobs and switches for damage. Replace damaged or faulty parts as necessary.			
3.		●				Lights	<p align="center">HOSE BODY ASSEMBLY</p> Perform operational checks on hose bed pick-up lights, rear warning lights, tail lights, and compartment lights. Inspect for defective lamps, bulbs, or damaged lenses. Replace defective parts.			
4.			●			Priming Pump	<p align="center">FIREFIGHTING SYSTEM</p> Perform operational check on priming pump motor. Visually inspect pump for corrosion or structural damage. Replace priming pump if defective or damaged.			
5.			●			Fire Pump	Perform operational check on fire pump. Visually inspect pump for corrosion or structural damage. Repair or replace pump if defective or damaged.			
6.	●					Coolant Level	<p align="center">ENGINE COOLING SYSTEM</p> <p align="center">WARNING</p> <p align="center">Allow engine to cool 15 minutes before removing filler cap.</p> Visually inspect coolant for rust or impurities. Check coolant level. Add coolant as necessary.			
7.	●					Fan Belt	Visually inspect fan belt for signs of cracks, breaks, or wear. Replace belt if any signs of wear are evident.			
8.			●			Thermostat Housing up.	Visually inspect thermostat housing for corrosion or structural damage. Inspect the sealing surface for corrosion build up.			
9.			●			Water Pump	Replace any damaged or defective parts. Visually inspect the front support bearing for damage or excessive wear. Inspect water pump body for cracks, corrosion, or excessive wear. Replace water pump if defective or damaged parts are found.			
10.				●		Radiator	Visually inspect radiator for signs of leakage, corrosion, or other structural damage. Refer to next higher level of maintenance for repair.			

**Table 4-2. Organizational Preventative Maintenance
Checks and Services (PMCS) (Continued)**

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
11.				●		Radiator Piping	Visually inspect radiator piping for signs of leakage or corrosion. Inspect piping for loose or missing clamps. Replace any defective parts.
12.			●			Air Cleaner Filter	Visually inspect air cleaner for free air flow. Replace air clear filter if clogged or dirty.
13.			●			Fuel Filter	Visually inspect the fuel filter for clogged or dirty passages. Replace fuel filter if clogged or dirty.
14.			●			Injection Pump and Lines	Visually inspect injection pump and lines for leakage, corrosion, or other structural damage. Replace fuel lines if damaged. Repair or replace injection pump if defective.
15.		●				Engine Assembly	<p style="text-align: center;">ENGINE AND ACCESSORIES</p> Visually inspect engine for signs of rust, pitting, or structural damage. Perform operational check. Refer to next higher level of maintenance for replacement.
16.		●				Batteries	Visually inspect built-in hydrometer located on top of the battery. If hydrometer shows clear or light yellow replace defective battery.
17.		●				Alternator and Belts	Visually inspect alternator bracket for corrosion or other structural damage. Inspect alternator for signs of pitting, scoring or other structural damage. Inspect alternator belt for evidence of cracks, breaks, wear and proper tension. Replace any defective parts. Refer to next higher level of maintenance for repair.
18.			●			Diesel Glow Plug System	Perform operational check. Check electrical connections. If system is defective replace glow plugs.
19.		●				Starter	Visually inspect starter for corrosion or other structural damage. Perform operational check. Replace starter if defective. Refer to next higher level of maintenance for repair.
20.			●			Intake Manifold	Visually inspect intake manifold for signs of pitting, corrosion, or structural damage. Inspect for loose, damaged, or missing attaching hardware. Replace intake manifold if damaged. Replace missing or damaged attaching hardware.
21.			●			Exhaust Manifold	Visually inspect exhaust manifold for signs of pitting, corrosion, or structural damage. Inspect for loose, damaged, or missing attaching hardware. Replace exhaust manifold if damaged. Replace missing or damaged attaching hardware.
22.			●			Rocker Arm Cover	Visually inspect rocker arm covers for signs of corrosion or other structural damage. Inspect for loose, damaged or missing attaching hardware. Replace rocker arm covers if damaged. Replace missing or damaged attaching hardware.
23.			●			Dipstick and Tube	Visually inspect the dipstick and filler tube for any signs of pitting, chips, corrosion, or any other signs of structural damage. Replace dipstick or filler tube if any damage is found.

Table 4-2. Organizational Preventative Maintenance Checks and Services (PMCS) (Continued)

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
24.					●	Engine Mountings	<p>Visually inspect engine mounting brackets for signs of pitting, scoring, chips, and other structural damage. Refer to next higher level of maintenance for replacement.</p> <p>CAB ASSEMBLY, LIGHTS, SWITCHES GAUGES, CONTROLS, AND INDICATORS</p> <p>WARNING Deadly fumes are discharged by this equipment in operation. Death by suffocation may result if operated indoors, without exhaust gases being ducted outdoors. Make sure that air intake is free of debris and is large enough not to restrict air flow.</p>
25.		●				Controls	<p>With engine running and parking brake secure, perform Indicators, and operational check of electrical controls, indicators, Gauges and gauges. Repair or replace any defective controls, indicators, or gauges.</p>
26.		●				Lights	<p>Perform operational check on headlights, parking lights, turn signal lights, spot lights, front warning lights, and roof beacon light. Visually inspect lights for defective lamps or bulbs, or damaged lenses. Replace or repair defective lamps, bulbs, or lenses.</p>
27.	●					Siren/Public	<p>Perform operational check on siren/public address system. Address System Visually inspect siren and external speaker for damage. Replace siren/public address system or external speaker if defective.</p>
28.			●			Heater/Defroster	<p>Perform operational check on heater/defroster system. Visually inspect heater/defroster system for missing, loose, or damaged mounting hardware. Replace heater/defroster if defective or damaged. Replace missing or damaged mounting hardware.</p>
29.		●				Cab Panels	<p>Visually inspect cab panels for rust or other structural damage. Replace damaged cab panels. Refer to next higher level of maintenance for repair of cab panels.</p>
30.					●	Cab/Body	<p>ELECTRICAL SYSTEM Visually inspect respective cab or body harness for breaks, Wiring Harness cracks, or fraying. Inspect for loose or missing mounting hardware. Visually inspect terminal posts located in the engine compartment and rear step assembly for loose or broken connections. Replace defective or missing hardware. Replace damaged cab or body wiring harness.</p>

Table 4-2. Organizational Preventative Maintenance Checks and Services (PMCS) (Continued)

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
31.			●			Propeller Shafts	<p>PROPELLER SHAFT ASSEMBLY</p> <p>Visually inspect propeller shafts for damage, misalignment, and unusual noises. Inspect center support bearing, universal joints and slip yokes for corrosion, structural damage, and loose or missing hardware. Lubricate rear propeller shaft, constant velocity joint, and slip yoke on the front propeller shaft if unusual noises are evident. If noise(s) continues replace defective parts. Replace any damage parts that are found.</p>
32.			●			Transmission	<p>TRANSMISSION ASSEMBLY</p> <p>Visually inspect transmission assembly for pitting, scoring, or other structural damage. Check for loose or missing attaching hardware. Perform operational check on shift control lever and linkage. Check transmission fluid level. Add fluid if necessary. Replace loose or missing hardware. Replace transmission if defective or damaged. Refer to next higher level of maintenance for repair.</p>
33.			●			Clutch	<p>CLUTCH ASSEMBLY</p> <p>Visually inspect clutch assembly for pitting, scoring, or other structural damage. Check for loose or missing attaching hardware. Perform operational check on clutch pedal and linkage. Check clutch reservoir fluid level. Add fluid if necessary. Replace loose or missing hardware. Replace clutch if defective or damaged. Refer to next higher level of maintenance for repair.</p>
34.			●			Transfer Case	<p>TRANSFER CASE ASSEMBLY</p> <p>Visually inspect transfer case assembly for pitting, scoring, or other structural damage. Check for loose or missing attaching hardware. Perform operational check on transfer case shift lever and linkage. Check transfer case fluid level. Add fluid if necessary. Replace loose or missing hardware. Replace transfer case if defective or damaged. Refer to next higher level of maintenance for repair.</p>
35.		●				Wheels and Tires	<p>WHEEL ASSEMBLY</p> <p>Visually inspect wheel rims for pitting, corrosion, or other structural damage. Inspect wheel rims for loose or missing lug nuts. Replace any defective or missing parts.</p>
36.		●				Brake System	<p>BRAKE SYSTEM</p> <p>Visually inspect brake system for corrosion or other structural damage. Inspect brake lines for damage or leakage. Perform operational check on brake system. Inspect brake system reservoir for proper level. Add silicone fluid if necessary. Replace any defective or missing parts.</p>
37.		●				Parking Brake	<p>Perform operational check on parking brake control. Visually Control inspect control linkage for corrosion or structural damage. Replace or adjust any defective parts.</p>

Table 4-2. Organizational Preventative Maintenance Checks and Services (PMCS) (Continued)

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
38.		●				Front Disc Brakes	Visually inspect front disc brakes for cracks, scores, spotting, or other structural damage to the caliper's. Inspect condition of brake lining. Replace front disc brakes or brake lining if defective or worn parts are found.
39.		●				Rear Drum Brakes	Visually inspect rear drum brakes for cracks, scores, deep grooves, and out-of-round. Inspect inside of drums for smoothness heat checking, and spotting. Inspect condition of brake lining. Replace rear brake drums or brake lining if defective or worn parts are found.
40.			●			Steering System	Visually inspect pitman arm, tie rods, connecting rods, and steering shock absorber for corrosion, cracks, bends, dents or other structural damage. Replace any damaged parts. STEERING ASSEMBLY
41.			●			Power Steering	Visually inspect power steering gear, pump, and piping System for signs of leakage, corrosion, and other structural damage. Inspect power steering reservoir for proper level. Add fluid if necessary. Inspect power steering pump belt for evidence of cracks, breaks, wear, and proper tension. Replace any defective or damaged parts. POWER STEERING SYSTEM
42.				●		Front Suspension	Visually inspect U-bolts, shock absorbers, leaf springs hangers, shackles, and shock absorber brackets for pitting, nicks, looseness or other structural damage. Inspect for loose or missing attaching hardware. Replace any defective or damaged parts. FRONT SUSPENSION ASSEMBLY
44.				●		Wheel Hub/Rotor	Visually inspect dust cap, brake rotor, and hub for corrosion, cracks, pitting, looseness, or other structural damage. Inspect screws and studs for distortion, damaged heads & screws. Replace any damaged or defective parts. REAR SUSPENSION ASSEMBLY
45.				●		Rear Suspension	Visually inspect stabilizer bar, U-bolts, shock absorbers, brackets, leaf springs, spring hangers and shackles for corrosion, cracks, pitting, distortion, or other structural distortion. Inspect all attaching hardware for cracks, looseness, or damaged threads. Replace any defective or damaged parts. REAR AXLE ASSEMBLY
46.				●		Wheel Bearings	Visually inspect bearing caps for damage or distortion. Inspect bearing for cracks, corrosion, or other structural damage. Replace wheel bearing seals and any other defective parts.
47.				●		Hub and Drum	Visually inspect dust cap, brake drum, and hub for corrosion, cracks, pitting, looseness, or other structural damage. Inspect screws and studs for distortion or damaged threads. Replace any damaged or defective parts.

Table 4-2. Organizational Preventative Maintenance Checks and Services (PMCS) (Continued)

		W - Weekly	Q - QUARTERLY	A - ANNUALLY	M - Monthly	S- SEMI ANNUALLY	
ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
48.			●				Axle Shaft Visually inspect axle shaft for signs of torsional fractures or other indications of impending failure. Replace shaft if damaged.
49.				●			Differential Side Gear and Pinion Visually inspect differential assembly for pitting, scoring, ridges, corrosion, or other structural damage. Inspect thrust surfaces, differential case halves surfaces, spider trunions and differential gears for worn surface areas warping, distortion, or other structural damage. Inspect differential pinion and side gear teeth for wear or damage. Replace any damaged or defective parts.
50.				●			Axle Shaft Visually inspect axle shaft for signs of torsional fractures or other indications of impending failure. Replace shaft if damaged.
51.				●			Differential Side Gear and Pinion Visually inspect differential assembly for pitting, scoring, ridges, corrosion, or other structural damage. Inspect thrust surfaces, differential case halves surfaces, spider trunions and differential gears for worn surface areas warping, distortion, or other structural damage. Inspect differential pinion and side gear teeth for wear or damage. Replace any damaged or defective parts.
52.			●				Front Bumper and Tow Hooks Visually inspect front bumper and tow hooks for signs of pitting, warping, distortion, corrosion, or other structural damage, Replace any damaged parts.
53.				●			Frame, Brackets, and Cross Members Visually inspect frame, frame-mounted brackets, and cross members for signs of pitting, warping, distortion, corrosion, or other structural damage. Refer to next higher level of maintenance for replacement

Section IV. LUBRICATION INSTRUCTIONS

Lubrication Instructions	Para. 4-9	General	Para. 4-8
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4-8. GENERAL.

The lubrication section illustrates and lists items of the 250 GPM MiniPumper Firefighting Truck which require lubrication checks and services. Detailed lubrication instructions for the transmission clutch, transfer case, and brake system assemblies can also be found under the appropriate organizational maintenance paragraphs.

NOTE

Park truck on levellest ground possible to check oil levels.

Clean fittings before and after lubricating with a dry, lint-free cloth.

Keep all external parts that do not require lubrication, free of lubricants. Before lubricating, clean lint, dust, or grease from the lubrication points.

Keep all lubricants in closed containers and store them in a clean, dry place away from external heat. Do not allow lint, dust, dirt, or other foreign matter to mix with lubricants. Keep all lubrication equipment clean and ready for use.

Operate the equipment immediately after lubrication to distribute the lubricant to all moving parts.

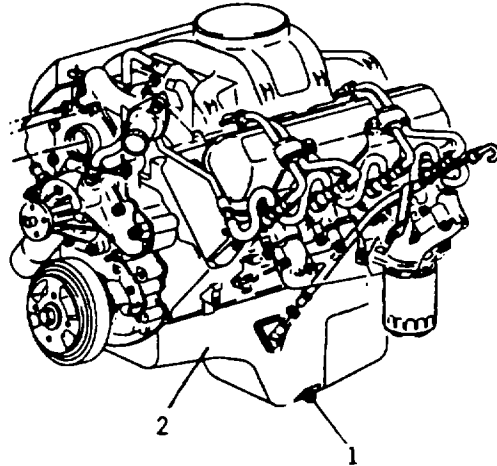
THESE LUBRICATION INSTRUCTIONS ARE MANDATORY.

4-9. LUBRICATION INSTRUCTIONS.

a. Engine Lubrication.

(1) Changing Engine Oil.

- (a) Bring the engine to operating temperature and shut off the engine. Remove the drain plug (1) from the bottom of the oil pan (2) and drain the engine oil into a suitable container.

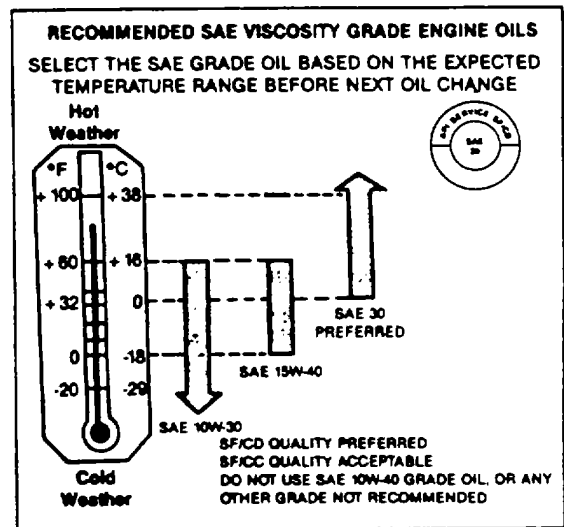


- (b) Install drain plug (1) in the bottom of the oil pan (2). Torque the drain plug to 17 ft-lbs (23 N-m).
- (c) Fill the crankcase using seven quarts (6.5 liters) of SAE 30 oil (Appendix D, Item 31) to a point above the "ADD" line.

- (2) Oil Change Interval. It is recommended that the engine oil be changed every 7,500 miles (12,500 km), 250 hours or 6 months, which ever occurs first.
- (3) SAE Oil Viscosity Recommendations.

- (a) CC category oil (Equivalent to MIL-2104B) describes oils for diesel engines which meet the requirements of military specification MIL-L-2104B. These oils provide low temperature protection from sludge and rust and are designed to perform moderately well at high temperatures.

Table 4-3. SAE Oil Viscosity Recommendations.



- (b) CD Category oil (Equivalent to Series 3 and MIL-L-45199B) describes oils for diesel engines which meet the requirements of Series 3 specification and MIL-L-45199B.

4-9. LUBRICATION INSTRUCTIONS (Continued).**b. Transmission Lubrication.**

- (1) Oil Level Check. Remove fill plug (1) and inspect level of transmission fluid. Fluid level should be level with filler plug hole.
- (2) Adjusting Oil Level.

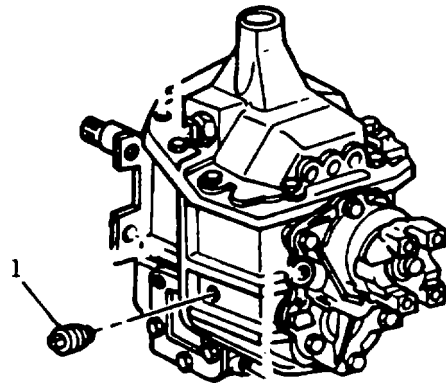
NOTE

It is absolutely necessary that the oil put into the transmission be clean. Oil must be handled in clean containers, fillers, etc. to prevent foreign material entering the transmission.

With fill plug (1) removed, fill transmission with DEXRON II fluid (Appendix D, Item 32). Fill fluid is level with filler plug hole. Replace fill plug (1). Torque fill plug to 17 ft-lbs (23 N•m).

(3) Fluid Recommendations.

- (a) Dexron, Dexron II and type C-3 oils (DDA approved SAE 10W or SAE 30) are recommended for use in the transmission.
- (b) Type C-3 oil is the only fluid approved for use in off-highway applications.



- (c) Use type C-3 SAE 30 (Appendix D, Item 31) in all applications where ambient temperature is consistently above 86°F.(30°C).
- (d) Some Dexron II fluids (Appendix D, Item 32) are also qualified as type C-3 oils and may be used in off-highway applications. However, a Dexron fluid which is not a qualified type C-3 oil is not approved for use in off-highway applications.

(4) Service Transmission.

- (a) Transmission fluid should be changed at 7,500 miles (12,500 km), then every 30,000 miles (50,000 km).

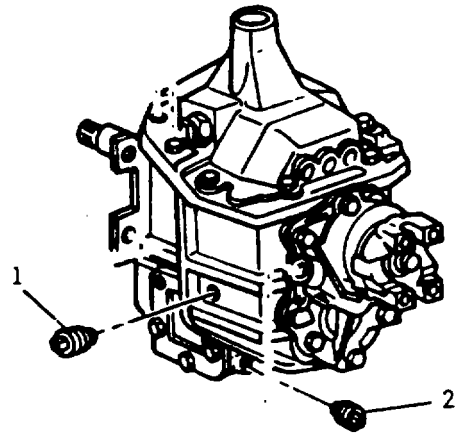
CAUTION

Containers that have been used for any anti-freeze solution should not be used for transmission oil.

4-9. LUBRICATION INSTRUCTIONS (Continued).

b. Transmission Lubrication (Continued).

- (b) Place a clean container below drain plug (1). Remove fill plug (2), then remove drain plug (1). Drain the transmission fluid.
- (c) Remove container of used transmission fluid. Replace drain plug (1). Using DEXRON II fluid (Appendix D, Item 32), fill transmission until fluid is level with fill plug hole. Replace fill plug (2). Torque both drain and fill plugs to 17 ft-lbs (23 N•m).



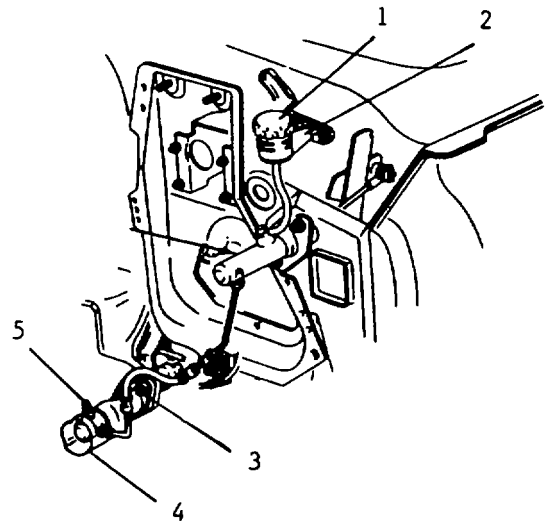
c. Clutch Lubrication.

- (1) Fluid Level Check. Remove cap (1) from reservoir (2) and inspect clutch fluid level.
- (2) Adjusting Fluid Level. Fluid level in the reservoir should reach the bottom of the diaphragm when it is in place in the reservoir. Replace fluid as necessary. Replace cap (1).

NOTE

Do not use fluid which has been bled from another system to fill the reservoir.

- (3) Fluid Recommendations. Silicone brake fluid which meets the requirements of military specification MIL-B-46167 are recommended.



4-9. LUBRICATION INSTRUCTIONS (Continued).

c. Clutch Lubrication (Continued).

(4) Clutch System Bleeding.

- (a) Remove two secondary cylinder mounting bolts (3). Remove secondary cylinder (4).

NOTE

Check and refill reservoir as needed while bleeding so air will not be drawn into the system.

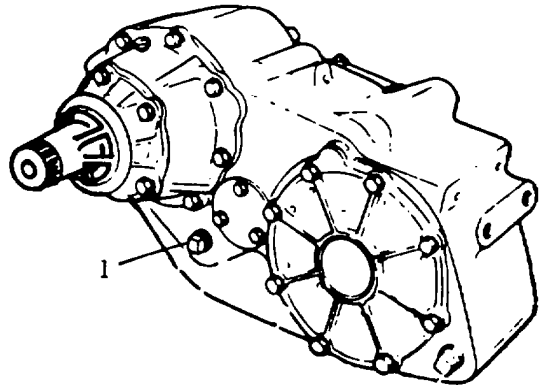
- (b) Hold the clutch pedal down, open the bleeder screw (5) to let air and fluid escape. Close bleeder screw (5). Let clutch pedal up. Repeat step (b) until all air is out of system.
- (c) Install the secondary cylinder (4) and mounting bolts (3). Tighten mounting bolts to 13 ft.-lbs. (18 N•m). Refill as needed.

d. Transfer Case Lubrication.

- (1) Oil Level Check. Remove fill plug (1) and inspect the level of the transfer case assembly. Fluid level should be filled approximately one inch below fill plug (1).
- (2) Adjusting Oil Level. With fill plug (1) removed, fill transfer case with DEXRON II fluid (Appendix D, Item 32). Fill until fluid level is approximately one inch below fill plug hole. Replace fill plug (1). Torque to 32 ft.-lbs (44 N•m).

(3) Fluid Recommendations.

- (a) Dexron, Dexron II and type C-3 oils (DDA approved SAE 10 W or SAE 30) are recommended for use in the transfer case (Appendix D, Item 32).
- (b) Type C-3 oil is the only fluid approved for use in off-highway applications.
- (c) Use type C-3 SAE 30 (Appendix D, Item 31) in all applications where ambient temperature is consistently above 85°F (300C).
- (d) Some Dexron II fluids are also qualified as type C-3 oils and may be used in off-highway applications. However, a Dexron fluid which is not a qualified type C-3 oil is not approved for use in off-highway applications.

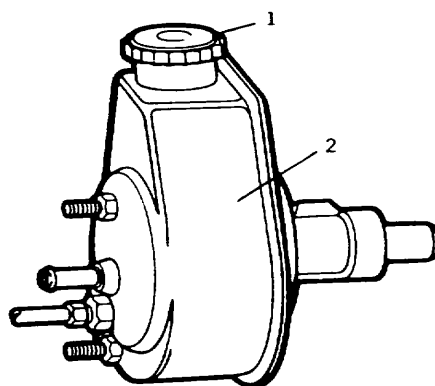
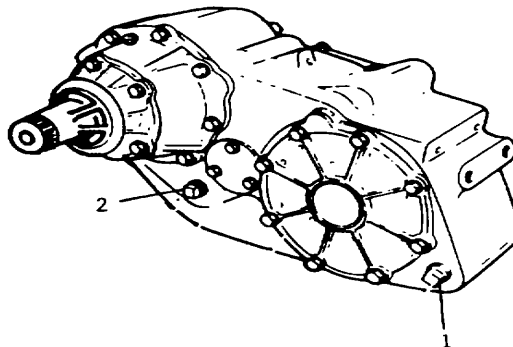


4-9. LUBRICATION INSTRUCTIONS (Continued).

c. Transfer Case Lubrication (Continued).

(4) Transfer Case Service.

- (a) Transfer case fluid should be changed at 7,500 miles (12,500 km), then every 30,000 miles (50,000 km).
- (b) Place a clean container below drain plug (1). Remove fill plug (2), then remove drain plug (1). Drain the transfer case fluid.
- (c) Remove container of used transfer case fluid. Replace drain plug (1). Using DEXRON II fluid (Appendix D, Item 32) fill transfer case until fluid is approximately one inch below fill plug hole. Replace fill plug (2). Torque both fill and drain plugs to 32 ft-lbs (44 N-m).

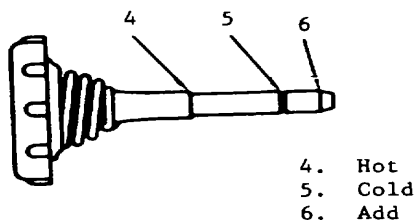


e. Power Steering System Lubrication.

(1) Fluid Level Check.

- (a) Run the engine until it reaches normal operating temperature, then shut engine off.
- (b) Remove cap (1) from reservoir (2) located on streetside front of engine.
- (c) Check fluid level on cap (1) dipstick.

- (2) Adjusting Fluid Level. Fluid level should be between the "HOT" and "COLD" marks on the fill cap indicator.



4-9. LUBRICATION INSTRUCTIONS (Continued).

e. Power Steering Lubrication (Continued).

(3) Fluid Recommendations.

- (a) Dexron, Dexron II and type C-3 oils (DDA approved SAE 10 W or SAE 30) are recommended for use in the power steering system.
- (b) Type C-3 oil is the only fluid approved for use in off-highway applications.
- (c) Use type C-3 SAE 30 (Appendix D, Item 31) in all applications where ambient temperature is consistently above 86°F (30°C).
- (d) Some Dexron II fluids (Appendix D, Item 32) are also qualified as type C-3 oils and may be used in off-highway applications.

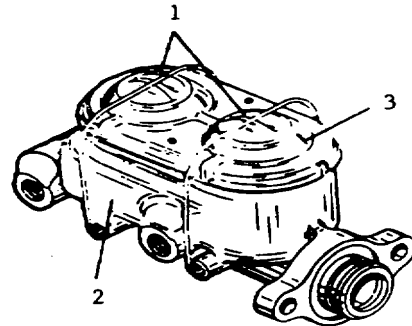
(4) Power Steering System Bleeding.

- (a) When checking the fluid level after the power steering system has been serviced, air must be bled from the system.
- (b) Fill the pump fluid reservoir to the proper level and let the fluid settle for at least two minutes.
- (c) Start engine and let it run for a few seconds. Turn engine off.
- (d) Add fluid as necessary. Repeat the above procedure until the fluid level remains constant after running the engine.
- (e) Raise the front end of the vehicle so that the wheels are off the ground.

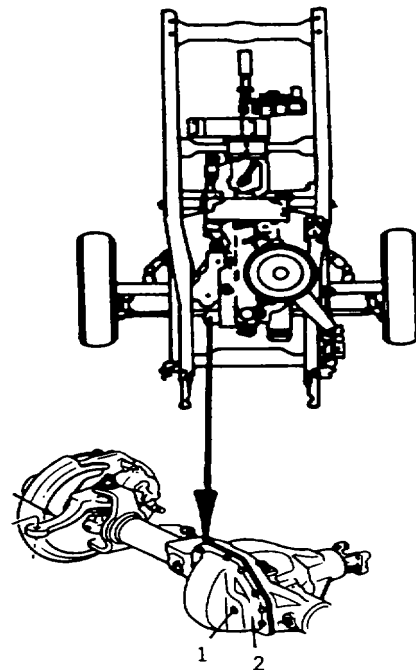
- (f) Start the engine. Slowly turn steering wheel left and right, lightly contacting the wheel stops. Add power steering fluid if necessary.
- (g) Lower the vehicle and turn the steering wheel slowly from lock to lock.
- (h) Stop the engine. Check fluid level and refill as required.

4-9. LUBRICATION INSTRUCTIONS (Continued).**f. Brake System Lubrication.**

- (1) Fluid Level Check.
 - (a) With a flat heat screwdriver, loosen retaining clips (1) from reservoir (2).
 - (b) Remove lid (3) from reservoir (2) located near streetside rear of engine.
 - (c) Inspect fluid level.
- (2) Adjusting Fluid Level. Fluid level in the reservoir should be 1/4 inch below the lowest edge of each filler opening. Replace fluid as necessary. Replace lid (3) and secure with retaining clips (1).
- (3) Fluid Recommendations. Silicone brake fluid which meets the requirement of military specification MIL-B-46167 are recommended (Appendix D, Item 4).

**g. Front Axle Lubrication.**

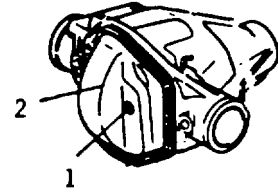
- (1) Oil Level Check. Remove fill plug (1) on front axle differential (2) and inspect front axle fluid level.
- (2) Adjusting Fluid Level. Fluid level in the front axle differential should be level with fill plug hole. Replace fluid necessary. Replace fill plug (1). Torque to 18 ft-lbs (25 N•m).
- (3) Fluid Recommendations. Lubricating gear oil which meets the requirements of military specification MIL-L-2105C.



4-9. LUBRICATION INSTRUCTIONS (Continued).

h. Rear Axle Lubrication.

- (1) Oil Level Check. Remove fill plug (1) on rear axle differential (2) and inspect rear axle fluid level.
- (2) Adjusting Fluid Level. Fluid level in the rear axle differential should be level with fill plug hole. Replace fluid as necessary. Replace fill plug (1). Torque to 18 ft-lbs (24 N•m).



- (3) Fluid Recommendations. Lubricating gear oil which meets MIL-L-2105C.

- 1. ENGINE CRANKCASE
- 2. KING PIN AND BALL JOINTS
- 3. FRONT DIFFERENTIAL
- 4. TRANSMISSION
- 5. PROPELLER SHAFT YOKES
- 6. TRANSFER CASE
- 7. FIRE PUMP
- 8. PROPELLER SHAFT YOKE
- 9. REAR DIFFERENTIAL
- 10. REAR WHEEL BEARINGS
- 11. BRAKE PEDAL SPRING
- 12. BRAKE MASTER CYLINDER
- 13. PARKING BRAKE CABLE
- 14. FRONT WHEEL BEARINGS
- 15. TIE ROD ENDS
- 16. CONNECTING ARM
- 17. POWER STEERING RESERVOIR
- 18. COOLING SYSTEM

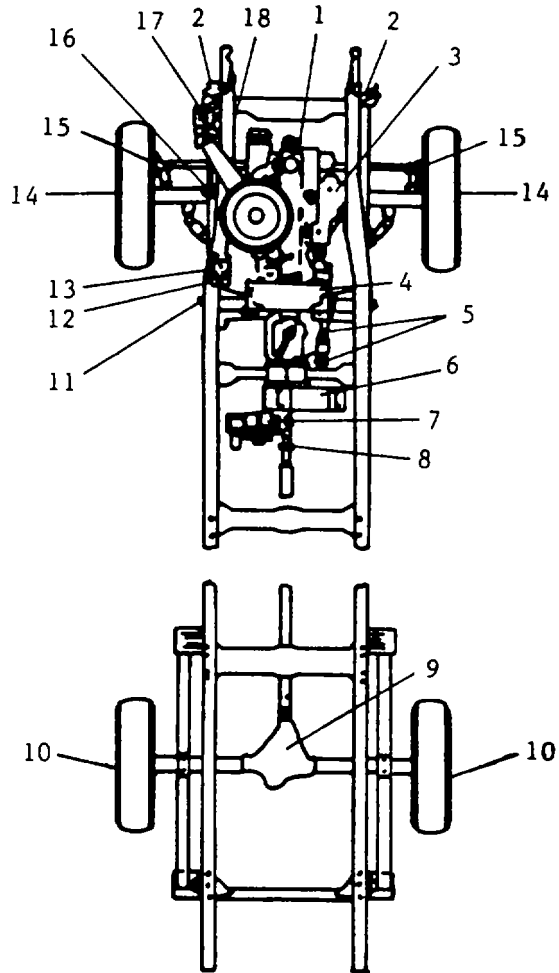


FIGURE 4-1. CHASSIS LUBRICATION SCHEMATIC.

4-9. LUBRICATION INSTRUCTIONS (Continued).

i. Chassis Lubrication.

(1) Engine Crankcase.

Every 7,500 miles, not to exceed 6 months or 250 hours of operation, drain oil and fill with 7 quarts (6.5 liters) of SAE 30 motor oil (Appendix D, Item 31). Check fluid level after filling to ensure proper fluid level.

(2) King Pin and Ball Joints.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation. Pressure gun should be held on fitting until new grease appears.

(3) Front Differential.

Remove fill plug, add Type MIL-L2105C gear oil (Appendix D, Item 30) to the level of fill plug hole, every 6 months, not to exceed 250 hours of operation.

(4) Transmission.

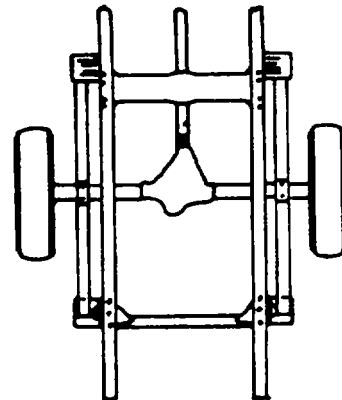
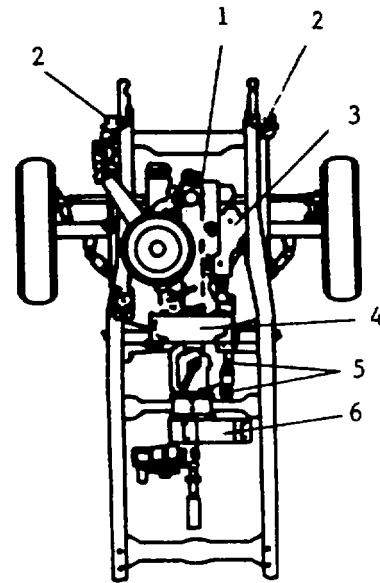
Check transmission fluid weekly. Change transmission fluid every 6 months, 6,000 miles or 250 hours of operation. Use DEXRON II type oil (Appendix D, Item 32).

(5) Propeller Shaft Yokes.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation. Pressure gun should be held on fitting until new grease appears.

(6) Transfer Case.

Change transfer case fluid every 6 months, 6,000 miles or 250 hours of operation. Use DEXRON II type oil (Appendix D, Item 32).



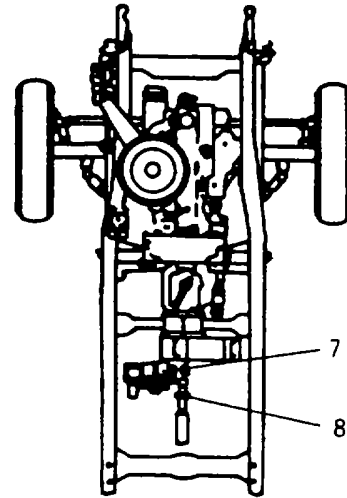
4-9. LUBRICATION INSTRUCTIONS (Continued).

i. Chassis Lubrication (Continued).

(7) Fire Pump.

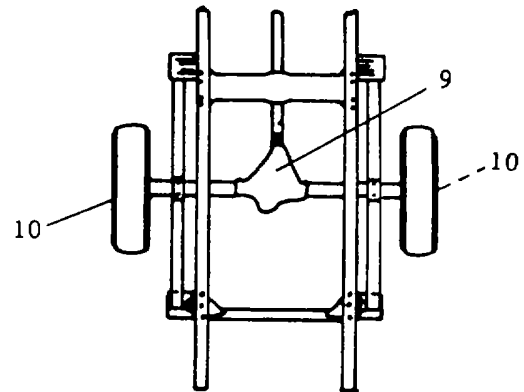
**WARNING
DO NOT OVER-FILL**

- (a) Keep pump transmission filled with oil to the level of the 1/8 inch NPT plug, on the right side of the transmission. To add oil, remove filler plug, add oil through opening.
- (b) Use SAE #20 engine oil (Appendix D, Item 31). Drain the transmission by removing magnetic drain plug from bottom and refill with new lubricant after each accumulated 100 hours of operation, or at least twice a year. Flush pump transmission case with kerosene or flushing oil once a year.



(8) Propeller Shaft Yoke.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation. Pressure gun should be held on fitting until new grease appears.



(9) Rear Differential.

Remove fill plug, add type MIL-L2105C gear oil (Appendix D, Item 30) to the level of fill plug, hole, every 6 months, not to exceed 250 hours of operation.

(10) Rear Wheel Bearings.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation. Pressure gun should be held on fitting until new grease appears.

4-9. LUBRICATION INSTRUCTIONS (Continued).

i. Chassis Lubrication (Continued).

(11) Brake Pedal Spring.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation.

Pressure gun should be held on fitting until new grease appears.

(12) Brake Master Cylinder.

Check fluid in reservoir monthly.

Fill brake master cylinder with silicone brake fluid, Type MIL-B46167 (Appendix D, Item 4).

(13) Parking Brake Cable.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation.

Pressure gun should be held on fitting until new grease appears.

(14) Front Wheel Bearings.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation.

Pressure gun should be held on fitting until new grease appears.

(15) Tie Rod Ends.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation.

Pressure gun should be held on fitting until new grease appears.

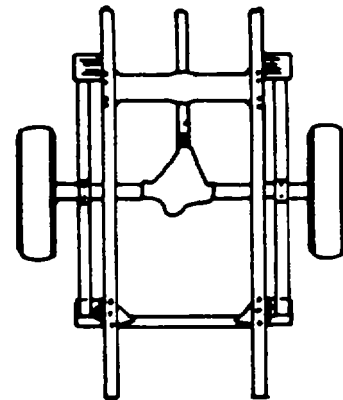
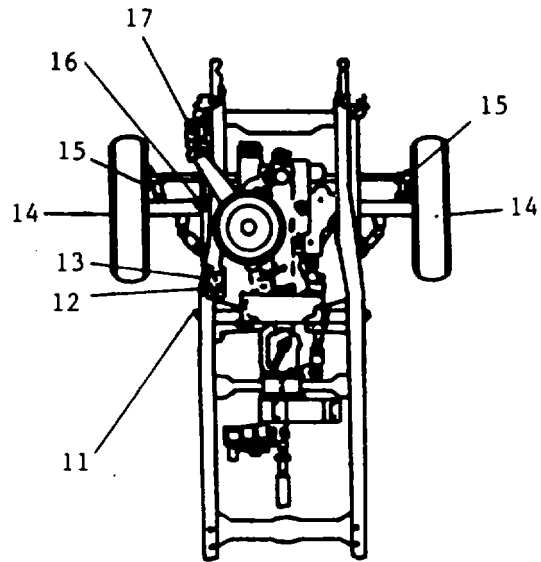
(16) Connecting Arm.

Lubricate with Type MPG grease (Appendix D, Item 15), every 5,000 miles, not to exceed 6 months or 250 hours of operation.

Pressure gun should be held on fitting until new grease appears.

(17) Power Steering Reservoir.

Check fluid level weekly. Fill with DEXRON II type oil (Appendix D, Item 32).



4-9. LUBRICATION INSTRUCTIONS (Continued).

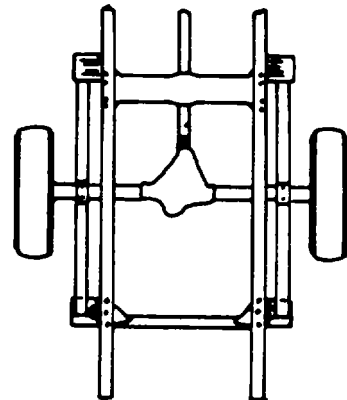
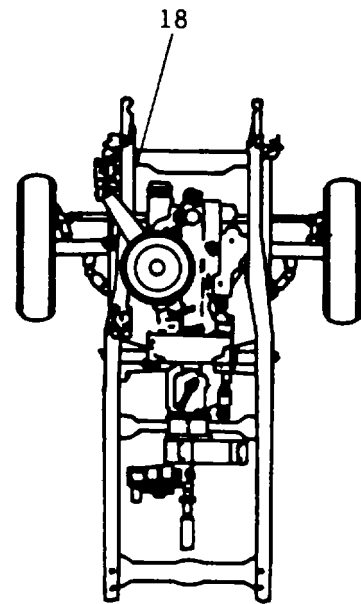
i. Chassis Lubrication (Continued).

(18) Cooling System.

WARNING

Do not remove radiator cap when system is hot, as this can result in injury to personnel.

Check coolant level before operation by looking at coolant recovery tank. Level should be at the "COLD LEVEL" mark. If coolant level is below the mark, add a 50/50 mixture of good quality ethylene glycol antifreeze and water to recovery tank.



Section V. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES

General	Para. 4-10	Symptom Index	Para. 4-11
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4-10. GENERAL.

- a. The table in this section lists the common malfunctions which may occur during the operation or maintenance of the Mini-Pumper Firefighting Truck or components. The troubleshooting should be performed in the order given in each malfunction.
- b. This manual cannot list all malfunctions that may occur nor all tests, inspections, or corrective actions. If a malfunction is not listed or it is not corrected by the listed corrective actions, notify your supervisor.

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NOTE

Before you use the troubleshooting tables, be sure you have performed all applicable operating checks and verified that a malfunction exists. When a corrective action is performed, verify that the action has corrected the malfunction. All malfunctions deferred to the next higher level of maintenance must be reported according to the instructions given in DA PAM 738-750.

Table 4-4. Organizational Troubleshooting Chart.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

HOSE REEL ASSEMBLY

1. FIRE HOSE NOZZLE LEAKS.
 - Step 1.* Check for defective o-ring in swivel coupling.
Replace O-ring (paragraph 4-19).
 - Step 2.* Check for defective nozzle assembly.
Replace nozzle (paragraph 4-19).
2. HOSE REEL REWIND INOPERATIVE.
 - Perform operational check on rewind motor.
 - Replace rewind motor (paragraph 4-22).

HOSE BODY ASSEMBLY

3. BACK-UP LIGHTS INOPERATIVE.
 - Step 1.* Inspect for loose or burnt out bulbs.
Secure or replace bulbs (paragraph 4-50).
 - Step 2.* Inspect for loose connections.
Tighten connections.
 - Step 3.* Inspect for blown fuse.
Replace fuse. If new fuse blows, check for short to ground in circuit from fuse through gear selector or back-up light switch.
4. STOP LIGHTS INOPERATIVE.
 - Step 1.* Inspect for loose or burnt out bulbs.
Secure or replace bulbs (paragraph 4-50).
 - Step 2.* Inspect for loose connections.
Tighten connections.
 - Step 3.* Inspect for blown fuse.
Replace fuse. If new fuse blows, check for short to ground in circuit between fuse and lights.

Table 4-4. Organizational Troubleshooting Chart (Continued).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

5. REAR WARNING LIGHTS INOPERATIVE.

Step 1. Inspect for loose or burnt out bulbs.

Secure or replace bulbs (paragraph 4-49).

Step 2. Inspect for loose connections.

Tighten connections.

Step 3. Inspect for blown fuse.

Replace fuse. If new fuse blows, check for short to ground in circuit between fuse and lights.

FIRE PUMP, PIPING SYSTEM, VALVES AND CONTROL RODS

6. ENGINE SPEEDS TOO HIGH FOR REQUIRED FIRE PUMP CAPACITY OR PRESSURE.

Check for inaccurate tachometer.

Replace tachometer if necessary (paragraph 4-34).

7. DISCHARGE VALVES DIFFICULT TO OPERATE.

Check for lack of lubrication.

Lubricate discharge and suction valves using a good grade petroleum base or silicon base grease (Appendix D, Item 16).

8. DISCHARGE VALVE CONTROL ROD IS DIFFICULT TO OPERATE.

Check for lack of lubrication.

Lubricate control linkages with oil.

9. PRESSURE RELIEF VALVE DOES NOT RECOVER AND RETURN TO ORIGINAL PRESSURE SETTING AFTER OPENING VALVES.

Check for faulty pressure relief valve.

Replace pressure relief valve (paragraph 4-68).

10. UNABLE TO ATTAIN PROPER SETTING ON RELIEF VALVE.

Step 1. Check if strainer in supply line from pump discharge to control valve is blocked.

Turn pressure relief valve control flush knob counterclockwise to flush strainer.

Step 2. Check for "Hunting Condition."

Clean strainer in relief valve system following Step 1 above.

11. WATER PRESSURE IS TOO HIGH OR TOO LOW.

Check for defective pressure relief valve.

Replace pressure relief valve (paragraph 4-68).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

12. FIRE PUMP WILL NOT ENGAGE.

Inspect for leaks in air system.

Locate and repair leaks as required (leakage, if external, maybe detected audibly.)

13. FIRE PUMP WILL NOT PRIME OR LOSES PRIME.

Step 1. Check electric priming system for adequate electric current.

Increase engine speed as required. Engine rpm should be adequate to maintain truck electrical system while providing enough speed for initial pumping operation.

Step 2. Check priming system for defects. If pump is tight, but primer pulls less than 22 inches (558.8mm) vacuum, it could indicate excessive wear.

Replace priming pump (paragraph 4-69).

Step 3. Check for air leaks.

Attempt to locate and correct air leaks.

CAUTION**Tighten packing only when the pump is primed and running at low speeds. Always allow slight leakage of water through the stuffing box to insure against over-tightening of the packing.****Check pump packing during attempt to locate leakage. If leakage through the packing becomes excessive, a light tightening of the knurled plunger is the only adjustment required.**

14. LEAK AT FIRE PUMP PACKING.

Check if pump packing adjustment is loose.

CAUTION**Tighten packing only when the pump is primed and running at low speeds. Always allow slight leakage of water through the stuffing box to insure against over-tightening of the packing.****Tighten the knurled plunger. Install new packing by removing the threaded cylinder head and injection plunger.**

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

15. WATER IN FIRE PUMP GEAR BOX.

- Step 1. Check for leak coming from above pump causing spillage onto pump gear box.
Tighten piping connections as required.
- Step 2. Check for excessive leakage at pump packing.
Follow procedures for "LEAK AT FIRE PUMP PACKING" above.

ENGINE COOLING SYSTEM

16. ENGINE COOLANT OVERHEATING.

- Step 1. Inspect pressure cap for proper seal.
Replace pressure cap (paragraph 4-72).
- Step 2. Check coolant level.
Fill cooling system to proper level (paragraph 4-72).
- Step 3. Check for loose or worn fan belt.
Replace worn fan belt (paragraph 4-76). Tighten fan belt.
- Step 4. Check for damaged coolant hoses.
Replace coolant hoses (paragraph 4-77).
- Step 5. Check for damaged or inoperative thermostat.
Replace thermostat (paragraph 4-79).
- Step 6. Check for scale or deposits in cooling system.
Clean and flush cooling system (paragraph 4-72).
- Step 7. Check for damaged radiator.
Replace radiator (paragraph 4-81). Refer to next higher level of maintenance for repair.

17. ENGINE COOLANT LOSS.

- Visually inspect hoses, radiator, clamps, water pump, thermostat housing, radiator drain, engine soft plugs for leakage.
Tighten connections as necessary.

ENGINE EXHAUST SYSTEM

18. VIBRATING OR RATTLING FROM EXHAUST SYSTEM.

- Visually inspect for loose or misaligned components.
Align and tighten connections. Replace damaged hanger brackets or clamps (paragraph 4-104).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

19. RESTRICTED EXHAUST SYSTEM.

- Step 1. Inspect for damaged or kinked tubing exhaust.
Replace the damaged condition (paragraph 4-101).
- Step 2. Inspect tail pipe end for obstructions.
Remove obstruction, or if end is crimped, straighten outlet.

20. EXHAUST LEAKAGE AND/OR NOISE.

- Step 2. Inspect all exhaust system component joints, couplings and connections for exhaust leaks.
Tighten clamps, couplings, or connectors.
- Step 2. Inspect for misaligned components.
Align and tighten connections.
- Step 3. Inspect exhaust manifold for damage.
Replace manifold (paragraph 4-111).
- Step 4. Inspect for burned or rusted out exhaust pipe.
Replace exhaust pipe (paragraph 4-101).

ENGINE AND ACCESSORIES

21. ENGINE WILL NOT CRANK.

- Step 1. Inspect for loose or corroded battery cables.
Tighten or replace battery cables (paragraph 4-106).
- Step 2. Check voltage to starter and starter solenoid.
Replace starter if defective (paragraph 4-109).
- Step 3. Check generator output and generator belt tension.
Replace generator or tighten belt (paragraph 4-107).

22. ENGINE CRANKS SLOWLY - WILL NOT START.

- Step 1. Check for loose connections at batteries, engine block, and starter.
Tighten loose connections.
- Step 2. Check condition of batteries.
Replace defective batteries (paragraph 4-106).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

23. ENGINE CRANKS NORMALLY - WILL NOT START.

CAUTION

Use care to direct the fuel away from the source of ignition.

Step 1. Remove inlet hose to fuel pump. Connect a hose to the pump from a separate container that contains fuel. Open the filter air bleed.

Replace fuel pump (paragraph 4-85).

Step 2. Inspect for incorrect or contaminated fuel.

Replace fuel.

24. ENGINE STARTS BUT WILL NOT CONTINUE TO RUN AT IDLE SPEED.

Step 1. Disconnect fuel return line at injection pump and route hose to a metal container. Connect a hose to the injection pump connection and route it to the metal container. Crank the engine and allow it to idle.

Replace check valve or hose.

Step 2. Inspect that the timing mark on the injection pump is aligned with the mark on the front cover.

Reset timing.

25. ENGINE WILL NOT RETURN TO IDLE SPEED.

Inspect linkage for proper alignment or binding.

Adjust or replace linkage (paragraph 4-33).

26. NOTICEABLE LOSS OF POWER.

Step 1. Inspect air cleaner element for damage or blockage.

Replace air cleaner element (paragraph 4-83).

Inspect for blocked fuel filter.

Replace fuel filter (paragraph 4-84).

Remove fuel tank and check filter.

Replace fuel tank filter (paragraph 4-88).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

27. ENGINE OVERHEATS.

- Step 1.* Check coolant system for leaks.
Fill cooling system as necessary (paragraph 4-72).
- Step 2.* Inspect for loose or worn fan belts.
Replace worn fan belt (paragraph 4-76). Tighten fan belt.
- Step 3.* Check if thermostat is stuck closed.
Replace thermostat (paragraph 4-79).
- Step 4.* Inspect for leaks at head gasket.
Replace head gasket (paragraph 4-79).

CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES,
CONTROLS AND INDICATORS

28. HEADLIGHTS INOPERATIVE.

- Step 1.* Inspect for loose connections to sealed beam.
Secure loose connections.
- Step 2.* Inspect for defective sealed beam units.
Replace sealed beam (paragraph 4-116).

29. FRONT SIDE MARKER LIGHTS INOPERATIVE.

- Step 1.* Inspect for loose or burnt out bulbs.
Secure or replace bulbs (paragraph 4-117).
- Step 2.* Inspect for loose connections.
Tighten connections.
- Step 3.* Inspect for blown fuse.
Replace fuse. If new fuse blows, check for short to ground between fuse panel and lights.
- Step 4.* Test light switch.
Replace switch if defective (paragraph 4-130).

30. TURN SIGNALS INOPERATIVE.

- Step 1.* Inspect for loose or burnt out bulbs.
Secure or replace bulbs (paragraph 4-50).
- Step 2.* Inspect for loose connections.
Tighten connections.

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	<i>Step 3.</i>	Inspect for blown fuse. Replace fuse. If new fuse blows, check for short to ground between fuse panel and lights.
	<i>Step 4.</i>	Check for defective turn signal flasher. Replace flasher (paragraph 4-130).
31. HAZARD WARNING LIGHTS INOPERATIVE.	<i>Step 1.</i>	Inspect for loose or burnt out bulbs. Secure or replace bulbs (paragraph 4-130).
	<i>Step 2.</i>	Inspect for loose connections. Tighten connections.
	<i>Step 3.</i>	Inspect for blown fuse. Replace fuse. If new fuse blows, check for short to ground between fuse panel and lights.
	<i>Step 4.</i>	Check for defective warning light flasher. Replace flasher (paragraph 4-130).
32. ROOF WARNING LIGHT OPERATES BUT FAILS TO ROTATE.	<i>Step 1.</i>	Check for defective internal motor. Replace motor (paragraph 4-122).
	<i>Step 2.</i>	Check for binding mechanism. Disassemble, clean and reassemble as required.
33. ROOF WARNING LIGHT OPERATES INTERMITTENTLY WHILE ROTATING.		Check if internal brush is too worn or corroded. Clean or replace brush (paragraph 4-122).
34. FRONT WARNING LIGHTS INOPERATIVE.	<i>Step 1.</i>	Inspect for loose or burnt out bulbs. Secure or replace bulbs.
	<i>Step 2.</i>	Inspect for loose connections. Tighten connections.
	<i>Step 3.</i>	Inspect for blown fuse. Replace fuse. If new fuse blows, check for short to ground in circuit between fuse and lights.

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
35. WINDSHIELD WIPERS INOPERATIVE.	<i>Step 1.</i> Check for blown fuse.	Replace fuse.
	<i>Step 2.</i> Inspect for damaged motor.	Replace motor (paragraph 4-123).
36. WINDSHIELD WASHER INOPERATIVE.	<i>Step 1.</i> Check for defective pump assembly by applying air pressure to tubing connection on side of pump assembly. Pump is defective if fluid is not pumped through outlet port at top center of pump.	Replace pump assembly (paragraph 4-125).
	<i>Step 2.</i> Check for leaking air line or loose connection.	Tighten connection or replace air line.
37. NOISE FROM SPEEDOMETER.	Inspect cable and casing for kinks, bends or burn marks.	Replace cable or casing (paragraph 4-127).
38. INADEQUATE DEFROSTING.	<i>Step 1.</i> Check that defrost lever is operating.	Adjust as necessary.
	<i>Step 2.</i> Inspect for obstructions in defroster ducts.	Remove any obstructions.
39. ERRATIC HEATER OPERATION.	<i>Step 1.</i> Check coolant level.	Fill to proper level.
	<i>Step 2.</i> Check for kinked heater hoses.	Relieve kinks or replace hoses.
	<i>Step 3.</i> Test blower motor.	Replace if defective (paragraph 4-137).
PROPELLER SHAFT ASSEMBLY		
40. NOISY PROPELLER SHAFT.	Inspect for bent or dented drive shafts.	Replace drive shafts (paragraph 4-186).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

41. PROPELLER SHAFT VIBRATION.

- Step 1. Check for loose or damaged universal joints.
Replace universal joints (paragraph 4-185).
- Step 2. Check to see if drive shaft tubes are out of balance.
Replace drive shaft tubes (paragraph 4-186).

TRANSMISSION ASSEMBLY

42. LUBRICANT LEAKS.

- Step 1. Inspect main drive bearing retainer and gasket for damage or looseness.
Tighten or replace bearing or gasket (paragraph 4-192).
- Step 2. Inspect side cover and gasket for damage or looseness.
Tighten or replace cover or gasket. (paragraph 4-192).
- Step 3. Inspect rear extension seal for damage.
Replace seal (paragraph 4-192).

43. NOISY SHIFTING.

- Step 1. Inspect shift linkage for damage.
Replace linkage (paragraph 4-192).
- Step 2. Inspect clutch linkage for proper adjustment or damage.
Replace or adjust as necessary (paragraph 4-195).

44. SLIPS OUT OF GEAR.

- Step 1. Inspect shift linkage for binding.
Adjust or replace linkage.
- Step 2. Inspect for dirt between clutch housing and transmission.
Clean the mating surfaces.
- Step 3. Inspect for proper alignment.
Align and tighten as necessary.

CLUTCH ASSEMBLY

45. CLUTCH WILL NOT DISENGAGE.

- Step 1. Check for air in the hydraulic system.
Bleed system and check for damage.
- Step 2. Check for proper clutch pedal travel.
Adjust clutch pedal travel.

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

46. CLUTCH SLIPS.
Check clutch linkage for proper adjustment.
Adjust clutch linkage.
47. CLUTCH GRABS.
Inspect engine mounts for loose or damaged hardware.
Refer to next higher level of maintenance for replacement.
48. PEDAL STAYS ON THE FLOOR WHEN DISENGAGED.
Inspect linkage and release bearing for binding.
Free, replace, or lubricate linkage or bearing.

TRANSFER CASE ASSEMBLY

49. EXCESSIVE NOISE.
Step 1. Check lubricant level.
Fill as required (paragraph 4-9).
Step 2. Inspect yoke bolts for looseness.
Tighten yoke bolts.
Step 3. Inspect adapter bolts for looseness.
Tighten adapter bolts.
50. SHIFT LEVER DIFFICULT TO MOVE.
Perform operational check on shift lever.
Refer to next higher level of maintenance.
51. LUBRICANT LEAKING.
Step 1. Inspect for excessive lubricant in case.
Drain to proper level.
Step 2. Inspect for loose or missing hardware.
Tighten or replace.

WHEEL ASSEMBLY

52. EXCESSIVE TIRE WEAR.
Step 1. Check tires for proper inflation.
Inflate to recommended pressure.
Step 2. Inspect shock absorbers for damage.
Replace shock absorbers (paragraph 4-231).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

Step 3. Check front end for proper alignment.

Align the front end.

Step 4. Check tires for proper balance.

Balance wheel/tires.

BRAKE SYSTEM

53. EXCESSIVE BRAKE PEDAL TRAVEL.

Step 1. Check tires for proper inflation.

Inflate to recommended pressure.

Step 2. Check front end for proper alignment.

Align front end.

Step 3. Inspect for worn brake lining.

Replace lining (paragraph 4-208).

Step 4. Inspect for loose calipers.

Tighten calipers.

Step 5. Check fluid in master cylinder.

Fill as necessary (paragraph 4-9).

54. EXCESSIVE BRAKE PEDAL EFFORT.

Step 1. Check for malfunctioning power brake unit.

Replace or repair as necessary (paragraph 4-210).

Step 2. Inspect for worn brake lining.

Replace lining (paragraph 4-208).

Step 3. Check fluid in master cylinder.

Fill as necessary (paragraph 4-9).

55. BRAKES SLOW TO RESPOND.

Step 1. Inspect wheel cylinders for leakage.

Replace as necessary (paragraph 4-233).

Step 2. Check brake pedal linkage for interference or binding.

Adjust or replace as necessary.

56. UNEVEN BRAKING ACTION - SIDE TO SIDE.

Step 1. Inspect wheel cylinders for leakage.

Replace as necessary (paragraph 4-233).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

- Step 2. Inspect for worn brake lining.
Replace brake lining (paragraph 4-208).
 - Step 3. Inspect brake drums or rotors for heat spots or scores.
Replace drums or rotors (paragraph 4-233).
- 57. BRAKES SQUEAK DURING APPLICATION.
 - Step 1. Inspect for uneven brake lining wear.
Replace brake lining (paragraph 4-208).
 - Step 2. Check brake drums for out-of-round.
Replace brake drums (paragraph 4-233).

STEERING ASSEMBLY

- 58. EXCESSIVE PLAY OR LOOSENESS.
 - Step 1. Inspect for worn steering shaft couplings.
Replace couplings (paragraph 4-237).
 - Step 2. Inspect for worn upper ball joints.
Replace ball joints (paragraph 4-237).
 - Step 3. Inspect for loose pittman arm, tie rods or steering arms.
Tighten as necessary.
- 59. HARD STEERING.
 - Step 1. Check tires for proper inflation Inflate to recommended pressure.
 - Step 2. Inspect steering linkage for proper lubrication.
Lubricate as necessary.
 - Step 3. Check front end for proper alignment.
Align front end.

POWER STEERING SYSTEM

- 60. BELT SQUEAL.
 - Inspect for loose belt.
Adjust belt tension (paragraph 4-76).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

61. EXCESSIVE STEERING WHEEL KICK-BACK OR LOOSE STEERING.

Step 1. Inspect system for air in lines.
Add oil to pump reservoir and bleed by operating steering.
Check all connections.

Step 2. Inspect for loose steering gear.
Tighten steering gear.

62. HARD STEERING.

Step 1. Inspect ball joint lubrication.
Lubricate as necessary.

Step 2. Check tires for proper inflation.
Inflate to recommended pressure.

Step 3. Inspect for bent frame.
Refer to next higher level of maintenance.

FRONT AND REAR SUSPENSION ASSEMBLY

63. POOR DIRECTIONAL STABILITY.

Step 1. Inspect ball joint lubrication.
Lubricate as necessary.

Step 2. Check tires for proper inflation.
Inflate to recommended pressure.

Step 3. Inspect for loose wheel bearings.
Adjust wheel bearings.

Step 4. Inspect for broken springs.
Replace springs (paragraph 4-242).

64. FRONT/REAR SHIMMY.

Step 1. Check tires for proper balance.
Balance wheel/tires.

Step 2. Inspect for loose or worn wheel bearings.
Replace wheel bearings (paragraph 4-234).

Step 3. Inspect for malfunctioning shock absorber.
Replace shock absorber (paragraph 4-231).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

- 65. VEHICLE PULLS TO ONE SIDE.
 - Step 1. Check tires for proper inflation.
Inflate to recommended pressure.
 - Step 2. Inspect for broken or sagging front or rear spring.
Replace springs (paragraph 4-242).
- 66. FRONT/REAR END NOISE.
 - Step 1. Inspect ball joints and steering linkage for proper lubrication.
Lubricate as necessary.
 - Step 2. Inspect for worn control arm bushings.
Replace bushings.
 - Step 3. Inspect for loose stabilizer bar.
Tighten as necessary.
 - Step 4. Inspect for loose wheel nuts.
Tighten wheel nuts.

REAR/FRONT AXLE ASSEMBLY

- 67. WHEELS DO NOT DRIVE (PROPELLER SHAFT ROTATING).
Broken axle shaft.
Replace axle shaft (paragraph 4-251).
- 68. LUBRICANT LEAKS THROUGH AXLE SHAFT.
 - Step 1. Worn or incorrectly installed axle shaft oil seal.
Replace axle shaft oil seal.
 - Step 2. Incorrect kind and weight of lubricant.
Drain and fill to specifications (paragraph 4-9).
 - Step 3. Lubricant above specified level.
Drain to proper level.
- 69. LUBRICANT LEAKS AT PINION SHAFT.
 - Step 1. Lubricant above specified level.
Drain to proper level.
 - Step 2. Incorrect kind and weight of oil.
Drain and fill to specifications (paragraph 4-9).

Table 4-4. Organizational Troubleshooting Chart.(Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Restricted axle housing breather valve.

Inspect and correct.

Step 4. Lubricant return passage in differential carrier housing restricted.

Inspect and correct.

Step 5. Universal joints companion flange loose on pinion shaft.

Tighten companion flange to specified torque.

70. CONSTANT NOISE FROM FRONT AXLE.

Improperly lubricated wheel bearings.

Repack wheel bearings (paragraph 4-234).

Section VI. MAINTENANCE OF ACCESSORIES

	Para.		Para.
General.....	4-12	Strainer Replacement.....	4-14
Hard Suction Hose Maintenance.....	4-13	Tire Jack, Handcrank, and	
Extension Ladder, 12 Foot,		Lug Wrench Replacement.....	4-16
Maintenance	4-15		

4-12. GENERAL.

This section contains information on the maintenance of the accessories that are maintainable at the Organizational level.

4-13. HARD SUCTION HOSE MAINTENANCE.

This task covers:

- a. Removal**
b. Installation
c. Testing

INITIAL SETUP:

Tools

Calibrated Pressure Gauge
Water Pump

Materials/Parts

Hard Suction Hose (133-00002)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brake lock set.

REMOVAL

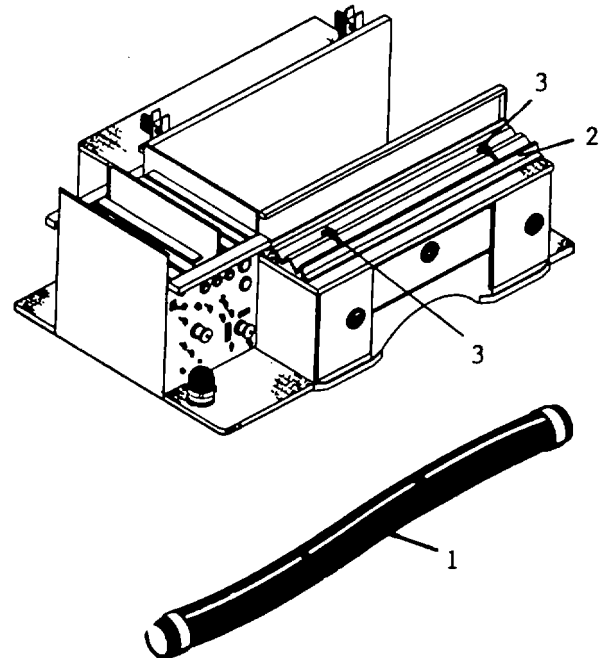
Lift and turn mounting bracket (3) and remove hard suction hose (i) from truck.

INSTALLATION

- a. Insert new hose onto hose bin (2) on streetside of the vehicle.
- b. Secure with mounting brackets (3).

TEST

Perform a hydrostatic test in accordance with page 1962-21, chapter 8, National Fire Protection Association Fire Codes.



4-14. STRAINER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Material/Parts

Strainer (139)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

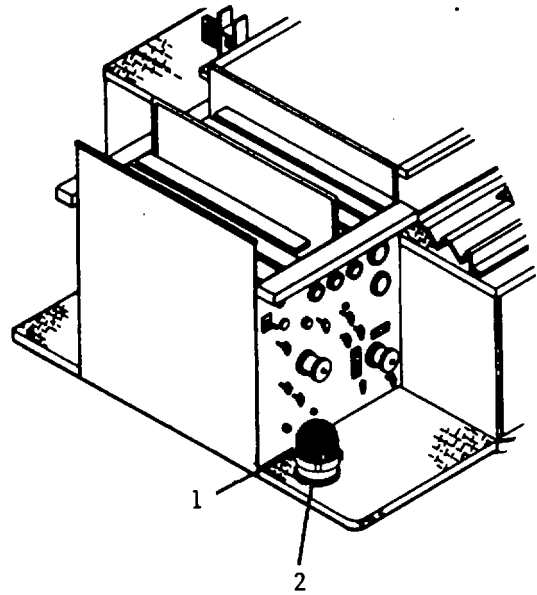
Parking brake and micro-brake lock set.

REMOVAL

Remove damaged or worn strainer (1) by unscrewing counterclockwise from mounting fixture (2).

INSTALLATION

Install new strainer (1) onto mounting fixture (2). Secure by turning strainer clockwise until tight.



4-15. 12 FOOT EXTENSION LADDER MAINTENANCE.

This task covers:

a. Removal

b. Installation

c. Repair

INITIAL SETUP:

Material s/Parts

12 Foot Extension Ladder (ALP-200-12)
Rope

General Safety Instructions

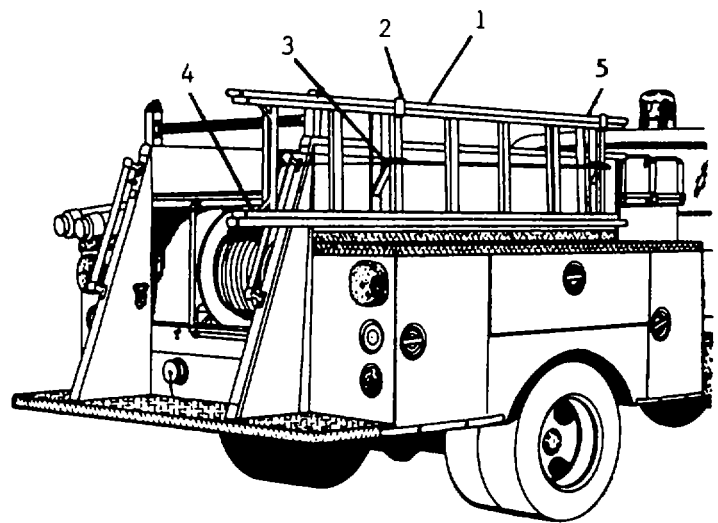
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brake lock set.

REMOVAL

Remove 12 foot extension ladder (1) from curb side brackets (2) on truck.

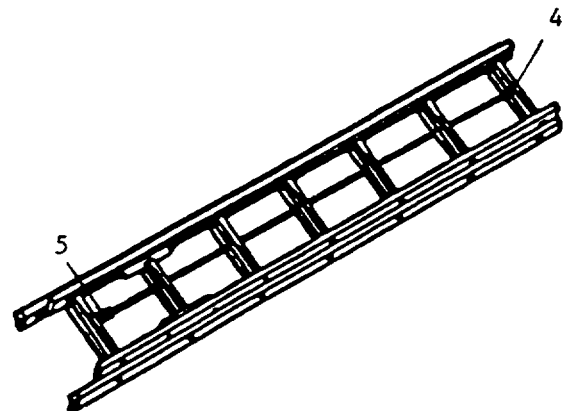
INSTALLATION

Place new ladder on mounting brackets (2) and secure with clamps (3).



REPAIR

- a. Remove remaining pieces of rope from the extension ladder.
- b. Secure one end of the new rope to the bottom rung of the fly ladder (4).
- c. Feed other end through pulley and secure to bed ladder (5) at a convenient point.



4-19. HOSE NOZZLE MAINTENANCE.

This task covers:

a. Removal

b. Installation

c. Repair

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Spanner Wrench

(J-7624)

Materials/Parts

Hose Nozzle (1701)

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

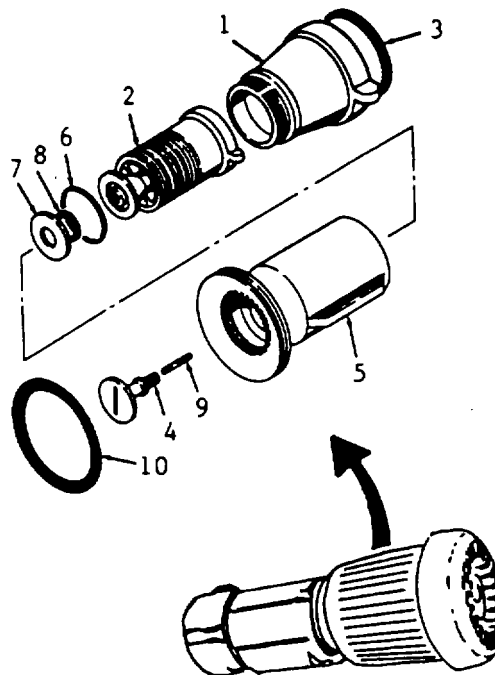
Parking brake and micro-brakelock set

REMOVAL

- a. Using a spanner wrench, turn nozzle base counter-clockwise.
- b. Remove firehose nozzle from truck.

REPAIR

- a. Unscrew connection base (1) from nozzle base (2). Remove gasket (3).
- b. Unscrew baffle (4).
- c. Unscrew nozzle base (2) from sleeve (5).
- d. Remove preformed packing (6), valve disc (7), gasket (8), and pin (9).
- e. Remove bumper (10) only if it must be replaced.
- f. Install new bumper (10), if necessary.
- g. Install new preformed packing (6), new gasket (8), valve disc (7), and new pin (9).
- h. Screw sleeve (5) onto nozzle base (2).
- i. Screw baffle (4) onto nozzle base (2).



- j. Place new gasket (3) in connection base (1). Screw connection base (1) onto nozzle base (2).

INSTALLATION

- a. Install nozzle base by turning clockwise onto hose end.
- b. Tighten with a spanner wrench.

4-20. HOSE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Hose 150 Feet

Equipment Condition

Para. Condition Description

4-19 Firehose Nozzle Removed

REMOVAL

- a. Unwind hose from hose reel
- b. Unscrew end from adapter.

INSTALLATION

- a. Position hose on reel and attach to adapter.
- b. Rewind hose onto reel.
- c. Install firehose nozzle.

4-21. HOSE REEL REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Hose Reel (FR-AA-8057)

Personnel Required: 2

Equipment Condition

Para. Condition Description

4-18 Hose Roller Assembly Removed

4-20 Hose Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set

Batteries disconnected.

4-21. HOSE REEL REPLACEMENT. (Continued)

REMOVAL

- a. Remove cover (1) and disconnect control wire from solenoid (2). Remove compartment light wire.
- b. Remove five nuts (3), lockwashers (4) and bolts (5).
- c. Loosen and remove piping from swivel joint (6).
- d. Slide hose reel assembly from rear compartment.

INSTALLATION

- a. Install hose reel assembly on rear of truck.
- b. Secure to hose body with five bolts (5), lockwashers (4), and nuts (3).
- c. Connect and tighten piping to swivel joint (6).
- d. Install control wiring to compartment light and hose reel motor solenoid (2).
- e. Install cover (1).
- f. Install hose (paragraph 4-20).
- g. Install hose roller assembly (paragraph 4-18).

4-22. MOTOR REPLACEMENT.

This task covers:**a. Removal****b. Installation****INITIAL SETUP:**Tools

General Mechanics Tool Kit

Materials/Parts

Motor (8031)

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set

Batteries disconnected.

4-22. MOTOR REPLACEMENT. (Continued)

REMOVAL

- a. Remove two screws (1) securing solenoid cover (2). Remove solenoid cover (2).
- b. Tag and disconnect two wires on the solenoid (3).
- c. Tag and disconnect two wires on hose reel rewind switch (4).
- d. Remove four nuts (5), washers (6) and bolts (7) securing motor (8) to mount (9). Remove motor (8) from mount (9).

INSTALLATION

- a. Install motor (8) on mount (9) and secure with four bolts (7), washers (6), and nuts (5).
- b. Connect two wires to hose reel rewind switch (4) and remove tags.
- c. Connect two wires to solenoid (3) and remove tag.
- d. Install solenoid cover (2) and secure with two screws (1).
- e. Reconnect battery cables.

4-23. SWIVEL JOINT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Tools**

General Mechanics Tool Kit

Materials/Parts

Swivel Joint (8000)

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set

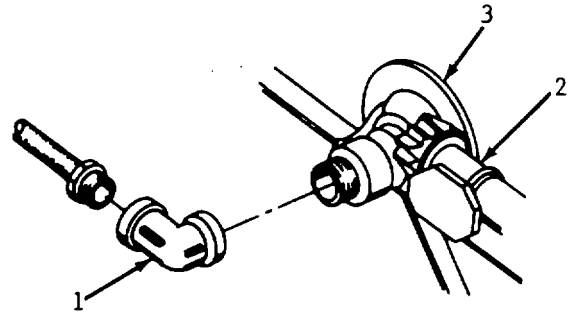
4-23. SWIVEL JOINT REPLACEMENT. (Continued)

REMOVAL

- a. Disconnect piping from swivel (1).
- b. Tighten brake (2) on hose reel (3) and turn swivel (1) off hose reel (3) using a pipe wrench.
- c. Remove swivel joint (1).

INSTALLATION

- a. Install swivel (1) to hose reel (3) assembly and secure using a pipe wrench.



- b. Attach piping to swivel joint (1).

4-24. REWIND SWITCH REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Rewind Switch (8055)

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

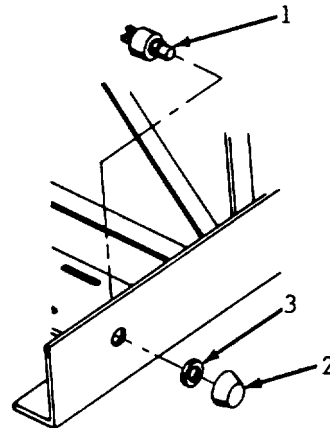
Batteries disconnected.

REMOVAL

- a. Tag and disconnect two wires on hose reel rewind switch (1).
- b. Remove weatherproof cover (2) and nut (3) securing hose reel rewind switch (1).
- c. Remove hose reel rewind switch (1).

INSTALLATION

- a. Install new hose reel rewind switch (1).
- b. Secure hose reel rewind switch (1) using nut (3) and install weatherproof cover (2).

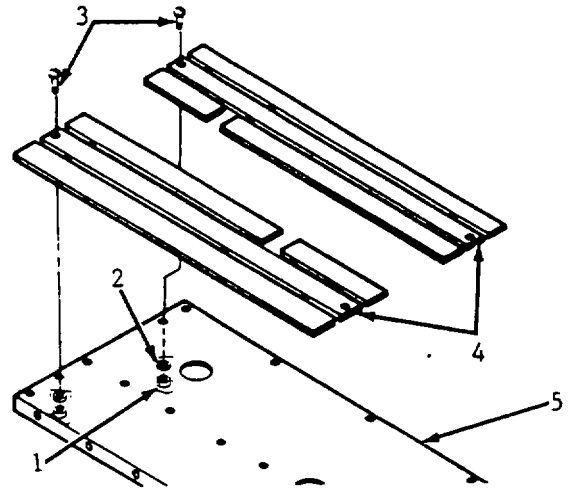


- c. Connect two wires to hose reel rewind switch (1).
- d. Reconnect battery cables.

4-26. HOSE BED FLOORS REPLACEMENT. (Continued)

INSTALLATION

- a. Install hose bed floor (4) on pump compartment roof panel (5).
- b. Secure each hose bed floor (4) with two phillips head screws (3), lockwashers (2) and nuts (1).



4-27. HOSE ROLLERS REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Hose Rollers (129-90004)

Equipment Condition

Para. Condition Description

4-26 Hose Bed Floors Removed

General Safety Instructions

Engine OFF

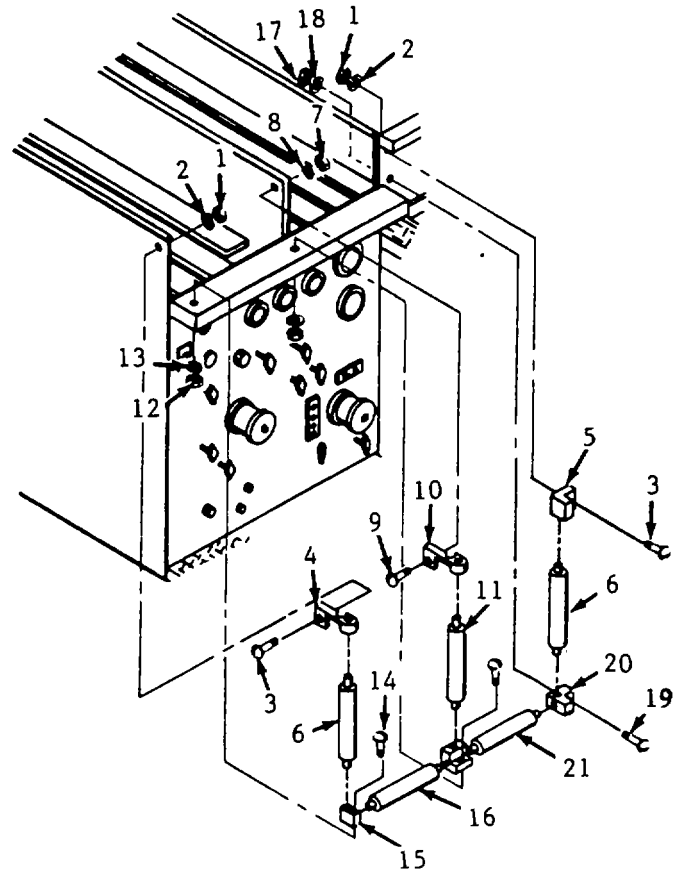
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

4-27. HOSE ROLLERS REPLACEMENT. (Continued)**REMOVAL****NOTE**

Hose roller removal procedures for street side and curb side hose roller assemblies are identical.

- a. Remove two acorn nuts (1), washers (2) and phillips screws (3).
- b. Remove hose roller retaining brackets (4 and 5).
- c. Remove vertical hose rollers (6).
- d. Remove hex nut (7), washer (8) and bolt (9).
- e. Remove hose roller retaining bracket (10) and remove remaining vertical hose roller (11).
- f. Remove hex nut (12), washer (13), and bolt (14).
- g. Remove retaining bracket (15) and hose roller (16).
- h. Remove hex nut (17), washer (18), and bolt (19).
- i. Remove retaining bracket (20) and hose roller (21).

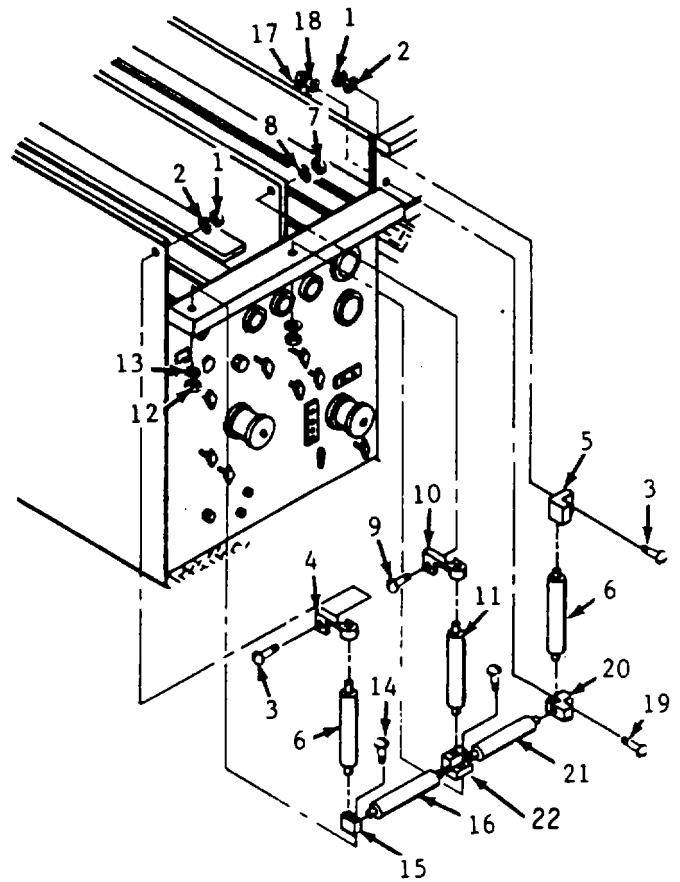
**INSTALLATION****NOTE**

Hose roller installation procedures for street side and curb side hose roller assemblies are identical.

4-27. HOSE ROLLERS REPLACEMENT. (Continued)

INSTALLATION

- a. Position hose roller (21) into mounted retaining bracket (22) and secure in place with mounting bracket (20), bolt (19), washer (18), and hex nut (17).
- b. Position hose roller (16) into mounted retaining bracket (20) and secure in place with mounting bracket (15), bolt (14), washer (13) and hex nut (12).
- c. Position vertical hose roller (11) into mounted retaining bracket (22) and secure in place with mounting bracket (10), bolt (9), washer (8), and hex nut (7).
- d. Position remaining vertical hose rollers (6) into mounted retaining brackets (15 and 20) and secure in place with mounting brackets (4 and 5), two phillips screws (3), washers (2), and acorn nuts (1).
- e. Install hose bed floors (paragraph 4-26).



4-28. HOSE BIN DIVIDERS REPLACEMENT.

This task covers:

a. Removal

b. Installation

c. Testing

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Hose Bin Dividers (101-00041 or 101-00042)

Equipment Condition

Para Condition Description

4-26 Hose Bin Floor Removed

4-27 Hose Roller Assemblies

Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

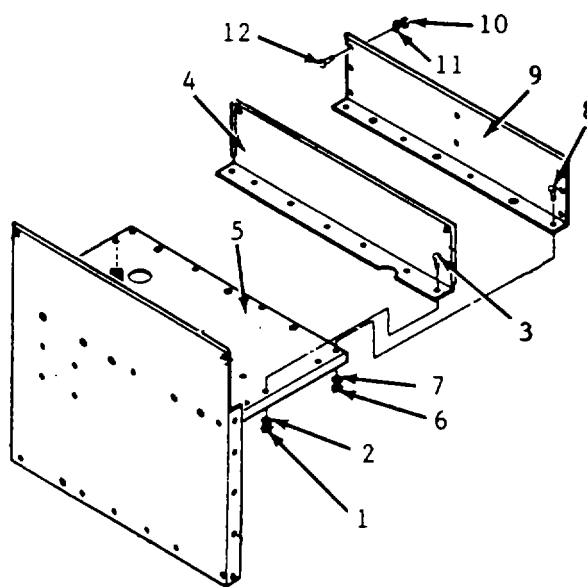
Parking brake and micro-brakelock set

REMOVAL

- a. Remove seven acorn nuts (1), washers (2) and phillips screws (3) securing center divider (4) to roof panel (5).
- b. Remove center divider (4).
- c. Remove seven acorn nuts (6), washers (7) and phillips screws (8) securing rear divider (9) to roof panel (5).
- d. Remove eight acorn nuts (10), washers (11) and phillips screws (12) securing rear divider (9) to fire body.
- e. Remove rear divider (9).

INSTALLATION

- a. Position rear divider (9) on roof panel (5) and secure in place with phillips screws (8), washers (7) and acorn nuts (6).
- b. Secure to fire body with phillips screws (12), washers (11) and acorn nuts (10) c. Position center divider (4) on roof panel (5) and secure in place with



phillips screws (3), washers (2), and acorn nuts (1).

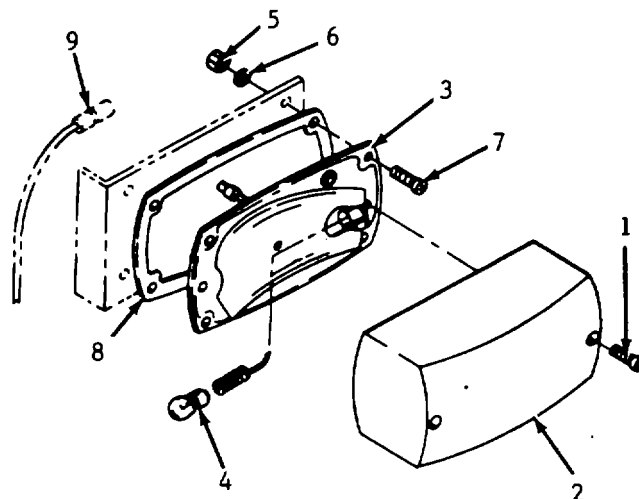
d. Install hose roller assemblies (paragraph 4-27).

e. Install hose bin floor (paragraph 4-26).

4-30. COMPARTMENT LIGHT MAINTENANCE. (Continued)

REMOVAL

- a. Removal two phillip screws (1) securing lens cover (2) to mounting plate (3) and remove lens cover (2).
- b. Remove bulb (4).
- c. Remove two hex nuts (5), washers (6) and phillips screws (7) securing mounting plate (3) to roof panel.
- d. Disconnect pigtail wire (9) and remove mounting plate (3) and gasket (8).

**REPAIR**

- a. Remove two phillips screws (1) securing lens cover (2) to mounting plate (3) and remove lens cover (2).
- b. Replace defective bulb (4).

INSTALLATION

- a. Install pigtail wire (9) through mounting plate (3) and position gasket (8) and mounting plate (3) on roof panel.
- b. Secure with two phillips screws (7), washers (6) and hex nuts (5).
- c. Install bulb (4), lens cover (2), and secure with two phillips screws (1).
- d. Reconnect batteries.

4-32. PUMP PANEL LIGHTS MAINTENANCE.

This task covers:

a. Removal

b. Repair

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

Equipment Condition

Para. Condition Description

4-27 Street Side Hose Rollers

Removed

Materials/Parts

Pump Panel Light

REMOVAL

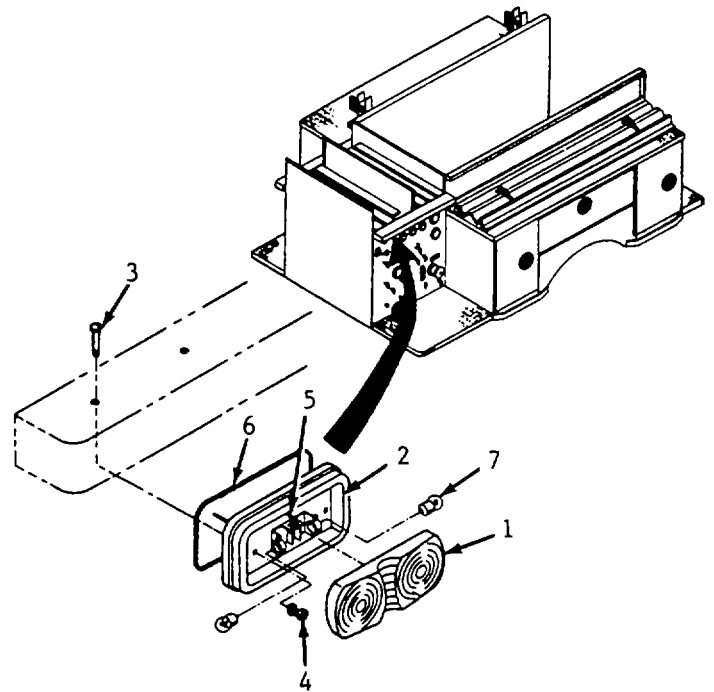
- a. Wedge a screwdriver or other similar tool between the lens cover (1) and mounting plate (2).
- b. Twist tool and the lens cover (1) will "pop" off.
- c. Remove two phillips screws (3) and locknuts (4).
- d. Disconnect wire (5) from light assembly.
- e. Remove mounting plate (2).
- f. Remove gasket (6).

REPAIR

- a. Repair consists of replacement of defective bulb(s) (7) or gasket (6). To remove bulb (7), twist 90° and pull out.

INSTALLATION

- a. Install pigtail wire (5) through mounting plate (2) and position gasket (6) and mounting plate (2) on roof.
- b. Secure with two phillips screws (3) and lock nuts (4).



- c. Position lens cover (1) and secure by pushing it on the mounting plate (2) until it snaps in place.
- d. Install street side hose rollers.
- e. Reconnect batteries.

4-34. TACHOMETER/HOURMETER MAINTENANCE.

This task covers: **a. Removal** **c. Calibrate**
 b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit
 Calibrated Test Gauge

Materials/Parts

Tachometer/Hourmeter (7AIH-24042)

Equipment Condition

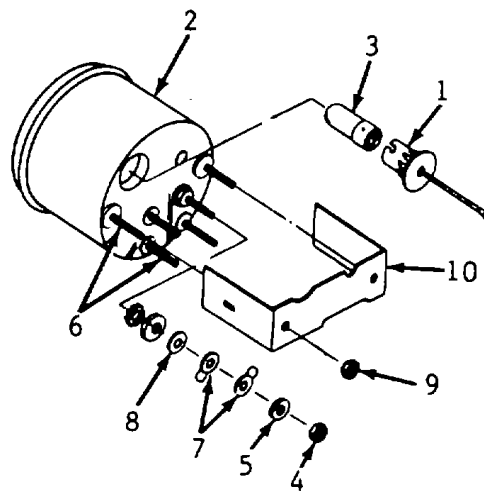
<u>Para.</u>	<u>Condition Description</u>
4-26	Hose Bed Floors Removed
4-27	Hose Rollers Removed
4-28	Hose Bin Dividers Removed
4-30	Compartment Light Removed
4-31	Roof Panel Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

REMOVAL

- a. Pull socket (1) from tachometer (2).
- b. Remove nuts (4) and lockwashers (5) from terminals (6). Tag and remove terminal wires (7) from back of tachometer (2). Do not lose round washer (8).
- c. Remove nuts (9) and mounting bracket (10).



INSTALLATION

- a. Position mounting bracket (10) and place tachometer (2) holding screws through openings in bracket.
- b. Insert nuts (9) and tighten firmly.
- c. Place round washer (8), terminal wires (7), lockwasher (5) and nut on terminal and secure.
- d. If necessary, replace bulb (3) in socket (1).
- e. Install socket (1) in tachometer (2).

CALIBRATE

- a. Position calibrated test gauge to tachometer test port on engine panel.
- b. Start engine and check tachometer against test gauge.
- c. Tachometer reading should match test gauge. If not matched, adjust tachometer accordingly.

4-35. WATER TANK LEVEL GAUGE REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Water Tank Level Gauge (MC-CAR-1)

Equipment Condition

Para. Condition Description

- 4-26 Hose Bed Floors Removed
- 4-27 Hose Rollers Removed
- 4-28 Hose Bin Dividers Removed
- 4-30 Compartment Light Removed
- 4-31 Roof Panel Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

REMOVAL

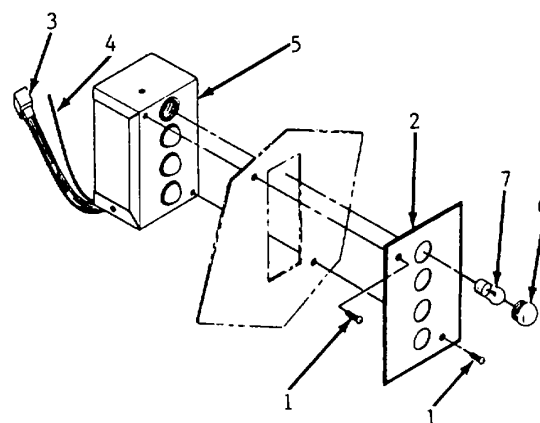
a. Remove two screws (1) and pull plate (2) carefully off of street side pump panel.

b. Unplug connector (3) from control wiring and remove and disconnect tachometer wire (4). Remove water level gauge (5) from pump compartment.

c. If lens cover (6) or bulbs (7) need to be replaced, use the following procedures.

(1) Unscrew lens covers (6) and remove bulb (7).

(2) Insert new bulb (7) and if necessary, new lens cover (6).



INSTALLATION

CAUTION

Improper installation of level gauge may result in inaccurate level readings which may cause damage to the water pump.

a. Connect plug (3) and tachometer wire (4) to connections in pump compartment.

4-35. WATER TANK LEVEL GAUGE REPLACEMENT. (Continued)

- | | |
|---|--|
| <ul style="list-style-type: none"> b. Install water tank level gauge (5) into pump compartment with wire connectors at the bottom and secure to plate (2) with two screws (1). c. Install roof panel (paragraph 431). d. Install compartment light (paragraph 4-30). | <ul style="list-style-type: none"> e. Install hose bin dividers (paragraph 4-28). f. Install hose rollers (paragraph 4-27). g. Install hose bed floors (paragraph 4-26). h. Reconnect batteries. |
|---|--|

4-36. SUCTION AND DISCHARGE STUB CAPS REPLACEMENT.

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Spanner Wrench

Materials/Parts

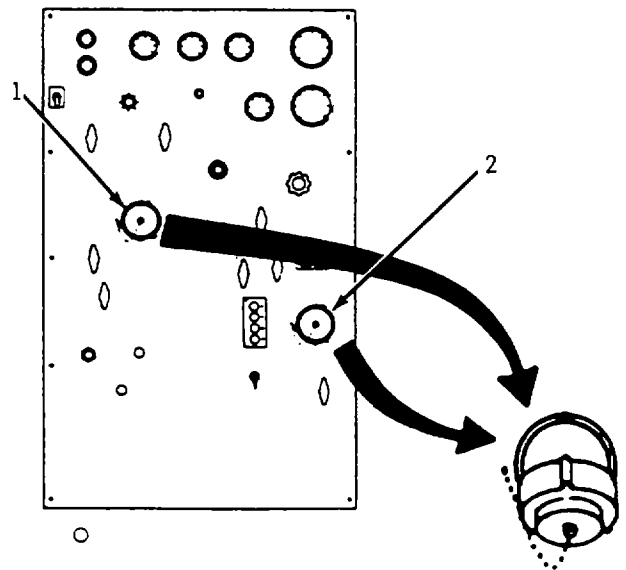
Stub Cap (HCC-38-2.5)

REMOVAL

- a. Close discharge valves before removing stub caps.
- b. Remove stub cap from discharge (1) and suction (2) stubs using a spanner wrench.
- c. Remove chain from stub caps.

INSTALLATION

- a. Install chain on stub caps.
- b. Install discharge (1) and suction (2) stub caps onto stubs with a spanner wrench.
- c. Open discharge valves.



4-37. GAUGES, CONTROL KNOBS, AND SWITCH REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Gauges, Control Knobs, and Switch
as required (Appendix E, Page 27)

Equipment Condition

Para. Condition Description

- 4-26 Hose Bed Floors Removed
- 4-27 Hose Rollers Removed
- 4-28 Hose Bin Dividers Removed
- 4-30 Compartment Light Removed
- 4-31 Roof Panel Removed

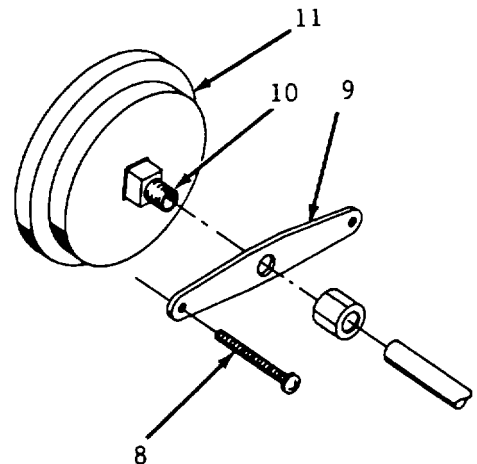
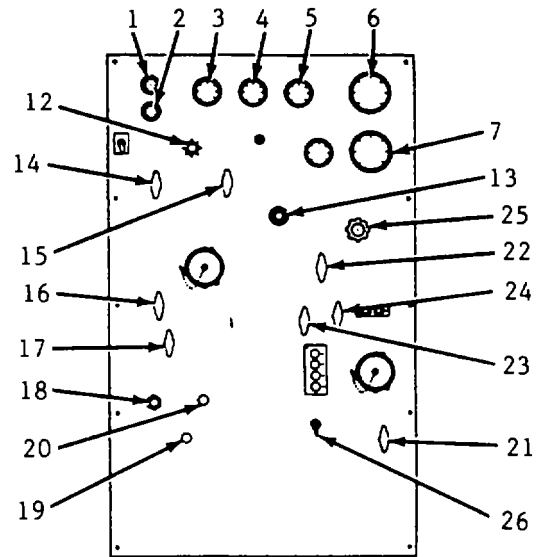
REMOVAL

a. Pressure Gauge Removal.

NOTE

This procedure is typical for the following pressure gauges. OIL TEMPERATURE (1), OIL PRESSURE (2), 2-1/2 OUTLET DISCHARGE PRESSURE (3), #1 PRECONNECT DISCHARGE OUTLET PRESSURE (4), #2 PRECONNECT DISCHARGE OUTLET PRESSURE (5), MASTER PRESSURE (6) AND COMPOUND PRESSURE (7).

- (1) Remove screws (8) from bracket (9).
- (2) Unscrew hose from plug connection (10).
- (3) Slide gauge (11) out of front of panel.



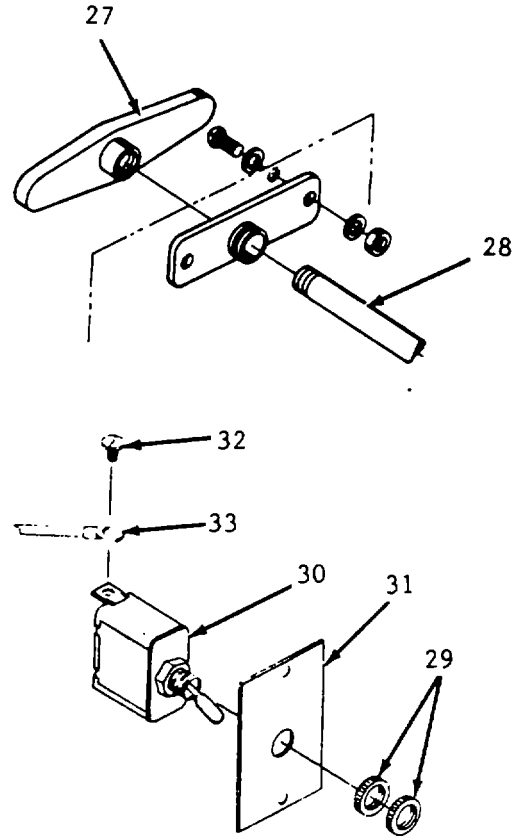
4-37. GAUGES, CONTROL KNOBS, AND SWITCH REPLACEMENT (Continued).

b. Control Knob Removal.

NOTE

This procedure is typical for the following control knobs. ENGINE THROTTLE CONTROL (12), RELIEF VALVE CONTROL FLUSH (13), #1 PRECONNECT DISCHARGE OUTLET CONTROL (14), #2 PRECONNECT DISCHARGE OUTLET CONTROL (15), 2-1/2 INCH DISCHARGE OUTLET CONTROL (16), BOOSTER OUTLET CONTROL (17), PRIMER CONTROL (18), WATER TANK DRAIN (19), 2-1/2 INCH DISCHARGE OUTLET DRAIN (20), REAR 3 INCH SUCTION INLET CONTROL (21), PRESSURE RELIEF CONTROL (22), TANK FILL CONTROL (23), 3 INCH SUCTION INLET CONTROL (24), PRESSURE RELIEF CONTROL (25), AND HEAT EXCHANGER CONTROL (26).

Turn knob (27) counterclockwise and remove from shaft (28).



- (1) Remove retaining nuts (29) from front of toggle switch (30) and slide switch out through the back of the plate.
- (2) Remove retaining screws (32) on toggle switch (30). Tag and remove the terminal lugs (33).
- (3) Remove toggle switch (30) and discard.

INSTALLATION

a. Pressure Gauge Installation.

NOTE

This procedure is typical for the following pressure gauges. OIL TEMPERATURE (1), OIL PRESSURE (2), 2-1/2 OUTLET DISCHARGE PRESSURE (3), #1 PRECONNECT DISCHARGE OUTLET PRESSURE (4), #2 PRECONNECT DISCHARGE OUTLET PRESSURE (5), MASTER PRESSURE (6) and COMPOUND PRESSURE (7).

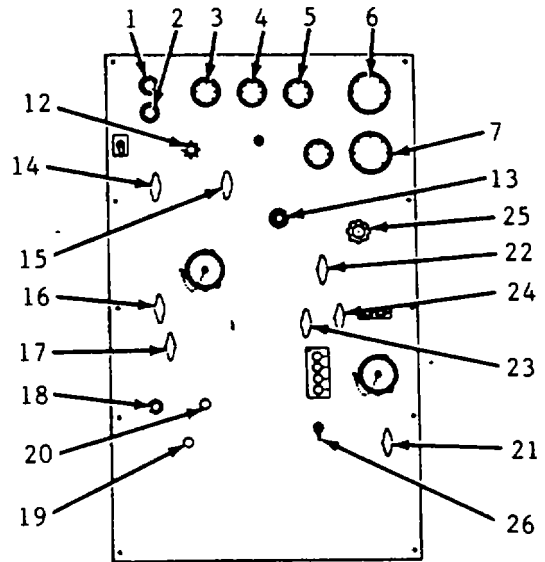
- (1) Slide gauge (5) into front of panel.
- (2) Screw hose onto plug connection (4).
- (3) Secure gauge with nuts (1), washers (2), and brackets (3).

4-37. GAUGES, CONTROL KNOBS, AND SWITCH REPLACEMENT (Continued).

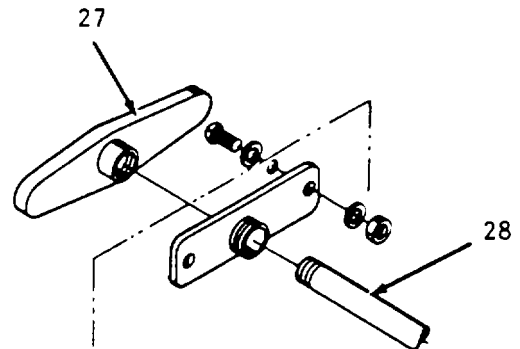
b. Control Knob Installation.

NOTE

This procedure is typical for the following control knobs. ENGINE THROTTLE CONTROL (12), RELIEF VALVE CONTROL FLUSH (13), #1 PRECONNECT DISCHARGE OUTLET CONTROL (14), #2 PRECONNECT DISCHARGE OUTLET CONTROL (15), 2-1/2 INCH DISCHARGE OUTLET CONTROL (16), BOOSTER OUTLET CONTROL (17), PRIMER CONTROL (18), WATER TANK DRAIN (19), 2-1/2 INCH DISCHARGE OUTLET DRAIN (20), REAR 3 INCH SUCTION INLET CONTROL (21), PRESSURE RELIEF CONTROL (22), TANK FILL CONTROL (23), 3 INCH SUCTION INLET CONTROL (24), PRESSURE RELIEF CONTROL (25), AND HEAT EXCHANGER CONTROL (26).

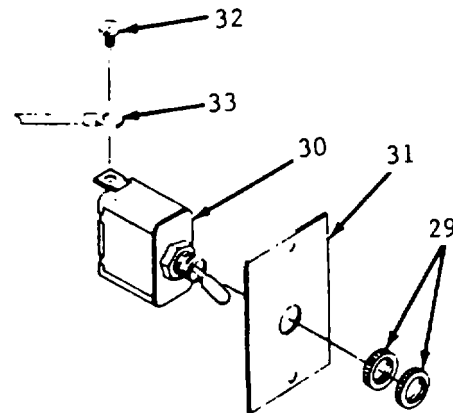


Turn knob (27) clockwise and secure to shaft (28).



c. Switch Installation.

- (1) Attach terminal lugs (33) with screws (32) on switch (30). Remove tags.
- (2) Insert toggle switch (30) in-to hole in plate (31).
- (3) Secure with retaining nut (29) on front of toggle switch (30).



4-39. STREET SIDE PUMP PANEL REPLACEMENT.

- | | |
|---|---|
| <ul style="list-style-type: none"> d. Install suction and discharge stub caps (paragraph 4-36). e. Connect water tank level gauge (paragraph 4-35). f. Connect tachometer/hourmeter (paragraph 4-34). g. Connect engine throttle assembly (paragraph 4-33). h. Connect pump panel lights (paragraph 4-32). | <ul style="list-style-type: none"> i. Install roof panel (paragraph 4-31). j. Install compartment light (paragraph 4-30). k. Install hose bin dividers (paragraph 4-28). l. Install hose rollers (paragraph 4-27). m. Install hose bed floors (paragraph 4-26). n. Reconnect battery cables |
|---|---|

4-40. STEPS AND MOUNTING BRACKETS REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking Brake and micro-brakelock set

Materials/Parts

Step (.101-00019 or 101-00046)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-14	Strainer Removed
4-26	Hose Bed Floors Removed
4-27	Hose Rollers Removed
4-28	Hose Bin Dividers Removed
4-30	Compartment Light Removed
4-39	Street Side Pump Panel Removed

4-40. STEPS AND MOUNTING BRACKETS REPLACEMENT (Continued).

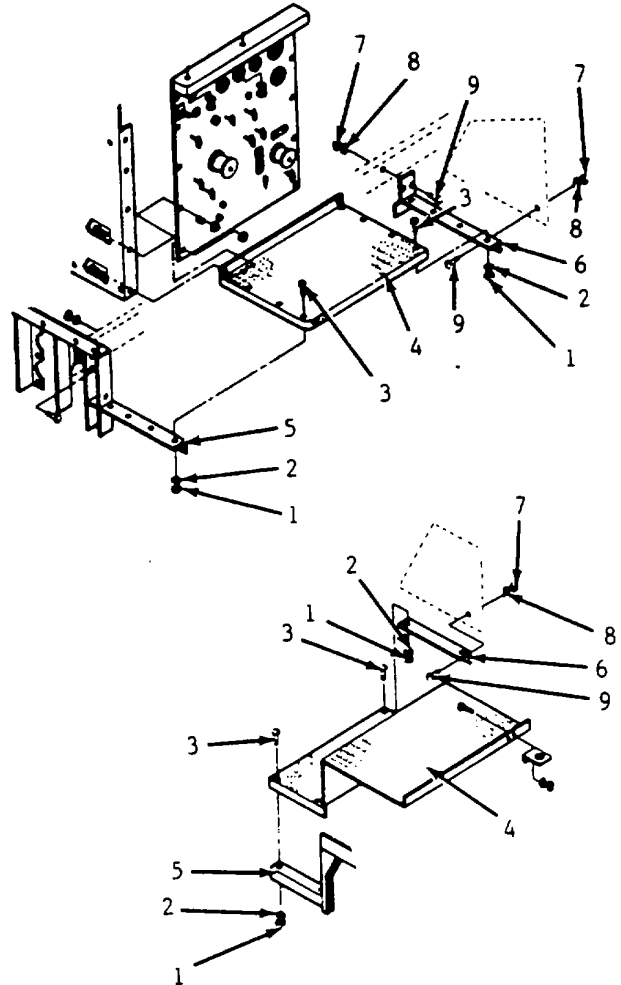
REMOVAL

a. Street Side Step Removal.

- (1) Remove six hex nuts (1), washers (2) and bolts (3) securing step assembly (4) to mounting brackets (5) and (6).
- (2) Remove step assembly (4).
- (3) Remove two hex head nuts (7), washers (8) and bolts (9) securing mounting bracket (6) to hose body assembly.
- (4) Remove bracket (6).

b. Curb Side Step Removal.

- (1) Remove six hex nuts (1), washers (2) and bolts (3) securing step assembly (4) to mounting brackets (5) and (6).
- (2) Remove step assembly (4).
- (3) Remove two hex head nuts (7), washers (8) and bolts (9) securing mounting bracket (6) to hose body assembly.
- (4) Remove bracket (6).



INSTALLATION

a. Street Side Step Installation.

- (1) Position bracket (6) to hose body assembly and secure with two bolts (9), washers (8) and nuts (7).
- (2) Position step assembly (4) on mounting brackets (5) and (6) and secure with seven phillips screws (3), washers (2) and hex nuts (1).

b. Curb Side Step Installation.

- (1) Position bracket (6) to hose body assembly and secure with two bolts (9), washers (8) and nuts (7).
- (2) Position step assembly (4) on mounting brackets (5) and (6) and secure with four phillips screws (3), washers (2) and hex nuts (1).

4-42. FRONT PANEL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Front Panel (101-90019)

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

Equipment Condition

Para. Condition Description

4-26 Hose Bed Floors Removed

4-27 Hose Rollers Removed

4-28 Hose Bin Dividers Removed

4-29 Curb Side Door Removed

4-30 Compartment Light Removed

4-31 Roof Panel Removed

4-39 Street Side Pump Panel Removed

4-40 Steps Removed

4-41 Priming Tank and Tubing Removed

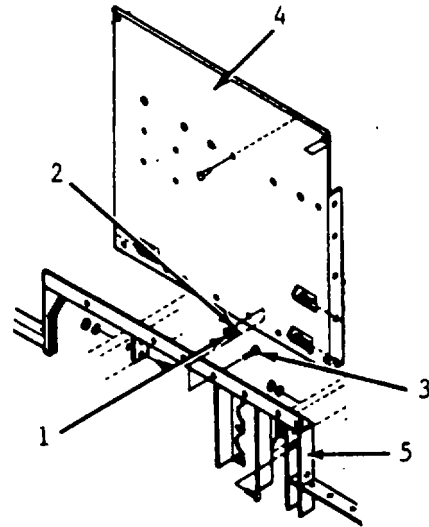
REMOVAL

- a. Remove seven hex nuts (1), washers (2), and screws (3) securing front panel (4) to mounting bracket (5).
- b. Remove front panel (4).

- g. Install compartment light (paragraph 4-30).
- h. Install curb side door (paragraph 4-29).
- i. Install hose bin dividers (paragraph 4-28).
- j. Install hose rollers (paragraph 4-27).
- k. Install hose bed floors (paragraph 4-26).

INSTALLATION

- a. Position front panel (4) to mounting bracket (5).
- b. Secure panel using seven screws (3), washers (2), and hex nuts (1).
- c. Install priming tank and tubing (paragraph 4-41).
- d. Install steps (paragraph 4-40).
- e. Install street side pump panel (paragraph 4-39).
- f. Install roof panel (paragraph 4-31).



SECTION IX. MAINTENANCE OF HOSE BODY ASSEMBLY

	Para.		Para.
Back-Up, Turn and Stop Lights Maintenance	4-50	Ladder Mounting Brackets Re- placement	4-45
Compartment Lights Maintenance.....	4-55	Rear Back-Up Alarm Replacement.....	4-51
Compartment Panels Replacement.....	4-57	Rear Compartment Replacement.....	4-60
Fill Tower Bracket Replacement.....	4-58	Rear Platform and Steps Re- placement	4-53
General	4-43	Rear Platform Signal Switch Replacement	4-52
Handrails Replacement	4-44	Rear Station Charger Replace- ment	4-54
Hard Suction Hose Bracket Replacement	4-46	Rear Suction Stub Replacement.....	4-47
Hose Bed Floor and Supports Replacement	4-59	Rear Warning Lights Maintenance	4-49
Hose Bed Pick-Up Lights and Mounting Brackets Maintenance	4-48	Side Panels Replacement	4-61
		Tread Plates Replacement	4-56

4-43. GENERAL.

This section contains information on the maintenance of the hose body assembly that are maintainable at the Organizational level.

4-44. HANDRAILS REPLACEMENT.

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Handrail (117-00001-D)

General Safety Instructions

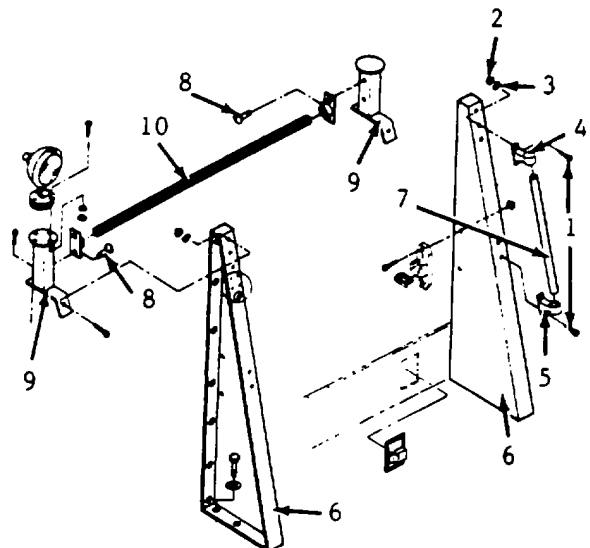
Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

REMOVAL

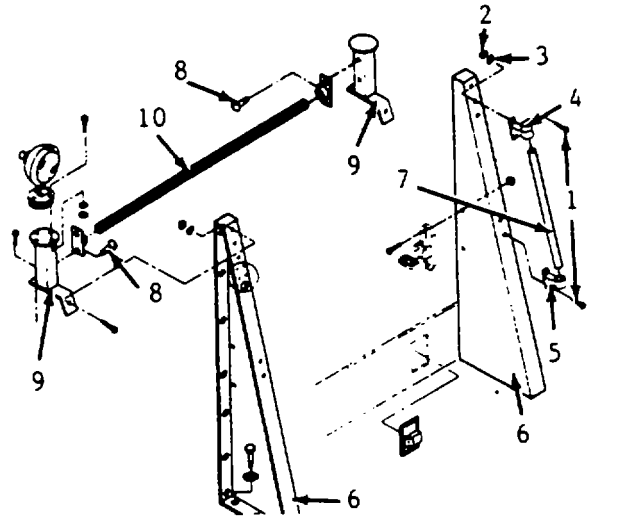
- a. Remove two bolts (1), nuts (2), and lock washers (3) at top mounting bracket (4) and bottom mounting bracket (5) on each rear side of the hose body (6).
- b. Remove handrail (7).
- c. Remove two screws (8) from both hose bed floor pick-up light mounting brackets (9).
- d. Remove top handrail (10).



4-44. HANDRAILS REPLACEMENT (Continued).

INSTALLATION

- a. Position handrail assemblies (7), top mounting bracket (4), bottom mounting bracket (5) and secure with bolts (1), washers (3), and nuts (2) on each side of hose body assembly (6).
- b. Position top handrail (10) and secure with two screws (8) on each hose bed pick-up light mounting brackets (9).



4-45. LADDER MOUNTING BRACKETS REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Mounting Bracket (131-00003)

Equipment Condition

Para. Condition Description

4-15 Ladder Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brake/lock set.

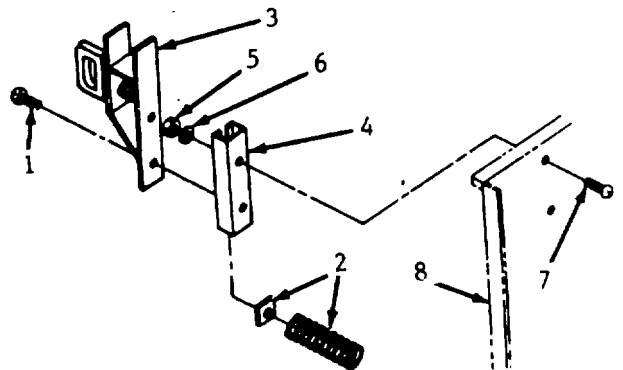
REMOVAL

- a. Remove two bolts (1), mounting nuts (2) and ladder hanger (3) from each ladder mounting bracket (4).
- b. Remove two nuts (5), washers (6) and bolts (7) from ladder mounting brackets (4) on the curb side panel assembly (8).
- c. Remove brackets (4).

INSTALLATION

- a. Position brackets (4) on curb side panel assembly (8) and secure with two bolts (7), washers (6) and nuts (5).

- b. Position ladder hangers (3) on brackets (4) and secure with two bolts (1) and mounting nuts (2).



- c. Replace 12 foot extension ladder (paragraph 4-15).

4-48. HOSE BED PICK-UP LIGHTS AND MOUNTING BRACKETS MAINTENANCE

This task covers:

a. Removal

b. Repair

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Light (AG-R-4413)

Bracket (152-00004)

Equipment Condition

Para. Condition Description

4-44 Handrails Removed

General Safety Instructions

Engine OFF

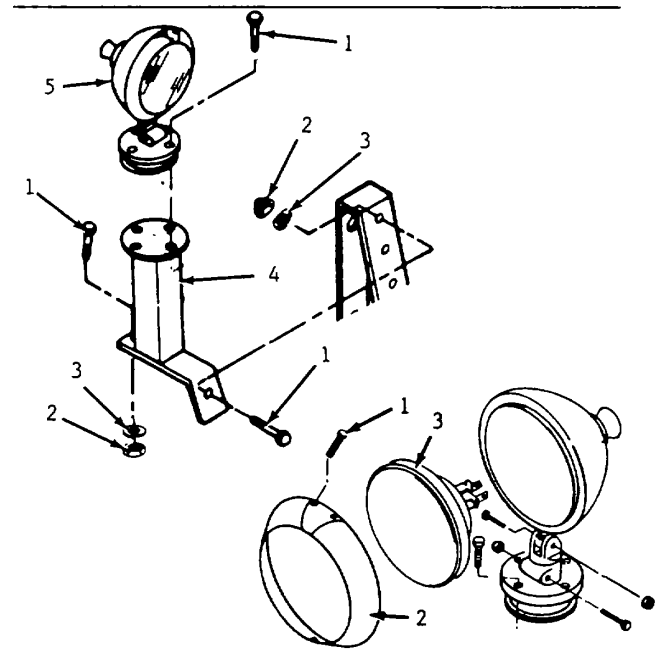
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Remove two screws (1), nuts (2) and washers (3) securing light mounting bracket (4) on each side of vehicle.
- b. Remove four screws (1), nuts (2), and washers (3) securing light (5) to mounting bracket (4).
- c. Disconnect wiring from light (5) and bracket (4).



REPAIR

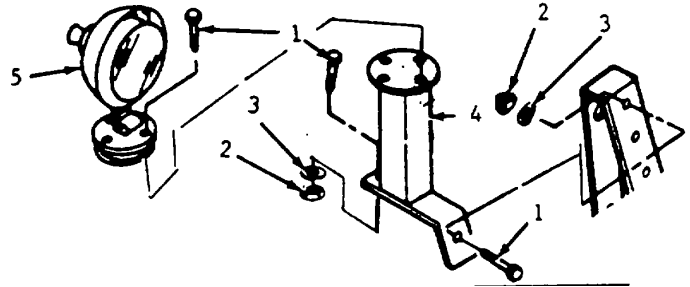
- a. Remove two screws (1) from top of lens retaining ring (2).
- b. Remove retaining ring (2).
- c. Disconnect and remove bulb (3).
- d. Connect bulb wiring and position bulb in socket.
- e. Position retaining ring (2) and install with screws (1).
- f. Connect battery cables.

INSTALLATION

- a. Connect wiring to mounting bracket (4) and lights (5).
- b. Install light (5) to mounting bracket (4) with four screws (1), washers (2) and nuts (3).

4-48. HOSE BED PICK-UP LIGHTS AND MOUNTING BRACKETS MAINTENANCE (Continued).

- c. Position and install two screws (1), washers (2), and nuts (3) securing light mounting brackets (4) to each side end panel (6).
- d. Install handrails (paragraph 444).
- e. Reconnect battery cables.



4-49. REAR WARNING LIGHT REPLACEMENT

This task covers:

- a. Removal**
- b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Warning Light (CE-600-1R)

General Safety Instructions

Engine OFF

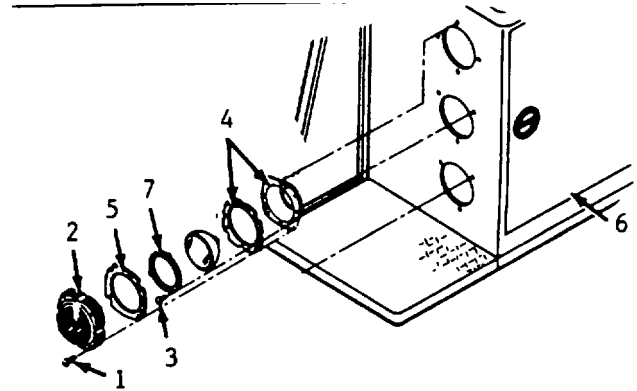
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Remove four screws (1) securing lens (2) to light assembly.
- b. Remove three screws (3) securing rear warning light assembly (4) to vehicle.
- c. Remove outer sealing gasket (5).
- d. Open rear compartment door (6) and disconnect wiring from warning light assembly (4).
- e. Remove warning light assembly (4).



INSTALLATION

- a. Open rear compartment door (6) and position warning light assembly (4) to opening.
- b. Connect wires to warning light assembly (4).

- c. Install outer panel (7) and gasket (5) with three screws (3) securing the light assembly (4) to the vehicle.
- d. Position rear warning light lens (2) and secure to assembly with four screws (1).
- e. Reconnect battery cables.

4-50. REAR BACK-UP, TURN AND STOP LIGHT MAINTENANCE

This task covers:

a. Removal**b. Repair****c. Installation****INITIAL SETUP:**Tools

General Mechanics Tool Kit

Materials/Parts

Back-Up Light (411SC)

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

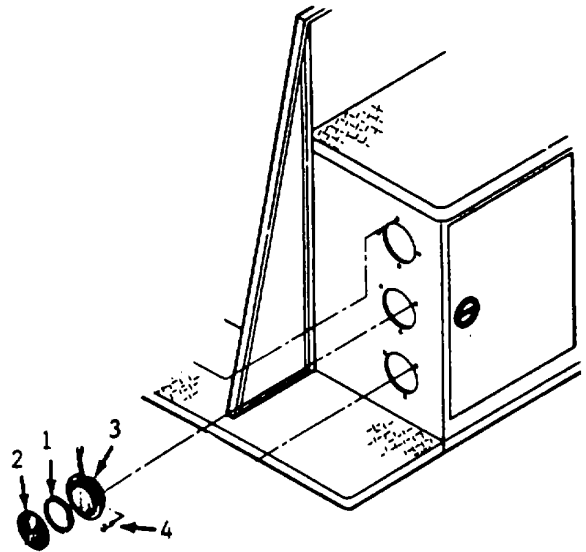
- a. Snap out the lens retaining spring (1).
- b. Remove the lens (2).
- c. Remove three retaining ring screws (3) and ring (4).
- d. Remove the lamp housing assembly.
- e. Disconnect wiring harness from the lamp housing assembly.

REPAIR

- a. Remove bulb by pressing down and twisting counterclockwise 90°.
- b. Install bulb by pressing down and twisting clockwise 90°.

INSTALLATION

- a. Connect the wiring harness to the lamp housing assembly.
- b. Position the lamp housing assembly in the rear panel.
- c. Install the three retaining ring screws (3) through the ring (4) into the assembly.

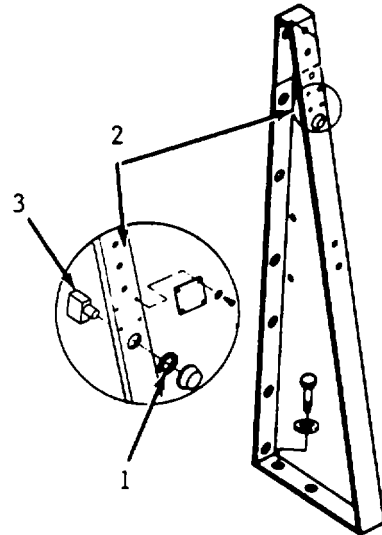


- d. Insert lens (2) into assembly and snap the retaining spring (1) into place.
- e. Reconnect battery cables.

4-52. REAR PLATFORM SIGNAL SWITCH REPLACEMENT (Continued).

REMOVAL

- a. Remove two screws securing protecting bracket to rear platform end panel.
- b. Remove nut (1) securing signal switch (3) to panel (2).
- c. Disconnect signal switch wiring.
- d. Remove signal switch (3).



INSTALLATION

- a. Connect signal switch wiring.
- b. Position signal switch (3) to opening in panel (2) and secure with nut (1).
- c. Position and install protecting bracket to end panel with two screws.
- d. Reconnect battery cables.

4-53. REAR PLATFORM AND STEPS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Platform (101-00020)

Panel (101-00036-D)

Equipment Condition

Para. Condition Description

4-44 Handrails Removed

4-48 Hose Bed Pick-Up Lights and Brackets Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

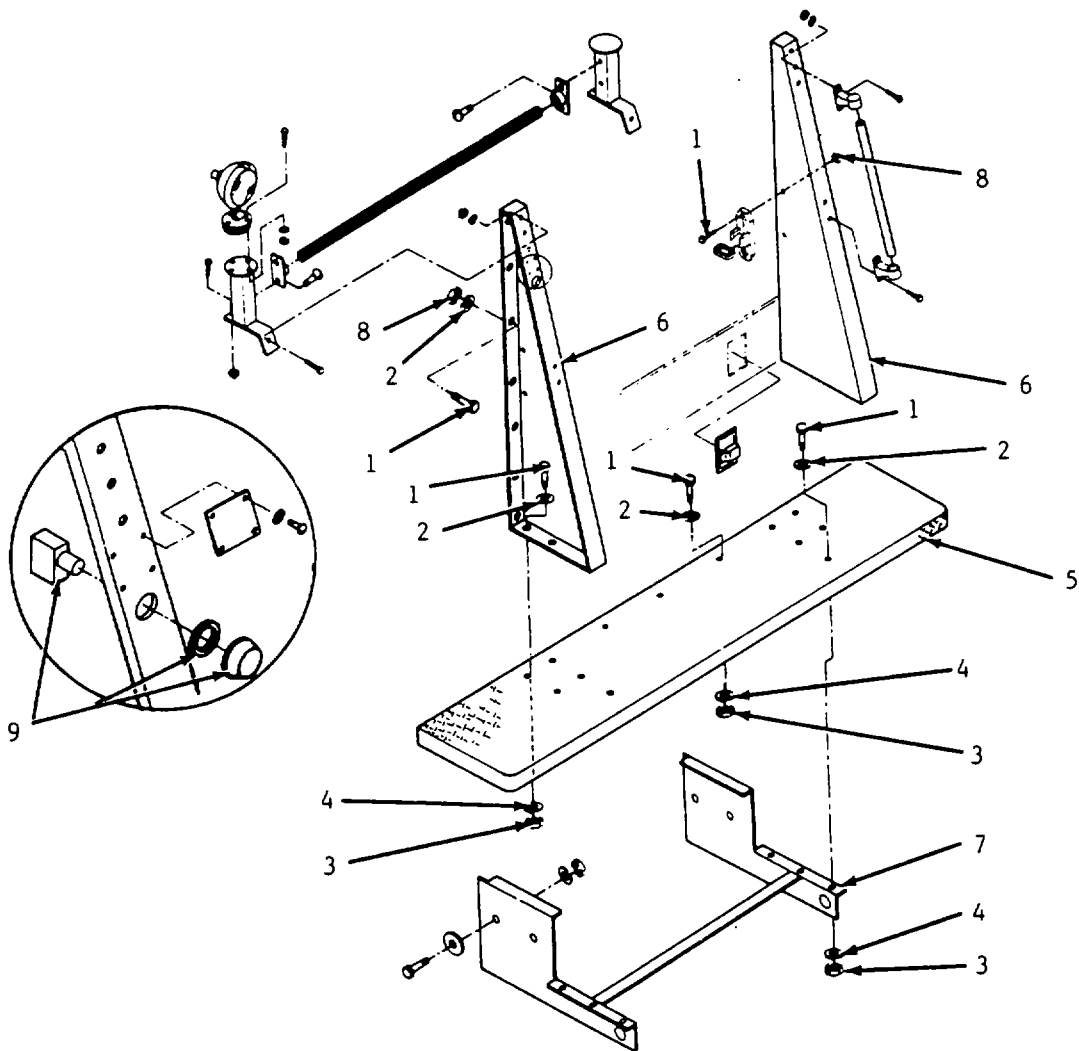
Parking brake and micro-brakelock set.

Batteries disconnected.

4-53. REAR PLATFORM AND STEPS REPLACEMENT (Continued).

REMOVAL

- a. Remove three screws (1), flatwashers (2), nuts (3), and lockwashers (4) securing underside of rear platform (5) to bottom of compartment panels (6) on each side of vehicle.
- b. Remove two screws (1), flatwashers (2), nuts (3), and lockwashers (4) securing bottom of end panels (6) to rear platform (5).
- c. Remove nine screws (1), flatwashers (2), nuts (3), and lockwashers (4) securing rear platform (5) to support rails (7).
- d. Remove seven screws (1), washers (2), two capnuts (8), five hex nuts (3) and four wire holders securing end panel (6) to hose bed body.
- e. Disconnect rear platform signal switch (9) from end panel (6).



4-53. REAR PLATFORM AND STEPS REPLACEMENT (Continued).

- f. Remove end panel (6) and platform (5) from vehicle.
- g. Remove folding steps (10) from end panel by removing two screws (1) and cap nuts (8) from panel (6).

INSTALLATION

- a. Install folding steps (10) to end panel with two screws (1) and cap nuts (8).
- b. Position and install rear platform (5) to vehicle.
- c. Install three screws (1), flatwashers (2), lockwashers (4) and nuts (3) securing underside of rear platform (5) to bottom of compartment panels on each side of vehicle.
- d. Position and install end panel (6) to hose bed body with seven screws (1), washers (2), two

- acorn nuts (8), five hex nuts (3) and four wire holders.
- e. Connect rear panel signal switch (9) to end panel (6).
- f. Install two screws (1), flatwashers (2), lockwashers (4) and nuts (3) securing bottom of end panels (6) to rear platform (5).
- g. Install nine screws (1), flatwashers (2), lockwashers (4), and nuts (3) securing rear platform (5) to support rails (7).
- h. Install handrails (paragraph 444).
- i. Install hose bed pick-up lights and brackets (paragraph 4-48).
- j. Reconnect battery cables.

4-54. REAR STATION CHARGER REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

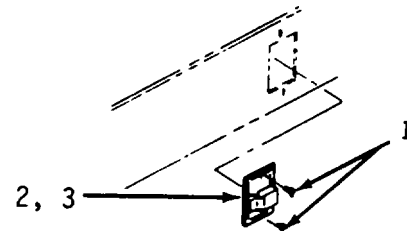
Station Charger (5378)

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected

REMOVAL

- a. Remove two screws (1) securing rear station charger (2) to vehicle.
- b. Pull station charger (2) outward and disconnect wiring.



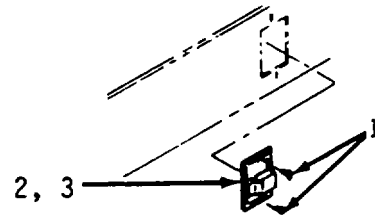
4-54. REAR STATION CHARGER REPLACEMENT (Continued).

- c. Remove station charger (2) and gasket (3).

- c. Connect battery cables.

INSTALLATION

- a. Position gasket (3) and connect wiring to station charger (2).
 b. Insert station charger (2) in opening and install two retaining screws (1).



4-55. COMPARTMENT LIGHTS MAINTENANCE

This task covers:

a. Removal

b. Repair

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Compartment Light (M393)

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

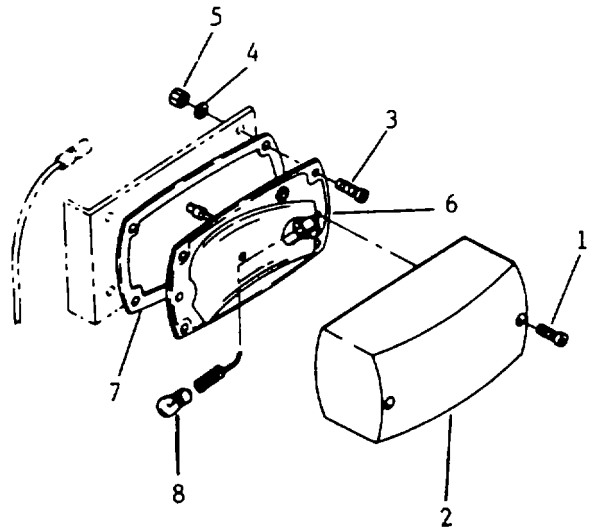
Batteries disconnected.

REMOVAL

- a. Remove two screws (1) securing lens (2) to light assembly.
 b. Remove lens (2).
 c. Remove two screws (3), washers (4), and nuts (5) securing light assembly to vehicle compartment.
 d. Disconnect wiring to light assembly.
 e. Remove housing (6) and gasket (7).

REPAIR

- a. Remove old bulb (8) by pressing in ward and rotating counterclockwise 90°.



4-55. COMPARTMENT LIGHTS MAINTENANCE (Continued).

- b. Install new bulb (8) by pressing in ward and rotating clockwise 90°.

INSTALLATION

- a. Install light assembly housing (6) and gasket (7) to vehicle compartment.
- b. Connect wiring to light assembly.

- c. Secure light assembly with two screws (3) washers (4) and nuts (5).
- d. Install lens (2) with two retaining screws (1).
- e. Reconnect battery cables.

4-56. TREAD PLATES REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Tread Plate (101-00021-P or 101-00021-D)

Equipment Condition

Para. Condition Description

4-46 Hard Suction Hose Bracket
Removed

General Safety Instructions

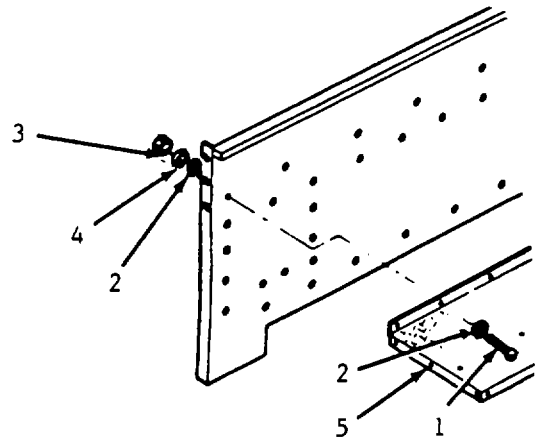
Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

REMOVAL

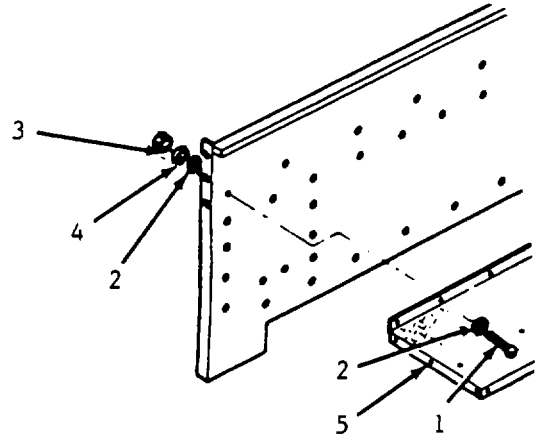
- a. Remove ten perimeter screws (1), flat washers (2), nuts (3), and lockwashers (4) attaching tread plate (5) to vehicle compartments.
- b. Remove nine screws (1), flat washers (2), nuts (3) and lockwashers (4) securing tread plate (5) to hose bed body.
- c. Lift off and remove tread plates (5).



4-56. TREAD PLATES REPLACEMENT (Continued).

INSTALLATION

- a. Position tread plate(s) (5) to top of vehicle compartment.
- b. Secure tread plate (5) to hose bed body with nine screws (1), flat washers (2), lockwashers (3), and nuts (4).
- c. Install ten perimeter screws (1), flatwashers (2), lockwashers (4) and nuts (3) attaching tread plate(s) (5) to top of vehicle compartments.



4-57. COMPARTMENT PANELS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

Materials/Parts

Street Side Compartment

(Appendix E, Page E-39)

Curb Side Compartment

(Appendix E, Page E-41)

Equipment Condition

Para.	Condition Description
4-13	Hard Suction Hose Removed
4-15	Ladder Removed
4-45	Ladder Mounting Bracket Removed
4-46	Hard Suction Hose Bracket Removed
4-49	Rear Warning Lights Removed
4-50	Back-Up, Turn, and Stop Lights Removed
4-55	Compartment Light Removed
4-56	Tread Plates Removed

REMOVAL

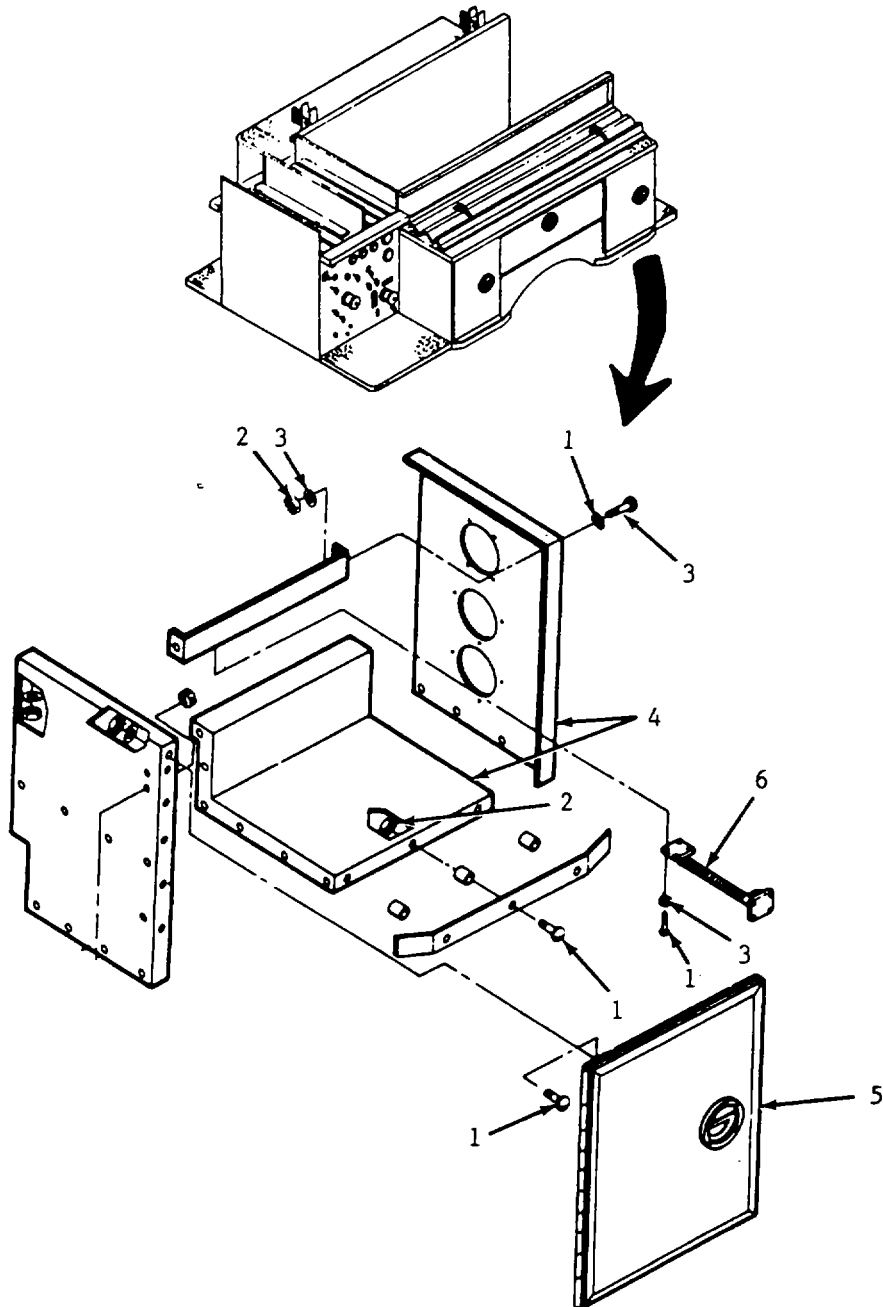
- a. Disconnect compartment wiring.
- b. Remove screws (1), nuts (2) and washers (3) attaching panels to each other and the inner body panels (4).
- c. Remove compartment panel doors (5) and hinge/spring assemblies (6) by removing screws (7), nuts (2) and washers (3) from door panels.
- d. Remove compartment panels.

4-57. COMPARTMENT PANELS REPLACEMENT (Continued).

INSTALLATION

a. Position compartment panel doors (5) and hinge/spring assemblies (6) and install with screws (7) washers (3) and nuts (2) to compartment panels (4).

b. Install compartment panel (4) by installing screws (1), nuts (2), and washers (3) attaching panels to each other and the inner body panels (4).



4-57. COMPARTMENT PANELS REPLACEMENT (Continued).

- c. Connect compartment wiring.
- d. Install tread plates (paragraph 4-56).
- e. Install compartment light (paragraph 4-55).
- f. Install back-up, turn, and stop lights (paragraph 4-50).
- g. Install rear warning lights (paragraph 4-49).
- h. Install hard suction hose bracket (paragraph 4-46).
- i. Install ladder mounting bracket (paragraph 4-45).
- j. Install ladder (paragraph 4-15).
- k. Install hard suction hose (paragraph 4-13).
- l. Reconnect battery cables.

4-58. FILL TOWER BRACKET REPLACEMENT

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Bracket (120-00013)

Equipment Condition

Para. Condition Description

4-15 Ladder Removed

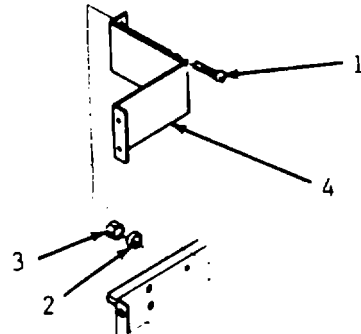
4-45 Ladder Mounting Brackets Removed

REMOVAL

- a. Remove four screws (1), lockwashers (2) and acorn nuts (3) securing fill tower bracket to top of hose body.
- b. Remove fill tower bracket (4).

INSTALLATION

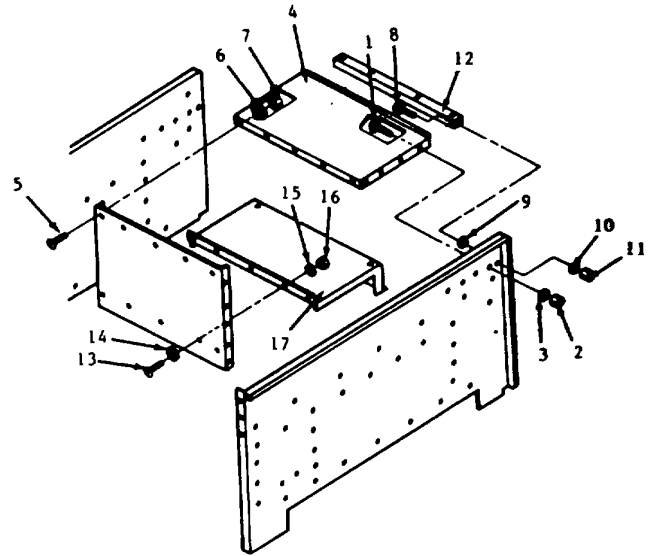
- a. Position and fill tower bracket (4) to top of hose body and secure with screws (1), lockwashers (2), and acorn nuts (3).
- b. Install ladder mounting brackets (paragraph 4-45).



- c. Install ladder (paragraph 4-15).

4-60. REAR COMPARTMENT REPLACEMENT (Continued).

- c. Install five screws (5), washers (6), and nuts (7) to front of top panel (4).
- d. Install four screws (1), washers (3) and nuts (2) to each side of top panel (4).
- e. Install hose bed floor and supports (paragraph 4-59).
- f. Install fill tower bracket (paragraph 4-58).
- g. Install compartment panels (paragraph 4-57).
- h. Install tread plates (paragraph 4-56).
- i. Install compartment lights (paragraph 4-55).
- j. Install rear station charger (paragraph 4-54).
- k. Install rear platform and steps (paragraph 4-53).
- l. Install back-up, turn, and stop light (paragraph 4-50).
- m. Install rear warning light (paragraph 4-49).
- n. Install rear suction stub cap (paragraph 4-47).
- o. Install hard suction hose bracket (paragraph 4-46).



- p. Install ladder bracket (paragraph 4-45).
- q. Install hose bed floors (paragraph 4-26).
- r. Install hose reel (paragraph 4-21).
- s. Install rear hose rollers (paragraph 4-18).
- t. Install ladder (paragraph 4-15).
- u. Install hard suction hose (paragraph 4-13).
- v. Reconnect battery cables.

4-61. SIDE PANELS REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

Materials/Parts

Panel (101-00030)

Panel (101-00047)

Bracket (101-00023)

Equipment Condition

Para. Condition Description

4-13 Hard Suction Hose Removed

4-15 Ladder Removed

4-21 Hose Reel Removed

4-26 Hose Bed Floors Removed

4-27 Hose Rollers Removed

4-28 Hose Bin Dividers Removed

4-45 Ladder Bracket Removed

4-46 Hard Suction Hose Bracket
Removed

4-47 Rear Suction Stub Cap
Removed

4-49 Rear Warning Lights Removed

4-50 Back-Up, Turn, and Stop
Lights Removed

4-51 Rear Back-Up Alarm Removed

4-53 Rear Platform and Straps
Removed

4-54 Rear Station Charger Removed

4-55 Compartment Light Removed

4-56 Tread Plate Removed

4-57 Compartment Panels Removed

4-58 Fill Tower Bracket Removed

4-59 Hose Bed Floor and Supports
Removed

4-60 Rear Compartment Removed

REMOVAL

WARNING

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

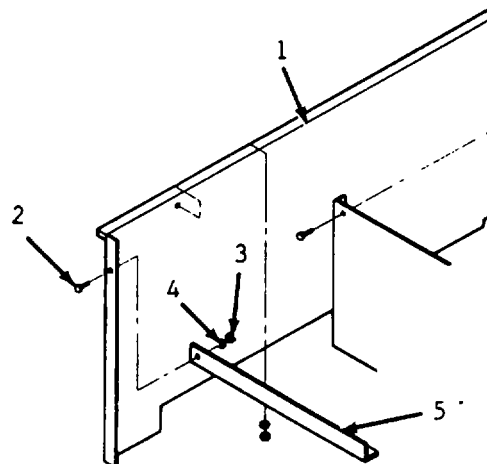
- a. Support side panel (1) with a hoist and sling.
- b. Remove screw (2), nut (3) and washer (4) securing side panel (1) to angle brace (5).
- c. Remove brace.
- d. Remove three screws (2), nuts (3), and washers (4) securing side panel to brackets on frame.
- e. Remove side panel (1) raising with hoist.

4-61. SIDE PANELS REPLACEMENT (Continued).

INSTALLATION**WARNING**

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- a. Lower side panel (1) into position with hoist and sling and support it until installation is completed.
- b. Secure side panel (1) to brackets on frame with three screws (2), washers (4) and nuts (3).
- c. Locate angle brace between side panels and secure with screw (2), washer (4), and nut (3).
- d. Remove hoist and sling.
- e. Install hose bed floor and supports paragraph - 59).
- f. Install fill tower bracket (paragraph 4-58).
- g. Install compartment panels (paragraph 4-57).
- h. Install tread plates (paragraph 4-56).
- i. Install compartment lights (paragraph 4-51).
- j. Install rear station charger (paragraph 4-54).
- k. Install rear platform and steps (paragraph 4-53).
- l. Install back-up alarm (paragraph 4-51).
- m. Install back-up, turn and stop light (paragraph 4-50).
- n. Install rear warning light (paragraph 4-49).
- o. Install rear suction stub cab (paragraph 4-47).
- p. Install hard suction hose bracket (paragraph 4-46).
- q. Install ladder bracket (paragraph 4-45).
- r. Install hose bin dividers paragraph 4-28).
- s. Install hose rollers (paragraph 4-27).
- t. Install hose bed floors (paragraph 4-26).
- u. Install hose reel (paragraph 4-21).
- v. Install ladder (paragraph 4-15).
- w. Install hard suction hose (paragraph 4-13).
- x. Reconnect battery cables.



Section X. MAINTENANCE OF WATER TANK ASSEMBLY

General	Para. 4-62	Tank Replacement	Para. 4-65
Tank Piping Replacement	4-64	Water Tank Level Sender Replacement	4-63

4-62. GENERAL.

This section contains information on the maintenance of the water tank assembly that are maintainable at the Organizational level.

4-63. WATER TANK LEVEL SENDER REPLACEMENT.

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Hoist

Materials/Parts

Level Sender (A-1-1875)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-58	Fill Tower Bracket Removed
4-59	Hose Bed Floor Removed

General Safety Instructions

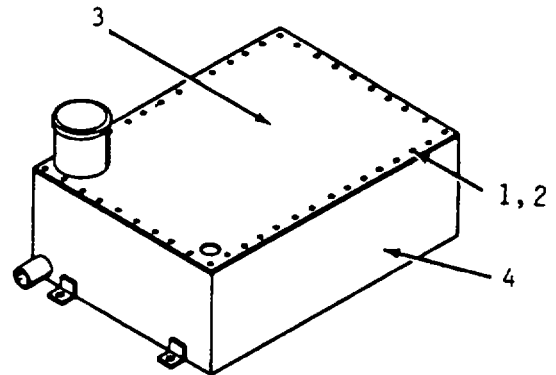
Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Disconnect water tank sending unit to water level gauge connector.
- b. Remove 46 nuts (1) and washers (2) securing tank cover (3) to tank (4).

WARNING

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

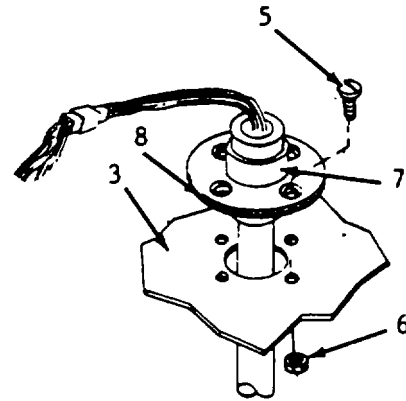


- c. Remove tank cover (3) using a hoist.
- d. Remove four phillips screws (5) and nuts (6) securing sending unit (7).
- e. Remove sending unit (7) and gasket (8).

4-63. WATER TANK LEVEL SENDER REPLACEMENT. (Continued)

INSTALLATION

- a. Install gasket (8) and water tank level sending unit (7) on water tank cover and secure with four phillips screws (5) and hex nuts (6).



WARNING

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- b. Install tank cover (3) using a hoist.
- c. Secure tank cover (3) to tank (4) using 46 washers (2) and hex nuts (1).
- d. Reconnect water tank sending unit to water level gauge connector.

- e. Install hose bed floor (paragraph 4-59).
- f. Install fill tower bracket (paragraph 4-58).
- g. Reconnect battery cables.

4-64. TANK PIPING REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Hoist

Materials/Parts

Tank Piping (120-90003)

Equipment Condition

Para. Condition Description

4-58 Fill Tower Bracket Removed
4-59 Hose Bed Floor Removed
4-63 Water Tank Level Sender Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected
Fire Pump and piping drained.

4-64. TANK PIPING REPLACEMENT. (Continued)

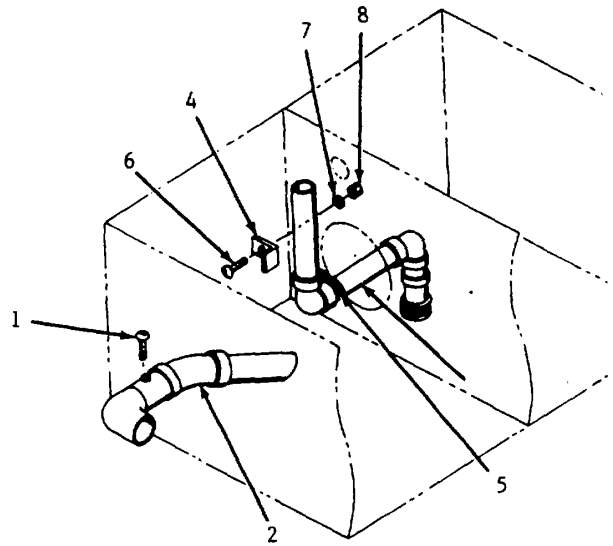
REMOVAL

- a. Remove locking screw (1) and remove pipe assembly (2).
- b. Loosen clamp (3).
- c. Slide clamp (3) off pipe support (4).

NOTE

Pipe is assembled as a single unit and must be replaced entirely.

- d. Remove pipe (5).
- e. Remove phillips screw (6), washer (7), and hex nut (8) securing pipe support (4) to baffle plate.
- f. Remove pipe support.



INSTALLATION

- a. Secure pipe support (5) to baffle plate with phillips screw (6), washer (7), and hex nut (8).
- b. Slide hose clamp (3) over pipe (5) and locate hose clamp on pipe support (4).
- c. Tighten hose clamp screw (6) to secure pipe (5).
- d. Install pipe assembly (2) to outlet pipe with locking screw (1).

CAUTION

When installing tank cover, ensure plastic pipe passes through smaller hole inside fill tower.

- e. Install water tank level sending unit (paragraph 4-63).
- f. Install hose bed floors (paragraph 4-59).
- g. Install tank fill tower (paragraph 4-58).
- h. Reconnect battery cables.

4-65. TANK REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Hoist

Sling

Materials/Parts

Water Tank (120-90003)

Equipment Condition

Para. Condition Description

2-24 Water Tank Drained

4-39 Pump Panel Removed

4-58 Fill Tower Bracket Removed

4-59 Hose Bed Floor Removed

4-63 Water Tank Level Sender
Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

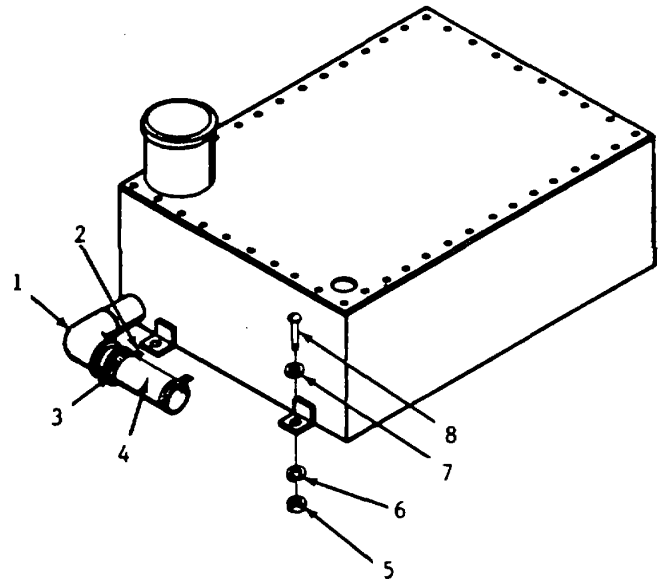
Parking brake and micro-brakelock set.

Batteries disconnected

Fire Pump and piping drained.

REMOVAL

- a. Open curb-side pump panel door and disconnect tank to piping connections (1) by removing screws (2), clamps (3) and gaskets (4).
- b. Remove four tank mounting nuts (5), lockwashers (6), washers (7), and bolts (8).
- c. Position sling underneath tank and raise tank with hoist.
- d. Push tank toward rear of vehicle and raise until tank to piping connector is clear of hose body assembly.
- e. Remove water tank assembly.

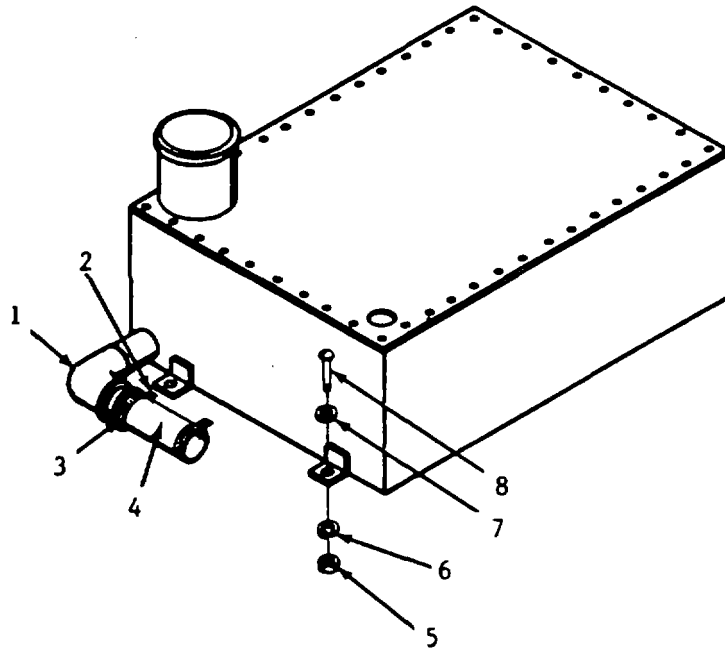


INSTALLATION

- a. Install tank using hoist and sling.
- b. Secure tank to chassis with mounting nuts (5), lockwashers (6), washers (7), and bolts (8).

4-65. TANK REPLACEMENT (Continued).

- c. Connect tank to piping connection (1) with gaskets (4), clamps (3), and screws (2).
- d. Install water tank level sender (paragraph 4-63).
- e. Install hose bed floor (paragraph 4-59).
- f. Install fill tower bracket (paragraph 4-58).
- g. Install pump panel (paragraph 439).
- h. Close drain and refill tank (paragraph 2-24).
- i. Reconnect battery cables.



**Section XI. MAINTENANCE OF FIRE PUMP, PIPING SYSTEM,
VALVES AND CONTROL RODS**

	Para.		Para.
Fire Pump Assembly		Priming Pump Assembly	
Maintenance	4-70	Replacement	4-69
General	4-66	Valves and Control Rods	
Piping Replacement	4-68	Replacement	4-67

4-66. GENERAL.

This section contains information on the maintenance of the fire pump and piping system that are maintainable at the Organization level.

4-67. VALVES AND CONTROL RODS REPLACEMENT.

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-39	Street Side Pump Panel Removed

Materials/Parts

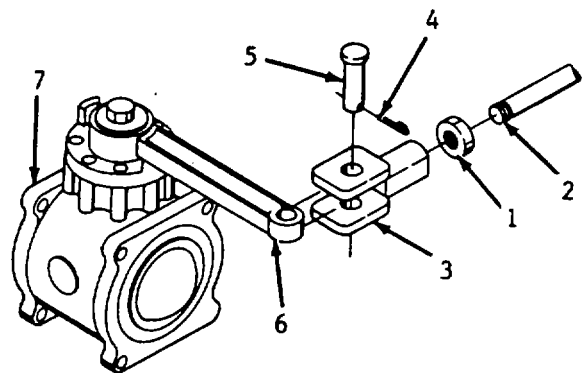
Valves and Control Rods As Required
(Appendix E, Page E-48)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

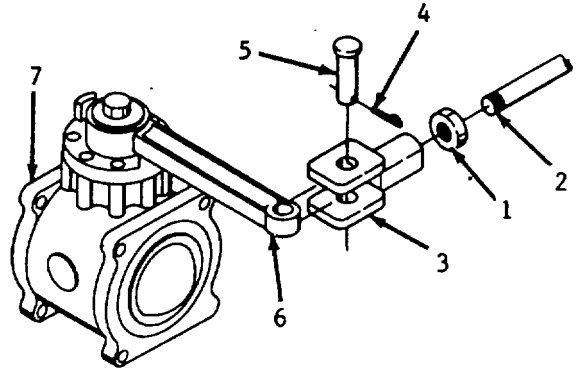
- a. Loosen jam nut (1).
- b. Unscrew rod (2) from clevis (3).
- c. Remove cotter pin (4) from clevis pin (5).
- d. Remove clevis (3) from valve control handle (6).
- e. Disconnect valve (7) from associated adapters, fittings and elbows and remove from truck.



4-67. VALVES AND CONTROL RODS REPLACEMENT. (Continued)

INSTALLATION

- a. Position valve (7) in truck and connect to associated adapters, nipples, fittings and elbows.
- b. Install clevis (3) to control handle (6) with clevis pin (5) and secure with cotter pin (4).
- c. Screw control rod (2) into clevis (3).
- d. Tighten jam nut (1) to secure control rod in proper position.
- e. Install street side pump panel (paragraph 4-39).



4-68. PIPING REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description
 4-39 Street Side Pump Panel
 Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

Materials/Parts

Various Pipes and Fittings
 (Appendix E, Page E-48)

REMOVAL

NOTE

**All pipes and fittings are threaded.
 Use a pipe wrench to remove as
 necessary.**

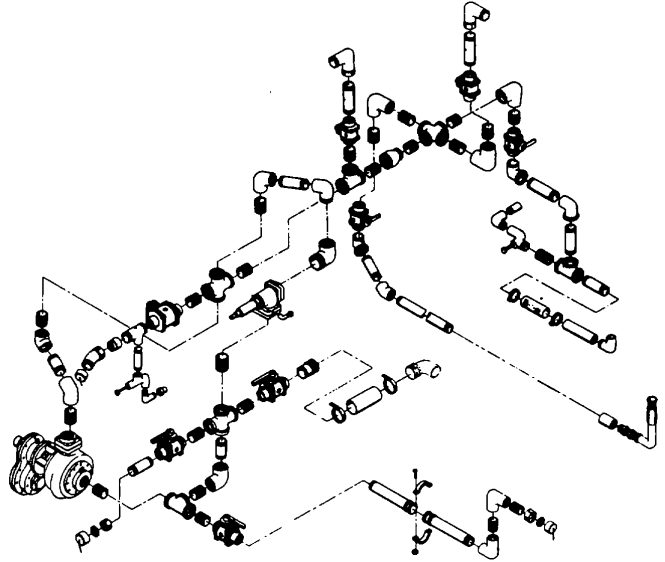
- a. Disconnect piping and remove as necessary from piping assembly, pump or tank.

4-68. PIPING REPLACEMENT. (Continued)

- b. Remove pipe.

INSTALLATION

- a. Position piping and install with new teflon tape or pipe joint compound.
- b. Install street side pump panel. (paragraph 4-39)



4-69. PRIMING PUMP ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal**
- b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Priming Pump (VGEAI/G158AI)

Equipment Condition

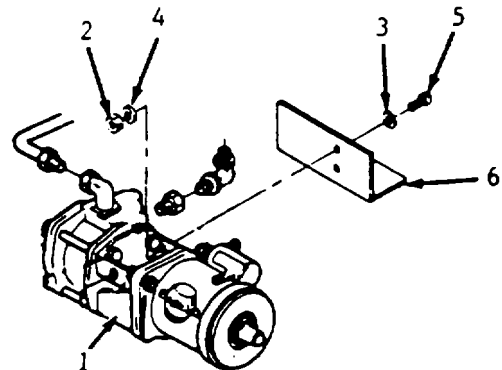
<u>Para.</u>	<u>Condition</u>	<u>Description</u>
4-39	Street Side Pump Panel	Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

REMOVAL

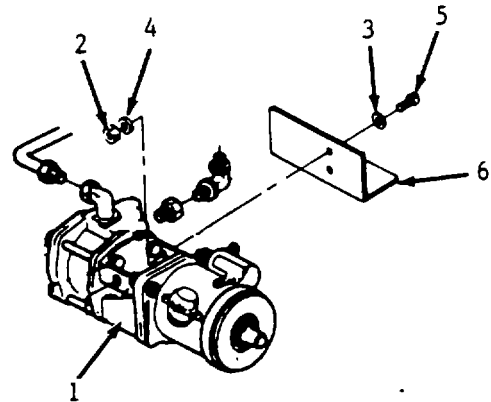
- a. Tag and remove all connections from priming pump (1).
- b. Remove two nuts (2), washers (3), lockwashers (4), and screws (5) from housing (1).
- c. Remove priming pump (1) from mounting bracket (6).



4-69. PRIMING PUMP ASSEMBLY REPLACEMENT. (Continued)

INSTALLATION

- a. Position priming pump (1) on bracket (6).
- b. Install two screws (5), washers (4), lockwashers (3) and nuts (2).
- c. Install street side pump panel (paragraph 4-39).



4-70. FIRE PUMP ASSEMBLY MAINTENANCE

This task covers:

a. Removal

b. Repair

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Bearing Puller (J-8433)
 Jack Stand

Materials/Parts

Fire Pump (HM250)

Equipment Condition

Para.	Condition Description
4-26	Small Hose Bed Floor Removed
4-28	Small Hose Bin Dividers Re- moved
4-39	Pump Panel Removed
4-68	Piping Removed
4-190	Pump Propeller Shaft Removed

REMOVAL

- a. Support pump (1) securely in place.
- b. Remove two bolts (2) and lock washers (3) from bracket (4).
- c. Remove four bolts (5) and lock-washers (6) from bracket (7).
- d. Carefully remove pump (1) from vehicle.

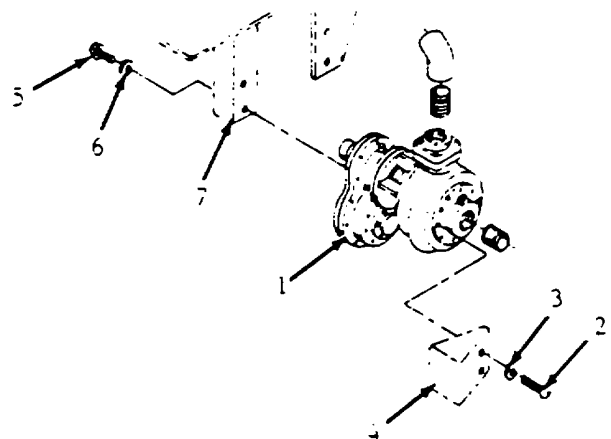
REPAIR

- a. Disassembly.

NOTE

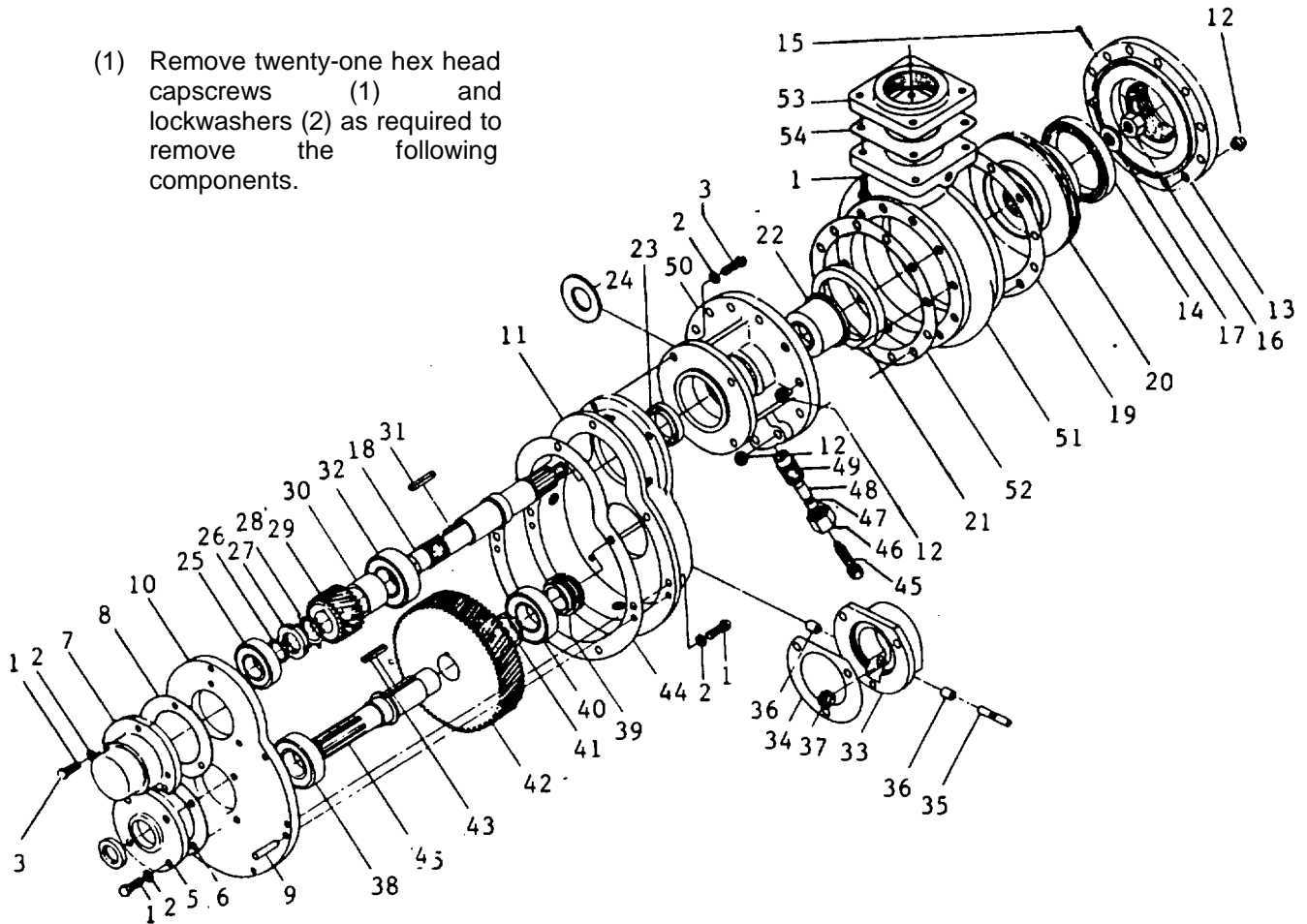
OS will perform complete repair of the Fire Pump Assembly only when it is necessary to remove the Fire Pump Assembly from the truck.

Repair by replacing unserviceable parts.



4-70. FIRE PUMP ASSEMBLY MAINTENANCE (Continued).

(1) Remove twenty-one hex head capscrews (1) and lockwashers (2) as required to remove the following components.



(2) Pry oil seal (3) from drive shaft (4).

(3) Remove bearing cap (5) and gasket (6).

(4) Remove bearing cap (7).

(5) Remove gasket (8).

(6) Drive two taper pins (9) from gear case cover (10) and gear case (11).

(7) Remove gear case cover (10).

(8) Remove twenty-four nuts (12).

(9) Remove outboard head (13) and seal ring (14).

(10) Remove cotter pin (15), nut (16) and washer (17) from impeller shaft (18).

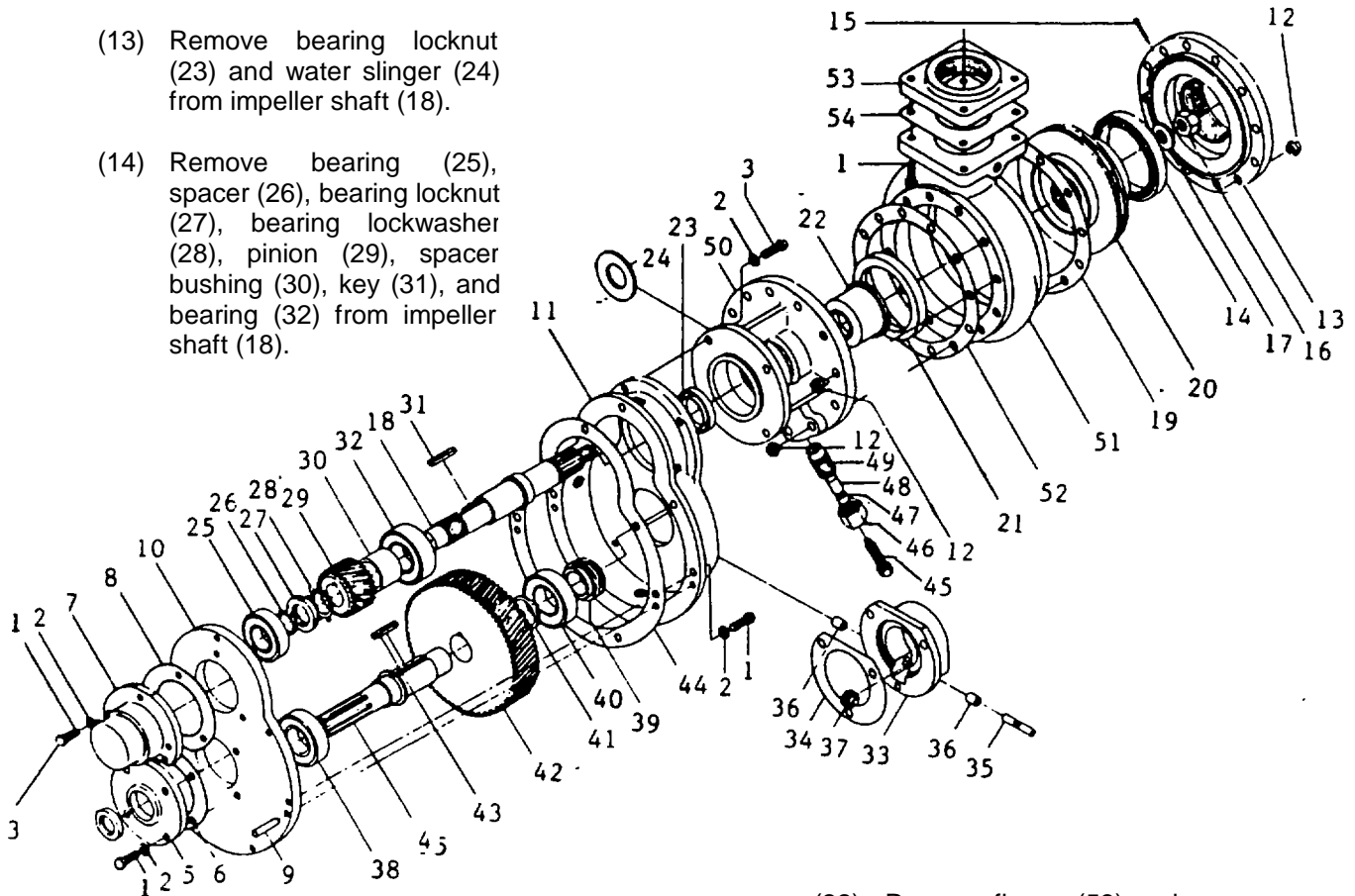
(11) Remove gasket (19) and impeller (20) from impeller shaft (18).

(12) Remove seal ring (21) and stuffing box (22).

4-70. FIRE PUMP ASSEMBLY MAINTENANCE (Continued).

(13) Remove bearing locknut (23) and water slinger (24) from impeller shaft (18).

(14) Remove bearing (25), spacer (26), bearing locknut (27), bearing lockwasher (28), pinion (29), spacer bushing (30), key (31), and bearing (32) from impeller shaft (18).



(22) Remove flange (53) and gasket (54).

- (15) Remove bearing caps (33) and gasket (34).
- (16) Remove tachometer drive shaft (35) and two bushings (36) along with tachometer gear (37).
- (17) Remove bearing (38), worm (39), bearing (40), bushing (41), gear (42) and key (43) from shaft (4).
- (18) Remove gasket (44) from gear case (11).
- (19) Remove stud (45), nut (46), plunger (47), packing (48), and plug (49) from inboard head (50).
- (20) Remove inboard head (50) from volute (51).
- (21) Remove gasket (52).

NOTE

Repair consists of replacing defective parts.

b. Assembly.

- (1) Install gasket (54) and flange (53).
- (2) Install gasket (52).
- (3) Install twenty-one cap screws (1) and lockwashers (2) and/ or twenty four nuts (12) as required for assembly of the following components.
- (4) Position head (50) to volute (51).

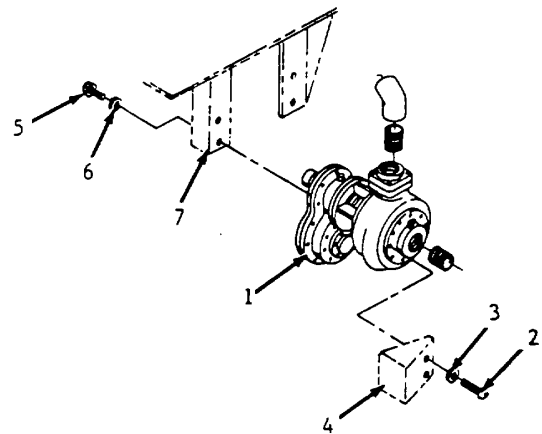
4-70. FIRE PUMP ASSEMBLY MAINTENANCE (Continued).

- (5) Install plug (49), packing (48), plunger (47), nut (46) and stud (45) in inboard head (50).
- (6) Install key (43), gear (42), bushing (41), bearing (40), worm (39), and bearing (38) on shaft (4).
- (7) Install tachometer gear (37), two bushings (36) and drive shaft (35).
- (8) Install gasket (34), bearing cap (33).
- (9) Install bearing (32), key, 31), bushing (30), pinion (29), lockwasher (28), locknut (27), spacer (26) and bearing (25) on impeller shaft (18).
- (10) Install water slinger (24) and locknut (23) on impeller shaft (18).
- (11) Install stuffing box (22) and seal ring (21).
- (12) Install impeller (20) and gasket (19) to impeller shaft (18).
- (13) Install impeller shaft (18), washer (17), nut (16), and cotter pin (15).
- (14) Install seal ring (14) and outboard head (13).
- (15) Install gasket (44) on gear case (11).
- (16) Install gear case cover (10) and two taper pins (9).
- (17) Install gasket (8).
- (18) Install bearing cap (7).

- (19) Install bearing cap (5) and gasket (6).
- (20) Install oil seal (3) on drive shaft (4).

INSTALLATION

- a. Position pump (1) to bracket (4) with four bolts (5) and lockwashers (6).
- b. Secure two bolts (2) and lockwashers (3) to bracket (4).



Section XII. MAINTENANCE OF ENGINE COOLING SYSTEM

	Para.		Para.
Coolant Recovery Bottle		Heat Exchanger Replacement.....	4-80
Replacement	4-73	Hoses And Piping	
Drive Belts Replacement	4-76	Replacement	4-77
Engine Cooling System		Radiator Replacement	4-81
Service	4-72	Thermostat And Housing	
Fan And Clutch Replacement	4-75	Replacement	4-79
Fan Shroud Replacement	4-74	Water Pump Replacement	4-78
General	4-71		

4-72. ENGINE COOLING SYSTEM SERVICE.

This task covers: Service

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Engine Coolant
(Appendix D, Item 12a)

General Safety Instructions

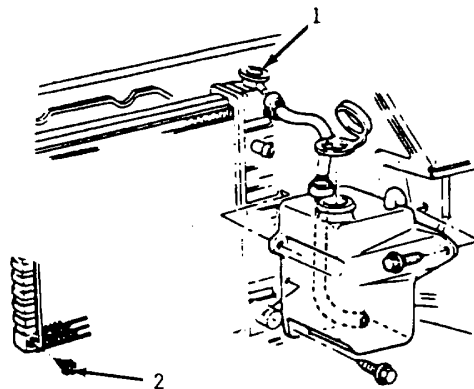
Be certain the engine is cool before attempting any work on the cooling system.
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

SERVICE

WARNING

Be certain the engine is cool before attempting any work on the cooling system. Serious personal injury could result from work on a hot cooling system.

- a. Remove radiator cap (1).
- b. Run engine, with cap removed, until upper radiator hose is hot, indicating thermostat is open.
- c. Stop engine and open radiator drain valve (2) to drain coolant.



- d. Close valve and add sufficient water to fill system

4-72. ENGINE COOLING SYSTEM SERVICE. (Continued).

- e. Repeat steps b, c, and d until the drained liquid is nearly colorless.
- f. Allow system to drain completely and then close the radiator drain valve (2) tightly.
- g. Add sufficient coolant (Appendix D, Item 12a) to provide the required freezing and corrosion protection.
- h. Run engine, with cap removed, until radiator upper hose becomes hot.
- i. With engine idling, add coolant until level reaches bottom of filler neck and install cap.
- j. Add fluid (Appendix D, Item 12a) to coolant recovery tank to raise level to "FULL HOT" mark.
- k. Install radiator cap (1).

4-73. COOLANT RECOVERY BOTTLE REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Coolant Bottle (22054185)

General Safety Instructions

Be certain the engine is cool before attempting any work on the cooling system.

Engine OFF.

Transmission in (N) neutral.

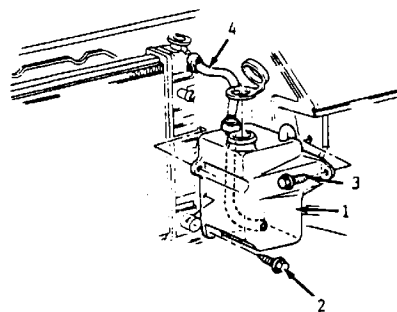
Parking brake and micro-brakelock set.

REMOVAL

WARNING

Be certain the engine is cool before attempting any work on the cooling system. Serious personal injury could result from work on a hot cooling system.

- a. Disconnect the coolant over flow hose (4) from the recovery tank (1) and drain the coolant.
- b. Remove the recovery retaining tank fasteners (2 and 3) and remove the tank (1) from the vehicle.

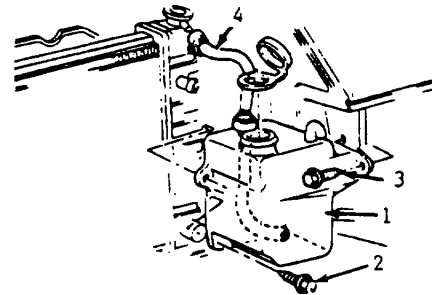


INSTALLATION

- a. Position the coolant recovery tank (1) and install the fasteners (2) and (3).

4-73. COOLANT RECOVERY BOTTLE REPLACEMENT. (Continued).

- b. Torque the bolt/screw (2) to 1.5 ft-lbs (2.0 N-m).
- c. Connect the coolant overflow hose (4) to the recovery tank (1).
- d. Fill the recovery tank (1) with the proper amount and mixture of coolant (Appendix D, Item 12a).



4-74. FAN SHROUD REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools
General Mechanics Tool Kit

Materials/Parts
Fan Shroud (14039951)

Equipment Condition	
<u>Para.</u>	<u>Condition Description</u>
4-75	Fan and Clutch Removed
4-76	Drive Belts Removed

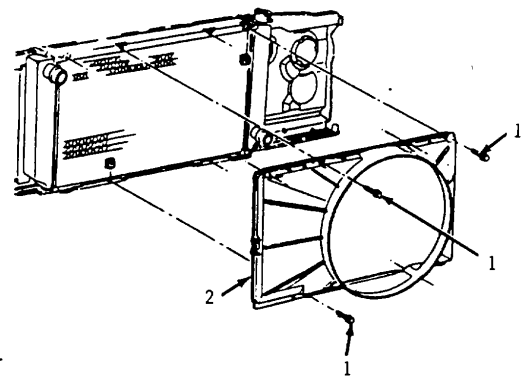
General Safety Instructions
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove four bolts (1) attaching shroud to radiator.
- b. Remove the fan shroud assembly (2).

INSTALLATION

- a. Install the shroud (2) to the radiator with four attaching bolts (1) and torque bolts to 53 in-lbs (6 N.m).
- b. Install drive belts (paragraph 476).
- c. Install fan and clutch (paragraph 4-75).



4-75. FAN AND CLUTCH REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Fan (1263011)
Fan Clutch (14032395)

Equipment Condition

Para. Condition Description
4-74 Fan Shroud Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

NOTE

Mark the fan clutch hub and water pump hub (1) for proper alignment at reassembly.

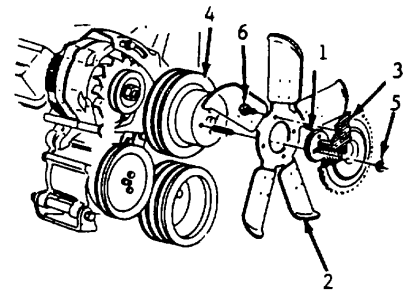
- a. Remove the fan (2) and fan clutch (3) from the water pump pulley (4) by removing nuts (5).

CAUTION

If a fan blade is bent or damaged in any way, no attempt should be made to repair and/or reuse the damaged part. A bent or damaged fan assembly must be replaced with a new fan assembly.

WARNING

It is essential that the fan assembly remain in proper balance. Balance cannot be assured once a fan assembly has been bent or damaged. A fan assembly that is not in proper balance could fail and fly apart during use, creating a dangerous condition to both the vehicle and the operator.



- b. Remove the fan (2) from the fan clutch (3) by removing the bolts (6).

INSTALLATION

NOTE

All mating surfaces (the water pump hub and fan clutch hub) must be inspected for smoothness and be reworked as necessary to eliminate any burrs or other imperfections.

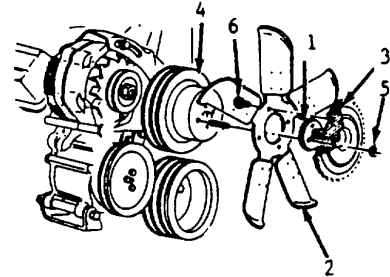
- a. Install the fan (2) to the fan clutch (3) with bolts (6).
- b. Torque to 18 ft-lbs (25 N-m).
- c. Install the fan (2) and fan clutch (3) assembly to the water pump pulley (4) with nuts (5).

4-75. FAN AND CLUTCH REPLACEMENT (Continued).

NOTE

Be sure to align the yellow reference marks (1) on the water pump hub and the fan clutch hub.

- d. Torque the nuts (5) to 18 ft-lbs (25 N-m).
- e. Install radiator fan shroud (paragraph 4-74).



4-76. DRIVE BELTS REPLACEMENT.

This task covers: a. Removal c. Adjustment
 b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit
 Tension Gauge (BT-33-95ACBN
 or BT-33-97M)

Materials/Parts

Generator Belt (9433749)
 Power Steering Belt (14050459)

General Safety Instructions

Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

REMOVAL

NOTE

More than one component may have to be loosened (and having the belt removed) to reach the belt to be replaced.

Place the belts into the pulley grooves by hand. Do not force a belt into a pulley groove by prying with a screwdriver, crowbar, or other wedge type tool. Prying a belt into position can damage both the belt and the belt drive components.

Remove the old belt(s) by loosening the component being driven by the belt.

INSTALLATION

- a. Install the new belt(s).

4-76. DRIVE BELTS REPLACEMENT. (Continued).

CAUTION

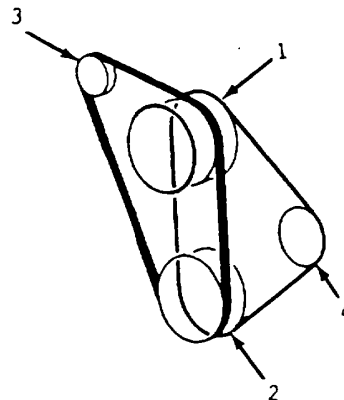
Avoid over or under-tightening drive belts. Loose belts result in slippage which can lead to belt and pulley "glazing", and inefficient component operation. Once a belt has become "glazed", it will be necessary to replace the belt. Loose belts can also place high impact loads on driven component bearings due to the whipping action of the loose belt. Over tightening belts can lead to bearing damage and early belt failure.

- b. Adjust belt to proper tension specification: New Belt 146 lb (650 N), Used Belt 67 lb (300 N).

NOTE

A used belt is one that has been rotated at least one complete revolution on the engine pulley. This begins the seating of the belt and it must never be tensioned to new belt specification.

- c. Tighten the component to the mounting bracket fasteners as follows:
- Generator Adjustment Bolt
20 ft-lbs (27 N-m)
 - Generator Pivot Bolt
32 ft-lbs (43 N-m)
 - Power Steering Adjustment Bolt
32 ft-lbs (43 N-m)
 - Power Steering Pivot Bolt
32 ft-lbs (43 N-m)
- d. Run the engine at idle speed for a minimum of 15 minutes, allowing the belt(s) to seat itself in the pulley(s).



- e. Allow the drive belt to cool.
- f. Check the belt tension which should be 67 lb (300 N).

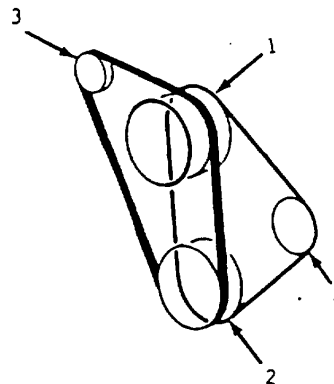
ADJUSTMENT**CAUTION**

Avoid over or under-tightening drive belts. Loose belts result in slippage which can lead to belt and pulley "glazing", and inefficient component operation. Once a belt has become "glazed", it will be necessary to replace the belt. Loose belts can also place high impact loads on driven component bearings due to the whipping action of the loose belt. Over tightening belts can lead to bearing damage and early belt failure.

4-76. DRIVE BELTS REPLACEMENT. (Continued).

NOTE

A used belt must never be tensioned to more than its specified tension limit. Belt should be cool or warm to the touch, not HOT.



- a. Place tension gauge at the center of the greatest span.
- b. Measure belt tension using proper tension gauge.
- c. If the belt is below the minimum "used" belt tension specification, adjust to specification:
New Belt 146 lb (650 N).
- d. For generator adjustment, loosen pivot bolt (1) and adjustment bolt (3) (and brace (2) if necessary).
- e. For power steering belt adjustment, loosen adjustment bolt three adjustment bolts and adjusting nut.
- f. By utilizing pry point, pivot assembly to proper tension in both areas.
- g. Torque generator adjustment bolt to 20 ft-lbs (27 N-m).
- h. Torque generator pivot bolt to 32 ft-lbs (43 N.m).
- i. Torque power steering pump adjustment bolt to 32 ft-lbs (43 N-m).
- j. Torque power steering pump pivot bolt to 32 ft-lbs (43 N-m).
- k. Run the engine at idle for a minimum of 15 minutes, allowing the belt(s) to reseat itself in the pulleys.
- l. Allow the drive belt to cool, then check the belt tension with the tension gauge.
- m. Belt tension with either belt should be 67 lb (300 N).
- n. Adjust to proper tension as necessary.

4-77. HOSES AND PIPING REPLACEMENT.

This task covers: **a. Removal** **b. Installation**

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Upper Radiator Hose (14036744)
Lower Radiator Hose (14036764)

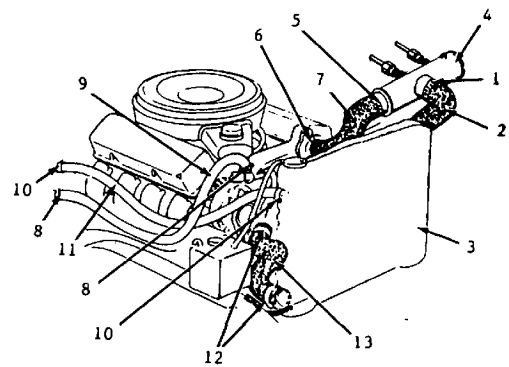
General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

4-77. HOSES AND PIPING REPLACEMENT. (Continued).

REMOVAL

- a. Remove two clamps (1) on hose (2) from radiator (3) to heat exchanger (4).
- b. Remove hose (2).
- c. Remove the clamp (5) from the crossover to the engine block.
- d. Remove the clamp (6) at the block.
- e. Remove the hose (7).
- f. Remove the clamps (8) from the crossover assembly to the heater.
- g. Remove the heater hose (9).
- h. Remove the clamps (10) from the heater to the radiator (2).
- i. Remove the hose (11).
- j. Remove the clamps (12) from the block to the lower portion of the radiator (2).
- k. Remove the hose (13).



INSTALLATION

- a. Position the clamps (12) on the lower radiator-to-block hose and install the hose (13).
- b. Position the clamps (10) on the heater to radiator hose and install the hose (11).
- c. Position the clamps (8) on the crossover-to-heater hose and install the hose (9).
- d. Position the clamps (6 and 5) on the crossover-to-engine block hose and install the hose (7).
- e. Position the clamps (1) on the radiator (3) -to-heat exchanger hose and install the hose (2).
- f. Make certain all connections are tight and secure.

4-78. WATER PUMP REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools
General Mechanics Tool Kit

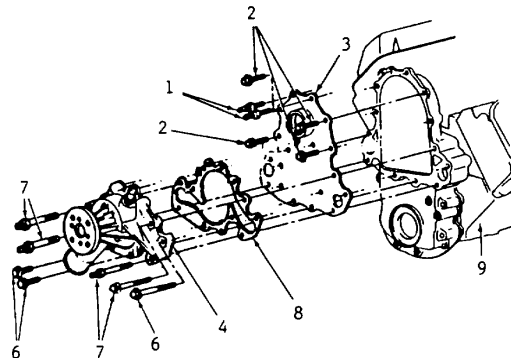
Materials/Parts
Thread Sealing Compound
(Appendix D, Item 43)
Water Pump (23500133)

Equipment Condition	
<u>Para.</u>	<u>Condition Description</u>
4-72	Cooling System Drained
4-74	Fan Shroud Removed
4-75	Fan Removed
4-76	Generator and Power Steering Belt Removed
4-77	Radiator Hoses Removed
4-113	Tube Removed
4-229	Power Steering Pump Removed

General Safety Instructions
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove the water pump bolts (1 and 2).
- b. Remove the water pump plate (3) and the water pump (4).
- c. Remove the water pump (4) from the water pump plate (3) by removing the bolts (6 and 7).
- d. Remove the gasket (8).



NOTE
Flanges must be free of oil. Clean the mating surfaces on the water pump, both sides of the water pump plate and the engine block.

NOTE
Thread sealing compound must be wet to the touch when bolts are tightened.

INSTALLATION

- a. Attach the water pump (4) to the water pump plate (3) with the gasket (8) and bolts (6 and 7).
- c. Install the water pump (4) to the engine block (9) with bolts (2 and 3).
- d. Torque the bolts to 15 ft-lbs (20 N.m).
- e. Install radiator hoses (paragraph 4-77).

4-78. WATER PUMP REPLACEMENT. (Continued).

- f. Install power steering pump (para 4-229).
- g. Install and adjust generator and power steering belts (paragraph 4-76).
- h. Install oil fill tube (paragraph 4-113).
- i. Install fan shroud (paragraph 474).
- j. Install fan (paragraph 4-75).
- k. Fill and service cooling system (paragraph 4-72).

4-79. THERMOSTAT AND HOUSING REPLACEMENT.

This task covers: **a. Removal** **b. Installation**

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Thermostat (14077122)
 Housing (14028917)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-72	Cooling System Drained
4-98	CDR Valve Removed
4-77	Hoses Removed

General Safety Instructions

Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

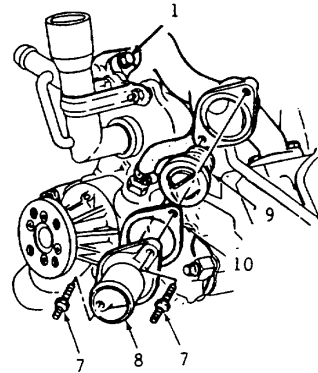
REMOVAL

WARNING

Be certain the engine is cool before attempting any work on the cooling system. Serious personal injury could result from work on a hot cooling system.

4-79. THERMOSTAT AND HOUSING REPLACEMENT. (Continued)

- a. Remove bolts (1).
- b. Remove crossover (6).
- c. Remove the studs (7) and the water outlet (8).
- d. Remove the thermostat (9) from its housing.
- e. Remove and discard the old gasket (10).



NOTE

Thermostat and water outlet are attached to the crossover along with the thermal bypass nipple.

INSTALLATION

- a. Install the thermostat (9) into its housing.
- b. Install a new gasket (10).
- c. Install the water outlet (8) with the studs (7).
- d. Torque the studs to 35 ft-lbs (47 N-m).
- e. Connect the upper radiator inlet hose (paragraph 4-77).
- f. Fill the radiator with proper coolant (paragraph 4-72).
- g. Position new gaskets (2) and install crossover (6) with bolts (1).
- h. Torque bolts to 35 ft-lbs (47 N.m).
- i. Install heater hose, upper radiator hose and bypass hose (paragraph 4-77).
- j. Install crankcase depression regulator valve (paragraph 4-98).
- k. Fill the cooling system with coolant (paragraph 4-72).

4-80. HEAT EXCHANGER REPLACEMENT. (Continued)

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Heat Exchanger (1938/3/5)

Equipment Condition

Para. Condition Description

4-72 Cooling System Drained

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

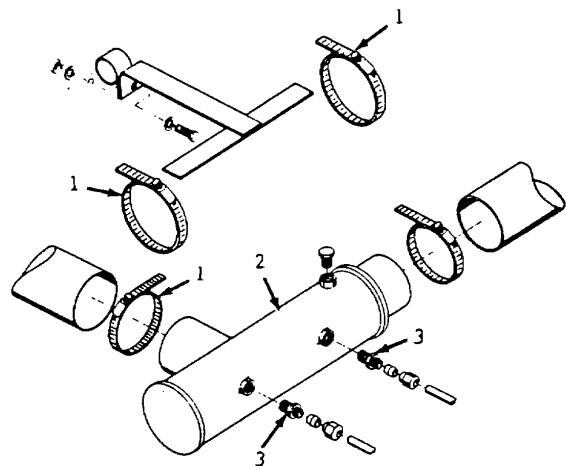
Parking brake and micro-brakelock set.

REMOVAL

- a. Loosen the two retaining straps (1) holding the heat exchanger (2).
- b. Disconnect the lines (3) from heat exchanger (2) with an adjustable wrench.
- c. Remove the heat exchanger (2) from the radiator.

INSTALLATION

- a. Place the heat exchanger (2) on the radiator with two retaining straps (1).
- b. Connect the lines (3) to the heat exchanger (2) with an adjustable wrench.
- c. Tighten retaining straps (1) holding the heat exchanger (2).
- d. Refill cooling system (paragraph 4-72).



4-81. RADIATOR REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools
General Mechanics Tool Kit

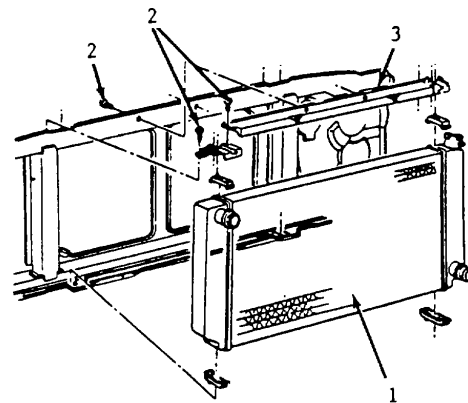
Materials/Parts
Radiator (3053686)

<u>Equipment Condition</u>	
<u>Para.</u>	<u>Condition Description</u>
4-72	Cooling System Drained
4-74	Fan Shroud Removed
4-77	Hoses Removed

General Safety Instructions
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove the upper radiator mounting hardware (2) and remove upper support (3).
- b. Remove the radiator (1) from the vehicle.



INSTALLATION

- a. Position the radiator (1) in the vehicle and install the upper radiator support (3).
- b. Torque the fasteners (2) to 13 ft lbs (17 N-m).
- c. Install the overflow hose to the radiator (paragraph 4-77).
- d. Install the upper and lower radiator hose to the radiator (paragraph 4-77).
- e. Install oil cooler lines (paragraph 4-77).
- f. Install fan shroud (paragraph 474).
- g. Fill and service cooling system (paragraph 4-72).

Section XIII. MAINTENANCE OF ENGINE FUEL SYSTEM

	Para.		Para.
Accelerator Pedal Replacement.....	4-89	Fuel Pump Replacement	4-85
Air Cleaner Replacement	4-83	Fuel Tank Replacement	4-88
Fuel Filter Replacement	4-84	General	4-82
Fuel Lines Replacement	4-87	Tank Fill Pipe and Cap Replacement	4-86

4-82. GENERAL.

This section contains information on the maintenance of the engine fuel system that are maintainable at the Organizational level.

4-83. AIR CLEANER REPLACEMENT.

This task covers: **a. Removal** **b. Installation**

INITIAL SET-UP

Materials/Parts
Air Cleaner (25041910)

General Safety Instructions
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

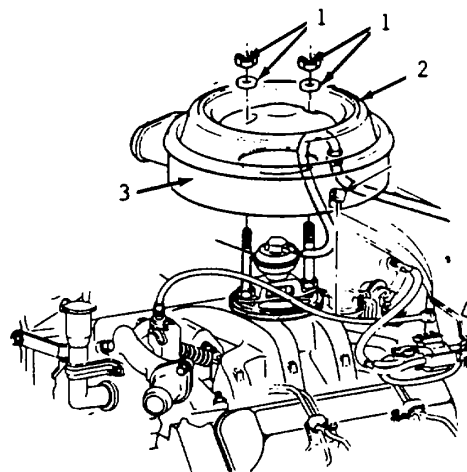
NOTE

Use extreme care when removing the filter element to prevent any dirt from falling into the engine.

- a. Remove two wing nuts (1) from the top of the air cleaner cover (2).
- b. Remove the air cleaner (2) cover from the base (3).
- c. Remove the air cleaner element.

NOTE

Remove all accumulated dirt from the base.



- c. Install two wing nuts (1) and tighten firmly.

INSTALLATION

- a. Install the air filter element.
- b. Install the air cleaner cover(2).

4-84. FUEL FILTER REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UPTools

General Mechanics Tool Kit

Materials/Parts

Fuel Filter (25055272)

General Safety Instructions

Engine OFF

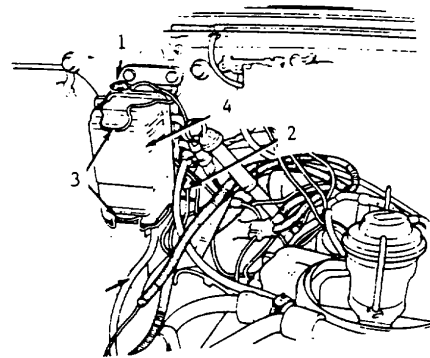
Transmission in (N) neutral.

Parking brake and micro-brakelock set

REMOVAL**WARNING**

The water/diesel fuel mixture is flammable, and could be hot. To help avoid personal injury and/or property damage, do not touch the fuel coming from the drain hose and do not expose the fuel to open flames or sparks. Be sure you do not over fill the container. Heat can cause the fuel to expand. If the container is too full fuel could be forced out of the container. This could lead to a fire and the risk of personal injury and/or vehicle damage.

- a. Place an explosion proof container under the filter drain hose.
- b. Open the air bleed (1) and the water drain valve (2) and drain the fuel.



- c. Disconnect both bail wires (3).
- d. Remove the fuel filter (4).

NOTE

Clean any dirt from the fuel sealing surfaces of the filter element and the filter adapter (5).

4-84. FUEL FILTER REPLACEMENT. (Continued)

INSTALLATION

- a. Install a new filter element.
- b. Connect the bail wires (3).
- c. Close the drain valve (2).
- d. Install a 1/8 inch (3 mm) inside diameter hose to the air bleed port (6) placing the other end of the hose into a suitable container.
- e. Disconnect the fuel injection pump shut-off solenoid wire.
- f. Crank the engine for 10 to 15 seconds and then wait one minute for the starter motor to cool.
- g. Repeat until clear fuel is observed coming from the air bleed.
- h. Close the air bleed (1). Disconnect the hose and remove the container.
- i. Connect the fuel injection pump solenoid wire.
- j. Install the fuel filler cap.
- k. Start the engine and let it idle for five minutes.
- l. Check the fuel filter for leaks.

CAUTION

If the engine is to be cranked or started with the air cleaner removed, take care not to let objects fall in to the engine. If the engine is running, suction can pull loose objects into the engine. Objects pulled or dropped into the engine can cause costly engine damage.

4-85. FUEL PUMP REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Fuel Pump (23500251)
Gasket (14022651)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-88	Fuel System Drained

General Safety Instructions

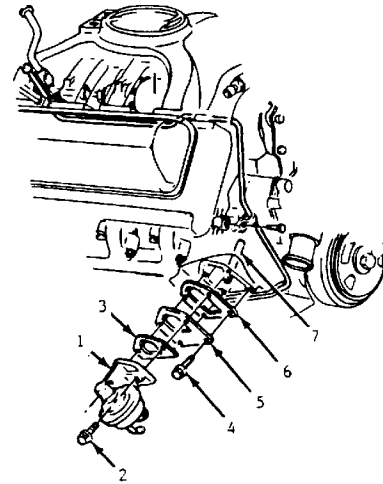
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

4-85. FUEL PUMP REPLACEMENT. (Continued)

REMOVAL**WARNING**

Be sure engine is cool before attempting any work on the fuel pump.

- a. Disconnect fuel pipes and hoses, from the fuel pump (1).
- b. Remove two bolts (2).
- c. Remove the fuel pump (1).
- d. Remove the gasket (3).
- e. Remove the bolts (4).
- f. Remove the mounting plate (5).
- g. Remove the gasket (6).
- h. If necessary, remove the push rod (7).

**INSTALLATION**

- a. If removed, apply some chassis grease (Appendix D, Item 15) to the push rod (7) to hold it up against the camshaft.
- b. Install a new gasket (6).
- c. Install the mounting plate (5).
- d. Install the bolts (4).
- e. Torque the bolts to 6 ft-lbs (8 N.m).
- f. Install a new gasket (3).
- g. Install the fuel pump (1).
- h. Install the bolts (2).
- i. Torque the bolts to 24 ft-lbs (33 N-m).
- j. Connect the fuel pipes and hoses to the fuel pump.
- k. Start the engine and check for leaks.
- l. Refill system (paragraph 4-88).

4-86. TANK FILL PIPE AND CAP REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Fill Pipe (14040799)

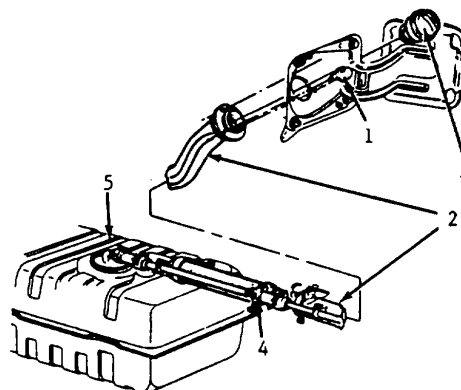
Cap (22518914)

General Safety Instructions

Disconnect the negative battery cable from the battery. Place "NO SMOKING" signs near work areas. Have a CO2 fire extinguisher nearby. Wear safety glasses. Siphon or pump fuel into an explosion proof container.

REMOVAL

- a. Remove two bolts (1) attaching the filler neck (2) and cap (3) to the body.
- b. Remove the clamps (4) connecting the filler neck assembly to the fuel tank (5).



INSTALLATION

- a. Position the filler neck (2) assembly to the vehicle.
- b. Install bolts (1).
- c. Replace cap (3).

4-87. FUEL LINE REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

TOOLS

General Mechanics Tool Kit

Materials/Parts

Fuel Lines (3750950)

General Safety Instructions

Disconnect the negative battery cable from the battery. Place "NO SMOKING" signs near work areas. Have a CO2 fire extinguisher nearby. Wear safety glasses. Siphon or pump fuel into an explosion proof container.

4-87. FUEL LINE REPLACEMENT. (Continued)

REMOVAL

- a. Disconnect fuel line(s) at fitting(s).
- b. Remove fuel line.

NOTE

Follow the same routing as the original pipe when re-installing.

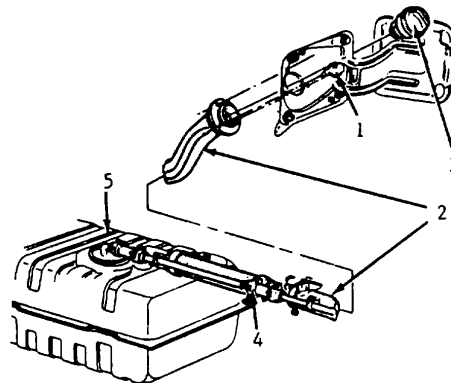
Never replace fuel pipe (welded steel tubing) with copper or aluminum tubing.

Check and replace any damaged "O" Rings or washers if used.

Pipes must be secured to the frame with a minimum 1/4 inch (6 mm) clearance to prevent contact and chafing.

INSTALLATION

- a. Position replacement fuel line(s) to vehicle.
- b. Using proper hose fitting(s) connect fuel line at proper junction.
- c. Tighten all fitting connections.
- d. Start the vehicle and check for leaks.



4-88. FUEL TANK REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Fuel Tank (14071994)

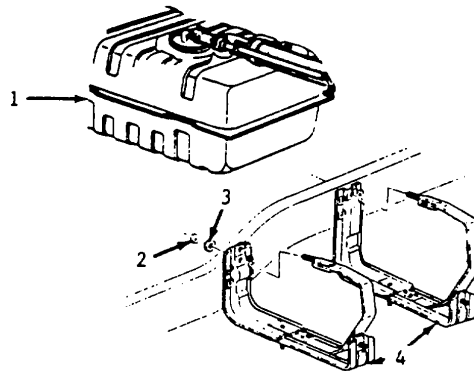
General Safety Instructions

Disconnect the negative battery cable from the battery.
 Place "NO SMOKING" signs near work areas.
 Have a CO2 fire extinguisher nearby.
 Wear safety glasses.
 Siphon or pump fuel into an explosion proof container.

4-88. FUEL TANK REPLACEMENT. (Continued)

REMOVAL

- a. Remove fuel from tank (1) and place in explosion proof container.
- b. Support the fuel tank and remove nut (2) and washer (3) on retaining straps (4).
- c. Disconnect the sending unit wire, hoses, pipes and ground straps.
- d. Lower and remove the fuel tank from the vehicle.



INSTALLATION

- a. Support and position the fuel tank (1) to the vehicle.
- b. Connect the sending unit wire, hoses, pipes and ground straps.
- c. Install the tank with the retaining straps (4), washers (3) and nuts (4).
- d. Torque the nuts to 4 ft-lbs. (6 N.m).

- e. Torque the bolts to 24 ft-lbs (33 N-m).
- f. Reconnect battery cables.

4-89. ACCELERATOR PEDAL REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Accelerator Pedal (468234)

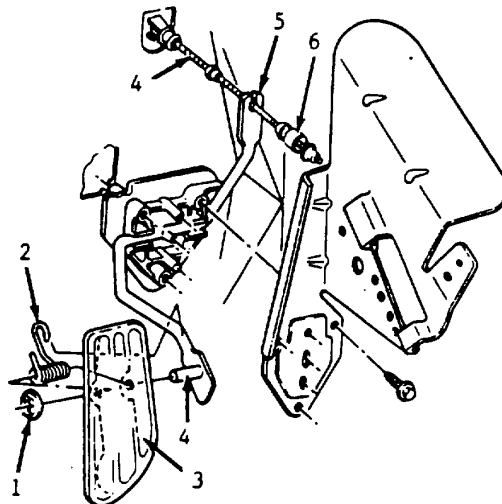
Equipment Condition

Para.	Condition Description
4-85	Air Cleaner Removed

4-89. ACCELERATOR PEDAL REPLACEMENT. (Continued)

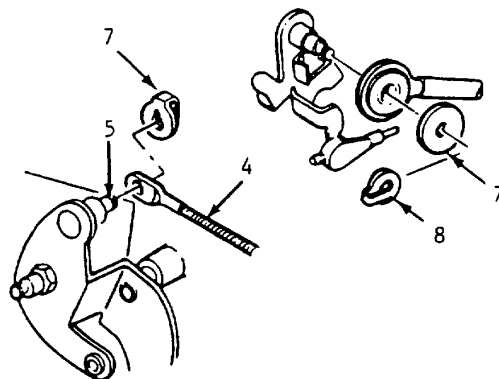
REMOVAL

- a. Remove retainer (1) from accelerator pedal shaft.
- b. Disconnect spring (2) from accelerator pedal.
- c. Remove accelerator pedal (3) by sliding off shaft (4).
- d. Disconnect the accelerator control cable (4) from the control rod (5).
- e. Remove the stop (6) from the cable (4).
- f. Disconnect the washer (7) and the retainer (8) from the stud on the pivot arm.
- g. Remove the cable from the vehicle.



INSTALLATION

- a. Route and position the cable (3) in the vehicle to the assemblies.
- b. Install the washer (7) and the retainer (8) to the stud on the pivot arm in the engine compartment.
- c. Install the air cleaner (paragraph 4-83).
- d. Remove the stop (6) from the cable (4).
- e. Connect the control cable to the control rod (5).
- f. Start the engine and check the operation of the accelerator before placing the vehicle in service.
- g. Slide accelerator pedal (3) on shaft (4).



- h. Connect spring (2) to pedal.
- i. Install retainer (1).

Section XIV. MAINTENANCE OF DIESEL FUEL INJECTION SYSTEM

	Para.		Para.
Diesel Fuel Injection System		Injection Nozzles	
Service	4-91	Replacement	4-94
General	4-90	Injection Pump	
Injection Lines		Replacement	4-93
Replacement	4-92		

4-90. GENERAL.

This section contains information on the maintenance of the diesel fuel injection system that are maintainable at the Organizational level.

4-91. DIESEL FUEL INJECTION SYSTEM SERVICE.

This task covers: Service

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description

4-84 Fuel Filter Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

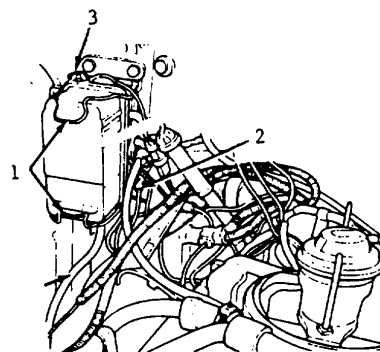
Parking brake and micro-brakelock set

REMOVAL

NOTE

To prevent fuel spillage drain fuel from the filter by opening both the air bleed and water drain valve allowing fuel to drain out into an explosion proof container.

- a. Clean any dirt off the fuel port sealing surface of the filter adapter and the new filter.
- b. Install the new filter and snap into position with bail wires (1).
- c. Close the water drain valve (2). Open the air bleed (3). Connect a 1/8 inch I.D. hose to the air bleed port and place the other end into a suitable container.



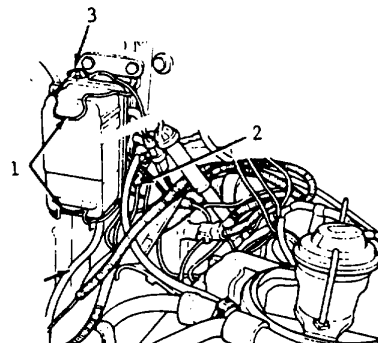
- d. Disconnect fuel injection pump shut off solenoid wire.

4-91. DIESEL FUEL INJECTION SYSTEM SERVICE. (Continued)

- e. Crank engine for 10-15 seconds and then wait one minute for the starter motor to cool. Repeat until clear fuel is observed coming from the air bleed.

CAUTION

If engine is to be cranked, or starting attempted with the air cleaner removed, care must be taken to prevent material from being pulled into the air inlet manifold which could result in engine damage.



- f. Close the air bleed (3). Reconnect the injection pump solenoid wire and replace fuel tank cap.

- g. Start engine and allow it to idle for 5 minutes.
- h. Check fuel filter for leaks.

4-92. INJECTION LINES REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

- Protective Covers (J-29664-1)
- General Mechanics Tool Kit

Equipment Condition

Para.	Condition Description
4-83	Air Cleaner Removed
4-110	Intake Manifold Removed

Material s/Parts

- Injection Lines (14033911 thru 14033918)

General Safety Instructions

Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

4-92. INJECTION LINES REPLACEMENT. (Continued)

REMOVAL

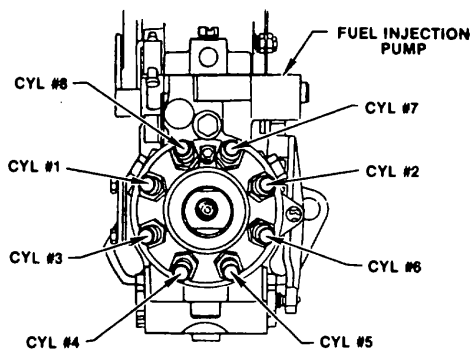
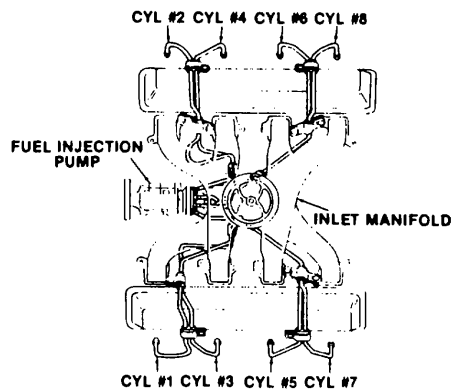
NOTE

It may be necessary to loosen the vacuum pump hold down clamp and rotate the pump to gain access to all intake manifold bolts (paragraph 4-93).

- a. Install the protective covers to the intake ports.
- b. Remove the injection line clips at the loom brackets.
- c. Remove the injection lines at the nozzles, capping the nozzles immediately.
- d. Remove the injection line from the pump.

INSTALLATION

- a. Install the fuel injection line(s) at the pump.
- b. Remove protective caps at the injection nozzles and install the fuel injection line(s) to the nozzle(s).
- c. Torque the fittings to 19 ft-lbs (25 N-m).
- d. Install the injection line clips at the loom brackets.
- e. Remove the protective covers and install the intake manifold.



- f. Install the intake manifold (paragraph 4-110).
- g. Torque the bolts to 30 ft-lbs (40 N-m).
- h. Install the crankcase ventilator bracket.
- i. Install the air cleaner (paragraph 4-83).

4-93. FUEL INJECTION PUMP REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

Protective Covers
(J-29664-1)
General Mechanics Tool Kit

Materials/Parts

Injection Pump (23500251)
Gasket (14022651)

Equipment Condition

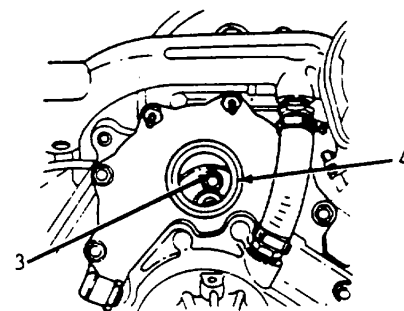
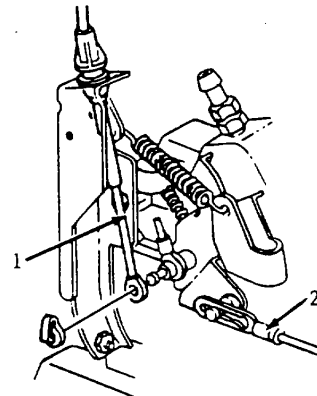
Para.	Condition Description
4-92	Injection Lines Removed
4-110	Intake Manifold Removed

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected

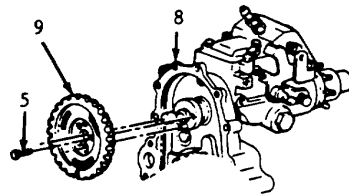
REMOVAL

- a. Remove the accelerator cable (1) at the injection pump.
- b. Remove the detent rod (2).
- c. Disconnect the fuel return line at the top of the injection pump.
- d. Disconnect the fuel inlet line from the injection pump.
- e. Disconnect all necessary wires and hoses from the pump.
- f. Remove the oil fill tube (including the CDR valve vent hose).
- g. Remove the grommet.
- h. Scribe or paint a mark on the front cover and the injection pump flange.
- i. Rotate the engine to gain access to the bolts (3) that hold the driven gear to the injection pump, access being gained through the oil filler neck hole (4).
- j. Remove the bolts (5).

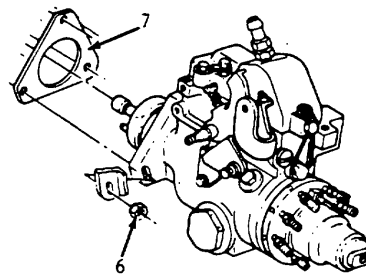


4-93. FUEL INJECTION PUMP REPLACEMENT. (Continued)

- k. Remove the nuts (6).
- l. Remove the pump.
- m. Cap all open lines and nozzles.
- n. Remove the gasket (7).

**INSTALLATION**

- a. Install a new gasket (7).
- b. Align the locating pin on the pump hub (8) with the slot in the injection pump driven gear (9), then install the injection pump to the front cover.
- c. Install the nuts (6).

**NOTE**

Check the timing mark alignment before fully torquing the nuts.

- d. Torque the nuts to 30 ft-lbs (40 N-m).
- e. Install the drive gear to injection pump bolts.
- f. Torque bolts to 20 ft-lbs (25 N-m).
- g. Install grommet.
- h. Install the oil fill tube including the CDR valve vent hose.
- i. Install the fuel feed line at the injection pump.
- j. Torque fitting to 20 ft-lbs (25 N-m).

- k. Install the fuel return line to the top of the injection pump.
- l. Install the detent rod (2).
- m. Connect all necessary wires and hoses.
- n. Connect the accelerator cable (1).
- o. Install the injection lines (paragraph 4-92).
- p. Install the intake manifold (paragraph 4-110).
- q. Reconnect the battery cables.

4-94. INJECTION NOZZLES REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

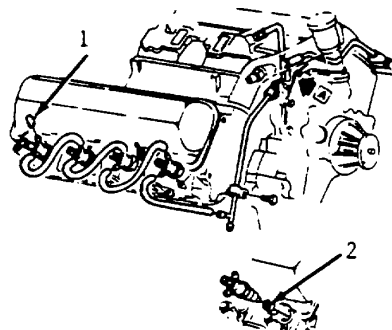
Tools
 Nozzle Socket
 (J-29873)
 General Mechanics Tool Kit

General Safety Instructions
 Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

Materials/Parts
 Injection Nozzles (14059057)

REMOVAL

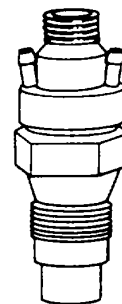
- a. Disconnect the fuel line clip.
- b. Disconnect the fuel return hose.
- c. Disconnect the fuel injection line(s).
- d. Cap (1) all nozzles and lines.



NOTE

When removing an injection nozzle, be sure to use the nozzle socket. Failure to do so could result in damage to the injection nozzle. Use the 30 mm hex portion applied where shown (2) in the illustration.

- e. Remove the injection nozzle with the nozzle socket.



Fuel Injection Nozzle

INSTALLATION

- a. Remove caps on nozzles and lines and install the injection nozzle using the nozzle socket.
- b. Torque the nozzle to 50 ft-lbs (70 N-m).
- c. Install the fuel injection line.
- d. Torque the nut to 20 ft-lbs (25 N-m).

- e. Connect the fuel return hose.
- f. Connect the fuel line clip.
- g. Reconnect the battery cables.

Section XV. MAINTENANCE OF EMISSION CONTROL SYSTEM

CDR Valve Replacement	Para. 4-98	Tubing and Hoses Replacement	Para. 4-97
Emission Control System Service	4-96	Vacuum Pump Replacement	4-99
General	4-95		

4-95. GENERAL.

This section contains information on the maintenance of the emission control system that are maintainable at the Organizational level.

4-96. EMISSION CONTROL SYSTEM SERVICE.

This task covers: Service

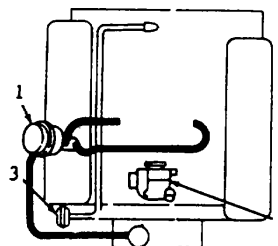
INITIAL SET-UP

Tools
General Mechanics Tool Kit

General Safety Instructions
Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

SERVICE

- a. Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment.
- b. Check all emission control hoses for proper hookup and condition. Replace if necessary.



4-97. TUBING AND HOSES REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UPTools

General Mechanics Tool Kit

Materials/Parts

Hoses as required

General Safety Instructions

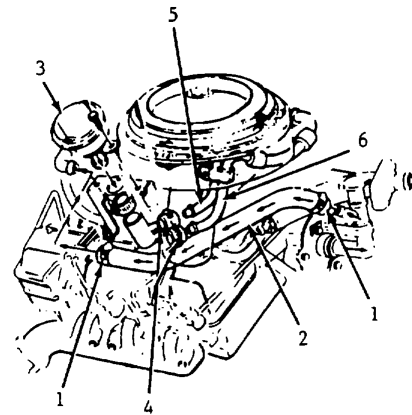
Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set

REMOVAL

- a. Loosen two plastic clamps (1) holding hose (2) from oil fill pipe to CDR valve (3).
- b. Remove hose (2).
- c. Unsnap two clamps (4) holding hoses from CDR valve (3) to two hoses (5 and 6).
- d. Remove hoses (4 and 5).
- e. Remove two tubes to intake manifold.

**INSTALLATION**

- a. Position hose(s) with clamps attached from tube(s) to CDR valve (3).
- b. Install clamps by tightening securely.
- c. Position hose (1) with clamps attached from CDR valve (3) to oil fill pipe (2).
- d. Install clamps by tightening securely.

4-98. CDR VALVE REPLACEMENT.

This task covers: a. Removal b. Installation

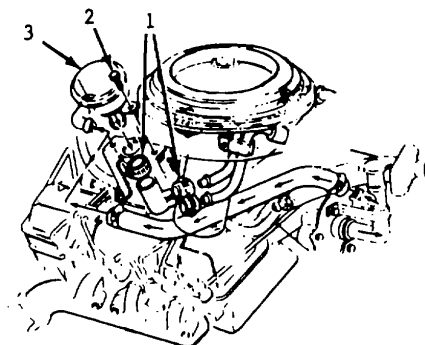
INITIAL SET-UP

Tools
General Mechanics Tool Kit

General Safety Instructions
Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set

REMOVAL

- a. Disconnect clamps (1) from the hoses.
- b. Disconnect the hoses.
- c. Remove bolts (2).
- d. Remove CDR valve (3).



INSTALLATION

- a. Install CDR valve (3) to the bracket.
- b. Install bolts (2).
- c. Connect hoses.
- d. Connect clamps (1).

4-99. VACUUM PUMP REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools
General Mechanics Tool Kit

Equipment Condition
Para. Condition Description
4-83 Air Cleaner Removed

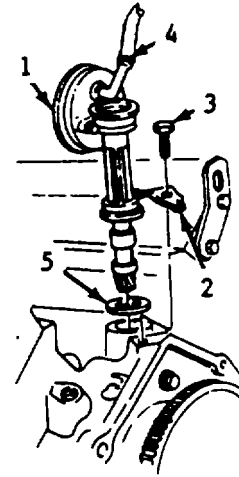
Materials/Parts
Cloth, Soft, Lint Free
(Appendix D, Item 12)
Vacuum Pump (7839416)

General Safety Instructions
Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

4-99. VACUUM PUMP REPLACEMENT. (Continued)

REMOVAL

- a. Cover the intake manifold.
- b. Disconnect the vacuum hose (4) from the vacuum pump (1).
- c. Remove the clamp (2) by removing the bolt (3).
- d. Remove the vacuum pump (1) and gasket (5).
- e. Cover the hole in the engine block with a soft lint-free cloth (Appendix D, Item 12) to prevent foreign material from falling into the engine block.

**INSTALLATION**

- a. Install a new gasket (5) on the vacuum pump (1).
- b. Remove the cloth and install the vacuum pump (1).
- c. Install the clamp (2) by inserting the bolt (3) and torque to 30 ft lbs (42 N-m).
- d. Connect the vacuum hose (4) to the pump (1).
- e. Remove cover from intake manifold and install the air cleaner (paragraph 4-83).

Section XVI. MAINTENANCE OF ENGINE EXHAUST SYSTEM

	Para.		Para.
Clamps and Hangers		Mufflers Replacement	4-103
Replacement	4-104	Tail Pipes Replacement	4-102
Exhaust Pipes Replacement	4-101		
General	4-100		

4-100. GENERAL.

This section contains information on the maintenance of the engine exhaust system that are maintainable at the Organizational level.

4-101. EXHAUST PIPES REPLACEMENT.

This task covers: **a. Removal** **b. Installation**

INITIAL SET-UP

Tools

- General Mechanics Tool Kit
- Jack Stand
- Jack

Materials/Parts

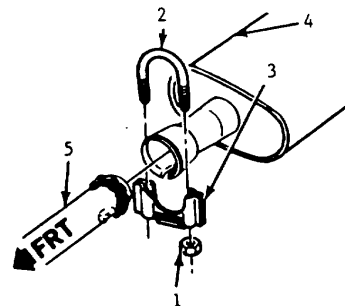
- Sealant
(Appendix D, Item 43)
- Exhaust Pipe as Required
(Appendix E, Page E-84)

General Safety Instructions

Since the exhaust system can reach extremely high temperatures, be sure the exhaust system is cooled before attempting any disassembly.

REMOVAL

- a. Raise the vehicle.
- b. Remove the nuts (1) and U-bolts (2) from the clamp (3) attaching the muffler (4) to the exhaust pipe (5).
- c. Remove the clamp (3).



4-101. EXHAUST PIPES REPLACEMENT. (Continued)

- d. Remove the nuts (6), washers (7), bolts (8) and clamp (9) holding the exhaust pipe (10) to the frame.
- e. Remove the nuts (11), washers (12) and flange (13) attaching the exhaust pipe (14) to the manifold (15).
- f. Remove the exhaust pipe.

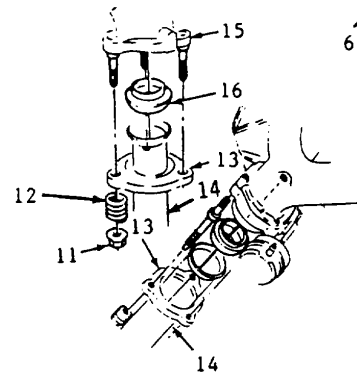
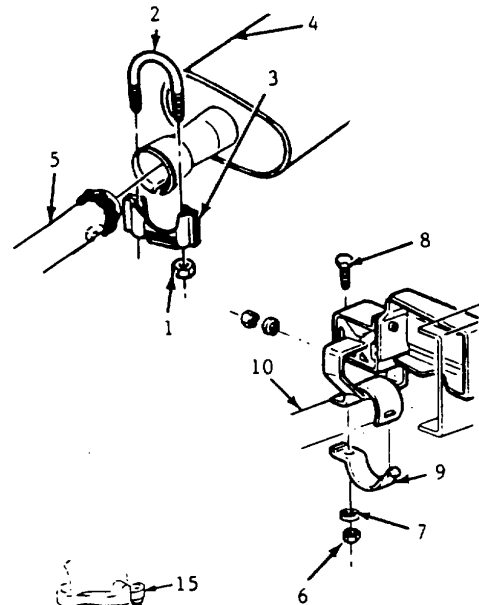
NOTE

When installing the exhaust pipe to the manifold, always use a new seal ring (16) and nuts. Be sure to clean the manifold studs with a wire brush before installing the nuts.

Sealer is to be applied to all slip-joint connections.

INSTALLATION

- a. Install the exhaust pipe (14) to the manifold (15) by sliding the exhaust pipe flange (13) on the exhaust pipe (14) up to the flared end.
- b. Slip the seal ring (16) on the exhaust pipe insert.
- c. Install washers (12) and insert this assembly onto the exhaust manifold and start the nuts (11) by hand. Do not tighten fully at this time.
- d. Install the exhaust pipe (5) to the muffler (4) with the clamp (3) using the U-bolt (2) and nuts (1). Do not tighten fully at this time.
- e. Attach the exhaust pipe to the cross member frame by installing the clamps (9), bolts (8), washers (7) and nuts (6). Do not tighten fully at this time.



- f. Check and be sure the exhaust pipe assembly is properly aligned and snug before torquing the nuts.
- g. Torque the exhaust pipe to manifold nuts to 15 ft-lbs (20 N-m).
- h. Torque the exhaust pipe to muffler clamp nuts to 30 ft-lbs (40 N-m).
- i. Torque the exhaust pipe hanger-to frame clamp nuts to 11 ft-lbs (15 N-m).
- j. Lower the vehicle.

4-102. TAIL PIPES REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit
Jack Stand
Jack

Materials/Parts

Curbside Tail Pipe (027-00010)
Streetside Tail Pipe (140450008)

General Safety Instructions

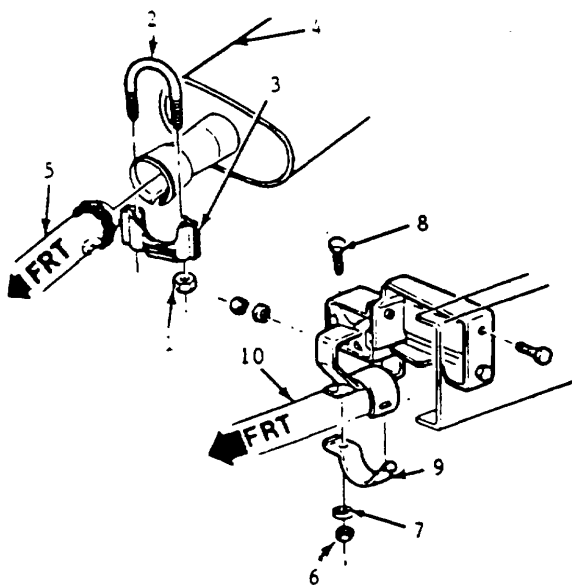
Since the exhaust system can reach extremely high temperatures, be sure the exhaust system is cooled before attempting any disassembly.

REMOVAL

NOTE

The curbside muffler and tailpipe is a welded unit. Both must be replaced at the same time.

- a. Raise vehicle.
- b. Remove the nuts (1) and U-bolts (2) from the clamp (3) attaching the muffler (4) to the tail pipe (5).
- c. Remove the exhaust pipe-to muffler clamp (2).
- d. Remove the nuts (6), washers (7), bolts (8) and clamp (9) holding the tail pipe (10) to the frame.



INSTALLATION

- a. Install the tail pipe (5) to the muffler (4) with the clamp (3) using the U-bolt (2) and nuts (1). Do not tighten fully at this time.
- b. Attach the tail pipe to the cross member frame by installing the clamp (9), washers (7) and nuts (6). Do not tighten fully at this time.
- c. Check and be sure the tail pipe assembly is properly aligned and snug before torquing the nuts.
- d. Torque the tail pipe to manifold nuts to 15 ft-lbs (20 N.m).
- e. Torque the tail pipe to muffler clamp nuts to 30 ft-lbs (40 N-m).
- f. Torque the tail pipe hanger-to frame clamp nuts to 11 ft-lbs (15 N-m).
- g. Lower the vehicle.

4-103. MUFFLERS REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UPTools

General Mechanics Tool Kit
Jack Stand
Jack

General Safety Instructions

Since the exhaust system can reach extremely high temperatures, be sure the exhaust system is cooled before attempting any disassembly.

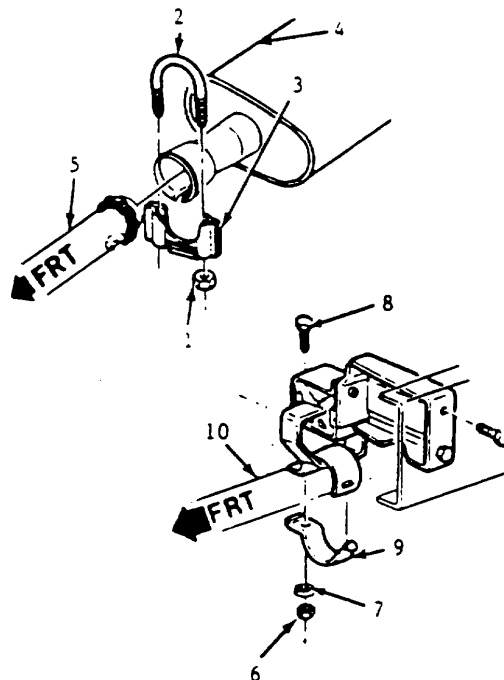
Materials/Parts

Mufflers (15537759)

REMOVAL**NOTE**

The curbside muffler and tailpipe is a welded unit. Both must be replaced at one time.

- a. Raise vehicle.
- b. Remove the nuts (1) and U-bolts (2) from the clamp (3) attaching the muffler (4) to the exhaust pipes (5).
- c. Remove the exhaust pipe-to muffler clamp (2).
- d. Remove the muffler (3).

**INSTALLATION**

- a. Install the exhaust pipe (5) to the muffler (4) with the clamp (3) using the U-bolt (2) and nuts (1). Do not tighten fully at this time.
- b. Attach the exhaust pipe to the cross member frame by installing the clamp (9), bolts (8), washers (7) and nuts (6). Do not tighten fully at this time.
- c. Check and be sure the exhaust pipe assembly is properly aligned and snug before torquing the nuts.
- d. Torque the exhaust pipe to manifold nuts to 15 ft-lbs (20 N-m).
- e. Torque the exhaust pipe to muffler clamp nuts to 30 ft-lbs (40 N-m).
- f. Torque the exhaust pipe hanger-to frame clamp nuts to 11 ft-lbs (15 N-m).
- g. Lower the vehicle.

4-104. CLAMPS AND HANGERS REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Clamps and Hangers As Required
(Appendix E, Page E-84)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set

REMOVAL

a. Street Side Cylinder Bank Exhaust:

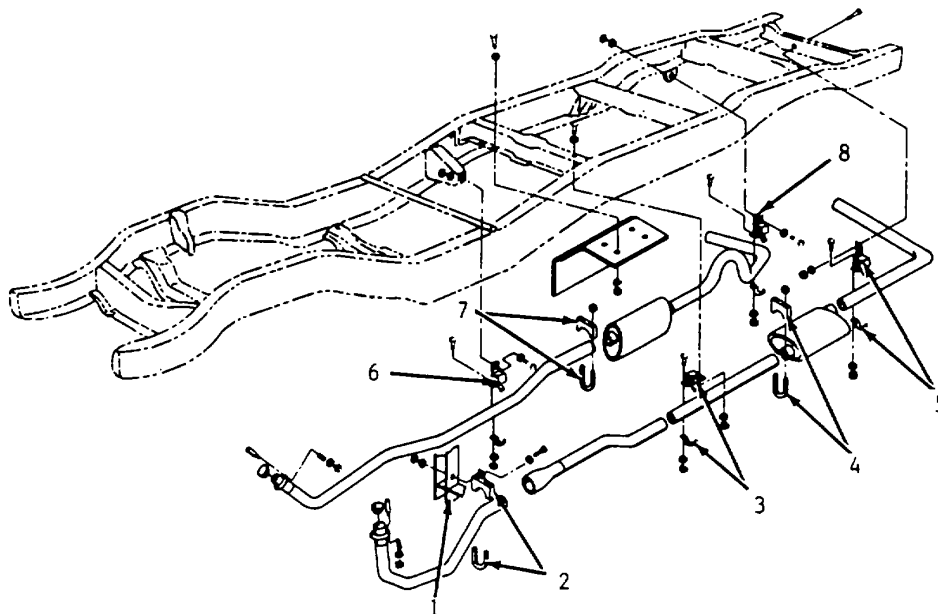
- (1) Remove clamp to lower frame bracket (1).
- (2) Remove U-clamp to "S" configuration cross-over (2).
- (3) Remove U-clamp at middle of frame crossover (3).
- (4) Remove U-clamp at muffler (4).
- (5) Remove clamp at rear crossover member (5).

b. Curb Side Cylinder Bank Exhaust

- (1) Remove clamp/braces at framebeam-extension forward (6).
- (2) Remove U-clamp at muffler (7).
- (3) Remove clamp/bracket on framebeam-extension at rear (8).

NOTE

Curbside tailpipe and muffler are one unit.



4-104. CLAMPS AND HANGERS REPLACEMENT. (Continued)

INSTALLATION

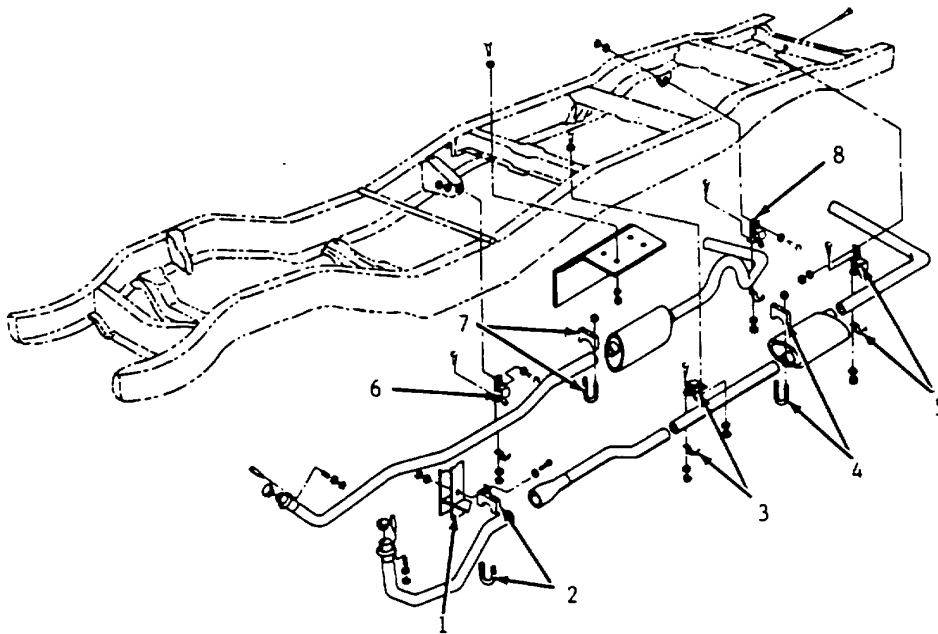
a. Curb Side Cylinder Bank Exhaust:

- (1) Install clamp/bracket on frame-beam-extension at rear (8).
- (2) Install U-clamp at muffler (7).
- (3) Install clamp/bracket at (forward) frame-beam-extension (6).

- (2) Install U-clamp at muffler (4).
- (3) Install U-clamp at middle (3) of frame crossover.
- (4) Install U-clamp to "S" configuration crossover (2).
- (5) Install clamp to lower frame bracket (1).
- (6) Torque all clamp nuts to 30 ft lbs (40 N-m).

b. Street Side Cylinder Bank Exhaust:

- (1) Install clamp at rear crossover member (5).



Section XVII. MAINTENANCE OF ENGINE AND ACCESSORIES

Alternator Replacement	Para. 4-107	General	Para. 4-105
Batteries and Cables Replacement	4-106	Intake Manifold Replacement	4-110
Diesel Glow Plug System Maintenance	4-108	Oil Pan Replacement	4-114
Dipstick and Tube Replacement	4-113	Rocker Arm Cover Replacement	4-112
Exhaust Manifold Replacement	4-111	Starter Replacement	4-109

4-105 GENERAL.

This section contains information on the maintenance of the engine and accessories that are maintainable at the Organizational level.

4-106. BATTERIES AND CABLES REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

The battery produces hydrogen gas. Do not smoke or cause a flame or spark to occur near the battery as it may cause the gas to ignite and explode.

Material s/Parts

Battery (105)

Engine OFF

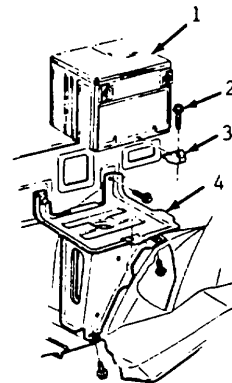
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected

REMOVAL

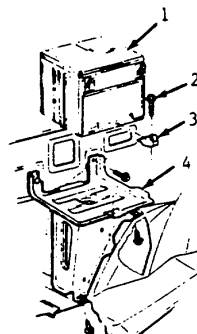
- a. Disconnect the negative cable from the negative battery terminal.
- b. Disconnect the positive battery terminal.
- c. Disconnect bolts (2) and remove battery hold-down retainer (3).
- d. Remove the battery (1).



4-106. BATTERIES AND CABLES REPLACEMENT. (Continued)

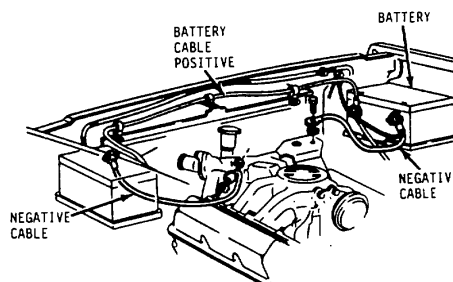
NOTE

Check the battery holder (4) for damage or foreign objects. If damage is noted, repair or replace. Clean the holder before installing battery. Clean the battery cables.



INSTALLATION

- a. Install the battery (1) into the battery holder (4).
- b. Install the battery hold-down retainer (3) and torque bolts (2) to 135 ft-lbs (15 N-m).
- c. Replace any worn or frayed battery cables as necessary.
- d. Connect the positive cable to the positive terminal.
- e. Connect the negative cable to the negative terminal.
- f. Torque the terminals to 120 ft-lbs (13 N-m).



4-107. ALTERNATOR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Belt Tension Gauge

Materials/Parts

Alternator (A00O17706JA)

General Safety Instructions

Failure to disconnect negative battery leads at the battery may result in an injury from the "hot" battery lead at the alternator.
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

4-107. ALTERNATOR REPLACEMENT. (Continued)

REMOVAL

- a. Disconnect the terminal plug and battery leads from the back of the alternator (1).
- b. Loosen adjusting bolts (2) for alternator mounting.
- c. Remove alternator drive belt
- d. Remove adjusting thru bolts (2, 3, and 4) which retains alternator to the mounting bracket.
- e. Remove alternator (1) from the vehicle.

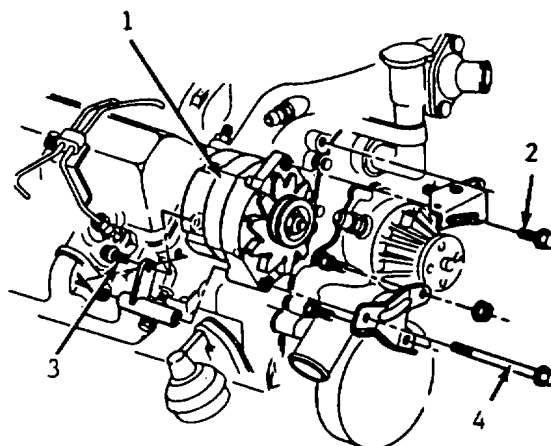
INSTALLATION

- a. Install alternator (1) on mounting bracket with thru bolts (3 and 4). Do not tighten at this time.
- b. Install the alternator drive belt and adjusting bolts (2).
- c. Torque the belt to 95 ft-lbs (420 N-m) as measured with a belt gauge.

NOTE

When installing a new belt, it is important to run the vehicle for 20-30 minutes under heavy electrical loads and then retension the belt. This is done to remove the initial belt stretch.

- d. Torque mounting bracket bolt (2) to 33 ft-lbs (45 N.m).
- e. After belt adjustment is made, torque alternator pivot bolt (4) to 45 ft-lbs (60 N.m).
- f. Connect the terminal plug and battery leads at the back of the alternator.
- g. Connect the negative battery terminal cables.



4-108. DIESEL GLOW PLUG SYSTEM MAINTENANCE.

This task covers:

- | | |
|---------------|-----------------|
| a. Removal | b. Test |
| c. Inspection | d. Installation |

INITIAL SETUP:

Materials/Parts
Glow Plug (5613738)

TEST EQUIPMENT

Ohmmeter
12 Volt Test Light

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Disconnect the plug (1) from the wire connector.
- b. Unscrew the plug (1).

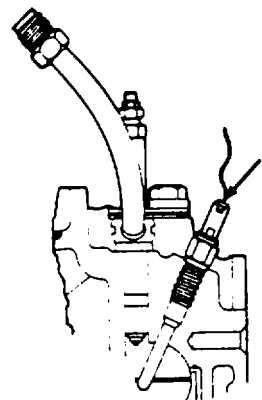
INSPECTION

- a. Check the glow plugs (1).
- b. Check all connectors in the glow plug electrical system.
- c. Check the engine harness ground connection to engine and torque the nut to 8 ft-lbs (11 N-m).
- d. Check the four-wire connector at controller to be sure it is fully seated and latched.
- e. Check both controller copper stud upper nuts and be sure they are torqued to 48 in-lbs (5 N-m).

NOTE

Do not tighten lower nuts.

- f. Check the temperature switch connectors at the top rear right cylinder head.



- g. Check the glow plug lamp on the instrument panel for tight connection and operation.

TESTING

A normal functioning system operates as follows:

- a. Key on - Engine not running and at ambient temperature.
 - (1) Glow plugs ON for 4 to 6 seconds, then OFF for about 4.5 seconds.
 - (2) Then cycle; ON for about 1.5 seconds, OFF for about 4.5 seconds, and continue to cycle 1.5 ON/4.5 OFF, for a total duration (including the initial 4 to 6 seconds) of about 20 seconds.

4-108. DIESEL GLOW PLUG SYSTEM MAINTENANCE. (Continued)

- b. If the engine is cranked during or after the above sequence, the glow plugs will cycle ON/OFF for a total duration of 25 seconds after the engine control switch is returned from the crank position, whether the engine starts or not. The engine does not have to be running to terminate the glow plug cycling.

NOTE

All the times mentioned previously are approximate because they vary with initial engine temperature. The initial ON time and cycling ON/OFF times vary also with system voltage and/or temperature. Lower temperatures cause longer duration of cycling.

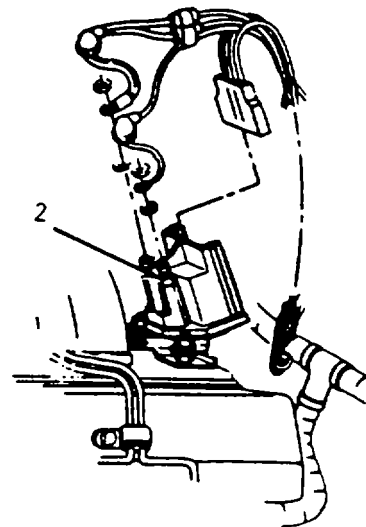
CAUTION

Do not manually bypass the relay in the glow plug controller (2) if jump started with more than a 12-volt system. The glow plugs could be damaged.

NOTE

The glow plug inhibit switch is temperature controlled and opens above 1250F (51. 50C) to prevent glow plug operation above this temperature. It is mounted at the rear of the right cylinder head.

- c. Check the temperature-controlled switch to make sure it is closed at low temperatures and open at high temperatures.



- (1) Remove the connector from the inhibit switch when the engine temperature is below 100°F (38°C).
- (2) Set the ohmmeter on a low range or use a self-powered test lamp.
- (3) Test across the terminals.
- (4) The switch should be closed (test lamp on or a reading of less than 0.1 ohm on the meter).
- (5) Test terminals to ground with a test lamp or the ohmmeter on a high range. The lamp should be off or the meter show greater than 1.0 megohm.

4-108. DIESEL GLOW PLUG SYSTEM MAINTENANCE. (Continued)

- (6) Replace the temperature control switch if it tests open across the terminals or if either terminal is closed to ground.
- (7) Disconnect the plug from the switch terminals when the engine is above 125°F (52°C).
- (8) Set the ohmmeter on the highest scale or use a self-powered test light.
- (9) Test across the terminals.
- (10) Test from each terminal to ground.
- (11) Switch should be open (test light off or high ohm reading of greater than 1. 0 megohm on the meter).

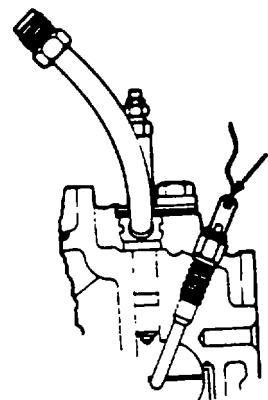
d. Glow Plug Afterstart.

The glow plug controller provides glow plug operation after starting a cold engine. This after-start operation is initiated when the engine control switch is returned to "RUN" from the "START" position. While loss of this function may not cause a cold start complaint, it may result in excessive white smoking and/or poor idle quality after start. To check for proper operation of this circuit proceed as follows:

- (1) With the engine cold 80°F (27°C), turn the engine control switch to the RUN position and allow the glow plugs cycle.
- (2) After 2 minutes crank the engine for 1 second. (It is not important that the engine starts). Return the engine control switch to RUN. Glow plugs should cycle at least once after cranking.

INSTALLATION

- a. Install the glow plug (1) and torque to 12 ft-lbs (17 N-m).
- b. Connect the wire connector to the glow plug.



4-109. STARTER REPLACEMENT.

This task covers:

- a. Removal b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
"S" Shaped Wrench

Materials/Parts

Starter (1998442)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

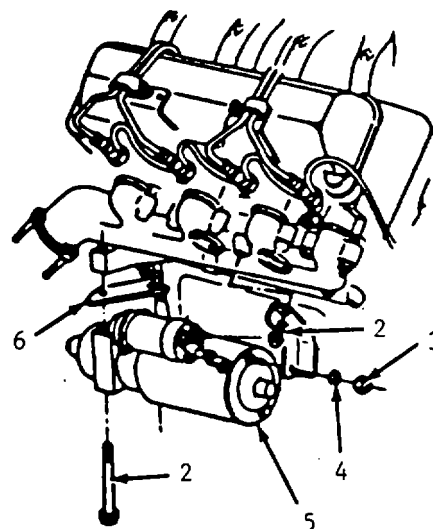
NOTE

When disconnecting starter wires, take note or mark wire leads appropriately for proper installation.

- a. Disconnect all wires from terminals on starter solenoid (1).
- b. Remove bolts (2), nuts (3), and washers (4) which attach starter to engine.
- c. Pull starter (5) away from engine to remove.

NOTE

If any shims (6) are removed be sure they are replaced.



INSTALLATION

- a. Position starter (5) against fly wheel housing.
- b. Install bolts (2), nuts (3) and washers (4).
- c. Torque starter (long) bolts to engine to 28 ft-lbs (38 N-m).
- d. Torque starter nuts to 7.4 ft-lbs (10 N-m).
- e. Torque starter (short) bolts to 24 ft-lbs (32 N-m).
- f. Connect all wires to terminals on starter solenoid.
- g. Tighten all terminal nuts firmly. Torque the terminal nuts no more than 6 ft-lbs (8 N-m).
- h. Reconnect battery cables.

4-110. INTAKE MANIFOLD REPLACEMENT. (Continued)

- e. Rotate the vacuum pump to the proper position and tighten the clamp bolt.
- f. Install CDR valve (paragraph 4-98).
- g. Install air cleaner (paragraph 4-83).
- h. Reconnect battery cables.

4-111. EXHAUST MANIFOLD REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Jack Stand
 Jack

Materials/Parts

Curb Side Exhaust Manifold (14022657)
 Street Side Exhaust Manifold (14025568)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-83Air	Cleaner Duct Bracket Removed
4-101	Exhaust Pipes Disconnected from Manifold
4-108	Diesel Glow Plugs Removed
4-113	Dipstick and Tube Removed

General Safety Instructions

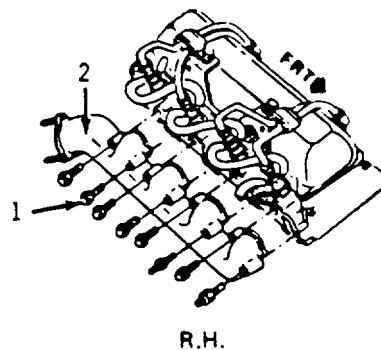
Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set
 Batteries disconnected.
 Fire Pump and piping drained

REMOVAL

- a. Raise vehicle.
- b. Remove exhaust manifold bolts (1).
- c. Remove exhaust manifold (2).

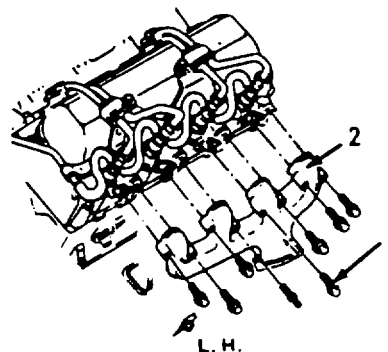
INSTALLATION

- a. Clean threads on manifold bolts (1).
- b. Clean sealing surfaces on exhaust manifold (2) and cylinder head.



4-111. EXHAUST MANIFOLD REPLACEMENT. (Continued)

- c. Install exhaust manifold (2) with bolts (1) and torque to 26 ft-lbs (35 N-m).
- d. Lower vehicle and install glow plugs and torque to 10 ft-lbs (14 N-m) (paragraph 4-108).
- e. Install air cleaner duct bracket (paragraph 4-83).
- f. Install glow plug (paragraph 4-108).
- g. Raise the vehicle.
- h. Connect the exhaust pipe to the manifold and torque nuts to 15 ft-lbs (20 N-m).



- i. Lower the vehicle.
- j. Install the dipstick tube (paragraph 4-113).
- k. Reconnect the battery cables.

4-112. ROCKER ARM COVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-92	Injection Lines Removed
4-110	Intake Manifold Removed

Materials/Parts

RTV Sealant
 (Appendix D, Item 44)
 Solvent (Appendix D, Item 44)
 Rocker Arm Cover (14024233)

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

REMOVAL

- a. Remove wiring harness from wiring harness clip.
- b. Remove wiring harness bracket (two bolts) from left rocker arm cover.

4-112. ROCKER ARM COVER REPLACEMENT. (Continued)

- c. Remove rocker cover bolts (1).

NOTE

Do not pry on the rocker arm cover when removing as damage to the sealing surfaces may result.

- d. Remove rocker arm cover (2).

WARNING

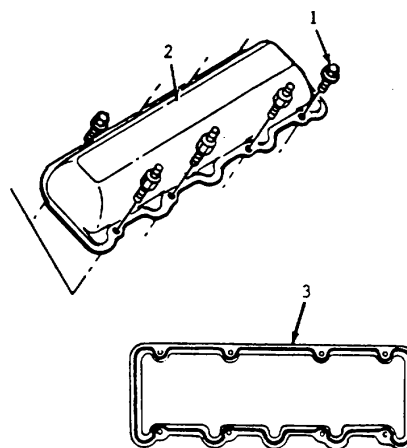
Cleaning solvent, Appendix D, Item 44, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

NOTE

Clean oil and grease from the sealing surfaces on the rocker arm cover and cylinder head using a suitable solvent (Appendix D, Item 44). Make certain that all old loose RTV sealant has been removed from the rocker arm cover and cylinder head. Before installation, be sure that all rocker arm sealing flanges are smooth and distortion or damage free.

INSTALLATION**CAUTION**

Do not allow RTV Sealant (Appendix D, Item 37) into the rocker arm cover bolt holes. This may cause a "Hydraulic Lock" condition when the bolts are tightened, damaging the cylinder head casting.

**NOTE**

The sealer must be wet to the touch when the bolts are torqued.

- a. Apply a 3/16 inch (5 mm) bead of sealant (Appendix D, Item 37) to the cylinder head (3) inboard of the bolt holes.
- b. Install the rocker arm cover (2) with the bolts (1) and torque to 16 ft-lbs (22 N-m).
- c. Install the wiring harness bracket.
- d. Install the wiring harness to the wiring harness clip.
- e. Install fuel injection lines (paragraph 4-92).
- f. Install intake manifold (paragraph 4-110).
- g. Reconnect the battery cables.

4-114. OIL PAN REPLACEMENT. (Continued)

REMOVAL

- a. Raise the vehicle.
- b. Drain the engine oil (paragraph 4-9).
- c. Remove the flywheel cover (1).
- d. Remove the left front engine mounting through-bolt.

CAUTION

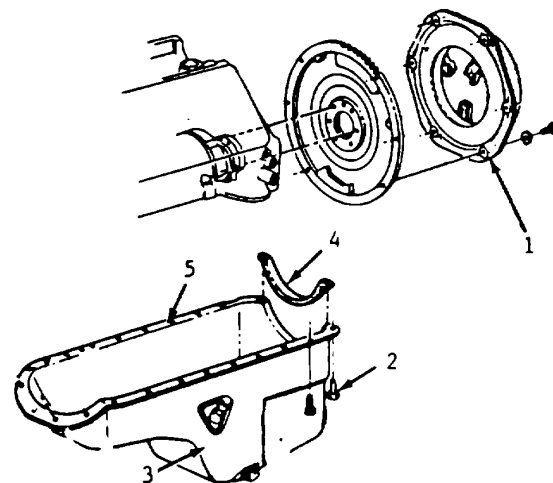
When raising or supporting the engine for any reason, do not use a jack under the oil pan, sheet metal, or crankshaft pulley. Due to the small clearance between the oil pan and the oil pump screen, jacking against the oil pan may cause it to be bent against the pump screen, resulting in a damaged oil pickup unit.

- e. Raise the engine.
- f. Remove the oil pan bolts (2).
- g. Remove the oil pan (3).
- h. Remove the oil pan rear seal (4).

INSTALLATION

WARNING

Cleaning solvent, Appendix D, Item 44, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.



NOTE

Clean all old RTV from the oil pan and block. Clean all oil and grease from the gasket surfaces using solvent (Appendix D, Item 44).

- a. Apply a 3/16 inch (5 mm) bead of RTV Sealant (Appendix D, Item 37) to the oil pan sealing surface (5) inboard of the bolt holes.

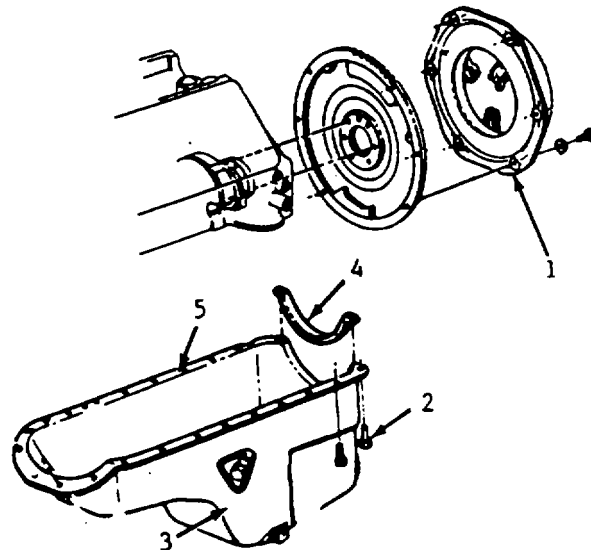
NOTE

The sealer must be wet to the touch when the oil pan is installed.

- b. Install the oil pan rear seal (4).
- c. Install the oil pan (3) to the engine with the oil pan bolts (2).

4-114. OIL PAN REPLACEMENT. (Continued)

- d. Torque all except two rear bolts to 84 ft-lbs (10.0 N.m).
- e. Torque two rear bolts to 17 ft-lbs (23 N-m).
- f. Lower the engine.
- g. Install the left front engine mounting through-bolt and nut.
- h. Torque bolt to 85 ft-lbs (115 N-m) or torque nut to 55 ft-lbs (75 N-m).
- i. Connect the oil dipstick tube (paragraph 4-113).
- j. Install the flywheel cover (1).
- k. Lower the vehicle.
- l. Refill engine with proper quantity and grade of engine oil (Appendix D, Item 31).
- m. Reconnect the battery cables.
- n. Start engine and check for leaks.



Section XVIII. MAINTENANCE OF CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

	Para.		Para.
Ammeter/Voltmeter		Heater Distributor and Core	
Replacement	4-128	Maintenance	4-137
Back Window Replacement	4-171	Heater Hoses Maintenance	4-136
Bench Seat Adjuster		Hood Assembly Replacement	4-148
Replacement	4-167	Hood Hinge Replacement	4-150
Bench Seat and Catch		Hood Ornament Replacement	4-154
Replacement	4-168	Hood Release Cable	
Bench Seat Replacement	4-166	Replacement	4-153
Blower Motor Replacement	4-135	Hood Spring Assembly	
Cab Sheet Metal Unit		Replacement	4-149
Replacement	4-175	Ignition Switch and Tone	
Cab Spotlight Replacement	4-119	Alarm Replacement	4-147
Control Knobs and Indicator		Inner Window Weather-strip	
Lights Maintenance	4-131	Replacement	4-177
Control Switches and Gauges		Inside Door Handle	
Replacement	4-130	Replacement	4-164
Door Lock Cylinder		Interior Trim Replacement	4-180
Replacement	4-162	Lock Cylinder Replacement	4-146
Door Lock Replacement	4-161	Mirrors Replacement	4-159
Door Replacement	4-160	Outer Window Weather-strip	
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Replacement	4-120	Replacement	4-151
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Replacement	4-133	Replacement	4-158
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Replacement	4-144	Replacement	4-122
Front Fender Replacement	4-157	Seat Belts Replacement	4-169
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Replacement	4-117	Spring Replacement	4-152
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Replacement	4-118	Replacement	4-132
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Replacement	4-121	Transducer Replacement	4-127
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Heater/Defroster Control		Turn Signal Switch	
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Cable Replacement	4-139	Vent Window Run Channel	
Heater/Defroster Resistor		Replacement	4-173
Replacement	4-141	Washer Replacement	4-125
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Section XVIII. MAINTENANCE OF CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS (Continued)

	Para.		Para.
Wheelhouse Panel Replacement	4-156	Windshield Replacement	4-170
Window Regulator Replacement	4-179	Wiper Motor Replacement	4-124
		Wipers Replacement	4-123

4-115. GENERAL.

This section contains information on the maintenance of the cab assembly, lights, switches, gauges, controls, and indicators that are maintainable at the Organizational level.

4-116. HEADLIGHTS MAINTENANCE.

This task covers:

- | | |
|---------------|-----------------|
| a. Adjustment | c. Repair |
| b. Removal | d. Installation |

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Lamp (5968098)

General Safety Instructions

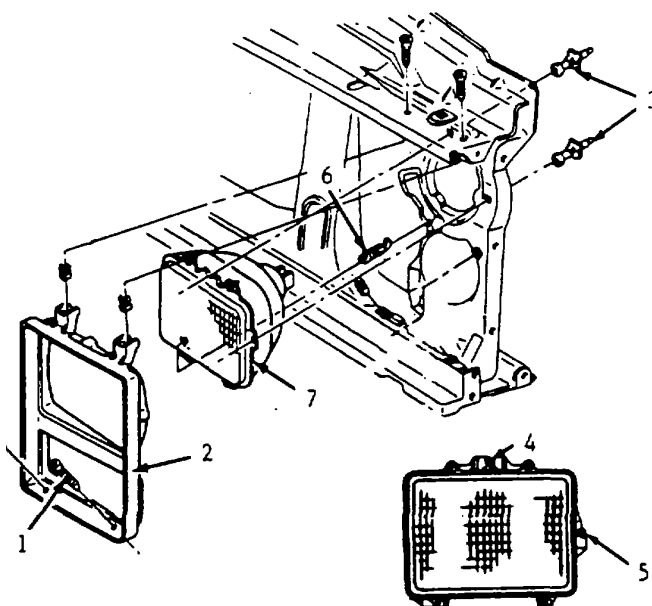
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

ADJUSTMENT

- a. Remove headlamp bezel retaining screws (1).
- b. Remove bezel (2).
- c. Remove retaining ring screws (3), being careful not to move the adjusting screws.

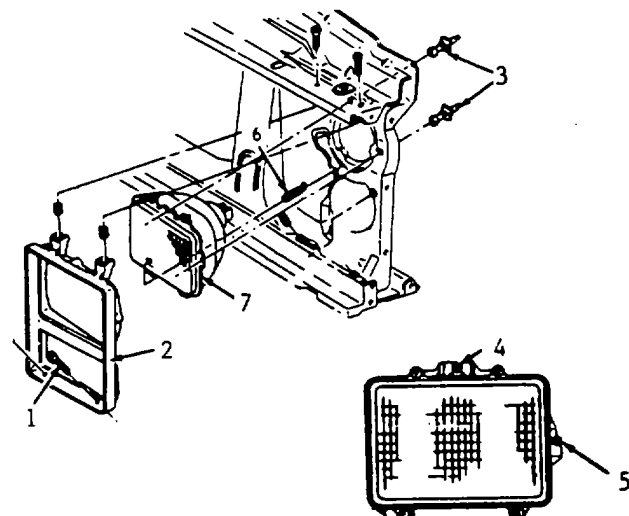
NOTE

Place the vehicle 25 feet (7.6 meters) from a vertical wall or structure with the front of the vehicle at a 90° angle to the wall or structure.



4-116. HEADLIGHTS MAINTENANCE. (Continued)

- d. Measure the height from the ground to the center of the headlight.
- e. Measure the distance from the center of one headlight to the other.
- f. Transfer these measurements to the wall or structure and mark them accordingly with two cross-marks, directly in front of the headlights.
- g. Turn on the headlights and switch to high beam.
- h. The focal "hot spot" of each headlight should be centered 2 inches (51 mm) below the junction of the vertical and horizontal marks.
- i. To raise the light, turn the vertical adjusting screw (4) clockwise. To lower the light, turn the vertical adjusting screw (4) counterclockwise.
- j. To turn the headlight to the left or vertical, turn the horizontal adjusting screw clockwise. To turn the headlight to the right of vertical, turn the horizontal adjusting screw counterclockwise.



- f. Remove headlamp.

REPAIR

Repair consists of replacing defective headlamp (7) or bezel(2).

INSTALLATION

- a. Connect headlamp wiring harness connector to the headlamp (7).
- b. Position headlamp (7) in the mounting unit.
- c. Install the retaining ring in the mounting unit.
- d. Install the retaining ring screws (3).
- e. Install the retaining ring spring (6).
- f. Position the bezel (2) and install the bezel retaining screws (1) into the grill.
- g. Reconnect battery cables.

REMOVAL

- a. Remove headlamp bezel retaining screws (1) and bezel (2).
- b. Remove retaining ring screws (3).
- c. Remove retaining ring spring (6).
- d. Remove retaining ring from the mounting ring.
- e. Disconnect the headlamp wiring harness connector from the headlamp (7).

4-117. FRONT SIDE MARKER LIGHTS REPLACEMENT.

This task covers:

- a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

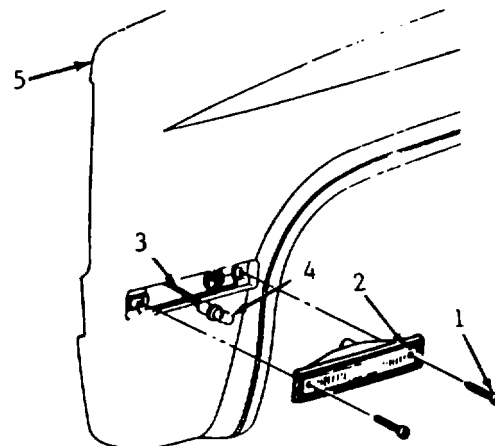
Curb Side Lamp (915449)
Street Side Lamp (915450)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Remove two mounting screws (1).
- b. Pull the lamp assembly (2) from fender (5) and twist the wiring harness socket 900 counterclockwise to remove the lamp harness (3) and bulb (4) from the housing.
- c. Replace bulb (4) if necessary.



INSTALLATION

- a. Insert bulb (4) in housing and press lamp harness (3) into wiring harness socket and twist 900 clockwise.
- b. Position lamp assembly (2) on fender (5) and secure with two mounting screws (1).

- c. Reconnect battery cables.

4-118. FRONT TURN SIGNAL LIGHTS REPLACEMENT

This task covers:

- a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description
4-116 Headlamp Bezel Removed

Materials/Parts
Lamp (915908)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

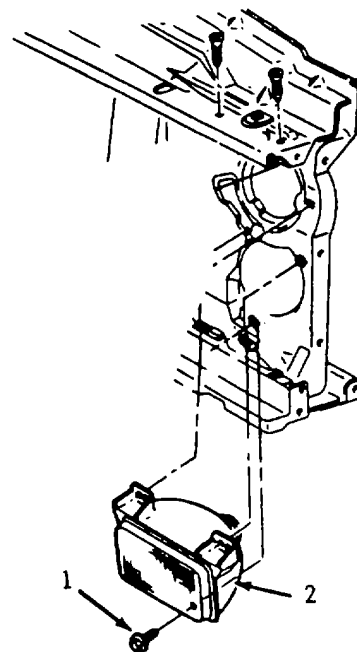
4-118. FRONT TURN SIGNAL LIGHT REPLACEMENT. (Continued)

REMOVAL

- a. Remove three retaining screws (1) and pull housing forward.
- b. Disconnect turn signal wiring harness from housing.
- c. Remove turn signal lamp unit (2).

INSTALLATION

- a. Connect wiring harness to housing.
- b. Position turn signal lamp unit (2) in the grill and secure with three retaining screws (1).
- c. Install headlamp bezel (paragraph 4-116).
 - d. Reconnect battery cables.



4-119. CAB SPOTLIGHTS REPLACEMENT.

This task covers:**a. Removal****b. Installation****INITIAL SETUP:**

TOOLS
General Mechanics Tool Kit

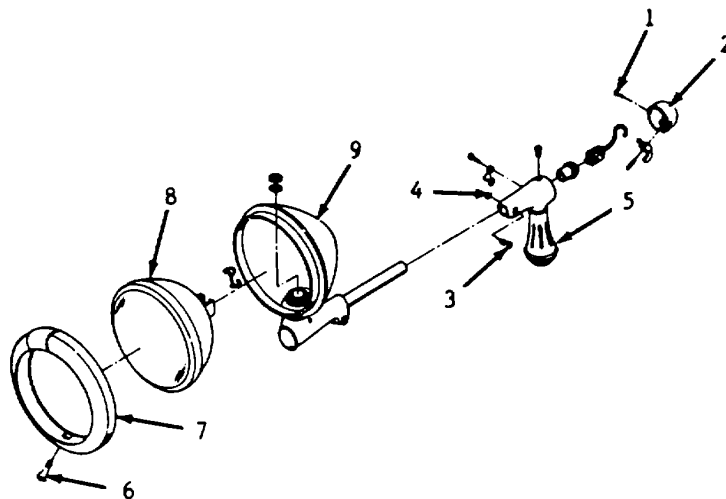
Materials/Parts
Spotlight (225B)

General Safety Instructions
Engine OFF.
Transmission in (n) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

4-119. CAB SPOTLIGHTS REPLACEMENT. (Continued)

REMOVAL

- a. Remove two screws (1) from end of cap (2) inside cab.
- b. Remove end cap (2).
- c. Disconnect wiring.
- d. Remove screw attaching lamp assembly to the inside of windshield post.
- e. Remove screw (3), nut (4), and brace (5) from spotlight.
- f. Remove two screws securing spotlight assembly to outside of windshield post.
- g. Remove spotlight assembly.
- h. Remove screw (6) from bottom of retaining ring (7).
- i. Remove retaining ring (7).
- j. Remove lamp (8) from housing (9). Replace lamp if defective.



- c. Position outer spotlight assembly to cab windshield post and secure with two screws.
- d. Install brace (5) to spotlight with screw (3) and nut (4).
- e. Secure inner spotlight assembly to windshield post with screw.
- f. Connect wiring to handle.
- g. Install end cap (2) and secure with two screws (1).
- h. Reconnect battery cables.

INSTALLATION

- a. Insert lamp (8) and wiring into housing (9).
- b. Install retaining ring (7) on housing (9) and secure with screw (6).

4-120. ENGINE COMPARTMENT LIGHTS REPLACEMENT.**This task covers:****a. Removal****b. Installation****INITIAL SETUP:**Tools

General Mechanics Tool Kit

Materials/Parts

Light (M393)

General Safety Instructions

Engine OFF.

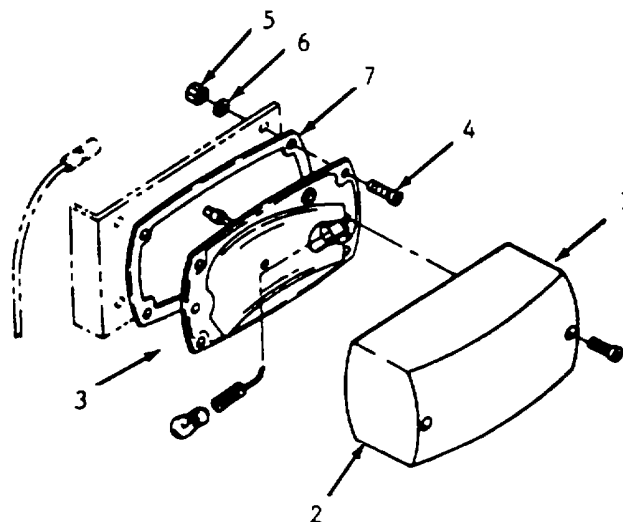
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Lift hood and disconnect wiring assembly.
- b. Remove two screws (1) securing lens (2) to light assembly (3).
- c. Remove lens (2).
- d. Remove two screws (4), nuts (5), and washers (6) securing light assembly (3) to mounting bracket.
- e. Remove light assembly (3) and gasket (7).
- f. Replace bulb (8) if defective.

**INSTALLATION**

- a. Install light assembly (3), and gasket (7) to mounting bracket with two screws (4), washers (6), and nuts (5).
- b. Install lens (2) to light assembly (3) with two screws (1).
- c. Connect wiring assembly.
- d. Reconnect battery cables.

4-121. FRONT WARNING LIGHTS REPLACEMENT.**This task covers:****a. Removal****b. INSERT FUNCTION****d. INSERT FUNCTION****INITIAL SETUP:**Tools

General Mechanics Tool Kit

Materials/Parts

Warning Light (CE-600-1R)

General Safety Instructions

Engine OFF.

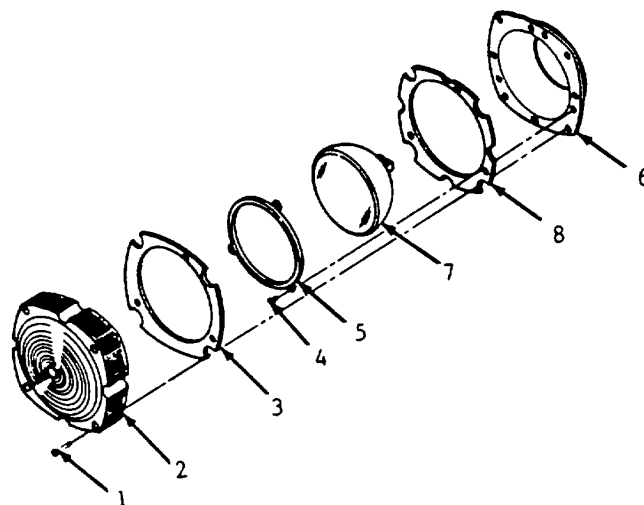
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Remove four screws (1) securing lens (2) to mounting assembly (6).
- b. Remove lens (2) and gasket (3).
- c. Remove four screws (4) securing bulb retaining ring (5) to mounting assembly (6).
- d. Remove retaining ring (5), lamp assembly (7) and gasket (8).
- e. Replace lamp assembly (7) if defective.

**INSTALLATION**

- a. Install gasket (8), lamp assembly (7) and retaining ring (5) into mounting assembly (6) and secure with four screws (4).
- b. Install gasket (3) and lens (2) and secure with four screws (1).
- c. Reconnect battery cables.

4-122. ROOF WARNING LIGHT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Roof Light (14-012C5B-R)

General Safety Instructions

Engine OFF.

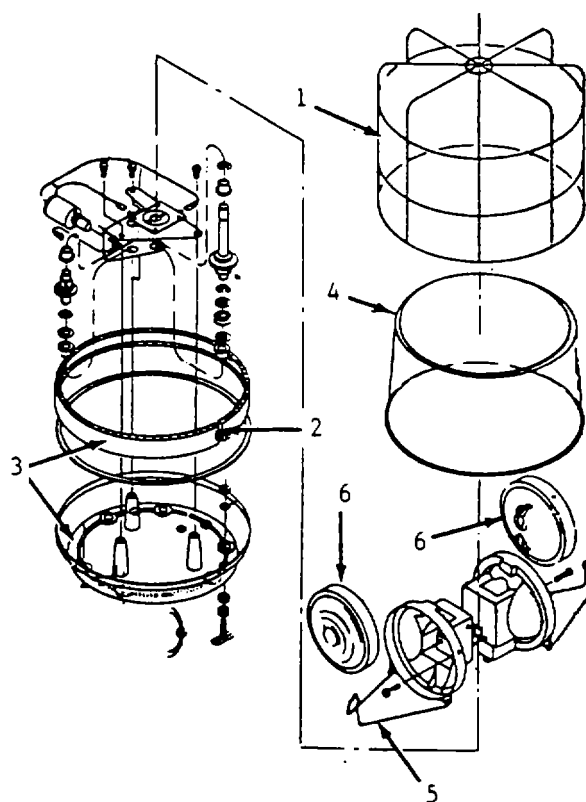
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Remove three cap nuts and washers securing wire frame (1) to roof.
- b. Remove wire frame (1).
- c. Open hasp (2) on housing assembly (3) and remove lens (4).
- d. Snap off spring-wire holders (5) from lamp assemblies (6).
- e. Disconnect wire assembly and remove lamp assemblies (6).
- f. Replace defective lamp assembly.



INSTALLATION

- a. Connect wire assembly to lamp assemblies (6) and position onto bracket and secure with springwire holders (5).
- b. Install lens (4) and secure with hasp (2) located on housing assembly (3).
- c. Install wire frame (1) and secure to roof with washers and cap nuts.
- d. Reconnect battery cables.

4-123. WIPERS REPLACEMENT.

This task covers:**a. Removal****b. Installation**

INITIAL SETUP:Tools

General Mechanics Tool Kit

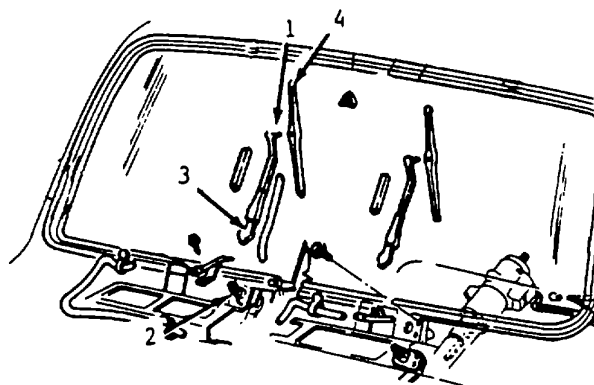
Materials/Parts

Wiper Blade (15593246)

Wiper Arm (15522766)

REMOVAL

- a. Pull outer end of arm (1) away from the windshield which will trip lock spring at base of arm and release spring from pivot shaft (2).
- b. Pull outward on cap section (3) at base of arm.
- c. Remove wiper arm (1).
- d. Replace wiper blades (4) as necessary.

**INSTALLATION**

- a. Position cap section (3) on pivot shaft (2) and push downward on arm to set wiper arm.
- b. Push outer end of arm (1) toward glass to set into position for operation.
- c. Adjust wiper arm on windshield.

4-124. WIPER MOTOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description

4-123 Wipers Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

Materials/Parts

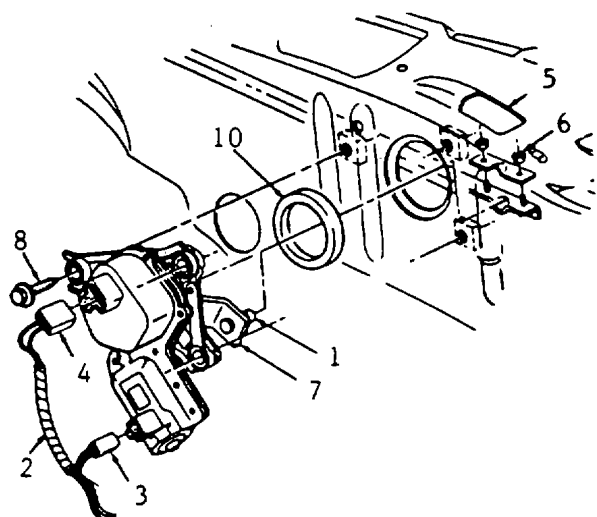
Wiper Motor (22049809)

REMOVAL

NOTE

Ensure wiper motor crankarm (1) is in the "park" position.

- a. Disconnect harness (2) at wiper motor (3) and harness at washer pump (4).
- b. Reach through access hole (5) and loosen drive rod attaching nuts (6).
- c. Disconnect drive rod assembly from wiper motor crank arm (7).
- d. Remove three attaching screws (8) and remove motor assembly (9) and seal (10).



INSTALLATION

- a. Lubricate wiper motor crank arm pivot ball (1) prior to installation.
- b. Position motor assembly (9) and seal (10) to dash panel and secure with screws (8).

- c. Reach through access hole (5) and tighten drive rod attaching nuts (6) .
- d. Connect harness (2) at wiper motor (3) and harness at washer pump.
- e. Install wipers (paragraph 4-123).
- f. Reconnect battery cables.

4-125. WASHER REPLACEMENT.

This task covers:

- a. Removal** **b. Installation**

INITIAL SETUP:

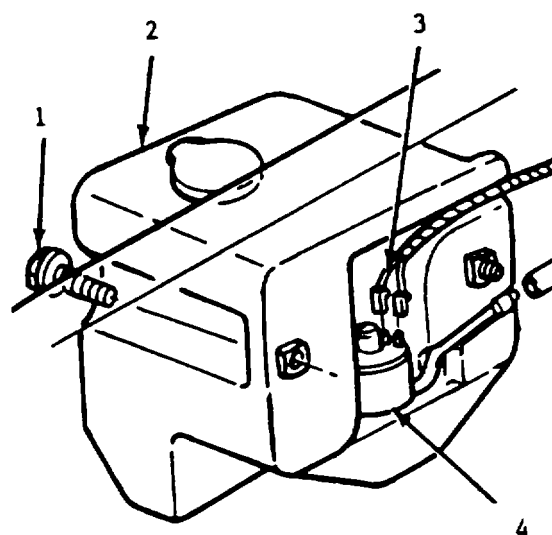
Tools
General Mechanics Tool Kit

Materials/Parts
Washer (22054185)

General Safety Instructions.
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Remove two reservoir retaining screws (1).
- b. Remove reservoir (2).
- c. Disconnect electrical connector (3) at washer motor (4).
- d. Disconnect fluid tube (5) from washer motor (4).



INSTALLATION

- a. Connect fluid tube (5) to washer motor (4).
- b. Connect electrical connector (3) to washer motor.

- c. Position and install reservoir (2) and secure with retaining screws (1).

4-126. SPEEDOMETER REPLACEMENT.

This task covers:

- a. Removal** **b. Installation**

INITIAL SETUP:

Tools
General Mechanics Tool Kit

Equipment Condition
Para. Condition Description
4-131 Headlamp Switch Knob
Assembly Removed

General Safety Instructions.
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

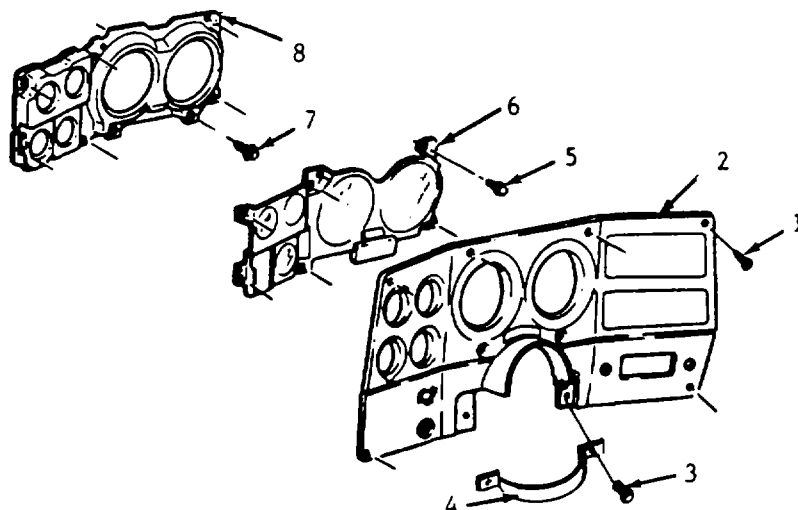
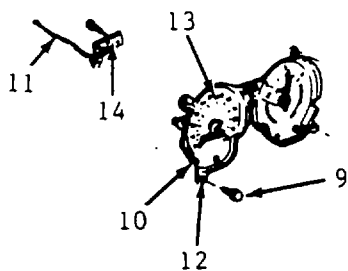
4-126. SPEEDOMETER REPLACEMENT. (Continued)

REMOVAL

- a. Remove the eight instrument cluster bezel screws (1) and remove bezel (2).
- b. Remove the five steering column cover screws (3) and remove steering column cover (4).
- c. Remove the six instrument cluster lens screws (5) and remove instrument cluster (6).
- d. Remove the four retainer screws (7) and remove the retainer (8).
- e. Remove the four speedometer to cluster screws (9) and speedometer assembly (10).
- f. Remove the speedometer cable (11) and case (12) from the speedometer (13) by depressing the spring clip (14).

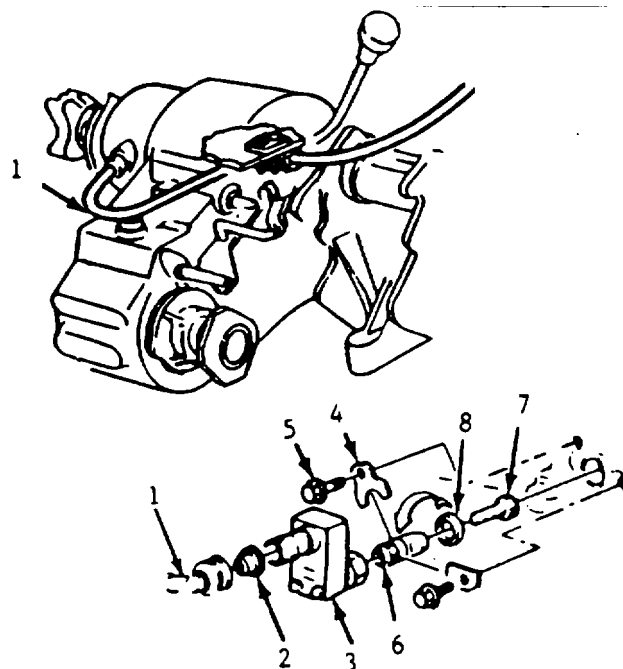
INSTALLATION

- a. Position the speedometer (13) and install the speedometer cable assembly into the speedometer head, rotating the cable assembly until the spring clip (14) engages.
- b. Install the speedometer assembly with the speedometer to cluster screws (9).
- c. Install the retainer (8).
- d. Install the instrument cluster lens (6).
- e. Install the steering column cover (4).
- f. Install the instrument cluster bezel (2).
- g. Install the headlamp switch knob assembly (paragraph 4-131).
- h. Reconnect the battery cables.



4-127. SPEEDOMETER CABLE CORE AND TRANSDUCER REPLACEMENT (Continued)

- d. Install the retainer (4) and screw (5).
- e. Install the adapter (3).
- f. Install the new seal (2).
- g. Coat O-ring seal (7) and gear (8) with a thin coating of transmission oil (Appendix D, Item 32).
- h. Feed the cable core into the speedometer end of the casting. Be careful not to kink the flexible cable (1) or casing.
- i. Turn the core to engage the drive gear (8) in the transfer case.
- j. Install speedometer (paragraph 4-126).
- k. Install headlamp switch knob assembly paragraph 4-131).



4-128. AMMETER/VOLTMETER REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Ammeter/Voltmeter (15402)

Equipment Condition

Para. Condition Description
 4-126 Instrument Bezel Removed
 4-131 Headlamp Switch Knob Assembly Removed

General Safety Instructions

Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

REMOVAL

- a. Remove the ammeter/voltmeter attaching screws.

4-128. AMMETER/VOLTMETER REPLACEMENT. (Continued)

- b. Remove the ammeter/voltmeter.

NOTE

When installing, ensure meter studs engage clips holding printed circuit to back of cluster housing.

- b. Install instrument bezel (paragraph 4-126).
- c. Install the headlamp switch knob (paragraph 4-131).
- d. Reconnect battery cables.

INSTALLATION

- a. Position and install the ammeter/ voltmeter with the attaching screws.

4-129. TACHOMETER REPLACEMENT.

This task covers:

- a. Removal**
- b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Tachometer (7ATH24042)

General Safety Instructions.

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

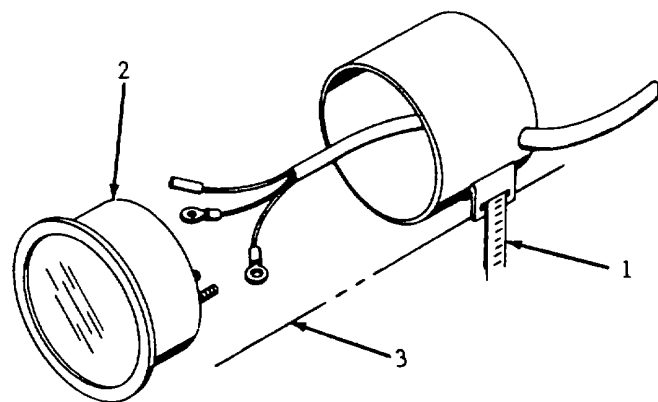
Battery disconnected.

REMOVAL

- a. Loosen hose clamp (1) securing tachometer (2) to steering column (3).
- b. Remove tachometer (2).

NOTE

Tag terminal connections before disconnecting tachometer.

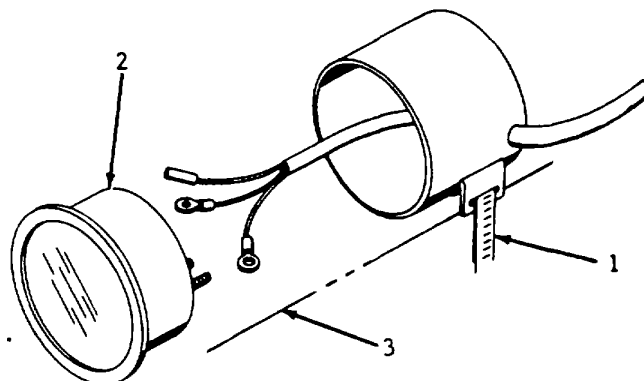


4-129. TACHOMETER REPLACEMENT. (Continued)

- c. Disconnect wires from tachometer terminals.
- d. Remove tachometer (2).

INSTALLATION

- a. Position tachometer (2) and connect wires to terminals.
- b. Install tachometer (2) in housing
- c. Connect wires to tachometer terminals.
- d. Reconnect battery cables.



4-130. CONTROL SWITCHES AND GAUGES REPLACEMENT.

This task covers:

- a. Removal**
- b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-126	Speedometer Removed
4-128	Ammeter/Voltmeter Removed
4-129	Tachometer Removed
4-131	Headlamp Switch Knob Assembly Removed

Materials/Parts

Switches and Gauges as Required
(Appendix E, Page E-138)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

4-130. CONTROL SWITCHES AND GAUGES REPLACEMENT. (Continued)

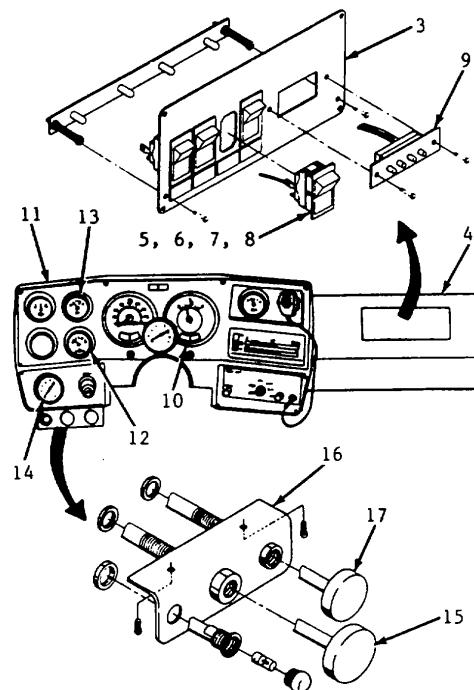
REMOVAL

- a. Remove four screws securing water level gauge and switch panel (3) to the instrument panel (4).
- b. Remove indicator light circuit board by removing two phillips screws from panel and lift free of spacers.
- c. If required, desolder leads from circuit board.

NOTE

Prior to removing rocker switches (5, 6, 7 and 8) from water level gauge and switch panel (3), tag wires to identify them at installation.

- d. Remove leads from rocker switches (5, 6, 7, and 8).
- e. Move rocker switch retainers and remove rocker switches (5, 6, 7, and 8) from rear of water level gauge and switch plate (3).
- f. Disconnect water tank level gauge wire plug.
- g. Remove two screws securing water tank level gauge (9) to panel.
- h. Remove water tank level gauge (9).
- i. Remove screw securing fuel gauge (10) to instrument panel cluster (11).
- j. Remove fuel gauge (10).
- k. Remove two screws securing water temperature gauge (12) to instrument panel cluster (11).
- l. Remove water temperature gauge (12).



- m. Remove two screws securing oil pressure gauge (13) to instrument panel cluster (11).
- n. Remove oil pressure gauge (13).
- o. Disconnect 1/4 inch plastic pipe at rear of pump pressure gauge (14).
- p. Remove two screws through pump pressure gauge bracket.
- q. Remove pump pressure gauge (14).
- r. Remove PTO knob (15) by turning counterclockwise by hand.
- s. Loosen jam nut at rear of mounting bracket (16).

4-130. CONTROL SWITCHES AND GAUGES REPLACEMENT. (Continued)

- | | |
|---|---|
| <ul style="list-style-type: none"> t. Disconnect PTO cable from transmission. u. Pull cable out through bracket inside cab. v. Remove brake lock knob (17) by turning counterclockwise by hand. w. Loosen jam nut at rear of mounting bracket (16). x. Loosen clamp on frame. y. Pull cable out through bracket (16) inside cab. z. Remove two screws and nuts securing bracket (16) to underside of instrument panel. aa. Remove PTO and brake lock cable bracket (16) from underside of instrument panel. | <ul style="list-style-type: none"> i. Install PTO knob (15) by manually turning clockwise. j. Install pump pressure gauge (14) to panel and secure with two screws through pump pressure gauge bracket. k. Connect 1/4 inch plastic pipe to rear of pump pressure gauge (14). l. Install oil pressure gauge (13) to instrument panel cluster (11) and secure with two screws. m. Install water temperature gauge (12) to instrument panel cluster (11) and secure with two screws. n. Install fuel gauge (10) to instrument panel cluster (11) and secure with one screw. |
|---|---|

INSTALLATION

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Install PTO and brake lock cable bracket (16) to underside of instrument panel and secure with two screws and nuts. b. Install brake lock cable through bracket inside cab. c. Secure cable by tightening clamp on frame. d. Tighten jam nut at rear of mounting bracket (16). e. Install brake lock knob (17) by manually turning clockwise. f. Install PTO cable through bracket (16) inside cab. g. Connect PTO cable to transmission. h. Tighten jam nut at rear of mounting bracket. | <ul style="list-style-type: none"> o. Install water tank level gauge (9) to water tank level gauge and switch panel (3) and secure with two screws. p. Connect water tank level gauge wire plug to back of water tank level gauge (9). q. Install rocker switches (5, 6, 7, and 8) through rear of water tank level gauge and switch panel (3). r. Install wire leads to rocker switches (5, 6, 7, and 8) and remove tags. s. If indicator light circuit board is replaced, solder leads to the circuit board. t. Install indicator light circuit board to water tank level gauge and switch panel (3) with two phillips screws. u. Install water tank level gauge and switch panel (3) to instrument panel (4) with four screws. |
|---|--|

4-130. CONTROL SWITCHES AND GAUGES REPLACEMENT. (Continued)

- v. Install tachometer (paragraph 4-129).
 - w. Install ammeter/voltmeter (paragraph 4-128).
 - x. Install speedometer (paragraph 4-126).
 - y. Install headlamp switch knob (paragraph 4-131).
 - z. Reconnect battery cables.
-

4-131. CONTROL KNOBS AND INDICATOR LIGHTS MAINTENANCE.

This task covers:

- | | |
|------------|-----------------|
| a. Removal | c. Installation |
| b. Repair | |
-

INITIAL SETUP:
Tools

General Mechanics Tool Kit

Materials/Parts

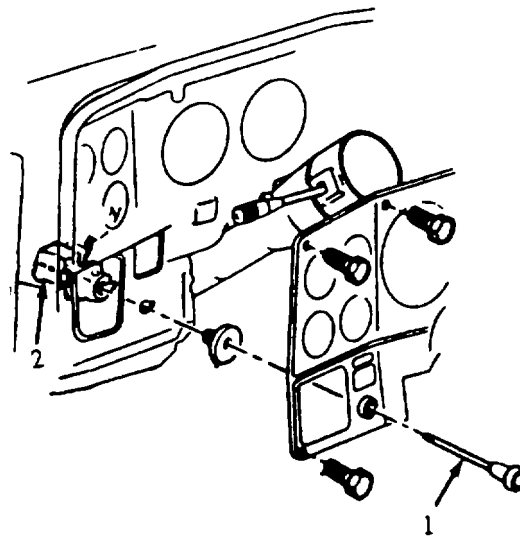
Control Knobs and Lights as Required
(Appendix E, Page E-138)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

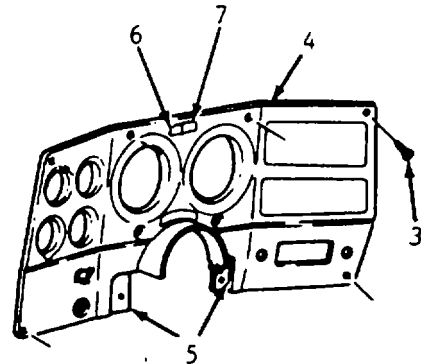
REMOVAL

- a. Pull light switch (1) out to full "Headlight on" position.
- b. Reach up behind instrument cluster and depress shaft retaining button (2).
- c. Remove switch knob and rod assembly (1) by pulling it out completely.
- d. Remove eight screws (3) retaining instrument cluster bezel (4).
- e. Remove instrument cluster bezel (4).



4-131. CONTROL KNOBS AND INDICATOR LIGHTS MAINTENANCE. (Continued)

- f. Remove four screws (5) attaching steering column lower cover.
- g. Remove steering column lower cover.
- h. Disconnect glow plug (6) and water in-fuel indicator (7) lights from instrument cluster bezel by holding socket and turning counter-clockwise 1/4 inch turn.
- i. Remove bulbs by pulling them directly from the sockets.
- j. Remove bulb from socket by pulling it out directly from the socket.

**REPAIR**

Repair consists of replacement of defective bulbs and/or light control knob and rod.

INSTALLATION

- a. Push bulb directly into socket.
- b. Reach behind dash and position socket into dash, then turn socket 1/4 inch turn clockwise.
- c. Position glow-plug (6) and water in-fuel (7) sockets into instrument cluster bezel (4) and turn socket 1/4 turn clockwise.
- d. Position instrument cluster bezel into dash panel and secure with eight screws (3).
- e. Position steering column lower cover into dash panel and secure with four screws (5).
- f. Position light control knob (1) into assembly and push rod inward to secure.

4-132. SIREN/PUBLIC ADDRESS SYSTEM REPLACEMENT.

This task covers:

- a. Removal** **b. Installation**
-

INITIAL SETUP:
Tools

General Mechanics Tool Kit

Materials/Parts

Siren (3693)

General Safety Instructions

Engine OFF.

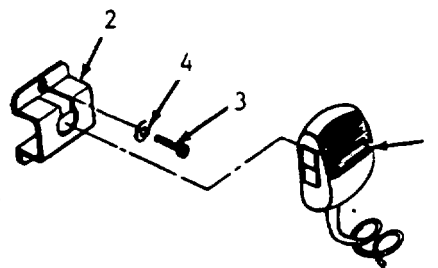
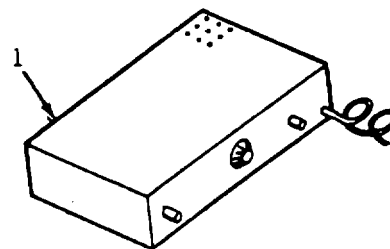
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Remove two screws securing siren/ public address system (1) on outside of dash.
- b. Reach behind dash and remove four screws and nuts from bracket on the rear of the siren/public address system (1).
- c. Slide siren/public address system out from behind dash.
- d. If necessary, remove microphone bracket (2) by removing two screws (3) and lockwashers (4).


INSTALLATION

- a. If removed, install new microphone bracket (2) and secure with two lockwashers (4) and screws (3).
- b. Insert siren/public address system (1) behind dash and secure to bracket with four screws and nuts.
- c. On outside of dash secure front of siren/public address system (1) with two screws.
- d. Reconnect battery cables.

4-133. EXTERNAL SPEAKER REPLACEMENT.

This task covers:

- a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-155	Grille Removed

Materials/Parts

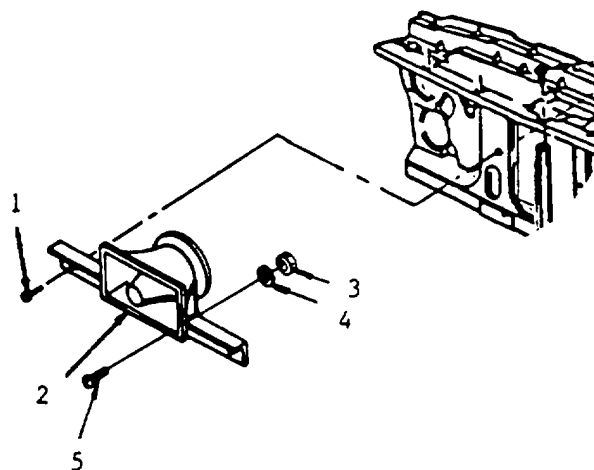
Speaker (TS24)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Remove two bolts (1) securing external speaker (2) to truck.
- b. Tag and disconnect all electrical connections from external speaker (2).
- c. Remove external speaker (2) from truck.
- d. Remove two nuts (3), washers (4) and bolts (5) securing external speaker (2) to speaker brackets.
- e. Remove external speaker (2) from brackets and replace external speaker (2)



INSTALLATION

- | | |
|---|---|
| <ol style="list-style-type: none"> a. Install new external speaker (2) to brackets and secure with two bolts (5), washers (4), and nuts (3). b. Install external speaker (2) in truck and attach all electrical connections. Remove tags. | <ol style="list-style-type: none"> c. Secure external speaker (2) to truck using two bolts (1). d. Install radiator grille (paragraph 4-155). |
|---|---|

4-134. HEATER/DEFROSTER DUCT REPLACEMENT.

This task covers:

- a. INSERT FUNCTION b. INSERT FUNCTION d. INSERT FUNCTION

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

RTV Sealant (1052356)
(Appendix D, Item 37)
Duct (14064924)

Equipment Condition

Para.	Condition Description
4-126	Instrument Panel Bezel and Dash Cover Removed
4-135	Blower Motor Removed
4-137	Heater Core Removed
4-139	Heater/Defroster Cables

Removed

General Safety Instructions

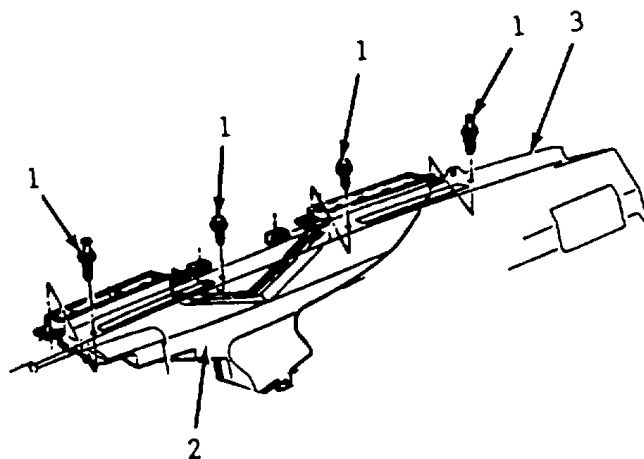
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- Remove screws (1) that hold the defroster duct (2) to the dash panel (3).
- Remove defroster duct (2) from beneath dash panel (3).

INSTALLATION

- Position defroster duct (2) beneath dash panel (3).
- Secure defroster duct (2) to dash panel (3) using screws (1).
- Install blower motor (paragraph 4-135).
- Install heater core (paragraph 4-137)
- Install heater/defroster cables(paragraph 4-139).
- Install instrument panel bezel and dash cover (paragraph 4-126).



4-135. BLOWER MOTOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

RTV Sealer (Appendix D, Item 37)

Blower Motor (22020945)

Equipment Condition

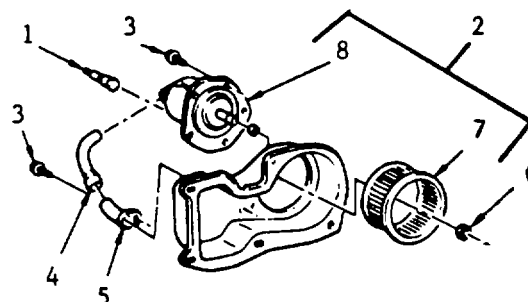
<u>Para.</u>	<u>Condition Description</u>
4-126	Instrument Bezel Removed
4-137	Heater Distributor and Core Removed
4-139	Heater/Defroster Cables Removed

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Disconnect blower motor lead wire (1).
- b. Remove motor and wheel assembly (2) by removing five mounting screws (3).
- c. Remove motor cooling tubes (4 and 5).
- d. Remove blower wheel to shaft nut (6).
- e. Remove blower wheel (7) from the motor (8).



- e. Place a new bead of RTV sealer (Appendix D, Item 37) to the mounting flange.
- f. Connect the blower motor lead wire (1).
- g. Install heater distributor and core (paragraph 4-137).
- h. Install heater/defroster cable (paragraph 4-139).
- i. Install instrument bezel (paragraph 4-126).
- j. Reconnect battery cables.
- k. Test the blower to ensure it is operational.

INSTALLATION

- a. Connect blower wheel (7) to the motor (8). Place the open end of the wheel (7) away from the blower motor (8).
- b. Install motor shaft nut (6).
- c. Install the motor and wheel assembly (2).
- d. Install motor cooling tubes (4 and 5).

4-136. HEATER HOSES MAINTENANCE.

This task covers:

- a. Inspection
- b. Removal
- c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-72	Cooling System Drained

Materials/Parts

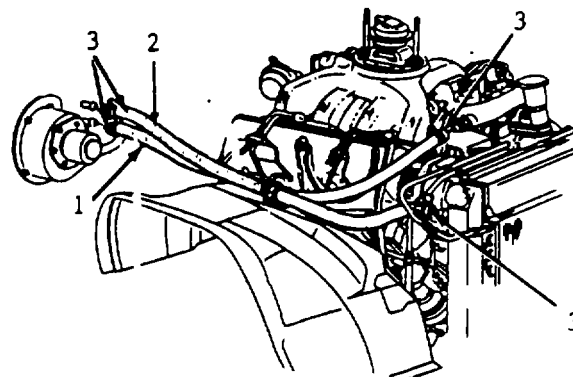
Hose (14061346 and 14061347)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

INSPECTION

- a. Visually inspect heater hoses (1 and 2) for any sign of kinks or leakage.
- b. If any kink or leak is evident, straighten or replace hoses (1 and 2) if necessary.,
- c. Inspect for loose or missing clamps (3). Replace as necessary.



REMOVAL

NOTE

Be sure heater fluid is cooled before replacing heater hoses (1 and 2).

- a. Remove defective hoses (1 and 2) by unscrewing and detaching hose clamps (3) at each end of defective hose.
- b. Remove hoses (1 and 2)

INSTALLATION

- a. Refit replacement hoses (1 and 2) to connection.
- b. Tighten hose clamp (3) firmly. Do not over-tighten.
- c. Refill cooling system (paragraph 4-72).

4-137. HEATER DISTRIBUTOR AND CORE MAINTENANCE

This task covers: a. Inspection b. Removal c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Core (3027247)

Equipment Condition

Para.	Condition Description
4-72	Engine Cooling System Drained
4-126	Instrument Bezel Removed
4-136	Heater Hoses Removed
4-138	Heater/Defroster Assembly Removed
4-139	Heater/Defroster Cables Removed

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

INSPECTION

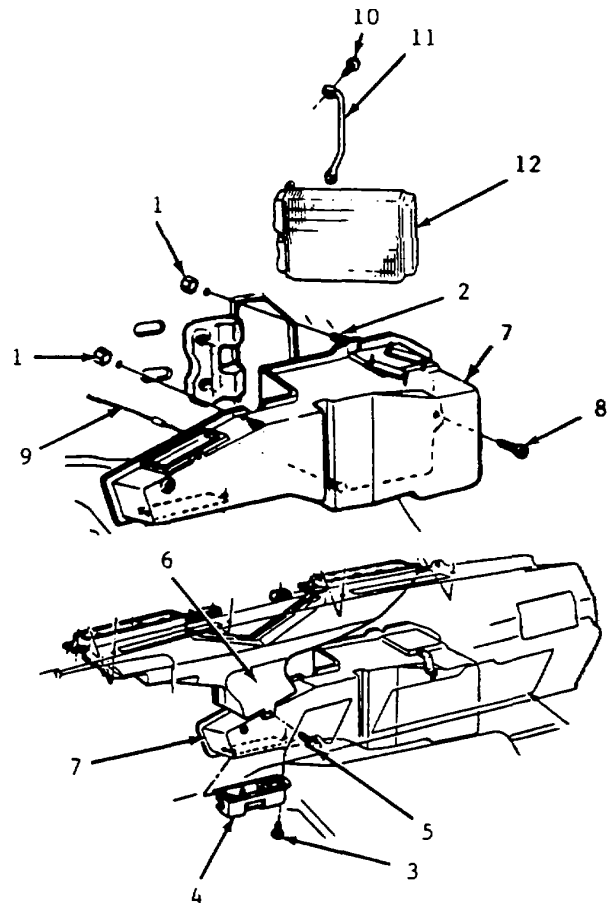
Visually inspect heater distributor and core assembly for any sign of leakage or damage.

REMOVAL

CAUTION

The heater core can be damaged near the tube attachment seams if force is applied on them. If the heater hoses do not come off, cut the hoses forward of the core tubes. Cut the hose on core tubes to remove.

- Remove nuts (1) from the distributor duct studs (2) that project into the engine compartment.
- Remove screws (3).
- Remove floor outlet (4).
- Remove screw (5) that holds the defroster duct (6) to the heater distributor (7).
- Remove screws (8) that hold the heater distributor (7) to the dash panel.

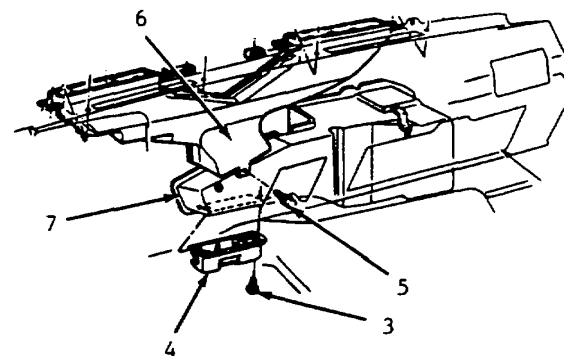
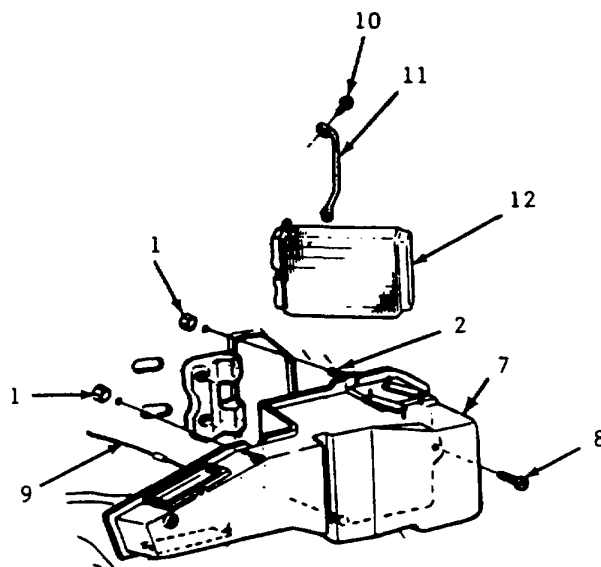


4-137. HEATER DISTRIBUTOR AND CORE MAINTENANCE. (Continued)

- f. Pull the assembly rearward to reach the wiring harness (9).
- g. Disconnect the wiring harness (9).
- h. Remove the heater distributor (7).
- i. Remove screws (10).
- j. Remove core retaining clamps (11).
- k. Remove core (12).

INSTALLATION

- a. Install core (12).
- b. Install core retaining clamps (11).
- c. Install screws (10).
- d. Install the heater distributor (7).
- e. Connect the wiring harness (9).
- f. Connect the heater distributor (7) to the dash panel with screws (8).
- g. Connect the defroster duct (6) to heater distributor (7) with screws (5).
- h. Install the floor outlet (4) with screws (3).
- i. Install nuts (1) to the distributor duct studs (2) that project into the engine compartment.
- j. Connect the air-defroster and temperature cables (paragraph 4139).
- k. Install the instrument panel bezel and dash cover (paragraph 4-126).
- l. Connect the heater hoses to the core tubes (paragraph 4-136).



- m. Install heater/defroster control assembly (paragraph 4-138).
- n. Replace the heater coolant (paragraph 4-72).
- o. Reconnect battery cables.

4-138. HEATER/DEFROSTER CONTROL ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

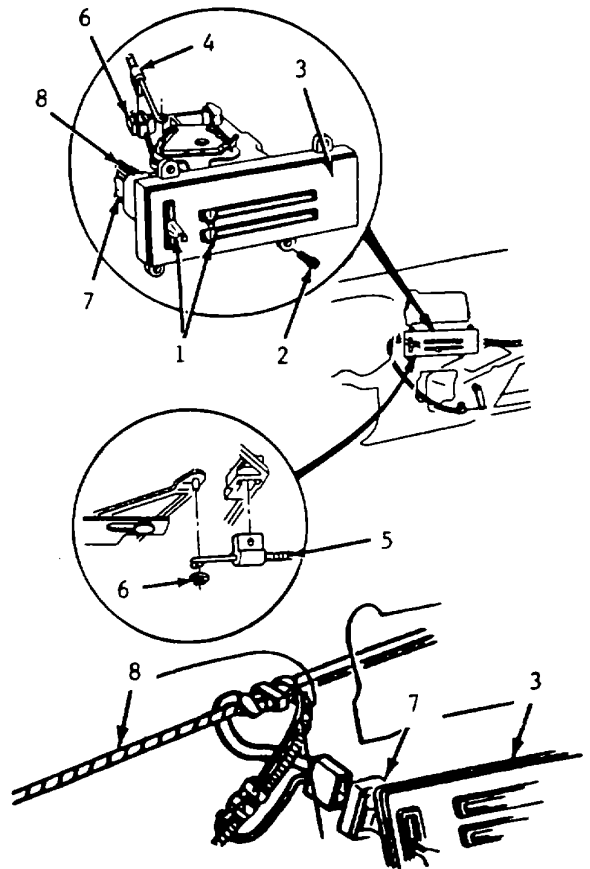
General Mechanics Tool Kit

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Remove knobs (1) from heater slide controls and blower control knobs by pulling firmly.
- b. Remove four screws (2) attaching the heater control assembly (3) to the dash.
- c. Disconnect heater cable (4) and defroster cable (5) at heater control assembly (3) by removing retainers (6).
- d. Disconnect blower switch (7) from wiring harness (8).
- e. Remove assembly through the opening.



INSTALLATION

- a. If a new unit is being installed, transfer the blower switch (7) to the new unit.
- b. Install assembly through the opening.
- c. Connect blower switch (7) to wiring harness (8).
- d. Attach heater cable (4) and defroster cable (5) at heater control assembly (3) with retainers (6).

- e. Align and affix heater/defroster control assembly and bezel (3) to dash with four screws (2).
- f. Install knobs (1) on heater slide controls and blower control (3).
- g. Connect battery cables.

4-139. HEATER/DEFROSTER CONTROL CABLE REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description

4-138 Heater/Defroster Controls
Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected

REMOVAL

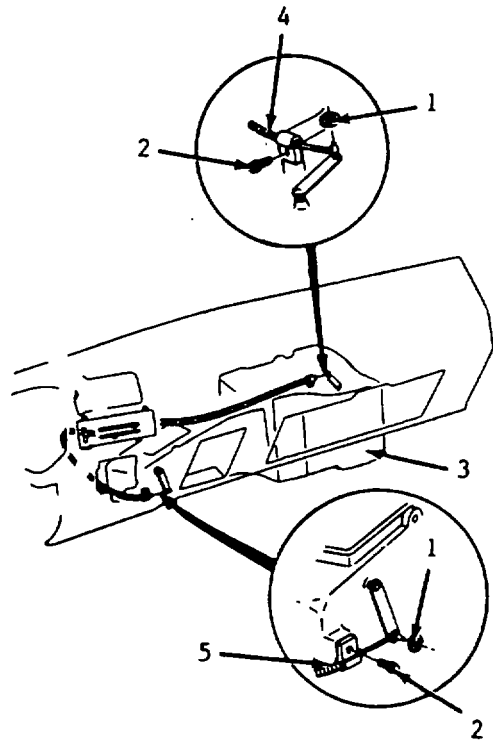
- a. Remove the cable push nut retainers(1) and tab attaching screws (2) from the heater distributor assembly (3). Raise or lower the control as necessary.
- b. Remove control cables (4 and 5).

INSTALLATION

CAUTION

Do not kink the cable. Route the cable as removed and check adjustment.

- a. Install cable assemblies (4 and 5).
- b. Attach cables to heater distributor assembly (3) using retainers (1) c. Install tab attaching screws (2).
- d. Install heater/defroster controls (paragraph 4-138).
- e. Reconnect battery cables.



4-140. HEATER/DEFROSTER BLOWER SWITCH REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description

4-138 Heater/Defroster Controls
Removed

General Safety Instructions

Engine OFF.

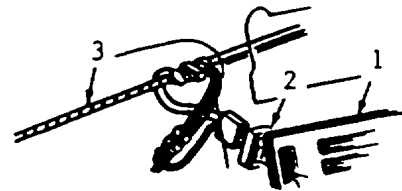
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Pull heater/defroster control assembly (1) out of dash so that blower switch/harness assembly (2) can be worked on.
- b. Disconnect blower switch (2) from wiring harness (3).
- c. Remove blower switch (2).



INSTALLATION

- a. Position new blower switch (2).
- b. Connect blower switch (2) to wiring harness (3).
- c. Insert heater/defroster control assembly (1) into dash.
- d. Install heater/defroster controls (paragraph 4-138).
- e. Reconnect battery cables.

4-141. HEATER/DEFROSTER RESISTOR REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

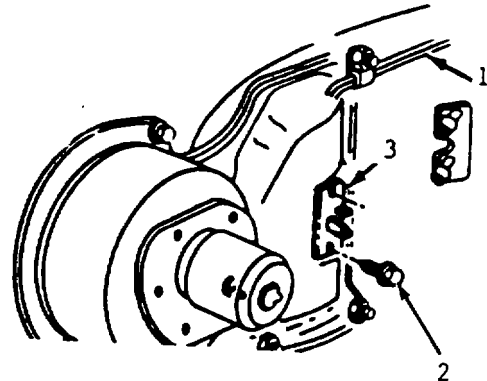
Para.	Condition Description
4-135	Blower Motor Removed

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Disconnect wiring harness (1).
- b. Remove two resistor mounting screws (2).
- c. Remove resistor (3).



INSTALLATION

- a. Install new resistor (3).
- b. Install two resistor mounting screws (2).
- c. Connect wiring harness (1).

- d. Install blower motor (paragraph 4-135).
- e. Reconnect battery cables.

4-142. STEERING WHEEL REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Steering Wheel Puller
(J-1859-03)

Materials/Parts

Steering Wheel (9762199)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

4-142. STEERING WHEEL REPLACEMENT. (Continued)

REMOVAL

- a. Remove the horn button cap.
- b. Remove the retainer and steering wheel nut.
- c. Remove the horn lead assembly and mark the relationship of the steering wheel to the steering shaft.

NOTE

Do not hammer on the puller or damage could result to the steering column.

- d. Remove the steering wheel using the steering wheel puller.

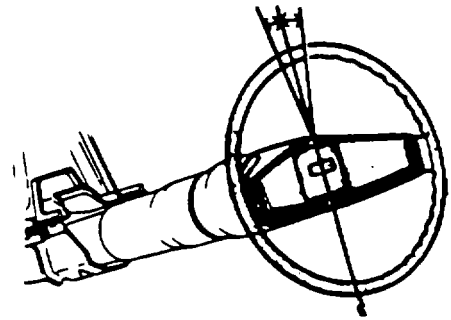
INSTALLATION

- a. Install the steering wheel onto the steering shaft. Align the marks made at removal.
- b. Install the horn lead assembly.
- c. Install the steering wheel nut and torque to 30 ft-lbs (40 N.m).

NOTE

Do not over-tighten the steering wheel nut or steering wheel rub may result.

- d. Install the retainer.
- e. Install the horn button cap.
- f. Reconnect battery cables.



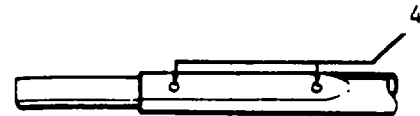
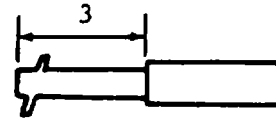
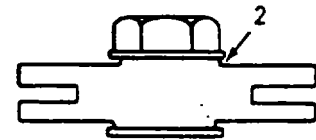
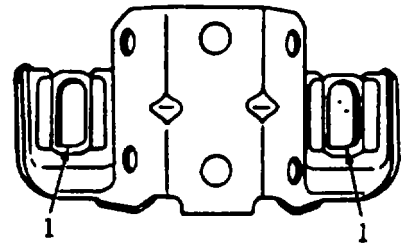
4-143. STEERING COLUMN MAINTENANCE (Continued.)

- c. Check for damage in the column support bracket area. It will be indicated by separation of the mounting capsules from the bracket. The bracket will have moved forward toward the entire engine compartment and will usually result in collapsing of the jacket section of the steering column.
- d. Inspect steering column for accident damage.

NOTE

Vehicles involved in accidents resulting in frame damage, major body or sheet metal damage, or where the steering column has been impacted may also have a damaged or misaligned steering column.

- e. Inspect capsules on the steering column bracket assembly. The capsules must be within 1/16 inch (1.59 mm) from the bottom (1) of the slots. If not, the bracket should be replaced.
- f. Inspect contact surface. The bolt head must not contact surface (2) or the shear load would be increased. If contact is made, replace the bracket.
- g. Measure the jacket collapse dimension from the collar on the toe plate flange to the lower edge of the upper jacket (3). If the jacket dimension is not within 14 inches (353 mm) a new jacket must be installed.

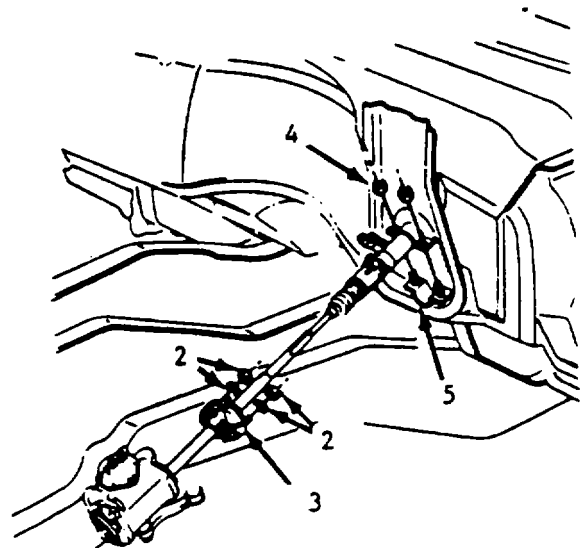
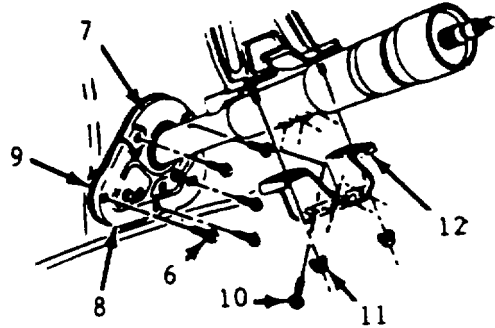


- h. Visually inspect for sheared injected plastic in the steering shaft. If sheared, replace with new parts.
- i. Any frame damage that could cause a bent steering shaft must have the steering shaft runout checked in the following manner: Remove intermediate shaft. Hold a ruler against the lower end of steering shaft and have the steering wheel rotated. The runout must not exceed 1/16 inch (1.59 mm). A dial indicator may be used instead of a ruler.

4-143. STEERING COLUMN MAINTENANCE (Continued.)

INSTALLATION

- a. Install plastic spacers onto the flexible coupling alignment pins.
- b. Install the lower end of the steering column through the dash opening.
- c. Lower the steering shaft flange onto the flexible coupling (3).
- d. Install the flange to coupling washers and nuts (2).
- e. Torque the nuts to 20 ft-lbs (27 N-m).
- f. Install the screws (10) and bracket (12) loosely. Tighten screws and nuts finger tight.
- g. Install clamp (5) and nuts (4).
- h. Torque nuts (4) to 18 ft-lbs (24 N.m).
- i. Torque screws (10) and nuts (11) to 22 ft-lbs (30 N-m)..
- j. Install seal (9) and covers (7 and 8) to the dash.
- k. Install screws (5).
- l. Remove the plastic spacers from the flexible coupling pins.
- m. Measure the pot point operating angle. The angle must not exceed 12 degrees.



4-144. FLEXIBLE COUPLING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Mallet

Materials/Parts

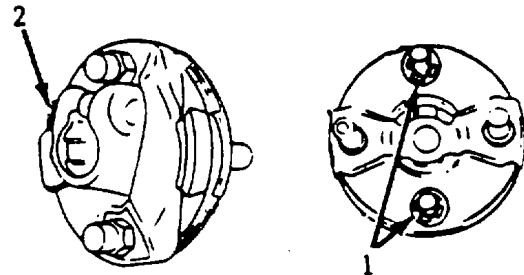
Coupling (7831571)

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove the coupling to flange bolt nuts and washers (1).
- b. Remove the clamp bolt (2).
- c. Remove the steering gear frame bolts.
- d. Lower the steering gear far enough to remove the flexible coupling.
- e. Remove the flexible coupling from the steering gear wormshaft by tapping lightly with a soft mallet.



- d. Place the steering gear into position, guiding the flexible coupling bolts into the proper holes in the steering shaft flange.
- e. Install the steering gear and frame bolts and torque to 75 ft-lbs (102 N-m).

INSTALLATION

- a. Install flexible coupling onto the steering gear wormshaft, align the flat on the shaft with the flat in the coupling.
- b. Push the coupling onto the wormshaft until the coupling reinforcement bottoms against the end of the worm.
- c. Clamp bolt (2) into the split clamp and torque to 31 ft-lbs (42 N-m).

NOTE

The coupling alignment pins should be centered in the flange slots.

- f. Install the coupling to flange bolt (2), nuts, and washers (1) and torque nuts to 20 ft-lbs (27 N-m).
- g. Measure the coupling to flange dimension and maintain a 0.250 to 0.375 inch (6.4 to 9.5 mm) dimension.

NOTE
The bolt must pass through the shaft undercut.

4-145. TURN SIGNAL SWITCH REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Lock Plate Compressor (J-23653-A)

Equipment Condition

Para.	Condition Description
4-142	Steering Wheel Removed

Materials/Parts

Switch (1997983)

General Safety Instructions

Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

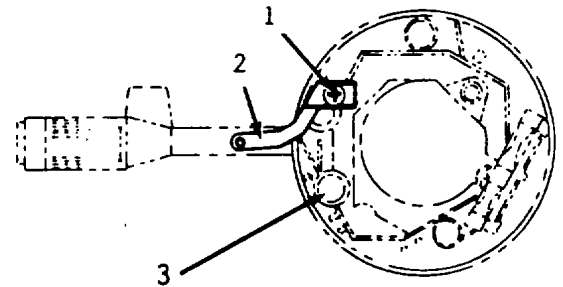
REMOVAL

- a. Remove the instrument panel trim cover.
- b. Position a screwdriver blade into the steering shaft lock plate cover slot. Pry up and out to free the cover from the lock plate.
- c. Screw the center post of the lock plate compressor onto the steering shaft as far as it will go.
- d. Compress the lock plate by turning the center post nut clockwise. Pry the retaining ring out of the shaft.
- e. Remove the lock plate compressor.

NOTE

If the column is being disassembled on a bench, the shaft could slide out of the end of the mast jacket when the snap ring is removed.

- f. Remove the lock plate.
- g. Remove the turn signal lever pivot screw (1) and lever (2).



- h. Remove the hazard warning knob by pressing the knob inward and unscrewing.
- i. Remove the turn signal mounting screws (3).
- j. Remove and pull the switch connector out of the bracket on the jacket and feed the switch connector through the column support bracket and pull the switch straight up, guiding the wiring harness through the column housing.
- k. Remove the wire protector by pulling it downward out of the column with pliers using the tab provided.
- l. Position the turn signal housing in a low position and remove the harness cover by pulling toward the lower end of the column, being careful not to damage the wires.

4-145. TURN SIGNAL SWITCH REPLACEMENT. (Continued)

- m. Remove the turn signal switch by pulling the switch straight up, guiding the wiring harness and cover through the column housing.

INSTALLATION

NOTE

Be sure the wiring harness is on the protector.

- a. Feed the connector and cover down through the housing and under the mounting bracket.

CAUTION

Use only the specified screws, bolts, and nuts at assembly. The use of over length screws could prevent a portion of the assembly from compressing if impacted.

- b. Install the cover on the harness.
- c. Install the turn signal mounting screws (4).
- d. Clip the connector to the bracket on the jacket.
- e. Install the instrument panel trim plate.
- f. Install the hazard warning knob (3).
- g. Install the turn signal lever (2) and screws (1).

- h. Put the turn signal switch in the "neutral" position.
- i. Pull "out" on the hazard warning knob.
- j. Install the washer, upper bearing preload spring and cancelling cam onto the upper end of the shaft.
- k. Install the lock plate onto the end of the shaft.
- l. Screw the center post of the lock plate compressor onto the steering shaft as far as it will go.
- m. Place a new retaining ring over the center post.
- n. Place the "C" bar over the center post and then compress the lock plate by turning the nut clockwise.
- o. Slide the new retaining ring down the tapered center post and into the shaft groove.
- p. Remove the lock plate compressor.
- q. Install the cover on the lock plate and snap into position.
- r. Install the steering wheel (paragraph 4-142).
- s. Reconnect the battery cables.

4-146. LOCK CYLINDER REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Cylinder (7830380)

Equipment Condition

Para. Condition Description

4-142 Steering Wheel Removed

4-145 Turn Signal Switch Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Place the lock cylinder in the "run" position.

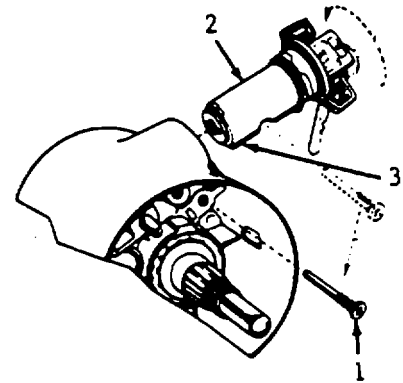
NOTE

It is not necessary to completely remove the turn signal switch from the column. Pull the switch rearward far enough to slip it out. Do not pull the harness out of the column.

CAUTION

If the retaining screw is dropped when removing, it could fall into the column requiring a complete disassembly to retrieve the screw.

- b. Remove the retaining screw (1) and the lock cylinder set (2).



- b. Align the cylinder key (3) with the keyway in the housing and rotate the knob clockwise against the stop.

- c. Push the lock all the way in.
- d. Install the retaining screw (1) and torque to 40 in-lbs (4.5 N.m).

INSTALLATION

- a. Install the lock cylinder set (2).

- e. Install the turn signal switch (paragraph 4-145).
- f. Install the steering wheel (paragraph 4-142).
- g. Reconnect battery cables.

4-147. IGNITION SWITCH AND TONE ALARM REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Switch (1990115)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

CAUTION

Be sure that the steering column is properly supported if it is not removed from the vehicle.

NOTE

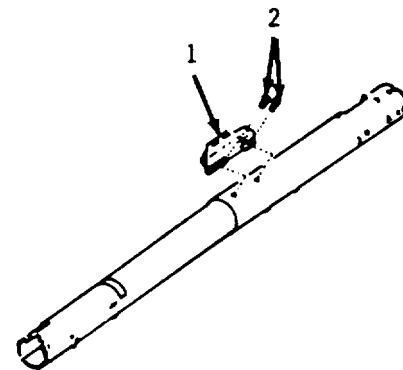
The ignition switch is mounted on top of the column jacket near the front of the dash. For anti-theft reasons, the switch is located inside the channel section of the brake pedal support. The switch is actuated by a rod and rack assembly. A portion of the rack is toothed and engages a gear on the end of the lock cylinder. This enables the rod and rack to be moved axially (with respect to the column) to actuate the switch when the lock cylinder is rotated.

It is not necessary to remove the steering wheel when following this procedure.

NOTE

Actuating rod to the switch should be pulled up until there is a definite stop, then moved down one detent, which is the "lock" position.

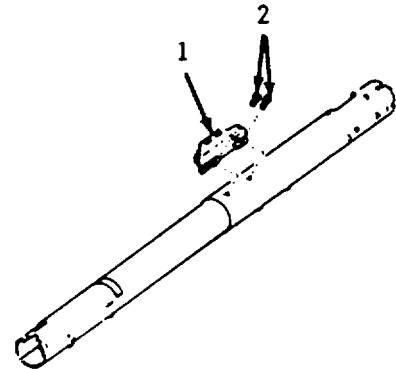
- a. Place the ignition switch (1) in the "lock" position.
- b. Remove the two ignition switch screws (2).
- c. Remove the ignition switch assembly.



4-147. IGNITION SWITCH AND TONE ALARM REPLACEMENT. (Continued)

INSTALLATION

- a. Place the ignition switch (1) in the "lock" position.
- b. Install the activating rod into the ignition switch (1).
- c. Install the ignition switch (1) and screws (2) to the column.
- d. Reconnect battery cables.



4-148. HOOD ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Equipment Condition

Para. Condition Description

4-120 Engine Compartment Lights Removal

4-149 Hood Spring Assembly Re-removal

Materials/Parts

Hood (15599228)

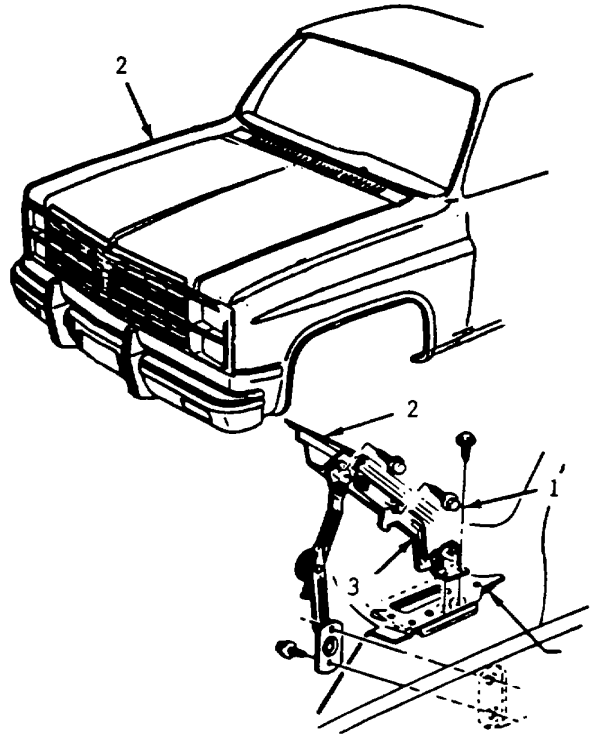
REMOVAL

- a. Raise and support the hood (1) at the front and rear.
- b. Place protective coverings over the cowl and fenders.
- c. Mark the position of the hinge (2) on the hood.
- d. Remove two bolts (3) securing hood (1) to hinge (2).
- e. Remove hood (1) from vehicle.

4-148. HOOD ASSEMBLY REPLACEMENT (Continued).

INSTALLATION

- a. Place the hood (1) on the vehicle by aligning the hood with the position marks previously made.
- b. Install the hood hinge (2) to hood bolts (3).
- c. Torque the bolts to 18 ft-lbs (25 N-m).
- d. Install hood spring assembly (paragraph 4-149).
- e. Install compartment lights (paragraph 4-120).
- f. Connect battery cables.



4-149. HOOD SPRING ASSEMBLY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Curb Side Spring (14021253)

Street Side Spring(14021254)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

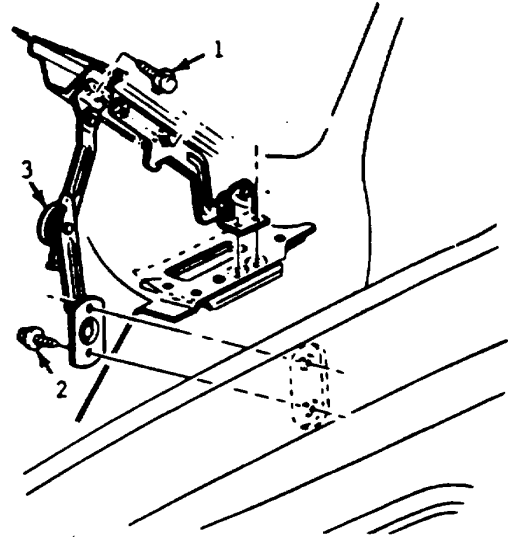
Parking brake and micro-brakelock set.

REMOVAL

- a. Raise and support the front of the hood.

4-149. HOOD SPRING ASSEMBLY REPLACEMENT. (Continued)

- b. Remove spring assembly to hood bolts (1).
- c. Remove spring assembly to fender screws (2).
- d. Remove spring assembly (3) from the vehicle.



INSTALLATION

- a. Install spring assembly (3) to the vehicle by installing spring assembly to fender screws (2) and torque to 18 ft-lbs (25 N-m).
- b. Install spring assembly to hood bolts (1) and torque to 18 ft-lbs (25 N-m).

4-150. HOOD HINGE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Equipment Condition

Para. Condition Description

4-123 Wiper Arm Removed

4-148 Hood Removed

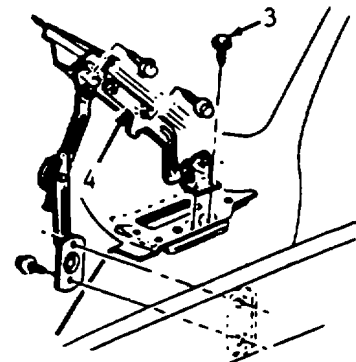
Materials/Parts

Curb Side Hinge (14043823)

Street Side Hinge (14043824)

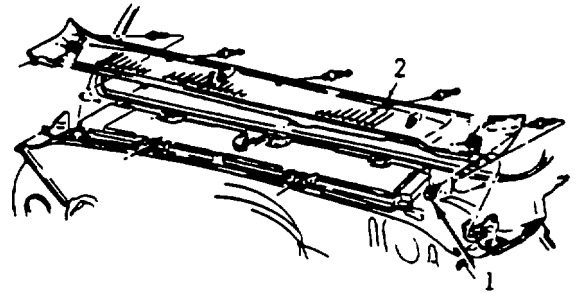
REMOVAL

- a. Remove cowl vent grille panel screws (1).
- b. Remove cowl vent grille plastic fasteners from the windshield frame.



4-150. HOOD HINGE REPLACEMENT (Continued).

- c. Remove cowl vent grille (2) from the vehicle.
- d. Remove two hinge to cowl bolts (3).
- e. Remove hinge (4) from vehicle.



INSTALLATION

- a. Install hinge (4) to vehicle by installing two hinge to cowl bolts (3).
- b. Torque bolts to 32 ft-lbs (43 N-m).
- c. Install cowl vent grille (2) to the vehicle by attaching plastic fasteners to the windshield frame.
- d. Install four cowl vent grille panel bolts.

- e. Install wiper arms (paragraph 4-123).
- f. Install hood (paragraph 4-148).

4-151. PRIMARY HOOD LATCH REPLACEMENT.

This task covers:

- a. Removal
- b. Installation
- c. Adjustment

INITIAL SETUP:

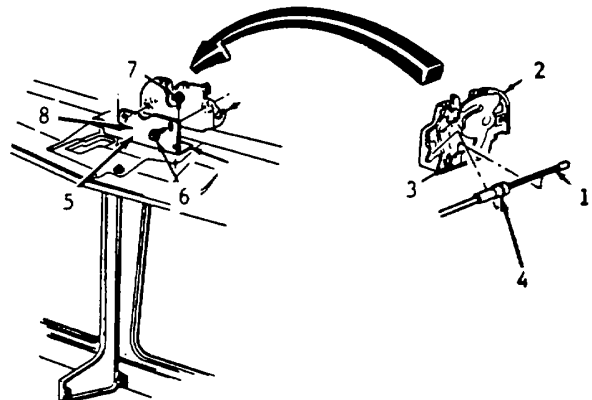
Tools
General Mechanics Tool Kit

Materials/Parts
Latch (14070703)

General Safety Instructions
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Raise the hood.
- b. Disconnect the hood latch release cable (1) from the latch (2) by inserting a screwdriver into the clip (3) and lifting the cable from the lock.
- c. Carefully pry the cable grommet (4) from the lock flange.
- d. Remove the bracket (5) to hood latch bolts (6).



4-151. PRIMARY HOOD LATCH REPLACEMENT (Continued).

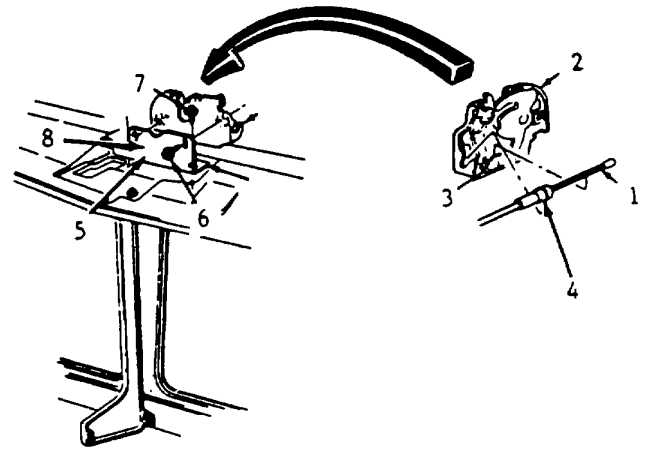
- e. Remove the hood latch (2) from the vehicle.

INSTALLATION

- a. Install the primary hood latch (2) to the bracket (7) by installing the bracket bolts (6) loosely. Do not tighten at this time.
- b. Install the hood latch release cable (1) to the latch (2) by affixing the cable grommet (4) to the lock flange, then inserting the cable into the cable clip (3).
- c. Lower the hood and adjust the hood latch bracket (7) on right until the striker in the hood easily engages the primary latch (2).
- d. Adjust the hood latch height so that when the hood is closed, the hood is held securely against the front hood bumpers. (If necessary, adjust the front hood bumpers so that the top of the hood is flush with the fenders.) Mark this height.
- e. Raise the hood and tighten the bracket to hood latch bolts (6) at the set height mark to 20 ft. lbs. (27 N-m).

ADJUSTMENT

- a. Raise the hood and loosen the bracket to support bolts (7) and latch to bracket bolts (6).



- b. Adjust the hood latch bracket (8) left or right until the striker in the hood easily engages the primary latch.
- c. Raise the hood and torque the bracket to the radiator support bolts (7) to 20 ft-lbs (27 N-m).
- d. Adjust the hood latch height so that when the hood is closed, the hood is held securely against the front hood bumpers.
- e. Adjust the front hood bumpers, if necessary, so that the top of the hood is flush with the fenders. Mark this height.
- f. Raise the hood and torque the bracket to hood latch bolts (6) at the set height mark to 20 ft lbs (27 N-m).

4-149. HOOD SPRING ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

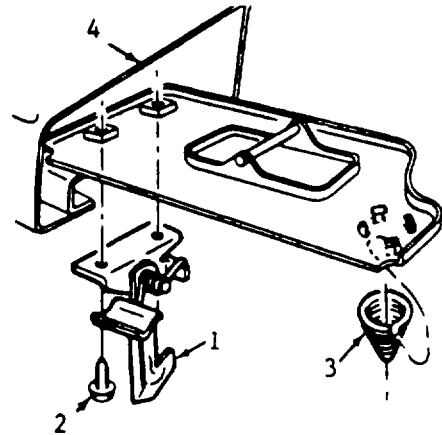
Hood Latch (14021243)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Mark the position of the secondary hood latch (1) assembly on the hood.
- b. Remove the secondary hood latch to hood bolts (2).
- c. Remove the secondary hood latch (1) from the vehicle.
- d. Remove the spring (3) from the hood (4) by twisting and pulling the spring (3) from the reinforcement.



INSTALLATION

- a. Install the spring (3) to the hood (4) by pushing and twisting the spring (3) into the reinforcement.

- b. Install the secondary hood latch (1) by carefully aligning the latch with the marks and installing the hood bolts (2). Torque bolts to 20 ft-lbs (27 N-m).

4-153. HOOD RELEASE CABLE REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description
4-151 Hood Latch Removed

Material/Parts

Cable (14039963)

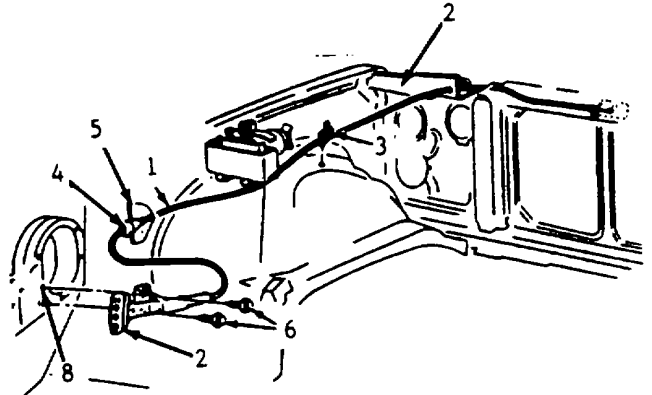
General Safety

Instructions Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

4-153. HOOD RELEASE CABLE REPLACEMENT.

REMOVAL

- a. Remove the cable (1) from the radiator support (2) and the wheelhouse retaining strap (3).
- b. Remove the grommet (4) from the cowl (5).
- c. Cut the grommet down to the cable casing on the engine side of the cowl and push the cable and grommet through the cowl.
- d. Remove the two bolts (6) attaching the cable handle (7) to the air vent bezel (8) underneath the dash.
- e. Remove the cable (1) from the vehicle.



- b. Insert the cable (1) into the grommet (4) and push the grommet into the cowl (5) leaving sufficient cable exposed to attach the cable release to the bracket.
- c. Install the cable bolts (6) through the cable bracket and into the air vent bezel (8) underneath the dash.
- d. Install the cable (1) through the wheel house retaining strap (3) and the radiator support (2).
- e. Install the cable to the primary latch (paragraph 4-151).

INSTALLATION

NOTE

Do not kink the cable.

- a. Install the new cable by pushing the cable (1) through the drivers side of the cowl (5).

4-154. HOOD ORNAMENT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Ornament (14039999)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

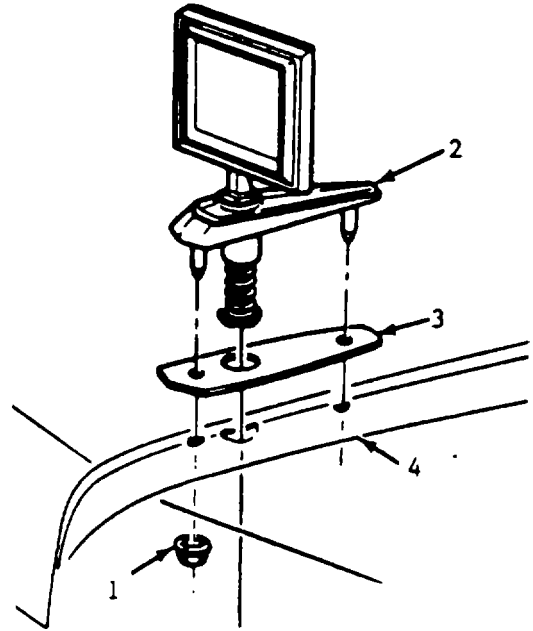
REMOVAL

- a. Raise the hood and remove the hood ornament nuts (1).
- b. Remove the hood ornament (2) and gasket (3) from the hood (4).

4-154. HOOD ORNAMENT REPLACEMENT (Continued).

INSTALLATION

- a. Install the gasket (3) to the hood ornament (2) and insert the assembly into the hood (4).
- b. Install the two hood ornament nuts (1) and tighten.
- c. Close hood.



4-155. GRILLE REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

Equipment Condition

Para. Condition Description

4-116 Headlights Removed

4-121 Front Warning Lights Removed

Materials/Parts

Grille (15598720)

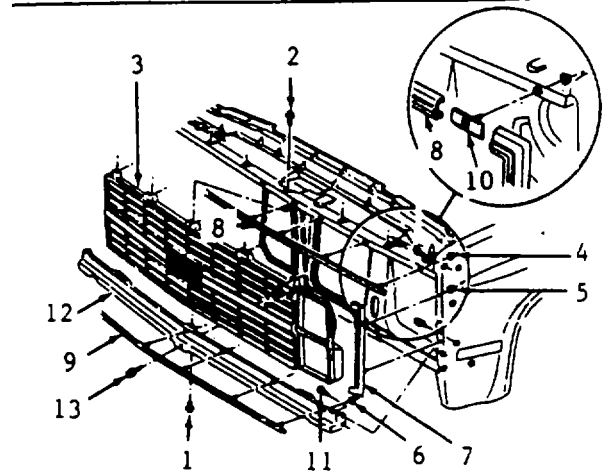
4-155. GRILLE REPLACEMENT (Continued)

REMOVAL

- a. Remove three lower radiator grille to grille bolts (1).
- b. Remove five radiator support to grille bolts (2).
- c. Remove grille (3) from the vehicle.
- f. Remove right and left moldings (7) from the upper (8) and lower moldings (9).
- d. Remove molding assembly to fender, radiator support and lower grille panel nuts (4), (5), and (6).
- e. Remove molding assembly from vehicle.
- g. Remove clips (10) from the moldings.
- h. Remove five lower radiator grille to fender bolts (11).
- i. Remove lower radiator grille (12) to the sheet metal support bolts (13).
- j. Remove lower radiator grille (12) from the vehicle.

INSTALLATION

- a. Install lower radiator grille (12) to the vehicle.
- b. Install lower radiator grille to the sheet metal support bolts (13).
- c. Install five lower radiator grille to fender bolts (11).
- d. Install upper molding to the radiator support with clips (10) and nuts (4). Do not tighten assemble loosely.



- e. Install lower molding to the radiator support wire clips (10) and nuts (6). Do not tighten assemble loosely.
- f. Install right and left moldings (7) to the fenders. The moldings must butt against the upper and lower moldings and be joined to those moldings by the clips.
- g. Install right and left molding nuts (5).
- h. Tighten upper and lower molding nuts (4) and (6).
- i. Install headlamp assemblies (paragraph 4-116).
- j. Install grille (3) to the vehicle by inserting the top of the grille to the underside of the radiator support and then slide the bottom of the grille into place.
- k. Install three lower radiator grille to grille bolts (1).
- l. Install five radiator support to grille bolts (2)
- m. Install front warning lights (paragraph 4-121).
- n. Reconnect battery cables.

4-156. WHEELHOUSE PANEL REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

Jack Stand
 General Mechanics Tool Kit

General Safety Instructions

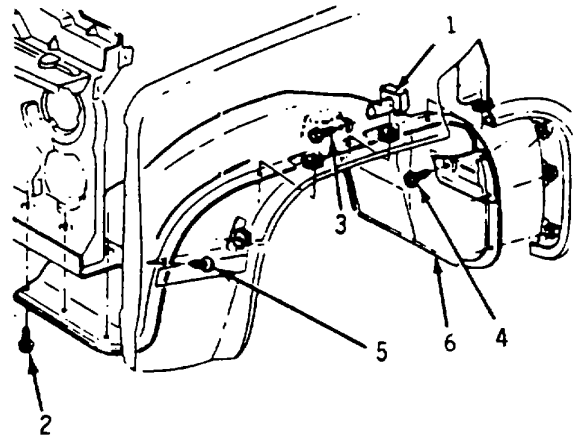
Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-16	Tire Jack, Hand Crank, and Lug Wrench Removed
4-73	Coolant Bottle Removed
4-125	Windshield Washer Fluid Reservoir Removed
4-153	Hood Release Cable Removed
4-203	Front Wheels Removed

REMOVAL

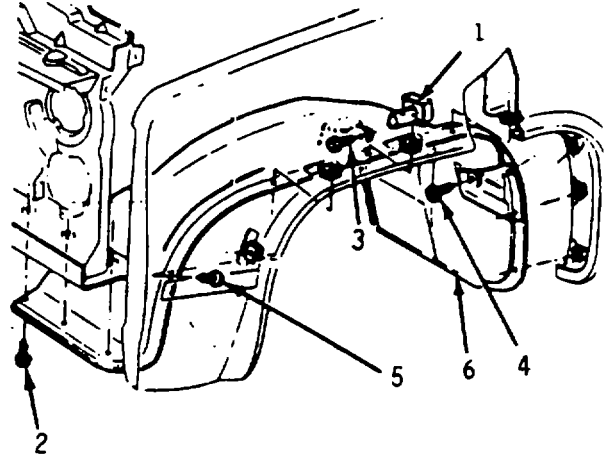
- a. Disconnect wiring harness (1).
- b. Raise vehicle on jack and support on jack stands.
- c. Remove the wheelhouse panel to radiator support bolts (2).
- d. Remove the wheelhouse panel reinforcement to underbody bolts (3) and (4).
- e. Remove the wheelhouse panel to fender bolts (5).
- f. Remove the wheelhouse panel (6) from the vehicle by sliding the panel forward to clear the lower back side of the fender well and tilting the wheelhouse panel out of the vehicle.



4-156. WHEELHOUSE PANEL REPLACEMENT (Continued).

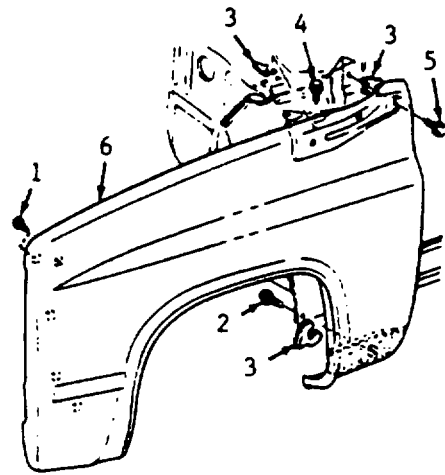
INSTALLATION

- a. Install the wheelhouse panel (6) to the vehicle by tilting the wheelhouse panel into the vehicle and sliding the panel into position.
- b. Install the wheelhouse panel to fender bolts (5) and torque to 13 ft-lbs (17 N-m).
- c. Install the wheelhouse panel reinforcement to underbody bolts (3 and 4) and torque (3) to 13 ft-lbs (17N-m) and (4) to 35 ft lbs (47 N-m).
- d. Install wheelhouse panel to radiator support bolts (5) and torque to 13 ft-lbs (17 N-m).
- e. Install the left front wheel (paragraph 4-203).
- f. Connect the hood release cable (paragraph 4-153).
- g. Connect the wiring harness.
- h. Install the windshield washer fluid reservoir (paragraph 4125).
- i. Lower the vehicle.
- j. Install tire jack, lug wrench, and hand crank (paragraph 4-16).
- k. Reconnect battery cables.



4-157. FRONT FENDER REPLACEMENT (Continued).

- g. Torque the lower door pillar to fender bolt (2) to 31 ft-lbs (43 N-m).
- h. Install shield to the underbody retainers using the Door Trim Pad Remover Tool.
- i. Install the wheelhouse panel to shield bolts.
- j. Torque the fender to cowl bolt (4) to 31 ft-lbs (43 N-m).
- k. Torque the upper fender to door pillar bolt (5) to 31 ft-lbs (43 N.m).
- l. Install the hood spring assembly (paragraph 4-150).
- m. Install grille (paragraph 4-155).
- n. Install headlamp (paragraph 4-116).
- o. Install hood release cable (paragraph 4-153).



- p. Install wheelhouse panel (paragraph 4-156).
- q. Install wheel (paragraph 4-203).
- r. Lower vehicle.
- s. Close hood.
- t. Reconnect battery cables.

4-158. RADIATOR SUPPORT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

Materials/Parts

Radiator Support (15522682)

Equipment Condition

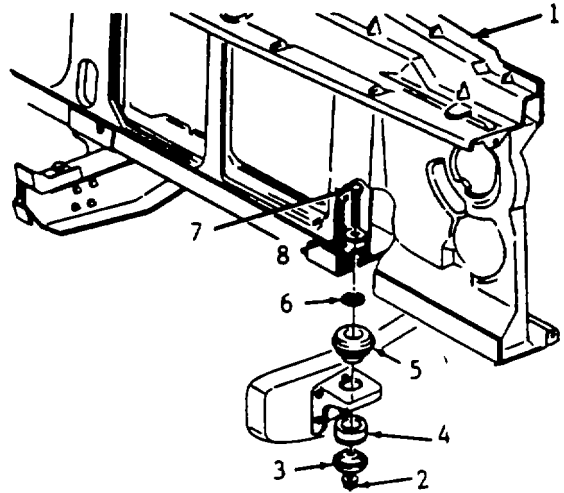
<u>Para.</u>	<u>Condition Description</u>
4-81	Radiator Removed
4-106	Battery Removed
4-116	Headlamps Removed
4-151	Primary Hood Latch Removed
4-155	Grille Removed
4-156	Wheelhouse Panel Removed
4-157	Fenders Removed

REMOVAL

- a. Disconnect the ground wires from the radiator support (1).
- b. Remove the air cleaner inlet from the radiator support (1).

4-158. RADIATOR SUPPORT REPLACEMENT (Continued).

- c. Remove the radiator support bolts (7).
- d. Remove the radiator (1) support from the vehicle.
- e. Remove the radiator support to frame nuts (2), lower retainers (3), lower cushions (4), upper cushions (5), retainers (6), bolts (7) and washers (8).
- f. Remove the radiator support from the vehicle by tilting the radiator support to the rear and lifting it up and out of the vehicle.

**INSTALLATION**

- a. Install the radiator support by lowering it into the vehicle and tilting it into position.
- b. Loosely install the radiator support to frame washers (8), bolts (7), retainers (6), upper cushions (5), lower cushions (4), lower retainers (3), and frame nuts (2). Do not tighten at this time.
- c. Install the sheet metal support to the vehicle.
- d. Install the sheet metal support to radiator support bolts and torque to 13 ft-lbs (17 N.m).
- e. Torque the radiator support to frame nuts (2) to 35 ft-lbs (47 N-m).
- f. Install the air cleaner inlet to the radiator support.
- g. Connect the ground wires to the radiator support.
- h. Install the lower radiator grille panel (paragraph 4-155).
- i. Install the grille (paragraph 4-155).
- j. Install the primary hood latch bracket (paragraph 4-151).
- k. Install the headlamp assemblies (paragraph 4-116).
- l. Install the batteries (paragraph 4-106).
- m. Install the radiator (paragraph 4-81).
- n. Install wheelhouse panel (paragraph 4-156).
- o. Install fenders (paragraph 4-157).
- P. Reconnect battery cables.

4-159. MIRROR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

General Mechanics Tool Kit

Materials/Parts

Mirrors (14016682)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

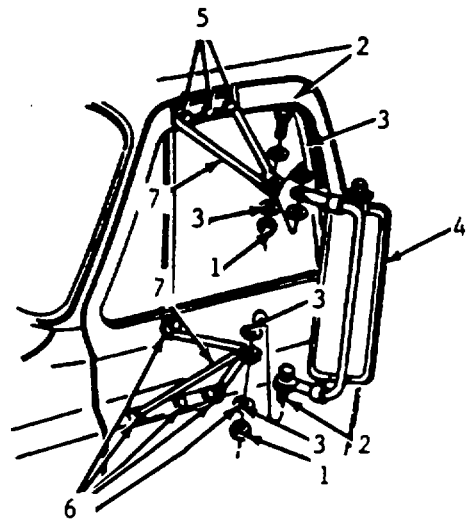
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove mirror bracket to door bracket nuts (1), bolts (2), and bushings (3).
- b. Remove the mirror bracket (4) from the vehicle.
- c. Remove door-bracket nuts (5) and screws (6).
- d. Remove brackets (7) from the door.

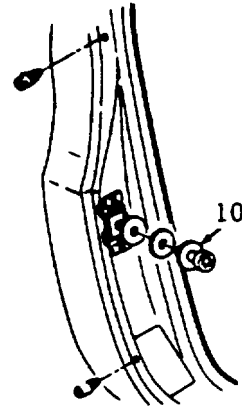
INSTALLATION

- a. Position door bracket (7) to the door.
- b. Install door bracket nuts (5) and screws (6).
- c. Position mirror bracket (4) to the door brackets.
- d. Install the mirror bracket to door bracket nuts (1), bolts (2), and bushings (3).



4-160. DOOR REPLACEMENT (Continued).

- f. Adjust the gap between the door (3) rear edge and the rear pillar (8) to 0.19 inch \pm .09 inch (5mm \pm 2mm).
- g. Adjust the gap between the door (3) and the windshield pillar (9) to 0.08 inch \pm 0.06 inch (2mm \pm 1.5mm).
- h. Make adjustment so that door surface is flush with the other panels within \pm 0.06 inch (\pm 1.5mm) except for the door to roof panel surface which should be flush within \pm 0.06 inch (\pm 1.5mm).
- i. Torque hinge bolts to 23 ft-lbs (30 N-m).
- j. If necessary, adjust the door striker bolt (10) with the wrench as that the bolt properly engages the door lock.



- k. Torque the striker bolt (10) to 46 ft-lbs (63 N-m).
- l. Reconnect batteries.

4-161. DOOR LOCK REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Materials/Parts

Curbside Lock (14039763)

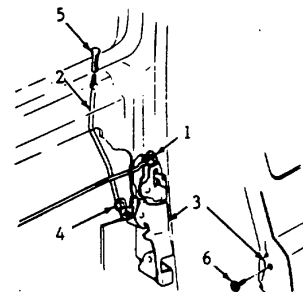
Streetside Lock (14039764)

Equipment Condition

Para.	Condition Description
4-164	Inside Door Handle Removed
4-176	Trim Panel Removed

REMOVAL

- a. Raise the window completely.
- b. Remove the clip (1) from the inside handle rod to lock by pushing on the tip of the clip where it is connected to the rod using a flat-bladed screwdriver pivot the clip away from the rod.



4-161. DOOR LOCK REPLACEMENT (Continued).

- | | |
|--|---|
| <ul style="list-style-type: none"> c. Disconnect the inside handle to lock rod (2) from the lock (3). d. Remove the outside door handle to lock rod clip (4) by pushing on the top of the clip where it is connected to the rod using a flat-bladed screwdriver and pivoting the clip away from the rod. e. Remove the inside door lock knob (5). f. Remove the door to lock assembly screws (6). g. Tilt the lock assembly away from the outside lock cylinder and pull it downward to make clearance for the inside lock rod. h. Remove the lock assembly from the door. | <ul style="list-style-type: none"> b. Install the door to lock assembly screws (6). c. Install the inside door lock knob (5) to the rod (2). d. Install the outside door to handle lock rod (2) onto the lock assembly (3). e. Install outside clip (3) onto the lock rod (2) by pivoting the clip up and onto the lock rod. f. Install the inside door handle to lock rod onto the lock assembly. g. Install inside clip onto the lock rod by pivoting the clip up and onto the door handle rod lock. h. Install the door trim panel (paragraph 4-176). i. Install inside door handle (paragraph 4-164). |
|--|---|

INSTALLATION

- a. Align the inside lock rod to the hole in the door panel then tilt the lock assembly onto the outside lock cylinder.

4-162. DOOR LOCK CYLINDER REPLACEMENT.

This task covers: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools
General Mechanics Tool Kit

Materials/Parts
Lock Cylinder (9632761)
Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-164	Inside Door Handle Removed
4-176	Trim Panel Removed

General Safety Instructions
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Raise the window completely.
- b. Using a flat-bladed screwdriver, slide the lock cylinder retain

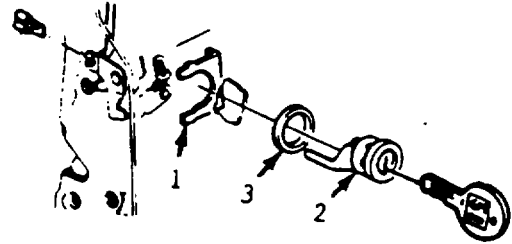
4-162. DOOR LOCK CYLINDER REPLACEMENT (Continued).

- ing clip (1) out of engagement with the lock cylinder.
- c. Remove the lock cylinder (2) and gasket (3) from the door.

- c. Install the door trim panel (paragraph 4-176).
- d. Install inside door handle (paragraph 4-164).

INSTALLATION

- a. Position the lock cylinder (2) with gasket (3) to the door, making certain that the lug of the cylinder engages the lock assembly lever.
- b. Install the lock cylinder retaining clip (1) onto the cylinder.



4-163. OUTSIDE DOOR HANDLE REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Handle (6272581)

Equipment Condition

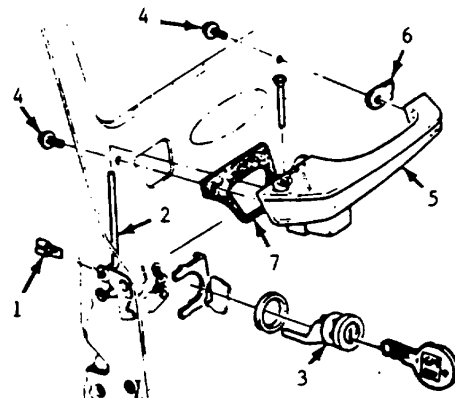
Para.	Condition	Description
4-176	Trim Panel Removed	

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Raise the window completely.
- b. Remove the outside door handle to lock rod clip (1) by using a flat bladed screwdriver and pushing on the top of the clip where it is connected to the rod (2) and pivoting the clip away from the rod.
- c. Disconnect the outside door handle to lock rod (2) from the lock (3).
- d. Remove the door to outside handle screws (4).



4-163. OUTSIDE DOOR HANDLE REPLACEMENT (Continued).

- | | |
|--|---|
| <ul style="list-style-type: none"> e. Remove the handle (5) with the control rod (2) from the door. f. Remove the gaskets (6) and (7) from the door. | <ul style="list-style-type: none"> d. Install the small gasket (6) between the door and the handle. e. Install the door outside handle screw (4) to the other side of the handle and tighten both screws. |
|--|---|

INSTALLATION

- | | |
|--|---|
| <ul style="list-style-type: none"> a. Install the large gasket (7) over the lock rod (2) and onto the handle (5). b. Install the handle with the lock rod onto the door. c. Loosely install the door to outside handle screw (4) to the push button side of the handle. | <ul style="list-style-type: none"> f. Connect the outside door handle to lock rod to the lock assembly. g. Install the clip (1) onto the lock rod by pivoting the clip up and onto the lock rod. h. Install the door trim panel (paragraph 4-176). |
|--|---|

4-164. INSIDE DOOR HANDLE REPLACEMENT.

This task covers:

- | | |
|------------|-----------------|
| a. Removal | b. Installation |
|------------|-----------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Handle (14030586)

Equipment Condition

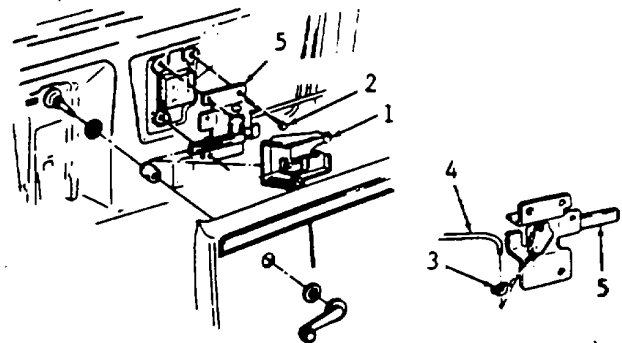
Para.	Condition Description
4-176	Door Trim Panel Removed

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

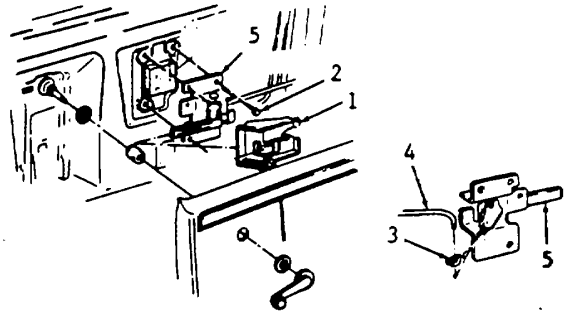
- a. Remove door handle seal (1).
- b. Remove handle to door screws (2).
- c. Slide the clip (3) so that the large diameter slot is in line with the lock rod, then pull the rod (4) disconnecting it from the handle (5).
- d. Remove the inside handle from the door.



4-164. INSIDE DOOR HANDLE REPLACEMENT (Continued).

INSTALLATION

- a. Position the inside door handle and connect the control rod (4) by placing the rod into the clip and lever, then slide the clip so that the small diameter slot is in line with the lock rod.
- b. Install the handle to door screws (2).
- c. Install the door handle seal (4).
- d. Install door trim panel (paragraph 4-176).



4-165. DOOR WEATHERSTRIP REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools
General Mechanics Tool Kit

Materials/Parts
Weatherstrip (1402777)

General Safety Instructions
Engine OFF
Transmission in (N) neutral
Parking brake and micro-brakelock set.

REMOVAL

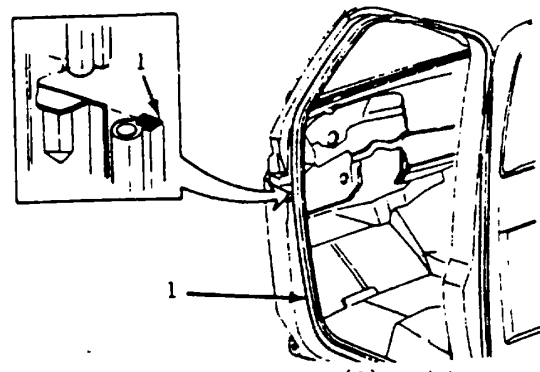
- a. Open the door and remove the sill plate at the bottom edge of door opening.
- b. Remove the weatherstrip (1) by pulling it away from the pinchweld flange.

INSTALLATION

NOTE

Remove all rust, road dirt, grease, oil, old cement and bits of old weatherstrip from the edge of the opening.

- a. Install the weatherstrip (1) to the pinchweld flange, starting at the bottom center of the door opening.



- b. Trim weatherstrip (1) and butt ends together.
- c. Install the sill plate to the vehicle.

4-166. BENCH SEAT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

General Mechanics Tool Kit

Materials/Parts

Bench Seat (094-90001)

General Safety Instructions

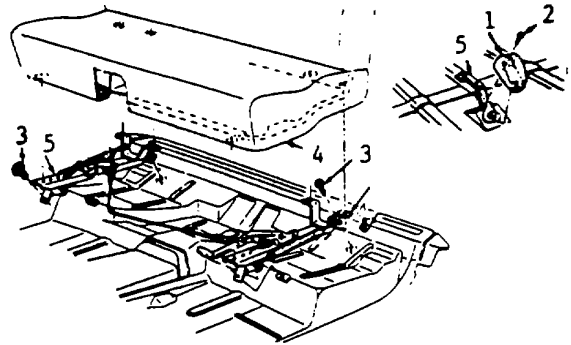
Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

REMOVAL

- a. Remove bolt cover (1) by removing bolt (2).
- b. Remove seat adjuster to floor panel bolts (3).
- c. Remove seat (4) with adjuster (5) from the vehicle.

**INSTALLATION**

- a. Install the seat (4) with adjuster (5) to the vehicle with the floor panel bolts (3).
- b. Install the bolt covers (1) by installing bolts (2).

4-168. BENCH SEAT AND CATCH REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Catch (14021209)

General Safety Instructions

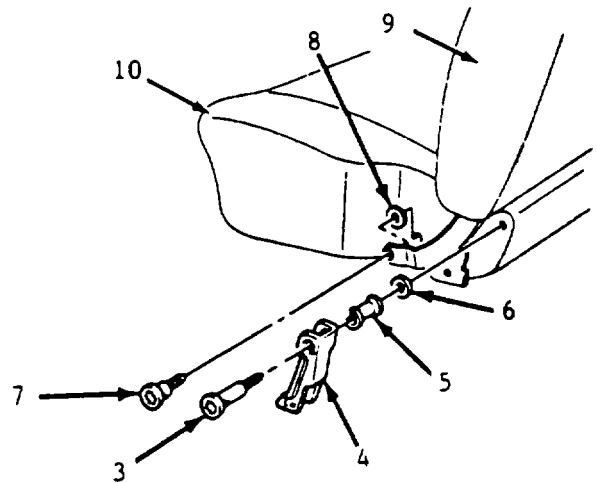
Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

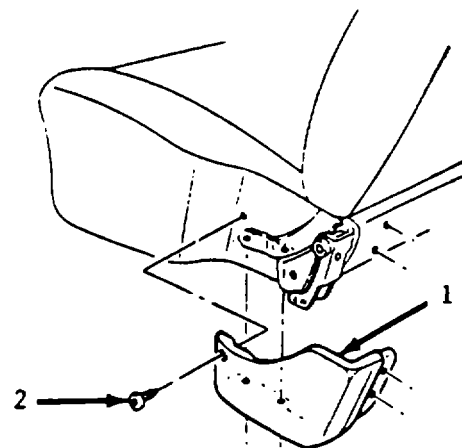
REMOVAL

- a. Remove seat back trim cover (1) by removing screws (2).
- b. Remove striker (3).
- c. Remove catch (4) with bushing (5).
- d. Remove washer (6).
- e. Remove seat back to seat base bolt (7) and washer (8).
- f. Remove seat back (9) from vehicle.



INSTALLATION

- a. Position seat back (9) to the seat (10) in the vehicle and install washer (8) between the seat base and the seat back frame.
- b. Install seat back to seat base bolt (7).
- c. Install washer (6).
- d. Install catch (4) with bushing (5).
- e. Install striker (3).
- f. Install seat back trim cover (1) with screws (2).



4-169. SEAT BELTS REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Seat Belts (14070566)

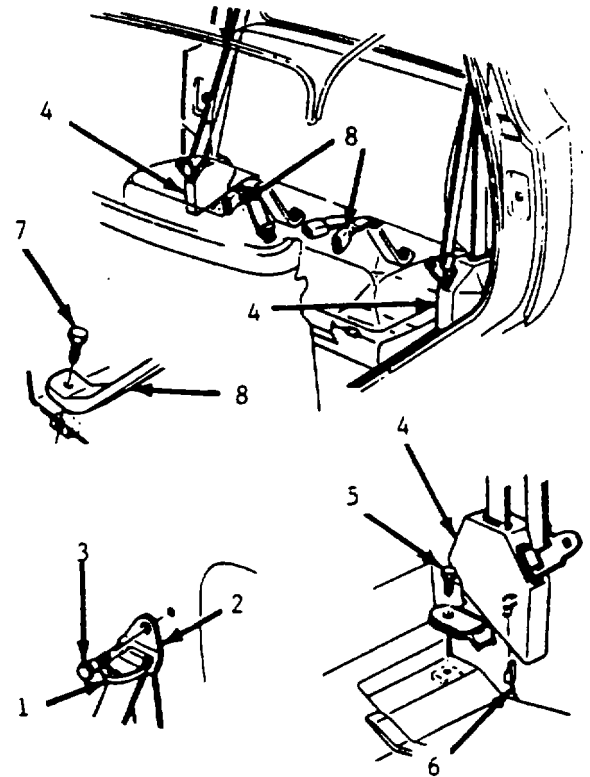
General Safety Instructions Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

REMOVAL

- a. Remove the upper seat belt anchor plate cover (1) by prying the top of the cover away from the anchor plate (2).
- b. Remove the anchor plate bolt (3).
- c. Remove the anchor plate (2).
- d. Remove the retractor (4) to floor bolt (5).
- e. Remove the seat belt wire (6) (left side only).
- f. Remove the retractor (4) from the vehicle.
- g. Remove the buckle to floor bolt (7).
- h. Remove the buckle (8) from the floor.



INSTALLATION

- a. Position the buckle (8) to the floor and fasten by installing the buckle to floor bolt (7) and torque to 37 ft-lbs (50 N-m).
- b. Install the retractor (4) to the vehicle and fasten with the retractor to floor bolt (5) and torque to 37 ft-lbs (50 N-m).
- c. Install the seat belt wire (6) (left side only).
- d. Install the anchor plate (2) to the door pillar.
- e. Install the anchor plate bolt (3) and torque to 37 ft-lbs (50 N-m).
- f. Install the upper seat belt anchor plate cover (1) by pivoting the cover upwards and pressing it into place.

4-170. WINDSHIELD REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Adhesive Dispensing Gun (J-24811)
 Weather-strip Tool (J-2189-02)
 Type Razor Knife
 Brazing Torch

Materials/Parts

GM Adhesive Service Kit No. 9636067
 (Appendix D, Item 19)
 GM Rubber Lubricant No. 1051717
 (Appendix D, Item 24)
 Alcohol (Appendix D, Item 1)
 Cloth, Soft, Lint-Free
 (Appendix D, Item 12)
 Black Gloss Primer
 (Appendix D, Item 34)
 Clear Gloss Primer
 (Appendix D, Item 35)
 Pinchweld Primer
 (Appendix D, Item 36)
 Urethane Adhesive Cartridge
 (Appendix D, Item 9)
 Windshield (14018595)

Equipment Description

<u>Para.</u>	<u>Condition Description</u>
4-124	Wiper Arms Removed

Special Environmental Conditions

The higher the temperature of the work area, the more pliable the weather-strip will be. The more pliable the weather-strip, the more easily the windshield can be removed.

General Safety Instructions

Always wear heavy gloves when handling glass to minimize the risk of injury.
 Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

Personnel Required : 2

REMOVAL

NOTE

Windshield installation requires a number of timed steps because of the cure times involved with primers, solvents, and adhesives used in this procedure. This is important and must be followed.

When replacing a cracked windshield, it is important that the cause of the crack be determined and the condition corrected, before a new glass is installed. The cause of the crack may be an obstruction or high spot somewhere around the flange of the opening; cracking may not occur until pressure from the high spot or obstruction becomes partially high due to winds, extremes in temperature, or rough terrain.

4-170. WINDSHIELD REPLACEMENT (Continued).

NOTE

If a crack extends to the edge of the glass, mark the point where the crack meets the weather-strip. (Use a piece of chalk and mark the point on the cab, next to the weather-strip). Later, when examining the flange of the opening for a cause of the crack, start at the point marked.

Before removing the glass, cover the instrument panel and the surrounding sheet metal with protective covering.

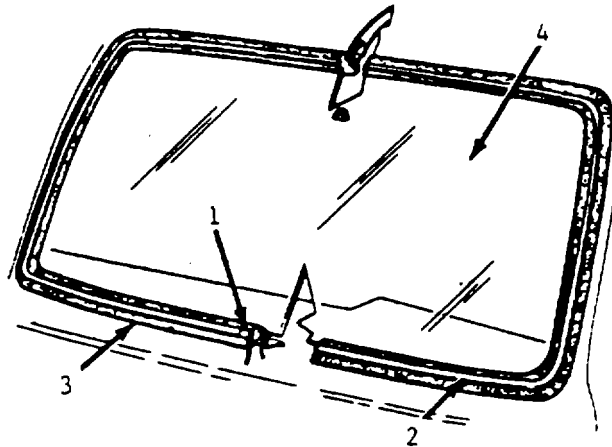
REMOVAL

- a. Remove the reveal molding cap (1) and the reveal molding lock strip (2).

CAUTION

If the windshield is broken, criss-cross the glass with strips of masking tape before removing it; this will help hold the glass together and minimize the risk of injury.

- b. From inside the cab, remove the weather-strip (3) and glass (4) from the pinchweld flange by applying a firm, controlled, pressure to the edge of the glass while forcing the weather-strip from the flange with a flat bladed tool.
- c. With the aid of an assistant from outside the vehicle, remove the windshield from the opening.



4-170. WINDSHIELD REPLACEMENT (Continued).

d. Remove any excess urethane and remaining weather-strip from the pinchweld flange.

INSTALLATION

CAUTION

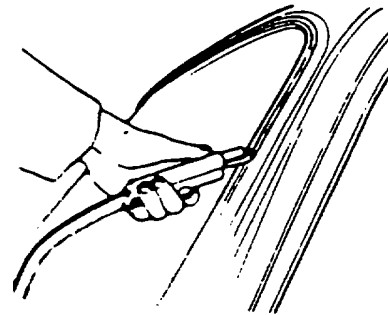
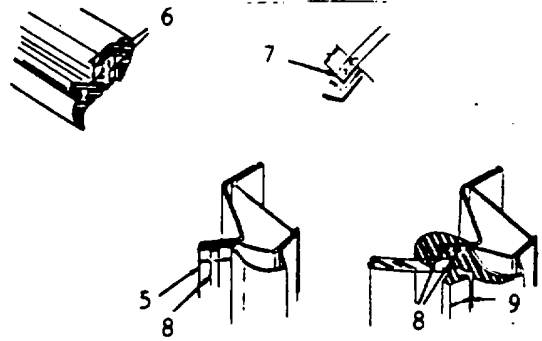
If there is too much clearance between the glass and the flange of the opening, the flange can be built up. Braze a piece of 1/8 inch (3mm) diameter wire to the edge of the flange. Usually, building up one side and half way around one corner will be enough. Taper off the ends of the wire to avoid an abrupt change in contour which could result, later, in a broken windshield.

NOTE

Before installing a windshield, the clearance between the edge of the glass and the flange of the opening should be checked. The glass and flange overlap by 0.2 inch (5mm). If the windshield is too big, rework the metal flange or grind off the edge of the glass. If the glass is to be ground off, place a strip of tape on the glass and use the edge of the tape as a guide.

Windshield installation requires a number of times steps because of the cure times involved with the primers, solvents, and adhesives used in this procedure. This timing is important and must be followed.

a. Wipe the pinchweld clean with a dry cloth, making sure all previous urethane has been removed.



NOTE

Primer must be thoroughly stirred and agitated prior to application.

- b. Apply the pinchweld primer (Appendix D, Item 36) with a new applicator to the pinchweld where indicated (5).
- c. Allow the primer to cure for 30 minutes.
- d. Apply rubber cleaner (Appendix D, Item 19) with a new applicator on both channels of the rubber weather-strip (6).
- e. Wait five minutes before wiping the channels with a clean, dry cloth.
- f. Apply rubber primer (Appendix D, Item 19) to both channels of the rubber weather-strip (6) where indicated.

4-170. WINDSHIELD REPLACEMENT (Continued).

g. Allow 30 minutes for the primer to cure.

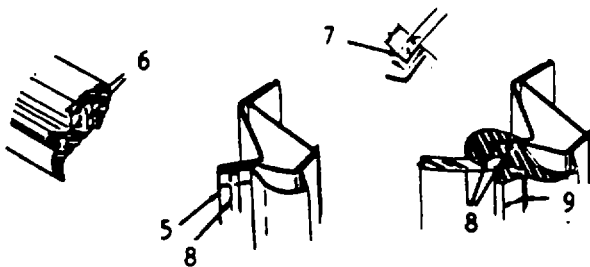
WARNING

When cleaning windshield glass, avoid contacting the edge of the plastic laminate material (on the edge of the glass) with volatile cleaner. Contact may cause discoloration and deterioration of the plastic laminate by wicking action.

Do not use a petroleum based solvent such as kerosene or gasoline. The presence of oil will prevent adhesion of new material.

Cleaning solvent, Appendix D, Item 44, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

- h. Thoroughly clean the surface of the glass to which the black primer (Appendix 0, Item 34) will be applied (7) (around the edge of the inside surface) by wiping the window with a clean alcohol dampened cloth (Appendix D, Item 1 and 12)
- i. Allow the alcohol to air dry.
- j. Apply the black primer (Appendix D, Item 34) inside face of the windshield (7) starting 0.40 inch (10 mm) from the edge and working outward to the edge. Apply the primer (Appendix D, Item 34) to the edge of the glass also, allowing the primer to dry to the touch.



NOTE

The windshield glass must be installed within 20 minutes of performing the following step.

- k. Apply a 0.25 inch (6.0 mm) diameter bead of urethane adhesive (Appendix D, Item 9) in the center of the pinchweld flange around the entire windshield opening (8).
- l. Apply a mist of plain water to the pinchweld flange, wetting it fully.
- m. Install the rubber weather-strip to the pinchweld flange.
- n. Apply an 0.18 inch (4.5 mm) diameter bead of urethane adhesive (Appendix D, Item 9) to the rubber weather-strip glass channel (8).
- o. With the aid of a helper, lift the glass into the window opening.

NOTE

The windshield must be firmly seated before taking the next step.

- p. Apply rubber lubricant (Appendix D, Item 24) the lockstrip channel (9).
- q. Install the lockstrip to the weather-strip using the weather-strip tool.
- r. Install the lockstrip cap at the lockstrip joint.
- s. Install the windshield wiper arms (paragraph 4-124).

4-171. BACK WINDOW REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

Razor Knife
Putty Knife
Brazing Torch

Personnel Required

2-Persons

General Safety Instructions

CAUTION: Always wear heavy gloves when handling glass to minimize the risk of injury.

Materials/Parts

Window (363107)

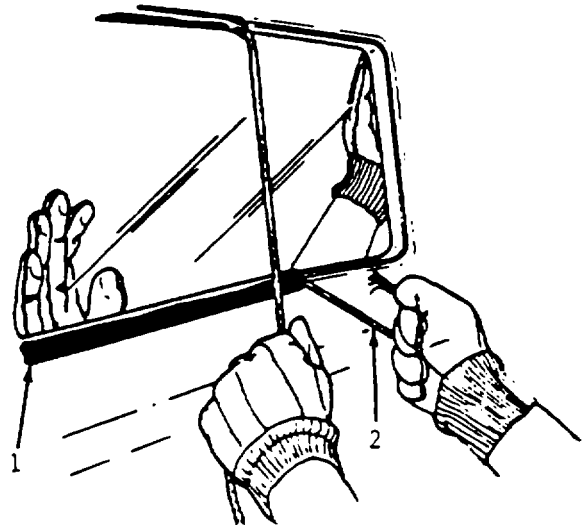
REMOVAL**CAUTION**

If a window is broken, crisscross the glass with strips of masking tape before removing it; This will help hold the glass together and minimize the risk of injury.

NOTE

When replacing a cracked window, it is important that the cause of the crack be determined and the condition corrected, before a new glass is installed. The cause of the crack may be an obstruction or high spot somewhere around the flange of the opening; cracking may not occur until pressure from the high spot or obstruction becomes particularly high due to winds, extremes of temperature, or rough terrain.

If a crack extends to the edge of the glass, mark the point where the crack meets the weather-strip. (Use a piece of chalk and mark the point on the cab, next to the weather-strip). Later, when examining the flange of the opening for a cause of the crack, start at the point marked.



- a. Run a putty knife or other flat-bladed tool around the edge of the window between the weather-strip (1) and the cab panels, inside and outside the cab. This will make sure the weather-strip is not stuck to the cab.
- b. With an assistant outside the cab next to the window, use the putty knife or other blunt tool to force the edge of the weather-strip off the flange of the opening inside the cab, pushing outward on the glass.
- c. Continue around the window, forcing the weather-strip off the flange, until the glass and the weather-strip are free of the opening.

4-171. BACK WINDOW REPLACEMENT (Continued).

- d. Have the assistant remove the glass and weather-strip from outside the vehicle.

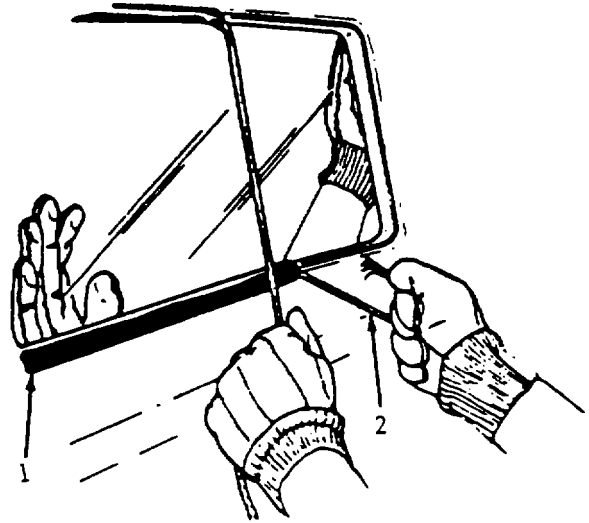
INSTALLATION**NOTE**

Before installing a rear window, the clearance between the edge of the glass and the flange of the opening should be checked. There should be 0.3 inch (8mm) overlap between the flange and the glass all the way around the edge of the window. If the glass is too big, rework the metal flange or grind off the edge of the glass. If the glass is to be ground off, place a strip of tape on the glass and use the edge of the tape as a guide.

If there is too much clearance between the glass and the flange of the opening, the flange can be built up. Braze a piece of 1/8 inch (3mm) diameter wire to the edge of the flange. Usually it is enough to build up one side of the opening and half way around one corner. Taper off the ends of the wire to avoid an abrupt change in contour. Too abrupt of a change in contour could cause a broken window later.

To ease installation, the weather-strip can be heated with a non-flame source. At higher temperatures, the weather-strip is more pliable. Do not heat above 1250F (520C) and/or for longer than 1-1/2 hours.

Avoid hitting the glass on anything that may chip its edge. Pressure on the window will tend to concentrate at the chipped areas, causing cracks. If the glass is chipped, the edge should be ground smooth.



- a. Place the weather-strip (1) around the edge of the glass to be installed.
- b. Place a length of cord (2) about 1/4 inch (6mm) thick around the weather-strip. It should be in the groove of the weather-strip where the flange of the opening will fit. The ends of the cord should overlap about 6 inches (152mm) and be located at the bottom of the window.
- c. Brush a soapy solution of water around the outside edge of the cab opening.
- d. Have an assistant hold the glass and weather-strip, with the cord around it, up to the window opening from the outside of the cab; the ends of the cord should have been placed through the opening and hang loosely inside the cab.

4-171. BACK WINDOW REPLACEMENT (Continued).

e. While the assistant holds the glass firmly in place, pull one end of the cord, forcing the lip of the weather-strip up and over the flange of the opening.

f. Continue pulling the cord until it is free from the weather-strip and the lip of the entire weather-strip is over the flange of the opening.

4-172. VENT GLASS REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

Mechanical Window Press

Materials/Parts

Sandpaper, Fine (Appendix D, Item 38)

Soap Solution

Rubber Lubricant (Appendix D, Item 24)

Glass Channel Filler

Curbside Glass (20264743)

Streetside Glass (20264744)

Equipment Condition

Para.

4-176

Condition Description

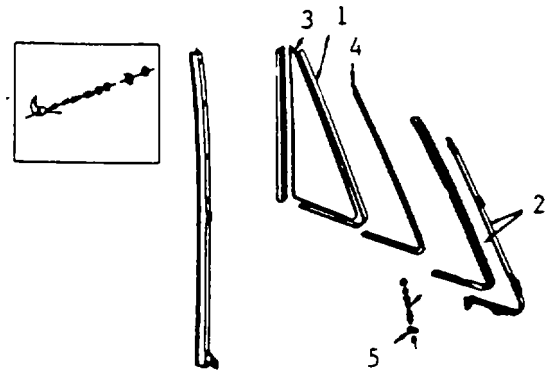
Door Trim Panel Removed

General Safety Instructions

CAUTION: Always wear heavy gloves when handling glass to minimize the risk of injury.

REMOVAL

- a. Using an oil can or similar means, squirt rubber lubricant (Appendix D, Item 24) solvent on the tar paper line filler (1) all around the glass channel (2) or frame to soften the old seal.
- b. When the seal has softened, remove the glass (3) and old filler from the channel (2).



INSTALLATION

- a. Thoroughly clean the inside of the glass channel (2) with sand-paper (Appendix D, Item 38) to remove all rust and foreign matter.
- b. Cut the new piece of glass channel filler (1) 2 inches (51mm) longer than required.
- c. Place the filler (1) soapstoned side of filler away from glass, evenly around and over the edge of the glass (3) that will be inserted into the channel (2).

NOTE

Usually the following procedure is done with a mechanical window press.

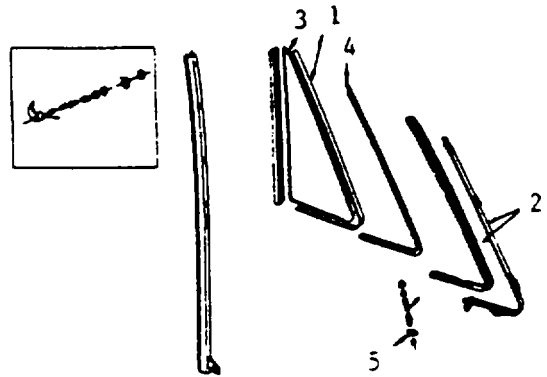
- d. Squeeze together the doubled ends of the filler (1) which project beyond the edge of the glass (3).
- e. Brush the inner channel (4) with soap solution.

NOTE

Do not use grease or oil.

4-172. VENT GLASS REPLACEMENT (Continued).

- f. Press the glass (3) and the filler (1) into the channel (2) until firmly seated.
- g. Trim off excess filler material (1) around and at the end of the channel (2).
- h. Bend the tabs on the adjustment nut (5) away from the nut.
- i. Adjust the vent by placing a wrench on the adjusting nut and turning the vent window to the desired tension.
- j. Bend the tabs over the hex nut (6) on the base of the assembly.



- k. Install the door trim panel (paragraph 4-176).

4-173. VENT/WINDOW RUN CHANNEL REPLACEMENT.

INITIAL SET-UP

Tools

General Mechanics Tool Kit
Window Handle Clip Removing Tool

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-176	Trim Panel Removed

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

Materials/Parts

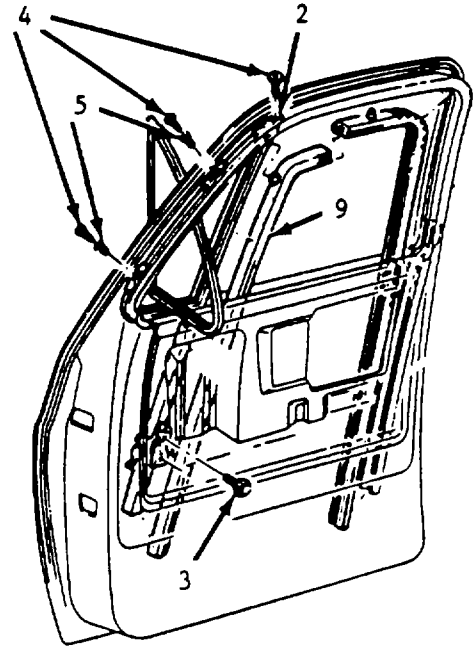
Curbside Channel (20354945)
Streetside Channel (20354946)

REMOVAL

- a. Lower glass to the bottom of the door.
- b. Disconnect the run channel molding (1) by pulling the molding out of the vent assembly (2) only.
- c. Remove the door panel to run channel bolt (3).
- d. Remove the door ventilator screws (4) and spacers (5).
- e. Remove the door vent/window run channel assembly from the vehicle by pulling the top of the vent backwards, away from the door frame and lifting and rotating the assembly out of the door.

4-173. VENT/WINDOW RUN CHANNEL REPLACEMENT (Continued).**INSTALLATION**

- a. Position the door vent/window run channel assembly (2) and install to the vehicle by rotating the vent assembly into the door and fitting it into the door frame.
- b. Install the door to ventilator screws (4) and spacers (5) starting with the screw at the top of the door and working downward.
- c. Install the door panel to run channel bolts (3).
- d. Install the run channel molding (1) by seating the clip into the vent, then pushing the remainder of the molding into the run channel.
- e. Install the door trim panel (paragraph 4-176).
- f. Check operation of the window assembly.



4-174. DOOR WINDOW REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

Window Handle Clip Removing Tool

General Safety Instructions

CAUTION: Always wear heavy gloves when handling glass to minimize the risk of injury.

Materials/Parts

Curbside Window (14022841)

Streetside Window (14022842)

Equipment Condition

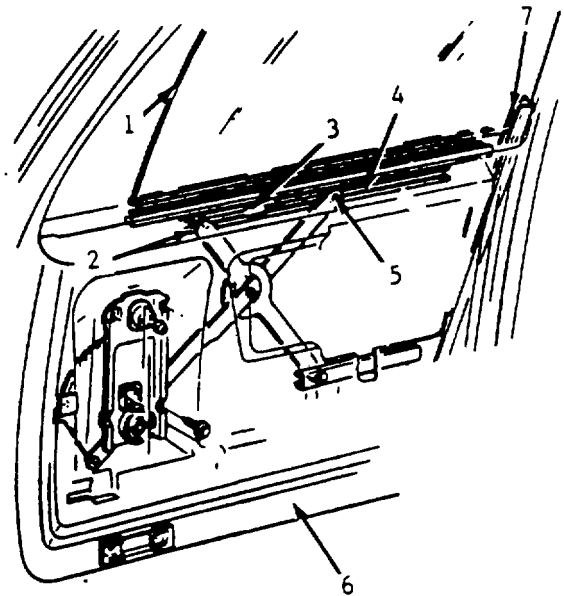
<u>Para.</u>	<u>Condition Description</u>
4-173	Door Vent, Window Run Channel Removed
4-176	Door Trim Panel Removed

REMOVAL

- a. Lower the window to the bottom of the door.
- b. Mask or cover any sharp edges that could scratch glass (1).
- c. Slide the glass forward until the front roller (2) is in line with the notch (3) in the sash channel (4).
- d. Disengage the roller (2) from the channel.
- e. Push the window forward and tilt the front portion of the window up until the rear roller (5) is disengaged.
- f. Put window assembly (1) in normal (level) position and raise it straight up and out of the door (6).

INSTALLATION

- a. Lower the window into the door frame (6).
- b. Push the window forward then tilt it up and slide the rear roller (5) into the sash channel (4).



4-174. DOOR WINDOW REPLACEMENT (Continued).

- c. Slide the glass backward until the front roller (2) is in line with the notch in the sash channel (4).
- d. Engage the roller (2) to the sash channel (4).
- e. Slide the glass rearward into the glass run channel (7).
- f. Remove any masking or covering.
- g. Install door vent/window run channel assembly (paragraph 4-173).
- h. Install door trim panel (paragraph 4-176).
- i. Check operation of window assembly.

4-175. CAB SHEET METAL UNIT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

Personnel Required

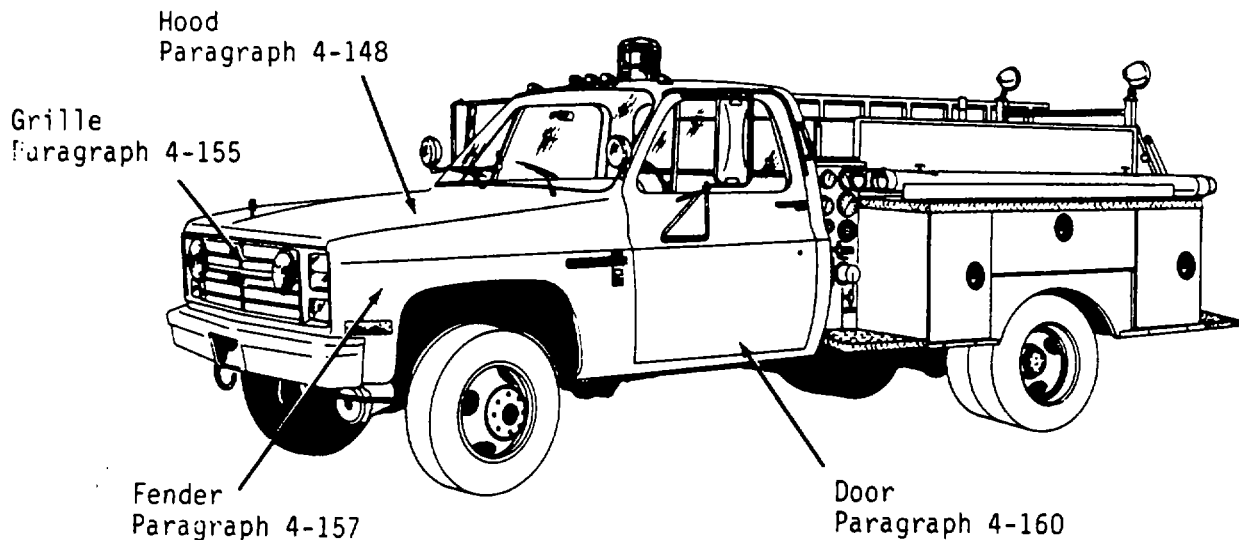
2 Persons

REMOVAL

- a. Remove damaged panel.
- b. Refer to next higher level of maintenance for repair.

INSTALLATION

- a. Install replacement panel
- b. Refer to next higher level of maintenance for painting.



4-176. TRIM PANEL REPLACEMENT.

This task covers:

a. Removal

b. Installation

Tools

- Window Handle Clip Remover (J-9886-01)
- Door Trim Pad Clip Remover (J-24595-B)
- General Mechanics Tool Kit
- Rubber Mallet

General Safety Instructions

- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

Materials/Parts

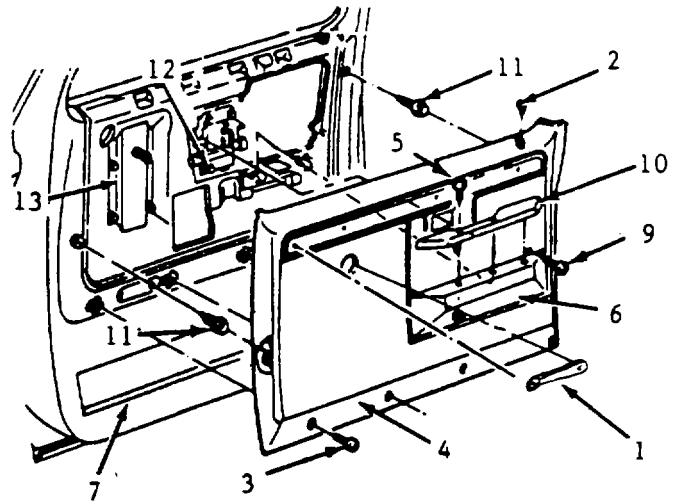
- Curbside Panel (15597667)
- Streetside Panel (15597668)

REMOVAL

- a. Remove the window regulator handle (1) using the clip remover (J-9886 -01).
- b. Remove the door lock knob (2).
- c. Remove four screws (3) securing lower edge of trim panel (4).
- d. Remove two arm rest attaching screws (5).
- e. Remove arm rest (6) from the door (7).
- f. Remove the screw (8) at door handle cover plate.
- g. Remove screw (9) located under arm rest pad (10)
- h. Remove door trim panel to door retainers (11) using the clip remover tool, carefully prying the top of the panel away from the door side window seal clips.

NOTE

Check that all the trim retainers are securely fastened and are not damaged. Replace any damaged fasteners.



4-176. TRIM PANEL REPLACEMENT. (Continued)

INSTALLATION

NOTE

Check that all the trim retainers are securely fastened and are not damaged. Replace any damaged fasteners.

- a. Pull door inside handle (12) inward.
- b. Position trim assembly (4) to inner panel (13), inserting door handle (12) through handle hole in panel (4).
- c. Fasten panel (4) onto door side window seal clips.
- d. Align remaining retainers with panel slots and tap in place with a clean rubber mallet.
- e. Install screw (9) located under arm rest pad (10).
- f. Install screw (8) at door handle cover plate.
- g. Install arm rest (10) to the door with the two attaching screws (5).
- h. Install four screws (3) securing lower edge of trim panel (4).
- i. Install the door lock knob (2).
- j. Install the window regulator handle (1) with the clip remover tool.

4-177. INNER WINDOW WEATHER-STRIP REPLACEMENT.

This task covers:

- a. Removal**
- b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-176	Trim Panel Removed

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

Materials/Parts

Weather-strip (15522764)

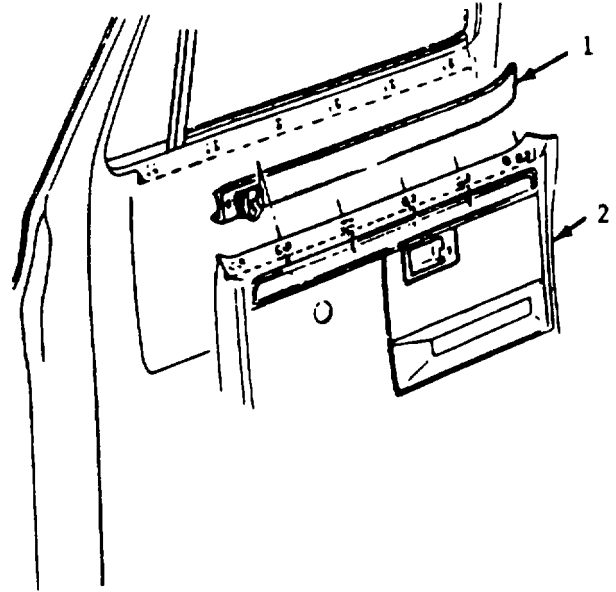
4-177. INNER WINDOW WEATHER-STRIP REPLACEMENT (Continued).

REMOVAL

Remove the weather-strip (1) from the trim panel (2) by prying the clips on the weather-strip from the trim panel shoulder.

INSTALLATION

- a. Install the weather-strip (1) to the trim panel (2) by pushing the weather-strip clips onto the trim panel shoulder.
- b. Install the door trim panel (paragraph 4-176).



4-178. OUTER WINDOW WEATHER-STRIP REPLACEMENT.

This task covers:

- | | |
|------------|-----------------|
| a. Removal | b. Installation |
|------------|-----------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Weather-strip (15522764)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

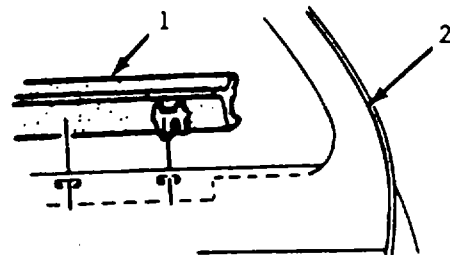
Parking brake and micro-brakelock set.

REMOVAL

- a. Lower the window fully.
- b. Remove the weather-strip (1) from the door panel by prying the weather-strip clips from the door panel (2).

INSTALLATION

- a. Install the weather-strip (1) to the door panel by pushing the weather-strip clips onto the door panel (2).
- b. Raise window.



4-179. WINDOW REGULATOR REPLACEMENT. (Continued)

- h. Install the trim panel.
(paragraph 4-176)
- i. Remove the tape from the window.

4-180. INTERIOR TRIM REPLACEMENT.

This task covers:

- a. Removal
 - b. Installation
-

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Trim (14022847)

General Safety Instructions

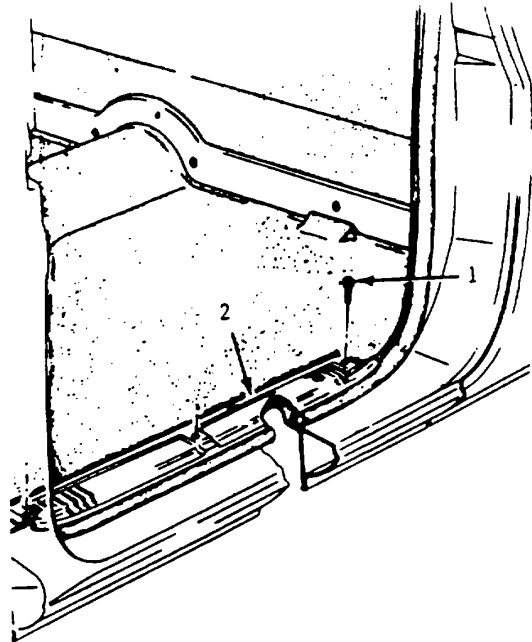
Engine OFF.

Transmission in (N) neutral.

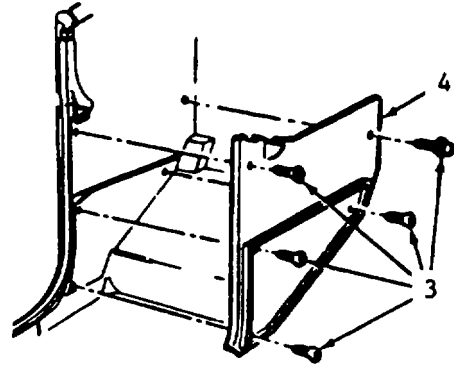
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove the sill plate screws (1).
- b. Remove the sill plate (2).
- c. Remove the kick panel screws (3).
- d. Remove the kick panel.(4).
- e. Remove the instrument panel outer filler screws (5).
- f. Remove the instrument panel filler (6).
- g. Remove upper garnish molding screws (7).
- h. Remove upper garnish molding (8).
- i. Remove windshield side garnish moulding screws (9).
- j. Remove windshield side garnish moulding (10).

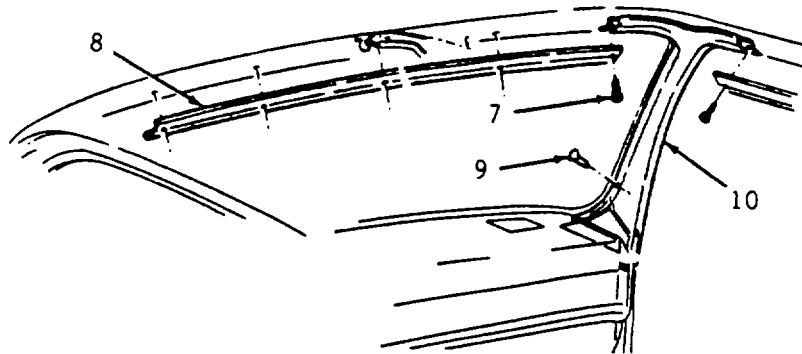
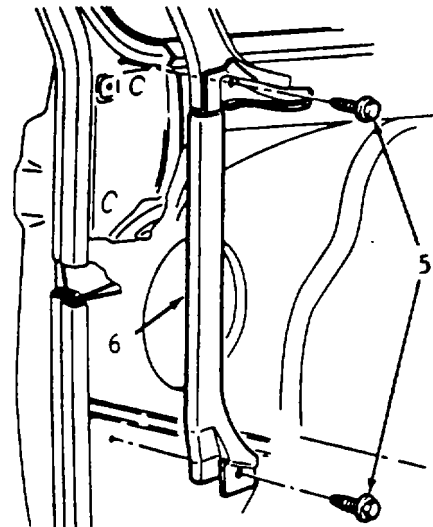


4-180. INTERIOR TRIM REPLACEMENT. (Continued)



INSTALLATION

- a. Position windshield side garnish moulding (10) and install with screws (9).
- b. Position upper garnish molding (8) and install with screws (7).
- c. Position instrument panel outer filler (6) and install with screws (5).
- d. Position kick panel (4) and install with screws (3).
- e. Position sill plate (2) and install with screws (1).



Section XIX. MAINTENANCE OF ELECTRICAL SYSTEM.

Cab Harness Replacement	Para. 4-182	General	Para. 4-181
Chassis Electrical System Replacement	4-183		

4-181. GENERAL.

This section contains information on the maintenance of the electrical system that are maintainable at the Organizational level.

4-182. CAB HARNESS REPLACEMENT.

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

Materials/Parts

Cab Harness as Required
(Appendix E, Page E-166)

REMOVAL

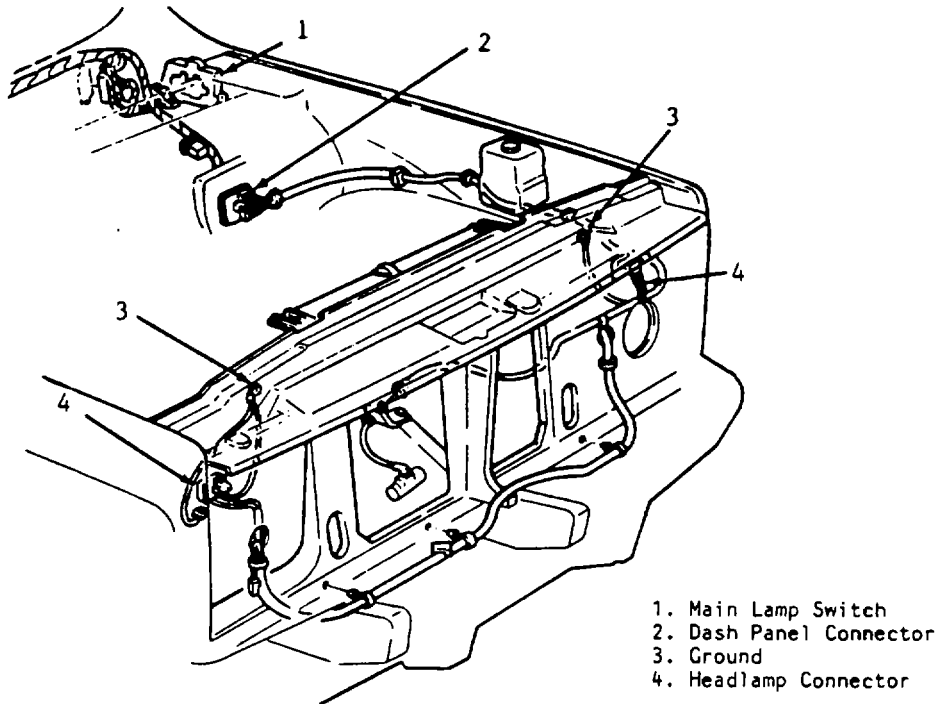
- a. Locate the harness which is being replaced and remove by bending or cutting open the various clips retaining the harness.
- b. Disconnect the harness from the sockets and various branch circuits.
- c. Remove harness.

INSTALLATION

- a. Position new wiring harness in vehicle and reconnect the various branch circuits and sockets.
- b. Insert harness in retaining clips and secure by bending or securing clips back into position.
- c. Reconnect the battery cables.

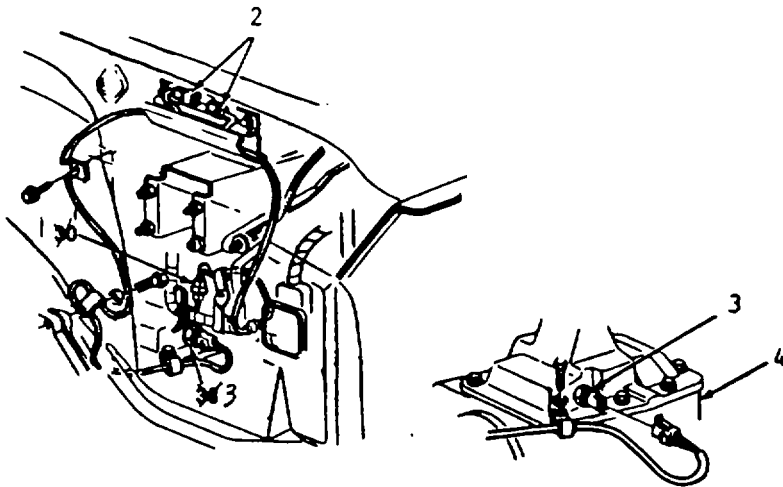
4-182. CAB HARNESS REPLACEMENT. (Continued)

a. Headlamp Harness.



- 1. Main Lamp Switch
- 2. Dash Panel Connector
- 3. Ground
- 4. Headlamp Connector

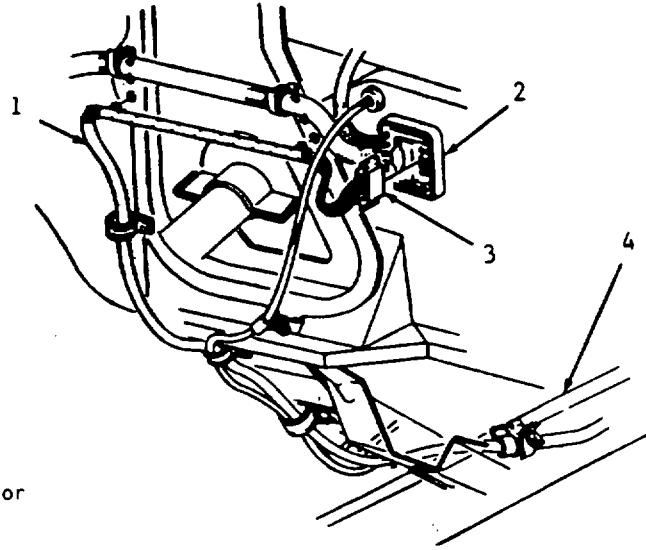
b. Back Up Lamp Switch Harness.



- 1. Instrument Panel Harness Connector
- 2. Connector - 4 Speed Manual Transmission
- 3. Back Up Switch
- 4. Manual Transmission

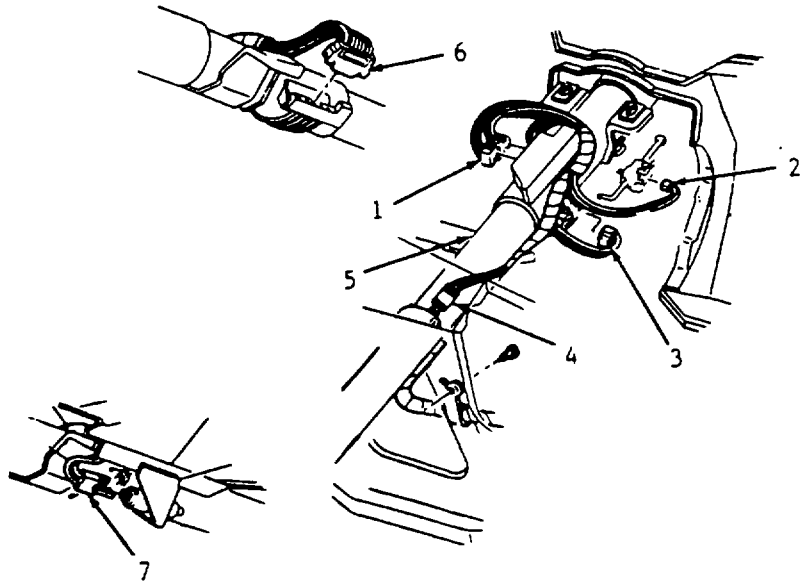
4-182. CAB HARNESS REPLACEMENT. (Continued)

c. Rear Lamp Harness.



- 1. Rear Lamp Harness
- 2. Dash Panel Connector
- 3. Rear Lamp Harness Connector
- 4. Left Frame Rail

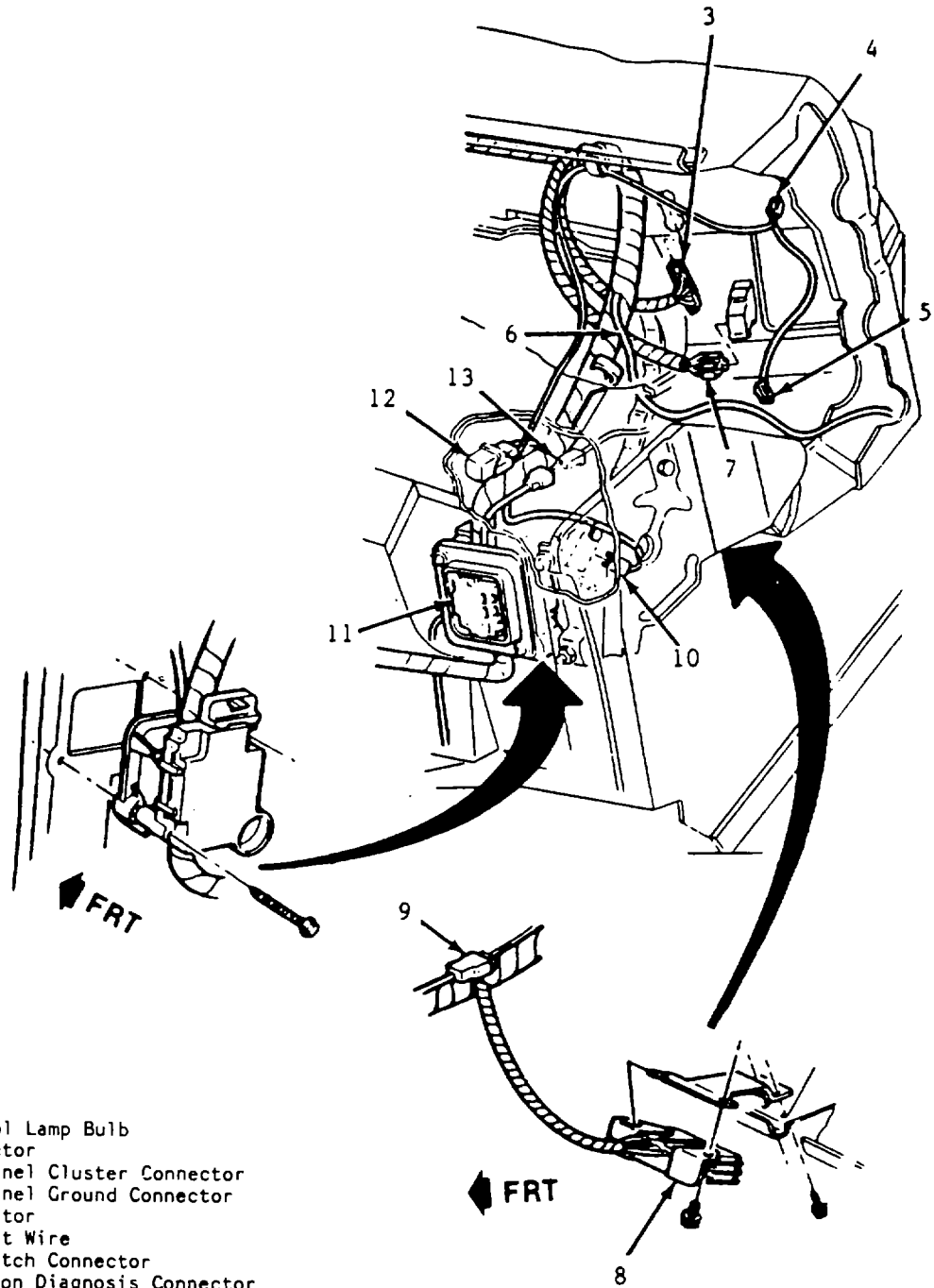
d. Lamp System Connectors At Steering Column.



- 1. Ignition Switch Connector
- 2. Neutral Switch Connector
- 3. Dimmer Switch Connector
- 4. Back Up Switch Connector
- 5. Steering Column
- 6. Turn Signal Indicator Connector
- 7. Stop Lamp Switch Connector

4-182. CAB HARNESS REPLACEMENT. (Continued)

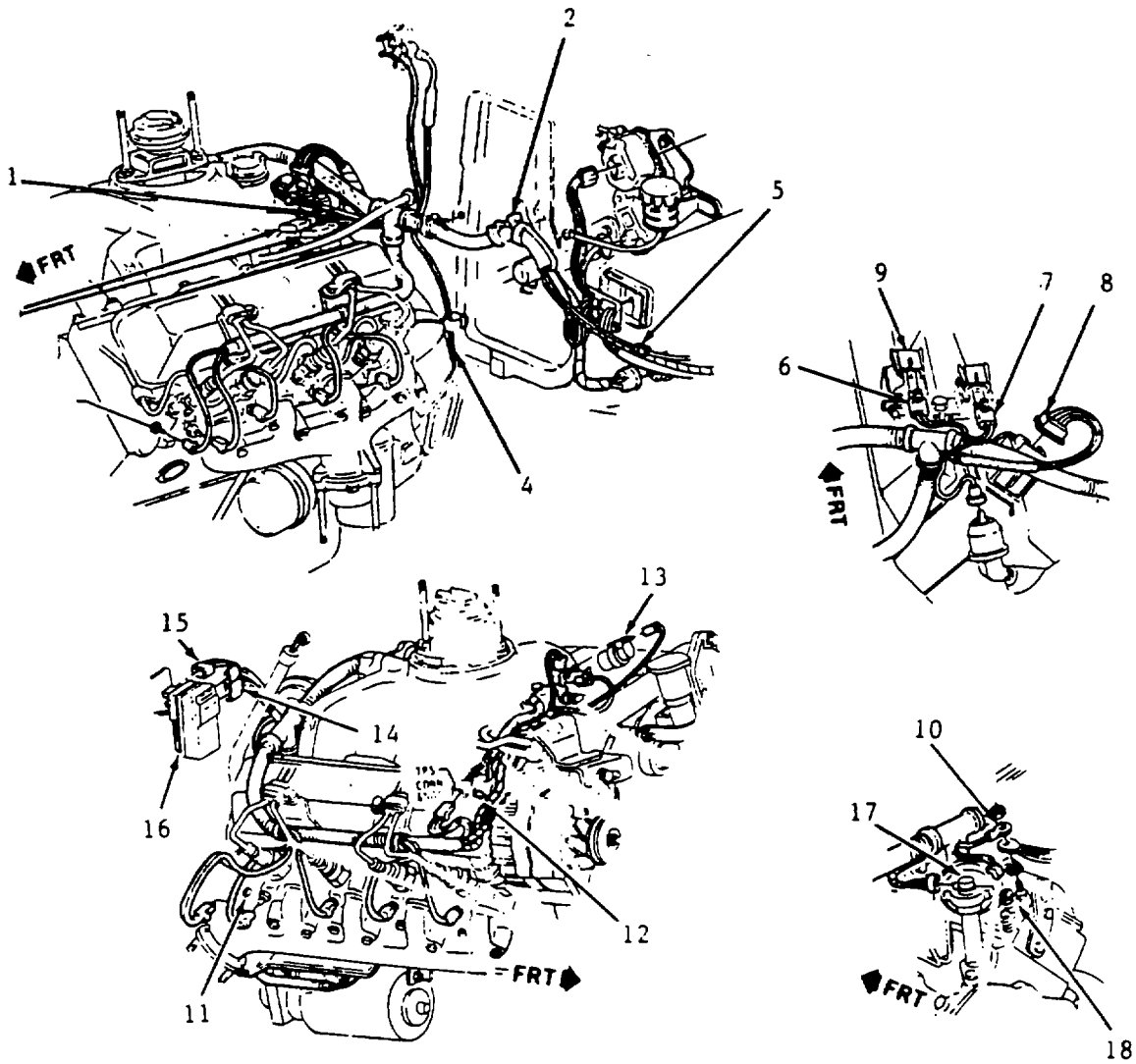
e. Instrument Panel Harness.



1. Heater Control Lamp Bulb
2. Heater Connector
3. Instrument Panel Cluster Connector
4. Instrument Panel Ground Connector
5. Ground Connector
6. Ground Circuit Wire
7. Main Lamp Switch Connector
8. Engine Function Diagnosis Connector
9. Door Jamb & Dome Lamp Connector
10. Parking Brake Switch Connector
11. Dash Panel Connector
12. Horn Relay
13. Dome Lamp and Door Jamb Harness Connector

4-182. CAB HARNESS REPLACEMENT. (Continued)

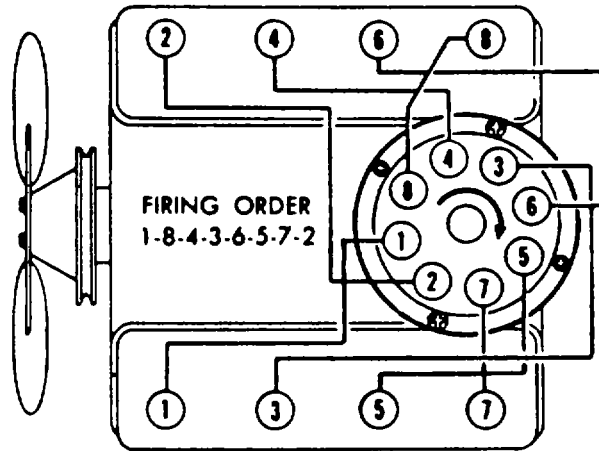
f. Engine Wiring.



- | | |
|-----------------------------------|-------------------------------|
| 1. Oil Pressure Switch | 10. Engine Harness Ground |
| 2. Diagnostic Connector | 11. Fast Idle Switch |
| 3. EGR/EPR Solenoid | 12. Transmission Switch |
| 4. Fuel Meter Wire | 13. Fast Idle Solenoid |
| 5. Low Coolant Connector | 14. Water Sensor Connector |
| 6. EGR Solenoid Connector | 15. Fuel Heater Connector |
| 7. EPR Solenoid Connector | 16. Fuel Filter |
| 8. Glow Plug Controller Connector | 17. Speed Sensor |
| 9. EPR/EGR Solenoid | 18. Engine Temperature Switch |

4-182. CAB HARNESS REPLACEMENT. (Continued)

g. Engine Glow Plug Wiring.



h. Fuses.

Courtesy Lamp, Roof Marker Lamp, Parking Lamp, Side Marker Lamp, Tail Lamp, Clearance Lamp	20 Amp
Directional Signal Indicator Lamp, Stop Lamp, Traffic Hazard	15 Amp
Fuel Gauge, Brake Warning Lamp, Temperature Warning Lamp, Oil Pressure Warning Lamp	4 Amp
Fuel Tank, Tachometer, Back-up Lamp, Directional Signal Indicator Lamp, Directional Signal Lamp, Headlamp Buzzer	15 Amp
Heater, Generator Warning Lamp	20 Amp
Idle Stop Solenoid, Emmission Control Solenoid	15 Amp
Instrument Cluster Lamp, Heater Dial Lamp, Windshield Wiper Switch Lamp	4 Amp
Windshield Wiper/Washer	15 Amp

4-183. CHASSIS ELECTRICAL SYSTEM REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools
General Mechanics Tool Kit

General Safety Instructions
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Locate the harness which is being replaced and remove by bending or cutting open the various clips retaining the harness.
- b. Disconnect the harness from the sockets and various branch circuits.
- c. Remove harness.

INSTALLATION

- a. Position new wiring harness in vehicle and reconnect the various branch circuits and sockets.
- b. Insert harness in retaining clips and secure by bending or securing clips back into position.
- c. Reconnect the battery cables.

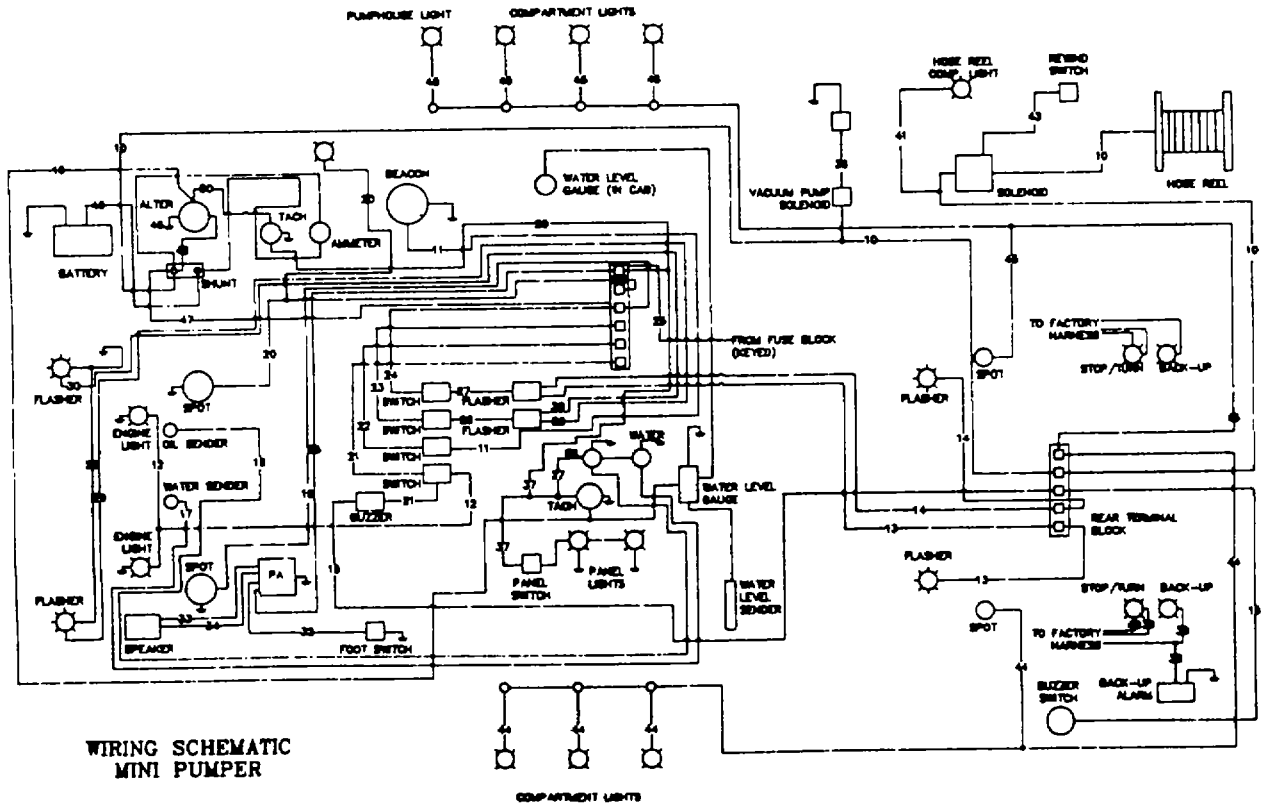


FIGURE 4-2 CHASSIS ELECTRICAL SYSTEM (Sheet 1 of 2)

4-183. CHASSIS ELECTRICAL SYSTEM REPLACEMENT. (Continued)

10. Rear Body Compartment Lights Power
11. Beacon
12. Engine Compartment From Switch
13. Rear Flasher, Left, From Flasher Unit
14. Rear Flasher, Right, From Flasher Unit
15. Buzzer To Button
16. Alternator Sensor
17. Water Temperature Sender
18. Oil Pressure Sender
19. Left Spotlight, To Breaker From Switch
20. Right Spotlight And Dome, To Breaker From Switch
21. Engine Compartment And Buzzer, To Breaker From Switch
22. Roof Beacon, To Breaker From Switch
23. Front Flasher, To Breaker From Switch
24. Rear Flasher, To Breaker From Switch
25. Auxiliary, From Fuse Block To Breaker
26. Switch To Front Flasher
27. Switch To Rear Flasher
28. Front Flasher Lights To Ground
29. Left Front Flasher Lights To Ground
30. Right Front Flasher Lights To Ground
31. Ground To PA. System
32. Foot Switch To PA. System
33. Speaker (Blue)
34. Speaker (Brown)
35. Breather To PA System
36. Prime Switch To Vacuum Pump Solenoid
37. Ignition To Panel
38. Reverse Light
39. Running Light
40. Left Turn
41. Hose Reel Compartment Light To Breaker
42. Right Turn
43. Hose Reel Rewind Button To Solenoid
44. Left Hand Compartment Harness
45. Right Hand Compartment Harness
46. Battery Shunt
47. Shunt To Breaker Buzzer Bar
48. Alternator To Shunt
49. Alternator To Ground
50. Cab Tachometer Cable

FIGURE 4-2 CHASSIS ELECTRICAL SYSTEM (Sheet 2 of 2)

4-185. UNIVERSAL JOINTS REPLACEMENT. (Continued)

CAUTION

Do not pound on the propellor shaft yoke ears or the injection joints may fracture. Never pry or place any tool between a yoke and a universal joint.

- e. Remove the yoke and cross assembly (5).

NOTE

Tape the bearing cups to prevent the loss of bearing rollers.

- f. Remove the rear propellor shaft (1) by first sliding it forward, then lowering and withdrawing it under the rear axle.

NOTE

Do not allow the universal joint (6) to incline greatly as the joint may fracture.

- g. Remove the rear universal joint (6).
- h. Reference mark the relationship of the propellor shaft (1) to the front axle and the transfer case flange.

CAUTION

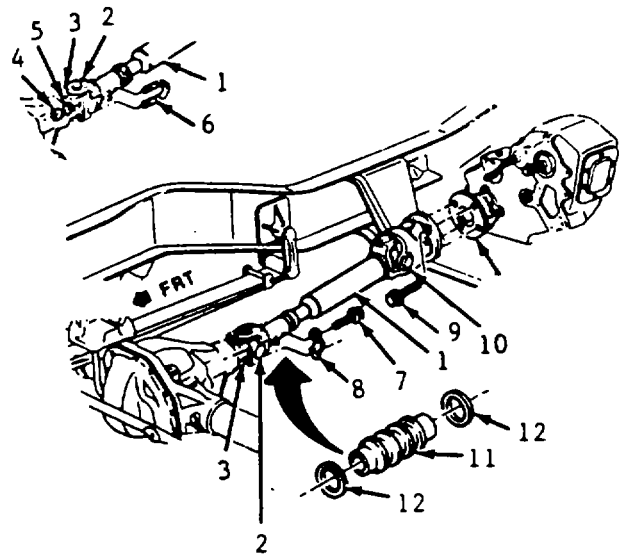
Do not pound on the joint when disconnecting.

- i. Disconnect the slip yoke (2) from the front axle yoke (3) by removing the nuts (4), washers (5), U-bolts (6), bolts (7), and retainers (8).
- j. Remove the bolts (9) at the flange (10).

- k. Remove the boot (11) by releasing the boot clamps (12) using the Keystone Clamp Pliers.
- l. Slide the propellor shaft (1) forward enough to disengage, then withdraw the propellor shaft (1) rearward to remove.
- m. Remove the constant velocity universal joint (13).

INSTALLATION

- a. Install the constant velocity universal joint (13).
- b. Install the boot (11) with the clamps (12) using the Keystone Clamp Pliers.
- c. Lubricate the slip yoke (2) and install it to the axle yoke (3).



4-185. UNIVERSAL JOINTS REPLACEMENT. (Continued)

- d. Adjust the propellor shaft (1) length and install by mating the joint using the reference marks.
- e. Install the U-bolts (6), washers (5), and nuts (4), the retainers (8) and bolts (7).
- f. Torque the bolts and nuts to 15 ft-lbs (20 N-m).
- g. Install the bolts (9) to the flange (10) by mating the joint, using the reference marks.
- h. Torque the bolts to 74 ft-lbs (100 N-m).
- i. Lubricate the constant velocity joint (13) with lubricant (Appendix D, Item 22).

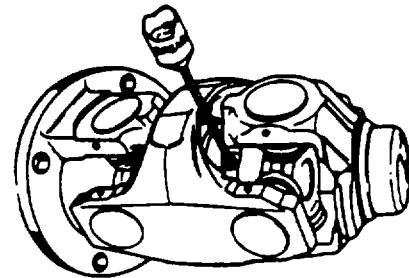
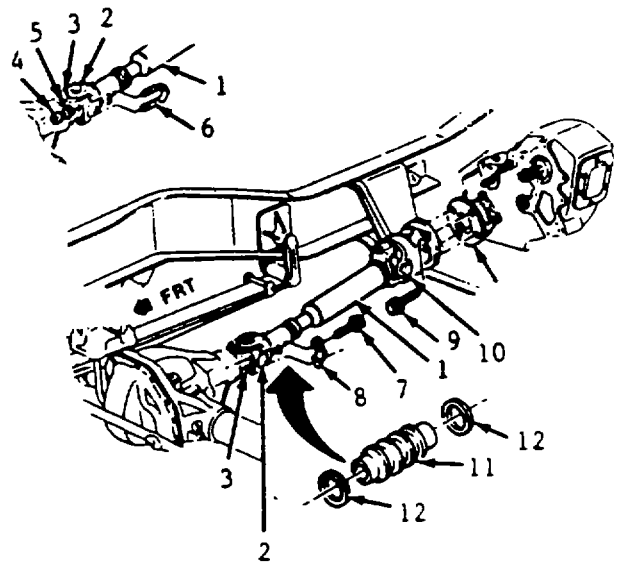
NOTE

If the fitting cannot be managed from beneath the vehicle, use the special adapter on the end of a flex hose CV propshaft lube gun (1/8" pipe)

- j. Install the rear universal joint (6).
- k. Locate the bridged tooth on the splined shaft and install the slip yoke (7) onto the splined shaft (8) by mating the missing tooth in the yoke (7) with the bridged tooth on the splined shaft (8).

NOTE

Be sure the slip yoke (7) ears are horizontal.



- l. Install the yoke and cross assembly (5).
- m. Install the propellor shaft (1) by supporting it and aligning the reference marks, checking the bearing for proper fit.
- n. Install the retainers (4) with the bolts (3), checking for proper joint fit.
- o. Torque the bolts (8) to 24 ft-lbs (33 N.m).
- p. Lubricate the slip yoke (7) by applying chassis lubricant (Appendix D, Item 22) at the slip spline grease fitting until the grease begins to leave through the vent hole.
- q. Lower the vehicle.

4-186. REAR PROPELLOR SHAFT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

Drive Shaft Wrench
(J-33051)
General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-185	Universal Joints Removed

Materials/Parts

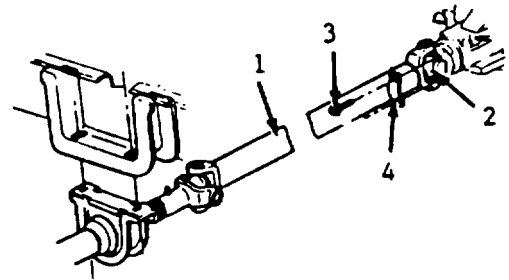
Solvent
(Appendix D, Item 44)
Propellor Shaft
(14007166)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- Reference mark the propellor shaft (1) to the pinion flange (2) connection.
- Remove the bolts (3) and retainers (4).



CAUTION

Do not pound on the propellor shaft yoke ears or the injection joints may fracture. Never pry or place any tool between a yoke and a universal joint

NOTE

Tape the bearing cups to prevent the loss of bearing rollers.

- Remove the rear propellor shaft (1) by first sliding it forward, then lowering and withdrawing it under the rear axle.
- Support the propellor shaft (1).

INSTALLATION

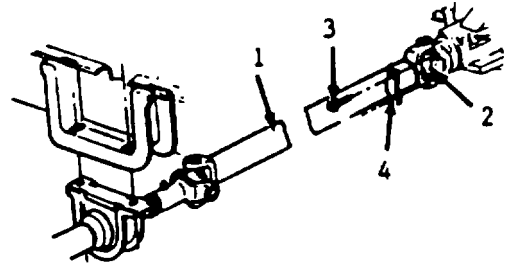
WARNING

Cleaning solvent (Appendix D, Item 44) is both toxic and flammable. Keep off skin. Use only in a well ventilated area and avoid prolonged breathing of vapors, Keep away from open flame.

- Install the propellor shaft (1) by supporting it and aligning the reference marks, checking the bearings for proper fit.
- Install the retainers (4) with the bolts (3) checking for proper fit.

4-186. REAR PROPELLOR SHAFT REPLACEMENT. (Continued)

- c. Torque the bolts (3) to 24 ft-lbs (33 N.m).
- d. Install universal joints (paragraph 4-185).



4-187. REAR SLIP YOKE REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

Driveshaft Wrench
(J-33051)
General Mechanics Tool Kit
Hoist

Materials/Parts

Slip Yoke (7815849)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-185	Universal Joint Removed
4-186	Rear Propellor Shaft Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

CAUTION

Do not pound on the propellor shaft yoke ears or the injection joints may fracture. Never pry or place any tool between a yoke and a universal joint.

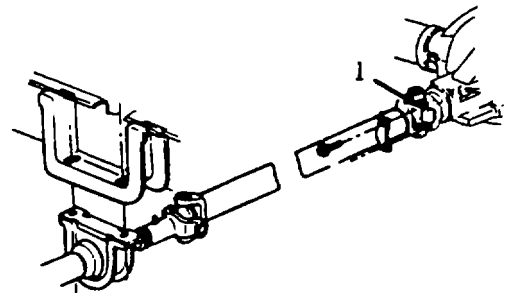
Remove the yoke and cross assembly (1).

NOTE

Tape the bearing cups to prevent the loss of bearing rollers.

INSTALLATION

- a. Lubricate the slip yoke and install slip yoke to universal joint.
- b. Install the yoke and cross assembly (1).



4-187. REAR SLIP YOKE REPLACEMENT. (Continued)

- c. Install rear propellor shaft (paragraph 4-186).
- d. Install universal joints (paragraph 4-185).

4-188. FRONT DRIVE PROPELLOR SHAFT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

Keystone Clamp Pliers (J-22610)
 General Mechanics Tool Kit
 Hoist

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-185	Universal Joint Removed

Materials/Parts

Lubricant (Appendix D, Item 22)
 Solvent (Appendix D, Item 44)
 Propellor Shaft (7845045)

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

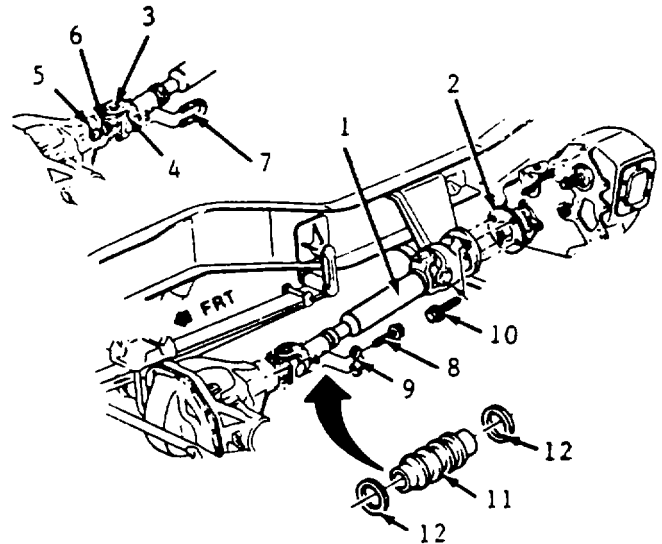
REMOVAL

- a. Reference mark the relationship of the propellor shaft (1) to the front axle and the transfer case flange (2).
- b. Disconnect the slip yoke (3) from the front axle yoke (4) by removing the nuts (5), washers (6), U-bolts (7), bolts (8), and retainers (9).

NOTE

Do not pound on the joint to disconnect.

- c. Remove the bolts (10) at the flange (2).
- d. Remove the boot (11) by releasing the boot clamps (12) using the Keystone Clamp Pliers.



- e. Slide the propellor shaft (1) forward enough to disengage, then withdraw the propellor shaft (1) rearward, taking care to avoid dropping cap assemblies from the yoke ends.

4-188. FRONT DRIVE PROPELLOR SHAFT REPLACEMENT. (Continued)

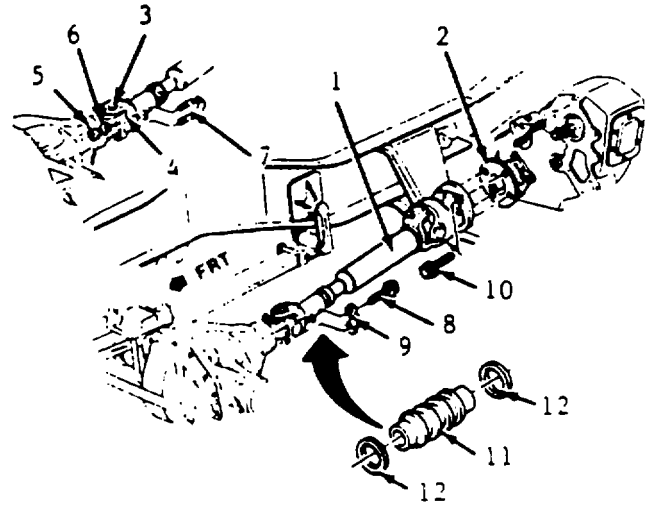
INSTALLATION

WARNING

Cleaning solvent (Appendix D, Item 44) is both toxic and flammable. Keep off skin. Use only in a well-ventilated air and avoid prolonged breathing of vapors. Keep away from open flame.

NOTE

Clean all parts in solvent and dry with compressed air before installing.



- a. Install the boot (11) with the clamps (12) using the Keystone Clamp Pliers.
- b. Lubricate (Appendix D, Item 22) the slip yoke (3) and install it to the axle yoke (4).
- c. Adjust the propellor shaft (1) length and install by mating the joint using the reference marks.
- d. Install the U-bolts (7), washers (6), nuts (5), the retainers (9), and bolts (8).
- e. Torque the bolts and nuts to 15 ft-lbs (20 N-m).

- f. Install the bolts (10) to the flange (2) by mating the joint, using the reference marks.
- g. Torque the bolts (10) to 74 ft-lbs (100 N-m).

NOTE

Lubricate the constant velocity joint (13) with lubricant (Appendix D, Item 22).

- h. Install universal joints (paragraph 4-185).

4-189. CENTER SUPPORT BEARING REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Hoist

Materials/Parts

Lubricant
(Appendix D, Item 22)
Solvent
(Appendix D, Item 44)
Support Bearing
(5598)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-185	Universal Joints Removed
4-186	Rear Propellor Shaft Removed
4-187	Rear Slip Yoke Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

4-189. CENTER SUPPORT BEARING REPLACEMENT. (Continued)

REMOVAL

- a. Remove the nuts (1), washers (2), and bolts (3) from the center bearing support (4).
- b. Remove the center bearing support (4).

INSTALLATION

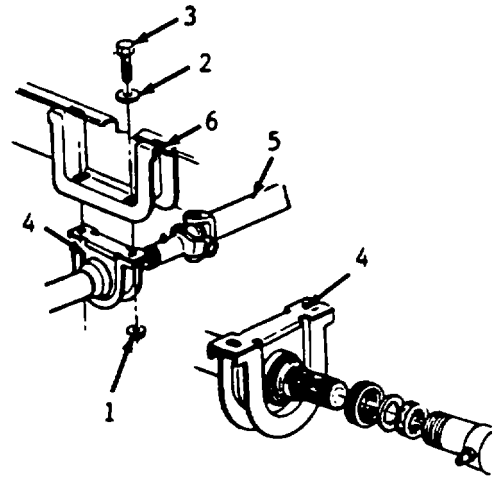
WARNING

Cleaning solvent (Appendix D, Item 44) is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

NOTE

Clean all parts in solvent and dry with compressed air before installation.

- a. Align the center bearing support 900 degrees to the propellor shaft (5) center lines.



- b. Install the center bearing support (4) onto the hanger (6) with the bolts (3), washers (2), and nuts (1).
- c. Torque the nuts (1) to 20 ft-lbs (27 N.m).
- d. Lubricate (Appendix D, Item 22) rear slip joint and install to propellor shaft (paragraph 4-187).
- e. Install rear propellor shaft (paragraph 4-186).
- f. Install universal joints (paragraph 4-185).

4-190. FIRE PUMP PROPELLOR SHAFT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Grease Gun
Hoist

Personnel Required: 2

Material s/Parts

Propellor Shaft (045-90001)

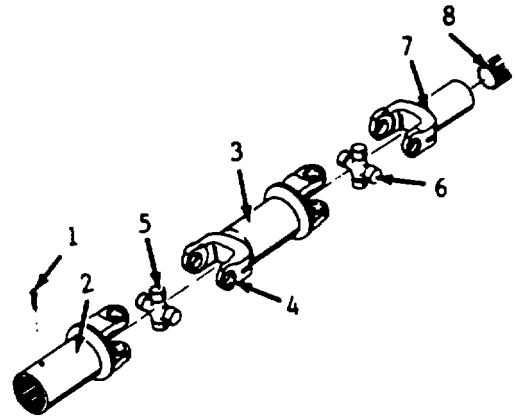
General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

4-190. FIRE PUMP PROPELLOR SHAFT REPLACEMENT. (Continued)

REMOVAL

- a. Remove screw (1) from slip yoke (2) on PTO end of propellor shaft (3).
- b. Remove four retaining rings (4) from universal joint on PTO end.
- c. Remove bearing (5) from universal joint on PTO end of propellor shaft (3).
- d. Remove four retaining rings (4) from universal joint on pump end of propellor shaft (3).
- e. Remove bearing (6) from slip yoke (7) on pump shaft (8) while supporting propellor shaft (3).
- f. Remove propellor shaft (3).
- g. Remove pump side slip yoke (7).



- c. Install propellor shaft (3) onto bearing (6).
- d. Install PTO and slip yoke (2) on PTO shaft.
- e. Install bearing (5) into slip yoke (2) on PTO shaft.
- f. Install propellor shaft (3) onto bearing (5).
- g. Secure PTO end slip yoke (2) to PTO shaft with screw (1).

INSTALLATION

- a. Install pump side slip yoke (7) on pump shaft (8).
- b. Install bearing (6) in slip yoke (7).

Section XXI. MAINTENANCE OF TRANSMISSION ASSEMBLY

General	Para. 4-191	Transmission Assembly	Para.
Shift Control Lever Replacement	4-193	Replacement	4-192

4-191. GENERAL.

This section contains information on the maintenance of the transmission assembly the are maintainable at the Organizational level.

4-192. TRANSMISSION ASSEMBLY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- Transmission Guide Pins (J-1126)
- General Mechanics Tool Kit
- Jack 4-186
- Jack Stand
- Transmission Jack

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
Rear	Propeller Shaft Removed
4-188	Front Drive Propeller Shaft Removed
4-190	Fire Pump Propeller Shaft Removed

Materials/Parts

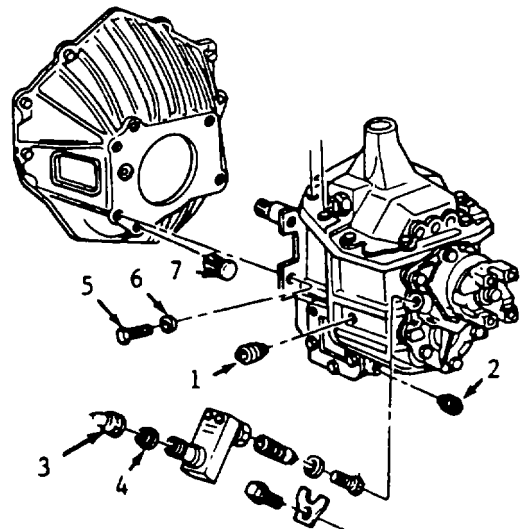
- Transmission Fluid (Appendix D, Item 32)
- Grease (Appendix D, Item 17)
- Transmission (RPO-MM4)

General Safety Instructions

- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.
- Batteries disconnected.

REMOVAL

- a. Remove attaching screws from transmission shift lever boot retainer.
- b. Slide boot and retainer up the lever and remove transmission shift lever
- c. Remove shift lever by pushing down on collar and turn counter clockwise.
- d. Raise vehicle and support engine with a suitable floor stand.
- e. Remove the fill plug (1).
- f. Remove the drain plug (2) and drain the transmission oil into a suitable pan.



4-192. TRANSMISSION ASSEMBLY REPLACEMENT. (Continued)

- g. Disconnect the speedometer cable (3) and the seal (4).
- h. Support transfer case in a suitable cradle.
- i. Remove bolts attaching transfer case to adapter and remove transfer case (paragraph 4-200).
- j. Disconnect exhaust pipes at exhaust manifolds (paragraph 4-101).
- k. Remove transmission mount-to-crossmember bolts.
- l. Support transmission and remove frame to crossmember bolts. Rotate crossmember to clear frame; raise and remove from vehicle.
- m. Remove transmission-to-clutch housing attaching bolts (5) and spring washers (6). Remove upper bolts first and install transmission guide pins.

CAUTION

Do not let the transmission hang from the clutch. Use guide pins to pull the transmission straight back on the clutch hub splines.

- n. Slide transmission rearward until main drive gear clears the clutch assembly, then lower transmission assembly from vehicle.
- o. Remove plugs (7) if they are loose or damaged. (Note the location of the plugs before removing).

CAUTION

Do not apply an excessive amount of grease, as under operation, the excess grease could be thrown onto clutch facings resulting in clutch problems.

INSTALLATION

- a. Apply a light coating of high temperature grease (Appendix D, Item 17) to the main drive gear shaft to assure free movement of clutch and transmission components during assembly.
- b. Insert plugs (7); new if necessary.

CAUTION

Do not force the transmission into the clutch.

Do not allow the transmission to hang from the clutch.

NOTE

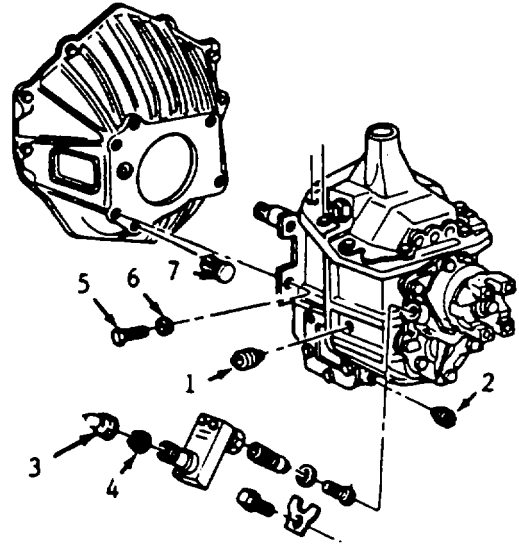
Shift the transmission into high gear before installing.

- c. Leaving the jack under the transmission to support it, position the transmission to the clutch housing.
- d. Install bolts (5) attaching transmission to clutch housing with new spring washers (6).

4-192. TRANSMISSION ASSEMBLY REPLACEMENT. (Continued)**NOTE**

Install the two bottom screws before removing the guide pins.

- e. Torque the bolts to 74 ft-lbs (100 N-m).
- f. Position the crossmember to the frame and install attaching bolts, torque to 55 ft-lbs (75 N.m).
- g. Install transmission mount to crossmember bolts and torque to 40 ft-lbs (54 N.m).
- h. Position transfer case to adapter and install attaching bolts, torque to 40 ft-lbs. (54 N-m) (paragraph 4-200).
- j. Connect propeller shafts to transfer case and torque bolts to 70-80 ft-lbs (95-110 N-m).
- l. Connect the exhaust pipes to the exhaust manifold and torque to 15 ft-lbs (20 N.m) (paragraph 4-101).
- m. Install the drain plug (2) and fill the transmission case with new transmission oil (Appendix D, Item 32) to the level of the fill plug hole.
- n. Install fill plug (1) and torque to 17 ft-lbs (23 N-m).
- o. Remove supports and lower vehicle.
- p. Install transmission shift lever by inserting lever (1) and pushing the cap (2) down and turning clockwise.
- q. Install the boot (3) by sliding the boot and retainer (4) down the shift lever and installing the boot attaching screws (5) and retainer screws (6).



4-193. SHIFT CONTROL LEVER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Shift Lever (041-90001)

General Safety Instructions

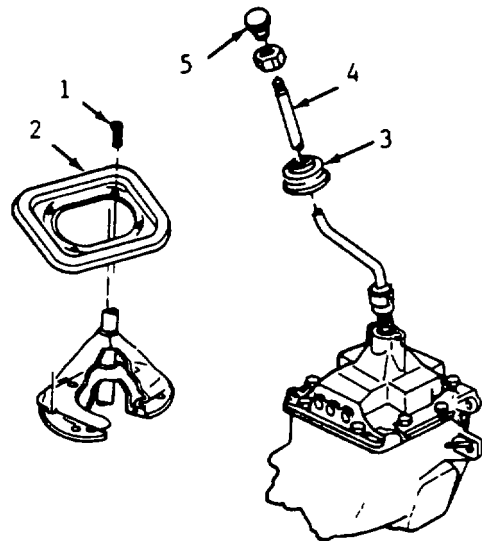
Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set

REMOVAL

- a. Remove the four transmission shift lever boot retainer attaching screws (1).
- b. Slide the retainer (2) and boot (3) up on the shift lever.
- c. Remove the shift lever (4) by pushing down on the cap (5) and turning counter-clockwise.



INSTALLATION

- a. Install transmission shift lever by inserting into cup and pushing the cap (5) down and turning clockwise.
- b. Slide boot (3) and retainer (2) down shift lever (4) and install screws (1).

Section XXII. MAINTENANCE OF CLUTCH ASSEMBLY

	Para.		Para.
Clutch Assembly Replacement	4-195	General	4-194
Clutch Master Cylinder and Reservoir Replacement	4-196	Hydraulic Clutch Pedal and Linkage Replacement	4-198
Clutch Secondary Cylinder and Hydraulic Line Replacement	4-197		

4-194. GENERAL.

This section contains information on the maintenance of the clutch assembly that are maintainable at the Organizational level.

4-195. CLUTCH ASSEMBLY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- Jack
- Jack Stand
- General Mechanics Tool Kit

Materials/Parts

- Clutch (038-90001)
- Grease (Appendix D, Item 17)

Equipment Condition

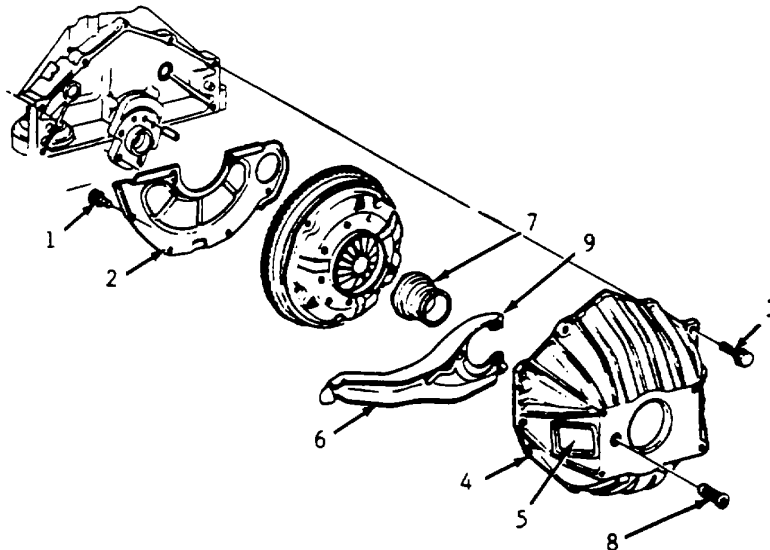
Para. Condition Description

- 4-192 Transmission Removed
- 4-198 Clutch Linkage Disconnected

General Safety Instructions

- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.
- Batteries disconnected.
- Fire pump and piping drained.

REMOVAL



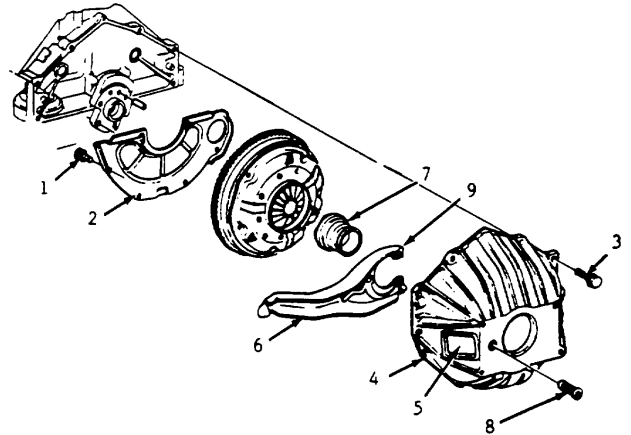
- a. Remove four screws (1) and remove clutch housing cover (2).
- b. Remove screws (3) and remove the flywheel housing (4).
- c. Remove boot (5), clutch fork (6), and release bearing (7).

4-195. CLUTCH ASSEMBLY REPLACEMENT. (Continued)

- d. Remove clutch fork (6) from ball stud (8).
- e. Remove retainer (9) out of clutch fork (6) if worn or damaged.
- f. Remove ball stud (8).

INSTALLATION

- a. Install ball stud (8) and pack with grease (Appendix D, Item 17).
- b. Install new retainer (9) into clutch fork (6) if removed.
- c. Install boot (5), clutch fork (6), and release bearing (7).
- d. Install flywheel housing (4) and secure with screws (3).



- e. Install clutch housing cover (2) and secure with screws (1).

4-196. CLUTCH MASTER CYLINDER AND RESERVOIR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Material/Parts

DOT 3 Brake Fluid
(Appendix D, Item 4)
Master Cylinder (15537761)

General Safety Instructions

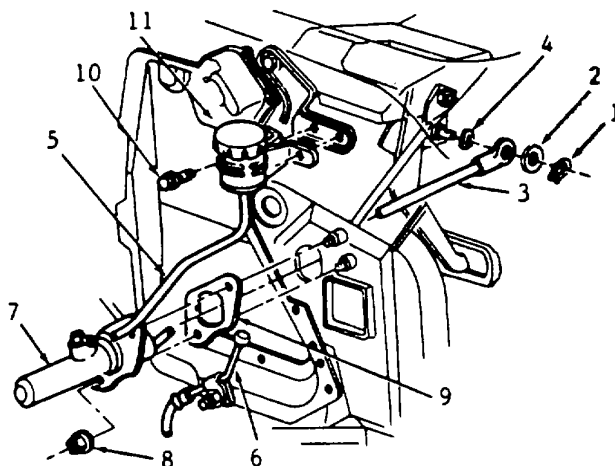
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Remove lower steering column covers.
- b. Remove retainer (1) and washer (2).
- c. Disconnect master cylinder push rod (3) and remove wave washer (4).
- d. Remove reservoir hose (5).
- e. Disconnect secondary cylinder hydraulic line (6) from the master cylinder (7).

4-196. CLUTCH MASTER CYLINDER AND RESERVOIR REPLACEMENT (Continued).

- f. Remove the master cylinder retaining nuts (8).
- g. Remove the master cylinder (7).
- h. Remove the gasket (9) and scrape all the gasket material from the master cylinder and cowl.
- i. Remove the reservoir retaining screws (10).
- j. Remove the reservoir (11).



INSTALLATION

- a. Install the reservoir (11) with screws (10).
- b. Install a new gasket (9) to master cylinder bolts.
- c. Install the master cylinder (7) with the nuts (8) and torque to 13 ft-lbs (18 N-m).
- d. Install secondary cylinder hydraulic line (6) to master cylinder (7).
- e. Install the reservoir hose (5).
- f. Install the new wave washer (4) and the push rod (3).
- g. Install the washer (2) and retainer (1).
- h. Install lower steering column covers.
- i. Reconnect battery cables.
- j. Fill reservoir to the level of the diaphragm with DOT 3 brake fluid (Appendix D, Item 4).
- k. Bleed the clutch system.

4-197. CLUTCH SECONDARY CYLINDER AND HYDRAULIC LINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Materials/Parts

- DOT 3 Brake Fluid
(Appendix D, Item 4)
- Grease
(Appendix D, Item 17)
- Secondary Cylinder (15537762)

Tools

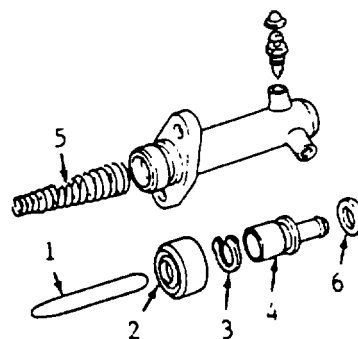
- General Mechanics Tool Kit
- General Safety Instructions
- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.
- Batteries disconnected.

4-197. CLUTCH SECONDARY CYLINDER AND HYDRAULIC LINE REPLACEMENT (Continued).



REMOVAL

- a. Raise the vehicle.
- b. Disconnect the hydraulic line (1) from the secondary cylinder (2).
- c. Remove secondary cylinder retaining nuts (3).
- d. Remove secondary cylinder (2).
- e. Disconnect the hydraulic line (1) from the master cylinder (4).
- f. Remove the nut (5) securing the hydraulic line (1).
- g. Remove the hydraulic line (1).
- h. Remove the push rod (1).
- i. Remove dust cover (2).
- j. Remove snap ring (3).
- k. Shake the plunger (4) out of the cylinder.
- l. Remove spring (5).
- m. Carefully remove seal (6) from plunger (4) ensuring no damage occurs to the plunger surfaces.



4-197. CLUTCH SECONDARY CYLINDER AND HYDRAULIC LINE REPLACEMENT

(Continued).

- n. Replace seal (6).
- o. Clean all remaining parts in clean brake fluid (Appendix D, Item 4).

NOTE

Check the cylinder bore to be sure that it is smooth to the touch and there are no visible scores, ridges or pitting. Replace the secondary cylinder if any of these conditions exist.

- p. Check the dust cover (2) for wear and cracking. Replace if necessary.

- f. Install push rod (1).

NOTE

Remove the nut holding the speedometer cable (6) in place.

Cover all hydraulic line openings to keep dirt and moisture out of the components.

- g. Uncover hydraulic line openings and install the nut holding the speedometer cable (6) in place.
- h. Install the hydraulic line (1) onto the master cylinder (4) and attach the hydraulic line with the nut (5).

INSTALLATION

- a. Coat a new seal (6) with clean brake fluid (Appendix D, Item 4) and fit it into the groove in the plunger (4).
- b. Install spring (5) on the plunger (4).
- c. Coat the cylinder bore with clean brake fluid (Appendix D, Item 4) and slide the plunger (4) in.
- d. Push the plunger (4) in and install the snap ring (3).
- e. Coat the inside of the rubber dust cover (2) with grease (Appendix D, Item 17) and slide it into place on the cylinder.

NOTE

The hydraulic line must be upright.

- i. Install the secondary cylinder (2) with the nuts (3); tighten to 13 ft.-lbs (18 N-m).
- j. Install the hydraulic line (1) onto the secondary cylinder (2).
- k. Lower the vehicle.
- l. Connect the battery cables.
- m. Bleed the clutch system.

4-198. HYDRAULIC CLUTCH PEDAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Material s/Parts

Clutch Pedal (15592273)

Lubricating Grease (Appendix D, Item 15)

General Safety Summary

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

4-198. HYDRAULIC CLUTCH PEDAL REPLACEMENT (Continued)**REMOVAL**

- a. Remove the lower steering column covers.
- b. Disconnect the clutch neutral start switch from the clutch pedal (1).
- c. Disconnect the retainer (2) and washer (3).
- d. Disconnect the master cylinder push rod (4) and wave washer (5) from the clutch pedal (1).
- e. Remove nuts (6).
- f. Remove braces (7).
- g. Slide a long screw or rod into the bracket while removing the stud (8), the pedal (1) and the spring (9).
- h. Remove the clutch pedal bushings (10) and spacer (11) from the pedal.

NOTE

Remove bumper (12) and replace if it is worn or damaged.

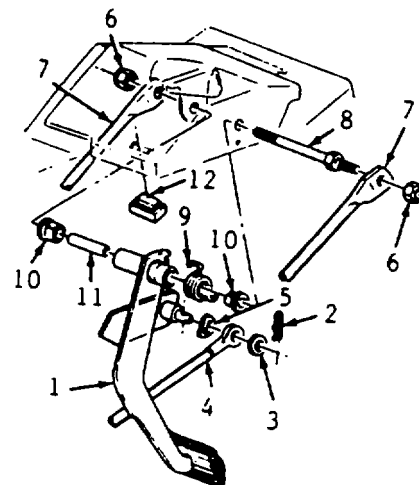
INSTALLATION

- a. Install bumper (12) if it was removed.
- b. Coat new spacer (11) and new bushings (10) with grease (Appendix D, Item 15) and install in pedal arm.

NOTE

The stud must be installed as shown.

- c. Install the spring (9), the pedal (1), and the stud (8) by removing the long screw or rod while installing the stud.



- d. Install the braces (7).
- e. Install the nuts (6) and torque to 29 ft-lbs (39 N-m).
- f. Install a new wave washer (5) and connect the clutch master cylinder push rod (4) to the clutch pedal (1).

NOTE

The washer must stand off the pedal.

- g. Install the washers (3) and the retainer (2).
- h. Install the clutch neutral start switch.
- i. Install the lower steering column covers.
- j. Reconnect the battery cables.
- k. Check the operation of the clutch assembly and bleed the hydraulic system as required.

Section XXIII. MAINTENANCE OF TRANSFER CASE ASSEMBLY

	Para.
General.....	4-199
Transfer Case Assembly Replacement	4-200

	Para.
Transfer Case Shift Lever And Linkage Replacement.....	4-201

4-199. GENERAL.

This section contains information on the maintenance of the transfer case assembly that are maintainable at the Organizational level.

4-200. TRANSFER CASE REPLACEMENT. (Continued)

This task covers:

a. Removal

b. Installation

INITIALSETUP:

Tools

- General Mechanics Tool Kit
- Jack
- Jack Stand

Materials/Parts

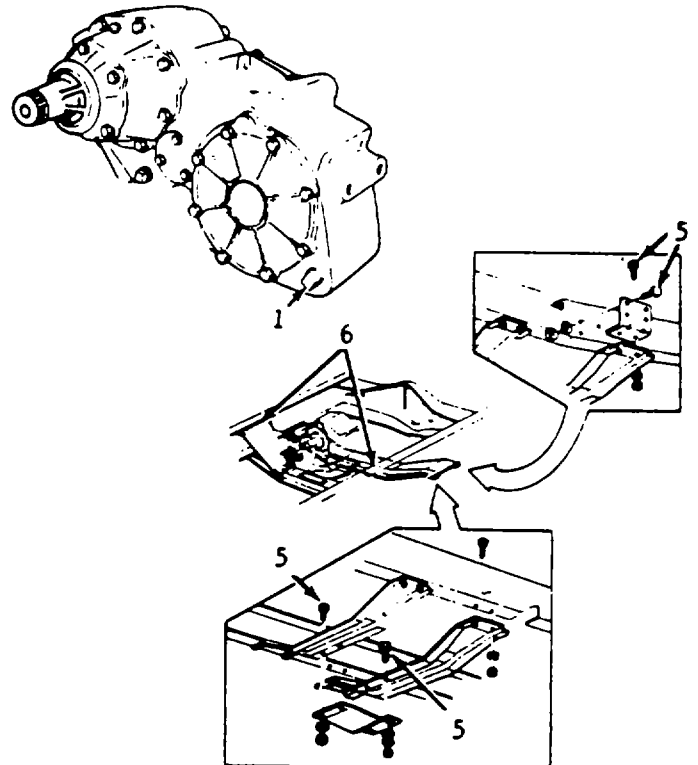
- Lubricant
- Transfer Case (148-90001)

General Safety Instructions

- Engine OFF
- Transmission in (N) neutral.
- Park brake and micro-brakelock set.

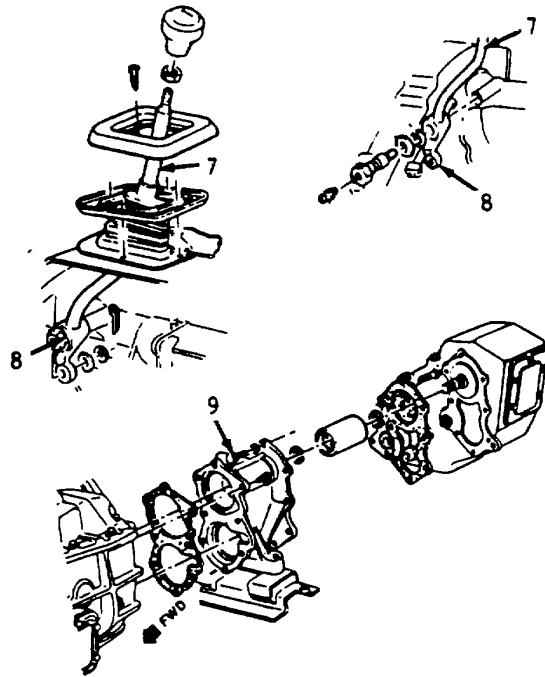
Removal

- a. Raise and support the vehicle on a jack stand.
- b. Remove drain plug (1) and drain transfer case.
- c. Disconnect the speedometer cable.
- d. Remove the skid plate, mounting hardware (5) and crossmember supports (6).
- e. Disconnect the rear propeller shaft from the transfer case and tie up away from the work area, marking the propshaft for assembly reference.
- f. Disconnect the front propeller shaft from the transfer case and tie-up shaft away from the work area.



4-200. TRANSFER CASE REPLACEMENT. (Continued)

- g. Disconnect the shift lever rod (7) from the shift rail link (8).
- h. Support the transfer case with a suitable stand and remove the bolts (9) attaching the transfer case to the transmission adapter.
- i. Move the transfer case to the rear until the input shaft clears the adapter, then lower the assembly from the vehicle.



INSTALLATION

- a. Support the transfer case in a suitable stand and position the case to the transmission adapter.
- b. Install bolts (9) attaching case to adapter and torque to 45 ft lbs (62 N-m).
- c. Remove the stand.
- d. Install the shift lever rod (7) to shift rail link (8) and torque nuts to 12 ft-lbs (17 N-m).

NOTE

Connect the shift lever to the transfer case if the shift lever was removed.

- e. Connect the front propeller shaft to the transfer case front output flange or yoke and torque to 75 ft-lbs (102 N-m).
- f. Connect the rear propeller shaft to the transfer case rear output yoke and torque bolts to 30 ft-lbs (40 N-m).

- g. Install crossmember support and skid plate and torque to 46 ft-lbs (63 N-m).
- h. Install the drain plug (1) and torque to 32 ft-lbs (44 N-m).
- i. Fill the transfer case to within one inch of fill plug (1) with Dextron II lubricant (Appendix D, Item 22).

NOTE

Capacity of the transfer case is 5.2 pints.

- j. Install the fill plug and torque to 32 ft-lbs (44 N-m).
- k. Lower the vehicle.

4-201. TRANSFER CASE SHIFT LEVER AND LINKAGE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIALSETUP:Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Materials/Parts

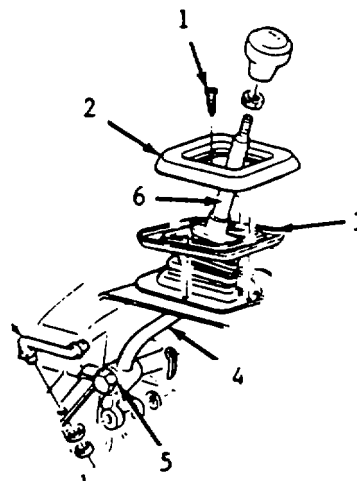
Shift Lever (14055531)

REMOVAL

- a. Remove retaining hardware (1), plate (2) and retainer (3).
- b. Disconnect shift lever rod (4) from shift rail link (5).
- c. Remove lever (6).

INSTALLATION

- a. Install lever (6) and secure to shift rail link (5).
- b. Install retainer (3), plate (2) and secure with mounding hardware (1).



Section XXIV. MAINTENANCE OF WHEEL ASSEMBLY

General	Para. 4-202	Tires Replacement	Para. 4-205
Lugs Replacement	4-204	Wheel Assembly Replacement	4-203
Rims Replacement	4-206		

4-202. GENERAL.

This section contains information on the maintenance of the wheel assembly that are maintainable at the Organizational level.

4-203. WHEEL ASSEMBLY REPLACEMENT.

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIALSETUP:

Tools

- Jack
- Lug Wrench

Materials/Parts

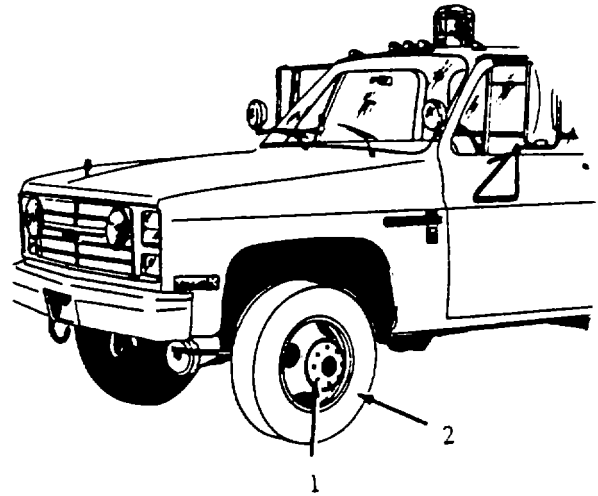
- Wheel (14035381)
- Tire (LT215/85R16M+S)

General Safety Instructions

- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

REMOVAL

- a. Using a lug wrench, loosen lugs (1) from wheel studs.
- b. Raise vehicle so that wheel assembly (2) is clear of ground.
- c. Remove the lugs (1) from the wheel assembly (2).
- d. Remove the wheel assembly from the vehicle.



INSTALLATION

- a. Single Wheels.
 - (1) Install wheel and tire assembly in position on the hub/rotor and install lug nuts loosely.

4-203. WHEEL ASSEMBLY REPLACEMENT. (Continued)

- (2) Turn the wheel until one nut is at the top of the bolt circle.
- (3) Tighten the nut just snug.
- (4) Snug-up the remaining nuts in a criss-cross pattern.
- (5) Torque lugs (1) to 140 ft. lbs.(190 N-m) evenly and alternatively to avoid excessive runout.

b. Dual Wheels.

- (1) Install inner and outer wheel and clamp ring on the rear wheel.

- (2) Install lug nuts finger tight.
- (3) Torque lugs to 140 ft-lbs (190 N.m), evenly and alternatively to avoid excessive runout.

NOTE

Be sure the pins on the clamp ring face outward.

- c. Lower the vehicle to the ground.

4-204. LUGS REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIALSETUP:

Tools

- Jack
- Lug Wrench

General Safety Instructions

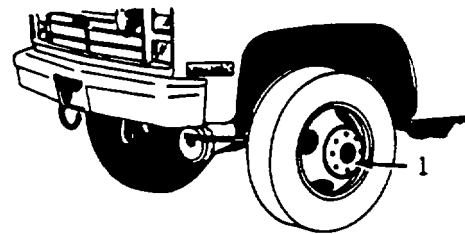
- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

Materials/Parts

- Lugs (As Required)

REMOVAL

- a. Using a lug wrench, loosen lugs (1) from wheel studs.
- b. Raise vehicle so that tire is off the ground.
- c. Remove the lugs (1) from the wheel.



4-204. LUGS REPLACEMENT. (Continued)

INSTALLATION

a. Single Wheels

- (1) Install wheel and tire assembly in position on the hub/rotor, and lug nuts installed loosely.
- (2) Turn the wheel until one nut is at the top of the bolt circle. Tighten the nut just snug.
- (3) Snug up the remaining nuts in a criss-cross pattern.
- (4) Torque lugs (1) to 140 ft lbs (190 N-m), evenly and alternatively, to avoid excessive runout.



NOTE

Be sure the pins on the clamp ring face outward.

- (2) Install lug nuts finger tight.
- (3) Torque lugs to 140 ft-lbs (190 N-m), evenly and alternatively to avoid excessive runout.

b. Dual Wheels

- (1) Install inner and outer wheel and clamp ring on the rear wheel.

c. Lower vehicle to ground.

4-205. TIRES REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIALSETUP:

Tools

Jack
Lug Wrench
Tire Changing Machine
Wire Brush

Material/Parts

Rubber Lubricant
(Appendix D, Item 25)
Tire (LT215/85R16M+S)

4-205. TIRES REPLACEMENT. (Continued)

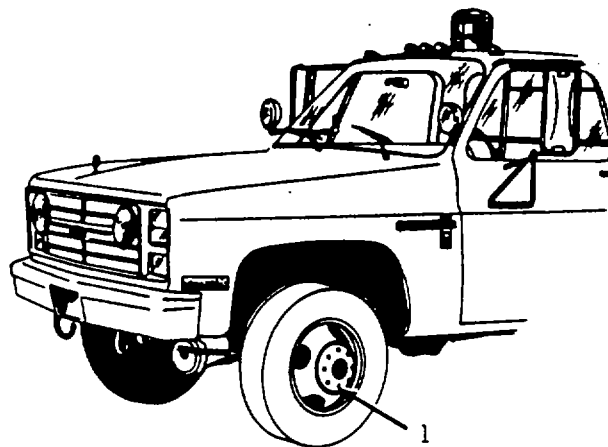
REMOVAL

- a. Raise the vehicle.
- b. Using a lug wrench, remove the lug nuts (1) from the studs.
- c. Remove the wheel from the vehicle.

CAUTION

Use a tire changing machine to demount tires. Do not use hand tools or tire irons alone to remove the tire from the wheel. Damage to the tire beads or wheel rim could result.

- d. Remove the tire from the rim.

**INSTALLATION**

- a. Clean the rim by removing all rust and other foreign material.
- b. Lubricate tire beads and rim bead seats with an approved rubber lubricant.

NOTE

Do not use silicone base lubricants as this could cause the tire to slip on the wheel.

Due to the construction of radial truck tires, particularly in the lower sidewall and bead area, it may be difficult to get the tire to take air. An inflation aid may be necessary to help seat the bead of tubeless radial tires.

- c. Install the tire to the wheel.

WARNING

Do not exceed 40 psi (275 kPa) pressure when inflating. If 40 psi (275 kPa) pressure will not seat beads, deflate, re-lubricate and reinflate. Over-inflation may cause the bead to break and cause serious personal injury.

4-205. TIRES REPLACEMENT. (Continued)**WARNING**

Do not stand over tire when inflating. Bead may break when beads snap over safety hump and cause serious personal injury.

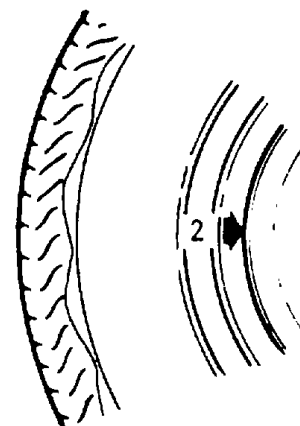
NOTE

Recommended vehicle tire mounting and inflation procedures are especially important with radial tires. Failure to follow these procedures can cause bead deformation due to incorrect bead seating. Bead deformation may lead to chafing, lower sidewall and bead area packing, eccentric wear, ride vibration and nonretreadable castings.

- d. Install valve core and inflate to proper pressure. Check the locating rings (2) of the tire to be sure they show around the rim flanges on both sides.
- e. Check the spacing between the rim flange and one of the three lower sidewall rim line rings while the tire is laying flat to verify bead seating. Measurements must be taken each 90° degrees around the circumference of the rim flange.

NOTE

If the spacing is uneven around the bead from side to side, repeat steps a through c, then recheck.

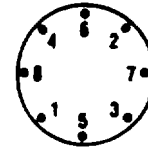
**CAUTION**

Before re-installing the wheels, remove any build up of corrosion on the wheel mounting surface and disc mounting surface by scraping and wire brushing. Installing wheels with out good metal-to-metal contact at the mounting surfaces can cause wheel nuts to loosen. This can lead to a wheel coming off while the vehicle is moving, causing loss of control.

4-205. TIRES REPLACEMENT. (Continued)

f. A Single Wheel Installation

- (1) Place the wheel and tire assembly in position on the hub/rotor and install the lug nuts, snugly, in a criss-cross pattern to minimize runout.
- (2) Turn the wheel until one nut is at the top of the bolt circle, then tighten evenly and alternatively according to a torque of 140 ft-lbs (190 N-m).



NOTE

Be sure pins on clamp ring face outboard.

- (2) Turn the wheel until one nut is at the top of the bolt circle, then tighten evenly and alternatively according to a torque of 140 ft-lbs (190 N-m).

NOTE

Lateral runout should not exceed 0.125 inch (3.18 mm) on the front wheel and 0.187 inch (4.76 mm) on the rear wheels.

g. Dual Wheel Installation

- (1) Place the inner and outer wheel and clamp ring in position on the hub/rotor and install the lug nuts, snugly, in a criss-cross pattern to minimize runout.

h. Inflate tire(s) to 30 psi (450 kPa).

i. Lower vehicle.

4-206. RIMS REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIALSETUP:

Tools

- Jack
- Lug Wrench
- Tire Changing Machine
- Wire Brush

Materials/Parts

- Rubber Lubricant
(Appendix D, Item 25)
- Rims (1403538)

General Safety Instructions

- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

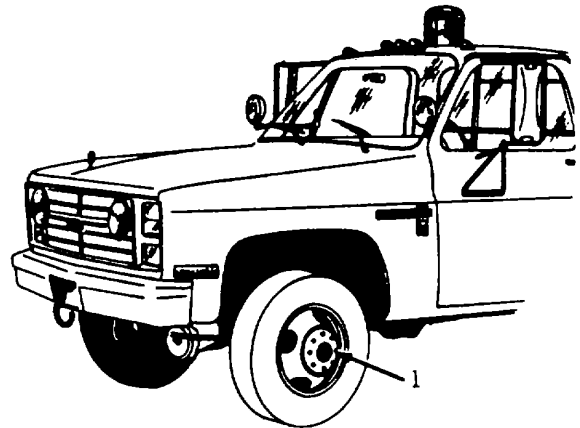
4-206. RIMS REPLACEMENT. (Continued)**REMOVAL**

- a. Raise the vehicle.
- b. Using a lug wrench, remove the lug nuts (1) from the studs.
- c. Remove the wheel from the vehicle.

CAUTION

Use a tire changing machine to demount tires. Do not use hand tools or tire irons alone to remove the tire from the wheel. Damage to the tire beads or wheel rim could result.

- d. Remove the tire from the rim.

**INSTALLATION**

- a. Clean the rim by removing all rust and other foreign material.
- b. Lubricate tire beads and rim bead seats with an approved rubber lubricant.

NOTE

Do not use silicone base lubricants as this could cause the tire to slip on the wheel.

- c. Install the tire to the wheel.

NOTE

Due to the construction of radial truck tires, particularly in the lower sidewall and bead area, it may be difficult to get the tire to take air. An inflation aid may be necessary to help seat the bead of tubeless radial tires.

WARNING

Do not stand over tire when inflating. Bead may break when beads snap over safety hump and cause serious personal injury.

4-206. RIMS REPLACEMENT. (Continued)

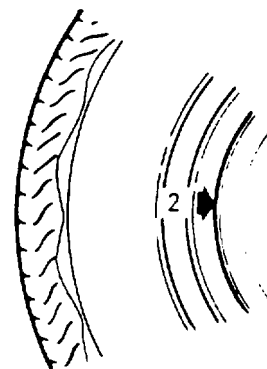
WARNING

Do not exceed 40 psi (275 kPa) pressure when inflating. If 40 psi (275 kPa) pressure will not seat beads, deflate, relubricate and reinflate. Overinflation may cause the bead to break and cause serious personal injury.

NOTE

Recommended vehicle tire mounting and inflation procedures are especially important with radial tires. Failure to follow these procedures can cause bead deformation due to incorrect bead seating. Bead deformation may lead to chafing, lower sidewall and bead area packing, eccentric wear, ride vibration and nonretreadable castings.

- d. Install valve core and inflate to proper pressure. Check the locating rings (2) of the tire to be sure they show around the rim flanges on both sides.
- e. Check the spacing between the rim flange and one of the three lower sidewall rim line rings while the tire is laying flat to verify bead seating. Measurements must be taken each 90° degrees around the circumference of the rim flange.

**NOTE**

If the spacing is uneven around the bead from side to side, repeat steps a through c, then recheck.

CAUTION

Before re-installing the wheels, remove any build up of corrosion on the wheel mounting surface and disc mounting surface by scraping and wire brushing. Installing wheels with out good metal-to-metal contact at the mounting surfaces can cause wheel nuts to loosen. This can lead to a wheel coming off while the vehicle is moving, causing loss of control.

4-206. RIMS REPLACEMENT. (Continued)

f. A Single Wheel Installation

- (1) Place the wheel and tire assembly in position on the hub/rotor and install the lug nuts, snugly, in a criss-cross pattern to minimize runout.
- (2) Turn the wheel until one nut is at the top of the bolt circle, then tighten evenly and alternatively to a torque of 140 ft-lbs (190 N.m).

g. Dual Wheel Installation

- (1) Place the inner and outer wheel and clamp ring in position on the hub/rotor and install the lug nuts, snugly, in a criss-cross pattern to minimize runout.

NOTE

Be sure pins on clamp ring face outboard.

- (2) Turn the wheel until one nut is at the top of the bolt circle, then tighten, evenly and alternatively to a torque of 140 ft-lbs (190 N-m).

NOTE

Lateral runout should not exceed 0.125 inch (3.18 mm) on the front wheel and 0.187 inch (4.76 mm) on the rear wheels.

- h. Inflate tire(s) to 30 psi (450 kPa).
- i. Lower vehicle.

Section XXV. MAINTENANCE OF BRAKE SYSTEM

	Para.		Para.
Brake Master Cylinder		Height Sensing Brake	
Replacement	4-216	Proportioning Valve	
Brake Pedal Replacement	4-213	Replacement	4-211
Brake System Combination		Hydraulic Brake Booster	
Valve Replacement	4-210	Service	4-217
Brake System Pipes and Hoses		Parking Brake Replacement	4-214
Replacement	4-209	Parking Brake Cable	
Brake System Service	4-208	Replacement	4-212
Front Disc Brake and Lining		Rear Drum Brake Replacement.....	4-219
Replacement	4-218	Step Light Switch	
General	4-207	Replacement	4-215

4-207. GENERAL.

This section contains information on the maintenance of the brake system that are maintainable at the Organizational level.

4-208. BRAKE SYSTEM SERVICE.

This task covers: Service

INITIALSETUP:

Tools	Equipment Condition
Brake Bleeder Adapter (J-29567)	Para. Condition Description
Combination Valve Depressor (J-23709)	4-203 Wheel Assembly Removed
General Mechanics Tool Kit	4-216 Brake Master Cylinder Removed
Material/Parts	General Safety Instructions
Brake Fluid	Engine OFF.
(Appendix D, Item 4)	Transmission in (N) neutral.
	Parking brake and micro-brakelock set.
	Batteries disconnected.

SERVICE

Bleeding The Brake Hydraulic System.

A bleeding operation is necessary if air has been introduced into the hydraulic brake system. It may be necessary to bleed the system at all four wheels if air has been introduced by a low fluid level condition in the master cylinder.

Also if the brake pipes have been disconnected at either the master cylinder or the combination valve. If a pipe is disconnected at one wheel, then only bleed that particular wheel.

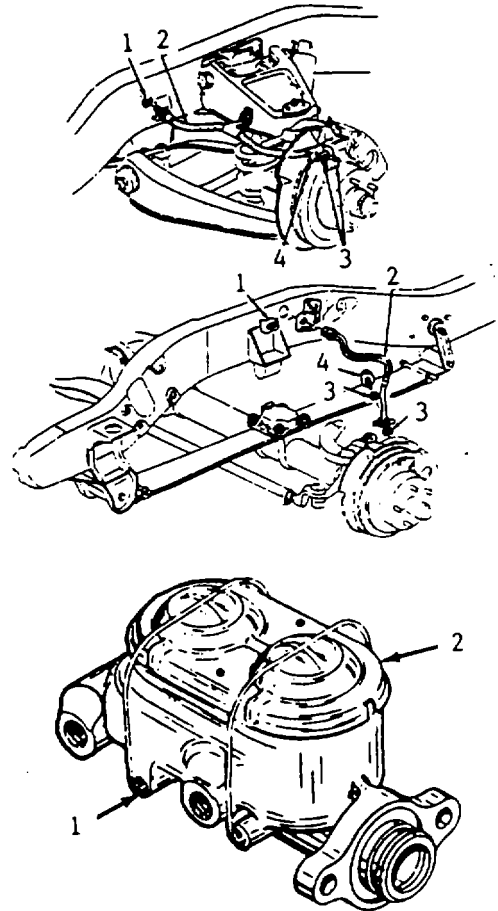
4-208. BRAKE SYSTEM SERVICE. (Continued)

a. Bench Bleeding.

NOTE

The purpose of bench bleeding is to remove the air from the mater cylinder so when it is installed on the vehicle, the brake system bleeding will be reduced.

- (1) Plug the outlet ports and mount the master cylinder (1) in a vise with the front end tilted slightly down.
- (2) Fill the reservoir (2) with clean brake fluid (Appendix D, Item 4).
- (3) Using a smooth, rounded end tool, stroke the primary piston about 1 inch (25 mm) several times. As air is bled from the master cylinder, with the outlets plugged, the resistance to the primary piston travel will not allow the full 1 inch (25 mm) stroke.
- (4) Reposition the master cylinder in the vise with the front end of the master cylinder tilted slightly up. Again, stroke the primary piston about 1 inch (25 mm) several times.
- (5) Reposition the master cylinder in the vise to the level position. Loosen the plugs one at a time and push the piston into the bore to force the air from the cylinder. To prevent air from being sucked back into the cylinder, tighten the plug (s) before allowing the piston to return to its' original position.



- (6) Fill the reservoir and install the master cylinder to the vehicle.

NOTE

Use extreme care to prevent brake fluid from contacting any painted surface.

b. Manual Bleeding.

If the vehicle is equipped with power brakes, deplete the vacuum reserve by applying the brakes several times with the engine off.

4-208. BRAKE SYSTEM SERVICE. (Continued)

- (1) Fill the master cylinder reservoirs with brake fluid (Appendix D, Item 4).

NOTE

Be sure to maintain the fluid level in the reservoir during the bleeding operation.

- (2) If the master cylinder is suspected to have air in the bore, it must be bled before any wheel cylinder or caliper is bled.
- (3) Remove the forward brake pipe connection at the master cylinder and allow brake fluid to flow from the connector port (4) Connect the brake pipe but do not tighten.
- (5) Slowly depress the brake pedal allowing the air to bleed from the loose fitting.
- (6) Tighten the fitting before releasing the pedal, once fluid begins to run. Wait 15 seconds if necessary, then repeat this sequence (including the 15 second wait) until all the air is purged from the bore and fluid begins to run.
- (7) After all the air has been removed from the forward connections, disconnect the rear pipe and allow brake fluid to flow from the connector port.
- (8) Again, connect the brake pipe but do not tighten.

- (9) Slowly depress the brake pedal allowing the air to bleed from the loose fitting.

- (10) When fluid begins to run, tighten the fitting before releasing the brake pedal.

- (11) Again, if air continues to purge before fluid runs and the brake pedal cannot be depressed any further, tighten the fitting before releasing the brake pedal, wait 15 seconds, then repeat this sequence (including the 15 second wait, if necessary) until all the air is purged from the bore.

NOTE

If it is known that the calipers and wheel cylinders do not contain any air, then it will not be necessary to continue. Otherwise, continue with the following.

- (12) Bleed each wheel in the following sequence: Right rear, left rear, right front, left front.

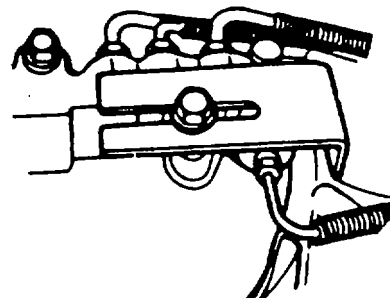
- (13) Attach a hose to the appropriate wheel cylinder/caliper bleeder screw and immerse the opposite end of the hose into a container partially filled with clean brake fluid (Appendix D, Item 4).

- (14) Slowly depress the brake pedal one time and hold.

- (15) Loosen the bleeder screw to purge air from the wheel cylinder/caliper.

4-208. BRAKE SYSTEM SERVICE. (Continued)

- (16) Tighten the bleeder screw and slowly release the pedal.
- (17) Wait 15 seconds, then repeat this sequence (including the 15 second wait) until all the air is purged from the wheel cylinder/caliper and brake fluid begins to flow clearly.
- (18) Continue steps 13 through 17 at each wheel until the entire brake system has been bled.
- (19) Check the brake pedal for sponginess and the brake warning lamp for an indication of an unbalanced pressure. Repeat the entire bleeding procedure to correct either of these two conditions.

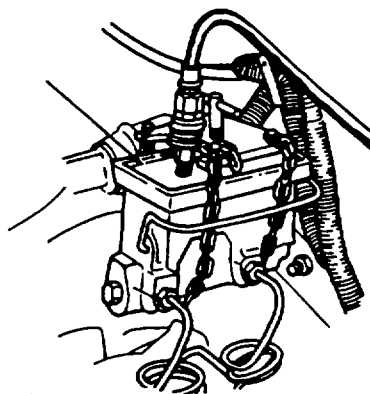
**c. Pressure Bleeding.****CAUTION**

The pressure bleeding equipment must be of the diaphragm type. It must have a rubber diaphragm between the air supply and the brake fluid to prevent air, moisture, oil and other contaminants from entering the hydraulic system. Also, it is very important that the correct master cylinder bleeder adapter be used to avoid possible damage to the master cylinder reservoir.

- (1) Fill the pressure tank at least 1/3 full of brake fluid (Appendix D, Item 4). The bleeder must be re-bled each time fluid is added.
- (2) Charge the bleeder to 20 25 psi (140 170 kPa).
- (3) Use the combination valve depressor to depress and hold the valve stem on the combination valve during the bleeding operation.

4-208. BRAKE SYSTEM SERVICE. (Continued)

- (4) Install the bleeder adapter and bleed each wheel in the following sequence: Right rear, left rear, right front, left front.
- (5) Connect the hose from the bleeder to the adapter at the master cylinder and open the tank valve.
- (6) Attach a hose to a brake bleeder screw and immerse the opposite end of the hose into a container partially filled with clean brake fluid (Appendix D, Item 4).
- (7) Open the bleeder screw at least 3/4 of a turn and allow the fluid to flow until no air is seen in the fluid.
- (8) Close the bleeder screw, repeating step 7 at all the wheels; (9) Check the brake for sponginess repeating the entire bleeding procedure if this condition is found.
- (10) Remove the combination valve depressor.
- (11) Disconnect the line from the bleeder adapter and remove the bleeder adapter.
- (12) Fill the master cylinder to the proper level with brake fluid (Appendix D, Item 4).



d. *Flushing The Brake System.*

NOTE

It is recommended that the entire hydraulic system be thoroughly flushed with clean brake fluid (Appendix D, Item 4) whenever new parts are installed in the hydraulic system.

Flushing is also recommended if there is any doubt as to the grade of fluid in the system or if fluid has been used which contains the slightest trace of mineral oil. Flush the system whenever there is any question of contamination.

Check master cylinder fluid level after flushing at each valve and replenish if required. When flushing is completed at all bleeder valves, make certain the master cylinder reservoir is filled to proper level.

4-209. BRAKE SYSTEM PIPES AND HOSES REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Tools

Flaring Tool
(J-23530)

Tube Cutter
(J-23533-B)

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description
4-203 Wheel Assembly Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Materials/Parts

Brake Fluid

(Appendix D, Item 4)

Pipes and Hoses As Required

(Appendix E, Page E-210)

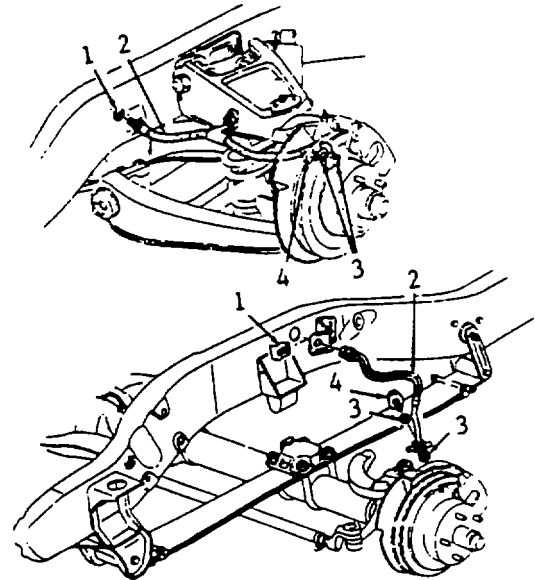
REMOVAL

NOTE

The hydraulic brake system components are interconnected by special steel piping and flexible hoses: When the hydraulic pipes or hoses have been disconnected for any reason, the brake system must be bled after reconnection.

Clean dirt, grease and other foreign material off fittings at all ends.

- a. On the front brakes, disconnect the bolt (4) and copper washers (3) at the brake caliper.
- b. Disconnect the nut or clip (1) attaching the hose (2) to the frame and remove the hose.
- c. At the rear, disconnect the nut or clip (1) attaching the hose (2) to the frame.
- d. Disconnect the bolt (4) and washers (3) attaching the hose (2) and pipe



- e. If pipe replacement is necessary, remove the pipe from the hose (2).

INSTALLATION

CAUTION

When installing hose, contact after assembly must not be made with any suspension components.

4-209. BRAKE SYSTEM PIPES AND HOSES REPLACEMENT. (Continued)**CAUTION**

Never use copper tubing for hydraulic brake lines because copper is subject to fatigue, cracking and corrosion which result in brake failure.

NOTE

When replacing a steel brake pipe, always use steel piping which is designed to withstand high pressure and resist corrosion. The same size pipe must be used as the one removed. The outside diameter of the pipe is used to specify the size.

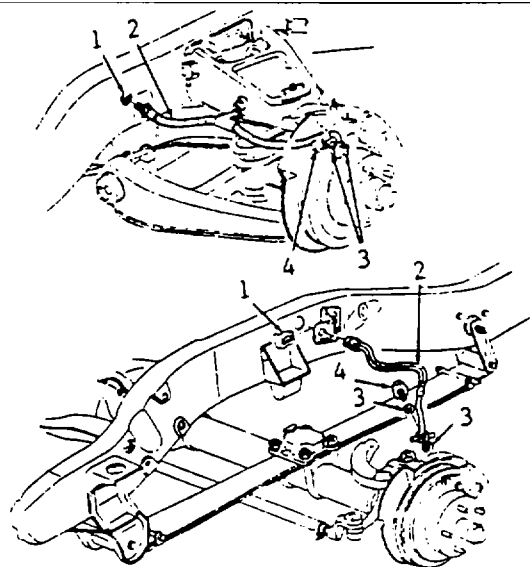
Brake pipes that run parallel to each other must maintain a 1/4 inch (6 mm) clearance.

When installing pipe, a special double-lap flaring tool must be used, as single flaring tools cannot produce a flare strong enough to hold the necessary pressure. When using the tool, be sure to follow the instructions furnished by the tool manufacturer. Be sure to inspect newly formed flares for cracks or malformations which might cause leaks.

- a. Cut the pipe with the tube cutter to length. Add 1/8 inch (3mm) to the length for each flare.
- b. Flare the pipe ends by following the instructions provided by the double lap flaring tool manufacturer.

WARNING

Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.



- c. After flaring, blow out the brake pipe with compressed air before installing on the vehicle.
- d. Bend the pipe to match the configuration of the old pipe by using a pipe bender.
- e. Attach the pipe to the rear brake drum hose.

NOTE

The hose must not be twisted

- f. Using new copper washers (3), install the pipe and hose (2) with new washers (3) to the drum.
- g. Install the other end of the hose (2) to the frame with the nut or clip (1).
- h. Install the front brake hose (2) to the caliper with the bolt (4) and new copper washers (3).
- i. Install the other end to the frame with nut or clip (1).
- j. Bleed the brakes (paragraph 4-208).
- k. Install wheel assembly (paragraph 4-203).

4-210. BRAKE SYSTEM COMBINATION VALVE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SET-UPTools

Jack
 Jack Stand
 General Mechanics Tool Kit

General Safety Instructions

Engine OFF
 Transmission in (N) neutral
 Parking brake and micro-brakelock set.

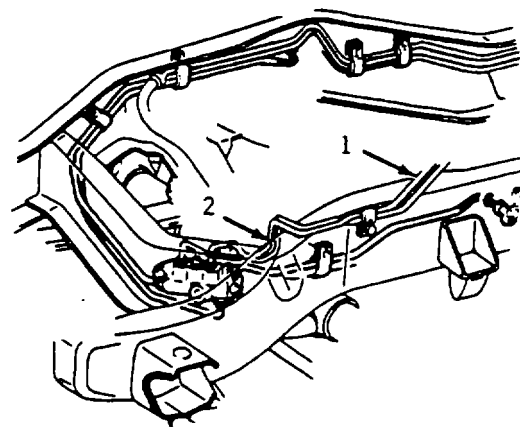
Materials/Parts

Brake Fluid (Appendix D, Item 4)
 Valve (25515631)

REMOVAL**NOTE**

Use care to prevent brake fluid from contacting any painted surface.

- a. Raise the vehicle.
- b. Remove the hydraulic pipes (1) leading to the valve (2).
- c. Plug the pipes to prevent loss of fluid or the entrance of dirt.
- d. Disconnect the warning switch harness.
- e. Remove the bolts.
- f. Remove the valve.



- d. Bleed the brake system. (paragraph 4-208).
- e. Lower the vehicle.

INSTALLATION

- a. Position the valve (2) on the bracket.
- b. Install the bolts.
- c. Install the hydraulic pipes (1).

4-211. HEIGHT SENSING BRAKE PROPORTIONING VALVE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SET-UPTools

Jack
 Jack Stand
 General Mechanics Tool Kit
 Proportioning Valve Adjustment Gauge

General Safety Instructions

Engine OFF
 Transmission in (N) neutral
 Parking brake and micro-brakelock set.

Materials/Parts

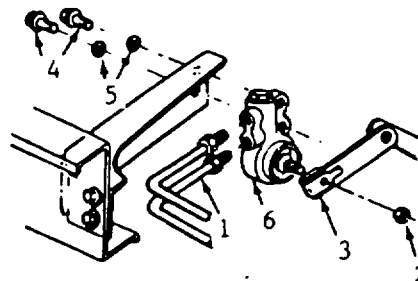
Brake Fluid (Appendix D, Item 4)
 Valve (14036789)

REMOVAL**WARNING**

Adding any type of suspension accessories or making modification that will change the distance between the axle and the frame without changing the load, will provide a false reading to the brake proportioning valve which could provide unsatisfactory brake performance, resulting in an accident and possible injury.

NOTE

The height sensing brake proportioning valve provides optimum brake balance and efficiency. The vehicle braking force is distributed to the front and rear wheels as determined by either a light or heavy payload condition. The valve is mounted on the frame and a linkage connects the valve to a bracket that is mounted on the axle.

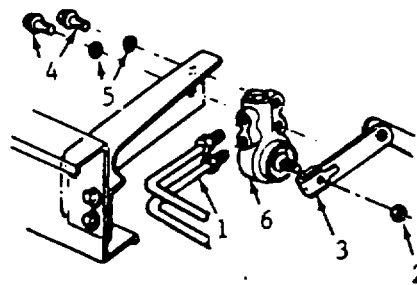


- Raise the vehicle and support the frame with suitable safety stands, allowing the axle to hang free.
- Clean the exterior of the valve connections to prevent dirt and other foreign materials from contaminating the hydraulic system.
- Disconnect the brake pipes (1), plugging them to prevent loss of fluid or entrance of dirt.
- Remove the nut (2) from the shaft and disconnect the lever (3).
- Disconnect the bolts (4) and washers (5) and remove the valve (6).

4-211. HEIGHT SENSING BRAKE PROPORTIONING VALVE REPLACEMENT. (Continued)

INSTALLATION

- a. Position the valve (6) on the mounting bracket and install the washers (5) and bolts (4).
- b. Rotate the valve shaft to permit the installation of the adjustment gauge (7).



NOTE

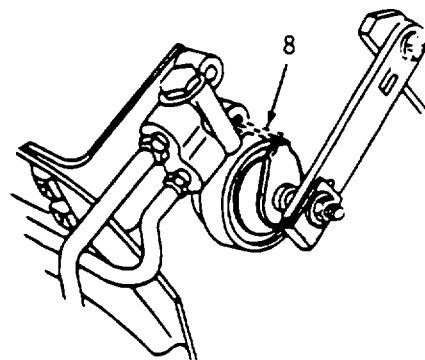
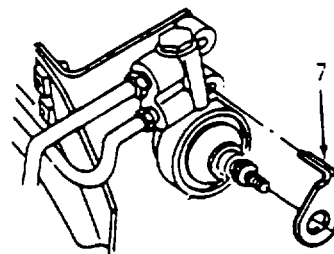
The center hole of the adjustment gauge must seat on the "D" shape of the valve shaft.

- c. Position gauge tang, so that it seats in the valve mounting hole.

NOTE

Do not drive lever assembly on valve shaft by using nut or proper valve setting may be disturbed.

- d. Install the lever (3).
- e. Install the nut (2) and torque to 89 in-lbs (10 N-m).
- f. Sever the tang (8) on the adjustment gauge.
- g. Install the brake pipes.
- h. Bleed the brakes (paragraph 4208).
- i. Remove the jack stands and lower the vehicle.
- j. Test the brakes.



NOTE

If a front wheel lock up is experienced when the vehicle is being operated near the maximum Gross Vehicle Weight Rating with a lower than desired brake application, the valve adjustment should be checked.

4-212. PARKING BRAKE CABLE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SET-UPTools

Jack
Jack Stand
General Mechanics Tool Kit

Materials/Parts

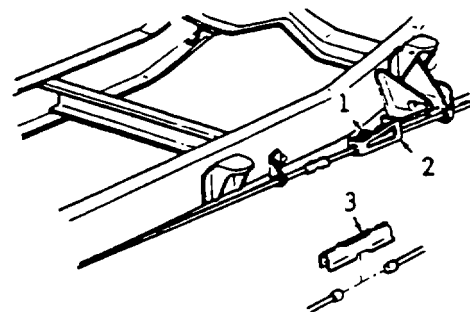
Cable (14064667)

General Safety Instructions

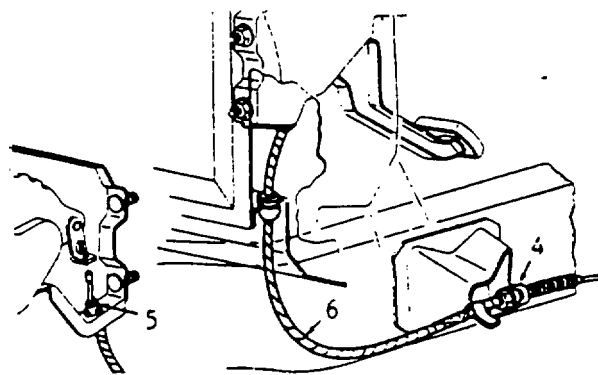
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- Raise the vehicle and support with a suitable jack stand.
- Remove the nut (1) from the equalizer (2).
- Remove the connector (3) from the front cable.
- Bend the retaining fingers (4 and 5) and remove the cable from the brake pedal assembly.
- Remove the cable assembly (6).

**INSTALLATION**

- Install the cable assembly, making sure all the retaining fingers (4 and 5) are completely through the holes.
- Install the cable (6) to the pedal assembly.
- Install the connector (3).
- Install the nut (1) onto the equalizer (2)
- Adjust the parking brake (paragraph 4-214).
- Remove the jack stands and lower the vehicle.



4-213. BRAKE PEDAL REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SET UP

Tools

General Mechanics Tool Kit

Material/Parts

Oil, Lubricating
(Appendix D, Item 31)
Petroleum Jelly
(Appendix D, Item 18)
Brake Pedal (347462)

General Safety Instructions

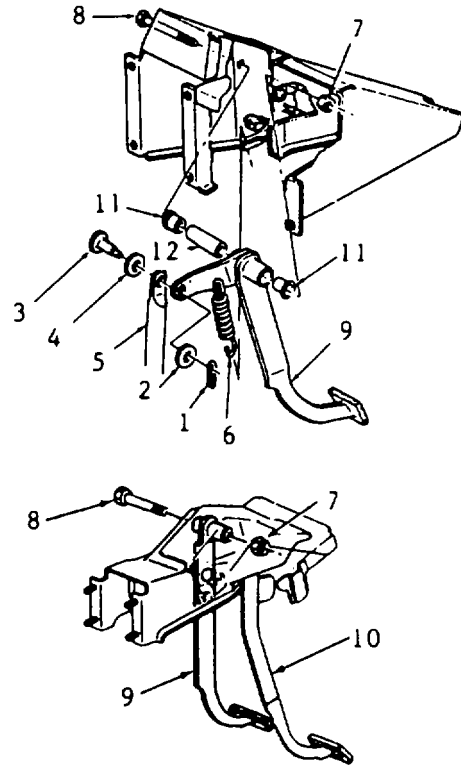
Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

NOTE

The brake pedal mounting is an integral design with the clutch pedal, necessitating the removal of the clutch pedal with the brake pedal.

- a. Remove retainer (1).
- b. Remove washer (2).
- c. Remove pin (3) and washer (4).
- d. Remove pushrod (5).
- e. Remove return spring (6).
- f. Remove nut (7) and bolt (8).
- g. Remove brake pedal (9) and clutch pedal (10).
- h. Remove bushings (11) and spacer (12).



INSTALLATION

NOTE

Components should be lubricated with petroleum jelly (Appendix D, Item 18) prior to assembly.

4-213. BRAKE PEDAL REPLACEMENT. (Continued)

- a. Install new bushings (11) and spacer (12) in pedal arms.

NOTE

Pivot bolt (8) must be installed in the direction shown in order to clear spring return.

- b. Position brake pedal (9) and clutch pedal (10) assembly within bracket and insert pivot bolt (8) through support and pedal arm assemblies.

- c. Install nut (7) and torque to 25 ft-lbs (34 N-m).
- d. Install return spring (6).
- e. Install washer (4) and pin (3) to pushrod (5) and brake pedal (9) arm.
- f. Install washer (2) and retainer (1).

NOTE

After assembly, check the operation of the stoplamp switch. Adjust if necessary (paragraph 4-215).

4-214. PARKING BRAKE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit
Jack
Jack Stand

Material/Parts

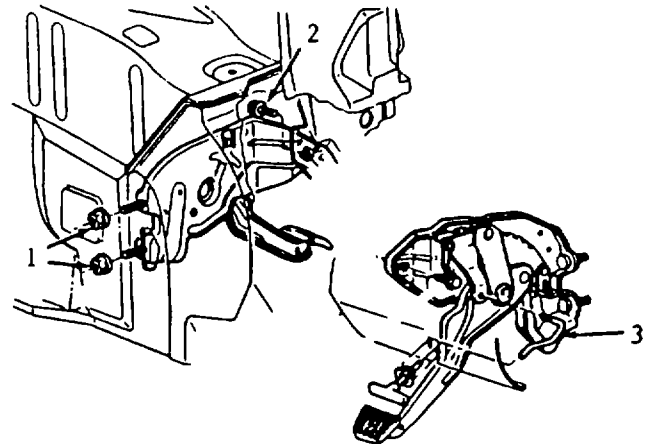
Wood Blocks
Parking Brake (362280)

General Safety Instructions

Position the vehicle on a level surface and set the gear in the "low" or "reverse" position before working on the parking brake. Be sure to block wheels.

REMOVAL

- a. Release the parking brake.
- b. Disconnect nuts (1) from bolts in firewall.
- c. Disconnect the release rod (3) from the brake assembly.
- d. Remove bolt (2) attaching parking brake assembly to the kick panel.



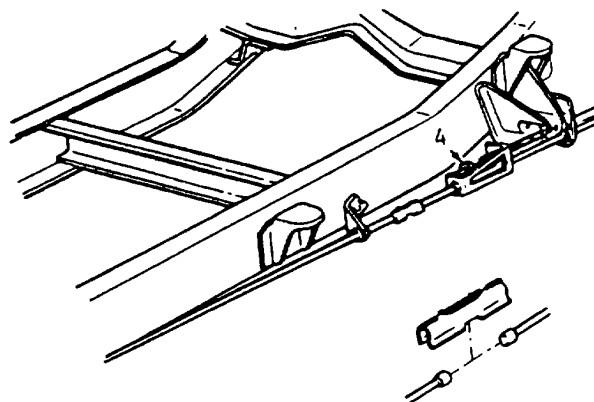
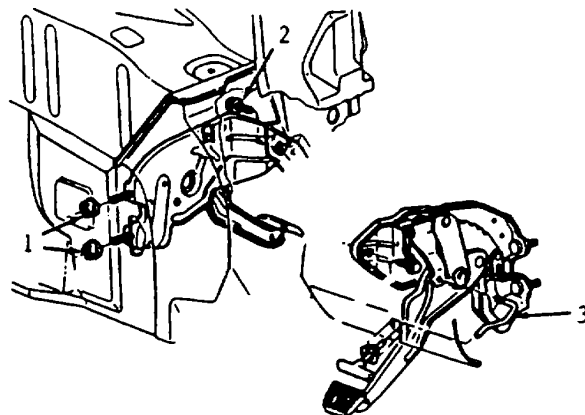
4-214. PARKING BRAKE REPLACEMENT (Continued).

- e. Remove the parking brake assembly.
- f. Disconnect the parking brake cable.

NOTE

The parking brakes must be adjusted whenever the parking brake cables have been replaced or disconnected. Also if the brake holding ability is not adequate. Before adjusting the parking brakes, check the condition of the service brakes. The service brakes must be adjusted properly before proceeding with the parking brake adjustment.

- g. Be sure the front wheels are properly blocked, then raise and support the rear axle with suitable jack stands.
- h. Loosen the equalizer nut (4).
- i. Set the parking brake pedal to four clicks.
- j. Adjust the equalizer nut (4) until the wheels will not rotate forward without a moderate drag.
- k. Release the parking brake and rotate the rear wheels. If properly adjusted, there should be no brake drag.
- l. Remove the jack stands.
- m. Lower the vehicle.



- b. Install the parking brake assembly to the kick panel with the bolt (2) and torque to 150 in . lbs (17 N.m).
- c. Connect the release rod (3) to the brake assembly.
- d. Install the nuts (1) to the bolts attaching the parking brake frame to the firewall.
- e. Torque the nuts to 150 in-lbs (17 N-m).
- f. Check the parking brake operation. If further adjustment is necessary adjust accordingly.

INSTALLATION

- a. Connect the parking brake cable to the parking brake assembly.

4-215. STOP LIGHT SWITCH REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SET-UPTools

General Mechanics Tool Kit

Material/Parts

Switch (14014559)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

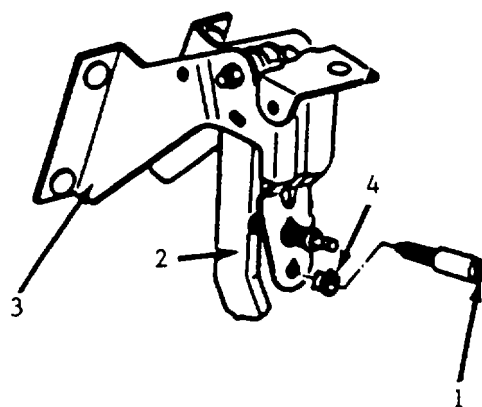
Parking brake and micro-brakelock set.

REMOVAL

- a. Disconnect the electrical connectors at the brake pedal (2) mounting bracket (3).
- b. Remove the switch (1).

INSTALLATION

- a. Install the switch (1).
- b. Connect the electrical connector.
- c. Depress the brake pedal (2) and press the switch (1) in until it is firmly seated in the clip (4).

**NOTE**

Audible clicks can be heard as the threaded portion of the switch is pushed through the clip.

- d. Pull the brake pedal (2) fully rearward against the pedal stop until the audible clicks can no longer be heard.
- e. Release the brake pedal (2), then repeat step c to assure that the switch is properly seated and no audible click can be heard.

- f. Electrical contact should now be made when the brake pedal is depressed 1 to 1.24 inches (25-31 mm) and the brake lights should go on.
- g. Check the operation of the switch.

4-216. BRAKE MASTER CYLINDER REPLACEMENT.

This task covers:

a. Removal**b. Installation****INITIAL SET-UP**Tools

General Mechanics Tool Kit

Material/Parts

Master Cylinder (14066425)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

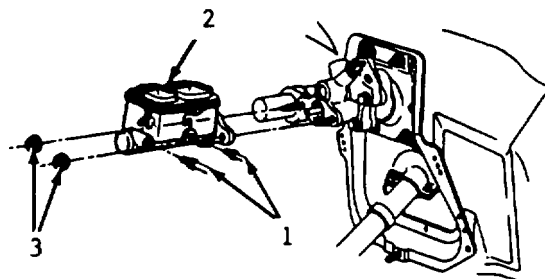
REMOVAL

- a. Apply the vehicle parking brakes.
- b. Disconnect the coiled pipes (1) from the master cylinder (2).

NOTE

Cover the ends of the pipes to prevent dirt from entering the system.

- c. Remove mounting nuts (3).
- d. Remove the master cylinder (2).

**INSTALLATION****NOTE**

Prior to installation of the replacement master cylinder, refer to bench bleeding procedure of the brake system (paragraph 4-208).

- a. Install the master cylinder (2).
- b. Install the mounting nuts (3) and torque to 32 ft-lbs (44 N-m).
- c. Connect the brake pipes (1).
- d. Bleed the brakes (paragraph 4-208).
- e. Release the parking brake

4-217. HYDRAULIC BRAKE BOOSTER SERVICE.

This task covers: **Service**

INITIAL SET-UPTools

Jack
Jack Stand

Material/Parts

Power Steering Fluid
 (Appendix D, Item 14)
Pump (7838936)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

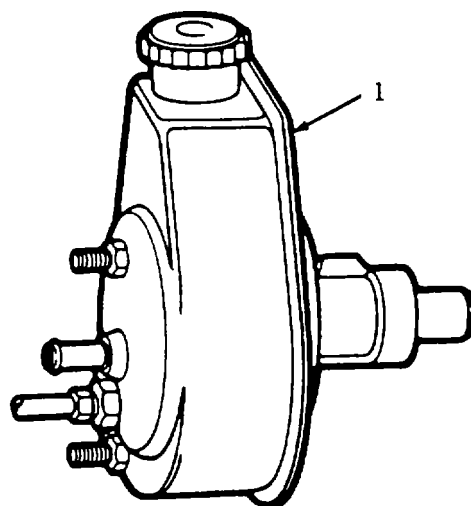
SERVICE**CAUTION**

The power steering fluid and brake fluid cannot be mixed. If the brake seals contact steering fluid or the steering seals contact brake fluid, seal damage will result.

NOTE

Whenever the booster system is removed and reinstalled, the steering system should be bled.

- a. Fill the power steering pump reservoir (1) to the proper level and let the fluid remain undisturbed for at least two minutes.
- b. Start the engine and run momentarily. Add additional fluid if necessary.
- c. Repeat steps a and b until the fluid level remains constant after running the engine.
- d. Raise the front of the vehicle so the wheels are off the ground and support the vehicle with suitable jack stands.



4-217. HYDRAULIC BRAKE BOOSTER SERVICE (Continued).

- | | |
|---|---|
| <ul style="list-style-type: none"> e. Turn the wheels from stop to stop, lightly contacting the stops, and add fluid, if necessary. f. Lower the vehicle. g. Start the engine and depress the brake pedal several times while rotating the steering wheel from stop to stop. h. Turn the engine off and then pump the brake pedal 4-5 times. i. Check fluid level, add fluid if necessary (Appendix D, Item 14). | <ul style="list-style-type: none"> j. If the fluid is extremely foamy, allow the vehicle to stand a few minutes with the engine off. Then repeat steps g, h, and i. k. Check for the pressure of air in the oil, which will have a milky appearance. Air in the system will cause the fluid level in the pump to rise when the engine is turned off. If it becomes obvious that the pump will not bleed the air after a few attempts, refer to paragraph 4-226. |
|---|---|

4-218. FRONT DISC BRAKE AND LINING REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SET-UP

Tools

Jack
 Jack Stand
 "C" Clamp
 General Mechanics Tool Kit
 Brass Punch
 Hammer

General Safety Instructions

Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.
 Batteries disconnected.

Material/Parts

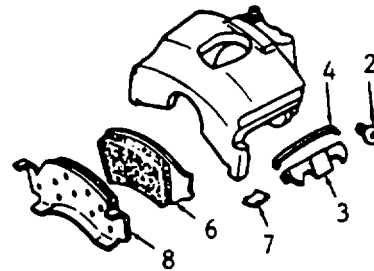
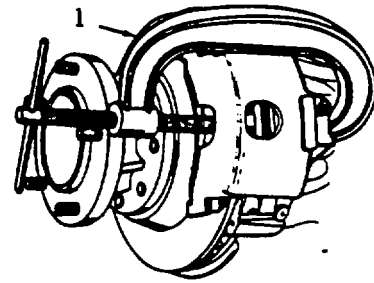
Brass Bristle Brush (Appendix D, Item 5)
 Lubricant, Silicone (Appendix D, Item 26)
 Brake Assembly (049-90007)
 Brake Fluid (Appendix D, Item 14)

REMOVAL

- a. Remove 2/3 of the brake fluid from the master cylinder.
- b. Raise the vehicle and support it with suitable jack stands.

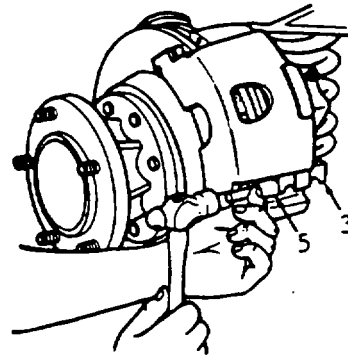
4-218. FRONT DISC BRAKE AND LINING REPLACEMENT (Continued).

- c. Mark the relationship of the wheel to the hub.
- d. Remove the wheel and tire assembly (paragraph 4-203).
- e. Position C clamp (1) and tighten until the piston bottoms in its bore.
- f. Remove the C clamp.
- g. Remove the bolt (2).
- h. Remove the support key (3) and spring (4) by using a brass punch (5) and a hammer to drive the support key out.
- i. Remove the caliper assembly.
- j. Suspend the caliper from the suspension.



CAUTION
 Do not allow the brake components to hang from the flexible hoses as damage to the hoses may occur.

- k. Remove the inboard pad (6) from the steering knuckle or rear caliper support.
- l. Remove the anti-rattle spring (7).
- m. Remove the outboard pad (8).
- n. Check the inside of the caliper assembly for signs of fluid leakage.
- o. Remove the hub and rotor (9).



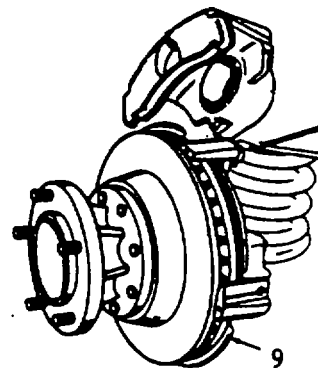
4-218. FRONT DISC BRAKE AND LINING REPLACEMENT (Continued).

INSTALLATION

NOTE

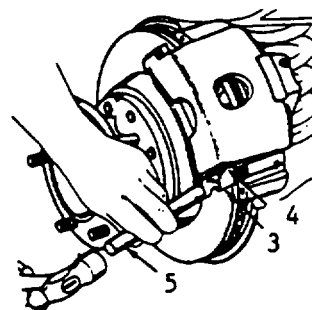
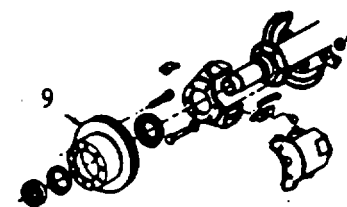
Use a wire brush to remove any corrosion from the machined surfaces of the steering knuckle and caliper.

- a. Lubricate the caliper and steering knuckle (or support) sliding surfaces and spring with silicone lube (Appendix D, Item 26).
- b. Install the hub and rotor (9).
- c. Install the inboard pad (6) and anti-rattle spring (7).
- d. Install the outboard pad (8) into the caliper assembly.
- e. Install the caliper assembly.

**CAUTION**

Make sure that the brake hose is not twisted or kinked since damage to the hose could result.

- f. Install the spring (4).
- g. Install the support key (3) by using a brass punch (5) and a hammer to drive the support key in.
- h. Install the bolt (2), fully fitting the boss in the bolt into the circular cutout in the key and torque to 15 ft-lbs (20 N-m).
- i. Install the wheel and tire assembly (paragraph 4-203).
- j. Lower the vehicle.
- k. Fill the master cylinder with brake fluid (Appendix D, Item 14).

**NOTE**

Before moving the vehicle, pump the brake pedal several times to make sure that the pedal is firm. Do not move the vehicle until a firm pedal is obtained. Check the brake fluid level in the master cylinder after pumping the brakes.

4-219. REAR DRUM BRAKE REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SET-UP

Tools

- Jack
- Jack Stand
- General Mechanics Tool Kit
- Brake Adjusting Tool

General Safety Instructions

- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

Material/Parts

- Grease, Lubricating
(Appendix D, Item 16)
- Cloth, Emery, Fine
(Appendix D, Item 11)
- Brake Drum (049-90008)

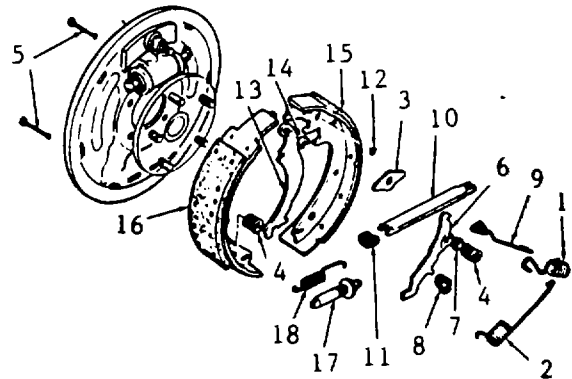
REMOVAL

- a. Raise the vehicle and support it with suitable safety stands.
- b. Mark the relationship of the wheel to the hub.
- c. Remove the wheel and tire assembly (paragraph 4-203).
- d. Mark the relationship of the drum to the axle.
- e. Remove the brake drum.

NOTE

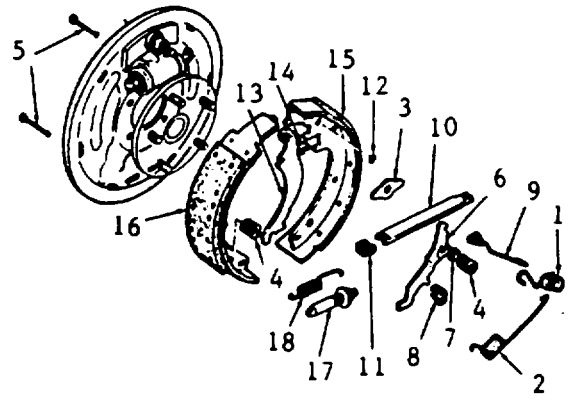
It may be necessary to back off the shoe adjustment before removing the drum.

- f. Remove the two return springs (1 and 2).
- g. Remove the shoe guide (3).
- h. Remove the hold down springs (4) and hold down pins (5).



4-219. REAR DRUM BRAKE REPLACEMENT. (Continued)

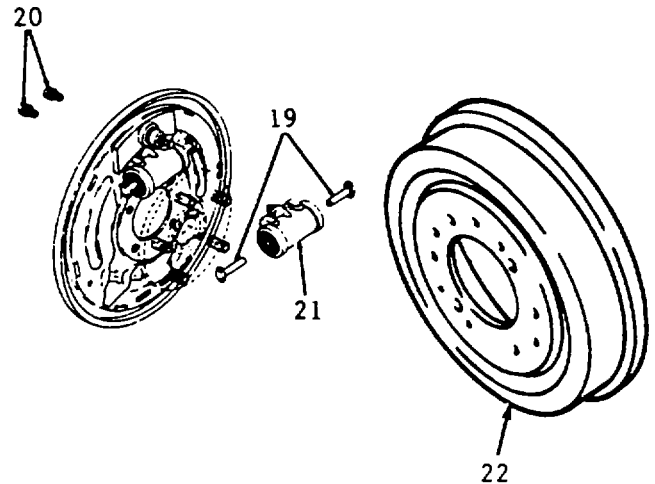
- i. Remove the actuator lever (6) and lever pivot (7).
- j. Remove the lever return spring (8) and actuator link (9).
- k. Remove the parking brake strut (10) and strut spring (11).
- l. Remove the retaining ring (12) parking brake lever (13) and washer (14).
- m. Remove the brake shoes (15 and 16).



CAUTION

Do not interchange the right and left adjusting screws.

- n. Remove the adjusting screw assembly (17) and adjusting screw spring (18).
- o. Remove cylinder links (19) and disconnect inlet tube line.
- p. Remove wheel cylinder bolts (20) and lift off wheel cylinder (21).
- q. Check all parts for signs of wear, discoloration due to heat, or stress, and replace if necessary.
- r. Check the wheel cylinder for signs of leakage.
- s. Check the brake drum (22) for scoring and machining tolerance.



CAUTION

A cracked drum is unsafe for further service and must be replaced. Do not attempt to weld a cracked drum.

CAUTION

Machining or grinding of brake drums increases the inside diameter of the drum and changes the lining-to-drum fit. All brake drums have a maximum diameter cast into them. This diameter is the maximum wear diameter. Do not machine a brake drum that will not meet the following specification.

- (1) Smooth up and polish slight scores or grooves with fine emery cloth.
- (2) Machine drums with severe scoring, pitting, grooves or barrel shaped, bell-mouthed or out-of-round condition.

4-219. REAR DRUM BRAKE REPLACEMENT. (Continued)

Drum Diameters

<u>Original</u>	<u>Maximum Refinish</u>	<u>(Discard) Replacement</u>
11.000	11.060	11.090
11.150	11.210	11.240
12.000	12.060	12.090
12.000	12.060	13.090

INSTALLATION

- a. Position wheel cylinder (21) and attach with bolts (20).
- b. Torque bolts to 160 in-lbs (18 N.m).
- c. Connect inlet tube line and install links (19).
- d. Torque inlet tube nut to 200 in lbs (22.6 N.m).
- e. Lubricate the adjusting screw threads with a thin coat of white lithium grease (Appendix D, Item 16).
- f. Install the adjusting screw assembly (17) and adjusting screw spring (18) to both shoes (15 and 16).
- g. Install the shoe assembly.
- h. Install the parking brake lever (13) and washer (14) into the shoe and secure with the retaining ring (12).
- i. Place strut spring (11) onto the parking brake strut (10) and install by spreading the shoes (15 and 16) apart.

NOTE

Be sure that the strut (10) is properly positioned. The end without the spring engages the parking brake lever. The end with the spring engages the opposite shoe.

- j. Install the actuator lever (6) and lever pivot (7) with the actuator link (9) and lever return spring (8).
- k. Install the hold down pins (5) and hold down springs (4).
- l. Install the shoe guide (3) and return springs (1 and 2).
- m. Install the drum by aligning the marks made during disassembly.
- n. Install the wheel and tire assembly by aligning the marks made during disassembly (paragraph 4-203).
- o. Adjust the brakes.

(1) Remove the lanced area in the brake backing plate.

(2) Adjust the brake adjusting screw until the wheel can just be turned by hand.

NOTE

The brake drag should be equal at both wheels.

- (3) Back off the adjusting screw 33 notches.

4-219. REAR DRUM BRAKE REPLACEMENT. (Continued)

NOTE

Brakes should have no drag after the screw has been backed-off about 15 notches. If a heavy drag is present, refer to parking brake adjustment (paragraph 4-214).

(4) Install an adjusting hole cover in the brake backing plate.

(5) Check parking brake adjustment.

p. Remove the jack stands and lower the vehicle.

q. Test the brakes.

Section XXVI. MAINTENANCE OF STEERING ASSEMBLY

	Para.		Para.
Connecting Rods Replacement	4-224	Steering Shock Absorber	
General	4-220	Replacement.....	4-222
Pitman Arm Replacement	4-221	Tie Rods Replacement.....	4-223

4-220. GENERAL.

This section contains information on the maintenance of the steering assembly that are maintainable at the Organizational level.

4-221. PITMAN ARM REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

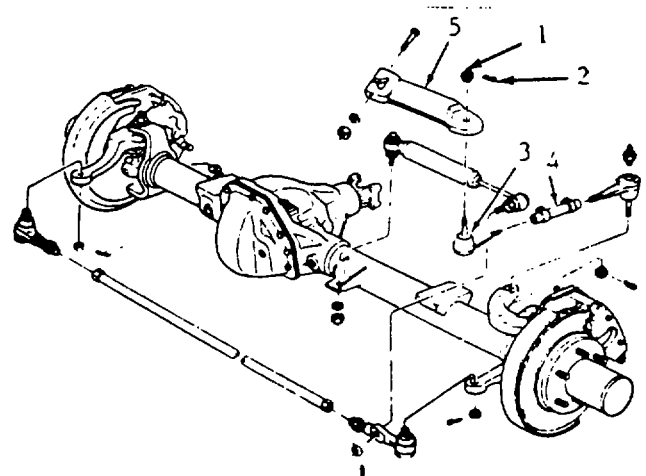
- Pitman Arm Remover
(J-6632-01)
- Pitman Arm Puller
(J-29107)
- Steering Linkage Puller
(J-24319-01)
- Steering Linkage Installer (12mm)
(J-29193)
- Steering Linkage Installer (14mm)
(J-29194)
- General Mechanics Tool Kit
Pitman Arm (14064660)

General Safety Instructions

- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

REMOVAL

- a. Raise the vehicle and remove the connecting rod nut (1) and cotter pin (2) from the pitman arm ball stud (3).
- b. Disconnect the connecting rod (4) from the pitman arm (5) with the steering linkage puller.
- c. Remove the pitman arm nut and washer from the pitman shaft on the steering gear.
- d. Mark the pitman arm and the pitman shaft. This will permit proper alignment at assembly.



CAUTION

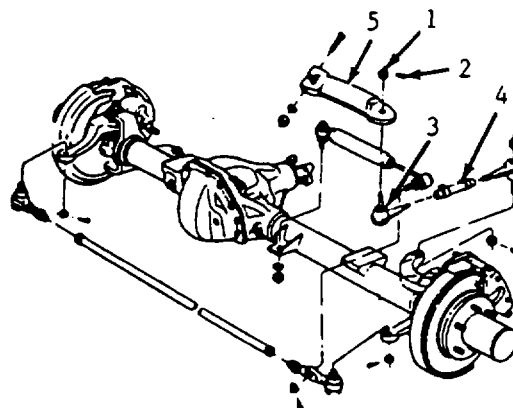
Do not hammer on Pitman arm, shaft or puller as damage to Pitman arm or steering gear may result.

4-221. PITMAN ARM REPLACEMENT. (Continued)

e. Remove the pitman arm remover or puller.

INSTALLATION**CAUTION**

If a clamp-type pitman arm is used, spread the pitman arm just enough with a wedge to slip the arm onto the pitman shaft. Do not spread the pitman arm more than required to slip over the pitman shaft with hand pressure. Do not hammer, or damage to the steering gear may result.



- a. Install the pitman arm (5) to the pitman shaft on the steering gear. Line up the marks made at time of removal.
- b. Install the pitman arm washer and nut and torque to 92 ft-lbs (125 N.m).
- c. Connect the connecting rod (4) to the pitman arm ball stud (3).
- d. Make certain the seal is on the stud and by using the 12 mm or 14 mm steering linkage installer, to 40 ft-lbs (54 N.m) to seat the tapers, then remove the tool.
- e. Install the connecting rod castellated nut (1) to the pitman arm ball stud and torque to 89 ft-lbs (120 N.m).
- f. Advance the nut to align the nut slot with the cotter pin hole. Never back the nut off to align the cotter pin hole.
- g. Install a new cotter pin (2) of the correct size.
- h. Lower the vehicle.

4-222. STEERING SHOCK ABSORBER REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

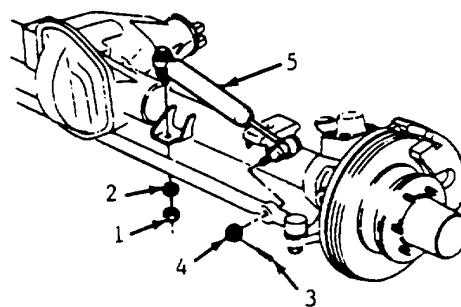
Batteries disconnected.

REMOVAL

- a. Raise vehicle.

4-222. STEERING SHOCK ABSORBER REPLACEMENT. (Continued)

- b. Remove shock absorber mounting nuts (1) and washers (2).
- c. Remove cotter pin (3) and castellated nut (4).
- d. Remove shock absorber (5).

**INSTALLATION**

- a. Install shock absorber (5) with bushings to the axle bracket.
- b. Install the shock absorber mounting nuts (1) and washers (2) and torque to 81 ft-lbs (110 N.m).
- c. Install the castellated nut (4) to the tie rod assembly and tighten to 46 ft-lbs. (62 N.m).

- d. Advance the nut to align the nut slot with the cotter pin hole. Never back the nut off to align the cotter pin hole.
- e. Install a new cotter pin (3) of the correct size.
- f. Lower the vehicle.

4-223. TIE RODS REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

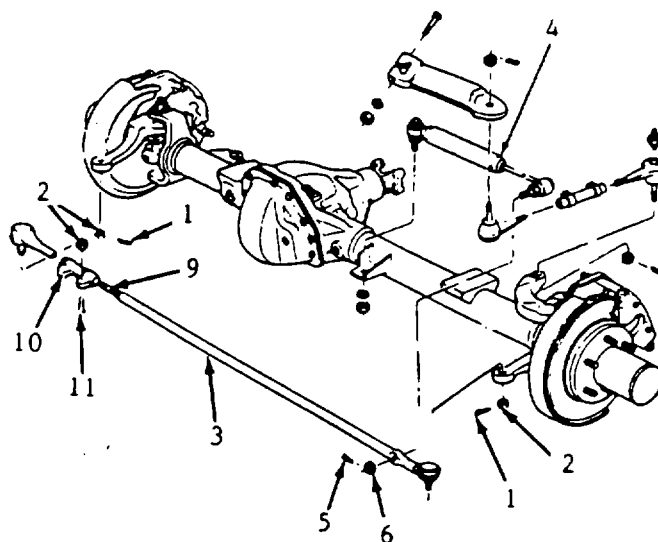
Wheel Stud Remover and
Tie Rod Remover (J-6627-A)
General Mechanics Tool Kit
Hoist

General Safety Instructions

Engine OFF.
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

- a. Raise the front of the vehicle on a hoist.
- b. Remove cotter pins (1) and castellated nuts (2) from the rod assembly (3).
- c. Disconnect the steering shock absorber (4) from the tie rod assembly (3) by removing the cotter pin (5) and castellated nut (6).
- d. Remove the rod ball studs (7) from the steering knuckle (8) using the wheel stud and tie rod remover.



4-223. TIE RODS REPLACEMENT. (Continued)

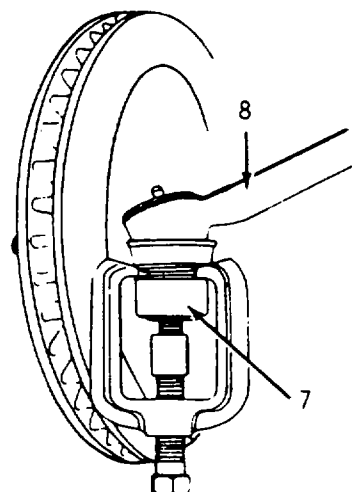
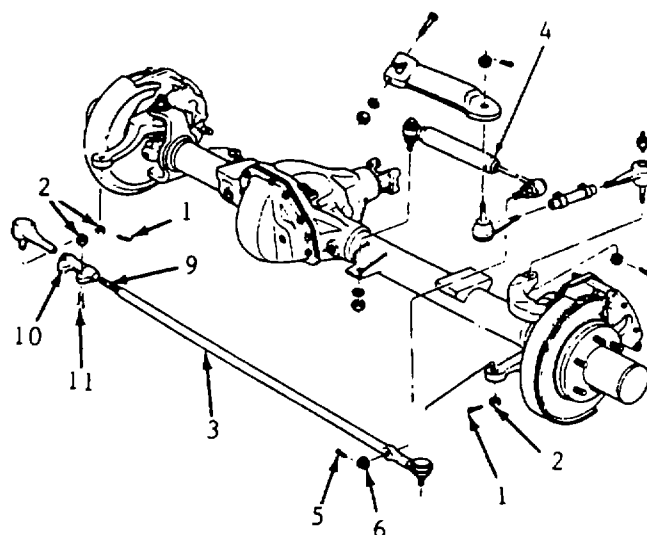
- e. Remove the tie rod end bodies (9) counting the number of turns needed to remove them.
- f. Remove the tie rod ends from the adjuster tube (10). Note the position of the adjuster tube and the direction from which the bolts (11) are installed.

INSTALLATION

- a. Install the tie rod end bodies to the tie rod (if removed). Screw the rod assembly on the same number of turns as when removed.
- b. Install the tie rod ends to the adjuster tube (10), referencing the previous position of the adjuster tube and the direction from which they were installed.
- c. Install the outer tie rod ball studs (7) to the steering knuckle (8).
- d. Connect the shock absorber (4) to the tie rod assembly and install the castellated nut, torque to 46 ft-lbs (62 N.m).
- e. Install the tie rod (9) end to steering knuckle (8) castellated nuts and torque to 40 ft-lbs (55 N.m).
- f. Advance all castellated nuts to align the nut slot with the cotter pin hole and install a new cotter pin of the correct size.

NOTE

Never back the nut off to align the cotter pin hole.



- g. Torque the jam nut at the tie rod end bodies (9) to 92 ft-lbs (125 N.m).
- h. Torque the adjuster tube clamp bolts to 40 ft-lbs (55 N.m).
- i. Lower vehicle.

4-224. CONNECTING RODS REPLACEMENT. (Continued)

- d. Install the inner connecting rod (3) ball stud short end to the pitman arm (4) making certain the seal is on the stud.
- e. Install the castellated nut (1) to the inner connecting rod ball stud and torque to 89 ft-lbs (120 N.m).
- f. Advance the nut to align the nut slot with the cotter pin hole and install a new cotter pin (2) of the correct size.

NOTE

Never back the nut off to align the cotter pin hole.

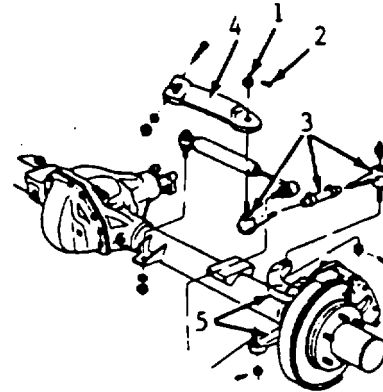
- g. Install the outer connecting rod ball stud to the steering knuckle (5).
- h. Install the castellated nut (1) to the outer connecting rod ball stud and torque to 89 ft-lbs (120 N.m).
- i. Advance the nut to align the nut slot with the cotter pin hole and install a new cotter pin (2) of the correct size.

NOTE

Never back the nut off to align the cotter pin hole. The connecting rod ends to the pitman arm and steering knuckle must be in correct relationship to each other after adjustment, within +/2 degrees.

- j. Set the front wheels in the straight ahead position.
- k. With the front wheels set straight ahead, check the position of the mark on the wormshaft designating steering gear high point. This mark should be at the top side of the shaft at the 12 o'clock position and lined up with the mark in the coupling lower clamp. If the gear has been moved off high point when setting the wheels in

the straight ahead position, loosen the adjuster tube clamps on the connecting rod (3) and turn the adjuster tube to bring the gear back on high point.



- l. Install the adjuster tube clamp bolts. Before tightening the clamp bolts, be sure the following conditions have been met:
 - (1) The clamps must be positioned between the locating dimples at either end of the adjuster tube. The clamps must be positioned within the angular travel shown.
 - (2) Both inner and outer connecting rod ends must rotate for their full travel. The position of each connecting rod end must be maintained as the clamps are tightened to ensure the free movement of each joint.
- m. Torque the adjuster tube bolts to 40 ft-lbs (54 N.m).
- n. Lower the vehicle.

Section XXVII. MAINTENANCE OF POWER STEERING SYSTEM

	Para.		Para.
General	4-225	Power Steering Pump	
Pitman Shaft Seal Replacement	4-228	Replacement	4-229
Power Steering Gear		Power Steering System	
Replacement	4-227	Maintenance	4-226

4-225. GENERAL.

This section contains information on the maintenance of the power steering system that are maintainable at the Organizational level.

4-226. POWER STEERING SYSTEM MAINTENANCE.

This task covers:

- | | |
|-----------------|---------------|
| a. Testing | b. Removal |
| c. Installation | d. Adjustment |

INITIAL SETUP:

Test Equipment

- Power Steering Gauge
(J-5176D)
- Power Steering Gauge Adapter, 18 mm
(J-5176-20)

Material/Parts

- Crocus Cloth
(Appendix D, Item 10)
- Power Steering Fluid
(Appendix D, Item 14)

Tools

- Pocket Thermometer (0-2200F)
(J-5421-20)
- Power Steering Analyzer
(J-25323)
- Power Steering Analyzer Adapter
(J-29525)
- General Mechanics Tool Kit
- Belt Tension Gauge
(J-24600B)

General Safety Instructions

- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

TESTING

NOTE

The power steering system may be tested using either the power steering gauge, or the power steering analyzer. The analyzer will measure the flow rate in addition to the pressure. The power steering system test is a

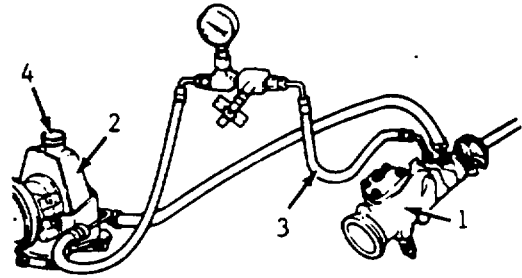
method used to identify and isolate hydraulic circuit difficulties.

All test are made with the engine idling at normal operating temperature. Check the idle adjustment and if necessary adjust the engine idle speed to the correct specification.

4-226. POWER STEERING SYSTEM MAINTENANCE. (Continued)

a. Power Steering Gauge (J-5176D):

- (1) Place a container under the steering gear (1) or pump (2) to catch the fluid when disconnecting or connecting the hoses.
- (2) With the engine NOT running, disconnect the pressure hose (3) at the steering gear or power steering pump and install the power steering gauge to both hoses using adapter fitting (18mm). The gauge must be between the shut-off valve and pump. Open the shut-off valve.
- (3) Remove the filler cap (4) from the pump reservoir (2) and check the fluid level. Fill the pump reservoir, with power steering fluid (Appendix D, Item 14) to the full mark on the dipstick. Start the engine and check the connections at the power steering gauge for leakage while momentarily holding steering wheel against stop.
- (4) Bleed the system:



- (a) Fill the pump fluid reservoir (2) to the proper level and let the fluid settle for at least two minutes.
- (b) Start the engine and let it run for a few seconds. Then turn the engine off.
- (c) Add fluid if necessary.
- (d) Repeat the above procedure until the fluid level remains constant after running the engine.
- (e) Raise the front end of the vehicle so that the wheels are off the ground.
- (f) Start the engine. Slowly turn the steering wheel right and left, lightly contacting the wheel stops.
- (g) Add power steering fluid (Appendix D, Item 14) if necessary.
- (h) Lower the vehicle and turn the steering wheel slowly from lock to lock.

NOTE

When a power steering pump or gear has been installed, or an oil line has been disconnected, the air that has entered the system must be bled out before the vehicle is operated. If air is allowed to remain in the power steering fluid system, noisy and unsatisfactory operation of the system may result. Bleed air from the hydraulic system as follows:

4-226. POWER STEERING SYSTEM MAINTENANCE. (Continued)

- (i) Stop the engine. Check the fluid level and refill as required.
 - (j) If the fluid is extremely foamy, allow the vehicle to stand a few minutes and repeat the above procedure.
- (5) Insert thermometer in the reservoir filler (4) opening. Move the steering wheel from stop to stop several times until the thermometer indicates that the hydraulic fluid in the reservoir has reached a temperature of 150 \pm to 170 \pm F (65 \pm to 77 \pm C).

NOTE

To prevent scrubbing flat spots on the tires, do not turn the steering wheel more than five times without rolling the vehicle to change the tire-to-floor contact area.

- (6) Start the engine and check the pump fluid level. Add power steering fluid if required. When the engine is at normal operating temperature, the initial pressure reading on the gauge (valve open) should be in the 80-125 psi (550-860 kPa) range. Should this pressure be in excess of 200 psi (1380 kPa) check the hoses for restrictions and the poppet valve for proper assembly.

CAUTION

Do not leave valve fully closed for more than 5 seconds as the pump could be damaged internally.

- (7) Close the gate valve fully 3 times. Record the highest pressures attained each time.

NOTE

If the pressures recorded are within the range of 1350-1450 psi (9308-9998 kPa) minimum and maximum, and the range of readings is within 50 psi (345 kPa), the pump is functioning within its specifications.

If the pressures recorded are high, but do not repeat within 50 psi (345 kPa), the flow controlling valve is sticking. Remove the valve, clean it and remove any burrs using crocus cloth (Appendix D, Item 10) or fine hone. If the system contains some dirt, flush it. If it is exceptionally dirty, both the pump and gear must be completely disassembled, cleaned, flushed and reassembled before further usage, or the pump must be replaced.

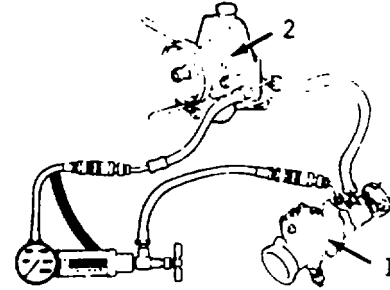
4-226. POWER STEERING SYSTEM MAINTENANCE. (Continued)

- (8) If the pump checks within specifications, leave the valve open and turn the steering wheel into both corners. Record the highest pressures and compare with the maximum pump pressure recorded. If this pressure cannot be attained in either (or one) side of the gear, the gear is leaking internally and must be disassembled and repaired or replaced (paragraph 4-227).
- (9) Shut the engine off, remove the testing gauge, reconnect the pressure hose, check the fluid level and replace the hoses as necessary.
- (10) If the problem still exists, the steering and front suspension must be thoroughly examined.

b. Power Steering Analyzer.

- (1) Place a container under the steering gear (1) or pump (2) to catch the fluid when disconnecting or connecting the hoses.
- (2) With the engine NOT running, disconnect the pressure hose at the steering gear or power steering pump. Thread the analyzer female adapter into the pressure hose and the male adapter into the gear or pump. Connect the power steering analyzer hoses to the adapter.
- (3) If the analyzer has never been used, it will be necessary to bleed the power steering system to remove all the air. The

analyzer gauge must be open during this procedure.



- (4) Add power steering fluid (Appendix D, Item 14) to the pump (1) if required.
- (5) Run the engine at idle speed with the gate valve open and record flow and pressure.

NOTE

If the flow is being 2 gpm (7.4 L/min.), the pump appears to be in need of replacement, but continue to test.

If the pressure is above 150 psi (1035 kPa), check the hoses for restriction and check the steering gear.

- (6) Partially close the gate valve to build 620 psi (4278 kPa). Record the flow.

4-226. POWER STEERING SYSTEM MAINTENANCE (Continued).**NOTE**

If the flow drops more than 1 gpm (3.7 L/min.) under flow, disassemble the pump and replace the ring, rotor, and vanes. If the pressure plates are worn or cracked, replace them. Replace all o-ring seals when reassembling the pump. Continue the test.

- (7) Completely close and partially open the gate valve three times (do not allow the valve to remain closed for more than 5 seconds). Record the "gate closed" pressure.
- (8) If the pump pressure recorded is 100 psi (690 kPa) lower than 1350 psi (9308 kPa) replace the flow control valve in the pump. If the pressure recorded is above 1450 psi (9998 kPa) the flow control valve in the pump should be removed and cleaned or replaced. If the system is exceptionally dirty, both the steering gear and pump must be completely disassembled and cleaned before reassembly, or replaced.
- (9) Increase the engine speed from idle to about 1500 rpm. Record the flow.

NOTE

If flow varies more than 1 gpm from flow, then the flow control valve should be removed and cleaned or replaced, the same as in step (8).

- (10) Have the steering wheel turned into the left and then right. Corner lightly against the wheel stops. Record the pressure and flow.

NOTE

Pressures developed in both corners should be nearly the same as the maximum pump output. At the same time, the flow should drop below 0.5 gpm (1.85 L/min.).

If the pressure does not reach maximum output or the flow does not drop below the specified value, excessive internal leakage is occurring. Remove and disassemble the steering gear and remove control valve or replace the steering gear.

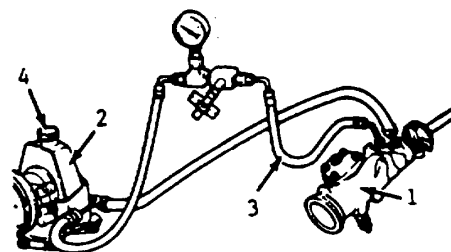
- (11) Have the steering wheel turned slightly in both directions and released quickly while watching the pressure gauge. The needle should move from the normal back pressure reading and snap back as the wheel is released. If it comes back slowly or sticks, the rotary valve in the steering gear is sticking. Remove, disassemble, and clean the rotary valve. If the system contains a lot of dirt and foreign material, disassemble the pump, the gear, clean and reassemble, or replace.
- (12) If the problem still exists, the steering and front suspension must be thoroughly examined.

4-226. POWER STEERING SYSTEM MAINTENANCE (Continued).REMOVAL

- Loosen the pivot nut (1) and pump brace adjusting bolts (2).
- Remove the pump belt (3) from the vehicle.

INSTALLATION

- Install pump belt (3) over pulley.
- Move the pump and bracket assembly outward, away from the engine.
- Torque the pivot nut (1) and brace adjusting bolts (2) to 32 ft-lbs (44 N.m).

ADJUSTMENT**CAUTION**

When adjusting a power steering pump belt, never pry against the pump reservoir or pull against the filler neck.

- Place the belt tension gauge midway between the pulleys on drive belt being checked.

NOTE

With old (used) belts, the tension should read 67 lbs (300 N). With a new belt, not having operated on the engine, the tension should read 146 lbs (650 N).

- Loosen the pivot bolt and pump brace adjusting nuts and adjust the belt to correct tension by moving the pump outward, away from the engine.
- Torque the pump bracket adjusting nut and the pivot bolt nut to 32 ft-lbs (44 N.m).
- Check the belt tension to insure correct tension, then remove the gauge from the belt.

4-227. POWER STEERING GEAR REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

General Mechanics Tool Kit

Materials/Parts

Steering Gear (016-90002)

General Safety Instructions

Engine OFF

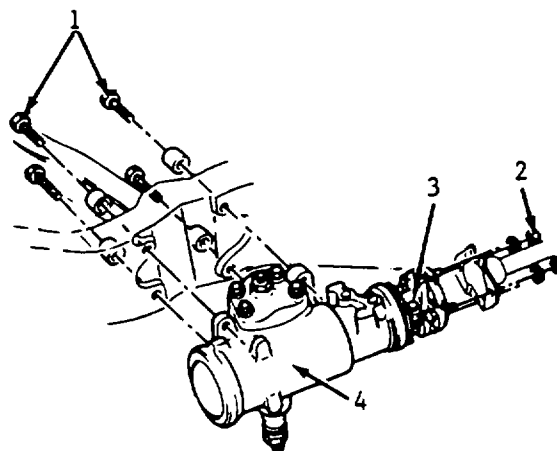
Transmission in (N) neutral.

Parking brake and micro-brakelock set.

4-227. POWER STEERING GEAR REPLACEMENT (Continued).REMOVAL**NOTE**

Place a drain pan below the steering gear.

- a. Remove the hoses from the steering gear. Raise the hose up to prevent oil drainage. Cap or tape the ends of the hose and gear fittings to prevent the entrance of dirt.
- b. Remove the lower universal joint pinch bolt.
- c. Remove the flexible coupling to steering shaft flange bolts (2).
- d. Remove the pitman arm assembly from the pitman shaft on the steering gear (paragraph 4-221).
- e. Remove the steering gear frame bolts (1) and the steering gear (4).
- f. Using a soft mallet, tap lightly on the flexible coupling (3) to remove the coupling from the steering gear stub shaft.



- d. Install the pinch bolt into the split clamp.
- e. Torque the pinch bolt to 31 ft-lbs (42 N.m).
- f. Place the steering gear (4) into position, guiding the coupling bolts into the proper holes in the shaft flange.
- g. Install the steering gear to frame bolts (1).
- h. Torque bolts to 75 ft-lbs (102 N.m).
- i. Install the coupling flange nuts and washers (2). The coupling alignment pins should be centered in the flange slots.
- j. Torque coupling flange nuts to 20 ft-lbs (27 N.m).

INSTALLATION

- a. Install the flexible coupling (3) onto the steering gear stub shaft.
- b. Align the flat in the coupling with the flat on the shaft.
- c. Push the coupling on the stub shaft until the coupling reinforcement bottoms against the end of the shaft.

NOTE

The pinch bolt must pass through the shaft undercut.

NOTE

Maintain a coupling to flange dimension of 0.250 to 0.375 inch (6.4 to 9.5 mm).

4-227. POWER STEERING GEAR REPLACEMENT (Continued).

- k. Install the Pitman arm (paragraph 4-221).
- l. Remove the plugs and caps from the steering gear and hoses.
- m. Install the hoses to the steering gear.
- n. Torque hose fittings to 25 ft-lbs (34 N m).

4-228. PITMAN SHAFT SEAL REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- Pitman Arm Puller (J-29107)
- Internal Snap Ring Pliers (J-4245)
- Steering Gear Pitman Shaft Oil Seal Installer (J-6219)
- General Mechanics Tool Kit

General Safety Instructions

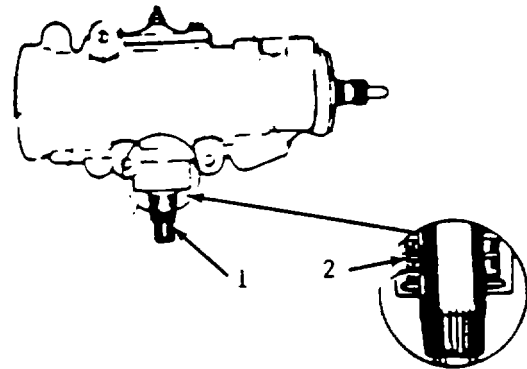
- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

Material/Parts

- Crocus Cloth (Appendix D, Item 10)
- Power Steering Fluid (Appendix D, Item 14)
- Seal (7826470)

REMOVAL

- a. Mark the position of the Pitman arm to the Pitman shaft (1).
- b. Remove the pitman arm using the pitman arm puller (paragraph 4-221).
- c. Position a drain pan under the steering gear.
- d. Remove the retaining ring using the internal snap ring pliers.
- e. Start the engine and full turn the steering wheel to the left turn position for one or two seconds at a time. This will force the Pitman shaft seals (2) and washers out of the housing).



- f. Stop the engine.
- g. Remove the Pitman shaft seals (2) and washers from the Pitman shaft (1).

4-228. PITMAN SHAFT SEAL REPLACEMENT (Continued).

INSTALLATION

- a. Prior to installation, clean the Pitman shaft (1) and seal (2) areas using a crocus cloth (Appendix D, Item 10).
- b. Lubricate the new seals (2) with power steering fluid (Appendix D, Item 14).
- c. Apply a single layer of tape to the Pitman arm shaft (1) to avoid damaging the seals (2).
- d. Install the single lip seal and washer using the steering gear Pitman shaft oil seal installer. Install far enough to provide clearance for the remaining seal, washer, and retaining ring.

NOTE

Do not allow the seal (2) to bottom on the end of the counter bore.

- e. Install the double lip seal and washer using the steering gear Pitman shaft oil double seal installer.
- f. Install the retaining ring using the internal snap ring pliers.
- g. Install the Pitman arm (paragraph 4-221).

4-229. POWER STEERING PUMP REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:**Tools**

Water Pump and Power Steering Pulley
Remover (J-29785-A)
Power Steering Pump Pulley Installer
(J-25033-B)
General Mechanics Tool Kit

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

Materials/Parts

Power Steering Fluid (Appendix D,
Item 14).
Steering Pump (017-90001)

REMOVAL

- a. Place a drain pan below the pump.
- b. Remove hoses at the pump. Raise the hose up to prevent drainage of the oil. Cap or tape the ends of the hose and pump to prevent the entrance of dirt.
- c. Loosen the pump adjusting bolts (2) and nuts (3).
- d. Remove the pump belt (1).
- e. Remove the pump adjusting bolts (2), nuts (3), and brackets (4).

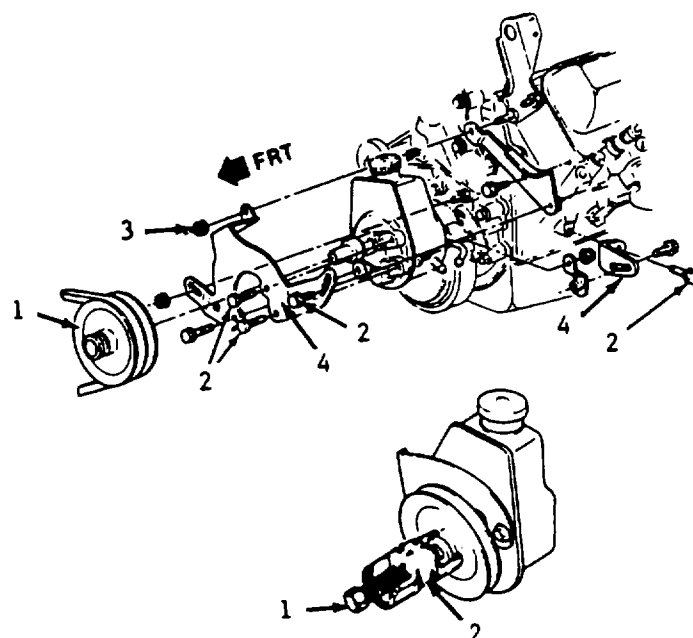
4-229. POWER STEERING PUMP REPLACEMENT (Continued).

- f. Remove the pulley from the pump with the water pump and power steering pulley removed.

NOTE

Be sure the pilot bottoms in the pump shaft by turning the nut to the top of the pilot bolt.

- g. Hold the pilot bolt (1) and turn the nut (2) counterclockwise.

**INSTALLATION**

- a. Install the brackets (4) to the pump.
b. Install the pulley to the pump by placing the pulley on the end of the pump shaft and installing the power steering pump pulley installer.

NOTE

Be sure the pilot bolt bottoms in the shaft by turning the nut to the top of the pilot bolt.

- c. Hold the pilot bolt (1) and turn the nut (2) clockwise.
d. Install the pump assembly by attaching the parts loosely to the engine.

CAUTION

Be sure the hoses are routed in the same position they were in before removal, avoiding sharp bends and kinking.

- e. Install the power steering hoses to the pump.

CAUTION

Do not start the engine with any power steering hose disconnected.

- f. Torque the power steering hoses to 20 ft-lbs (27 N.m).
g. Fill the reservoir with power steering fluid (Appendix D, Item 14). Bleed the pump by turning the pulley backwards (counterclockwise as viewed from the front of the vehicle).
h. Install the pump belt (1) over the pulley and adjust the tension.
i. Torque the pump bolt and adjusting nuts and bracket bolts and nuts to 32 ft-lbs (44 N.m).
j. Fill and bleed the system.

Section XXVIII. MAINTENANCE OF FRONT SUSPENSION ASSEMBLY

	Para.
General.....	4-230
Leaf Spring And Bushing Replacement	4-238
Shock Absorber Replacement	4-231
Spindle Replacement	4-236
Steering Knuckle And Arm Replacement	4-237

	Para.
Stabilizer Bar Replacement.....	4-232
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Wheel Hub Bolt Replacement	4-235
Wheel Hub/Rotor Replacement	4-233

4-230. GENERAL.

This section contains information on the maintenance of the front suspension assembly that are maintainable at the Organizational level.

4-231. SHOCK ABSORBER REPLACEMENT. (Continued)

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Hoist

Materials/Parts

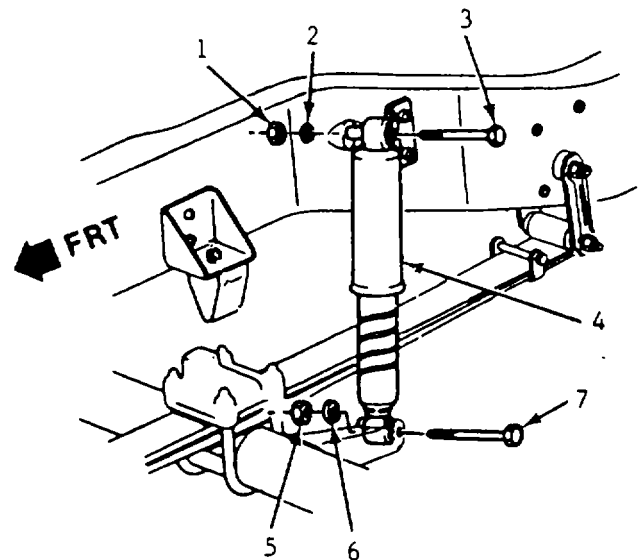
Shock Absorber (3187846)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Raise the vehicle on a hoist.
- b. Remove the nut (1), washer (2) and bolt (3) attaching the shock absorber (4) to the frame.
- c. Remove the nut (5), washer (6) and bolt (7) attaching the shock absorber to the axle.
- d. Remove shock absorber (4).



- c. Lower the vehicle to the floor.

INSTALLATION

- a. Install the shock absorber (4) by installing the bolt (3), washer (2) and nut (1) to the frame and torque to 65 ft-lbs (88 N.m).
- b. Install the shock absorber bolt (7), washer (6), and nut (5) to the axle and torque to 65 ft-lbs (88 N m).

4-232. STABILIZER BAR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Hoist

Materials/Parts

Rubber Lubricant
(Appendix D, Item 24)
Stabilizer Bar (328132)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

- a. Raise the vehicle on a hoist.
- b. Disconnect the stabilizer bar (4) from the frame brackets by removing the nuts (5), washers (6), brackets (7), and bolts (9).
- c. Disconnect the stabilizer bar (4) from the spring plate (1) by removing the bolts (3) and washers.
- d. Remove the stabilizer bar.
- e. Remove bushings (8) from the stabilizer bar.

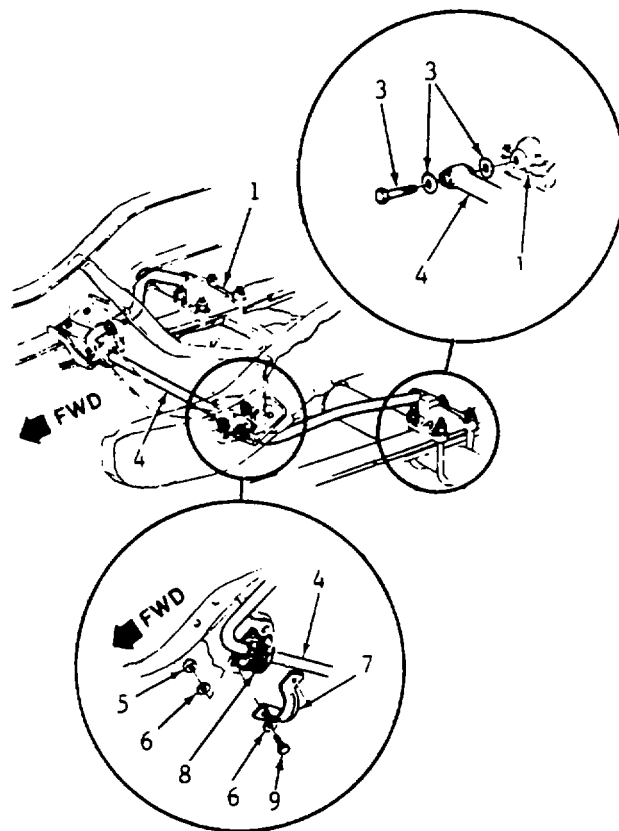
INSTALLATION

- a. Install bushings (8) onto the stabilizer bar.

NOTE

Use rubber lubricant (Appendix D, Item 24) when installing the bushings (slit faces forward) onto the stabilizer bar.

- b. Connect the stabilizer bar (4) to the frame brackets by installing the brackets (7), bolts (9), washers (6), and nuts (5). Do not tighten.



- c. Connect the stabilizer bar (4) to the spring plate (1) by installing the washers (6) and bolts (3).
- d. Torque the nuts (5) to 52 ft-lbs (70 N.m) and bolts (9) to 133 ft-lbs (180 N.m).
- e. Lower the vehicle to the ground.

4-233. WHEEL HUB/ROTOR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- Torque Wrench Adapter (J-23446)
- Wheel Bearing Nut Wrench (J-26878-A)
- Drive Handle (J-8092)
- Bearing Race Installer (Outer) (J-6368)
- Bearing Race Installer (Inner) (J-23448)
- General Mechanics Tool Kit
- Brass Drift Punch
- Hammer
- Jack Stand

Equipment Condition

Para.	Condition Description
4-203	Tire and Wheel Assembly Removed
4-218	Brake Calipers Removed
4-253	Locking Hub Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set
Batteries disconnected.

Materials/Parts

- Cleaning Solvent (Appendix D, Item 44)
- Brush, Medium Bristle (Appendix D, Item 6)
- Grease, Lubricating (Appendix D, Item 15)
- Wheel Hub/Rotor (352982)

REMOVAL

- a. Raise the vehicle and support it with suitable jack stands.
- b. Remove the locking nut (2), ring (3), and adjusting nut (4) using the wheel bearing nut wrench.
- c. Remove the hub/rotor assembly (8).

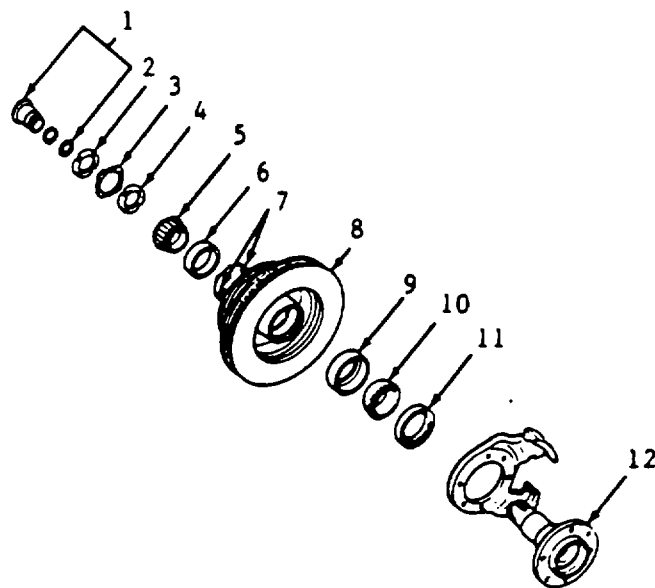
NOTE

The outer wheel bearing (5) will slide off the spindle (12) ahead of the hub/rotor (8).

- d. Use a brass drift punch and hammer for the seal (11) and races (6 and 9).

NOTE

The inner bearing (10), race (9) are behind the seal (11). Check all bearings and races for signs of damage or wear. If either is evident, replace part(s) as necessary.



4-233. WHEEL HUB/ROTOR REPLACEMENT. (Continued)**INSTALLATION****CAUTION**

Do not damage the hub/rotor during the race installations.

- a. Install races (4 and 9) into the rotor/hub (8). Use the driver handle and bearing race installer (outer) for installation of the outer bearing outer race (6). Use the driver handle and bearing race installer (inner) for installation of the inner bearing inner race (9).

WARNING

Cleaning solvent, Federal Specification P-D-680, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

- b. Clean the grease from the rotor/ hub (8), spindle (12), and wheel bearings (5 and 10) using cleaning solvent (Appendix D, Item 44) and a small brush with no loose bristles.

WARNING

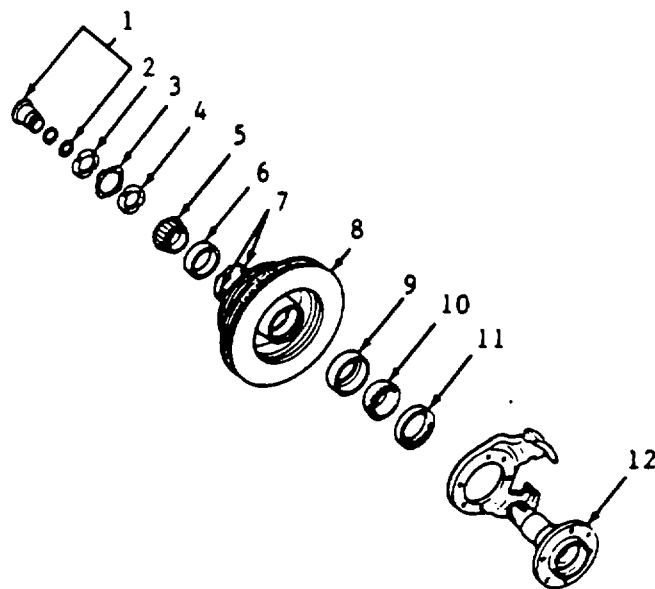
Do not spin the wheel bearings with compressed air to dry them as the wheel bearings may be damaged. Be certain to use an approved high temperature front wheel bearing grease (Appendix D, Item 15).

NOTE

Do not mix greases as mixing may change the grease's properties resulting in poor performance.

- c. Apply a thin film of grease (Appendix D, Item 15) to the spindle (12) at the outer wheel bearing seat and at the inner wheel bearing seat and at the shoulder and seal seat.

- d. Put a small quantity of grease inboard of each wheel bearing cup, inside the rotor/hub (8).



- e. Fill the wheel bearing (cone and roller assemblies) full of grease (Appendix D, Item 15)

CAUTION

Failure to completely pack the wheel bearings (cones, rollers and cage) with grease will result in premature wheel bearing damage and/or wear.

NOTE

Use a cone-type grease packer that forces grease into the bearing. If a cone-type grease packer is not available, pack the bearings by hand. If packing the wheel bearings by hand, work the grease into the bearings between the rollers, cones and the cage.

- f. Install the inner wheel bearing (10) into the rotor/hub (8).

4-233. WHEEL HUB/ROTOR REPLACEMENT. (Continued)

NOTE

Put an additional quantity of grease outboard of this wheel bearing.

- g. Install new seal (11).

NOTE

Use a flat plate to install the seal so it is flush with the rotor/hub flange, lubricating the seal lip with a thin layer of grease.

- h. Install the rotor/hub (8).

CAUTION

Do not damage the spindle threads.

- i. Install the outer wheel bearing (5) by pressing on the spindle until the wheel bearing fully seats against the rotor/hub outer race.

- j. Install the adjusting nut (4).
- k. Adjust the wheel bearing.
- l. Install ring (3) and locking nut (2).

NOTE

Tang on the inside diameter of the ring must pass onto the slot on the spindle (12). The hole in the ring must align with the pin on the lock nut (2). Move the adjustment nut (4) to align the pin.

- m. Using the wheel bearing nut wrench and the torque wrench adapter, torque the lock nut (2) to 160 ft-lbs (217 N.m).
- n. Install the locking hub (1).
- o. Install the caliper.
- p. Install the wheel and tire.
- q. Lower the vehicle to the ground.

4-234. WHEEL BEARING ADJUSTMENT.

This task covers:

Adjustment

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Bearing (7451928)

Equipment Condition

Para.	Condition Description
4-203	Wheel Assembly Removed
4-218	Disc Brake Lining Removed
4-253	Manual Locking Hub Removed

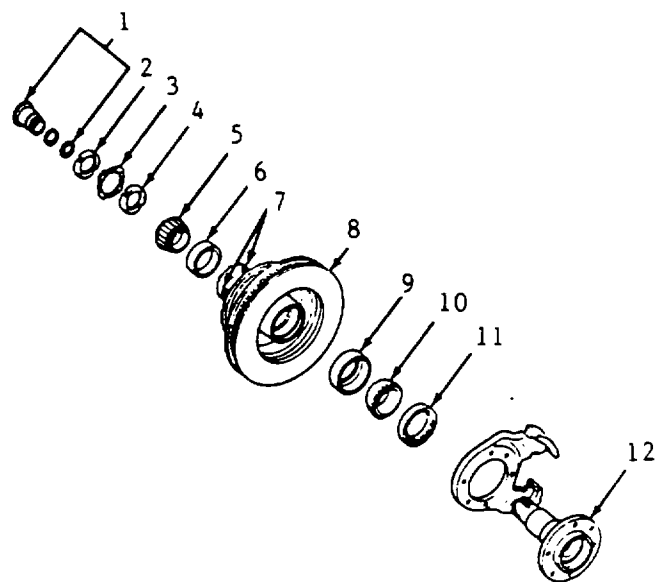
4-234. WHEEL BEARING ADJUSTMENT. (Continued)**ADJUSTMENT****NOTE**

The proper functioning of the front suspension cannot be maintained unless the front wheel bearings are correctly adjusted. The cones must be a slip fit on the spindle and the inside diameter of the cones must be lubricated to insure the cones will creep. The adjusting nut must have a free-running fit on the spindle threads.

- a. Torque the adjusting nut (4) to 50 ft-lbs (60 N.m) while rotating the hub/rotor in order to seat the bearings.
- b. Back off the adjusting nut (4) and retighten.
- c. Torque the adjusting nut to 50 ft-lbs (60 N.m) while rotating the wheel.
- d. Back off the adjusting nut (4) enough to free the bearing.
- e. Adjust the ring (3) and lock nut (2).

NOTE

The tang on the inside diameter of the ring must pass onto the slot on the spindle (12). The hole in the ring must align with the pin on the lock nut (2). Move the adjustment nut (4) to align the pin.



- f. Torque the lock nut (2) to 160 ft-lbs (217 N.m) minimum.
- g. Measure the endplay in the hub/ rotor assembly. It should be set between 0.001 to 0.010 inch (0.025 to 0.254mm).
- h. Install the locking hub assembly (1).
- i. Install the caliper (paragraph 4-218).
- j. Install the wheel following paragraph 4-203 and torque the stud nuts to 140 ft-lbs (190 N.m).
- k. Install manual locking hub (paragraph 4-253).

4-235. WHEEL HUB BOLT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

Hub/Rotor Support
(J-9746-02)
General Mechanics Tool Kit

Materials/Parts

Hub Bolt (355815)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-203	Tire and Wheel Assembly Removed
4-218	Hub/Rotor Assembly Removed

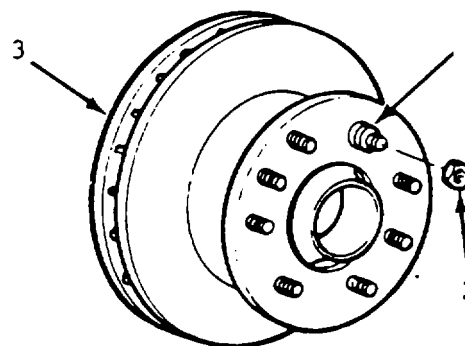
General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set

REMOVAL**CAUTION**

Do not damage the wheel mounting surface on the hub/rotor flange.

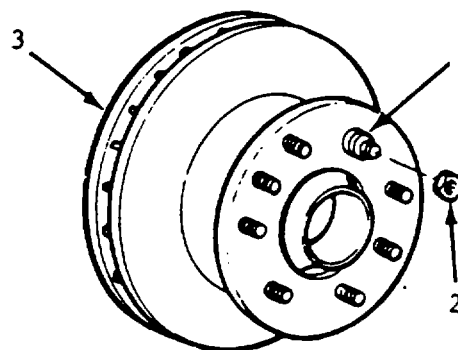
- Support the hub/rotor using the hub/rotor support to prevent damage to the rotor face.
- Remove the wheel hub bolts (1) using a press and the support.

INSTALLATION

- Install new serrated bolt (1) into the hole in the hub/rotor (3).
- Place four washers onto the bolt, then fasten a nut (2) onto the bolt until the nut bottoms on the washers.
- Tighten the nut (2) until the bolt fully seats into the hub/ rotor (3).
- Remove the nut (2) and washers.

4-235. WHEEL HUB BOLT REPLACEMENT. (Continued)

- e. Install the hub/rotor to the vehicle (paragraph 4-218).
- f. Install the wheel and tire assembly (paragraph 4-203).
- g. Torque the wheel stud nut to 140 ft-lbs (190 N.m).



4-236. SPINDLE REPLACEMENT. (Continued)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- Jack
- Jack Stand
- Driver Handle
(J-8092)
- Bearing Installer
(J-21465-17)
- General Mechanics Tool Kit
- Mallet

Equipment Condition

Para	Condition Description
4-203	Wheel Assembly Removed
4-218	Wheel Hub/Rotor Removed

General Safety Instructions

- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set

Materials/Parts

- Grease, Lubricating
- Spindle (14009626)

REMOVAL

- a. Remove the spindle (5) from the steering knuckle (11) by removing the nuts (1), washers (2), plate (3), and bracket (4).
- b. Tap the end of the spindle (5) with a plastic or rubber mallet to break it loose from the steering knuckle (11).

CAUTION

Be sure that the vise jaws do not damage the machine surface of the spindle.

- c. Remove spindle components by securing the spindle in a

4-236. SPINDLE REPLACEMENT. (Continued)

vise, placing the high-step diameter in the jaws and removing the bearing seal (7) and shaft bearing (6).

- d. Remove the spacer (8), seal (9), and oil deflector (10) from the axle shaft.

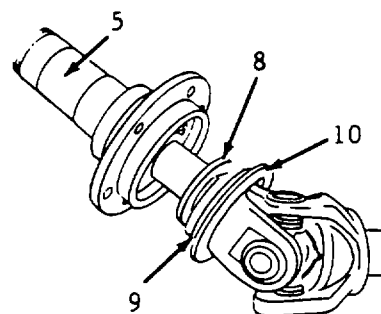
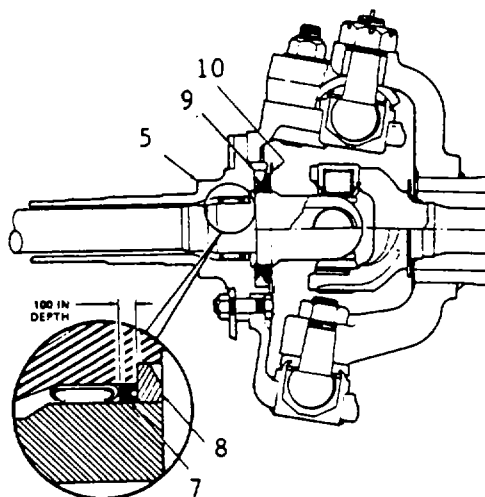
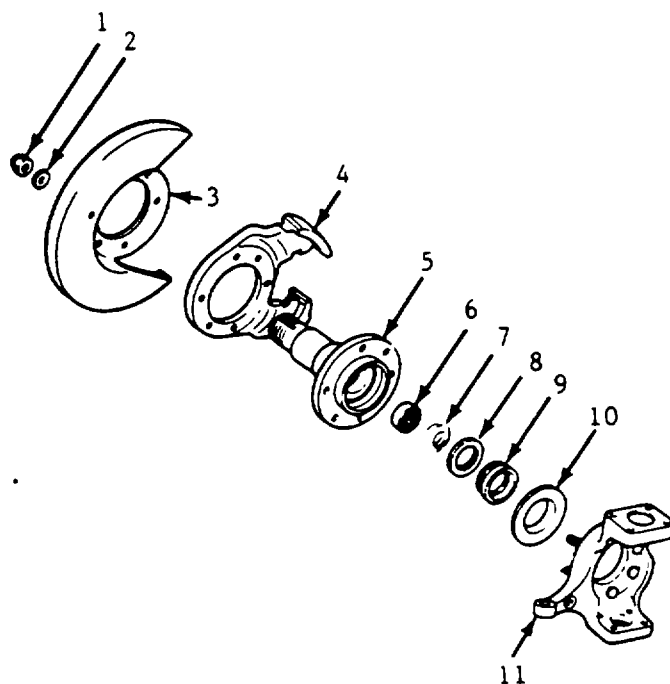
INSTALLATION

- Relubricate the shaft bearing (6) and the spindle (5) with a high melting point type wheel bearing grease (Appendix D, Item 15)
- Install the shaft bearing (6) and the bearing seal (7) into the spindle (5) by using the driver handle and bearing installer.
- Install the oil deflector (10) and seal (9) onto the axle shaft by placing the seal (9) onto the oil deflector (10) with the deflector lip toward the spindle.
- Install the spacer (8) onto the axle shaft with the chamfer points toward the oil deflector (10).
- Install the spindle (5) onto the steering knuckle (11) by sliding the spindle over the axle shaft until it seats on the steering knuckle.

NOTE

The bolts must protrude through the spindle.

- Install the bracket (4), plate (3), washers (2) and new nuts (1).
- Torque the nuts (1) to 65 ft-lbs (88 N.m).



4-236. SPINDLE REPLACEMENT. (Continued)

- h. Install wheel hub/rotor assembly. (paragraph 4-218)
- i. Install the wheel and tire assembly (paragraph 4-203).
- j. Torque the wheel stud nuts to 140 ft-lbs (190 N.m).
- k. Lower the vehicle to the ground.

4-237. STEERING KNUCKLE AND ARM REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

- King Pin Installer (J-28871)
- Front Pinion Bearing Installer (J-7817)
- King Pin Bearing Seal Installer (J-22301)

- Jack
- Jack Stand
- General Mechanics Tool Kit
- Grease Packer, Cone Type

Materials/Parts

- Grease, Lubricating (Appendix D, Item 15)
- Steering Knuckle (462853)

Equipment Condition

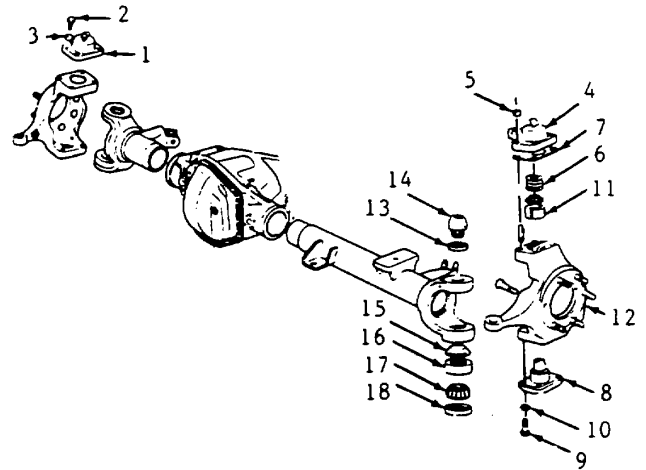
Para.	Condition Description
4-203	Wheel Assembly Removed
4-233	Wheel Hub/Rotor Removed
4-236	Spindle Removed
4-253	Manual Locking Hub Removed

General Safety Instructions

- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set

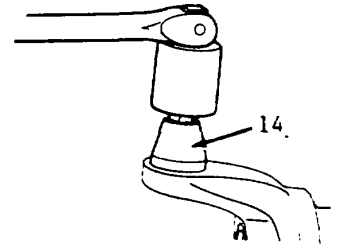
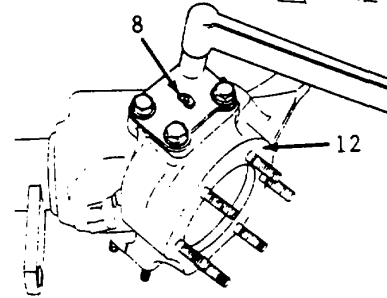
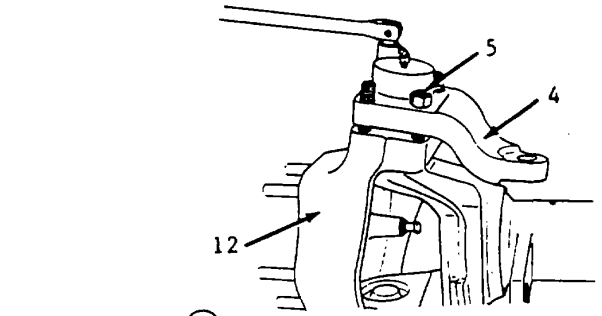
REMOVAL

- a. Remove the upper cap (1) by removing the bolts (2) and washers (3) alternatively as the compression spring will force the cap up.
- b. Remove the steering arm (4) by removing the nuts (5) alternatively as the compression spring (6) will force the steering arm up.



4-237. STEERING KNUCKLE AND ARM REPLACEMENT. (Continued)

- c. Remove the gasket (7) and compression spring (6).
- d. Remove the lower bearing cap and king pin (8) by removing the bolts (9) and washers (10).
- e. Remove the upper king pin bushing (11) by pulling it out through the steering knuckle (12).
- f. Remove the steering knuckle (12) from the axle yoke.
- g. Remove the seal (13).
- h. Remove the upper king pin (14) from the axle yoke by using a large breaker bar and the king pin installer and applying 500-600 ft-lbs (677-813 N.m) of torque to break the king pin free.
- i. Remove the retainer (15), race (16), bearing (17) and the seal (18) from the axle yoke by punching all the components out at once.

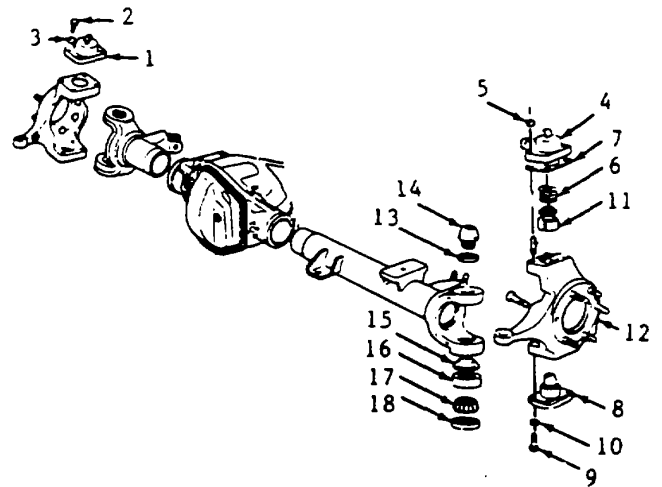


NOTE

Discard the old seal (18) and retainer (15).

INSTALLATION

- a. Install a new retainer (15) and the race (16) by using the front pinion bearing installer.
- b. Fill the area in the retainer (15) and race with an approved high temperature bearing lubricant (Appendix D, Item 15).



4-237. STEERING KNUCKLE AND ARM REPLACEMENT. (Continued)

- c. Grease the bearing (17) by using a cone-type grease packer that forces grease into the bearing.

NOTE

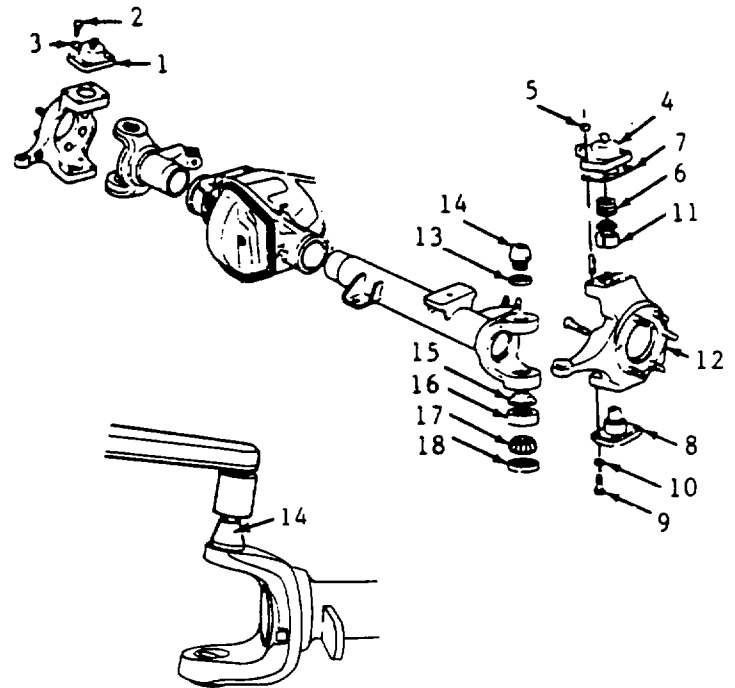
If a cone-type grease packer is not available, pack the bearing between the rollers, cones and cage.

- d. Install the bearing (17) and new seal (18) using the king pin bearing seal installer.

NOTE

Do not distort the seal when installing. It will protrude slightly from the surface of the axle yoke flange when fully seated.

- e. Install the upper king pin (14) by using the king pin installer.
- f. Torque the king pin (14) to 500 ft-lbs (745 N.m).
- g. Install the steering knuckle (12) and bushing (11) by inserting the felt seal (13) to the king pin (14) through the steering knuckle, placing the knuckle onto the king pin (14) and inserting the bushing (11) over the king pin (14).
- h. Install the bearing cap and king pin (8) to the steering knuckle (12) with four bolts (9) and washers (10).
- i. Torque the bolts (9) alternatively and evenly to 80 ft-lbs (108 N.m).
- j. Install the steering arm (4) to the steering knuckle (12) with the compression spring (6), gasket (7) and nuts (5).



- k. Torque the nuts alternatively and evenly to 80 ft-lbs (108 N.m).
- l. Install the spindle (paragraph 4-236)
- m. Install the wheel hub/rotor assembly (paragraph 4-233).
- n. Adjust the wheel bearings.
- o. Install the locking hub (paragraph 4-253).
- p. Install the wheel and tire assembly (paragraph 4-203).
- q. Torque the wheel stud nuts to 140 ft-lbs (190 N.m).
- r. Check the front end alignment.
- s. Lower the vehicle to the ground.

4-238. LEAF SPRING AND BUSHING REPLACEMENT. (Continued)

This task covers:

a. Removal

b. Installation

INITIAL SETUP:Tools

Jack
 Jack Stand
 Hoist
 General Mechanics Tool Kit

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set

Materials/Parts

Leaf Spring (14071877)

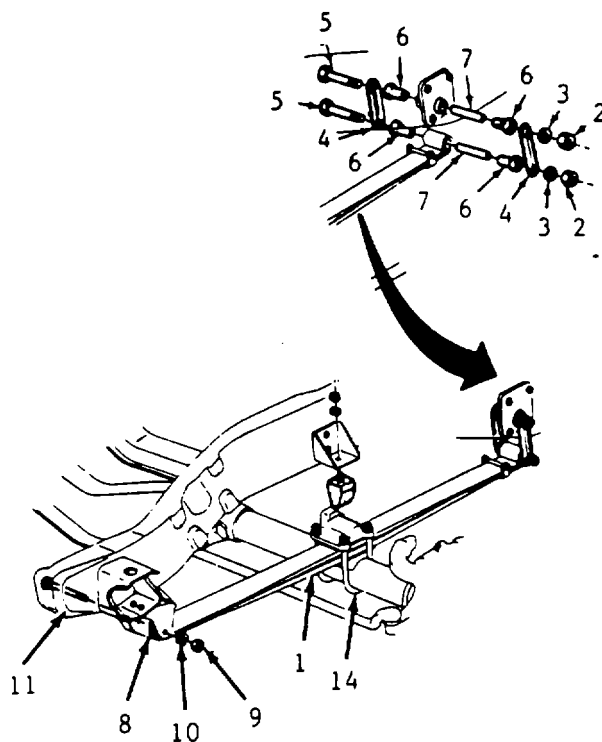
REMOVAL

- Raise the vehicle on a hoist and support the front axle with a floor jack. Raise the floor jack until all tension is relieved from the springs.
- Remove the spring (1) from the frame by removing the nut (2), washer (3), shackle (4), bolt (5), bushings (6) and spacer (7).
- Remove the spring (1) from the hanger (8) by removing the nut (9), washers (10) and bolt (11).
- Remove the spring (1) from the axle as follows:

(1) Left Side: remove nuts (12), washers (13), U-bolts (14) plate (15) and the spacers (16).

(2) Right Side: Remove the bolts (17), nuts (12), washers (13) U-bolts (14), plate (15) and the spacers (16).

- Remove the shackles (4) from the spring (1) by removing the nut (2), washer (3), bolt (5), bushings (6) and the spacer (7).



- Remove the bushing from the spring eye by placing the spring in a press and pressing out the bushing using a suitable rod, pipe or tool.

4-238. LEAF SPRING AND BUSHING REPLACEMENT. (Continued)

INSTALLATION

- a. Press a new bushing into the spring eye making sure the tool presses on the steel outer shell of the bushing.

NOTE

Bushing must protrude an equal amount on either side of the spring eye when properly installed.

- b. Install the shackles (4) into the spring (1) with the spacer (7), bushings (6), washers (3), bolt (5) and nut (2).

NOTE

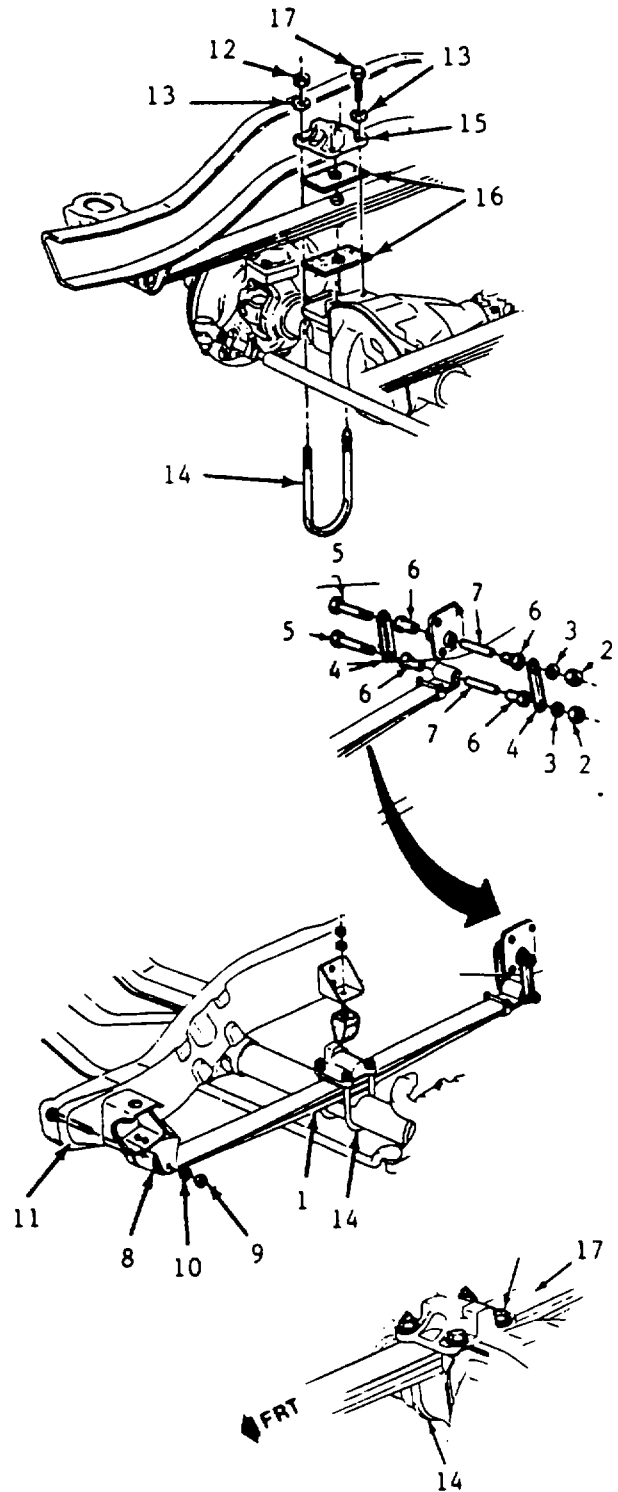
Do not tighten at this time.

- c. Install the upper spacer (16) onto the spring (1).
- d. Install the spring into the hanger with the bolt (17), washers (13) and nut (12).

NOTE

Do not tighten at this time.

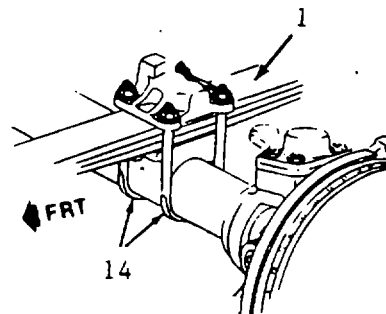
- e. Install the spring into the frame by placing the bushings (6) and the spacer (7) into the frame, inserting the shackle (4) into position and attaching bolt (5), washer (3) and nut (2).



4-238. LEAF SPRING AND BUSHING REPLACEMENT. (Continued)

NOTE**Do not tighten at this time.**

- f. Install the spring to the axle as follows:
- (1) Right Side: Attach the lower spacer (16), plate (15), U-bolt (14), washers (13), bolts (17) and nuts (12).
 - (2) Left Side: Attach the lower spacer (16), plate (15), U-bolts (14), washers (13), and nuts (12).
- g. Tighten nuts (12) and bolts (17) in sequence (2-4-1-3) to 150 ft-lbs. (203 N.m).
- h. Torque the spring to frame nuts (9) to 90 ft-lbs (122 N.m).
- i. Torque the spring to hanger fastener nuts (2) to 50 ft-lbs. (68 N.m).
- j. Lower the floor jack and lower the vehicle to the ground.



Section XXIX. MAINTENANCE OF REAR SUSPENSION ASSEMBLY

	Para.		Para.
General	4-239	Rear Suspension Shock	
Rear Suspension Leaf Springs		Absorbers Replacement	4-240
and Bushings Replacement.....	4-242	Rear Suspension Stabilizer	
		Bar Replacement	4-241

4-239. GENERAL.

This section contains information on the maintenance of the rear suspension assembly that are maintainable at the Organizational level.

4-240. REAR SUSPENSION SHOCK ABSORBERS REPLACEMENT.

This task covers:

- | | |
|-------------------|------------------------|
| a. Removal | b. Installation |
|-------------------|------------------------|

INITIAL SETUP:

Tools

- Hoist
- Jack
- General Mechanics Tool Kit

General Safety Instructions

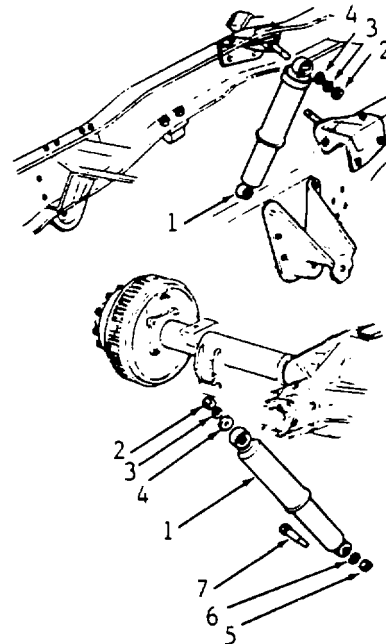
- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

Materials/Parts

- Shock Absorbers (3187845)

REMOVAL

- a. Raise the vehicle on a hoist and support the rear axle independently of the rest of the vehicle.
- b. Disconnect the shock absorber (1) from the frame by removing the nut (2), spring washer (3) and/or washer (4).
- c. Remove the shock absorber (1) from the axle by removing the nut (5), spring washer (6) and bolt (7).



INSTALLATION

- a. Install the shock absorber (1) to the frame by installing the spring washer (3) and/or washer (4) plus the nut (2).

4-240. REAR SUSPENSION SHOCK ABSORBERS REPLACEMENT. (Continued)

- b. Torque the nut to 52 ft-lbs (70 N.m).
- c. Connect the shock absorber (1) to the axle by lining up the shock absorber with the axle bracket and installing the bolt (7), spring washer (6), and the nut (5).
- d. Torque the nut (5) to 114 ft-lbs (155 N.m).
- e. Lower the vehicle to the ground.

4-241. REAR SUSPENSION STABILIZER BAR REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools
 Hoist
 Jack
 General Mechanics Tool Kit

General Safety Instructions

Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

Materials/Parts

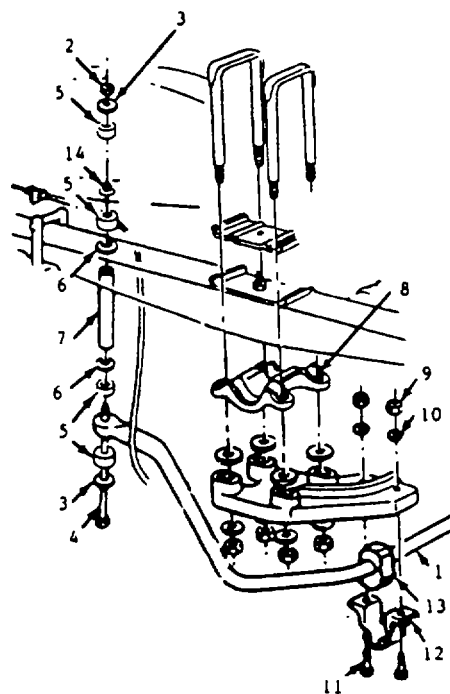
Stabilizer Bar (328132)

REMOVAL

- a. Raise the vehicle on a hoist. Support the rear axle independently of the rest of the vehicle.
- b. Disconnect the stabilizer bar (1) from the frame by removing the nut (2) and washer (3), then sliding the link bolt (4) out along with the grommets (5), washers (6), and spacer (7).
- c. Remove the stabilizer bar (1) from the anchor plates (8) by removing the nuts (9), washers (10), bolts (11) and the clamps (12).
- d. Remove the insulators (13) from the stabilizer bar (1).

INSTALLATION

- a. Install the insulators (13) to the stabilizer bar (1).
- b. Install the stabilizer bar (1) to the anchor plates (8) with the clamps (12), bolts (11), washers (10), and nuts(9).



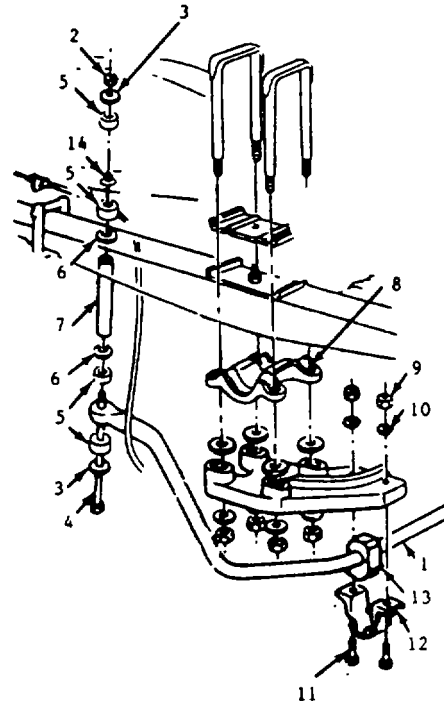
- c. Torque the nuts (9) to 147 ft-lbs (200 N.m).

4-241. REAR SUSPENSION STABILIZER BAR REPLACEMENT. (Continued)

NOTE

Be sure to route the parking brake cable over the stabilizer bar.

- d. Connect the stabilizer bar (1) to the frame positioning the link bolt (4), washers (3), grommets (6), spacer (7), retainer (14), and nut (2).
- e. Torque the nuts (2) to 147 ft-lbs (200 N.m).
- f. Lower the vehicle to the ground.



4-242. REAR SUSPENSION LEAF SPRINGS AND BUSHINGS REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools
 Hoist
 Jack
 Press
 General Mechanics Tool Kit

Equipment Condition	
<u>Para.</u>	<u>Condition Description</u>
4-241	Rear Suspension Stabilizer Bar Removed

Materials Parts
 Leaf Springs (14071877)

General Safety Instructions
 Engine OFF.
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

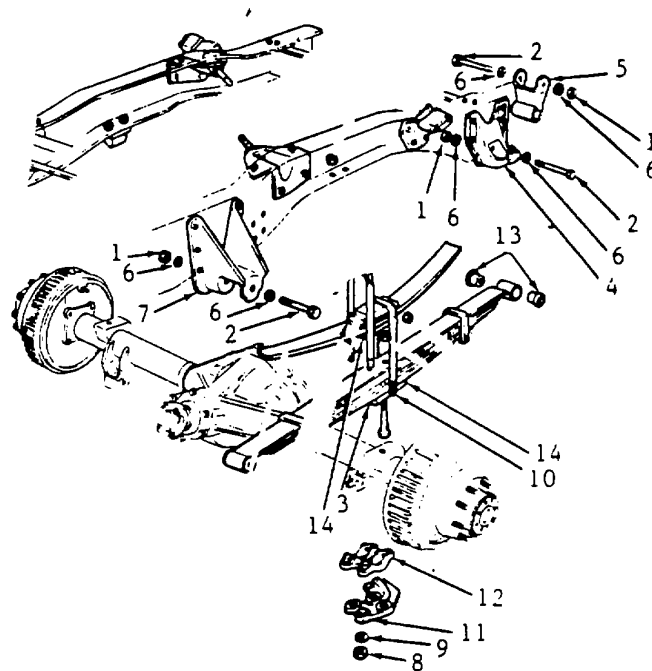
Personnel Required: 2

REMOVAL

- a. Raise the vehicle on a hoist and support the rear axle independently to relieve tension on the leaf springs.

4-242. REAR SUSPENSION LEAF SPRINGS AND BUSHINGS REPLACEMENT (Continued)

- b. Loosen, but do not remove, the spring-to-shackle nut (1) and bolt (2) of the leaf spring (3) from the rear hanger (4).
- c. Remove the nut (1) and bolt (2) securing the shackle (5) to the rear hanger (4).
- d. Remove the nut (1), washer (6) and bolt (2) securing the leaf spring (3) to the front hanger (7).
- e. Remove the nut (1) and bolt (2) securing the shackle to the leaf spring.
- f. Remove nuts (8) and washers (9) from U-bolts (10) and remove stabilizer bar anchor (11) and anchor plate (12).
- g. Remove spring (3).
- h. Remove spring bushing (13).

**INSTALLATION**

- a. Install a new bushing (13) into the leaf spring (3) by using a press to properly position the bushings.
- b. Install the leaf spring (3) to the rear axle by placing the spring in position and fastening the stabilizer bar anchor (11) and anchor plate (12) with the U-bolts (10), washers (8), nuts (9) and if necessary, shims (14).
- c. Torque the nuts (9) in a diagonal sequence 1-3-2-4, initially to 18 ft-lbs (25 N.m) and then a final torque to 147 ft-lbs (200 N.m).

- d. Install the shackle (5) to the leaf spring (3) with the bolts (2), washers (6) and nuts (1) making sure the bolt is positioned correctly.

NOTE**Do not tighten at this time.**

- e. Install the leaf spring (3) to the front hanger (7) with bolt (2), washers (6), and nut (1).

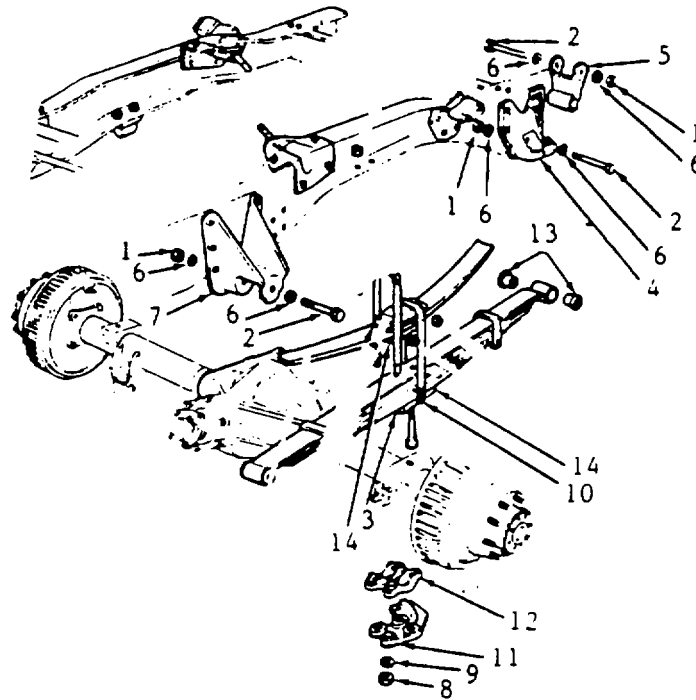
NOTE**Do not tighten at this time**

- f. Install the leaf spring (3) to the rear hanger (4) with bolt (2) washers (6), and nut (1) and

4-242. REAR SUSPENSION LEAF SPRINGS AND BUSHINGS REPLACEMENT. (Continued)

- torque the nut to 92 ft-lbs (125 N.m) and bolt to 110 ft-lbs (150 N.m).
- g. Torque the leaf spring to front hanger nut (1) to 92 ft-lbs (125 N.m) and bolt (2) to 110ft-lbs (150 N.m).

- h. Torque the shackle to leaf spring nuts (1) to 92 ft-lbs (125 N.m) and bolts (2) to 110 ft-lbs (150 N.m).
- i. Lower the support on the rear axle. Lower the vehicle to the ground.



Section XXX. MAINTENANCE OF REAR AXLE ASSEMBLY

	Para.
Differential Side Gear and Pinion Replacement	4-246
General	4-243
Hub and Drum Assembly Replacement	4-248

	Para.
Rear Axle Assembly Replacement	4-244
Rear Axle Shaft Replacement	4-247
Rear Wheel Bearing Replacement	4-245

4-243. GENERAL.

This section contains information on the maintenance of the rear axle assembly that are maintainable at the Organizational level.

4-244. REAR AXLE ASSEMBLY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- Hoist
- Jack
- General Mechanics Tool Kit

Materials/Parts

- Grease, Lubricating, MIL-G-10924
- Transmission Oil (Appendix D, Item 32)
- Rear Axle Assembly (009-90005)

General Safety Instructions

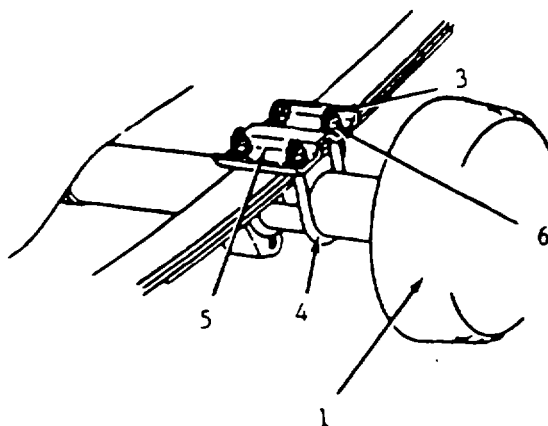
- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-186	Propeller Shaft Disconnected
4-203	Wheel Assembly Removed
4-209	Hydraulic Brake Lines Disconnected
4-211	Height Sensing and Brake Proportioner Valve Disconnected
4-214	Parking Brake Cable Disconnected
4-240	Rear Suspension Shock Absorber Removed
4-247	Rear Suspension Stabilizer Bar Removed

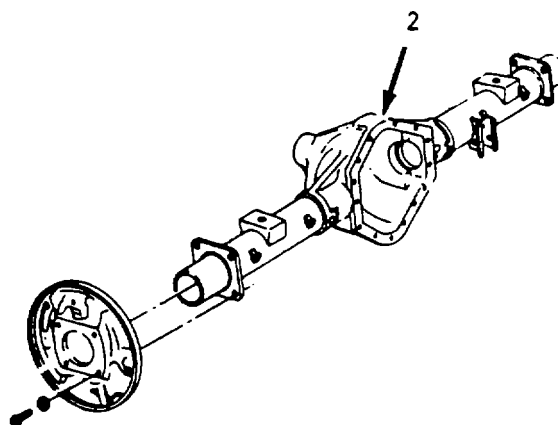
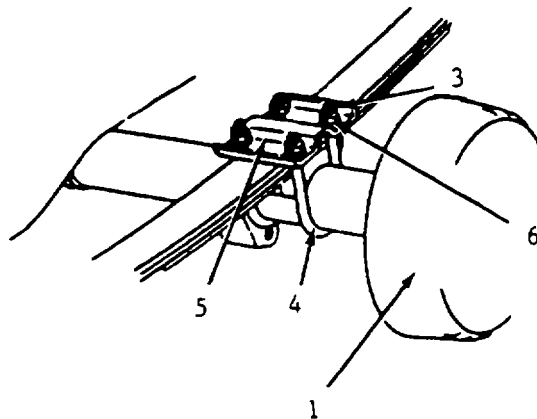
REMOVAL

- a. Raise the vehicle and support the axle with a suitable lifting device.
- b. Remove the brake drum (1) or hub and drum assembly.
- c. Drain lubricant from the axle housing (2).
- d. Disconnect the vent hose from the axle vent fitting.
- e. Remove nuts (3) from the U-bolts (4).
- f. Remove U-bolts, (4), spring plates (5), and spacers (6) from the axle assembly. Lower the jack and the axle assembly.



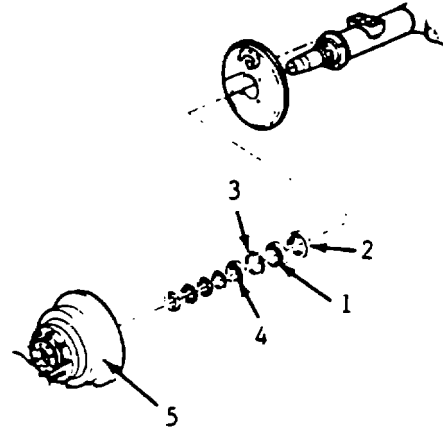
4-244. REAR AXLE ASSEMBLY REPLACEMENT (Continued).**INSTALLATION**

- a. Position the rear axle under the vehicle. Align the axle assembly with the springs.
- b. Install spacers, (6), spring plates (5), and U-bolts (4) to the axle assembly. Raise the axle assembly.
- c. Install washers and nuts (3) to the U-bolts. Thread the nuts on firmly. Adjust the alignment of the semi-float axles.
- d. Install the stabilizer shaft.
- e. Connect the height sensing and brake proportional valve linkage (paragraph 4-211).
- f. Connect the vent hose to the axle vent fitting.
- g. Connect shock absorbers to the axle brackets (paragraph 4-240).
- h. Connect hydraulic brake lines to the connectors (paragraph 4-209.)
- i. Connect the parking brake cable to the lever and flange plate (paragraph 4-214).
- j. Install brake drum (1) hub and drum assembly.
- k. Install the propeller shaft (paragraph 4-186).
- l. Fill axle housing (2) with lubricant (Appendix D, Item 32).
- m. Install the wheel assembly (paragraph 4-203).
- n. Lower the vehicle.



4-245. REAR WHEEL BEARING REPLACEMENT (Continued).

- f. Install inner bearing cup using inner wheel bearing cup installer on handle. Drive cup into place until it seats against hub bore shoulder.
- g. Install new oil seal (2) with wheel hub oil seal installer.
- h. Install axle shaft (paragraph 4-247).
- i. Install hub and drum assembly (paragraph 4-248).
- j. Install wheel assembly (paragraph 4-203).
- k. Lower vehicle.



4-246. DIFFERENTIAL SIDE GEAR AND PINION REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Soft Faced Hammer

Materials/Parts

Side Gear (3977344)

Equipment Condition

Para. Condition Description
4-247 Axle Shaft Removed
4-248 Hub and Drum Assembly Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

REMOVAL

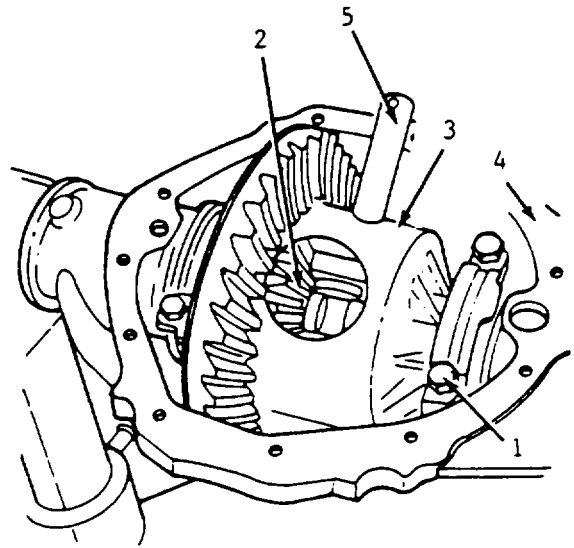
- a. Remove differential side gear bolts (1) and lockwashers and use a soft faced hammer to tap side gear (2) from case (3).
- b. Remove pinion bearing retainer nuts from housing (4).
- c. Remove pinion and bearing retainer assembly. It may be necessary to rap on the pilot end of the pinion (5) to assist the assembly from the carrier.

4-246. DIFFERENTIAL SIDE GEAR AND PINION REPLACEMENT (Continued).

- d. Record the thickness of the shims removed from between the bearing retainer flange and the carrier housing.

INSTALLATION

- a. Examine drive pinion head for a pinion depth code number.
- b. Compare depth code number with number on original pinion. Use the chart below to select proper shim for preliminary setting of pinion depth.



CODE NUMBER ON ORIGINAL PINION

	+2	+1	0	-1	-2	
CODE	+2	-	+0.001	+0.002	+0.003	+0.004
NUMBER	+1	-0.001	-	+0.001	+0.002	+0.003
ON	0	-0.002	-0.001	-	+0.001	+0.002
SERVICE	-1	-0.003	-0.002	-0.001	-	+0.001
PINION	-2	-0.004	-0.003	-0.002	-0.001	-

- c. Refer to the thickness of the shim recorded when the pinion was removed. Increase or decrease the shim thickness according to the chart. Two examples follow in (1) and (2).

The correct shim would be .012 inch minus .004 inch or .008 inch.

- (1) If the original shim measured .014 inch, original code was -1 and new code is +2. The correct shim would be .014 inch plus .003 inch or .017 inch.
- (2) If the original shim measured .012 inch, original code was +2, and new code is -2.

- d. Place pinion shim determined in step c above, into the carrier housing. Ensure bolt holes align with those of the carrier and that mating surfaces are free of foreign matter.
- e. Place pinion retainer assembly into position and align bolt holes to carrier. Install retaining bolts and secure in a crosswise pattern. Torque bolts to 65 ft.-lbs.

4-246. DIFFERENTIAL SIDE GEAR AND PINION REPLACEMENT (Continued).

- f. Place a new ring gear into position on case and install lock washers and bolts.
- g. Torque bolts alternately to 120 ft.-lbs.

4-247. REAR AXLE SHAFT REPLACEMENT.

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Soft Faced Hammer

Materials/Parts

Curbside Shaft (3977383)
Streetside Shaft (3977384)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-203	Wheel Assembly Removed
4-219	Rear Drum Brake Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

REMOVAL

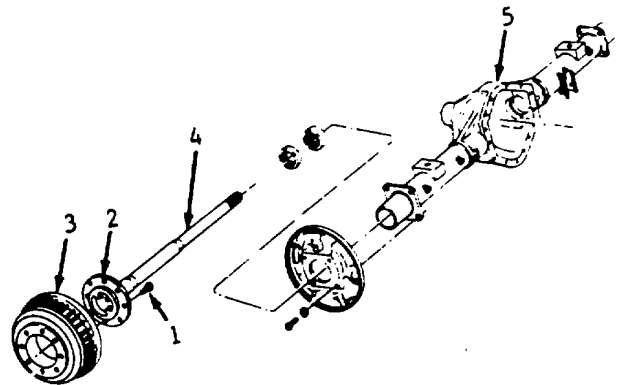
- a. Remove bolts (1) that attach axle shaft flange (2) to the wheel hub (3).
- b. Rap on flange (2) with a soft faced hammer to loosen shaft (4). Grip the rib on end with a pair of locking pliers and twist to start shaft removal.
- c. Remove shaft (4) from axle tube (5).

breathing of vapors. Keep away from open flame.

- d. Thoroughly clean axle shaft with solvent (Appendix D, Item 44) flange (2) and end of wheel hub (3).

CAUTION
Any lubricant on these surfaces tends to loosen the axle shaft flange.

WARNING
Cleaning solvent, Federal Specification P-D-680, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged



4-247. REAR AXLE SHAFT REPLACEMENT (Continued).

INSTALLATION

- a. Place a new gasket over the axle shaft (4) and position the axle shaft in the housing so that the shaft splines enter the differential side gear.
- b. Position gasket so that holes are aligned and install flange (2) to hub (3) with attaching bolts (1).
- c. Torque bolts to 115 ft.-lbs.
- d. Install rear drum brake assembly (paragraph 4-219).
- e. Install wheel assembly (paragraph 4-203).
- f. Lower vehicle.

4-248. HUB AND DRUM ASSEMBLY REPLACEMENT.

This task covers:

- a. Removal**
- b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Wheel Bearing Nut Wrench (J-2222-C)

Materials/Parts

Lubricant (Appendix D, Item 25)
 Hub and Drum (6260831)

Equipment Condition

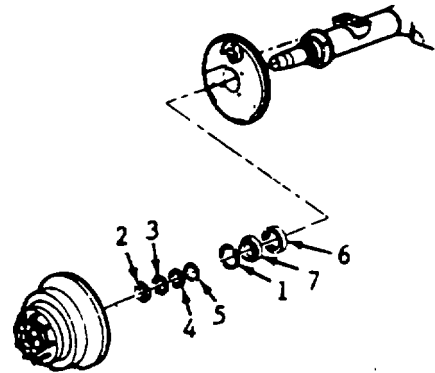
<u>Para.</u>	<u>Condition Description</u>
4-203	Wheel Assembly Removed
4-247	Rear Axle Shaft Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

REMOVAL

- a. Disengage tang of retainer (1) from slot or flat of lock nut (2) and remove lock nut (2) and lockwasher (3) from housing tube using wheel bearing out wrench.
- b. Disengage tang of retainer (1) from slot or flat of adjusting nut (4) and remove retainer (1) from housing tube.

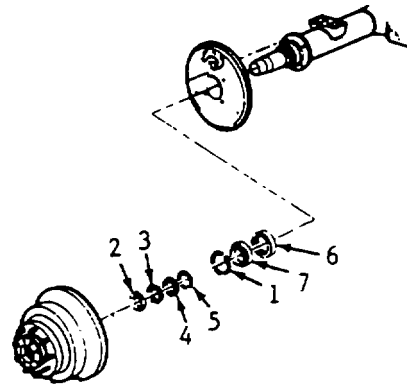


4-248. HUB AND DRUM ASSEMBLY REPLACEMENT (Continued).

- c. Use wheel bearing nut wrench to remove adjusting nut (4) from housing tube. Remove thrust washer (5) from housing tube.
- d. Pull hub and drum assembly straight off axle housing.
- e. Remove and discard oil seal.

INSTALLATION

- a. Using a high melting point EP bearing lubricant (Appendix D, Item 25) liberally pack bearings and apply a light coat on the inside diameter of the hub bearing contact surface and outside diameter of axle housing tube.
- b. Ensure inner bearing oil seal (6), axle housing oil deflector, and inner bearing race (7) and oil seal are positioned properly.
- c. Install hub and drum assembly on axle housing, while exercising care to ensure oil seal is not damaged or other internal components are not dislocated.
- d. Install thrust washer (5) so that tang on inside diameter of washer is in keyway on axle housing.
- e. Install adjusting nut (4) and complete the installation by adjusting bearing following (paragraph 4-245).
- f. Install rear axle shaft (paragraph 4-247).

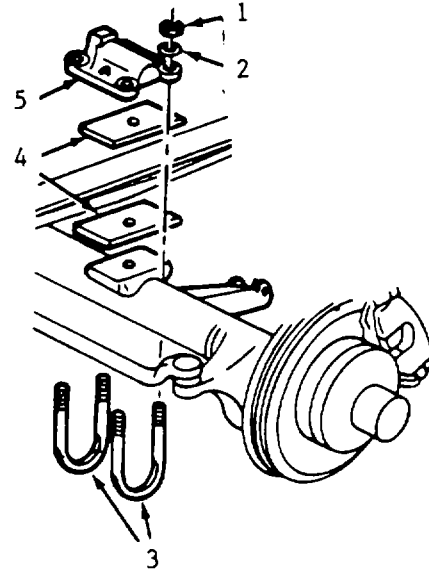


- g. Install wheel assembly (paragraph 4-203).
- h. Lower vehicle.

4-250. FRONT AXLE REPLACEMENT. (Continued)

INSTALLATION

- a. Position the axle assembly under the vehicle.
- b. Install plates (5), spacers (4), U-bolts (3), washers (2), and nuts (1).
- c. Install axle vent tube and clips.
- d. Install the front stabilizer bar.
- e. Install the brake caliper (paragraph 4-218).
- f. Connect the connecting rod to the steering arm (paragraph 4-224).
- g. Install the propeller shaft (paragraph 4-188).
- h. Install universal joints (paragraph 4-185).



4-251. FRONT AXLE SHAFT REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Front Axle Shaft (14039120)

Solvent (Appendix D, Item 44)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-203	Wheel and Tire Removed
4-218	Front Disc Brake Removed
4-233	Wheel Hub and Rotor Removed
4-236	Spindle Removed
4-253	Manual Locking Hub Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

Parking brake and micro-brakelock set.

Batteries disconnected.

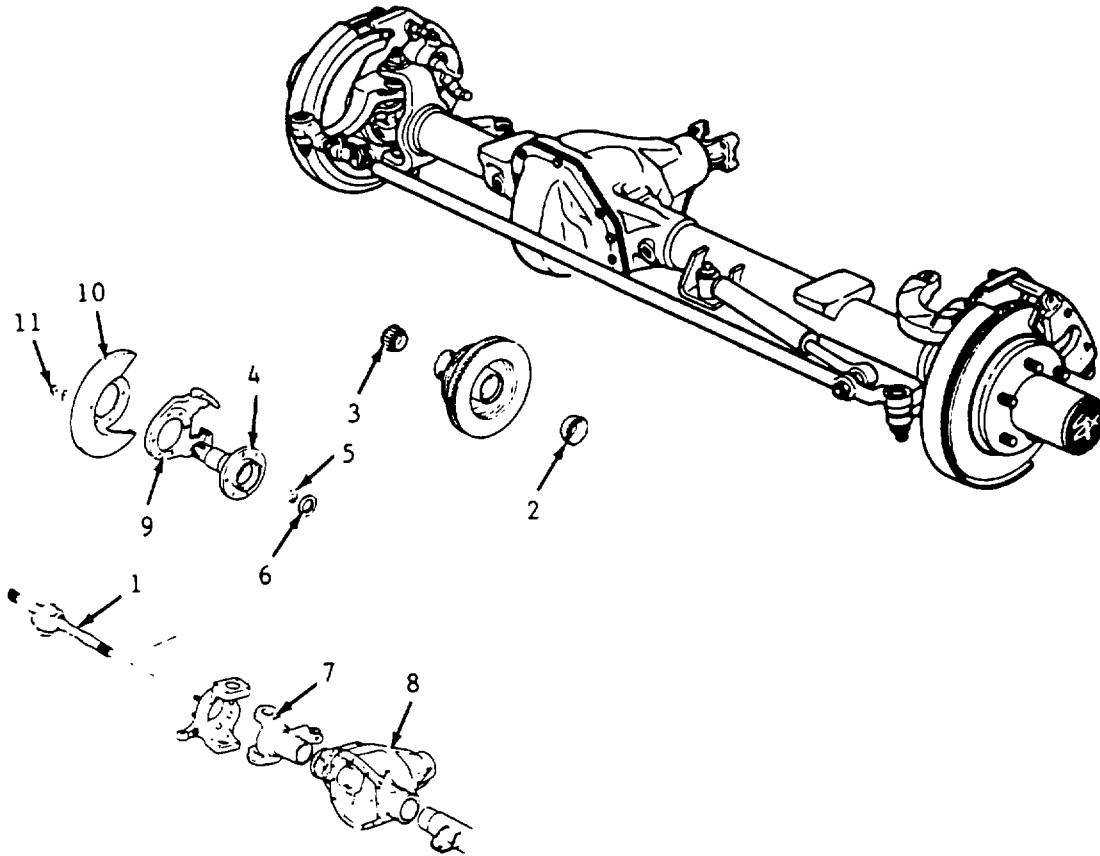
REMOVAL

Remove axle shaft (1).

CAUTION

All front axle fasteners are important attaching parts in that they could affect the performance

of vital parts and systems, and/or could result in major damage. Torque values must be used as specified during reassembly to assure proper retention of all parts.

4-251. FRONT AXLE SHAFT REPLACEMENT. (Continued)**INSTALLATION**

- a. Lubricate spindle bearing.

WARNING

Cleaning solvent is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

- b. Clean with solvent (Appendix D, Item 44), inspect, and repack inner and outer wheel bearings (2) and (3).
- c. Clean hub and spindle (4) and lubricate spindle (4).
- d. Install seal (5) and spacer (6) on axle shaft (1).
- e. Install axle shaft (1) into axle tube (7) and housing (8).
- f. Install spindle (5), brake bracket (9), and splash shield (10) and torque nuts (11) to 65 ft-lbs. (88 N.m).
- g. Install rotor (paragraph 4-233).
- h. Adjust wheel bearings (2) and (3) paragraph 4-234).
- i. Install hub lock mechanism (paragraph 4-253).
- j. Install front disc brakes (paragraph 4-218).
- k. Install wheel and tire (paragraph 4-203).

4-252. AXLE JOINT ASSEMBLY REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- General Mechanics Tool Kit
- C Clamp
(J-9519-10)
- Spanner
(J-23447)
- Sleeve
(J-23453-4)
- Lower Ball Joint Separator
(J-23454-1)
- Upper and Lower Ball Joint Sleeve
(J-23454-2)
- Upper and Lower Ball Joint Spacer
(J-23454-3 or J-6283-3)
- King Pin Socket
(J-26871)
- Front Pinion Bearing Installer
(J-7817)
- King Pin Bearing Seal Installer
(J-22301)
- King Pin Installer
(J-28871)

Materials/Parts

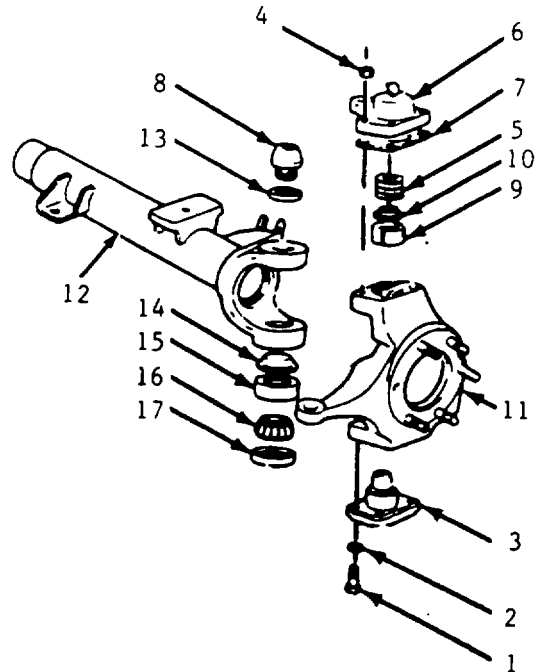
- Axle Joint (14050688)
 - Grease (Appendix D, Item 15)
 - Equipment Condition
- | Para. | Condition | Description |
|-------|----------------------------|-------------|
| 4-203 | Wheels and Tires Removed | |
| 4-233 | Wheel, Hub, Rotor Removed | |
| 4-236 | Spindle Removed | |
| 4-237 | Steering Arm Removed | |
| 4-253 | Manual Locking Hub Removed | |

General Safety Instructions

- Engine OFF.
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

REMOVAL

- a. Remove bolts (1), nuts (2) and king pin bearing cap (3).
- b. Remove nuts (4) alternately as spring (5) will force steering arm (6) up.
- c. Remove and discard gasket (7).
- d. Remove spring (5) and upper king pin (8) using large breaker bar and king pin socket.
- e. Remove upper king pin bushing (9) and retainer (10) from steering knuckle (11).
- f. Remove steering knuckle (11) from yoke (12).



- g. Remove seal (13).
- h. Remove retainer (14), race (15), bearing (16), and seal (17) from the axle yoke (12) all at once.
- i. Discard old seal (17).
- j. Discard retainer (14) if damaged.
- h. Install knuckle onto the king pin (8).
- i. Place bushing (9) over the king pin (8).
- j. Install bearing cap and king pin (3) to the steering knuckle (11) using four bolts (1) and washers (2).
- k. Torque bolts (1) alternately and evenly to 80 ft-lbs (108 Nm).
- l. Install compression spring (5), gasket (7) and steering arm (6) to steering knuckle (11) using nuts (4).
- m. Torque nuts (4) alternately and evenly to 80 ft-lbs (108 N.m).
- n. Install spindle (paragraph 4-236).
- o. Install wheel, hub, rotor (paragraph 4-233).
- p. Install locking hub (paragraph 4-253).
- q. Adjust wheel bearings (paragraph 4-234).
- r. Install wheel and tire assembly (paragraph 4-203).
- s. Check front end alignment.
- t. Lower vehicle to the ground.

INSTALLATION

- a. Install new retainer (14) and race (15) using front pinion bearing installer.
- b. Fill the area in the retainer (14) and race (15) with grease (Appendix D, Item 15).
- c. Grease bearing (16), packing the grease between the rollers, cones, and cage.
- d. Install bearing (16) and seal (17) using king pin bearing seal installer.

NOTE

Seal will protrude slightly from the surface of the axle yoke flange when fully seated.

- e. Install upper king pin (8), torque to 550 ft-lbs (745 Nm).
- f. Tighten steering knuckle (11) and bushing (9).
- g. Install felt seal (13) to the king pin (8) through the steering knuckle (11).

4-253. MANUAL LOCKING HUB REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Locking Hub (15521883)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

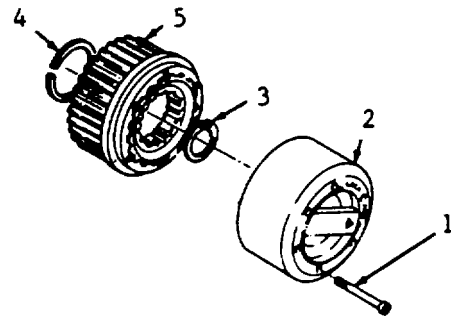
Parking brake and micro-brakelock set.

Batteries disconnected.

REMOVAL

- a. Remove allen head screw (1).
- b. Remove outer hub locking assembly (2).
- c. Remove snap ring (3) from end of axle shaft.
- d. Remove body assembly internal snap ring from hub (4).
- e. Remove outer assembly (5).

- d. Install outer hub locking assembly (2).
- e. Install allen head screws (1).



INSTALLATION

- a. Install outer assembly (5).
- b. Install body assembly internal snap ring (4) into hub.
- c. Install snap ring (3) on axle shaft.

NOTE

Ensure inner gear concave side faces the spring.

Section XXXII. MAINTENANCE OF FRAME ASSEMBLY

Front Bumper Replacement.....	Para. 4-255	Tow Hooks Replacement.....	Para. 4-256
General.....	4-254		

4-254. GENERAL.

This section contains information on the maintenance of the frame assembly that are maintainable at the Organizational level.

4-255. FRONT BUMPER REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Bumper (002-90001-2)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

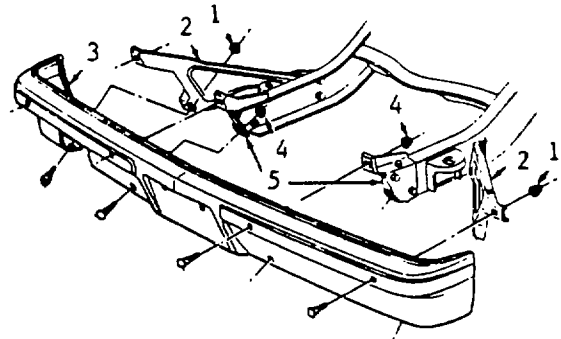
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove nuts (1) from brace (2) to bumper (3).
- b. Remove nuts (4) from bracket (5) to bumper (3).
- c. Remove bumper assembly from vehicle.

INSTALLATION

- a. Position bumper (3) to vehicle and install nuts (4) from bracket (5) to bumper (3).
- b. Install nuts (1) from brace (2) to bumper (3).
- c. Torque nuts to 70 ft-lbs (95 N.m).



4-256. TOW HOOK REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Tow Hook

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

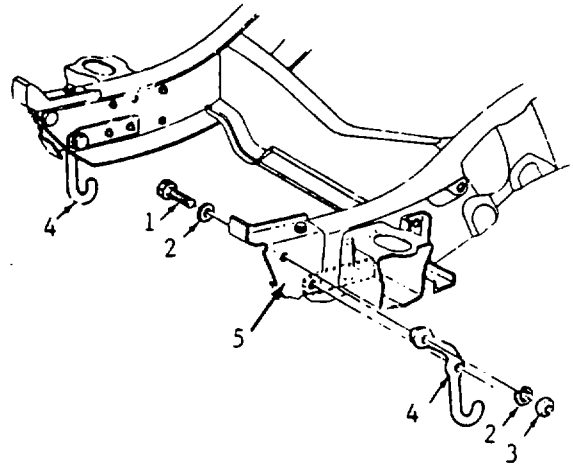
Parking brake and micro-brakelock set.

REMOVAL

- a. Remove bolts (1), washers (2) and nuts (3) attaching tow hook (4) to frame (5).
- b. Remove tow hook (4).

INSTALLATION

- a. Position tow hook (4) to frame (5).
- b. Install bolts (1), washers (2), and nuts (3).
- c. Torque nuts to 70 ft-lbs (95 N.m).



Section XXXIII. PREPARATION FOR SHIPMENT OR STORAGE

General.....	Para. 4-257	Servicing Vehicle While in	Para.
Administrative Storage.....	4-258	Storage.....	4-260
Preparing Vehicle for Shipment or Storage.....	4-259		

4-257. GENERAL.

The purpose of this section is to assist organizational personnel in the preparation of the 250 GPM Mini-Pumper Firefighting Truck for shipment or storage.

4-258. ADMINISTRATIVE STORAGE.

- a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factor as determined by the directing authority. During the storage period appropriate maintenance records will be kept.
- b. Before placing equipment in administrative storage, current maintenance services and equipment serviceable criteria (ESC) evaluations should be completed, shortcomings and deficiencies should be corrected, and all modification work orders (MWO's) should be applied.
- c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

4-259. PREPARING VEHICLE FOR SHIPMENT OR STORAGE.

- a. *Cleaning.*
 - (1) Remove all debris from cab, hose body, and equipment storage areas. Remove rust and scale from corroded areas.
 - (2) Wash vehicle thoroughly and remove stones from suspension and tire assemblies.
 - (3) Steam clean the engine.
- b. *Cooling System.*

NOTE

Under no circumstances should the vehicle be stored with a dry cooling system.

- (1) Drain and flush the cooling system (paragraph 4-72).
- (2) Fill cooling system with a conditioned water/anti-freeze solution suitable for the lowest temperature anticipated.

4-259. PREPARING VEHICLE FOR SHIPMENT OR STORAGE (Continued).

c. Fuel System.

- (1) Clean or replace air cleaner (paragraph 4-83).
- (2) Drain the fuel tank (paragraph 4-88).
- (3) Remove, empty, and reinstall fuel filter (paragraph 4-84).
- (4) Put 2 oz. of a fuel stabilizer in the fuel tank and refill tank with diesel fuel.
- (5) Start the engine and run at idle speed for approximately 4 minutes to circulate the fuel stabilizer.

d. Engine Lubrication.

- (1) Oil or grease all linkage connections, joints, nuts, pins, shafts, and bushings (paragraph 4-9).
- (2) Drain lub oil from engine crankcase (paragraph 4-9).
- (3) Change the oil filter (paragraph 4-9).
- (4) Fill engine with oil (paragraph 4-9).
- (5) Start the engine and run at idle speed for approximately 30 seconds.

*e. Batteries.***NOTE**

Ensure batteries are fully charged before shipment or storage.

Remove batteries and store in a cool dry place 32° to 55° (0° to 10° C) to minimize discharge.

f. Drive Belts.

- (1) Loosen tension on all drive belts (paragraph 4-76).
- (2) Coat unpainted surfaces of pulley grooves with primer (Appendix D, Item 34).
- (3) A warning tag bearing the information "TENSION RELEASED ON ALL DRIVE BELTS, ADJUST BEFORE USE" shall be attached to the steering wheel.

4-259. PREPARING VEHICLE FOR SHIPMENT OR STORAGE (Continued).

g. Transmission, Clutch, and Transfer Case.

Fill transmission, master clutch reservoir, and transfer case to proper operating level and operate through all ranges to assure lubricant coverage of all interior parts and surfaces (paragraph 4-9).

h. Cab.

- (1) Lubricate door hinges, latches, and operating mechanisms.
- (2) Open windows 1/2 inch for ventilation.
- (3) Remove wiper blades (paragraph 4-123) and store inside cab compartment.
- (4) Remove mirrors (paragraph 4-159) and store inside cab compartment.

i. Firefighting System.

- (1) Thoroughly flush system and spray piping with preservative.
- (2) Remove hose reel nozzle and store inside rear compartment.

j. Tires.

Block tires clear of ground and reduce tire pressure to approximately 25% of normal operating pressure (paragraph 3-12).

4-260. SERVICING VEHICLE WHILE IN STORAGE.*a. Every Month.*

Check batteries for water level and specific gravity and change if needed.

b. Every Six Months.

- (1) Visually inspect engine and radiator for leakage or other defects.
- (2) Install fully charged batteries.
- (3) Check level of coolant in radiator and add coolant if necessary (paragraph 4-72).
- (4) Drain the fuel tank (paragraph 4-88).

4-260. SERVICING VEHICLE WHILE IN STORAGE (Continued).

- (5) Remove, empty, and reinstall fuel filter (paragraph 4-84).
- (6) Put 2 oz. of a fuel stabilizer in the fuel tank and refill tank with diesel oil.
- (7) Remove tag from steering wheel and tighten tension on all drive belts (paragraph 4-76).
- (8) Start the engine and run at idle speed for approximately 4 ~~mins~~ to circulate the fuel stabilizer.
- (9) Oil or grease all linkage connections, joints, nuts, pins and bushings (paragraph 4-9).
- (10) Add engine oil if necessary and operate engine at idle speed for approximately 30 seconds to circulate oil.
- (11) Remove batteries and return to storage.

CHAPTER 5
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

- Section I. REPAIR PARTS SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT
- Section II. DIRECT SUPPORT TROUBLESHOOTING PROCEDURES
- Section III. MAINTENANCE OF ENGINE COOLING SYSTEM
- Section IV. MAINTENANCE OF ENGINE AND ACCESSORIES
- Section V. MAINTENANCE OF CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS
- Section VI. MAINTENANCE OF FRAME ASSEMBLY

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

	Para.		Para.
Repair Parts.....	5-1	Special Tools, TMDE, and Support Equipment.....	5-2

5-1. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list, Appendix E, covering organizational, direct support, and general support maintenance for the 250 GPPI Mini-Pumper Firefighting Truck.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Special tools, TMDE, and support equipment required to maintain the Mini-Pumper Firefighting Truck are listed in Appendix B, Section III.

Section II. DIRECT SUPPORT TROUBLESHOOTING PROCEDURES

	Para.		Para.
General.....	5-3	Symptom Index.....	5-4

5-3. GENERAL.

- (a) The table in this section lists the common malfunctions which may occur during the operation or maintenance of the Mini-Pumper Firefighting Truck or components. The troubleshooting should be performed in the order given in each malfunction.
- (b) This manual cannot list all malfunctions that may occur nor all tests, inspections, or corrective actions. If a malfunction is not listed or it is not corrected by the listed corrective actions, notify your supervisor.

5-4. SYMPTOM INDEX.

SYMPTOM	PAGE
ENGINE COOLING SYSTEM	
Engine Coolant Overheating.....	5-3
Engine Coolant Loss.....	5-3
ENGINE AND ACCESSORIES	
Engine Will Not Crank.....	5-4
Engine Cranks Slowly - Will Not Start.....	5-4
Engine Cranks Normally - Will Not Start.....	5-4
Engine Starts But Will Not Continue To Run At Idle Speed.....	5-5
TRANSMISSION ASSEMBLY	
Noisy Shifting.....	5-5
Slips Out Of Gear.....	5-5
CLUTCH ASSEMBLY	
Clutch Will Not Disengage.....	5-6
Clutch Slips.....	5-6
Clutch Grabs.....	5-6
TRANSFER CASE ASSEMBLY	
Excessive Noise.....	5-6
Shift Lever Difficult To Move.....	5-6

NOTE

Before you use the troubleshooting tables, be sure you have performed all applicable operating checks and verified that a malfunction exists. When a corrective action is performed, verify that the action has corrected the malfunction.

Table 5-1. Direct Support Troubleshooting Chart

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
--------------------	---------------------------	--------------------------

ENGINE COOLING SYSTEM

1. ENGINE COOLANT OVERHEATING.

Step 1. Inspect pressure cap for proper seal.

Replace pressure cap.

Step 2. Check coolant level.

Fill cooling system to proper level (paragraph 4-72).

Step 3. Check for loose or worn fan belt.

Replace worn fan belt. Tighten fan belt (paragraph 4-76).

Step 4. Check for damaged coolant hoses.

Replace coolant hoses (paragraph 4-20).

Step 5. Check for damaged or inoperative thermostat.

Replace thermostat (paragraph 4-79).

Step 6. Check for scale or deposits in cooling system.

Clean and flush cooling system (paragraph 4-72).

Step 7. Check for damaged radiator.

Replace radiator (paragraph 4-81).

2. ENGINE COOLANT LOSS.

Visually inspect hoses, radiator, clamps, water pump, thermostat housing, radiator drain, engine soft plugs for leakage.

Tighten connections as necessary.

Table 5-1. Direct Support Troubleshooting Chart (Continued).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
-------------	--------------------	-------------------

ENGINE AND ACCESSORIES

3. ENGINE WILL NOT CRANK.

Step 1. Inspect for loose or corroded battery cables.

Tighten or replace battery cables.

Step 2. Check voltage to starter and starter solenoid.

Replace starter if defective (paragraph 4-109).

Step 3. Check generator output and generator belt tension.

Replace generator or tighten belt (paragraph 4-107).

4. ENGINE CRANKS SLOWLY - WILL NOT START.

Step 1. Check for loose connections at batteries, engine block, and starter.

Tighten loose connections.

Step 2. Check condition of batteries.

Replace defective batteries (paragraph 4-106).

5. ENGINE CRANKS NORMALLY - WILL NOT START.

CAUTION

Use care to direct the fuel away from the source of ignition.

Step 1. Remove inlet hose to fuel pump. Connect a hose to the pump from a separate container that contains fuel. Open the filter air bleed.

Replace fuel pump (paragraph 4-85).

Step 2. Inspect for incorrect or contaminated fuel.

Replace fuel.

Table 5-1. Direct Support Troubleshooting Chart (Continued).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
6. ENGINE STARTS BUT WILL NOT CONTINUE TO RUN AT IDLE SPEED.	<p>Step 1. Disconnect fuel return line at injection pump and route hose to a metal container. Connect a hose to the injection pump connection and route it to the metal container. Crank the engine and allow it to idle.</p>	<p>Replace check valve or hose (paragraph 4-92).</p>
	<p>Step 2. Inspect that the timing mark on the injection pump is aligned with the mark on the front cover.</p>	<p>Reset timing.</p>
7. NOISY SHIFTING.	<p>Step 1. Inspect shift linkage for damage.</p>	<p>Replace linkage (paragraph 4-193).</p>
	<p>Step 2. Inspect clutch linkage for proper adjustment or damage.</p>	<p>Replace or adjust as necessary (paragraph 4-195).</p>
8. SLIPS OUT OF GEAR.	<p>Step 1. Inspect shift linkage for binding.</p>	<p>Adjust or replace linkage (paragraph 4-193).</p>
	<p>Step 2. Inspect for dirt between clutch housing and transmission.</p>	<p>Clean the mating surfaces.</p>
	<p>Step 3. Inspect for proper alignment.</p>	<p>Align and tighten as necessary.</p>

Table 5-1. Direct Support Troubleshooting Chart (Continued).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CLUTCH ASSEMBLY

9. CLUTCH WILL NOT DISENGAGE.

Step 1. Check for air in the hydraulic system.

Bleed system and check for damage (paragraph 4-195).

Step 2. Check for proper clutch pedal travel.

Adjust clutch linkage (paragraph 4-195).

10. CLUTCH SLIPS.

Check clutch linkage for proper adjustment.

Adjust clutch linkage.

11. CLUTCH GRABS.

Inspect engine mounts for loose or damaged hardware.

Tighten or replace engine mounts (paragraph 5-11).

TRANSFER CASE ASSEMBLY

12. EXCESSIVE NOISE.

Step 1. Check lubricant level.

Fill as required (paragraph 4-9).

Step 2. Inspect yoke bolts for looseness.

Tighten yoke bolts (paragraph 4-200).

Step 3. Inspect adapter bolts for looseness.

Tighten adapter bolts (paragraph 4-200).

13. SHIFT LEVER DIFFICULT TO MOVE.

Perform operational check on shift lever.

Refer to next higher level of maintenance.

Section III. MAINTENANCE OF ENGINE COOLING SYSTEM

	Para.		Para.
General.....	5-5	Radiator Repair.....	5-6

5-5. GENERAL.

This section contains information on the maintenance of the engine cooling system that are maintainable at the Direct Support level.

5-6. RADIATOR REPAIR.

This task covers: Repair

INITIAL SETUP

Tools

- Small Torch
- Heat Gun
- General Mechanics Tool Kit

Materials/Parts

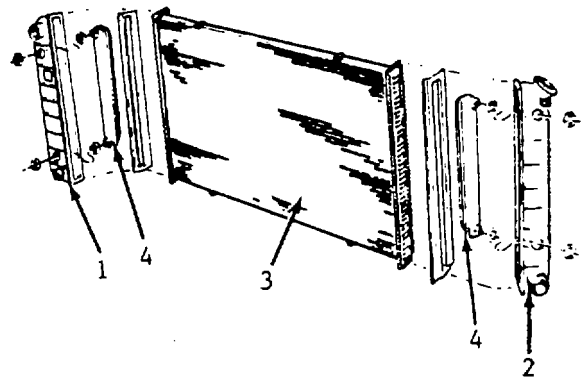
- Hot Melt Adhesive Repair Kit
(Appendix D, Item 20)
 - Lint Free Cloth (Appendix D, Item 12)
 - Equipment Condition
- | | |
|--------------|------------------------------|
| <u>Para.</u> | <u>Condition Description</u> |
| 4-81 | Radiator Removed |

REPAIR

a. Aluminum Radiator Service.

NOTE

The Hot Melt Adhesive method has been found to be the most simple and effective method for repair of the radiator core. The hot melt adhesive repair kit contains adhesive sticks, cotton swabs, wire brush, and primer. The adhesive stick is reusable, has an indefinite shelf life, and is waste free. Store the sticks in a sealed container to keep them dry.



The tanks (1 and 2) cannot be repaired if broken or cracked. The radiator core (3) can be replaced and the new core used with the original tanks and oil coolers (4).

5-6. RADIATOR REPAIR. (Continued)

NOTE

If the header or a tube near the header requires a repair, the side tank does not have to be removed. A damp cloth can be placed against the side tank where the repair has to be made. The side tank can also be submerged in a tank of water up to the header.

b. *General Core Repair.*

NOTE

Preparation of the surface in the area cannot be overemphasized. If the leak area surface is not clean, none of the repair materials will stick to the surface.

- (1) Position the core so the repair area is accessible.
- (2) Apply a wet cloth if you are working near the plastic tanks or the joints between the core tubes and header; or submerge the tank in water.
- (3) Heat the repair area slightly with a small torch or heat gun to be sure it is dry.
- (4) Brush the area to be repaired with the small steel brush that is supplied in the kit and blow dust away from the repair area.
- (5) Open the tube of primer, using the spurred cap or a pin, and apply primer to the repair area only. Use of the primer produces a stronger repair.
- (6) Scrub the repair area with a cotton swab until a fresh swab stays clean. The clear, yellow-brown coating does not have to be removed.
- (7) Heat the repair area with a heat gun or by moving the torch in a circular pattern.
- (8) Withdraw the torch and rub the adhesive stick on the repair area. The adhesive will flow at a temperature of 500° F (260°C). If the stick doesn't start to melt, remove it and reapply the heat. Do not heat the stick directly with a flame. High heat will burn and char the adhesive.
- (9) Continue heating until the adhesive flows and wets the entire repair area and fills the joint. If a hole is in the center of a tube, heat the tube and let the hot surface melt and pull in the adhesive. The force of the flame or heat gun will also tend to guide the adhesive toward the hole. For leaks between a tube and header, flow the adhesive completely around the tube and header joint with the tank installed.
- (10) Heat the repair area until the adhesive is bubble-free and smooth, with a light yellow color. Curing is not required.
- (11) Test the radiator for leaks when cool. If the repair area still leaks, reheat it gently to dry it. Heat and reflow the adhesive or apply more as necessary to repair the leak.

5-6. RADIATOR REPAIR. (Continued)

c. Special Preparation.

For damaged areas that are between the cooling fins, it may be necessary to remove some of the fins. Do not remove more fins than necessary. Usually 1/4 inch beyond the leak or damage area is enough to make an effective repair.

d. Tube Blocking

NOTE

Do not block off more than two tubes in a radiator. Blocking off more than two tubes will reduce the cooling capability of the system.

If a tube is severely damaged, it can be blocked. The tube should be cut off 1/4 inch (6 mm) from the header and pinched shut before it is cleaned and sealed.

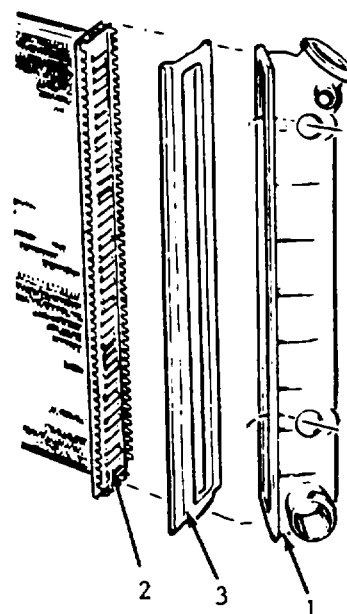
e. Inlet or Outlet Tank Gasket Leak Repair.

- (1) Pry open the clinch tabs except those under the inlet, outlet, and filler necks using a screwdriver. Lift the tabs only enough to allow removal.

NOTE

Care should be taken not to overbend the tabs. Overbending could result in breakage. If there are more than 3 tabs broken on one side of the header, or more than 2 adjacent tabs together, the core must be replaced.

- (2) Lift the tank (1) and slide it out from under the remaining clinched tab(s) (2). You may have to tap the tank(s) with your hand to dislodge the gasket (3). Lift the remaining tab(s) with pliers.
- (3) Remove and discard the gaskets (3).



- (4) Clean the header and gasket groove of all dirt and old rubber.
- (5) Clean the sealing edge of the tank(s) (1).
- (6) Examine the header gasket surface and tank flange for evidence of leakage, and clean the surface to remove dirt, burrs, and bumps.

5-6. RADIATOR REPAIR. (Continued)

- (7) Remove the oil cooler(s) (5) and install it in the new tank, if used.
- (8) Dip or coat the new tank gasket (6) in engine coolant and position it on the header surface. The coolant helps hold the gasket in place.
- (9) Position the tank (7) and gasket (6) to the header (8), clamp it in place and secure it by bending four clinch tabs.
- (10) Clamp remaining clinch tabs around the header using the clinching tool or pliers.

NOTE

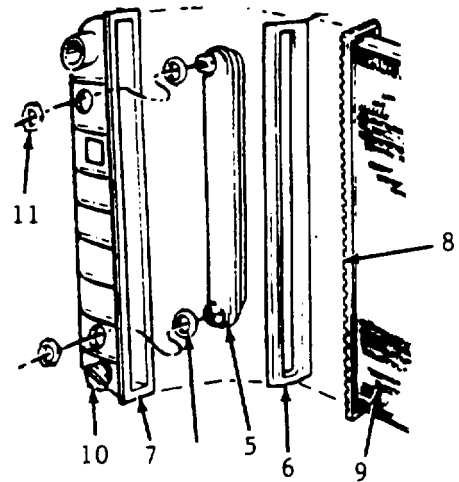
Tighten the clinch tabs as you would cylinder head bolts, starting at the center and working out to the ends.

- (11) Replace the core (9) if there are more than three tabs broken on one side or two adjacent tabs broken.
- (12) Install the drain cock (10) if removed.
- (13) Test the radiator for leaks.

f. Oil Cooler Replacement.

- (1) Remove the outlet tank (7) as previously outlined.
- (2) Remove nuts (11) from the oil cooler fittings.
- (3) Remove the oil cooler (5) and gasket (12) from the tank.

- (4) Discard the old rubber gasket (12) then clean and dry seal areas.
- (5) Place rubber gasket (12) on a new oil cooler (5) and place onto the outlet tank (7) fitting holes. Be careful not to loosen or misalign the gasket (12). Gasket must be installed dry and be free of dirt and oil.
- (6) Install and tighten nuts (11) snugly onto the fittings. Torque nuts (11) to 15 ft-lbs (20 N.m). Overtorquing could cut the rubber gaskets (12).



- (7) Replace the tank (paragraph 4-81).
- (8) Test the radiator.

g. Recore.

If the radiator core is damaged beyond repair and the other parts are serviceable, install the original inlet and outlet tanks, oil cooler, radiator cap, and valve along with the new core and new gaskets.

Section IV. MAINTENANCE OF ENGINE AND ACCESSORIES

	Para.		Para.
Alternator Repair.....	5-9	General.....	5-7
Engine Replacement.....	5-8	Starter Repair.....	5-10
Engine Mounting Replacement.....	5-11		

5-7. GENERAL.

This section contains information on the maintenance of the engine and accessories that are maintainable at the Direct Support level.

5-8. ENGINE REPLACEMENT

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

- General Mechanics Tool Kit
- Jack
- Jack Stand
- "S" Shaped Wrench
- Transmission Jack
- Personnel Required2

General Safety Instructions

- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.
- Batteries disconnected.
- Fire Pump and piping drained.

Materials/Parts

- Engine (23500303)

REMOVAL

- | | |
|--|--|
| <ul style="list-style-type: none"> a. Raise vehicle using jack, lower vehicle onto jack stands. Remove jack. b. Remove flywheel cover bolts and support the transmission with the transmission jack. c. Disconnect exhaust pipes at the manifolds (paragraph 4-101). d. Disconnect starter wires, remove starter mounting bolts, and remove starter (paragraph 4-109). e. Remove transmission bell housing bolts (paragraph 4-192). | <ul style="list-style-type: none"> f. Remove front and rear engine mounting bolts (paragraph 5-11). g. Disconnect block heater. h. Remove engine wire harness (paragraph 4-183), transmission cooler lines (paragraph 4-192), and front battery cable clamp at the oil pan. i. Disconnect fuel return lines at the engine (paragraph 4-87). j. Disconnect oil cooler lines at the engine (paragraph 4-77) and remove lower fan shroud bolts (paragraph 4-74). |
|--|--|

5-8. ENGINE REPLACEMENT. (Continued)

- k. Raise vehicle using jack, remove jack stands, and lower vehicle.
- l. Remove the hood (paragraph 4-148).
- m. Drain the cooling system (paragraph 4-72).
- o. Disconnect ground cable at the alternator bracket and alternator wires and clips (paragraph 4-107).
- p. Disconnect wiring at the injection pump (paragraph 4-93).
- q. Disconnect wiring from rocker arm clips including glow plug wires.
- r. Disconnect EGR-PGR solenoids, glow plug controller, and temperature sensor, moving the harness aside.
- s. Remove the fan (paragraph 4-75).
- t. Remove upper radiator hoses at the engine (paragraph 4-77).
- u. Remove the fan shroud (paragraph 4-74).
- v. Remove the power steering pump, reservoir and belt (paragraph 4-229).
- w. Disconnect accelerator cable at injection pump (paragraph 4-89).
- x. Disconnect the heater hose at the engine (paragraph 4-136).
- y. Disconnect the lower radiator hose at the engine (paragraph 4-77).
- z. Disconnect the oil cooler lines, heater hose, overflow, and upper radiator cover. Remove radiator (paragraph 4-81).
- aa. Remove the detent cable.

CAUTION

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- bb. Position engine lifting device and carefully remove the engine from the vehicle.

INSTALLATION**CAUTION**

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- a. Position engine lifting device and carefully install the engine into the vehicle.
- b. Install the detent cable.
- c. Install radiator (paragraph 4-81). Connect the oil cooler lines, heater hose, overflow, and upper radiator cover.
- d. Connect the lower radiator hose at the engine (paragraph 4-77).
- e. Connect the heater hose at the engine (paragraph 4-136).
- f. Connect accelerator cable at injection pump (paragraph 4-89).
- g. Install the power steering pump, reservoir and belt (paragraph 4-229).

5-8. ENGINE REPLACEMENT. (Continued)

- h. Install the fan shroud (paragraph 4-74).
 - i. Install upper radiator hoses at the engine (paragraph 4-77).
 - j. Install the fan (paragraph 4-75).
 - k. Position the harness and connect EGR-PGR solenoids, glow plug controller, and temperature sensor.
 - l. Connect wiring to rocker arm clips including glow plug wires.
 - m. Connect wiring at the injection pump (paragraph 4-93).
 - n. Connect ground cable at the alternator bracket and alternator wires and clips (paragraph 4-107).
 - o. Install fuel filter (paragraph 4-84) to cowl. Install the air cleaner (paragraph 4-83).
 - p. Fill the cooling system (paragraph 4-72).
 - q. Install the hood (paragraph 4-148).
 - r. Raise vehicle using jack, install jack stands, and lower vehicle.
 - s. Connect oil cooler lines at the engine (paragraph 4-77) and install lower fan shroud bolts (paragraph 4-74).
 - t. Connect fuel return lines at the engine (paragraph 4-87).
 - u. Install engine wire harness (paragraph 4-183), transmission cooler lines (paragraph 4-192), and front battery cable clamp at the oil pan.
 - v. Connect block heater.
 - w. Install front and rear engine mounting bolts (paragraph 5-11).
 - x. Install transmission bell housing bolts (paragraph 4-192).
 - y. Position starter and install starter mounting bolts, and starter wires (paragraph 4-109).
 - z. Connect exhaust pipes at the manifolds (paragraph 4-101).
 - aa. Install the flywheel cover bolts and remove the transmission jack.
 - bb. Raise vehicle using jack, remove jack stands. Lower vehicle and remove jack.
 - cc. Reconnect battery cables.
-

5-9. ALTERNATOR REPAIR.

This task covers:

- a. Disassembly b. Test c. Assembly

INITIAL SETUP:

Tools

- Lathe
- Voltmeter
- General Mechanics Tool Kit
- Heat Gun
- Bearing Puller (J-8433)
- Arbor Press
- Ammeter

Materials/Parts

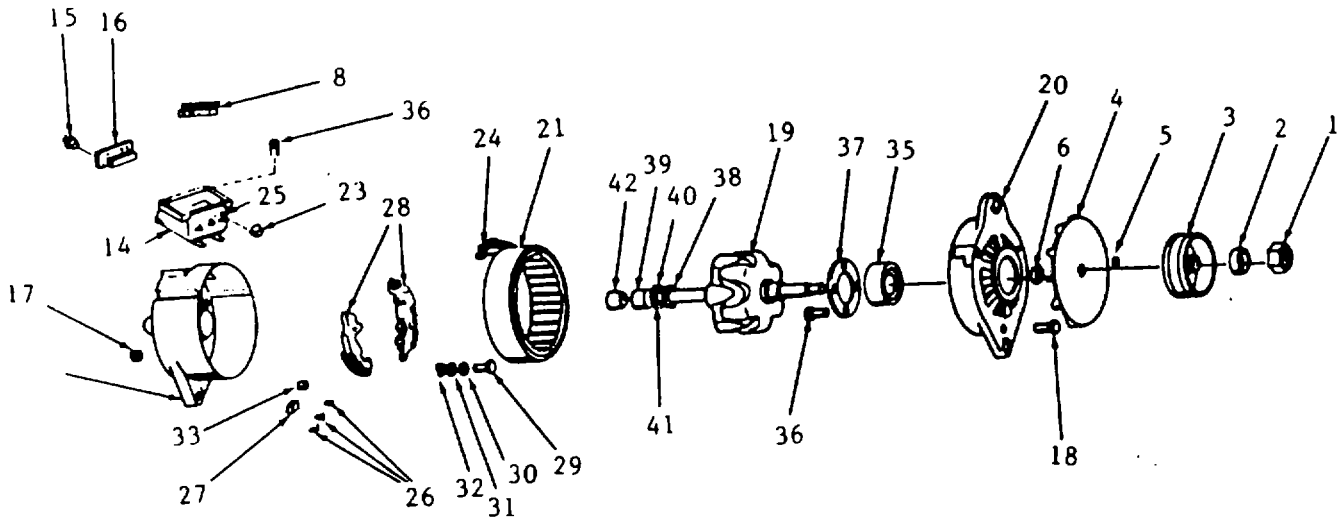
- Solder (Appendix D, Item 43a)
- Loctite (Appendix D, Item 21)
- Anaerobic Sealant (Appendix D, Item 41)

Equipment Condition

Para.	Condition Description
4-107	Alternator Removed

DISASSEMBLY

- a. Remove the shaft nut (1) and washer (2).
- b. Using the bearing puller remove the pulley (3), fan (4), drive key (5), and fan spacer (6).
- c. Remove the diode lead (7) from top of the regulator (8) and remove the 5/16-18 (9) and 1/4-20 nuts (10) from the positive and negative output terminals (11 and 12) which will free the regulator jumpers for the regulator and brush housing assembly (13) removal.



5-9. ALTERNATOR REPAIR. (Continued)

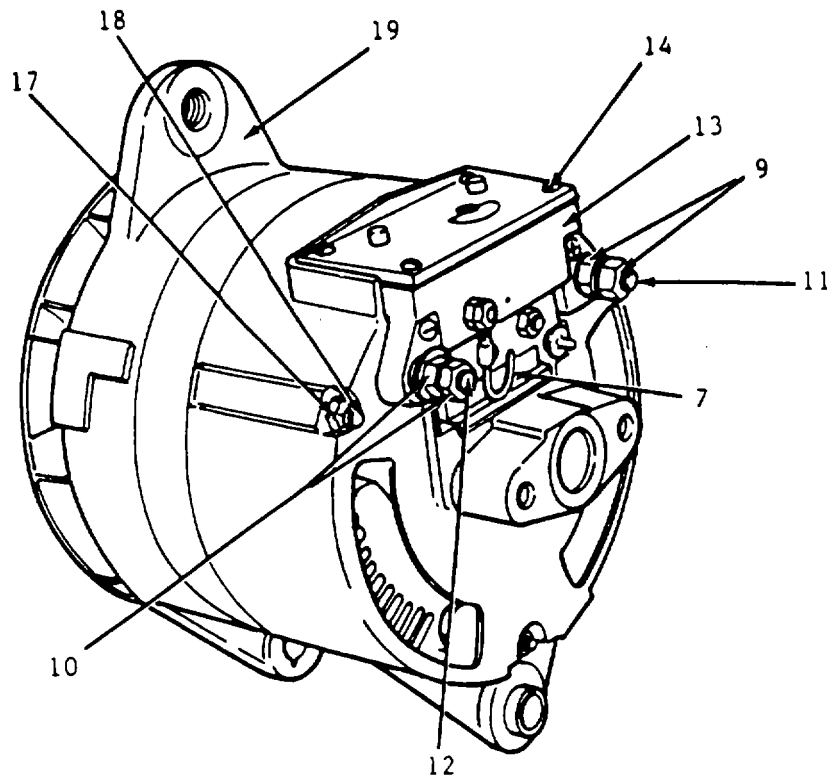
NOTE

Due to the application of Loctite to the brush housing screws during manufacturing it may be necessary to apply heat to assist in the removal of these screws. Use a heat gun and hold on each screw for approximately 45-60 seconds.

- d. Remove four 8-32 screws (14) and remove regulator and brush housing assembly (13).
- e. Remove three screws (15) and remove diode trio (16) from AC terminal board.
- f. Remove three lock nuts (17) and through bolts (18).

CAUTION

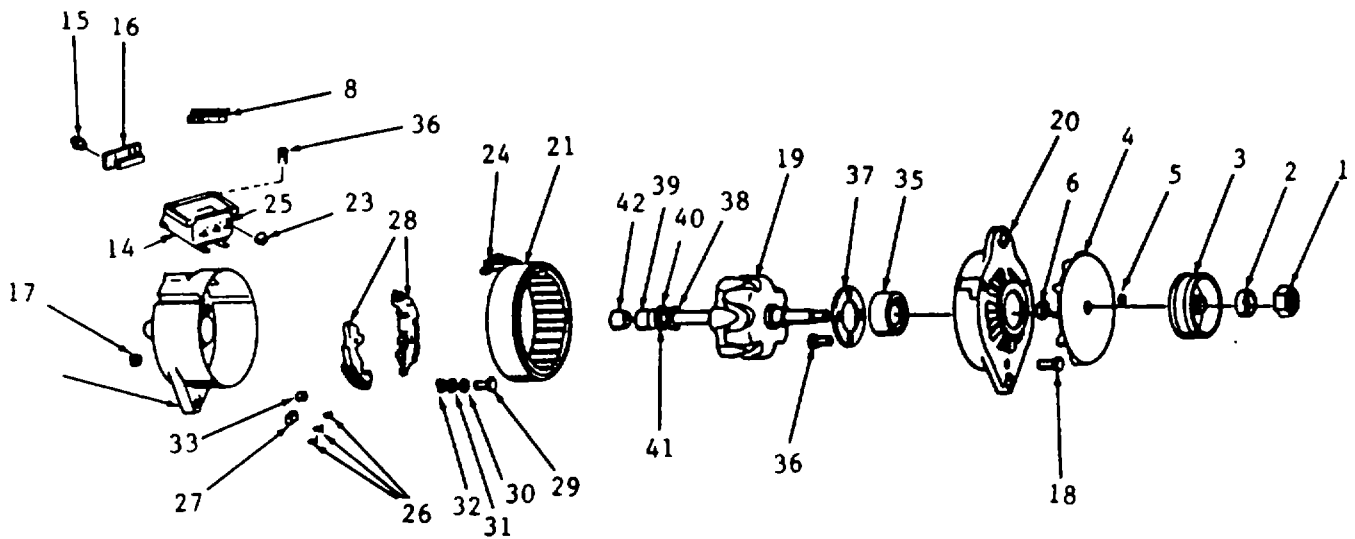
Ensure that drive end housing (20) separates from stator (21) and that the stator remains attached to the slip ring end housing (22) to avoid damage to the stator leads.



- g. Remove rotor (19) and drive end housing assembly (20) from stator (21) and slip ring end housing assembly (22).

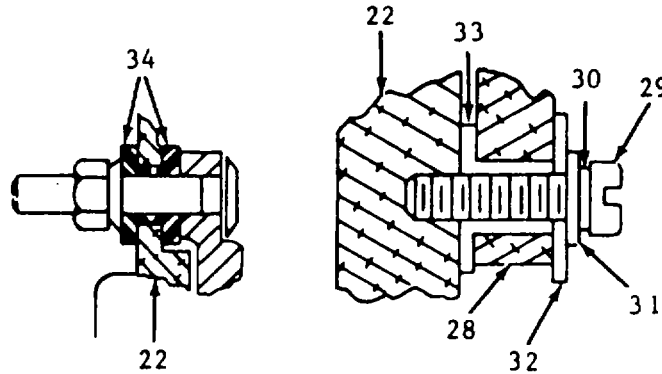
5-9. ALTERNATOR REPAIR (Continued).

- h. Remove three nuts (23) which secure stator leads (24) to terminals (25) and remove stator (21).
- i. Remove positive and negative output terminal bolts (11 and 12).
- j. Remove three hex screws (26) and remove capacitor (27) connected between the heat sinks (28).
- k. Remove two screws (29), lockwashers (30), guardwashers (31), and insulating washers (32) which retain lower end of heat sinks (28).
- l. Remove heat sinks (28) and note location of insulating washers (32) and bushings (33).



- m. Remove two terminal stud bushings (34).
- n. Using a bearing puller remove drive end housing (20) and bearing assembly (35) from the rotor shaft (19).
- o. Remove four screws (36) and bearing retainer (37) and press bearing out of drive end housing.
- p. With a heat gun remove wire (38) that connects the rotor coil (19) to the outside slip ring (39). Unsolder the wire from the inside slip ring (40) and with a bearing puller remove the slip ring assembly and insulation washer (41).
- q. Using a bearing puller remove the bearing (42).

5-9. ALTERNATOR REPAIR (Continued).



TEST

NOTE

Before performing these tests inspect all parts for wear, cracks, or other mechanical defects. Replace all damaged parts.

a. *Positive Heat Sink Test.*

NOTE

The positive heat sink is the one to which positive output terminal is connected. The square hole in the positive heat sink is larger than the negative heat sink hole.

- (1) Connect the positive lead of the test lamp to the positive heat sink and touch the negative test lead to each of the three diode terminals. The test lamp should not light. If the test lamp lights, the diode is shorted.
- (2) Reverse the test leads so that the negative test lead is connected to the positive heat sink. The positive test lead should now be touched to each diode terminal. If the test lamp fails to light, an open diode is indicated.
- (3) If a shorted or open diode is detected replace the entire heat sink assembly.

b. *Negative Heat Sink Test.*

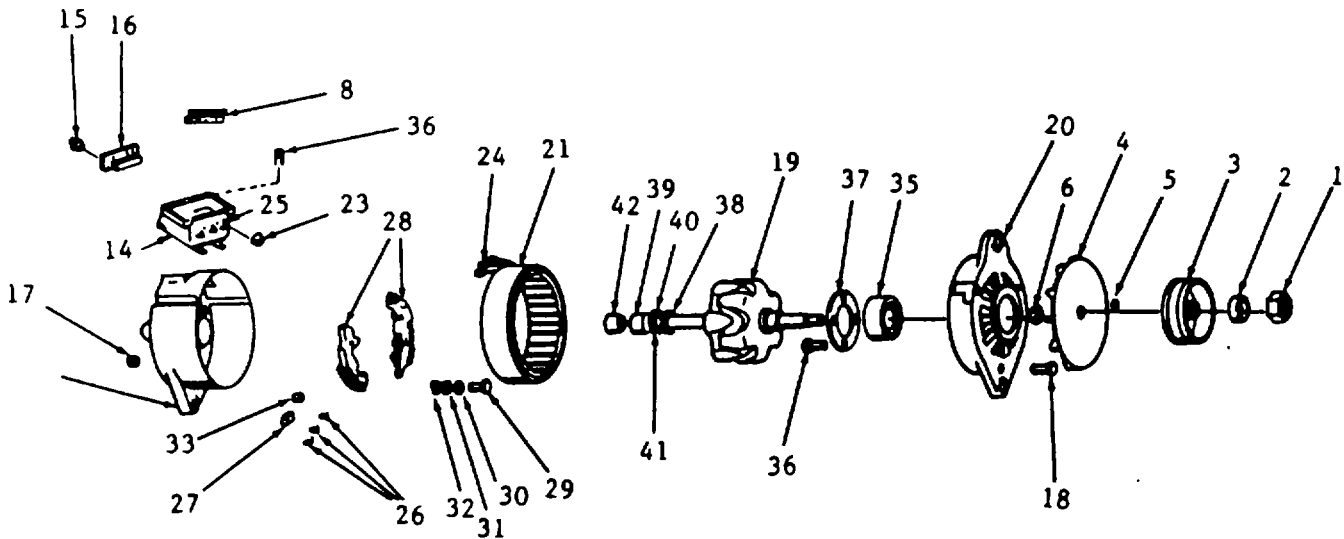
- (1) Connect the negative lead of the test lamp to the negative heat sink and touch the positive test lead to each of the three diode terminals. The test lamp should not light. If the test lamp lights, the diode is shorted.

5-9. ALTERNATOR REPAIR (Continued).

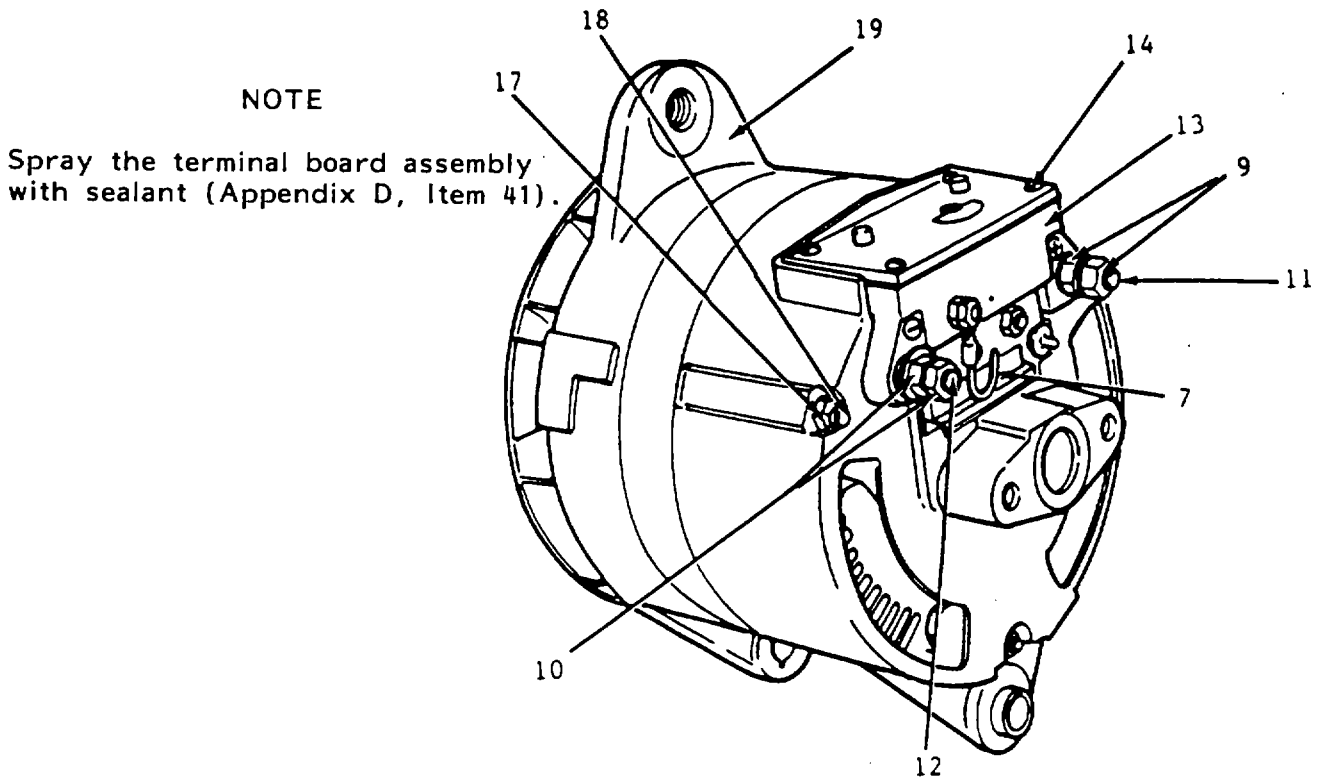
- (2) Reverse the test leads so that the positive test lead is connected to the negative heat sink. The negative test lead should now be touched to each diode terminal. If the test lamp fails to light, an open diode is indicated.
- (3) If a shorted or open diode is detected replace the entire heat sink assembly.

ASSEMBLY

- a. Install bearing (42) on the inner race of the bearing (19).
- b. Press on new slip ring assembly (39 thru 41) making sure the slot lines up with the slot in the shaft. The new slip ring assembly should be pressed on the shaft with enough pressure to prevent the insulation washer (41) from turning.
- c. Solder the rotorcoil leads (38) to slip ring assembly using a heat gun and solder (Appendix D, Item 43a).
- d. Place slip ring end of rotor shaft (19) into an arbor press. Install the rotor and drive end housing (20) by pressing the housing and bearing (35) on rotor shaft.
- e. Install the stator (21) on the slip ring end housing (22) and align bolt holes in stator (21) with housing (22).
- f. Install three stator terminals (24) on the terminal board studs (25) and secure with lock nuts (23).



5-9. ALTERNATOR REPAIR (Continued).



- g. Support the slip ring end housing (22) on an arbor press. Slip the rotor (19) to the drive end housing (20) through the stator (21) and into the slip ring end of the housing.
- h. Install three through bolts (18), lock nuts (17), and tighten nuts.
- i. Install the regulator (8) and brushes (36) in the housing.
- j. Connect jumpers (24) and tighten nuts (9 and 10).
- k. Push and pin the brushes (36) in place.
- l. Install regulator brush holder housing assembly (13) and install four brush housing screws (14). Coat with Loctite (Appendix D, Item 21).
- m. Install nuts (9 and 10) on output terminals (11 and 12) and connect diode lead (7).
- n. Install fan spacer (6), drive key (5), fan (4), and pulley (3) to the regulator (8).
- o. Install washer (2) and shaft nut (1).

5-10. STARTER REPAIR

This task covers:

a. Disassembly

b. Test

c. Assembly

INITIAL SETUP:

Tools

Ammeter
 Voltmeter
 General Mechanics Tool Kit
 Test Light

Materials/Parts

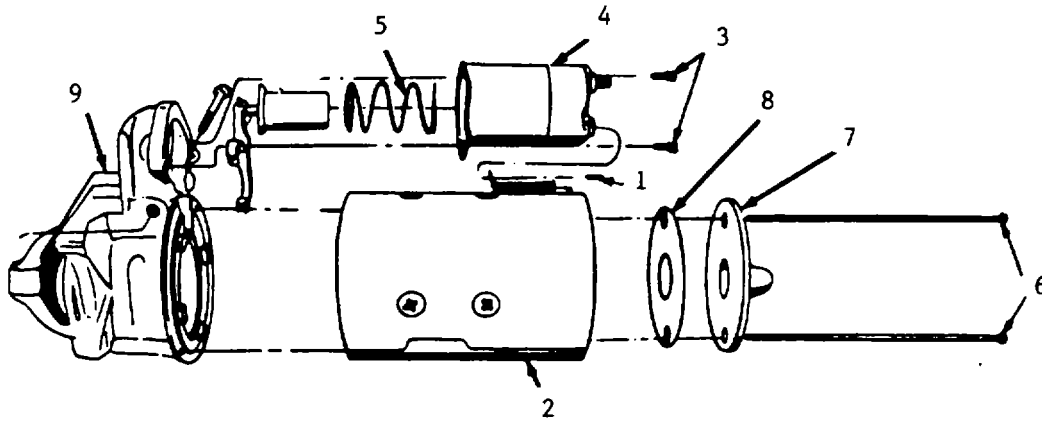
Solvent (Appendix D, Item 44)
 Lubricant (Appendix D, Item 17)
 Equipment Condition
Para. Condition Description
 4-109 Starter Removed

DISASSEMBLY

a. Starter Disassembly.

(1) Remove screw (1) from field coil connector (2) and solenoid mounting screws (3). Rotate solenoid (4) 90° and remove along with plunger return spring (5). Solenoid may now be serviced without further starter disassembly at this time.

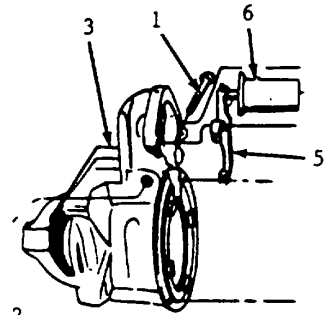
(2) Remove two through bolts (6), then remove commutator end frame (7), remove insulator (8). Remove field frame assembly (2) from drive gear housing (9).



5-10. STARTER REPAIR. (Continued)

b. Shift Lever and Plunger Removal.

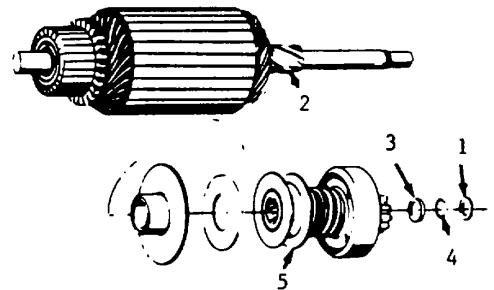
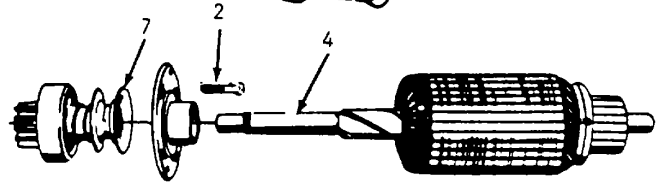
- (1) Remove shift lever pivot bolt (1).
- (2) Remove center bearing screws (2) and remove drive gear housing (3) from armature shaft (4). Shift lever (5) and plunger assembly (6) will now fall away from starter clutch.



c. Remove Drive Assembly From Shaft.

If necessary to remove overrunning clutch from armature shaft, proceed as follows:

- (1) Remove thrust washer collar (1) from armature shaft (2).
- (2) Slide a 5/8 inch deep socket or piece of pipe of suitable size over shaft against retainer (3) as a driving tool. Tap tool to move retainer off snap ring (4).
- (3) Remove snap ring (4) from groove in shaft. If snap ring is distorted, it will be necessary to use a new one on reassembly.



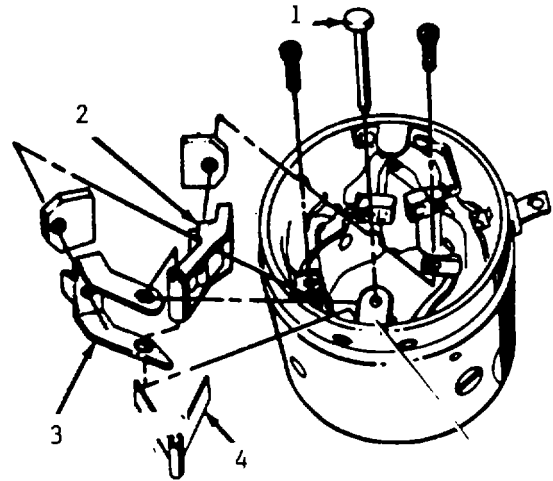
- (4) Remove retainer (3), clutch assembly (5), from armature shaft (2).

5-10. STARTER REPAIR. (Continued)

d. Replace Brush Holder.

If necessary to replace brush holder parts, proceed as follows:

- (1) Remove brush holder pivot pin (1) which positions one insulated (2) and one grounded brush (3).
- (2) Remove brush spring (4).
- (3) Replace brushes as necessary.



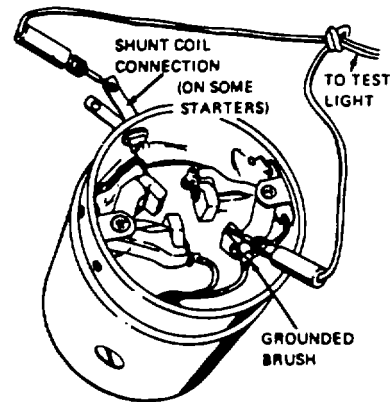
TEST

a. Testing Shunt Coil For Open.

WARNING

Cleaning solvent, Federal Specification P-D-680, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

- (1) Clean all starting motor parts with solvent (Appendix D, Item 44).
- (2) Inspect armature commutator, shaft and bushings, overrunning clutch pinion, brushes and springs for discoloration, damage or wear. Replace as required.
- (3) Check fit of armature shaft in bushing in drive housing. Shaft should fit snugly in the bushing. If the bushing is worn, it should be replaced.



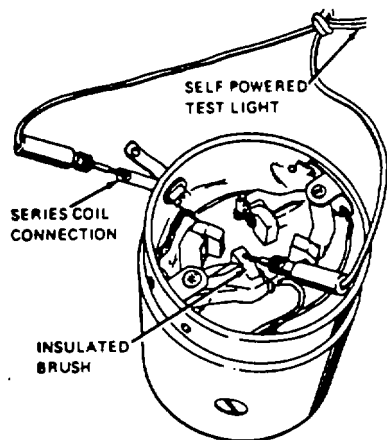
- (4) Inspect armature commutator. If commutator is rough, it should be turned down. Inspect the points where the armature conductors join the commutator bars to make sure they have a good connection. A burned commutator bar is usually evidence of a poor connection.

5-10. STARTER REPAIR. (Continued)

- (5) Check the armature for short circuits by placing on growler and holding hack saw blade over armature core while armature is rotated. If saw blade vibrates, armature is shorted. Recheck after cleaning between the commutator bars. If saw blade still vibrates, replace the armature.
- (6) Using a test lamp, place one lead on the shut coil terminal and connect the other lead to a ground brush. This test should be made from both ground brushes to insure continuity through both brushes and leads. If the lamp fails to light, the field coil is open and will require replacement.

b. Testing Series Coil For Open.

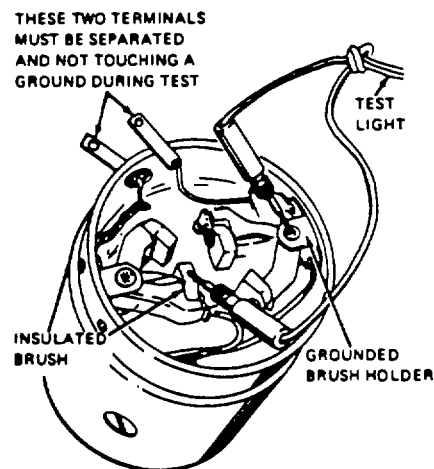
Using a test lamp, place one lead on the series coil terminal and the other lead on the insulated brush. If the lamp fails to light,



the series coil is open and will require repair or replacement. This test should be made from each insulated brush to check brush and lead continuity.

c. Testing Series Coil For Ground

Using a test lamp place one lead on the grounded brush holder and the other lead on either insulated brush. If the lamp lights, a grounded series coil is indicated and must be repaired or replaced.



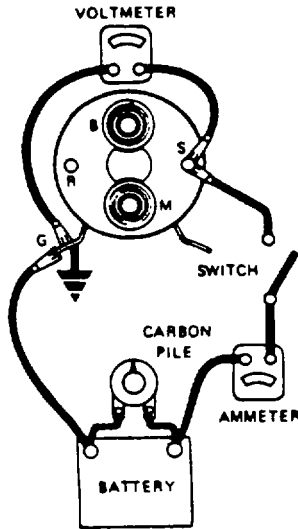
d. Testing Solenoid Windings

Check the current draw of the solenoid winding as follows:

- (1) If solenoid is not removed from starting

5-10. STARTER REPAIR. (Continued)

motor, the connector strap terminals must be removed from the terminal on the solenoid before making these tests. Complete tests in a minimum of time to prevent overheating of the solenoid.



- (2) To check hold-in winding, connect an ammeter in series with 12-volt battery and the "switch" terminal on the solenoid. Connect a voltmeter to the "switch" terminal and to ground. Connect carbon pile across battery. Adjust the voltage to 10 volts and note the ammeter reading. It should be 14.5 to 16.5 amperes for all starting motors.
- (3) To check both windings, connect as for previous test. Ground the solenoid motor

terminal. Adjust the voltage to 10 volts and note the ammeter reading. It should be 41 to 47 amperes for all starting motors.

NOTE

Current will decrease as windings heat up.

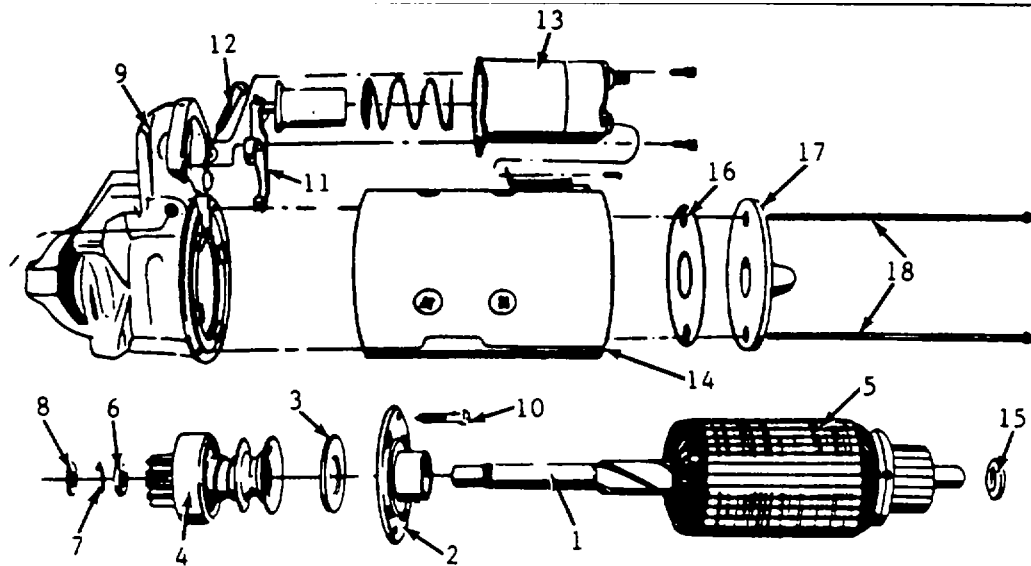
- (d) Current draw readings that are over specifications indicate shorted turns or a ground in the windings of the solenoid and the solenoid should be replaced. Current draw readings that are under specifications indicate excessive resistance. No reading indicates an open circuit. Check connections then replace solenoid if necessary.

ASSEMBLY

Assemble the armature and clutch as follows:

- (1) Lubricate drive end of armature shaft (1) with lubricate (Appendix D, Item 17).
- (2) Install center bearing (2) with bearing toward the armature winding. Then install the fiber washer (3) on the armature shaft (1).

5-10. STARTER REPAIR. (Continued)



- (3) Slide clutch assembly (4) onto armature shaft (1) with pinion away from armature (5).
- (4) Slide retainer (6) onto shaft (1) with cupped side facing the end of shaft (1).
- (5) Install snap ring (7) into groove on armature shaft.
- (6) Install thrust washer (8) on shaft (1).
- (7) Position retainer (6) and thrust washer (8) with snap ring (7) in between. Using two pliers, grip retainer (6) and thrust washer (8) or collar and squeeze until snap ring (7) is forced into retainer (6) and is held securely in groove in armature shaft (1).
- (8) Lubricate (Appendix D, Item 17) drive gear housing bushing.
- (9) Engage shift lever yoke with clutch and slide complete assembly into drive gear housing (9).
- (10) Install the center bearing screws (10) and the shift lever (11), and pivot bolt (12).
- (11) Install solenoid assembly (13).
- (12) Position field frame (14) against drive gear housing (9) on alignment pin using care to prevent damage to brushes.
- (13) Lubricate commutator endframe bushing with lubricant (Appendix D, Item 17).
- (14) Install washer (15) on armature shaft and slide end frame onto shaft (1). Install insulator (16) and then end frame (17) onto shaft (1). Then install through-bolts (18) making sure they pass through bolt holes in insulator (16).
- (15) Connect the field coil connector (15) to the solenoid terminal with screw (20).

5-11. ENGINE MOUNTING REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

Engine Jack
General Mechanics Tool Kit

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

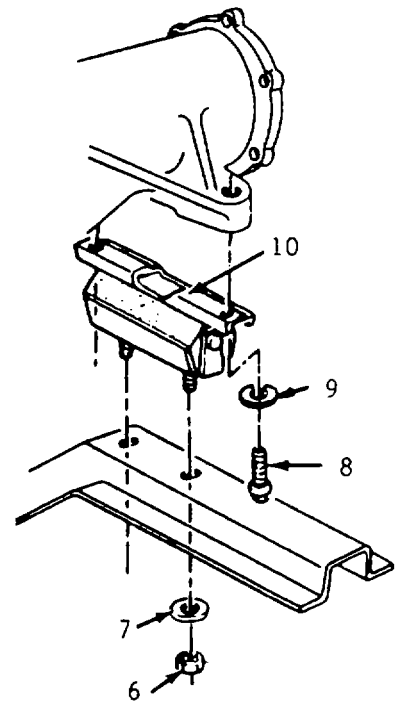
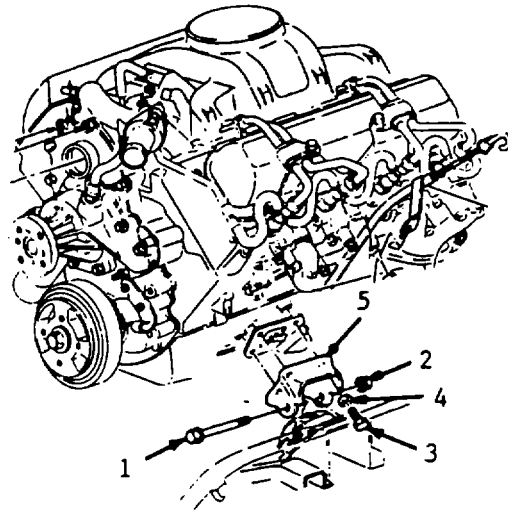
REMOVAL

a. *Front Engine Mounting Assembly.*

CAUTION

When raising or supporting the engine for any reason, do not use a jack under the oil pan, any sheet metal or crankshaft pulley. Due to the small clearance between the oil pan and the oil pump screen, jacking against the oil pan may cause it to be bent against the pump screen, resulting in a damaged oil pickup unit.

- (1) Support the engine with a suitable jack, being careful not to "load" the engine mounting.
- (2) Remove the engine mounting through bolt (1) and nut (2).
- (3) Raise the engine only enough to permit removal of the engine mounting.
- (4) Remove the mounting assembly bolts (3), and washers (4).
- (5) Remove the mounting assembly (5).



5-11. ENGINE MOUNTING REPLACEMENT. (Continued)

b. Rear Engine Mounting Assembly.

- (1) Support the rear of the engine with a suitable jack to relieve the weight on the rear mountings.
- (2) Remove the mounting-to-crossmember nuts (6) and washers (7).
- (3) Remove the mounting-to-transmission bolts (8) and washers (9).
- (4) Raise the rear of the engine only enough to permit removal of the mounting (10).
- (5) Remove the mounting (10).

INSTALLATION

a. Front Engine Mounting Assembly.

NOTE

The through-bolt must be inserted from the rear of the right side mounting before the mounting is installed in the vehicle.

- (1) Install the engine mounting assembly (5) to the vehicle.
- (2) Install the mounting assembly bolts (3) and washers (4).
- (3) Torque the bolts (3) to 36 ft-lbs (48 N.m).

NOTE

Be sure there is a 1 inch (25 mm) clearance between the throughbolt head and mounting assembly.

- (4) Lower the engine until the through-bolts can be inserted.
- (5) Install the through-bolts (1) and nuts (2) and torque the bolt to 85 ft-lbs (115 N-m) or nuts to 55 ft-lbs (75 N-m).
- (6) Remove the support and reconnect the battery cables.

b. Rear Engine Mounting Assembly.

- (1) Install the mounting (10).
- (2) Lower the rear of the engine.
- (3) Install the mounting-to-transmission bolts (8) and washers (9).
- (4) Torque the bolts to 40 ft-lbs (54 N-m).
- (5) Install the mounting-to-crossmember nuts (6) and washers (7).
- (6) Torque the nuts to 36 ft-lbs (48 N-m).
- (7) Remove the support and reconnect the battery cables.

5-13. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS REPLACEMENT. (Continued)

- l. Disconnect and remove transmission gear selector (paragraph 4-193) and transfer case shift lever (paragraph 4-201).
- m. Remove the rear mounting hardware which hold the cab to the chassis.
- n. Remove the front mounting hardware holding the cab to the chassis.
- f. Install transmission gear selector (paragraph 4-193).
- g. Connect all electrical lines that run between the cab and chassis, including the cabchassis ground strap, headlight wires, horn wires, and brake light switch (paragraphs 4-182 and 4-183).
- h. Connect speedometer cable (paragraph 4-127).

WARNING

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- o. Engage hoist and sling to cab. Remove cab by raising slightly to clear support brackets.
- p. Remove lifting sling and hoist.
- i. Install master cylinder (paragraph 4-196).
- j. Clip brake and clutch lines to cab (paragraph 4-209).
- k. Connect steering coupling (paragraph 4-221).
- l. Connect accelerator linkage (paragraph 4-89).
- m. Connect heater hoses at cab connections (paragraph 4-77).
- n. Service radiator (paragraph 472).
- o. Install and connect batteries (paragraph 4-106).
- p. Install grille (paragraph 4-155).

INSTALLATION

WARNING

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- a. Install lifting sling and hoist.
- b. Raise cab over chassis and lower into position.
- c. Install front mounting hardware.
- d. Install rear mounting hardware.
- e. Install transfer case shift lever (paragraph 4-201).

5-14. CAB PANELS REPAIR.

This task covers: Repair

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Heat Gun
Rubber Mallet
File
Grinder

Materials/Parts

Sandpaper (Appendix D, Item 38)
Filler (Appendix D, Item 12b)
Putty (Appendix D, Item 36a)
Paint (Appendix D, Item 33a)

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.
Batteries disconnected.

a. Repair Holes Using Metal Insert.

- (1) Using the appropriate tools, cut the rusted or damaged material from the panel.
- (2) Using an rubber mallet, form a step in the original panel so that the new sheet metal or aluminum insert will set flush with the original panel.
- (3) Cut a new sheet metal or aluminum insert to fit within the step area of the panel being repaired.
- (4) Attach the insert to the original panel by spot or tack welding it in place.
- (5) Using a grinder, cut down the welds flush with the exterior surface of the repair area.
- (6) To complete the repair, use the procedure for Surface Filling and Finishing.

b. Repairing Dents.

- (1) Clean metal to the bare surface.
- (2) Drill or punch 1/2 inch holes in the dent to assure a good anchor for the filler.
- (3) To complete the repair, use the procedure for Surface Filling and Finishing.
- (4) To complete the repair, use the procedure for Surface Filling and Finishing.

c. Surface Filling And Finishing.

After repairing the damaged areas. apply filler (Appendix D, Item 12b) and finish the surface using this procedure:

- (1) Following the manufacturer's instructions, mix enough body filler to re-establish the surface.

5-14. CAB PANELS REPAIRS. (Continued)

CAUTION

Mix filler on formica, teflon or other hard surface. Do not work on a porous surface such as cardboard.

- (2) Work the filler (Appendix D, Item 12b) into the repaired surface making sure to fill all voids and remove large air bubbles.

NOTE

Allow filler to extend above the original surface to allow for shrinkage.

- (3) When the filler (Appendix D, Item 12b) is firm to the touch file off the excess, still leaving the filler level slightly above that of the original surface.

WARNING

Keep heat source at least 12 inches away from the repair area.

- (4) Pre-shrink the filler, using a heat gun. A minimum temperature of 49°C (120°F) is required for shrinkage.
- (5) Sand the filler with sandpaper (Appendix D, Item 38) until it is smooth and even with the original surface.
- (6) If the filler (Appendix D, Item 12b) is slightly porous, apply a thin coat of glazing putty (Appendix D, Item 36a).

NOTE

If the filler is pockmarked, do not use glazing putty. Apply another layer of body filler as covered in steps (1) through (5) before applying the glazing putty.

- (7) Allow the glazing putty to cure under heat gun. Finish by sanding with sandpaper (Appendix D, Item 28).

WARNING

Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.

- (8) Clean the area with air. Spot prime the surface and wet sand with sandpaper (Appendix D, Item 28). Complete the repair by painting (Appendix D, Item 33a) the surface.

Section VI. MAINTENANCE OF FRAME ASSEMBLY

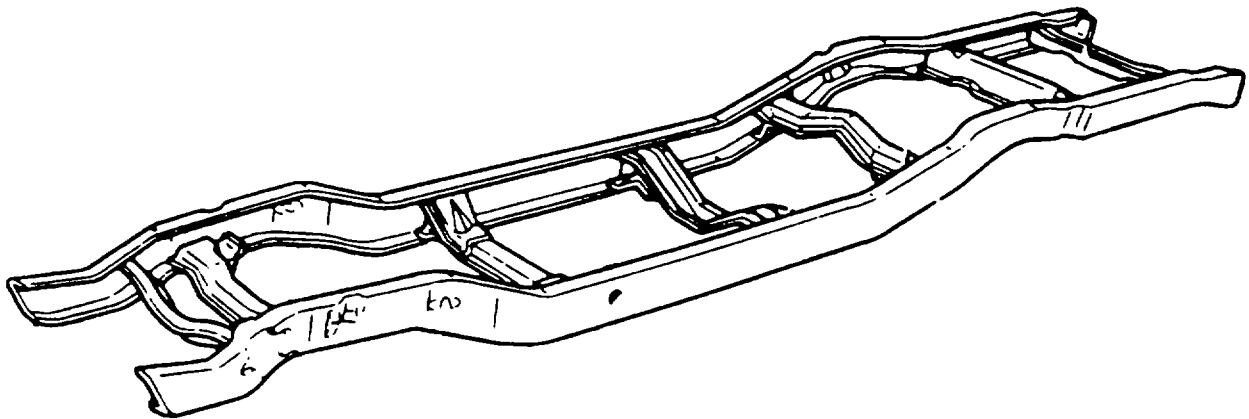
Crossmember Replacement.....	Para. 5-16	General	Para. 5-15
Frame Rail Replacement.....	5-17		

5-15. GENERAL.

This section contains information on the maintenance of the frame assembly that are maintainable at the Direct Support level.

5-16. CROSSMEMBER REPLACEMENT.

This task covers:	a. Repair	b. Installation	
<u>INITIAL SETUP:</u>			<u>General Safety Instructions</u>
<u>Tools</u>			Engine OFF
General Mechanics Tool Kit			Transmission in (N) neutral.
			Parking brake and micro-brakelock set.
			Batteries disconnected.
			<u>Equipment Condition</u>
			<u>Para.(s)</u> <u>Condition Description</u>
			4-13 thru 4-16 Accessories Removed
			4-18 Hose Rollers Removed
			4-21 Hose Reel Removed
<u>Personnel Required</u> 2			4-26 thru 4-42 Pump Compartment Assembly Removed
			4-44 thru 4-61 Hose Body Assembly Removed
			4-65 Water Tank Removed
			5-8 Engine Removed
			5-13 Cab Assembly Removed



5-16. CROSSMEMBER REPLACEMENT (Continued).

REMOVAL

- a. Remove all wires, cables and/or lines that may be connected to the crossmember.
- b. Remove brackets, valves or anything else mounted on the frame that will prevent the crossmember removal.
- c. Support the crossmember and remove the bolts or rivets that hold it to the frame rail.
- d. Remove the crossmember.

INSTALLATION

- a. Place the crossmember in position on the frame.
- b. Install the bolts or rivets that hold each of the crossmember to the frame rail.
- c. Install any brackets, valves, etc. that were removed when removing the crossmember.
- d. Connect any wires, cables or lines that should be connected to the crossmember.
- e. Install cab assembly (paragraph 5-13).
- f. Install engine (paragraph 5-8).
- g. Install water tank (paragraph 4-65).
- h. Install hose body assembly (paragraphs 4-44 thru 4-61).
- i. Install pump compartment assembly (paragraphs 4-26 thru 4-42).
- j. Install hose reel (paragraph 4-21).
- k. Install hose rollers (paragraph 4-18).
- l. Install accessories (paragraphs 4-13 thru 4-16).
- m. Reconnect the battery cables.

5-17. FRAME RAIL REPLACEMENT.

This task covers:

a. Removal

b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Jack Stand
Hoist

Personnel Required 4

		Equipment Condition
		<u>Para.(s)</u> <u>Condition Description</u>
	5-16	Crossmembers Removed
	4-67 thru 4-70	Fire Pump and Piping Removed
	4-72 thru 4-81	Engine Cooling System Removed
	4-82 thru 4-89	Engine Fuel System Removed
	4-100 thru 4-104	Exhaust System Removed
	4-182 and 4-183	Electrical System Removed
	4-185 thru 4-190	Propeller Assemblies Removed
	4-192	Transmission Assembly Removed
	4-195	Clutch Assembly Removed
	4-200	Transfer Case Removed
	4-208	Brake System Drained
	4-209	Brake System Pipes and Hoses Removed
	4-221 thru 4-224	Steering Assembly Removed
	4-226 thru 4-229	Power Steering System Removed
	4-231 thru 4-238	Front Suspension Removed
	4-240 thru 4-242	Rear Suspension Removed
	4-244 thru 4-248	Rear Axle Assembly Removed
	4-250 thru 4-252	Front Axle Assembly Removed

REMOVAL

- a. Remove jack stands from under frame rails.

WARNING

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- b. Using hoist remove frame rail from area.

5-17. FRAME RAIL REPLACEMENT. (Continued)

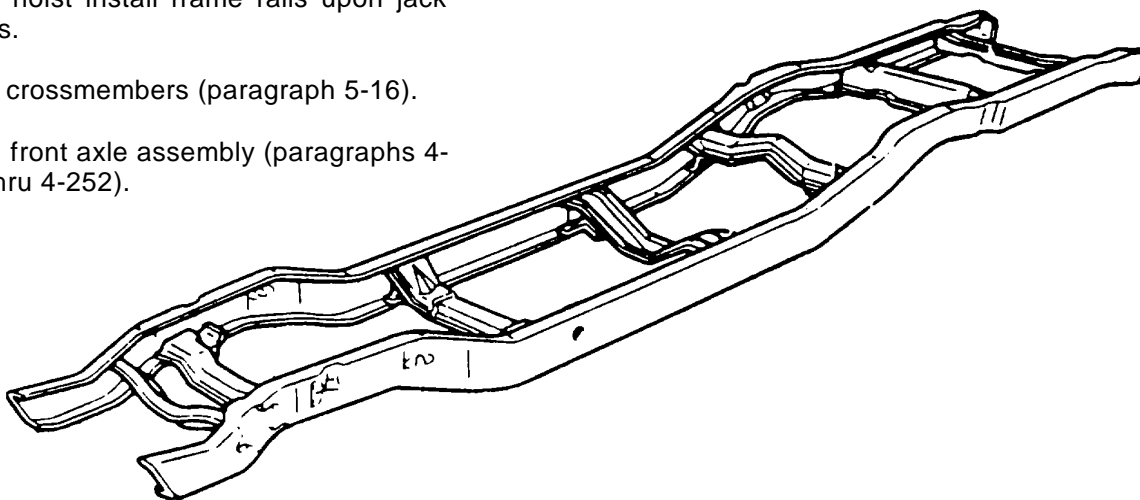
INSTALLATION

- a. Position frame rail to begin assembly.

WARNING

When lifting an object make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- b. Using hoist install frame rails upon jack stands.
 c. Install crossmembers (paragraph 5-16).
 d. Install front axle assembly (paragraphs 4-250 thru 4-252).



- e. Install rear axle assembly (paragraphs 4-244 thru 4-248).
 f. Install rear suspension (paragraphs 4-240 thru 4-242).
 g. Install front suspension (paragraphs 4-231 thru 4-238).
 h. Install power steering system (paragraphs 4-226 thru 4-229).
 i. Install steering assembly (paragraphs 4-221 thru 4-224).
 j. Install brake system pipes and hoses (paragraph 4-209).

- k. Install fluid in brake system (paragraph 4-208).
 l. Install transfer case (paragraph 4-200).
 m. Install clutch assembly (paragraph 4-195).

- n. Install transmission assembly (paragraph 4-192).
 o. Install propeller assemblies (paragraphs 4-185 thru 4-190).
 p. Install electrical system (paragraphs 4-182 and 4-183).
 q. Install exhaust system (paragraphs 4-100 thru 4-104).
 r. Install engine fuel system (paragraphs 4-82 thru 4-89).
 s. Install engine cooling system (paragraphs 4-72 thru 4-81).
 t. Install fire pump and piping (paragraphs 4-72 thru 4-81).

**CHAPTER 6
GENERAL SUPPORT MAINTENANCE INSTRUCTIONS**

- Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT
- Section II. MAINTENANCE OF ENGINE AND ACCESSORIES
- Section III. MAINTENANCE OF TRANSMISSION ASSEMBLY
- Section IV. MAINTENANCE OF CLUTCH ASSEMBLY
- Section V. MAINTENANCE OF TRANSFER CASE ASSEMBLY

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

	Para.		Para.
Repair Parts.....	6-1	Special Tools, TMDE, and Support Equipment.....	6-2

6-1. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list, Appendix E, covering organizational, direct support and general support maintenance for the 250 GPM Mini-Pumper Firefighting Truck.

6-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Special tools, TMDE, and support equipment required to maintain the Mini- Pumper Firefighting Truck are listed in Appendix B, Section III.

Section II. MAINTENANCE OF ENGINE AND ACCESSORIES

	Para.		Para.
Camshaft Maintenance.....	6-13	Oil Pump Drive	
Connecting Rod and Piston		Maintenance	6-9
Maintenance	6-16	Rear Crankshaft Seal	
Crankshaft and Main Bearing		Maintenance	6-15
Maintenance	6-17	Rocker Arm, Shaft and Push	
Cylinder Head Maintenance.....	6-8	Rod Maintenance.....	6-5
Engine and Accessories		Timing Chain and Sprocket	
Repair	6-4	Maintenance	6-12
Front Cover Maintenance.....	6-11	Torsional Damper and Front	
General	6-3	Crankshaft Seal	
Hydraulic Lifter		Maintenance	6-10
Maintenance	6-6	Valve, Stem Seals, and	
Oil Pump Maintenance.....	6-14	Spring Maintenance.....	6-7

6-3. GENERAL.

This section contains information on the maintenance of the engine and accessories that are maintainable at the General Support level.

6-4. ENGINE AND ACCESSORIES REPAIR.

This task covers: Repair

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Seals and Gaskets as required

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
--------------	------------------------------

4-76	Drive Belts Removed
------	---------------------

5-8	Engine Removed
-----	----------------

REPAIR

NOTE

Engine repair consists of disassembly, repair or re- placement of the following components.

6-4. ENGINE AND ACCESSORIES REPAIR. (Continued)

- a. Remove alternator (paragraph 4-107).
- b. Remove starter (paragraph 4-109).
- c. Disassemble, repair, or replace the diesel glow plug system (paragraph 4-108).
- d. Disassemble, repair or replace the intake manifold (paragraph 4-110).
- e. Disassemble, repair, or replace the exhaust manifold (paragraph 4-111).
- f. Disassemble, repair, or replace the rocker arm cover (paragraph 4-112).
- g. Disassemble, repair or replace the rocker arm, shaft and pushrods (paragraph 6-5).
- h. Disassemble, repair, or replace the hydraulic lifters (paragraph 6-6).
- i. Disassemble, repair or replace the valves, stem seals and springs (paragraph 6-7).
- j. Disassemble, repair or replace the cylinder heads (paragraph 6-8).
- k. Disassemble, repair or replace the oil pump drive (paragraph 6-9).
- l. Disassemble, repair or replace the torsional damper and front crankshaft seal (paragraph 6-10).
- m. Disassemble, repair or replace the front cover (paragraph 6-11).
- n. Disassemble, repair or replace timing chain and sprocket (paragraph 6-12).
- o. Disassemble, repair or replace the camshaft (paragraph 6-13).
- p. Disassemble, repair or replace the dipstick and tube (paragraph 4-113).
- q. Disassemble, repair or replace the oil pan (paragraph 4-114).
- r. Disassemble, repair or replace the oil pump (paragraph 6-14).
- s. Disassemble, repair or replace the rear crankshaft seal (paragraph 6-15).
- t. Disassemble, repair or replace the connecting rods and pistons (paragraph 6-16).
- u. Disassemble, repair or replace the crankshaft and main bearing (paragraph 6-17).
- v. Remove or replace the engine mountings (paragraph 5-11).
- w. Replace alternator (paragraph 4-107).
- x. Replace starter (paragraph 4-109).

6-5. ROCKER ARM, SHAFT AND PUSH ROD MAINTENANCE.

This task covers:

a. Repair

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
1/2" Drift

Materials/Parts

Rocker Arm (23500074)
Shaft (23500075)
Push Rod (14057232)

Equipment Condition

Para.	Condition Description
4-112	Rocker Arm Cover Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

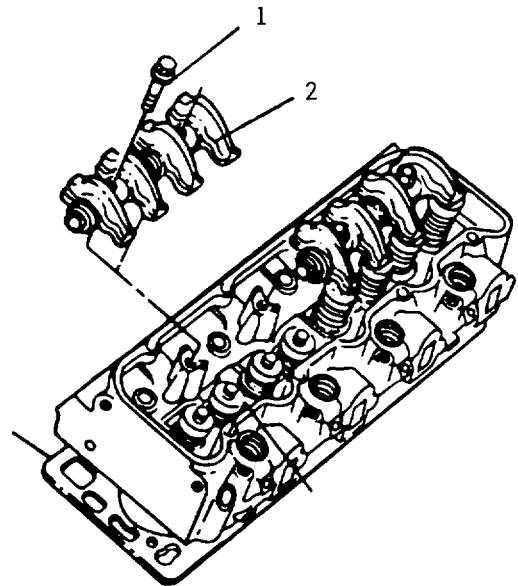
REMOVAL

- a. Remove rocker arm shaft bolts (1).
- b. Remove rocker arm shaft with rocker arms (2).

CAUTION

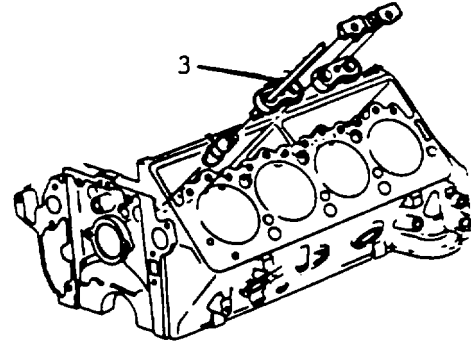
Push rod upper end must be identified for reinstallation. Push rods must be installed in original direction because they have a different degree of hardness at each end. A paint stripe identifies the upper end.

- c. Mark the assemblies so they can be returned to the original location at assembly.

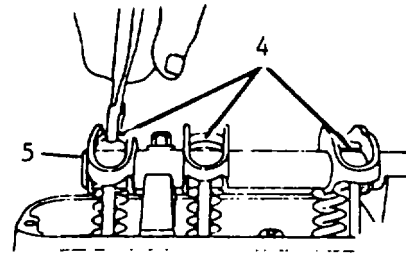


6-5. ROCKER ARM, SHAFT AND PUSH ROD MAINTENANCE. (Continued)

- d. Remove pushrods (3).
- e. Insert a screwdriver into the rocker arm shaft bore and break off the end of the nylon rocker arm retainers.



- f. Remove the rocker arm retainers (4) with pliers.
- g. Remove the cotter pin (5) from the shaft and slide the rocker arms off the shaft.



INSPECTION

Check rocker arm assembly and push rods for damage and excessive wear. Replace if damage is evident.

INSTALLATION

- a. Slide the rocker arms onto the rocker arm shaft and install a new cotter pin (5).
- b. Center the rocker arms on the corresponding holes in the rocker arm shaft and install new retainers (4) using a drift of at least 1/2 inch (13 mm) diameter.

CAUTION

Push rods must be installed with the marked or painted end up. Failure to do so may result in damage or premature wear.

- c. Install push rods (3).

- d. Install the rocker' arm shaft assembly (2) making sure the ball ends of the push rods seat in the rocker arms.

CAUTION

Improper installation of the rocker arm shaft bolts may cause rocker arm shaft breakage and/ or piston to valve contact.

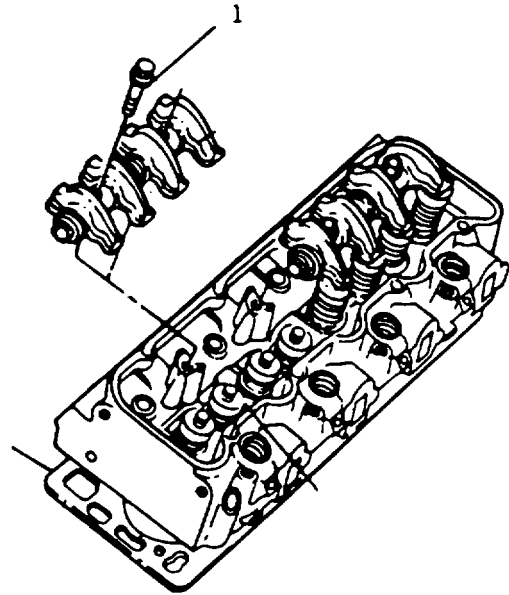
- e. Install rocker arm shaft bolts (1) by rotating the engine until the mark on the torsional damper aligns with the "0" mark on the timing tab.

6-5. ROCKER ARM, SHAFT AND PUSH ROD MAINTENANCE. (Continued)

NOTE

This measurement can be estimated by aligning the torsional damper mark with the first lower, water pump bolt. This procedure will position the engine so no valves are close to a piston crown.

- f. Rotate the engine counterclockwise 3-1/2 inches (88 mm), measured at the torsional damper.
- g. Install both rocker arm shaft bolts (1) snug on the shaft and alternately, torque to 40 ft-lbs (55 N.m).
- h. Install rocker arm cover (paragraph 4-112).



6-6. HYDRAULIC LIFTER MAINTENANCE.

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Hydraulic Lifter Remover (J-29834)

Materials/Parts

Lubricant (Appendix D, Item 22)
Hydraulic Lifter (5234530)

Equipment Condition

Para.	Condition Description
4-112	Rocker Arm Cover Removed
6-5	Rocker Arms Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

6-6. HYDRAULIC LIFTER MAINTENANCE. (Continued)

REMOVAL

- a. Remove guide clamps (1) and guide plates (2).
- b. Remove hydraulic lifters through the access hole in the cylinder head using the hydraulic lifter remover and a magnet.

INSPECTION

- a. Check hydraulic lifter body for scuffing and scoring; Replace the lifter if wear or damage is evident.
- b. Check the roller for looseness and excessive play, missing or broken needle bearings; replace if necessary.

INSTALLATION

NOTE

New hydraulic lifters must be primed before installation. Damage to the lifters may result if dry when the engine is started. Prime new lifters by working lifter plunger while submerged in clean kerosene or diesel fuel.

- a. Coat the lifter roller and bearings with lubricant (Appendix D, Item 22).
- b. Install filers into their original positions in the cylinder block using a rigid mechanics wire or welding rod for fabricating a device to facilitate installation.
- c. Install valve lifter guide plates (1).
- d. Install guide plate clamps (2) with clamp bolt and torque to 18 ft-lbs (26 N-m).
- e. Install rocker arms (paragraph 6-5).
- f. Install rocker arm cover (paragraph 4-112).

6-7. VALVE, STEM SEALS, AND SPRING MAINTENANCE.

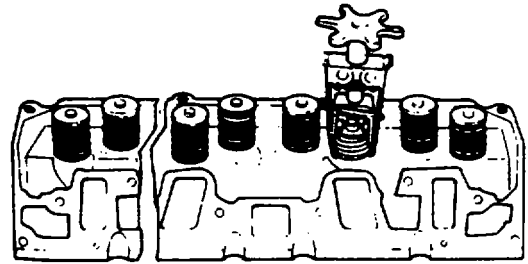
This task covers:

	a. Removal	b. Inspection	c. Installation
<u>INITIAL SETUP:</u>			Equipment Condition
<u>Tools</u>			Para. Condition Description
General Mechanics Tool Kit			4-112 Rocker Arm Cover Removed
Valve Grinder			6-5 Rocker Arm, Shaft and Push Rods Removed
Mallet			6-6 Hydraulic Lifters Removed
Air Line Adapter (J-29666)			
Valve Spring Compressor (J-26513)			
<u>Materials/Parts</u>			<u>General Safety Instructions</u>
Valve Seal (3835333)			Engine OFF
Grease (Appendix D, Item 15)			Transmission in (N) neutral.
			Parking brake and micro-brakelock set.

6-7. VALVE, STEM SEALS, AND SPRING MAINTENANCE. (Continued)

WARNING

Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.



REMOVAL

- a. Rotate the engine until the piston is at top dead center for each cylinder, or install air line adapter to glow plug port and apply compressed air to hold the valves in place.
- b. Install valve spring compressor and compress the valve spring until valve keys are accessible.
- c. Remove valve keys, valve cap, or rotator, valve springs and seals. If valve spring does not compress, tap tool with a mallet to break bind at rotator and keys.
- b. Check valve stems for excessive wear or damage. Replace if necessary.
- c. Check valve spring for damage or excessive wear. Replace if necessary.
- d. Check the valve stem seals for damage and wear. Replace if necessary.

INSPECTION

- a. Check valve heads for pitting, warpage, burning, cracked faces, excessive wear or other damage. Reface or replace as necessary.

NOTE

Check valve heads that have been refaced. If the edge of the valve head is less than 1/32 inch (0.8mm) thick after grinding, replace the valve.

INSTALLATION

- a. Install new valve seal(s).
- b. Install valve spring with damper, shield, cap, and rotator.

WARNING

Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.

6-7. VALVE, STEM SEALS, AND SPRING MAINTENANCE. (Continued)

- c. With air pressure applied to the cylinder, install the valve keepers by compressing the valve spring with the valve spring compressor, and inserting the valve keeper using grease (Appendix D, Item 15) to hold them in place.
- d. Carefully release spring pressure, making sure the valve keepers remain in place.
- e. Remove the valve spring compressor.
- f. Remove the air lines and adapter. (J-29666)
- g. Install hydraulic lifters (paragraph 6-6).
- h. Install rocker arm, shaft and push rods (paragraph 6-5).
- i. Install rocker arm cover (paragraph 4-112).

6-8. CYLINDER HEAD MAINTENANCE.

- This task covers:
- a. Removal
 - b. Inspection
 - c. Installation
 - d. Test

INITIAL SETUP:

Tools

- Compression Gauge (J-26999-10)
- General Mechanics Tool Kit
- Jack
- Jack Stand

Materials/Parts

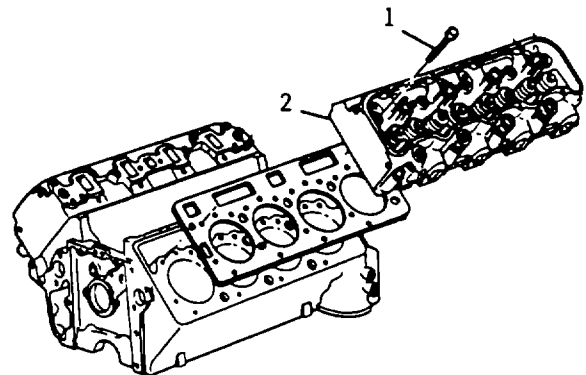
- Sealant (Appendix D, Item 42)
- Gasket (14066246)

Equipment Condition

Para.	Condition Description
4-72	Cooling System Drained
4-92	Injection Lines Removed
4-101	Exhaust Pipes Removed
4-107	Alternator Removed
4-108	Glow Plugs Removed
4-110	Intake Manifold Removed
4-112	Rocker Arm Cover Removed
4-113	Dip Stick Removed
6-5	Rocker Arm Assemblies Removed

REMOVAL

- a. Disconnect radiator by-pass and heater hoses.
- b. Remove cross-over and thermostat housing assembly.
- c. Remove cylinder head bolts (1) (17 each side).
- d. Remove cylinder head (2).



6-8. CYLINDER HEAD MAINTENANCE. (Continued)

INSPECTION

Inspect the cylinder head for cracks in the exhaust ports, combustion chambers, and for external cracks to the coolant chamber or any other damage.

CAUTION

Measure the cylinder head. If warped more than 0.006 inch (0.15 mm) longitudinally or 0.003 inch (0.08 mm) transversely, replace the cylinder head.

All gasket surfaces must be entirely free of dirt, sand and foreign matter directly before and during assembly.

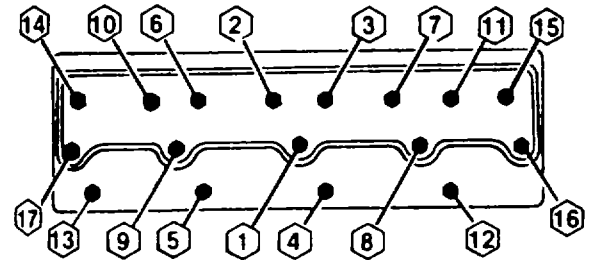
Head gaskets are a special composition gasket that must be used without a sealer.

Left rear cylinder head bolt must be installed into head prior to installation

INSTALLATION

- a. Place the head gasket on the engine block over the dowel pins.
- b. Carefully guide the cylinder head into place over the dowel pins.
- c. Coat threads and underside of cylinder head bolts with sealant and install bolts finger tight (Appendix D, Item 42).
- d. Torque the cylinder head bolts in sequence shown to 20 ft-lbs (25 N-m).

- e. In sequence, torque cylinder bolts to 50 ft-lbs (65 N-m).
- f. In sequence, torque all bolts an additional 900 degrees (1/4 turn).



Torque Sequence

- g. Install rocker arm assemblies (paragraph 6-5).
- h. Install dip stick (paragraph 4-113).
- i. Install rocker arm cover (paragraph 4-112).
- j. Install intake manifold (paragraph 4-110).
- k. Install glow plugs (paragraph 4-108).
- l. Install alternator (paragraph 4-107).
- m. Install exhaust pipes (paragraph 4-101).
- n. Install injection lines (paragraph 4-92).
- o. Install cooling system (paragraph 4-72).

6-8. CYLINDER HEAD MAINTENANCE. (Continued)

TEST

NOTE

- a. Remove air cleaner(paragraph 4-83).
- b. Disconnect injection pump fuel solenoid terminal end.
- c. Disconnect glow plug wires, remove all glow plugs (para- graph 4-108).
- d. Screw the compression gauge into the glow plug hole of the cylinder that is being checked.

Normal compression ratio is 21.5:1.

The lowest reading cylinder should not be less than 80% of the highest, and no cylinder reading should be less than 300 PSI (2068 kPa)

- e. Crank the engine, six puffs per cylinder.

6-9. OIL PUMP DRIVE MAINTENANCE

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit

Materials/Parts

Oil Pump Kit (14079426)

Lint Free Cloth (Appendix D, Item 12)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-83	Air Cleaner Removed

General Safety Instructions

Engine OFF

Transmission in (N) neutral.

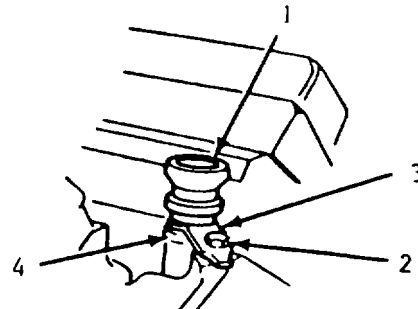
Parking brake and micro-brakelock set.

REMOVAL

- a. Cover intake manifold.
- b. Remove oil pump drive (1), bolt (2), and hold down clamp (3).

INSPECTION

Check the oil pump drive (1) for damage or evidence of leakage.

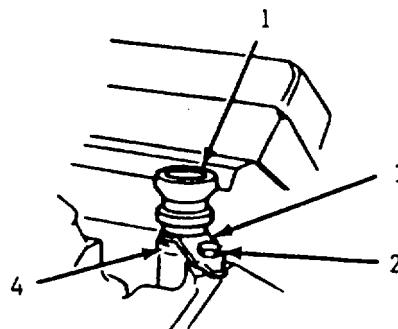


INSTALLATION

- a. Install new gasket (4).

6-9. OIL PUMP DRIVE MAINTENANCE. (Continued)

- b. Install oil pump drive to the engine by indexing the drive with the camshaft gear and oil pump drive shaft, making sure the drive seats fully.
- c. Install clamp (3) and bolts (2) torque bolt to 31 ft-lbs (42 N-m).
- d. Install air cleaner (paragraph 4-83).



6-10. TORSIONAL DAMPER, FRONT CRANKSHAFT SEAL MAINTENANCE.

This task covers:

- a. Removal
- b. Inspection
- c. Installation

INITIAL SETUP:

Tools

- General Mechanics Tool Kit
- Torsional Damper Puller (J-23523-E)
- Pilot (J-29788)
- Seal Installer (J-22102)
- Mallet

Materials/Parts

- Torsional Damper (14022671)
- Seal (14024209)
- Lubricant (Appendix D, Item 22)

Equipment Condition

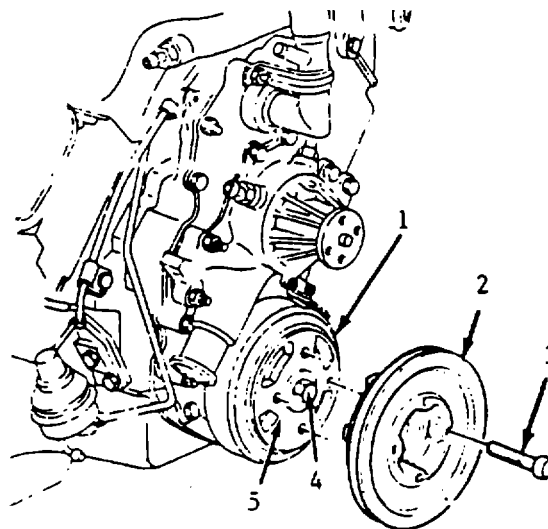
Para.	Condition	Description
4-76	Drive Belts Removed	

General Safety Instructions

- Engine OFF
- Transmission in (N) neutral.
- Parking brake and micro-brakelock set.

REMOVAL

- a. Remove bolts (3) and crankshaft pulley (2).
- b. Remove torsional damper bolt (4) and washer (5).
- c. Remove torsional damper (1) using the torsional damper puller and pilot.
- d. Remove the front crankshaft seal by prying it out with a screwdriver or other suitable tool.



6-10. TORSIONAL DAMPER AND FRONT CRANKSHAFT SEAL MAINTENANCE.
(Continued)

INSPECTION

- a. Check torsional damper for cracks, nicks, burrs, or scoring of parts and replace if damaged.
- b. Check front crankshaft seal for cracks or damage and replace if damaged.

INSTALLATION

- a. Lubricate the seal lips of the new front crankshaft seal with engine oil (Appendix D, Item 22).
- b. Apply engine oil (Appendix D, Item 22) to the crankshaft tub.
- c. Install the seal using the seal installer.
- d. Position the torsional damper (1) and tap into place with a mallet making sure the key is in place parallel to the crankshaft.
- e. Make certain the damper is all the way on the crankshaft and install the damper bolt (4) and washer (5).
- f. Torque the bolt to 200 ft-lbs (270 N-m).
- g. Install the crankshaft pulley (2) with the bolts (3) and torque the bolts to 30 ft-lbs (40 N-m).
- h. Install drive belts (paragraph 4-76).

6-11. FRONT COVER MAINTENANCE.

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Seal Installer (J-22102)

Materials/Parts

RTV Sealant (Appendix D, Item 37)
 Sealant (Appendix D, Item 41)
 Front Cover (14044971)
 Lubricant (Appendix D, Item 22)

Equipment Condition

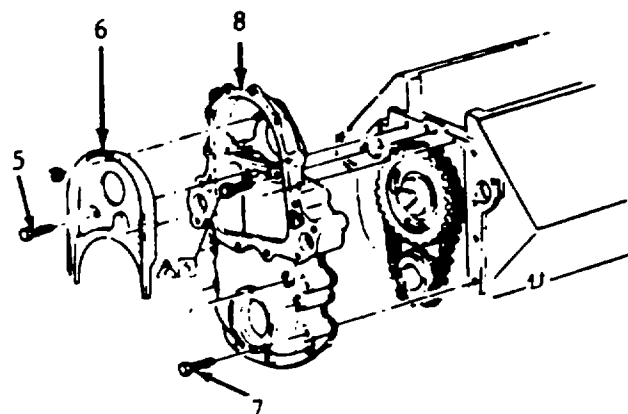
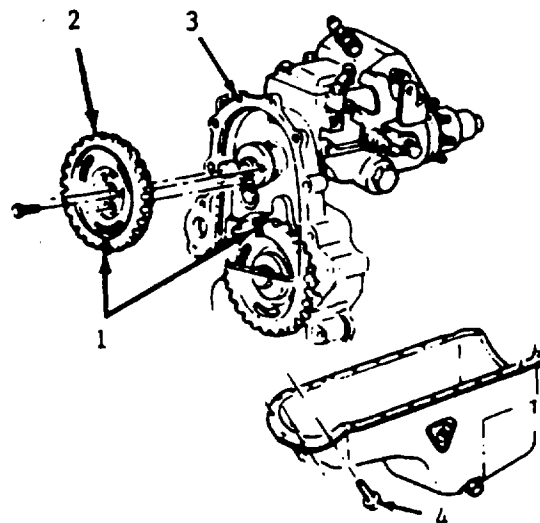
<u>Para.</u>	<u>Condition Description</u>
4-72	Cooling System Drained
4-78	Water Pump Removed
6-10	Torsional Damper Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set

6-11. FRONT COVER MAINTENANCE. (Continued)**REMOVAL**

- a. Rotate the engine until the timing marks (1) on the pump gear (2) are aligned.
- b. Scribe a mark aligning the injection pump flange and front cover (3)
- c. Remove the four bolts (4) securing front cover to oil pan.
- d. Remove the two clips on fuel return line.
- e. Remove the injection pump retaining nuts (5) at the front cover.
- f. Remove the baffle (6).
- g. Remove the front cover bolts (7).
- h. Remove the front cover (8).
- i. Remove the front crankshaft seal by prying it out with a screwdriver or other suitable tool.

**INSPECTION**

Inspect the front cover for cracks or any other form of damage, especially to the sealing surfaces. Replace front cover if damaged.

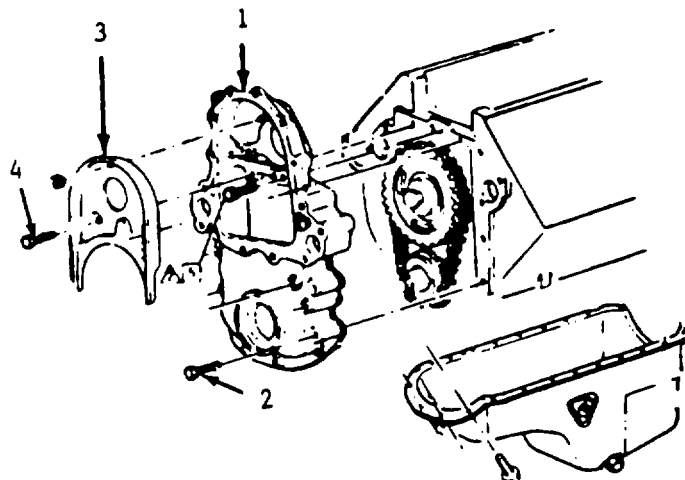
INSTALLATION**NOTE**

Make certain that the sealing surfaces on the front cover are clean and all old RTV sealant (Appendix D, Item 37) is removed from the oil pan sealing surface.

- a. Lubricate the seal lips of the new front crankshaft seal with engine oil (Appendix D, Item 22).
- b. Apply engine oil (Appendix D, Item 22) to the crankshaft stub.
- c. Install the seal using the seal installer.
- d. Apply a 3/32 inch (2 mm) bead of anaerobic sealant (Appendix D, Item 41) to the front cover (1) sealing area.

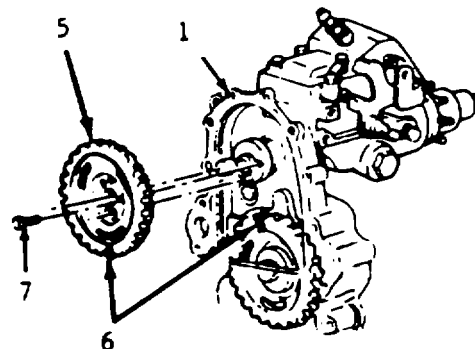
6-11. FRONT COVER MAINTENANCE. (Continued)

- e. Apply a 3/16 inch (5 mm) bead of RTV sealant (Appendix D, Item 37) to the front cover sealing surface that mates against the oil pan.
- f. Position the front cover (1) to the engine and install the attaching bolts (2).
- g. Torque the front cover to block bolts to 33 ft-lbs (45 N.m) and the oil pan bolts to 84 ft-lbs (10 N-m).
- h. Install the baffle (3) and torque the baffle bolts (4) to 33 ft-lbs (45 N-m).
- i. Align the scribe marks on the front cover (1) and injection pump.
- j. Install the injection pump with the nuts and torque to 31 ft-lbs (42 N-m).
- k. Install the injection pump driven gear (5) making sure the timing marks (6) on the cam gear and the pump gear are aligned.
- m. Install torsional damper (paragraph 6-10).
- n. Install water pump (paragraph 4-78).
- o. Service cooling system (paragraph 4-72).

**CAUTION**

Measure the clearance between the injection pump gear and baffle. A minimum of 0.040 inch (1.0 mm) clearance between the gear and baffle is necessary to prevent damage or wear.

- l. Install the injection pump gear bolts (7) and torque to 17 ft-lbs (23 N-m).



6-12. TIMING CHAIN AND SPROCKET MAINTENANCE.

This task covers:	a. Repair b. Inspection	c. Installation d. Adjustment
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INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Dial Indicator (J-8001)

Materials/Parts

Timing Chain (14022647)
 Sprocket (14022646)

Equipment Condition

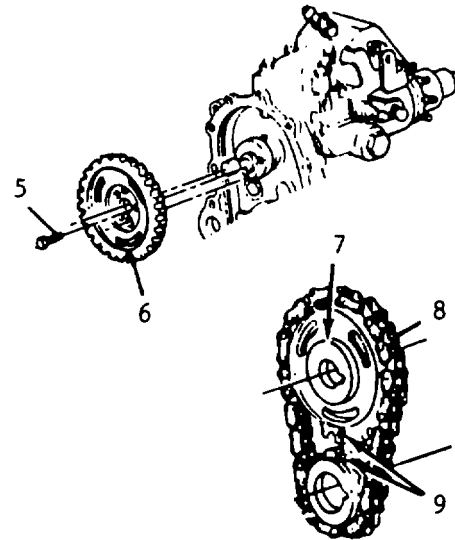
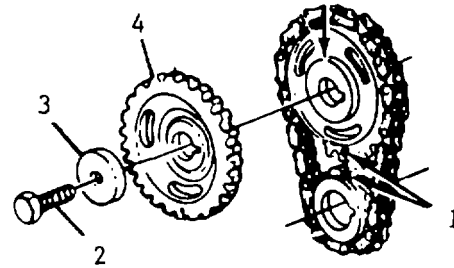
<u>Para.</u>	<u>Condition Description</u>
6-11	Front Cover Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set
 Batteries disconnected.

REMOVAL

- a. Align timing marks (1).
- b. Remove bolt (2) and washer (3) attaching camshaft gear (4).
- c. Remove bolts (5) and remove injection pump gear (6).
- d. Remove camshaft sprocket (7) and timing chain (8).
- e. Remove crankshaft sprocket (9).



INSPECTION

- a. Measure the timing chain free play by mounting a dial indicator to the front of the block.
- b. Position the dial indicator so that the plunger contacts the timing chain between the two gears.

6-12. TIMING CHAIN AND SPROCKET MAINTENANCE. (Continued)

- c. Pull the chain outward (parallel to the front face of the block) the maximum amount with finger pressure on the inside of the timing chain.
- d. Set the dial indicator to zero.
- e. Move the chain inward (parallel to the front face of the block) the maximum amount with finger pressure on the outside of the chain.
- f. Total travel should not exceed 0.800 inch (20.3 mm) or 0.500 inch (12.7 mm) with new parts.
- g. With used parts, check the gears and timing chain for wear, missing or damaged components.
- d. Install the camshaft gear (4), bolt (2) and washer (3).
- e. Torque the bolt to 75 ft-lbs (100 N-m).
- f. Install the injection pump gear (6) and bolts (5).
- g. Align the timing marks (1).
- h. Torque the bolts to 17 ft-lbs (23 N-m).
- i. Install front cover (paragraph 6-11).

INSTALLATION

- a. Install crankshaft sprocket (9).
- b. Install camshaft sprocket (7) with timing chain (8).
- c. Align the timing marks (1).

ADJUSTMENT

Adjustment of the injection pump timing is necessary if new gears, sprockets, or timing chain are installed. Refer to paragraph 4-91.

6-13. CAMSHAFT MAINTENANCE.

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Engine Jack
 Jack Stand

Materials/Parts

Molykote
 Lubricant (Appendix D, Item 23)
 Camshaft (14066308)

Personnel Required

2-PERSONS

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-9	Engine Oil Drained
4-72	Cooling System Drained
4-74	Fan Shroud Removed
4-75	Fan Removed
4-78	Water Pump Removed
4-79	Thermostat and Housing Removed
4-81	Radiator Removed
4-85	Fuel Pump Removed
4-92	Injection Pump Lines Removed At Pump and Nozzles.
4-93	Injection Pump Removed
4-99	Vacuum Pump Removed
4-101	Exhaust Pipes Removed From Exhaust Manifold
4-110	Intake Manifold Removed
4-112	Rocker Arm Covers Removed
4-229	Power Steering Pump Removed
5-11	Front Engine Mounting Bolts Removed
6-5	Rocker Arm Shaft Assembly and Push Rod Assembly Removed
6-6	Hydraulic Lifters Removed
6-8	Cylinder Heads Removed
6-11	Front Cover Removed
6-12	Timing Chain and Sprocket Removed

REMOVAL

CAUTION

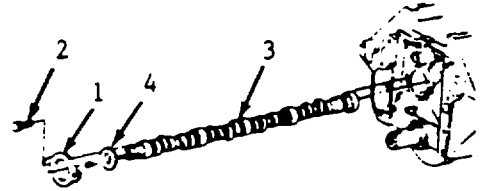
When raising or supporting the engine for any reason, do not use a jack under the oil pan, any sheet metal or crankshaft pulley. Due to the small clearance between the oil pump screen, jacking against the oil pan may cause it to be bent against the pump screen, resulting in a damaged oil pickup unit.

6-13. CAMSHAFT MAINTENANCE. (Continued)

- a. Raise the engine and block in position.
- b. Remove the cam retainer thrust plate (1) and bolts (2).

NOTE

Pull the camshaft from the block carefully to avoid damage to the camshaft bearings.



- c. Remove the spacer (4).

INSPECTION

Check camshaft for scoring, burrs, any sign of damage, or excessive wear. Replace if damage is evident.

INSTALLATION

- a. Install the spacer (4) with the ID chamfer towards the camshaft (2).
- b. Lubricate the camshaft bearing journals with engine oil (Appendix D, Item 23).
- c. Coat the camshaft lobes with Molykote (Appendix D, Item 29) and insert the camshaft carefully into the block to avoid damage to the camshaft bearings.
- d. Install the retainer thrust plate (3) and bolts (4).
- e. Torque bolts to 17 ft-lbs (23 N-m).
- f. Remove engine jack, lower engine.
- g. Install front engine mounting bolts (paragraph 5-11).
- h. Install fuel pump (paragraph 85).
- i. Install timing chain and sprocket (paragraph 6-12).
- j. Install front cover (paragraph 6-11).
- k. Install hydraulic lifters (paragraph 6-6).
- l. Install cylinder heads (paragraph 6-8).
- m. Install thermostat and housing (paragraph 4-79).
- n. Install rocker arm shaft assembly (paragraph 6-5).
- o. Install rocker arm covers (paragraph 4-112).
- p. Install power steering pump (paragraph 4-229).

6-13. CAMSHAFT MAINTENANCE. (Continued)

- | | |
|--|---|
| <ul style="list-style-type: none"> q. Install injection pump (paragraph 4-93). r. Install water pump (paragraph 4-78). s. Connect injection pump lines at pump and nozzles (paragraph 4-92). t. Install intake manifold (para- graph 4-110). u. Install vacuum pump (paragraph 4-99). | <ul style="list-style-type: none"> v. Install fan (paragraph 4-75). w. Install fan shroud (paragraph 4-74). x. Install radiator (paragraph 4-81). y. Connect exhaust pipes to exhaust manifold (paragraph 4-101). z. Refill engine oil (paragraph 4-9). aa. Refill cooling system (paragraph 4-72). |
|--|---|
-

6-14. OIL PUMP MAINTENANCE.

This task covers:	a. Removal b. Inspection	c. Repair d. Installation	
<u>INITIAL SETUP:</u>			Equipment Condition
<u>Tools</u>			<u>Para.</u> <u>Condition Description</u>
General Mechanics Tool Kit			4-9 Engine Oil Drained
			4-114 Oil Pan Removed
<u>Materials/Parts</u>			<u>General Safety Instructions</u>
Seal (14022683)			Engine OFF
Oil Pump (14077182)			Transmission in (N) neutral.
			Parking brake and micro-brakelock set

REMOVAL

- a. Remove pump to rear main bearing cap bolt (1).
- b. Remove oil pump (2) and extension shaft (3).

INSPECTION

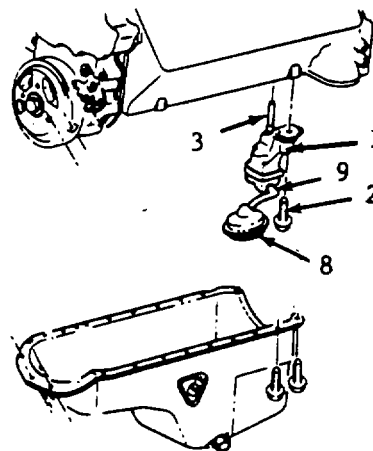
- a. Inspect the pump body (4) and cover (5) for cracks or excessive wear.
- b. Inspect pump gears (6) for damage or excessive wear.
- c. Check the drive gear shaft (7) for looseness in the pump body.
- d. Check the inside of the pump cover (5) for wear that would permit oil to leak past the ends of the gears.
- e. Inspect the pickup screen (8) and pipe assembly (9) for damage to screen (8) or pipe (9).
- f. Check the oil pump extension shaft (3) bushing for cracks.
- g. Check the pressure regulator valve for fit.

6-14. OIL PUMP MAINTENANCE. (Continued)

REPAIR

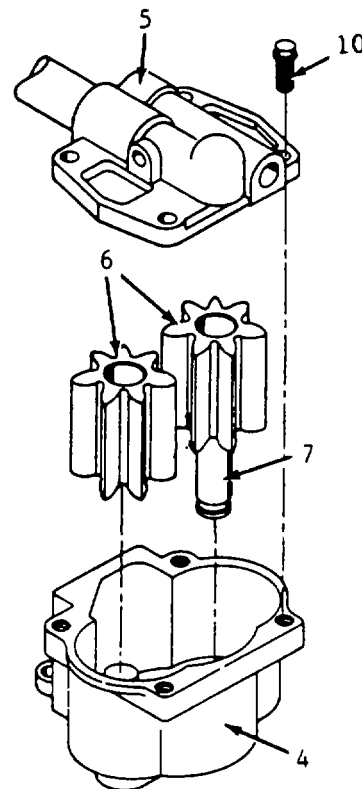
a. *Disassembly.*

- (1) Remove the pump cover attaching screws (10) and the pump cover (5).
- (2) Mark gear teeth (6) so they may be reassembled with the same teething index.
- (3) Remove the pressure regulator valve retaining pin, pressure regulator valve and related parts.
- (4) Replace any damaged parts.



b. *Assembly.*

- (1) Install the pressure regulator valve and related parts.
- (2) Install the gear (6) and shaft (7) in the pump body.
- (3) Install the pump cover (5) and secure with screws (10).
- (4) Turn the drive shaft by hand to check for smooth operation.



INSTALLATION

- a. Position oil pump (2) and extension shaft (3) to rear main bearing cap, aligning hex on top of extension shaft with drive hex on lower end of vacuum pump drive shaft.
- b. Install oil pump bolt (1).
- c. Torque bolt to 65 ft-lbs (90 N-m).
- d. Install oil pan (paragraph 4-114).
- e. Refill engine oil (paragraph 4-9).

6-15. REAR CRANKSHAFT SEAL MAINTENANCE.

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Mallet

Materials/Parts

Lubricating Oil (Appendix D, Item 23)
Loctite 414 (Appendix D, Item 21)
Sealant (Appendix D, Item 40)
Crankshaft Seal (14022683)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
6-14	Oil Pump Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set

REMOVAL

- a. Remove the rear main cap.
- b. Remove the old seal from the main bearing cap.

INSPECTION

- a. Check the ends of the seal for fraying which may prevent the main bearing cap from sealing.
- b. Check the seal for damage or deterioration.

NOTE

Measure rear main bearing clearance using plastic gauge material. Clearance specifications for #1,2,3, and 4 is 0.0018 0.0033 inch (.045 .083 mm); for #5 the clearance is 0.0022 0.0037 inch (.055 .093 mm).

INSTALLATION

- a. Install seal halves to the block.
- b. Apply a light coat of engine oil (Appendix D, Item 23) to the seal lips where they contact the crankshaft.
- c. Insert one seal half into the block seal groove until 1/2 inch (13 mm) of the seals' one end is extending out of the block.
- d. Insert the other seal half into the opposite side of the seal groove in the block.
- e. Install the main bearing cap to the block by lightly coating the seal groove in the main bearing with adhesive (Appendix D, Item 21).

6-15. REAR CRANKSHAFT SEAL MAINTENANCE. (Continued)

CAUTION

To prevent damage to the main bearing caps, the caps are to be tapped into the block using a brass or leather mallet. The new seal is used as a guide. The cap must not be pulled into the block with the bolts.

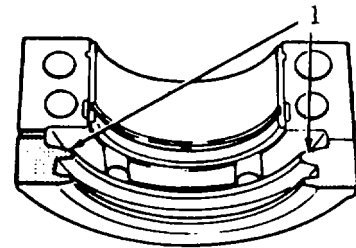
The contact ends of the seal halves should now be at the four and ten o'clock positions. This is necessary to align the rear main bearing cap and seal lips.

- f. Apply a thin film of anaerobic sealant (Appendix D, Item 40) to the main bearing cap (1), being careful not to put sealant in the bearing cap oil relief slot.
- g. Apply engine oil (Appendix D, Item 23) to the main bearing cap bolt threads.
- h. Tap the main bearing cap into place with a brass or leather mallet.

NOTE

Install the main bearing cap bolts, torque the inner bolts to 110 ft-lbs (150 N • m) and the outer bolts to 100 ft-lbs (150 N-m) in sequence.

- i. Install oil pump (paragraph 6-14).
- j. Retighten all bolts using the same sequence.
- k. Install oil pump. (paragraph 6-14)



6-16. CONNECTING ROD AND PISTON MAINTENANCE.

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
 Ring Compressor (J-8037)
 Brass Mallet

Materials/Parts

Lubricating Oil (Appendix D, Item 22)
 Connecting Rod (14025523)
 Piston (23500391)
 Lint Free Cloth (Appendix D, Item 12)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-114	Oil Pan Removed
6-8	Cylinder Head Removed
6-14	Oil Pump Removed

General Safety Instructions

Engine OFF
 Transmission in (N) neutral.
 Parking brake and micro-brakelock set.

REMOVAL

- a. Place a cloth (Appendix D, Item 12) on top of the piston.
- b. Use a ridge reamer to remove any ridges or deposits from the upper end of the cylinder bore.
- c. Turn the crankshaft until the piston is at the top of the stroke and remove the cloth and cuttings.
- d. Remove the connecting rod cap.
- e. Attach two short pieces of 3/8 inch (10 mm) hose to the connecting rod bolts to protect the crankshaft bearing journal during removal of the connecting rod and piston.
- f. Remove the rod and piston assembly through the top of the cylinder bore.

NOTE

If connecting rod bearings, are to be reused, place them in an organizer rack so they can be returned to their original locations.

- g. Remove the connecting rod bearings.

CAUTION

Check the connecting rod and cap for identification marks. Mark the parts if required. The connecting rod and cap must be kept together as mating parts.

INSPECTION

- a. Inspect connecting rods for cracks twisting, or bending. Replace connecting rods if damaged.
- b. Inspect the pistons for cracked ring lands, skirts or pin bosses, wavy or worn ring lands, scuffed or damaged skirts, eroded areas at top of piston, any other damage or excessive wear. Replace pistons that are damaged or show signs of extensive wear.

6-16. CONNECTING ROD AND PISTON MAINTENANCE. (Continued)

INSTALLATION**NOTE**

Make sure the cylinder walls are clean. Lubricate the cylinder wall lightly with engine oil (Appendix D, Item 22).

Install used pistons in the cylinder from which they were removed. Install new pistons in the cylinders for which they were fitted.

If replaced, be certain that the new connecting rod bearings are the proper size.

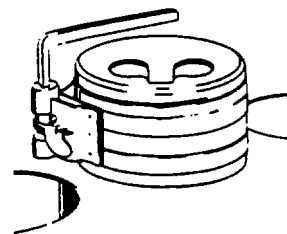
- a. Lubricate the connecting rod bearing with engine oil (Appendix D, Item 22) and install the bearings in the connecting rod and connecting rod cap.

NOTE

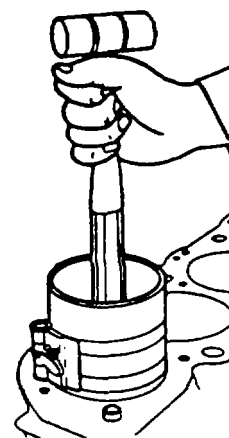
Measure connecting rod bearing clearance. If the clearance exceeds 0.0018 0.0039 inch, select a new, correct size bearing and remeasure the clearance.

Each connecting rod and bearing cap should be marked, beginning at the front of the engine. Cylinders 1,3,5, and 7 are the left bank and 2,4,6, and 8 are the right bank. The numbers on the connecting rod and bearing cap must be on the same side when installed in the cylinder bore. If a connecting rod is ever transposed from block or cylinder to another new connecting rod bearings should be fitted and the connecting rod should be numbered to correspond with the new cylinder number.

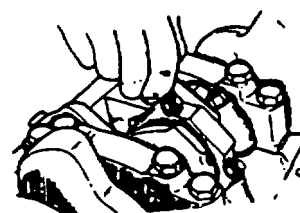
- b. Lubricate the piston and rings with engine oil (Appendix D, Item 22).



- c. Locate the piston ring end caps and without disturbing the ring end cap location, install the compressor over the piston.

**CAUTION**

The piston must be installed so that the depression in the piston crown is towards the outside of the engine. The connecting rod bearing tang slots must be opposite the camshaft.



- f. Place the piston in its matching bore and using light blows with a hammer handle, tap the piston down into its bore.

6-16. CONNECTING ROD AND PISTON MAINTENANCE. (Continued)

g. At the same time, from beneath the vehicle, guide the connecting rod to the crankpin with the pieces of hose.

k. Torque the connecting rod cap nuts to 48 ft-lbs (65 N-m).

NOTE

Hold the ring compressor against the block until all rings have entered the cylinder bore.

NOTE

Measure the connecting rod side clearance by using a feeler gauge between the connecting rod and crankshaft. Correct clearance is 0.0067 0.0248 inch (0.17 0.63 mm) .

h. Remove the hoses from the connecting rod bolts.

l. Install oil pump (paragraph 6-14).

i. Install the connecting rod cap and bearing.

m. Install oil pan (paragraph 4-114).

j. Install the connecting rod cap nuts.

n. Install cylinder head (paragraph 6-8).

6-17. CRANKSHAFT AND MAIN BEARING MAINTENANCE.

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Main Bearing Remover/Installer (J-8080)
Brass Mallet
Lead Mallet

Materials/Parts

Lubricating Oil (Appendix D, Item 22)
Sealant (Appendix D, Item 41)
Crankshaft (23500247)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-108	Glow Plugs Removed
4-113	Oil Dipstick and Tube Removed
4-114	Oil Pan Removed
5-8	Engine Removed
6-10	Torsional Jumper Removed
6-11	Front Cover Removed
6-12	Timing Chain Removed
6-16	Connecting Rod Caps and Piston Removed

General Safety Instructions

Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set.

6-17. CRANKSHAFT AND MAIN BEARING MAINTENANCE. (Continued)**REMOVAL****CAUTION**

Check the main bearing caps for location markings. Mark the parts if necessary. The main bearing caps must be returned to their original location at time of assembly.

- a. Remove the main bearing caps.
- b. Remove lower main bearing inserts from the main bearing caps.
- c. Remove crankshaft oil seal (paragraph 6-15).
- d. Remove upper main bearing inserts by inserting main bearing remover into the crankshaft journal oil hose and rotating the crankshaft, turning the bearing insert out of the block.
- e. Remove the crankshaft.

INSPECTION

- a. Check upper and lower half of bearings for damage or wear. If damage is evident, replace bearing.
- b. Check crankshaft for damage, cracks, scoring and excessive wear. If damage is evident replace crankshaft.

NOTE

Measure dimensions of main bearing journals and crankpins with a micrometer for: out-of-round, 0.0002 inch (.005 mm) maximum for both the main journal and crankpin; taper, 0.0002 inch (.005 mm) maximum for both the main journal and crankpin; undersize, diameter dimension of #1,2,3,4 main journal is 2.94988 inches (74.917 mm) 2.95043 inches (74.941 mm), #5 main journal is 2.94929 inches (74.912 mm) 2.95024 inches (74.936 mm); diameter dimension of crankpin is 2.39815 inches (60.913 mm) 2.39917 inches (60.939 mm). Replace if out of specification.

- c. Check the crankpins and main bearing journals for scoring nicks or damage caused by lack of lubrication. Replace if necessary.

INSTALLATION

- a. Install the crankshaft.
- b. Install the upper main bearing inserts by inserting the main bearing installer into a crankshaft journal main bearing oil hole.

6-17. CRANKSHAFT AND MAIN BEARING MAINTENANCE. (Continued)

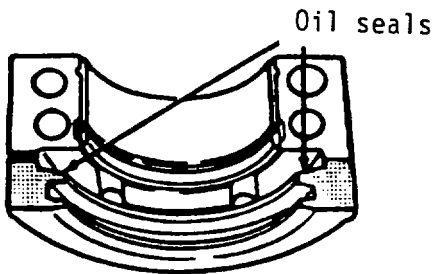
- c. Apply engine oil (Appendix D, Item 22) to inserts of the proper size and position the plain end (without the bearing tang) of the insert between the crankshaft and the notched side of the block.
- d. By rotating the crankshaft, install the insert into the engine block.
- e. Remove the tool.
- f. Apply engine oil (Appendix D, Item 22) to the lower main bearing inserts and install them to the main bearing caps.

NOTE

Measure the main bearing clearance. If the bearing clearance is within specifications: #1,2,3, and 4 = 0.0018 0.0033 inch (.04572 .08383 mm), #5 = 0.0022 0.0037 inch (.05588 .09398 mm), the bearing insert is satisfactory. If the clearance is not within specifications, replace the insert.

Always replace both upper and lower inserts as a unit.

- g. Install rear crankshaft oil seal halves to the block.



- h. Install the number 5 (rear) main bearing cap by first applying a thin film of anaerobic sealant (Appendix D, Item 41) to the bearing cap, keeping the sealant off the bearing and seal, being careful not to get any sealant in the bearing cap oil relief slot.
- i. Apply a light coat of engine oil (Appendix D, Item 22) to the crankshaft surface that will contact the seal, and to the main bearing cap bolt threads.

CAUTION

The main bearing caps are to be tapped into place with a brass or leather mallet before the attaching bolts are installed. Do not use the attaching bolts to pull the main bearing caps into their seats, as this may damage the bearing cap and/or block.

- j. Tap the main bearing cap into place with a brass or leather mallet.
- k. Install the inner bolts and torque to 110 ft-lbs (150 N•m).
- l. Install the outer bolts and torque to 100 ft-lbs (135 N•m).
- m. Install numbers 1, 2, and 4 main bearing caps and bolts tightening to same specification and sequence as number 5. Main bearing caps steps k and l.

6-17. CRANKSHAFT AND MAIN BEARING MAINTENANCE. (Continued)

- n. Install the number 3 (center) main bearing cap and bolts.
- o. Torque bolts initially to 10 ft-lbs (14 N•m).
- p. Tap the end of the crankshaft first rearward then forward with a lead hammer. This will line up the rear main bearing and crankshaft thrust surfaces.
- q. Tighten remaining main bearing cap bolts to specifications as listed in steps k, and l.
- r. With the crankshaft forced forward, measure crankshaft end play at the front end of the number 3 main bearing with a feeler gauge. The proper clearance is 0.003937 - 0.0098425 inch (0.10 - 0.25 mm).

NOTE

Burrs on the bearing cap, foreign matter between the insert and the block or the bearing cap, or faulty insert could cause a lack of clearance at the bearing.

- s. Turn the crankshaft to check for binding. If the crankshaft does not turn freely, loosen the main bearing cap bolts, one at a time, until the tight bearing is located.
- t. Install the connecting rod bearing inserts.

NOTE

Used bearing inserts must be installed in their original locations.

- u. Install connecting rods to the crankshaft by pulling the connecting rods down, making sure the connecting rod bearing insert stays in place.

NOTE

Measure connecting rod bearing clearance. If the clearance exceeds 0.0018 - 0.0039 inch, select a new, correct size bearing and remeasure clearance.

- v. Install the connecting rod cap nuts and torque to 48 ft-lbs (65 N•m).
- w. Measure the connecting rod side clearance by using a feeler gauge between the connecting rod and crankshaft. Correct clearance is 0.0067 - 0.0248 inch (0.17063 mm).
- x. Install connecting rod caps and piston (paragraph 6-16).
- y. Install oil pan (paragraph 4-114).
- z. Install timing chain (paragraph 6-12).
- aa. Install front covers (paragraph 6-11).
- bb. Install torsional damper (paragraph 6-10).
- cc. Install glow plugs (paragraph 4-108).
- dd. Install dipstick and tube (paragraph 4-113).
- ee. Install engine (paragraph 5-8).

Section III. MAINTENANCE OF TRANSMISSION ASSEMBLY

General.....	6-18	Transmission Repair.....	6-19
Rear Retainer Oil Seal Replacement.....	6-20		

6-18. GENERAL.

This section contains information on the maintenance of the transmission assembly that are maintainable at the General Support level.

6-19. TRANSMISSION REPAIR.

This task covers:

- | | | |
|-----------------------|----------------------|--------------------|
| a. Disassembly | b. Inspection | c. Assembly |
|-----------------------|----------------------|--------------------|

INITIAL SET-UP

Tools

- General Mechanics Tool Kit
- Driver Gear Bearing Remover/Installer (J-22872)
- Front Bearing Retainer Seal Installer (J-22833)
- Snap Ring Installer (J-22830-A)
- Bearing Puller (J-8433)
- Countergear Front Bearing Remover (J-28509)
- Countergear Rear Bearing Remover (J-22832-01)
- Mainshaft Bearing Locknut Installer (J-23070)
- Mainshaft Rear Bearing Installer (J-22874-1)
- 2nd. Speed Bushing Installer (J-22873)
- 3rd. Speed Bushing Installer (J-27875)

Equipment Condition

<u>Para.</u>	<u>Condition Description</u>
4-192	Transmission Removed

Materials/Parts

- Cleaning Solvent (Appendix D, Item 44)
- Soft Lint-Free Cloth (Appendix D, Item 12)
- Transmission (RPO-MM4)
- Grease (Appendix D, Item 15).

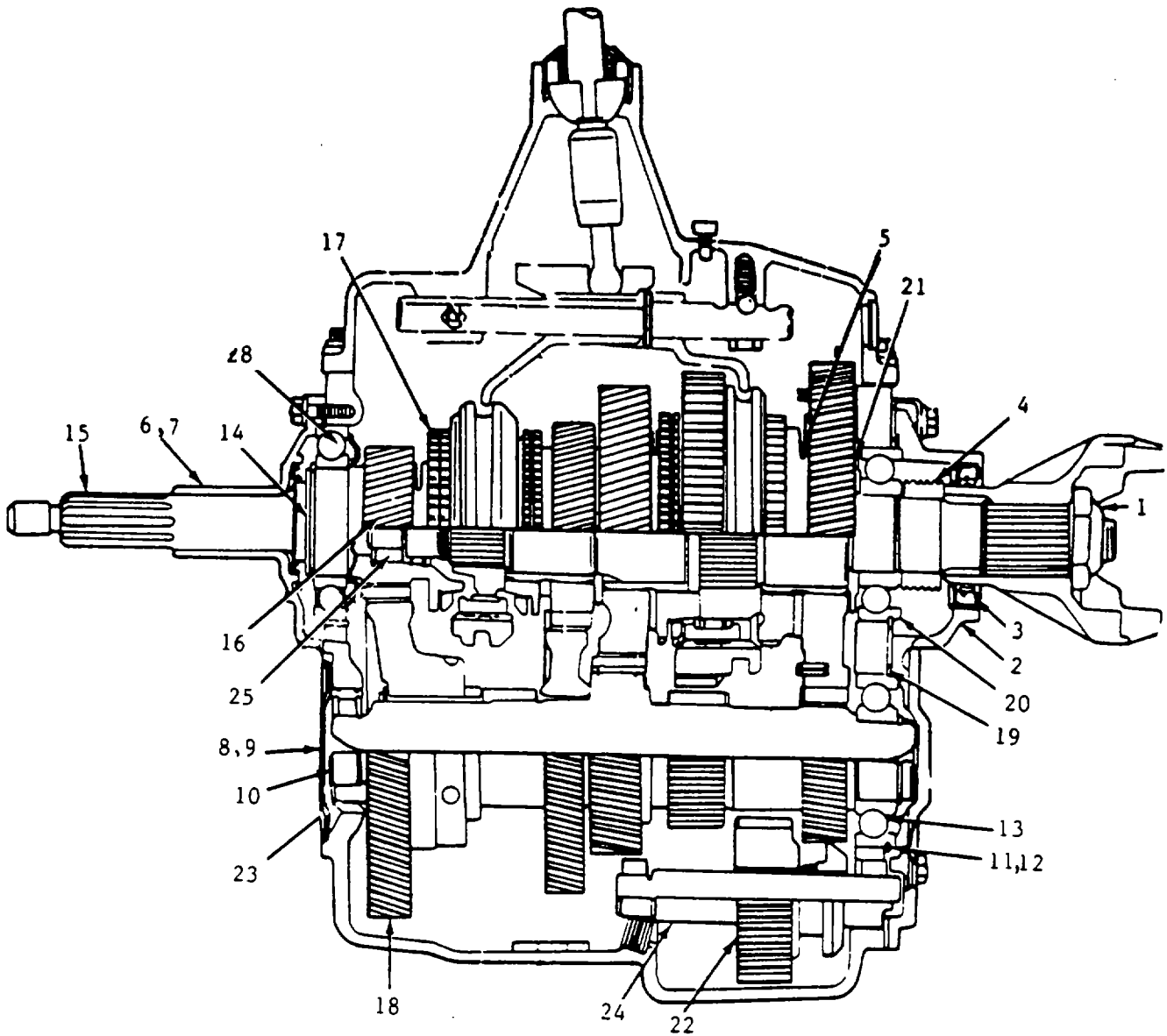
DISASSEMBLY

a. Transmission Disassembly.

- (1) Mount transmission in a suitable holding fixture and remove cap screws securing transmission cover assembly to transmission

case. If required, insert two 5/16 x 18 screws in cover flange threaded holes and turn evenly to raise cover dowel pins from the case.

6-19. TRANSMISSION REPAIR. (Continued)

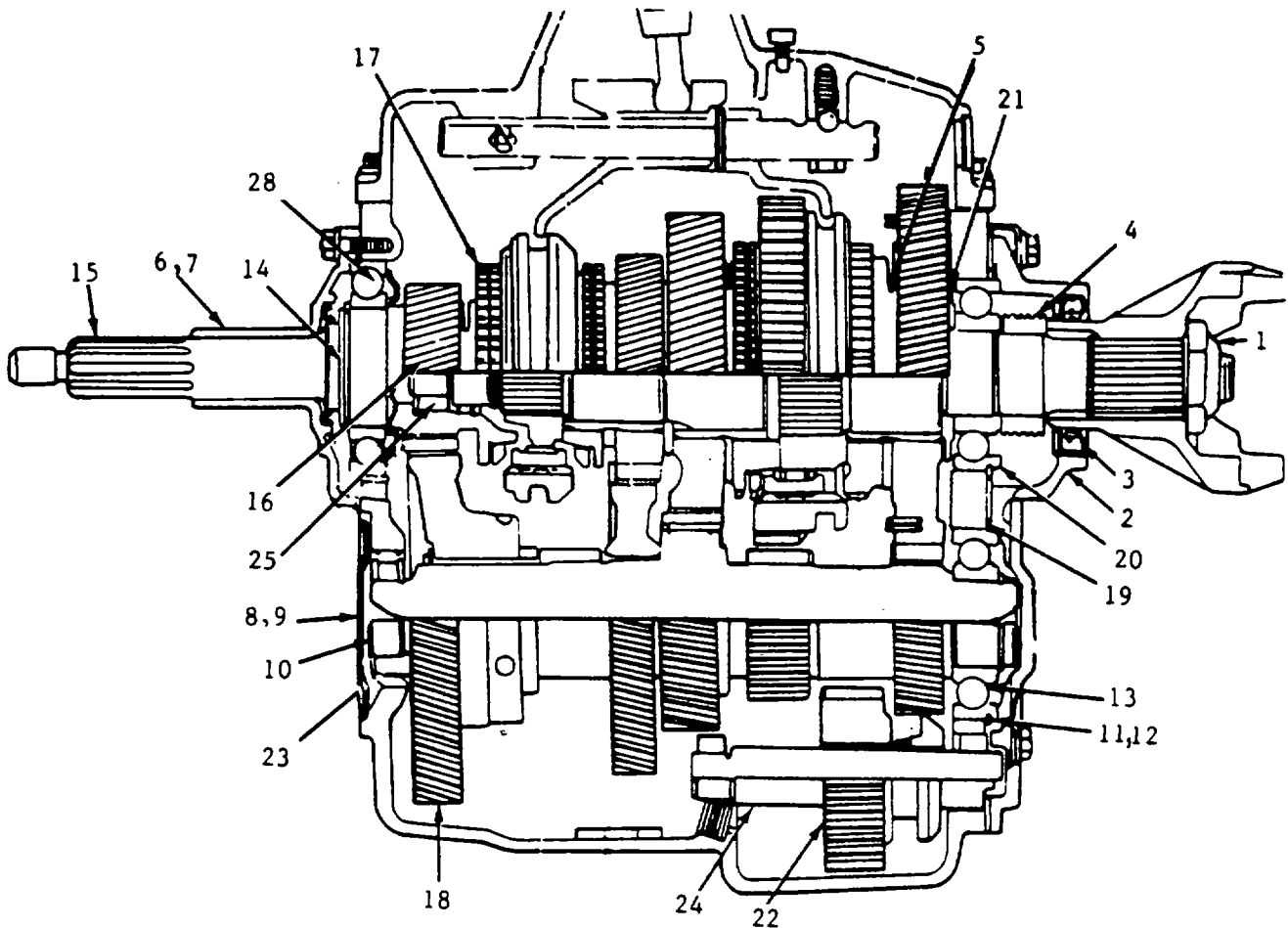


(2) Move reverse shifterfork so reverse idler gear is partially engaged before attempting to remove cover. Forks must be positioned so rear edge of the slot in the reverse fork is in line with the front edge of the slot in the forward forks as viewed through tower opening.

(3) Lock gears by placing transmission in two gears at once. Remove the universal joint flange nut, universal joint front flange, and brake drum assembly.

(4) Remove mainshaft rear locknut (1) using mainshaft bearing locknut installer.

6-19. TRANSMISSION REPAIR. (Continued)

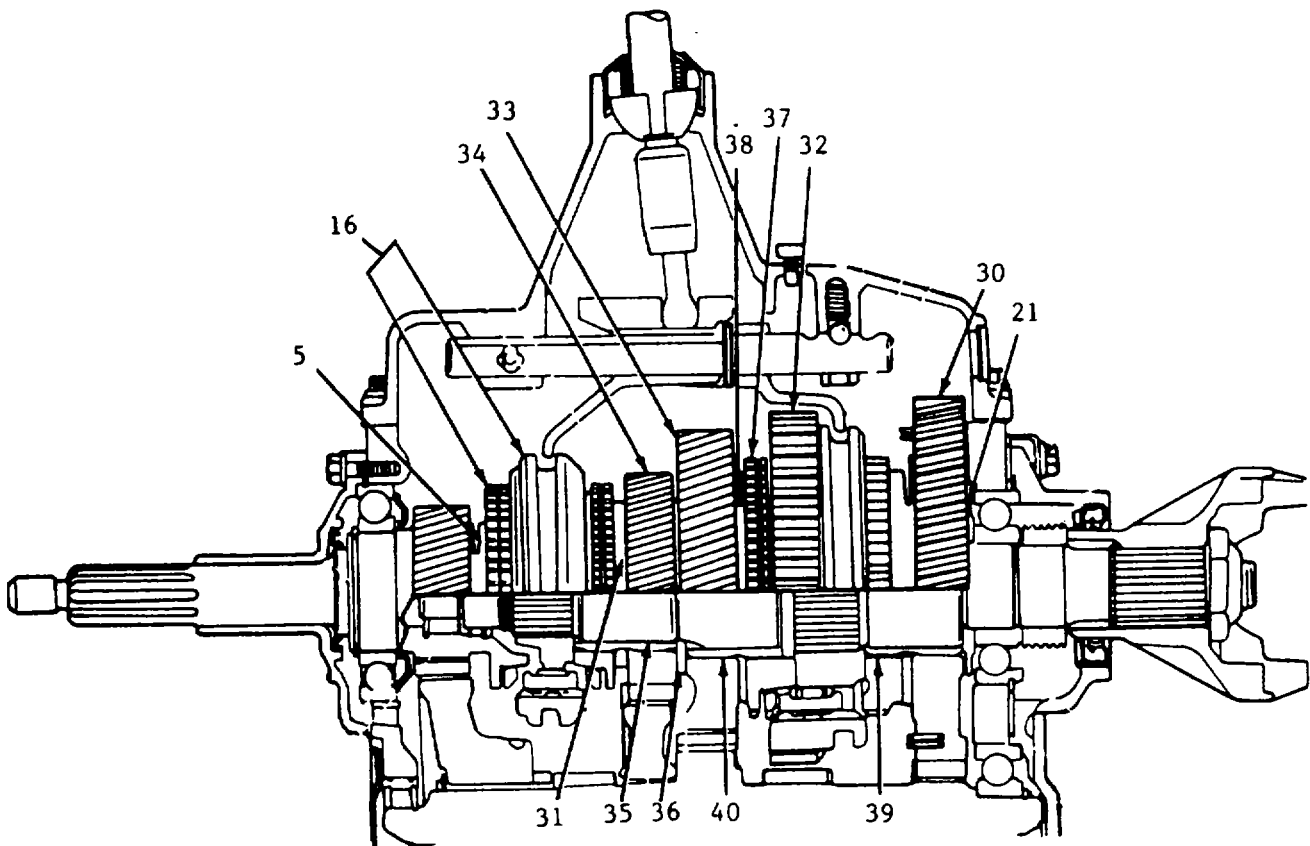


- (5) Remove rear bearing retainer (2) and gasket (3).
- (6) Slide speedometer drive gear (4) off the mainshaft (5).
- (7) Remove drive gear bearing retainer (6) and gasket (7).
- (8) Remove counter gear front bearing cap (8) and gasket (9).
- (9) Pry counter gear front bearing (10) out by inserting a counter gear front bearing remover through the cast slots in the case.
- (10) Remove counter gear rear bearing retaining rings (11 and 12) from shaft and bearing (13). Remove counter gear rear bearing using counter gear rear bearing remover, and bearing puller. This allows the counter gear assembly to rest on the bottom of the case.
- (11) Remove drive gear bearing outer race to case retaining ring (14).

6-19. TRANSMISSION REPAIR. (Continued)

- (12) Remove drive gear (15) and bearing (16) by tapping gently on bottom side of drive gear shaft and prying directly opposite against the case and bearing snap ring groove at the same time.
 - (a) Remove 4th. gear synchronizing ring (17).
 - (b) Index cut out section of drive gear (15) in down position with countergear (18) to obtain clearance for removing clutch gear.
- (13) Remove rear mainshaft bearing retainer ring (19) and using countergear rear bearing remover and bearing puller, remove bearing (20) from case. Slide 1st. Gear thrust washer (21) off mainshaft.
- (14) Raise rear of mainshaft assembly and push rearward in case bore. Swing front end up and lift from case. Remove synchronizer cone (16) from shaft (5)
- (15) Slide reverse idler gear (22) rearward and move countergear (18) rearward until the front end is free of the case (23). Lift countergear (18) to remove from case (23).
 - (16) To remove reverse idler gear (22). Drive reverse idler gear shaft (24) out of case from front to rear using a drive. Remove reverse gear (22) from case (23).
 - b. Drive Gear Disassembly.*
 - (1) Remove mainshaft pilot bearing rollers (25) from drive gear (15) if not already removed and remove roller retainer (26). Do not remove snap ring on the inside of the drive gear.
 - (2) Remove snap ring (27) securing bearing (28) on stem of drive gear.
 - (3) Position driver gear bearing remover/installer to the bearing using an arbor press and press plate holder. Press gear and shaft (15) out of bearing (28).

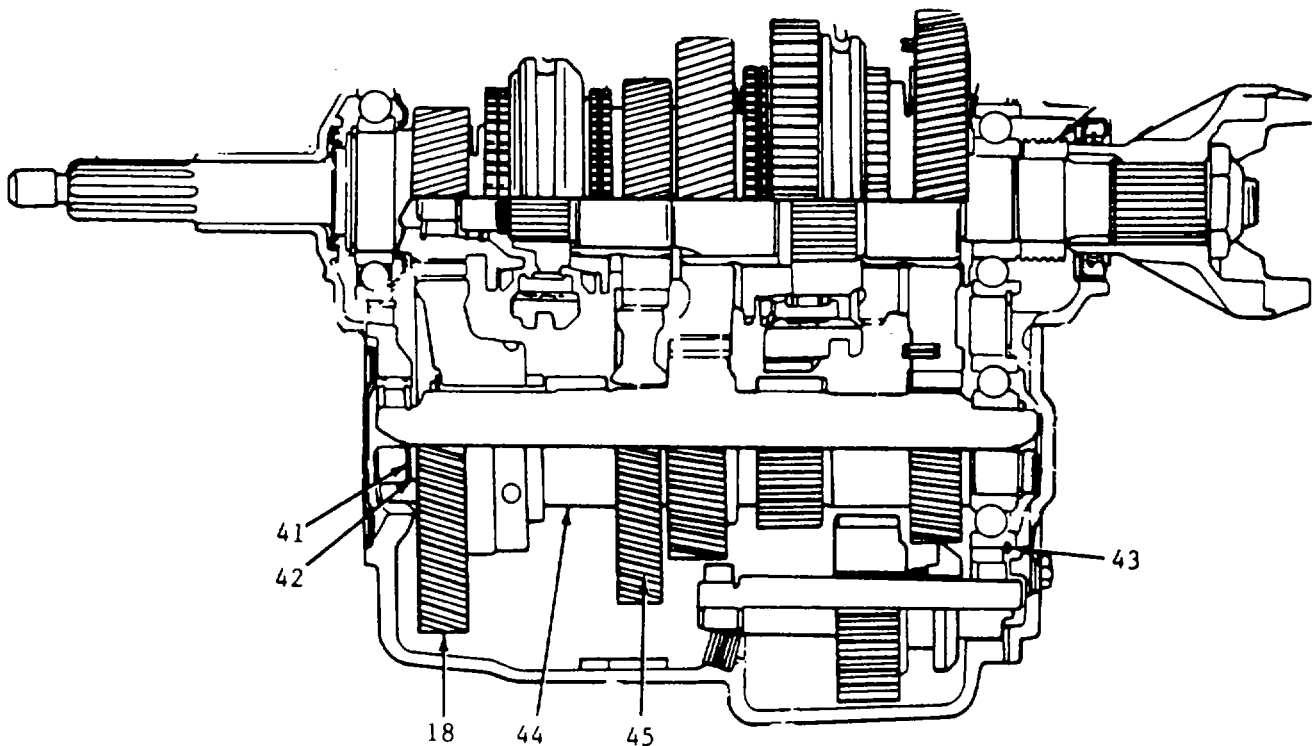
6-19. TRANSMISSION REPAIR. (Continued)



c. Disassembly of Mainshaft Assembly.

- (1) Remove 1st. speed gear (30) and thrust washer (21).
- (2) Remove snap ring (31) in front of 3rd. and 4th. Synchronizer assembly (16).
- (3) Remove reverse driven gear (32).
- (4) Press behind second speed gear (33) to remove 3rd-4th synchronizer assembly (16), 3rd. speed gear (34) and 2nd. speed gear (33) along with 3rd. speed gear bushing and thrust washer (36).
- (5) Remove second speed synchronizer ring (37).
- (6) Supporting 2nd. speed synchronizer hub (38) at front face, press mainshaft (5) through, removing 1st. speed gear bushing (39) and 2nd. gear synchronizing hub (38).
- (7) Split 2nd gear bushing (40) and chisel and remove bushing from shaft. Be careful not to damage mainshaft (5).

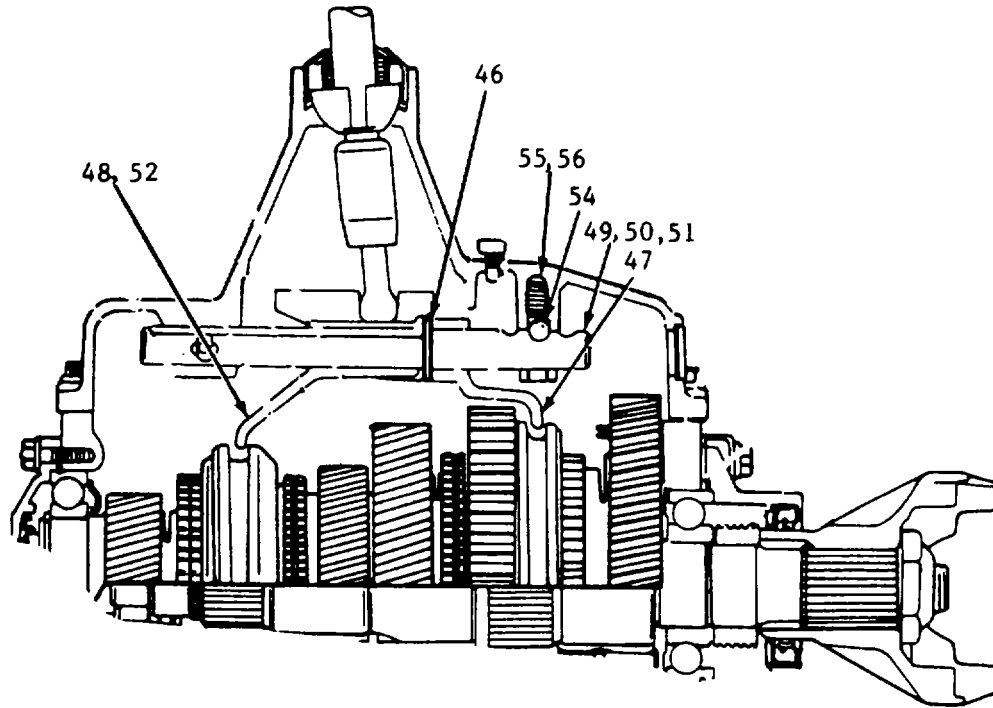
6-19. TRANSMISSION REPAIR. (Continued)



d. Countershaft Disassembly.

- (1) Remove front countergear retaining ring (41) and thrust washer (42). Discard snap ring (41).
- (2) Install countergear rear bearing remover on the countershaft with the open side facing the spacer. Support assembly in an arbor press and press countershaft out of clutch countergear assembly (18). Countergear is a slip fit and pressing may not be required.
- (3) Remove clutch countergear rear retaining ring (43).
- (4) Remove 3rd. speed countergear spacer (44).
- (5) Position assembly on an arbor press and press shaft from 3^d speed countergear (45).

6-19. TRANSMISSION REPAIR. (Continued)



e. Transmission Cover Disassembly.

- (1) Using a small punch, drive out pins (46) retaining 1st-2nd (47) and 3rd-4th shifter forks (48) to shifter shafts (49,50) and the expansion plugs (51).

- (2) Remove the pin (52) retaining the 3rd and 4th shifter fork (48) to the shaft cover (53) and the shifter fork from the cover before attempting to remove the reverse shifter head pin (46).

CAUTION

Exercise care during shaft removal so detent balls (54), springs (55) and interlock pin (56) located in the cover (53) are not lost when the shifter shafts (48,49) are removed.

Exercise care during shaft removal since detent balls (54) are under spring tension in the rear rail boss holes.

- (3) With the shifter shafts (47,48) in the neutral position, drive shafts (49,50) out of cover (53) and shifter forks (47,48).
- (4) Drive out pin (57) securing reverse shifter head (58) and drive the shaft (59) out.

6-19. TRANSMISSION REPAIR. (Continued)**INSPECTION****WARNING**

Cleaning solvent is both toxic and flammable. Use only in a well-ventilated area. Keep off skin and avoid prolonged breathing of vapors. Keep away from open flame.

a. Transmission Case Inspection.

- (1) Wash transmission thoroughly inside using solvent (Appendix D, Item 44).
- (2) Inspect transmission case for cracks. Replace if damaged.
- (3) Wipe the magnetic disc with a clean, lint-free cloth (Appendix D, Item 12).

NOTE

The magnetic disc is glued in place.

- (4) Check front and rear faces for burrs.

b. Roller Bearing and Spacers Inspection.

- (1) Closely inspect all bearing rollers and replace them if there is any indication of wear.
- (2) Inspect spacers and replace any worn ones.

*c. Front and Rear Bearings Inspection.***WARNING**

Cleaning solvent is both toxic and flammable. Use only in a well-ventilated area. Keep off skin and avoid prolonged breathing of vapors. Keep away from open flame.

- (1) Wash front and rear bearings thoroughly in cleaning solvent (Appendix D, Item 44).
- (2) Blow out bearings with compressed air.

WARNING

Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.

- (3) Lubricate bearings with light engine oil (Appendix D, Item 23) and check them for roughness by slowly turning the race by hand.

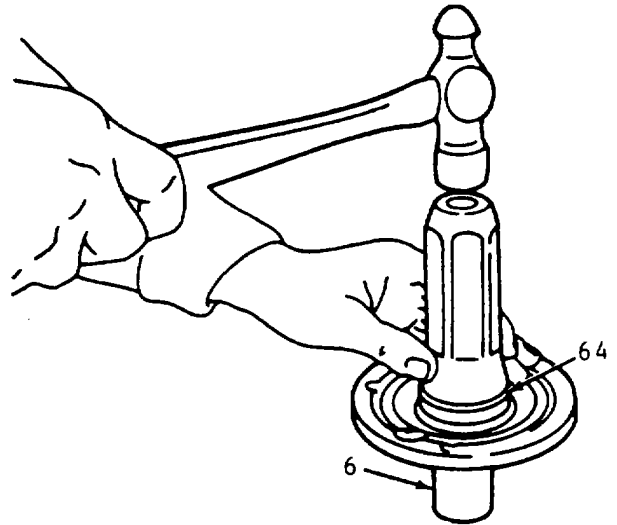
d. Gears Inspection.

- (1) Inspect all gears for excessive wear, chips, or cracks.
- (2) Replace any gears that are worn.
- (3) Check clutch sleeves to ensure they slide freely on their hubs.

6-19. TRANSMISSION REPAIR. (Continued)*e. Synchronizer and Springs Repair.***NOTE**

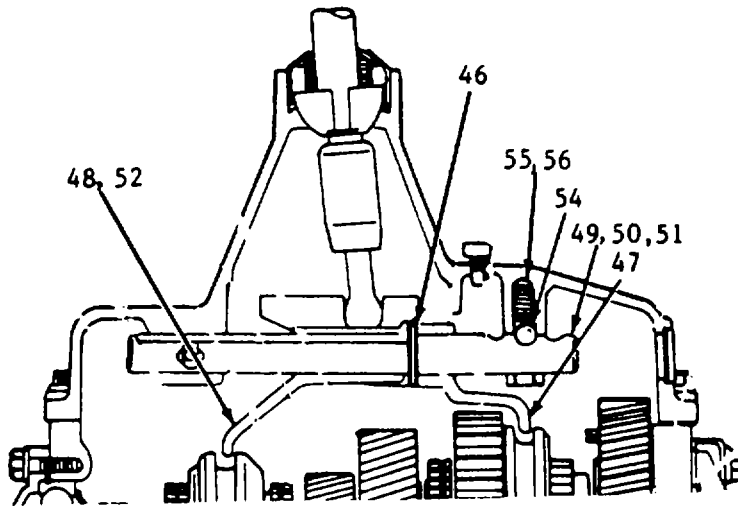
The synchronizer hubs and sliding sleeves are a selected assembly and should be kept together as originally assembled, however the keys and two springs may be replaced if worn or broken.

- (1) If the relation of hub and sleeve are not marked, mark them for assembly purposes.
- (2) Push the hub from the sliding sleeve. The keys will fall free, and the springs will be easily removed.
- (3) Place the two springs in position (one on each side of the hub) so all three keys are engaged by both springs.
- (4) Place the keys in position and while holding them in place slide the sleeve onto the hub. Align the marks made before disassembly.

*f. Drive Gear Retainer Oil Seal Repair.*

- (1) Remove retainer (6) and oil seal assembly (64).
- (2) Pry oil seal (64) out of retainer (6).
- (3) Install new seal (64) on front bearing retainer seal installer with lip of seal toward tool flange.
- (4) Support front surface of retainer (6) in press.
 - (a) Start seal (64) and tool in retainer bore.
 - (b) Drive seal (64) into retainer (6) until tool flange bottoms on retainer as shown.
- (5) Install new gasket (7) on retainer (6) and install retainer on transmission case (23) when assembling transmission.

6-19. TRANSMISSION REPAIR. (Continued)

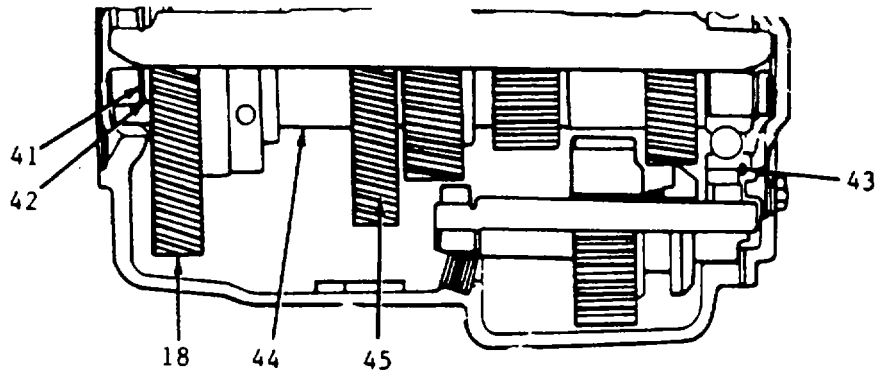


ASSEMBLY

a. *Transmission Cover Assembly.*

- (1) Place fork detent ball springs (55) and balls (54) in position in holes in cover (23).
- (2) Start shifter shafts (49,56) into cover (53).
 - (a) Depress detent balls (54) with a small punch and push shafts (49,50,59) over balls.
 - (b) Hold reverse fork (58) in position and push shaft (59) through yoke.
 - (c) Install split pin (46) in fork (58) and shaft and push fork in neutral position.
- (3) Hold 3rd and 4th fork (48) in position and push shaft (49) through yoke but not through front support bore.
- (4) Place the interlock balls (54) cross bore in front support boss between reverse and 3rd and 4th shifter shaft.
 - (a) Install interlock pin (55) in 3rd and 4th shifter shaft hole.
 - (b) Apply grease (Appendix D, Item 15) to hold shaft in place.
- (5) Push 3rd and 4th shaft (59) through fork (48) and cover bore, keeping both balls and pin in position between shafts until retaining holes align in fork and shaft.
 - (d) Install retaining pin (56) and move to neutral position.
- (6) Place two interlock balls (54) between the 1st and 2nd shifter shaft (50) and 3rd and 4th shifter (49) in the cross bore of the front support boss.
 - (a) Hold 1st and 2nd fork (47) in position and push shaft (50) through cover bore in fork until retainer hole and fork align with hole in shaft.
 - (b) Install retainer pin (46) and move to neutral position.
- (7) Install new shifter shaft hole expansion plugs (51) and expand in place.

6-19. TRANSMISSION REPAIR. (Continued)



b. Countergear Assembly.

(1) Position 3rd speed countergear (45) and shaft on arbor press and press gear onto shaft. Install gear mating machined surface with snap ring toward the front.

(2) Install spacer (44).

(3) Press front gear (18) on countershaft (24) and install snap ring (48) and thrust washer (42).

(4) Install new clutch countergear rear retaining ring using snap ring installer and 2nd speed bushing installer and snap ring pliers.

(a) Install snap ring installer on end of shaft and position snap ring (41) on tool.

(b) Using 2nd speed bushing installer push down on snap ring (41) until it engages groove on shaft (24).

(c) Carefully expand snap ring (41) with snap ring pliers until it just slides onto splines.

(d) Push ring down shaft until it engages groove in shaft.

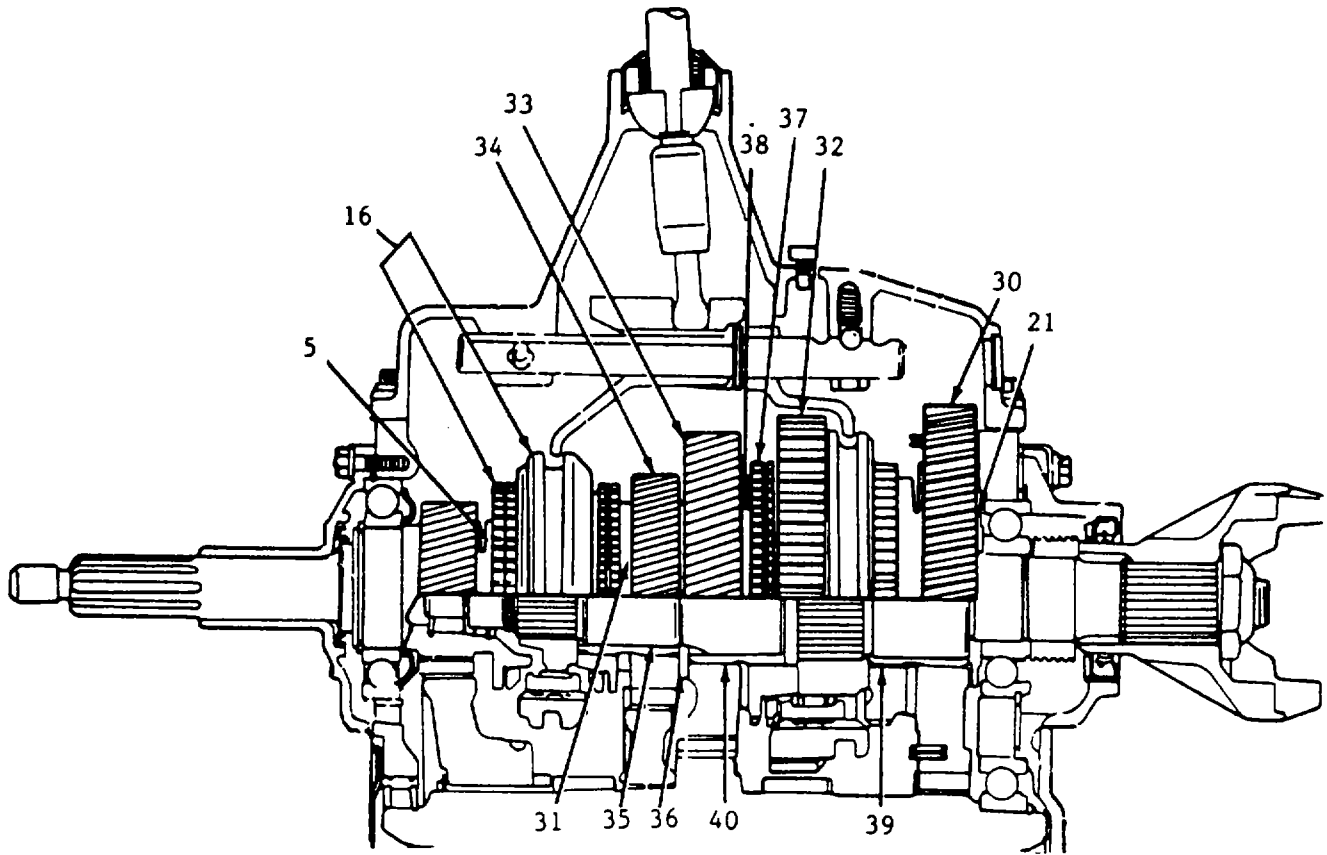
(5) Position clutch countergear (17) and spacer (40) on shaft (21) and press countergear onto shaft against snap ring using 2nd speed bushing installer.

CAUTION

Do not overstress snap ring or damage may result. Ring should be tight in groove with no side play.

(6) Install clutch countergear thrust washer (39) and front retaining ring (38) using snap ring installer and 2nd speed bushing installer.

6-19. TRANSMISSION REPAIR. (Continued)



c. Installing Drive Gear.

CAUTION

Exercise care to prevent distortion of the oil slinger.

- (1) Press bearing (26) and new oil slinger (15) onto drive gear shaft (14) using driver gear bearing remover/installer. Slinger should be located flush with bearing shoulder on drive gear.
- (2) Install snap ring (28) to secure bearing (16) on drive gear shaft (15).
- (3) Install bearing retainer ring (14) in groove on outside diameter of bearing (16). The bearing must turn freely after it is installed on the shaft (15).

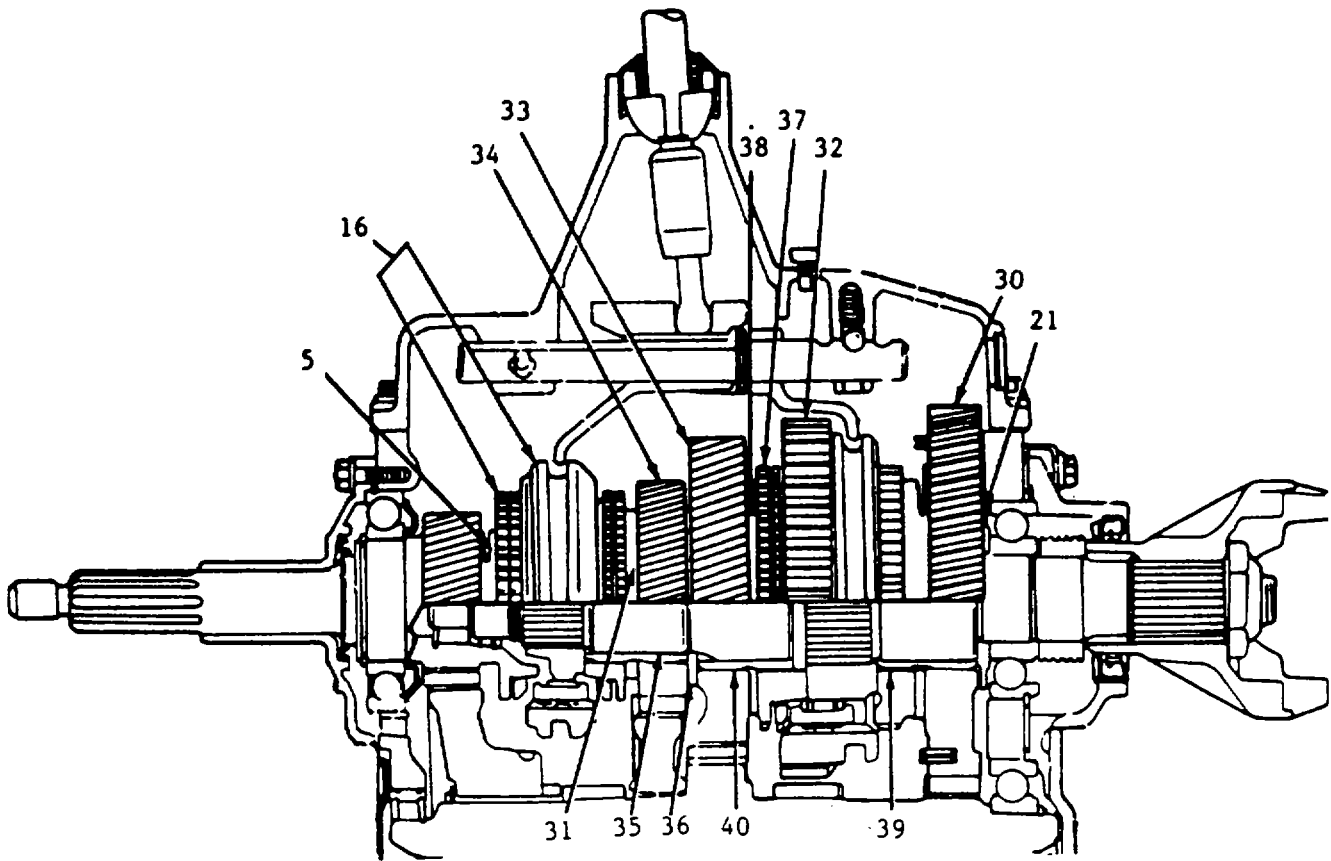
- (4) Install snap ring (27) on inside diameter of mainshaft pilot bearing bore in clutch gear.
- (5) Apply a small amount of grease (Appendix D, Item 15) to bearing surface in the shaft recess.

NOTE

This roller bearing retainer holds bearing in position and in final transmission assembly, is pushed forward into recess by mainshaft pilot.

- (6) Install transmission mainshaft pilot roller bearings (26) and install roller bearing retainer (31).

6-19. TRANSMISSION REPAIR. (Continued)



d. Installing Mainshaft.

- (1) Using 2nd speed bushing installer press 2nd gear bushing (39) onto mainshaft (5) until it bottoms against shoulder.

CAUTION

1st, 2nd, and 3rd gear bushings (49,40,35) are made of sintered iron. Exercise care when installing them or damage may result.

- (2) Press 1st and 2nd speed synchronizer hub (38) onto mainshaft (5) until it bottoms against shoulder with the annulus toward the rear of the shaft.
- (3) Install 1st and 2nd synchronizer keys (61) and springs (62).

- (4) Using 2nd speed bushing installer press 1st speed gear bushing (39) onto mainshaft (5) until it bottoms against hub.
- (5) Install synchronizer blocker ring (37) and 2nd speed gear (33) onto mainshaft (5) and against synchronizer hub (38). Index synchronizer key slots with keys (61) in synchronizer hub (38).

NOTE

This roller bearing retainer holds bearings in position and in final transmission assembly, is pushed forward into recess by mainshaft pilot.

- (6) Install 3rd speed gear thrust washer (36) onto mainshaft with tang on thrust washer in slot on shaft (5) and against 2nd gear cushioning (40).

6-19. TRANSMISSION REPAIR. (Continued)

- (7) Press 3rd speed gear bushing(35) onto mainshaft (5) with 3rd speed bushing installer until it bottoms against thrust washer (36).

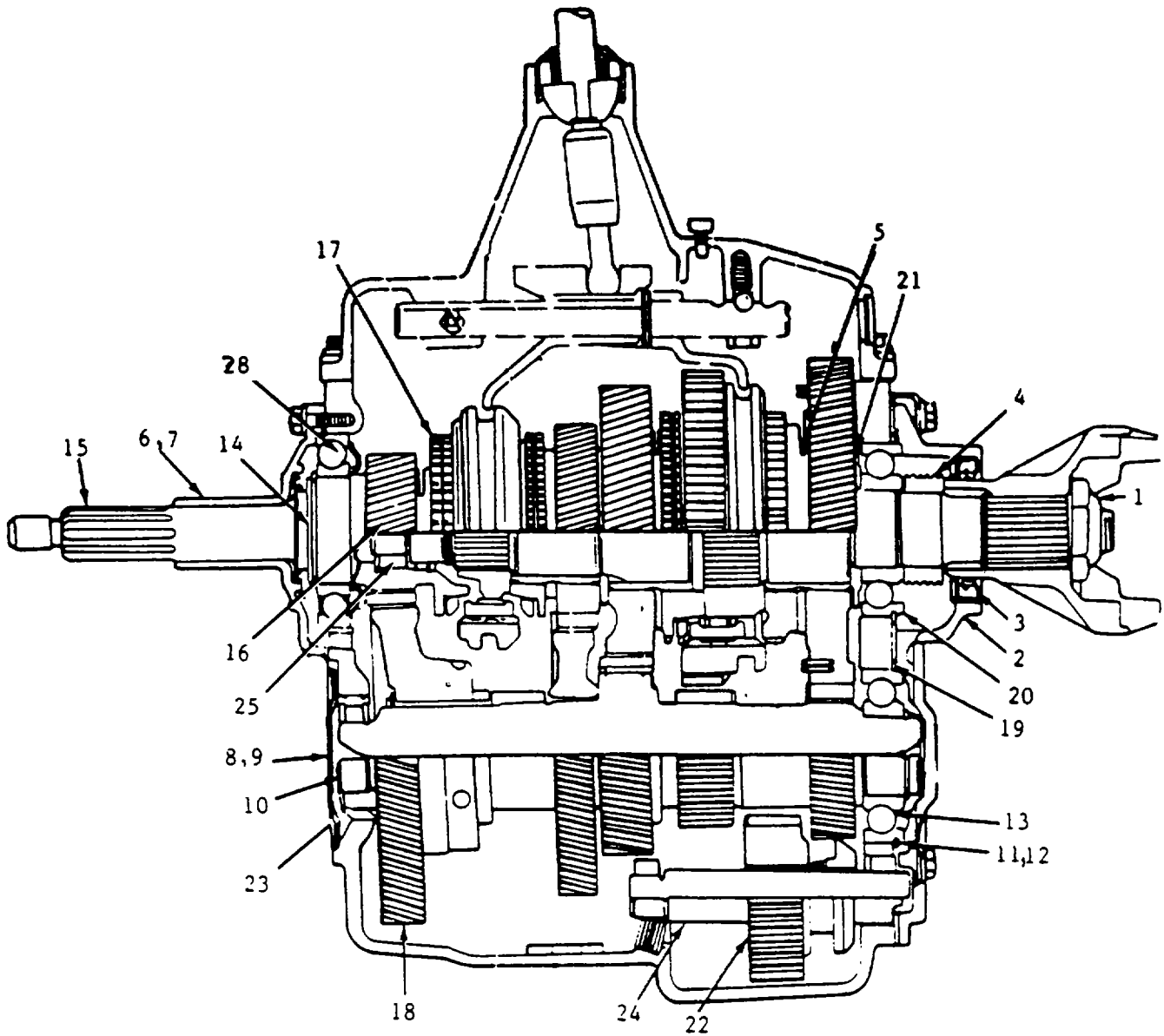
- (8) Instal 3rd speed gear synchronizer blocker ring (17) and 3rd speed gear (34) onto mainshaft against 3rd speed gear thrust washer (36)

- (9) Index synchronizer ring key slots with synchronizer assembly keys (61) and press 3rd and 4th synchronizer assembly onto mainshaft (5) using 3rd speed bushing installer and against 3rd speed gear bushing thrust face toward third speed gear. Retain synchronizer assembly with a snap ring.

- (10) Install reverse driven gear (32) with fork groove facing rearward.

- (11) Install 1st speed gear (30) onto mainshaft (5) and against 1st and 2nd synchronizer hub (5). Install 1st speed gear thrust washer (21).

6-19. TRANSMISSION REPAIR. (Continued)



e. Transmission Assembly.

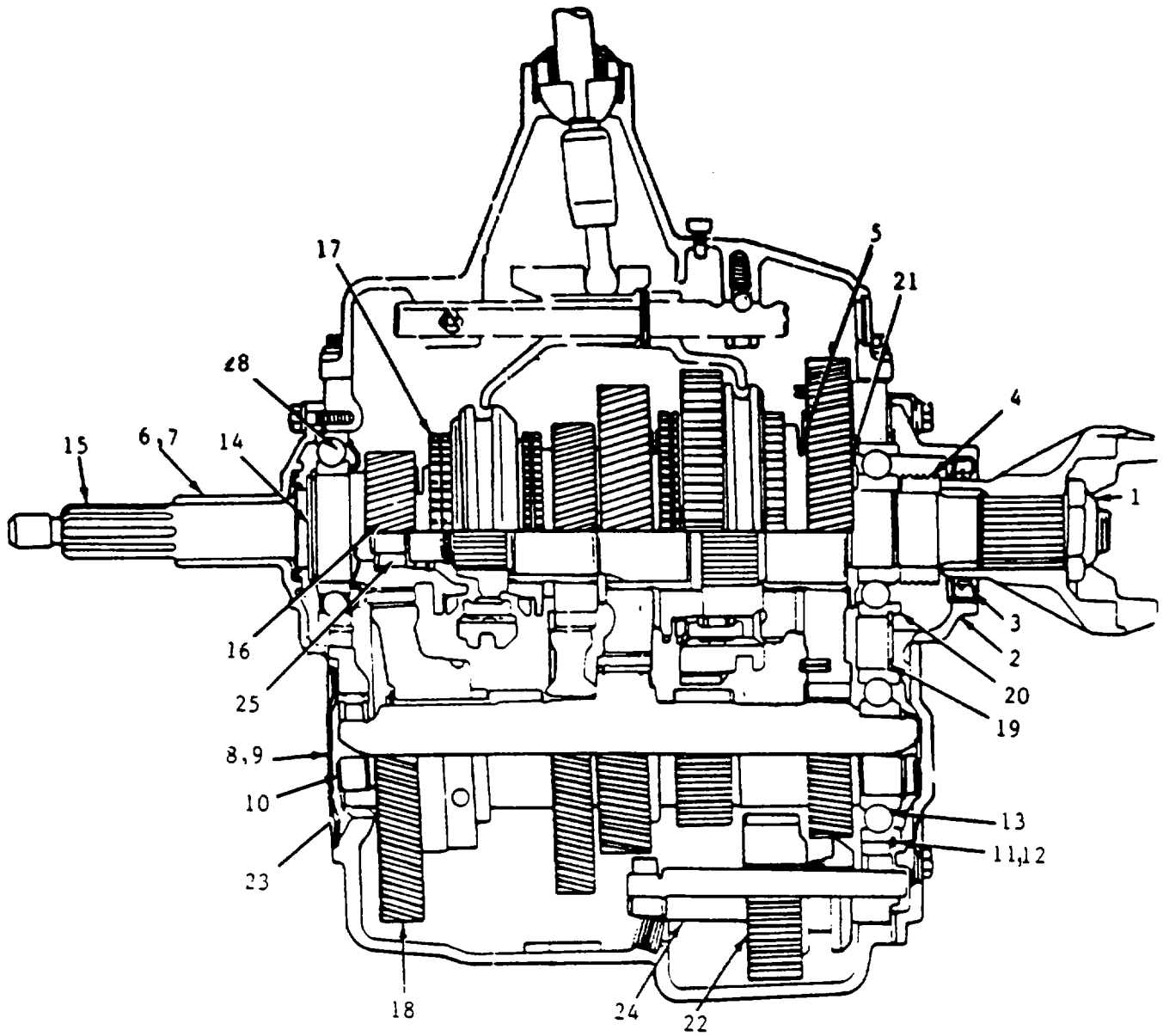
- (1) Lower the countergear (18) into the case until it rests on the bottom of the case (23).
- (2) Place reverse idler gear (22) in transmission case (23) with gear teeth toward the front.
 - (a) Ensuring the slot in the end of the shaft is facing down, install the idler gear shaft (25) from rear to front.

- (b) Shaft slot face must be at least flush with case.
- (3) Install mainshaft assembly (5) into case with rear of shaft protruding out of rear bearing hole in case.
 - (a) Position mainshaft rear bearing installer in clutch gear case opening and engage front mainshaft.

6-19. TRANSMISSION REPAIR. (Continued)

- (b) Rotate case (23) onto front end.
- (c) Install 1st speed gear thrust washer (21) on shaft.
- (4) Install snap ring (19) on bearing outside diameter and position rear mainshaft bearing (20) on shaft (5).
 - (a) Using mainshaft rear bearing installer drive bearing (20) onto the shaft (5) and into case (24).
 - (b) Rotate case (24) and remove mainshaft rear bearing installer.
- (5) Install synchronizer cone (17) on pilot end of mainshaft (5) and slide rearward to clutch hub (60). Ensure three cut out sections of 4th speed synchronizer cone (17) align with three clutch keys (61) in clutch assembly.
- (6) Install snap ring (14) on drive gear bearing (16) outside diameter.
 - (a) Index cut out portion of drive gear (15) teeth to obtain clearance over countershaft drive gear (18) teeth and install clutch gear assembly onto case (24).
 - (b) Raise mainshaft (5) to get clutch gear (18) started and tap bearing outer race with plastic tipped hammer.
- (7) Install drive gear bearing retainer (6) using a new gasket (7).
- (8) Install bolts (65) and torque to 25 ft-lbs (32 N•m).
- (9) Install tool in countergear front bearing opening in case to support countergear (23) and rotate case (24) onto front end.
- (10) Install snap ring (12) on countergear rear bearing (13) outside diameter position and bearing on countergear (23).
 - (a) Drive bearing (13) into place using mainshaft rear bearing installer.
 - (b) Rotate case (24) and install snap ring (11) on countershaft (23) at rear bearing (12).
 - (c) Remove mainshaft rear bearing installer.

6-19. TRANSMISSION REPAIR. (Continued)



(11) Tap counter gear front bearing assembly into case.

(12) Install counter gear front bearing cap (8) and new gasket (9). Torque screws (66) to 20 ft-lbs (27 N•m).

6-19. TRANSMISSION REPAIR. (Continued)

- (13) Slide speedometer drive gear (4) over mainshaft (5) to bearing (20).
 - (14) Install rear bearing retainer (2) with new gasket (3).
 - (a) Ensure snap ring ends are in lubrication slot and cut out in bearing retainer (2).
 - (b) Install bolts (67) and torque the upper retainer bolts to 20 ft-lbs (27 N•m) and the lower retainer bolts to 30 ft-lbs (40 N•m).
 - (c) Install mainshaft rear bearing locknut (1) and washer (68) using mainshaft bearing locknut installer.
 - (d) Tighten mainshaft rear bearing locknut (1) and bend washer tangs to slot in nut.
 - (15) Install parking brake drum and /or universal joint flange (69).
 - (16) Lock transmission in two gears at once. Install universal joint flange locknut (70) and tighten.
-

6-20. REAR RETAINER OIL SEAL REPLACEMENT. (Continued)

INSTALLATION

- a. With gasket surfaces clean, coat the outer diameter of the new oil seal with sealing cement (Appendix D, Item 42) .
- b. Install the new seal using the rear retainer seal installer.
- c. Install the rear bearing retainer cap with a new gasket (10) on the transmission.
- d. Install the upper attaching bolts (8) and torque to 20 ft-lbs (27 N•m).
- e. Install the lower attaching bolts (8) and torque to 30 ft-lbs (40 N•m).
- f. Install oil seal (11) and output yoke (7) on mainshaft.
- g. Using a flange or yoke holding tool, install U-joint flange retaining nut (6), torque to 100 ft-lbs (135 N•m).
- h. Install the speedometer driven gear and new seal (4) and the speedometer cable (3) (paragraph 4-127).
- i. Install the propeller shaft to the transmission (paragraph 4-186).
- j. Install the drain plug (2) and torque to 17 ft-lbs (23 N•m).
- k. Fill the transmission with new transmission oil (Appendix D, Item 32) to the level of the fill plug hole.

NOTE**Capacity is 4.2 qts. (4.0 liters)**

- l. Install the oil fill plug (1) and torque to 17 ft-lbs (23 N•m).
- m. Lower the vehicle.

Section IV. MAINTENANCE OF CLUTCH ASSEMBLY

Clutch Assembly Repair.....	Para 6-22	General.....	Para. 6-21
-----------------------------	--------------	--------------	---------------

6-21. GENERAL.

This section contains information on the maintenance of the clutch assembly that are maintainable at the General Support level.

6-22. CLUTCH ASSEMBLY REPAIR.

This task covers:

- | | | |
|-----------------------|----------------------|--------------------|
| a. Disassembly | b. Inspection | c. Assembly |
|-----------------------|----------------------|--------------------|

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Equipment Condition

<u>Para.</u>	<u>Condition</u>	<u>Description</u>
4-195	Clutch	Removed

Material/Parts

Lubricant (Appendix D, Item 23)

General Safety Instructions

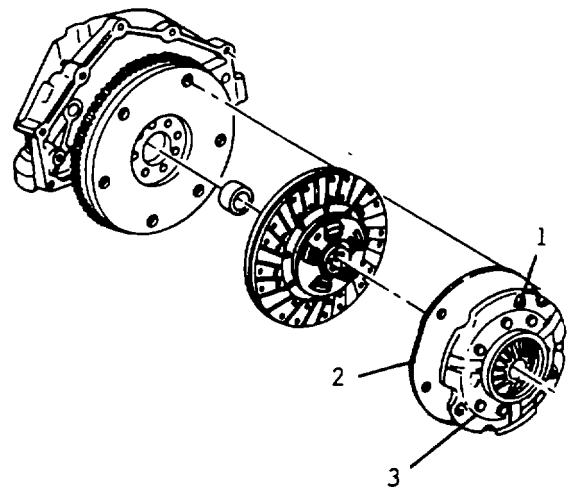
Engine OFF
Transmission in (N) neutral.
Parking brake and micro-brakelock set

DISASSEMBLY

CAUTION

When disassembling, mark edge of pressure plate and cover. These marks must be aligned in assembly to maintain balance.

- a. Remove three drive-strap to pressure plate bolts (1) and retracting springs and remove pressure plate (2) from clutch cover (3).
- b. The clutch diaphragm spring and two pivot rings are riveted to the clutch cover.



6-22. CLUTCH ASSEMBLY REPAIR. (Continued)**INSPECTION**

- a. Check drive straps for looseness at the clutch cover and evidence of looseness at pressure plate bolt holes.

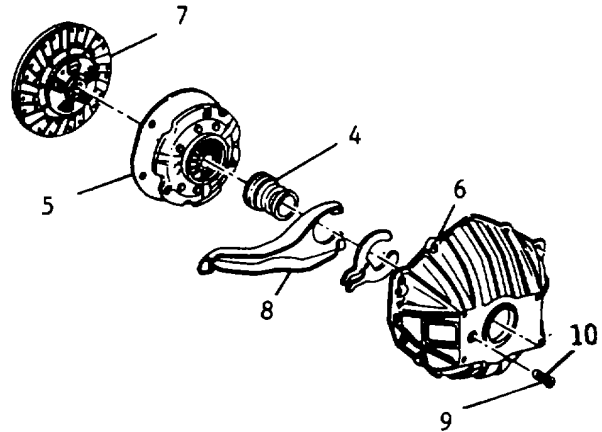
WARNING

Cleaning solvent, Federal Specification P-D-680, is both toxic and flammable. Keep off skin. Use only in a well ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

CAUTION

The release bearing (4) is permanently packed with lubricant and should not be soaked in cleaning solvent as this will dissolve the lubricant.

- b. Wash all parts, except driven disk and release bearing, in cleaning solvent.
- c. Inspect pressure plate (5) and flywheel housing (6) for scores on the contact surfaces. Use a straight edge and check for flatness of contact surfaces.
- d. Check release bearing (4) for roughness and freedom of movement on the sleeve of the transmission clutch gear bearing retainer. Replace retainer if rough.
- e. Inspect clutch disc (7) for worn, loose or oil soaked facings, broken springs, loose rivets, etc. Replace if necessary.
- f. Examine splines in hub and make sure they slide freely on splines of transmission clutch shaft. If splines are worn, the clutch disc or clutch gear should be replaced as necessary.

**NOTE**

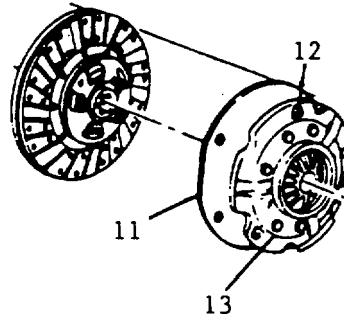
Ball spring (10) on fork (8) may be bent in toward fork if necessary.

- g. Inspect clutch fork ball socket and fingers for wear and ball retaining spring (10) for damage. Spring should hold fork tightly to ball stud (9).
- h. Inspect ball stud (9) for wear. Replace if scored.
- i. Check run out of transmission pilot hole in clutch housing by removing a flywheel bolt and installing a dial indicator.
- j. Lubricate ball stud (9) with lubricant (Appendix D, Item 23) before reassembly.
- k. Lubricate bearing I.D. and groove with lubricant (Appendix D, Item 23) before reassembly.

6-22. CLUTCH ASSEMBLY REPAIR. (Continued)

ASSEMBLY

- a. Install the pressure plate (11) in the cover assembly (12) lining up the punch marks on the edge of the pressure plate with the punch marks on the edge of the cover.
- b. Install pressure plate retracting springs and drivestrap to pressure plate bolts (13) and lock washers and torque to 11 ft-lbs (15 N•m).



Section V. MAINTENANCE OF TRANSFER CASE ASSEMBLY

General.....	Para. 6-23	Transfer Case Assembly Repair.....	Para. 6-24
--------------	------------	------------------------------------	------------

6-23. GENERAL.

This section contains information on the maintenance of the transfer case assembly that are maintainable at the General Support level.

6-24. TRANSFER CASE ASSEMBLY REPAIR.

INITIAL SET-UP

Installer/Remover (J-8092)

Tools

- General Mechanics Tool Kit
- Snap Ring Pliers (J-23432)
- Intermediate Shaft Remover/Installer (J-23429)
- Intermediate Gear Bearing Cup Installer (J-9276)
- Front Output Shaft Bearing Retainer Seal Installer (J-22836)
- Rear Output Shaft Housing Bearing Remover/Installer (J-23431)
- Front Output Shaft/Front Bearing

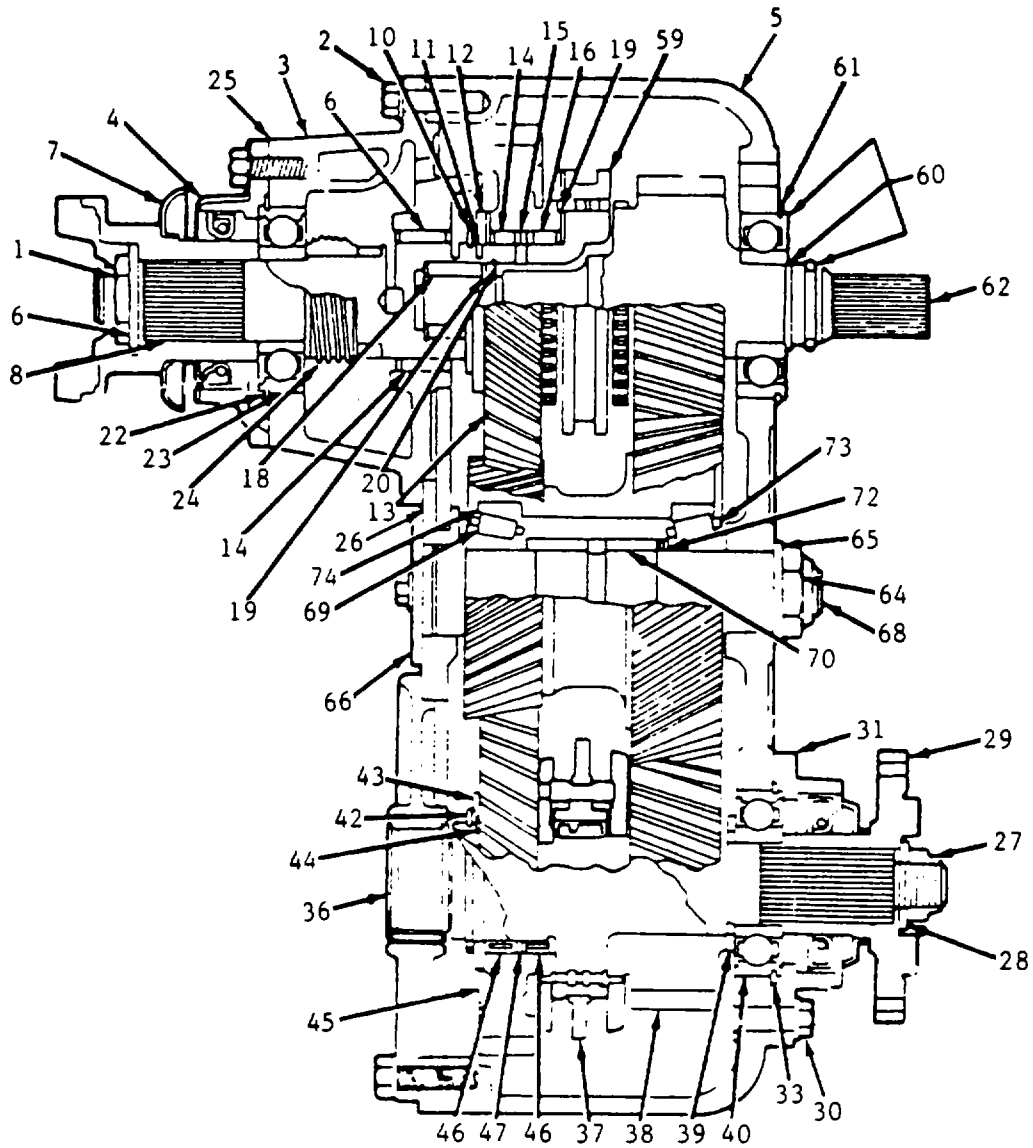
Equipment Condition

Para.	Condition Description
4-200	Transfer Case Removed

Material s/Parts

Cleaning Solvent	(Appendix D, Item 44)
Loctite 414	(Appendix D, Item 21)
Grease	(Appendix D, Item 15)
Transfer Case	(148-9001)

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)



DISASSEMBLY

a. *Transfer Case Disassembly.*

- (1) Loosen rear output shaft yoke retaining nut (1).
- (2) Remove rear output shaft housing bolts (2) and remove housing (3) and retainer assembly (4) from case (5).
- (3) Remove output shaft yoke retaining nut (1), washer (6) and yoke (7) from shaft (8), then remove shaft assembly from housing (3).
- (4) Remove snap ring (9) using snap ring pliers and discard snap ring.

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)

- (5) Remove thrust washer (10) and washer pin (11).
- (6) Remove tanged bronze washer (12), low speed gear (13). Remove gear needle bearings (14) (32 per row), spacer (15) and second row of needle bearings (16).
- (7) Remove tanged bronze thrust washer (17) from shaft (8).
- (8) Remove pilot rollers (18), retainer (20) and washer (19).
- (9) Remove oil seal retainer (21), snap ring (22), ball bearing (23), speedometer gear (24). Discard gaskets (25 and 26). Press out bearing as required.
- (10) Remove oil seal from the retainer (21).

b. Front Output Shaft Disassembly.

- (1) Remove lock nut (27), washer (28) and yoke (29).
- (2) Remove front bearing retainer attaching bolts (30) and retainer (31).
- (3) Remove gasket (32) and snap ring (33).
- (4) Remove front output shaft rear bearing retainer attaching bolts (34).
- (5) Tap on output shaft (35) with a soft hammer and remove shaft, gear assembly and rear

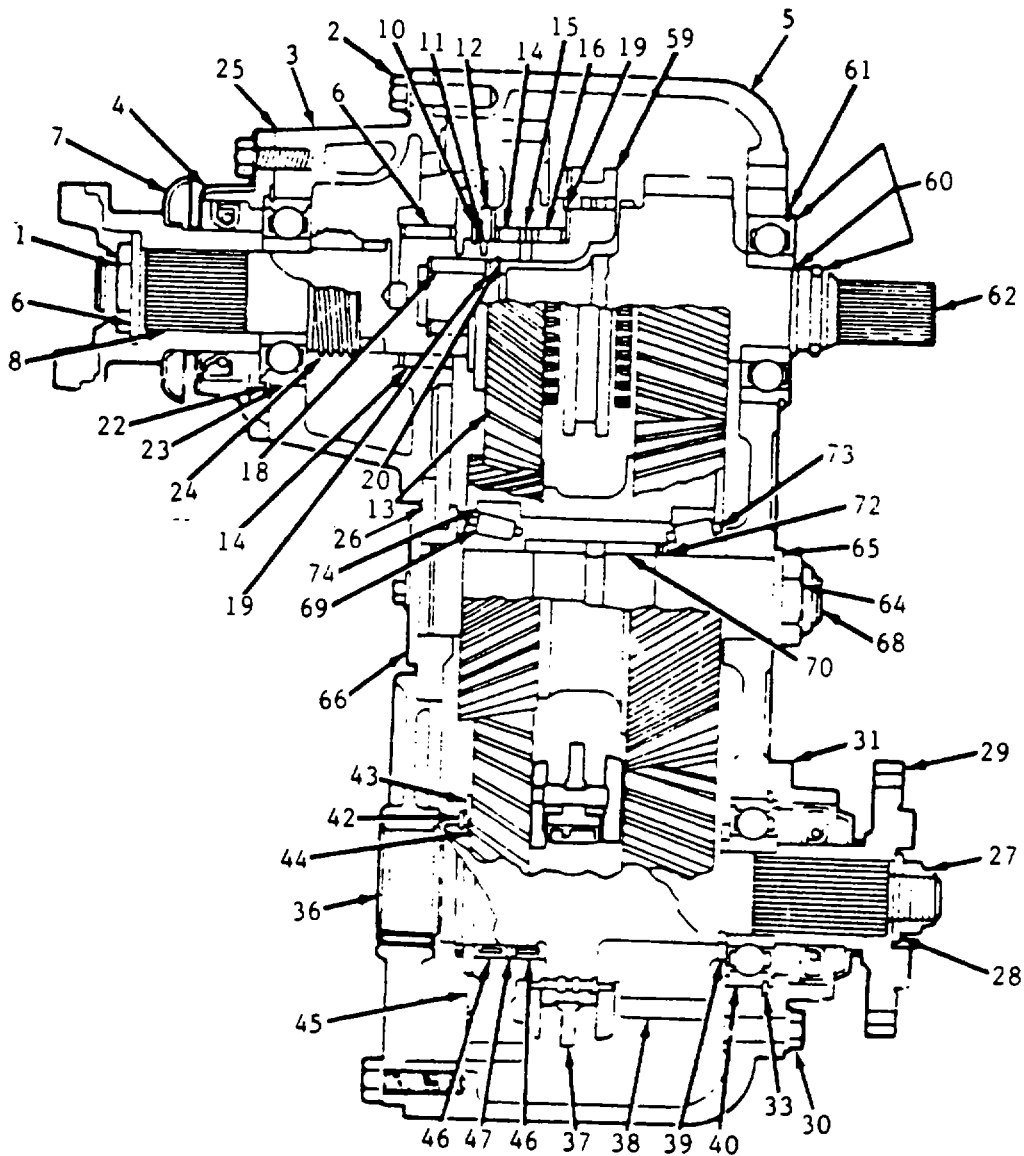
bearing retainer (36) from case (5). Remove the synchronizer (37) from output high gear (38), washer (39), and bearing (40) which will have remained in the case (5).

- (6) Remove gasket (41).
- (7) Using large snap ring picks, remove the gear retaining ring (42) from the shaft (35) and discard.
- (8) Remove thrust washer (43) and pins (44) from shaft (35).
- (9) Remove gear (45), two needle bearings (46) (32 per row) and spacer (47).

c. Shift Rail and Fork Assembly Disassembly.

- (1) Remove the two poppet nuts (48), gasket (49) on top of case, two poppet springs (50) and using a magnet, remove the poppet balls (51).
- (2) Drive cup plugs into case using a 6.35 mm (1/4 inch) punch.
- (3) Position both shift rails (52) and (53) in neutral and using a long, narrow punch drive shift fork pins (54) through shift rails into the case (5).
- (4) Remove clevis clips and pins (55) and shift rail link (56).

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)



- (5) Remove shift rails, upper (range) rail (52) first, then lower (4-wheel) rail (53).
- (6) Remove shift forks (57 and 58) and slide clutch hub (59) from case.
- (7) Remove the front output high gear (38), washer (39), and bearing (40) from the case (5). Remove the shift rail cup plugs and pins from the case.
- (8) Remove snap rings and O-ring (60) in front of bearing (61). Using a soft hammer, tap shaft (62) out rear of case. Tap bearing (61) out of case.

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)

- (9) Tip case on PTO and remove two interlock pins (63) from inside of case.

d. Idler Gear Disassembly.

- (1) Remove idler gear shaft nut (64) and washer (65).
- (2) Remove idler shaft rear cover (66) and gasket (67).
- (3) Remove idler gear shaft (68), bearing (69) and spacer (70) using a soft hammer and intermediate shaft remover.
- (4) Roll idler gear (71) to front output shaft and remove from case.
- (5) Remove bearing (72), cups (73 and 74) and shims (75) as required from idler gear (71).

INSPECTION**NOTE**

Carefully inspect all bearings and rollers for evidence of chipping, cracks, or worn spots that would render bearing unfit for further service. Bearings are nonadjustable and if worn or damaged, must be replaced with new parts.

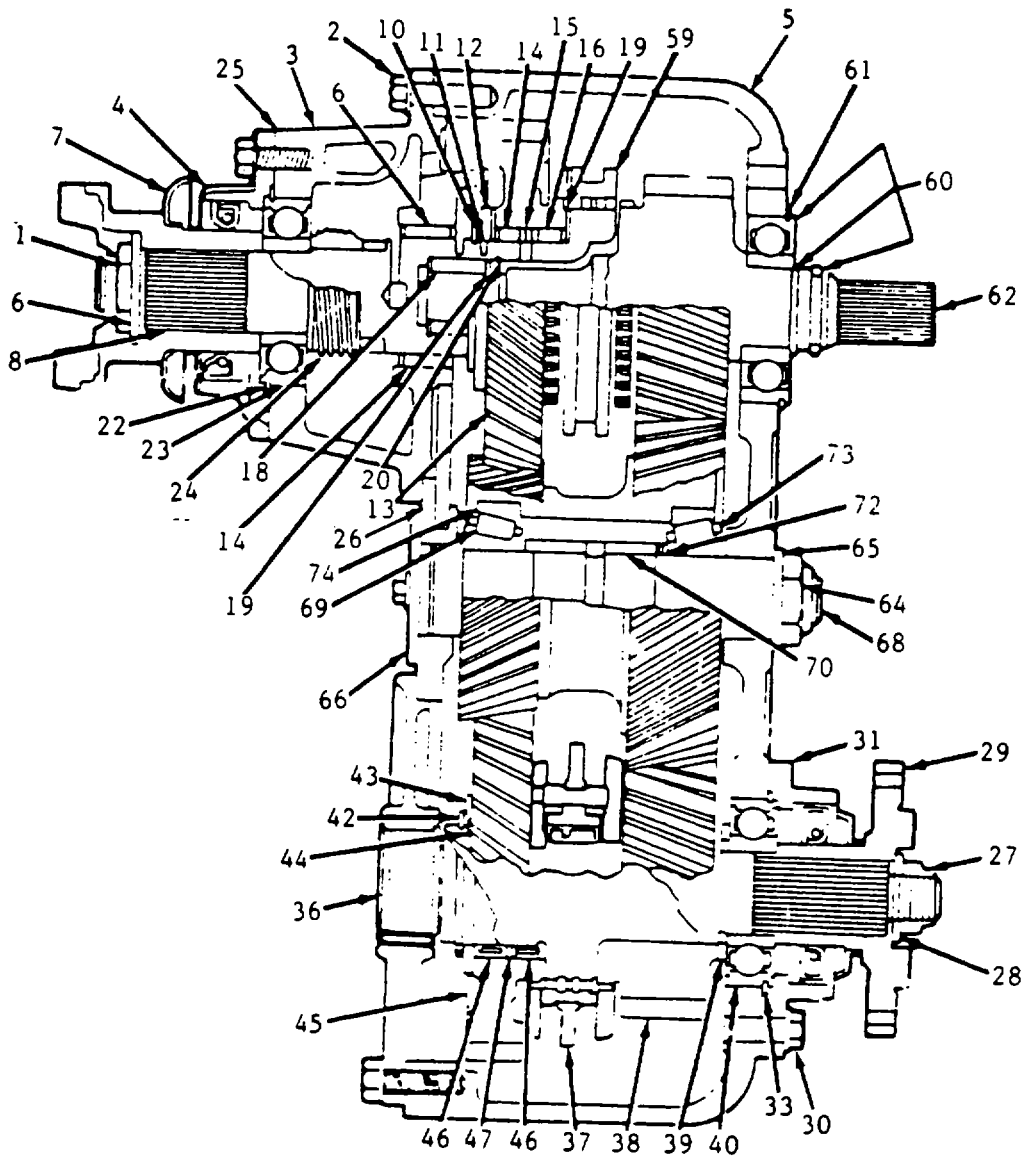
Inspect shaft splines and gears. If any indication of failure, such as chipped teeth or excessive wear is indicated, those parts should be replaced with new parts.

WARNING

Cleaning solvent, Federal Specification P-D-680, is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

- a. *Bearings* Place all bearings and rollers in cleaning solution (Appendix D, Item 44) and allow to remain long enough to loosen all accumulated lubricant. Bearings should be sloshed up and down and turned slowly below surface of solution to remove as much lubricant as possible. Remove bearings and blow out with compressed air, being careful to direct air across bearing so that bearings do not spin.
- b. *Shafts and Gears.* Clean all shafts in cleaning solution (Appendix D, Item 44) to remove all accumulations. Dry with compressed air.
- c. *Case, Cover and Bearing Caps* Transfer case, cover and bearing caps must be thoroughly cleaned in solution to remove all accumulation of lubricant and dirt. Remove all traces of gaskets from surface where used.
- d. *Synchronizer.* The synchronizer can be installed in any direction as the sides are identical. Synchronizer wear could occur on engagement side, if wear is present, use opposite side of synchronizer and reassemble.

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)



ASSEMBLY

a. Idler Gear Assembly.

- (1) Press the two bearing cups (73 and 74) in the idler gear (71) (if previously removed) using intermediate gear bearing remover and handle.
- (2) Assemble the two bearing cones (72), spacer (70), shims (75), and idler gear (71) on dummy shaft with bore up. Check end play. Limits are 0.001 to 0.002 inch

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)

- (3) Install idler gear assembly (71) with dummy shaft into case (5) through front output bore large end first.
- (4) Install idler shaft (68) from large bore side and drive through using a soft hammer.
- (5) Install washer (65) and new locknut (64). Check for end play and free rotation. Torque nut to 150 ft-lbs (202 N•m).
- (6) Install idler shaft cover (66) and gasket (67). Torque idler shaft cover bolts to 20 ft-lbs (27 N•m). Flat on cover must be located adjacent to front output shaft rear cover (36).

b. Shift Rail and Fork Assembly.

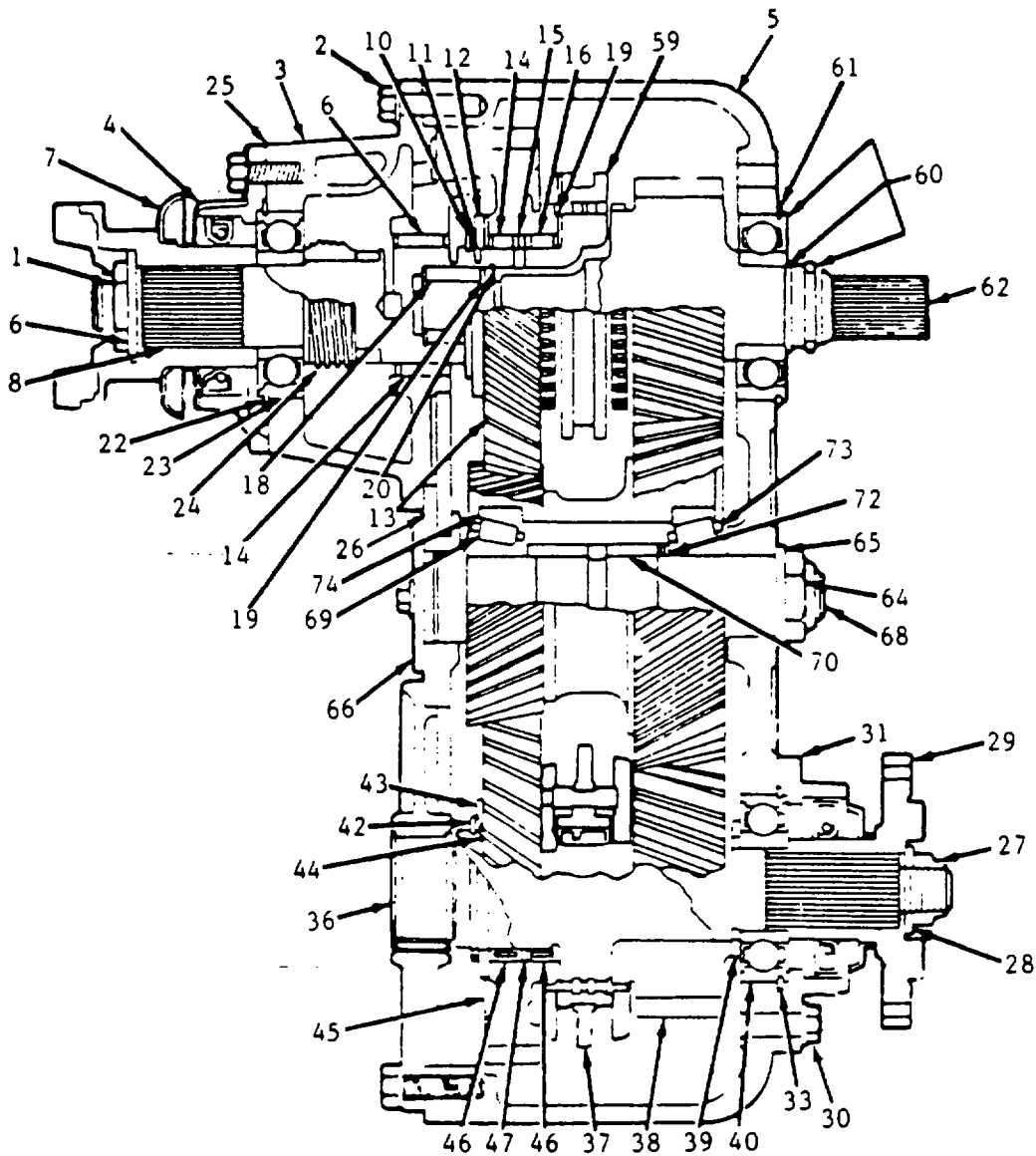
- (1) Press the two rail seals (76) into the case (5). Seals should be installed with metal lip outward.
- (2) Install interlock pins (63) through large bore or PTO opening.
- (3) Start front output drive shift rail (53) into case (5) from back, slotted end first, with poppet notches up.
- (4) Install shift fork (57) (long end inward) into rail, push rail through to neutral position.
- (5) Install input shaft bearing (72) and shaft (68) into case (5).
- (6) Start range rail (52) into case (5) from front, with poppet notches up.

- (7) Install sliding clutch (59) onto fork (58) place over input shaft (8) in case. Position to receive range rail and push rail through to neutral position.
- (8) Install new lock pins through holes at top of case and drive them into the forks. Tip case on PTO opening when installing range rail lock pin.

c. Front Output Shaft and Gear Assembly.

- (1) Install two rows of needle bearings (46), (32 each) separated by a spacer (47) in the front low output gear (44) and retain with a sufficient amount of grease (Appendix D, Item 15).
- (2) Place front output shaft (35) in soft jawed vise, spline end down. Install front low gear (45) over shaft with clutch gear facing down and install thrust washer pin (44), thrust washer (43) and new snap ring (42) using snap ring pliers. Position the snap ring so that the opening is opposite the pin.
- (3) Position front wheel hi-gear (38) and washer (39) in case. Install synchronizer (37) in the shift fork (57) then put fork and rail in the front wheel drive (4-H) position with the clutch teeth in mesh with the teeth of the front wheel hi-gear.
- (4) Line up washer (39) high gear (38) and synchronizer (37) with bearing bore. Insert front output shaft (35) and low gear assembly through the high gear assembly.

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)



- (5) Install new seal in bearing retainer (36) using front output shaft bearing retainer seal installer. Install the front output bearing and retainer (36) on the case.
- (6) Clean and grease rollers in front output rear bearing retainer using grease (Appendix D, Item 15). Install onto case using one gasket

- (15). Dip bolts into sealant (Appendix D, Item 21). Install bolts and torque to 30 ft-lbs (40 N•m).
- (7) Install front output yoke (29), washer (28), and lock nut (27). Torque nut to 150 ft-lbs (202 N•m).

6-24. TRANSFER CASE ASSEMBLY REPAIR. (Continued)

d. Transfer Case Assembly.

- (1) Install two rows of needle bearings (14 and 16) (32 each) separated by a spacer (15) into the output low gear. Use sufficient grease (Appendix D, Item 15) to retain needles.
- (2) Install thrust washer (17) onto rear output shaft (8) tang down in clutch gear groove. Install output low gear (13) onto shaft (8) with clutch teeth facing down.
- (3) Install thrust washer (12) over gear with tab pointing up and away from gear. Install washer pin (11) and also large thrust washer (10) over shaft and pin. Rotate washer until tab fits into slot approximately 90° degrees away from pin. Finally, install snap ring (12) using snap ring pliers and check end play which should be within 0.002 to 0.027 inch.
- (4) Grease pilot bore on rear output shaft using grease (Appendix D, Item 15) and install needle bearings (18). Install thrust washer (19) and new snap ring (20) in bore.
- (5) Clean, grease (Appendix D, Item 15) and install new bearing (23) in retainer housing (21), using rear output shaft housing bearing remover/installer.
- (6) Install housing onto output shaft assembly, install spacer (9) and speedometer gear (24) then install bearing (23).
- (7) Install rear bearing retainer and seal (4).
- (8) Install bearing retainer assembly (4) onto housing with one or two gaskets (25) depending on clearance. Torque bolts to 30 ft-lbs (40 N•m).
- (9) Install yoke (7), washer (6) and lock nut (1) output shaft.
- (10) Position range rail in "high" and install output shaft and retainer assembly on transfer case (5). Torque housing bolts to 30 ft-lbs (40 N•m).
- (11) Install PTO cover and gasket (25). Torque bolts (2) to 15 ft-lbs (20 N•m).
- (12) Install and seal cup plugs at rail pin holes.
- (13) Install drain and filler plugs and torque to 30 ft-lbs (40 N•m).
- (14) Install shift rail cross link (61), clevis pins (60) and lock pins (63).
- (15) Install transfer case (paragraph 4-200).

**APPENDIX A
REFERENCES**

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS.

Equipment Improvement Recommendations SF 386
 Equipment Inspection and Maintenance Work Sheet..... DA Form 2404
 Recommended Changes to Equipment Technical Manuals..... DA Form 2028-2
 Recommended Changes to Publications and Blank Forms DA Form 2028
 Maintenance Request..... DA Form 2407
 Packaging Improvement Report..... DD Form 6

A-3. FIELD MANUALS.

First Aid for Soldiers FM 21-11

A-4. TECHNICAL MANUALS.

Administrative Storage of Equipment..... TM 740-90-1
 Procedures for Destruction of Equipment to Prevent Enemy Use..... TM 750-244-3
 The Army Maintenance Management System..... DA PAM 738-750

A-5. TECHNICAL BULLETINS.

Index of Technical Publications DA PAM 310-1
 Preservation and Storage of Mechanical Equipment for
 Shipment and Storage..... TB 740-97-2

A-6. MISCELLANEOUS PUBLICATIONS.

Visual Inspection Guide for Rubber Hoses..... FED-STD-162A
 Dry Vacuum Test..... NFPA 1901

A-1/A-2 (Blank)

APPENDIX B MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

- a. This section provides a general explanation of all maintenance and repair functions authorized at the various maintenance categories.
- b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.
- c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.
- d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions will be limited to and defined as follows:

- a. *Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standard through examination (e.g., by sight, sound, or feel).
- b. *Test.* To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (included decontaminate when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.
- d. *Adjust.* To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.
- e. *Align.* To adjust specified variable elements of an item to bring about optimum performance.
- f. *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.

B-2. MAINTENANCE FUNCTIONS (Continued).

- g. *Remove/Install.* To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment of system.
- h. *Replace.* To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC.
- i. *Repair.* The application of maintenance services, including fault location troubleshooting², removal/installation, and disassembly/assembly, procedures, and maintenance actions⁴, to identify troubles, and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module function, or failure in a part, subassembly, module (component or assembly) end item, or system.
- j. *Overhaul.* The maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required 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 to an item to like new condition.
- k. *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 material 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 equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

- a. *Column 1, Group Number.* Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group numbers shall be "00".
- b. *Column 2, Component/Assembly.* Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

¹Services - inspect, test, service, adjust, align, calibrate, and/or replace.

²Fault locate/troubleshoot - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

³Disassemble/assemble - encompasses the step-by-step taking apart (or breakdown) of a spare/functional group for the category of maintenance under consideration.

⁴Actions - welding, grinding, riveting, straightening, facing remachinery, and/or resurfacing.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II (Continued).

- c. *Column 3, Maintenance Function* Column 3 lists the functions to be performed on the item listed in Column 2. For a detailed explanation of these functions, see paragraph B-2.
- d. *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 tasks within a 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 (including any necessary disassembly/assembly time, troubleshooting/fault location 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
L.....	Specialized Repair Activity (SRA) ⁵
D.....	Depot Maintenance

- e. *Column 5, Tools and Equipment* Column 5 specifies, by code, those common tools (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.
- f. *Column 6, Remarks* This column shall, when applicable, contain a letter code, in alphabetical order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

- a. *Column 1, Reference Code* The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.
- b. *Column 2, Maintenance Category* The lowest category of maintenance authorized to use the tool or test equipment.
- c. *Column 3, Nomenclature* Name or identification of the tool or test equipment.

⁵This maintenance category is not included in Section II Column 4 of the Maintenance Allocation Chart. To identify functions to this category of maintenance, enter a work time figure in the "H" column of Section II, Column 4, and use an associated reference code in the Remarks Column, 6. Key the code to Section IV, Remarks, and explain the SRA complete repair application there. The explanatory remark(s) shall reference the specific Repair Parts and Special Tools List (RPSTL) TM which contains additional SRA criteria and the authorized spare/repair parts.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III (Continued).

- d. Column 4, National Stock Number* The national stock number of the tool or test equipment.
- e. Column 5, Tool Number* The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.

- a. Column 1, Reference Code* The code recorded in Column 6, Section II.
- b. 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

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
00	250 GPM MINI PUMPER								
01	ACCESSORIES HARD SUCTION HOSES	Inspect Test Replace	.50	.50 .25				13,100	
	STRAINER	Replace		.25					
	12 FOOT EXTENSION LADDER	Replace Repair		.25 .25					
	TIRE JACK, HANDCRANK AND LUG WRENCH	Replace		.25				91	
02	HOSE REEL ASSEMBLY HOSE ROLLERS	Inspect Replace	.50	.50				91	A
	HOSE NOZZLE	Replace Repair		.25 1.0				85,91	D
	HOSE	Replace		.50				91	
	HOSE REEL	Service Replace	.50	1.0				91 91	
	MOTOR	Replace		.50				91	E
	SWIVEL JOINT	Replace		.50				91	
	REWIND SWITCH	Replace		.50				91	
03	PUMP COMPARTMENT ASSEMBLY HOSE BED FLOORS	Inspect Replace	.50	.25				91	
	HOSE ROLLERS	Replace		.50				91	
	HOSE BIN DIVIDERS	Replace		.25				91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
03	PUMP COMPARTMENT ASSEMBLY (Continued)								
	CURBSIDE DOOR ASSEMBLY	Replace		.25				91	
	COMPARTMENT LIGHT	Replace		.25				91	
		Repair		.25				91	F
	ROOF PANEL	Replace		.50				91	
	PUMP PANEL LIGHTS	Replace		.50				91	
		Replace		.25				91	F
	ENGINE THROTTLE CONTROL ASSEMBLY	Replace		1.0				91	
	TACHOMETER/HOURMETER	Replace		.50				91	
		Calibrate		.50				89	
	WATER TANK LEVEL GAUGE	Replace		.50				91	
	SUCTION AND DISCHARGE STUB CAPS	Replace		.25				85	
	GAUGES, CONTROL KNOBS, AND SWITCHES	Replace		3.0				91	
	CALIBRATION AND TEST PORTS	Replace		1.0				91	
	STREETSIDE PUMP PANEL	Replace		.50				91	G
	STEPS AND MOUNTING BRACKETS	Replace		1.0				91	
PRIMING TANK AND TUBING	Service		.25						
	Replace		.50				91		
FRONT PANEL	Replace		.50				91		

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
04	HOSE BODY ASSEMBLY	Inspect	.50						
	HANDRAILS	Replace		.50				91	
	LADDER MOUNTING BRACKETS	Replace		.50				91	
	HARD SUCTION HOSE BRACKET	Replace		.50				91	
	REAR SUCTION STUB CAP	Replace		.25				85	
	HOSE BED PICK-UP LIGHTS AND MOUNTING BRACKETS	Replace		.50				91	
		Repair		.25				91	F
	REAR WARNING LIGHTS	Replace		.50				91	
		Repair		.25				91	F
	BACK-UP, TURN, AND STOP LIGHTS	Replace		.50				91	
		Repair		.25				91	F
	REAR BACK-UP ALARM	Replace		.50				91	
	REAR PLATFORM SIGNAL SWITCH	Replace		.50				91	
	REAR PLATFORM AND STEPS	Replace		.75				91	
	REAR STATION CHARGER	Replace		.50				91	
	COMPARTMENT LIGHTS	Replace		.50				91	
		Repair		.25				91	F
	TREAD PLATES	Replace		.50				91	
COMPARTMENT PANELS	Replace		2.0				91		
FILL TOWER BRACKET	Replace		.25				91		
HOSE BED FLOOR AND SUPPORTS	Replace		.50				91		

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
04	HOSE BODY ASSEMBLY (Continued)								
	REAR COMPARTMENT	Replace		1.0				91	
	SIDE PANELS	Replace		1.0				91	G
05	WATER TANK ASSEMBLY	Inspect	.50						
	WATER TANK LEVEL SENDER	Replace		.50					
	TANK PIPING	Replace		1.0					
	TANK	Replace		1.0				36,49 91	
06	FIRE PUMP AND PIPING SYSTEM	Inspect	1.0						
	VALVES AND CONTROL RODS	Replace		3.0				91	A
	PIPING	Replace		3.0				91	
	PRIMING PUMP ASSEMBLY	Replace		1.0				91	
	FIRE PUMP ASSEMBLY	Service	.50						
		Replace		2.0				91	A,B
		Repair		4.0				91	C,D
07	ENGINE COOLING SYSTEM	Inspect	.50						
		Service		.25					
	COOLANT RECOVERY BOTTLE	Replace		.50				91	
	FAN SHROUD	Replace		1.0				91	
	FAN AND CLUTCH	Replace		.50				91	
	DRIVE BELTS	Replace		.50				91	
		Adjust		.50				9,91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
07	ENGINE COOLING SYSTEM (Continued)								
	HOSES AND PIPING	Replace		1.0				91	
	WATER PUMP	Replace		.50				91	E
	THERMOSTAT AND HOUSING	Replace		.50				91	
	HEAT EXCHANGER	Replace		.50				91	
	RADIATOR	Replace		2.0				91	
		Repair			2.0			35,82, 91	
08	ENGINE FUEL SYSTEM	Inspect	1.0						
	AIR CLEANER	Replace		.50					
	FUEL FILTER	Replace		1.0				91	
	FUEL PUMP	Replace		1.0				91	
	TANK FILL PIPE AND CAP	Replace		.50				91	
	FUEL LINES	Replace		1.0				91	
	FUEL TANK	Replace		1.0				91	
	ACCELERATOR PEDAL	Replace		1.0				91	
09	DIESEL FUEL INJECTION SYSTEM	Inspect	.50						
		Service		.50				91	
		Adjust		.50				91	
	INJECTION LINES	Replace		1.0				70,91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
09	DIESEL FUEL INJECTION (Continued)								
	INJECTION PUMP	Replace Repair		1.0 2.0				70,91 91	D
	INJECTION NOZZLES	Test Replace		1.0 1.0				69,91 60,91	
10	EMISSION CONTROL SYSTEM	Inspect Service	.50	.50					
	TUBING AND HOSES	Replace		.75				91	
	CDR VALVE	Replace		.50				91	
	VACUUM PUMP	Replace		.50				91	
11	ENGINE EXHAUST SYSTEM	Inspect	.50						
	EXHAUST PIPES	Replace		1.0				91	
	TAIL PIPES	Replace		1.0				91	
	MUFFLERS	Replace		1.0				91	
	CLAMPS AND HANGERS	Replace		.50				91	
12	ENGINE AND ACCESSORIES	Inspect Replace		1.0	6.0			25,36 41,42 91,107	A
		Repair				80.0			D
	BATTERIES AND CABLES	Inspect Replace	.25	.50				91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
12	ENGINE AND ACCESSORIES (Continued)								
	ALTERNATOR	Inspect Replace		.25 .50				4,9,14 91,99	D
		Repair			2.0		46,91		
	DIESEL GLOW PLUG SYSTEM	Inspect Test Replace		.50 .50			91 61,110 91		
	STARTER	Inspect Test Replace Repair		.25 .25 .50		3.0		4,14,99 91,107 91	D
	INTAKE MANIFOLD	Inspect Replace		.25 2.0			91		
	EXHAUST MANIFOLD	Inspect Replace		.25 2.0			91		
	ROCKER ARM COVER	Inspect Replace		.25 .50			91		
	ROCKER ARM, SHAFT AND PUSHRODS	Inspect Replace				.50 2.0	19,91		
	HYDRAULIC LIFTERS	Inspect Replace				.50 2.0	38,52 91		
	VALVES, STEM SEALS, AND SPRINGS	Inspect Replace				.50 1.0	91,97 3,57,91 98		

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
12	ENGINE AND ACCESSORIES (Continued)								
	CYLINDER HEADS	Inspect Test Replace				.50 1.0 2.0		15 41,42 91	
	OIL PUMP DRIVE	Inspect Replace				.50 1.0		91	
	TORSIONAL DAMPER AND FRONT CRANKSHAFT SEAL	Inspect Replace				.50 .75		28,57,63 91,93	
	FRONT COVER	Inspect Replace				.25 1.0		28,91	
	TIMING CHAIN AND SPROCKET	Inspect Replace Adjust				.50 1.0 .50		18 91 91	
	CAMSHAFT	Inspect Replace Repair				.50 2.0 .25		25,41 42,91 91	
	DIPSTICK AND TUBE	Inspect Replace		.25 1.0				91	
	OIL PAN	Inspect Replace	.25	1.0				41,42 91	
	OIL PUMP	Inspect Replace Repair				.50 .50 2.0		91 91	D

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
12	ENGINE AND ACCESSORIES (Continued)								
	REAR CRANKSHAFT SEAL	Inspect Replace				.50 .75	91		
	CONNECTING RODS AND PISTONS	Inspect Replace				1.0 4.0	64,91		
	CRANKSHAFT AND MAIN BEARING	Inspect Replace				.50 2.25	47,53 57,91		
	ENGINE MOUNTINGS	Inspect Replace		.50		1.0	25,91		
13	CAB ASSEMBLY, LIGHTS, SWITCHES GAUGES, CONTROLS, AND INDICATORS	Inspect Replace	.25			20.0	91	A	
	HEADLIGHTS	Adjust Replace Repair		.25 .25 .25			91 91 91	F	
	FRONT SIDE MARKER LIGHTS	Replace Repair		.25 .25			91 91	F	
	FRONT TURN SIGNAL LIGHTS	Replace Repair		.25 .25			91 91	F	
	CAB SPOTLIGHTS	Replace Repair		.25 .50			91 91	F	
	ENGINE COMPARTMENT LIGHTS	Replace Repair		.25 .25			91 91	F	
	FRONT WARNING LIGHTS	Replace Repair		.25 .25			91 91	F	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
13	CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS (Continued)								
	ROOF WARNING LIGHT	Replace Repair		.25 .50				91 91	E,F
	WINDSHIELD WASHER/WIPER ASSEMBLY	Service	.25						A
	WIPERS	Replace		.25					
	MOTOR	Replace		.50				91	
	WASHER	Replace		1.50				91	
	SPEEDOMETER	Replace		.50				91	
	SPEEDOMETER CABLE CORE AND TRANSDUCER	Replace		.50				91	
	AMMETER/VOLTMETER	Replace		.50				91	
	TACHOMETER	Replace		.50				91	
	CONTROL SWITCHES AND GAUGES	Replace		2.0				62,91	
	CONTROL KNOBS AND INDICATOR LIGHTS	Replace Repair		1.0 .50				91 91	D
	SIREN/PUBLIC ADDRESS SYSTEM	Inspect Replace Test	.25	1.0 .25				91	A
	EXTERNAL SPEAKER	Inspect Replace	.25	.50				91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
13	CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS (Continued)								
	HEATER/DEFROSTER	Inspect Replace		1.25 1.0				91	
	STEERING WHEEL AND COLUMN	Replace		1.0				88,91	
	FLEXIBLE COUPLING	Replace		.50				91	
	TURN SIGNAL SWITCH	Replace		.50				50,91	
	LOCK CYLINDER	Replace		.50				91	
	IGNITION SWITCH AND TONE ALARM	Replace		.50				91	
	HOOD ASSEMBLY	Replace		1.0				91	
	GRILLE	Replace		.50				91	
	WHEELHOUSE PANELS	Replace		1.0				21,41, 42,91	
	RADIATOR SUPPORT	Replace		.50				91	
	MIRRORS	Replace		.50				91	
	DOORS	Replace Adjust		1.0 .50				91 20,29, 91	
	SEAT	Replace		.50				91	
	GLASS	Replace		.50				2,59,76 77,102, 105	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
13	CAB ASSEMBLY, LIGHTS, SWITCHES GAUGES, CONTROLS, AND INDICATORS (Continued)								
	CAB PANELS	Replace		8.0				21,58, 91,105	
		Repair			4.0			91 G	
14	ELECTRICAL SYSTEM	Inspect		1.0					
	CAB ELECTRICAL SYSTEM	Replace		4.0				91	
	BODY ELECTRICAL SYSTEM	Replace		4.0				91	
15	PROPELLER SHAFT ASSEMBLY	Inspect	.50						
	UNIVERSAL JOINTS	Replace		.50				1,22,36 43,91	
	REAR PROPELLER SHAFT	Replace		1.0				22,34, 36,91	
	SLIP YOKE, REAR	Replace		.50				22,36 91	
	FRONT PROPELLER SHAFT	Service		.25					
		Replace		1.0				34,36, 43,91	
	CENTER SUPPORT BEARING	Replace		1.0				91	
	FIRE PUMP PROPELLER SHAFT	Replace		1.0				34,91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
16	TRANSMISSION ASSEMBLY	Service		.50				41,42, 91	D
		Inspect		.50				41,42, 91,94 6,16,17, 23,27, 55,56, 83,91, 108,109	
		Replace		7.0					
		Repair				16.0			
	REAR RETAINER OIL SEAL	Replace				1.0	41,42 80,91		
	SHIFT CONTROL LEVER AND LINKAGE	Replace		1.0			91		
17	CLUTCH ASSEMBLY	Service		.25				41,42 91	D
		Inspect		.50				91 91	
		Replace		10.0					
		Repair				10.0			
	HYDRAULIC CLUTCH PEDAL AND LINKAGE	Replace		1.0			91		
18	TRANSFER CASE ASSEMBLY	Service		.25				41,42 91 24,30, 31,32, 39,40 54,78, 79,81, 91	D
		Inspect		.50					
		Replace		9.0					
		Repair				10.0			

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
18	TRANSFER CASE ASSEMBLY (Continued)								
	TRANSFER CASE SHIFT LEVER AND LINKAGE	Replace		1.0				91	
19	WHEEL ASSEMBLY	Inspect	.50						
		Align		1.0					
		Replace		.50				41,51	
	LUGS	Replace	.50					41,51	
	TIRES	Service		.50					
		Replace		.50				41,51	
	RIMS	Replace		.50				41,51	
20	BRAKE SYSTEM	Service		.25				10,91	
		Inspect		2.0				96	
	TUBING AND HOSES	Replace		1.50				26,91, 95	
	VALVES	Replace		3.0				41,42, 91	
	BRAKE PEDAL	Replace		1.0				91	
	PARKING BRAKE	Replace		1.0				91	
		Adjust		.50				41,42, 91	
	STOP LIGHT SWITCH	Replace		.50				91	
	MASTER CYLINER	Replace		2.0				41,42, 65,91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
20	BRAKE SYSTEM (Continued)								
	FRONT DISC BRAKES	Service		1.0				11	
		Replace		1.75				12,41, 42,47, 91,106	
		Test		.50				18,91	
	REAR DRUM BRAKES	Service		1.0				91	
		Replace		1.75				41,42, 91	
	Test		.50						
21	STEERING ASSEMBLY	Inspect		1.0				A	
	PITMAN ARM	Replace		1.0				66,67, 86,87, 91	
	STEERING SHOCK ABSORBER	Replace		2.0				91	
	TIE RODS	Replace		1.0				91,104	
CONNECTING RODS	Replace		1.0				41,42, 87,91		
22	POWER STEERING SYSTEM	Inspect		.75					
		Test		.50				71,72, 73,74, 90	
		Adjust		.50				9.91	
	POWER STEERING GEAR	Replace		2.0				91	
		Adjust		1.0					
	PITMAN SHAFT SEAL	Replace		1.0				66,68, 84,91	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
22	POWER STEERING SYSTEM (Continued)								
	POWER STEERING PUMP	Replace		1.50				75,91 101	
		Adjust		.75				75,101	
23	FRONT SUSPENSION ASSEMBLY	Inspect		1.0					
	SHOCK ABSORBERS	Replace		.75				36,91	
	STABILIZER BAR	Replace		.50				36,91	
	WHEEL HUB/ROTOR	Replace		1.0				7,,8,12, 24,41, 42,91, 92,103	
	BEARINGS	Adjust		.75				91	
	WHEEL HUB BOLT	Replace		.50				37,91	
	SPINDLE	Replace		.75				5,24,41, 42,91	
	STEERING KNUCKLE AND ARM	Replace		1.0				33,34, 41,42, 44,45,91	
	LEAF SPRING AND BUSHING	Replace		3.0				36,41, 42,91	
	24	REAR SUSPENSION ASSEMBLY	Inspect		1.0				
SHOCK ABSORBERS		Replace		.75				36, 41, 91	
STABILIZER BAR		Replace		.50				36,41, 91	

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NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
24	REAR SUSPENSION ASSEMBLY (Continued)								
	LEAF SPRINGS AND BUSHINGS	Replace		3.0				36,41, 91	
25	REAR AXLE ASSEMBLY	Inspect Replace		.50 2.75				36,41, 91	
	REAR WHEEL BEARINGS	Replace Adjust		.50 .50				91 91	
	DIFFERENTIAL SIDE GEAR AND PINION	Replace		1.0				91	
	AXLE SHAFT	Replace		1.0				91	
	HUB AND DRUM ASSEMBLY	Replace		.75				91	
26	FRONT AXLE ASSEMBLY	Inspect Replace		.50 2.75				36,41, 91	
	FRONT AXLE SHAFT	Replace		1.0				36,41 91	
	AXLE JOINT ASSEMBLY	Replace		.75				91	
	MANUAL LOCKING HUB	Replace		2.0				91	
27	FRAME ASSEMBLY	Inspect		1.0					
	FRONT BUMPER	Replace		.50				91	
	TOW HOOKS	Replace		.50				91	
	CROSSMEMBERS	Replace		1.0				48,91 G	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS									
(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
27	FRAME ASSEMBLY (Continued) FRAME RAILS	Replace			4.0			36,41, 42,91	G

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Number	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	O	Adapter		J-25512-2 (03608)
2	O	Adhesive Dispensing Gun		J-24811 (03608)
3	H	Airline Adapter		J-29666 (03608)
4	O	Ammeter		
5	O	Bearing Installer		J-21465-17 (03608)
6	H	Bearing Puller		J-8433 (03608)
7	O	Bearing Race Installer Inner		J-23448 (03608)
8	O	Bearing Race Installer Outer		J-6368 (03608)
9	O	Belt Tension Gauge		BT-33-95 ACBN and/or BT-33-97M (03608)
10	O	Brake Bleeder Adapter		J-29567 (03608)
11	O	Brake Rotor Refinishing Machine		
12	O	Brass Punch		
13	O	Calibrated Pressure Gauge		

TOOL AND TEST EQUIPMENT REQUIREMENTS.

(1) Reference Number	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
14	O	Carbon Pile		
15	H	Compression Gauge		J-26999-10 (03608)
16	H	Countergear Front Bearing Remover		J-28509 (03608)
17	H	Countergear Rear Bearing Remover		J-22832-01 (03608)
18	O,H	Dial Indicator Set		J-8001 (03608)
19	H	Drift - 1/2 Inch		
20	O	Door Striker Bolt Remover and Installer		J-23457 (03608)
21	O	Door Trim Pad Remover		J-24595-B (03608)
22	O	Drive Shaft Wrench		J-33051 (03608)
23	H	Driver Gear Bearing Remover/Installer		J-22872 (03608)
24	O,H	Driver Handle		J-8092 (03608)
25	F,H	Engine Jack		
26	O	Flaring Tool		J-23530 (03608)
27	H	Front Bearing Retainer Seal Installer		J-22833 (03608)
28	H	Front Cover Seal Installer		J-22102 (03608)
29	O	Front Door Hinge, Bolt Wrench		J-22585-01 (03608)
30	H	Front Output Shaft Front Bearing Installer		J-29167 (03608)
31	H	Front Output Shaft Front Bearing Remover		J-29168 (03608)
32	H	Front Output Shaft Rear Bearing Installer		J-29163 (03608)
33	O	Front Pinion Bearing Installer		J-7817 (03608)
34	O	Grease Gun		
35	F	Heat Gun		
36	O,F	Hoist		St-884-1 (03608)

TOOL AND TEST EQUIPMENT REQUIREMENTS.

(1) Reference Number	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
37	O	Hub/Rotor Support		J-9746-02 (03608)
38	H	Hydraulic Lifter Remover		J-29834 (03608)
39	H	Input Gear Bearing Installer		J-29169 (03608)
40	H	Input Gear Bearing Remover		J-29170 (03608)
41	O,F,H	Jack		
42	O,F,H	Jack Stand		
43	O	Keystone Clamp Pliers		J-22610 (03608)
44	O	King Pin Bearing Seal Installer		J-22301 (03608)
45	O	King Pin Installer		J-28871 (03608)
46	F	Lathe		
47	O,H	Lead Hammer		
48	F	Lifting Fixture		
49	O	Lifting Sling		337557 (03608)
50	O	Lock Plate Compressor		J-23653 (03608)
51	O	Lug Wrench		
52	H	Magnet		
53	H	Main Bearing Remover/ Installer		J-8080 (03608)
54	H	Mainshaft Bearing Installer		J-29174 (03608)
55	H	Mainshaft Bearing Locknut Installer		J-23070 (03608)
56	H	Mainshaft Rearing Bearing Installer		J-22874-1 (03608)
57	H	Mallet, Brass		
58	O	Mallet, Rubber		
59	O	Mechanical Window Press		

TOOL AND TEST EQUIPMENT REQUIREMENTS.

(1) Reference Number	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
60	O	Nozzle Socket		J-29873 (03608)
61	O	Ohmmeter		8012A (03608)
62	O	Oil Pressure Sending Unit Socket Tool		J-21757-03 (03608)
63	H	Pilot		J-29788 (03608)
64	H	Piston Ring Compressor		J-8037 (03608)
65	O	Piston Sealer Installer		J-24548 (03608)
66	O	Pitman Arm Puller		J-29107 (03608)
67	O	Pitman Arm Remover		J-6632-01 (03608)
68	O	Pitman Shaft Seal Installer		J-6219 (03608)
69	O	Pressure Gauge		
70	O	Protective Covers		J-29664-1 (03608)
71	O	Power Steering Analyzer		J-25323 (03608)
72	O	Power' Steering Analyzer Adapter		J-29525 (03608)
73	O	Power Steering Gauge		J-5176D (03608)
74	O	Power Steering Gauge Adapter		J-5176-20 (03608)
75	O	Power Steering Pump Pulley Installer		J-25033 (03608)
76	O	Putty Knife		
77	O	Razor Knife		
78	H	Rear Output Bearing Installer		J-7818 (03608)
79	H	Rear Retainer Oil Seal Installer		J-29162 (03608)
80	H	Rear Retainer Seal Installer		J-22834 (03608)
81	H	Slide Hammer		J-2619-01 (03608)
82	F	Small Torch		

TOOL AND TEST EQUIPMENT REQUIREMENTS.

(1) Reference Number	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
83	H	Snap Ring Installer		J-22830-A (03608)
84	O	Snap Ring Pliers		J-4245 (03608)
85	O	Spanner Wrench Set		
86	O	Steering Linkage Installer		J-29193 (03608)
87	O	Steering Linkage Puller		J-24319-01 (03608)
88	O	Steering Wheel Puller		J-2927 (03608)
89	O	Test Gauge		
90	F	Thermometer		J-5421 (03608)
91	O,F,H	Tool Kit, General Mechanics Light Weight		
92	O	Torque Wrench Adapter		J-23446 (03608)
93	H	Torsional Damper Puller		J-23523-B (03608)
94	O	Transmission Guide Pins		J-1126 (03608)
95	O	Tube Cutter		J-23533-B (03608)
96	O	Valve Depressor		J-23709 (03608)
97	H	Valve Grinder		
98	H	Valve Spring Compressor		J-26513 (03608)
99	O	Voltmeter		
100	O	Water Pump		
101	O	Water Pump/Power Steering Pulley Remover		J-29785-A (03608)
102	O	Weatherstrip Tool		J-2189-02 (03608)
103	O	Wheel Bearing Nut Wrench		J-26878-A (03608)
104	O	Wheel Stud/Tie Rod Remover		J-6627-A (03608)
105	O	Window Handle Clip Remover		J-9886-01 (03608)

TOOL AND TEST EQUIPMENT REQUIREMENTS.

(1) Reference Number	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
106	O	"C" Clamp		J-9519-10 (03608)
107	O,F	"S" Shaped Wrench		3376571 (03608)
108	H	2nd. Speed Bushing Installer		J-22873 (03608)
109	H	3rd. Speed Bushing Installer		J-22875 (03608)
110	O	12 Volt Test Light		

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Operational Test.
B	Adjust Packing Glands
C	OS will perform complete repair of the Fire Pump Assembly only when it is necessary to remove the Fire Pump Assembly from Fire Truck.
D	Repair by replacing unserviceable parts.
E	Repair of Motor is not authorized.
F	Repair by replacing unserviceable Lamps only.
G	Straighten, weld or patch

APPENDIX C COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

C-1. SCOPE.

This appendix lists components of end item and basic issue items for the 250 GPM Mini-Pumper Firefighting Truck to help you inventory items required for safe and efficient operation.

C-2. GENERAL

The Components of End Item and Basic Issue Item Lists are divided into the following sections:

- a. *Section II., Components of End Item* This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.
- b. *Section III, Basic Issue Items* These are the minimum essential items required to place the 250 GPM Mini-Pumper Firefighting Truck in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, the basic issue items (BII.) must be with the 250 GPM Mini-Pumper Firefighting Truck during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII., based on TOE/MTOE authorization of the end item.

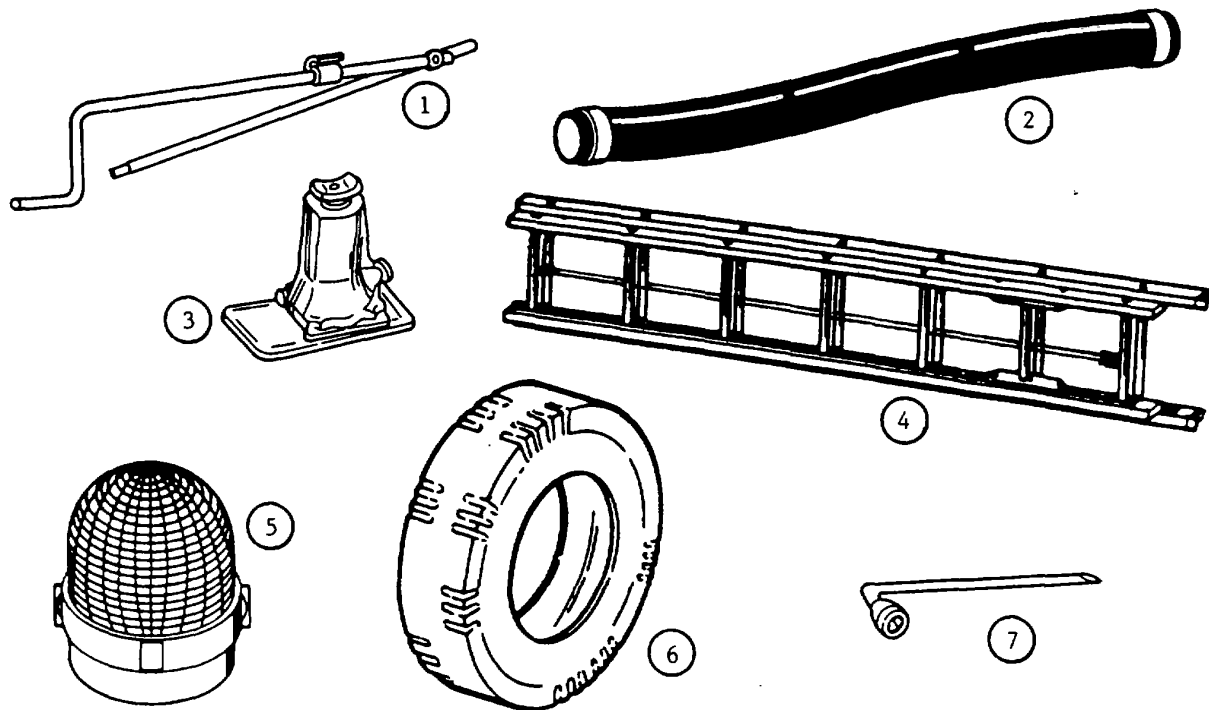
C-3. EXPLANATION OF COLUMNS.

- a. *Column (1), Illustration Number (Illus Number)* This column indicates the number of the illustration in which the item is shown.
- b. *Column (2), National Stock Number.* Indicates the national stock number assigned to the item and will be used for requisitioning purposes.
- c. *Column (3), Description* Indicates the federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.
- d. *Column (4), Unit of Measure (U/M).* Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

C-3. EXPLANATION OF COLUMNS (Continued).

e. *Column (5), Quantity Required (Qty rqr).* Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM



(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	USABLE ON CODE	(4) UM	(5) QTY RQR
1		Crank, Hand (92677) 1400-7107		EA	1
2		Hose, Suction, Hard, 3 Inch Dia. 8 Ft. Lg. (59556)		EA	2
3		Jack, Tire (92677) 1401-8603		EA	1
4		Ladder, Extension, 12 Ft. Lg. (70338) ALP-200-12		EA	1
5		Strainer, 3 Inch Dia. (8T694) 139		EA	1
6		Tire, Spare (92677) LT215/85R16		EA	1
7		Wrench, Lug (92677) 1406-4610		EA	1

**APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST**

Section I. INTRODUCTION

D-1. SCOPE.

This appendix lists expendable supplies and materials you will need to operate and maintain the 250 GPM Mini-Pumper Firefighting Truck.

This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2. EXPLANATION OF COLUMNS.

- a. *Column 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 sealing compound, Item 6, Appendix D").
- b. *Column 2, Category* This column identifies the lowest category of maintenance that requires the listed item.
 - C.....Operator/Crew
 - O.....Organizational Maintenance
 - F.....Direct Support Maintenance
 - H.....General Support Maintenance
- c. *Column 3, National Stock Number* This is the national stock number assigned to the item; use it to request or requisition the item.
- d. *Column 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.
- e. *Column 5, Unit of Measure (U/M)*. 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/DURABLE SUPPLIES AND MATERIALS LIST

ITEM NO.	CATEGORY	SPECIFICATION	DESCRIPTION	U/M
1.	O		Alcohol	gl
2.	O		Block, wood	ea
3.	O		Brake adjustment gauge	ea
4.	O	MIL-B-46176	Brake fluid, silicone	gl
5.	O		Brush, brass bristle	ea
6.	O		Brush, medium bristle	ea
7.	O		Brush, soft bristle	ea
8.	O		Cartridge, adhesive	ea
9.	O	Essex No. SCD551.2 (83527)	Cartridge, adhesive urethane	ea
10.	O, F		Cloth, crocus, 400 grain	ea
11.	O		Cloth, emery, fine	ea
12.	O, F, H		Cloth, soft, lint-free	ea
12a.	O, F, H		Coolant	gl
12b.	F		Filler	gl
13.	O	VV-F-800	Fluid, diesel	gl
14.	O		Fluid, power steering	gl
15.	C, O	MIL-G-10924	Grease, lubricating	lb
16.	O	MIL-G-23549	Grease, lubricating	lb
17.	O	MIL-G-813220	Grease, lubricating	lb
18.	O, H		Jelly, petroleum	lb
19.	O	General Motors No. 9636067 (92677)	Kit, service, adhesive	ea
20.	O, F		Kit, repair, hot melt adhesive	ea
21.	O, H	General Motors No. 1052621 (92677)	Loctite 414	oz
22.	O, H	General Motors No. 1050677 (92677)	Lubricant	lb
23.	O, H	General Motors No. 1052365 (92677)	Lubricant	lb

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

ITEM NO.	CATEGORY	SPECIFICATION	DESCRIPTION	U/M
24.	O	General Motors No. 1051717 (92677)	Lubricant, rubber	gl
25.	O		Lubricant, rubber, non-sili- cone based	gl
26.	O		Lubricant, silicone	gl
27.	O		Lubricant, speedometer	gl
28.	O		Lubriplate	lb
29.	O, H		Molykote	gl
30.	O	MIL-L-2105C	Oil, gear, multipurpose	gl
31.	C, O	MIL-L-2104C	Oil, lubricating	gl
32.	O	DEXRON II	Oil, transmission	gl
33.	O		Oil, vegetable	gl
33a.	F		Paint	gl
34.	O	Essex No. SCD435.20 (83527)	Primer, black gloss	gl
35.	O	Essex No. SCD435.18 (83527)	Primer, clear gloss	gl
36.	O	Essex No. SCD435.34 (83527)	Primer, pinchweld	ea
36a.	F		Putty	gl
37.	O, H	General Motors No. 1052915 (92677)	RTV sealant	gl
38.	O, F		Sandpaper, fine	ea
39.	O	General Motors No. 1052080 (92677)	Sealant	gly
40.	O, H	General Motors No. 1052356 (92677)	Sealant, anaerobic	gl
41.	O, H	General Motors No. 1052357 (92677)	-Sealant, anaerobic	gl

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

ITEM NO.	CATEGORY	SPECIFICATION	DESCRIPTION	U/M
42.	O, H	General Motors No. 1052080 (92677)	Sealant	gl
43.	O	MIL-S-81733	Sealing compound, pipe joint and thread	oz
43a.	O, F, H		Solder	ea
44.	O, H	P-D-680, Type II.	Solvent, cleaning	gl
45.	O	Towel, shop		

**APPENDIX E
REPAIR PARTS AND SPECIAL TOOLS LIST**

Section I. INTRODUCTION

E-1. SCOPE.

This appendix lists and authorizes spare and repair parts required for performance of organizational, direct support, and general support maintenance of the firefighting truck. It authorizes the requisitioning and issue of spare and repair parts.

E-2. GENERAL.

Repair Parts List, Section II., is a list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending numeric sequence, with the parts in each group listed in ascending item number sequence.

E-3. EXPLANATION OF COLUMNS.

- a. *Item Number (Column 1)*. Item number indicates the number used to identify items called out in the illustration.
- b. *FSCM (Columns 2 and 4)*. The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code which is used to identify the manufacturer, distributor or government agency, etc., that supplies the item.
- c. *OEM Part Number (Column 3)* Indicates the original equipment part number of the original manufacturer assigned to identify an item.
- d. *True Vendor Part Number (Column 5)* Indicates the part number assigned by the prime contractor to identify an item.
- e. *Description (Column 6)* This column includes the following information:
 - (1) The item name and, when required, a minimum description to identify the item.
 - (2) Items that are included in kits and sets are listed below the name of the kit or set.
 - (3) Spare/repair parts that make up an assembled item are listed immediately following the assembled line entry.
 - (4) When the part to be used differs between serial numbers of the same model, the effective serial numbers are shown as the last line of the description.

E-3. EXPLANATION OF COLUMNS (Continued).

f. *Qt . Inc. in Unit (Column 7).* The Quantity Incorporated in Unit (QTY INC IN UNIT) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. An "AR" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e.g., shim, spacers).

E-4. HOW TO LOCATE REPAIR PARTS.

- a. *First* Using the table of contents, determine the functional group to which the item belongs. This is necessary since figures are prepared for functional groups and listings are divided into the same groups following the order of the MAC chart.
- b. *Second* Find the figure covering the functional group or subfunctional group to which the item belongs.
- c. *Third* Identify the item on the figure and note the item number of the item.
- d. *Fourth* Refer to the Repair Parts List for the figure to find the line item entry for the item number noted on the figure.

E-5. ABBREVIATIONS.

AR	As Required	NSS	Not Sold/Service Separately
GPM	Gallons Per Minute	P/N	Part Number
LH	Left Hand	psi	pounds per square inch
max	maximum	qty	quantity
mifg	manufacturing	RH	Right Hand
min	minimum or minute	rpm	revolutions per minute
No.	number(s)	U/M	Unit of Measure
		wt.	Weight

E-6. MANUFACTURER'S CODE.

The following is a listing of vendor codes with names and addresses of suppliers; vendor parts are listed in this publication. The codes are arranged in numerical order, followed by an alphabetical listing of same.

NUMERICAL LISTING OF FSCM NUMBERS

00912	Akron Brass Company 1450 Spruce street Wooster, OH 44691	55465	Moonlite Marine Corporation 776 West 17th Street Costa Mesa, CA 92627
03608	General Motors Corporation Truck and Bus Group Los Angeles Truck Center 6901 South Alameda Street Los Angeles, CA 90001	56212	M. C. Products One Rabro Drive Hauppauge, NY 11788
09527	Faria Corporation Pink Row, Uncasville, CT 06382	57273	Span Instruments 1947 Avenue K, P. O. Box 709 P. O. Box 0983 Piano, TX 75074
11757	Chelsea Plant, Dana Corporation Power Take-Off Division 5800 Sibley Road Chelsea, MI 48118	59556	Kovatch Corporation 1 Industrial Complex Nesquehoning, PA 18240
12662	Peterson Manufacturing Company 4200 East 135th Street Grandview, MO. 64030	60319	South Park Corporation 1019 North Concord Street P. O. Box 61 South St. Paul, MN 55075
13445	Cole-Hersee Company 20 Old Colony Avenue South Boston, MA. 02127	62534	Red Dot Corporation 495 Andover Park E P. O. Box 58270 Seattle, WA 98188
15852	Darley, W.S., and Company 2000 Anson Drive Melrose Park, IL. 60160	65063	Federal Signal 2645 Federal Signal Drive University Park, IL 65063
21563	Sen-Dur Products, Inc. 25 Moffitt Boulevard Bay Shore, NY 11706	66416	Public Safety Equipment 1842 Craig Park Court St. Louis, MO 63146
24161	Gates Rubber Company 999 South Broadway P. O. Box 5887 Denver, CO. 80217	70338	Aluminum Ladder Company W. Darlington Street P. O. Box 5329 Florence, SC 29502
31211	Motorola, Inc. 1299 East Algonquin Road Schaumburg, IL 60160	71183	Westinghouse Electric Corporation Bryant Division 1421 State Street, P. O. Box D Bridgeport, CT 06602
35510	Leece-Neville, Cleveland Div. Sheller-Globe Corporation 1374 East 51st Street Cleveland, OH 44103	72447	Dana Corporation Spicer Universal Joint Division 4100 Bennett Road P. O. Box 986 Toledo, OH 43696

NUMERICAL LISTING OF FSCM NUMBERS

77254	Philadelphia Valve Company 500 West Catawissa Street Nesquehoning, PA 18240	83448	Stewart Warner Alemite Sales Co. 930 North Eighth Street Philadelphia, PA 19123
77977	Signal Stat Corporation 1200 Commerce Avenue Union, NJ 11211	87946	Triangle Manufacturing Company 150 Libbey Avenue P. O. Box 1070 Oshkosh, WI 54901
78977	Unity Manufacturing Company 1260 North Claybourn Avenue Chicago, IL 60610	9X737	Buyers Products 7700 Tyler Boulevard Mentor, OH 44060
79470	Weatherhead Division Dana Corporation 750 Beta Drive Cleveland, OH 44143	92677	Chevrolet Motors Division of General Motors General Motors Corporation Janesville, WI
8T694	Red Head Brass Company P. O. Box 566 643 Legion Drive Shreve, OH 44676	93061	Parker-Hannifin Corporation 300 Parker Drive, P. O. Box 215 Otsego, MI 49078

ALPHABETICAL LISTING OF FSCM NUMBERS

00912	Akron Brass Company 1450 Spruce Street Wooster, OH 44691	03608	General Motors Corporation Truck and Bus Group Los Angeles Truck Center 6901 South Alameda Street Los Angeles, CA 90001
70338	Aluminum Ladder Company W. Darlington Street P. O. Box 5329 Florence, SC 29502	59556	Kovatch Corporation 1 Industrial Complex Nesquehoning, PA 18240
9X737	Buyers Products 7700 Tyler Boulevard Mentor, OH 44060	35510	Leece-Neville, Cleveland Div. Sheller-Globe Corporation 1374 East 51st Street Cleveland, OH 44103
11757	Chelsea Plant, Dana Corporation Power Take-Off Division 5800 Sibley Road Chelsea, MI 48118	56212	M. C. Products One Rabro Drive Hauppauge, NY 11788
92677	Chevrolet Motors Division of General Motors General Motors Corporation Janesville, WI	55465	Moonlite Marine Corporation 776 West 17th Street Costa Mesa, CA 92627
13445	Cole-Hersee Company 20 Old Colony Avenue South Boston, MA 02127		31211 Motorola, Inc. 1299 East Algonquin Road Schaumburg, IL 60196
72447	Dana Corporation Spicer Universal Joint Division 4100 Bennett Road P.O. Box 986 Toledo, OH 43696	93061	Parker-Hannifin Corporation 300 Parker Drive, P. O.Box 215 Otsego, MI 49078
15852	Darley, W.S., and Company 2000 Anson Drive Melrose Park, IL	12662	Peterson Manufacturing Company 4200 East 135th Street Grandview, MO 64030
09527	Faria Coporation Pink Row, P. O. Box 0983 Uncasville, CT 06382	60160	77254 Philadelphia Valve Company 500 West Catawissa Street Nesquehoning, PA 18240
65063	Federal Signal Drive 2645 Federal Signal Drive University Park, IL 65063	66416	Public Safety Equipment 1842 Craig Park Court St. Louis, MO 63146
24161	Gates Rubber Company 999 South Broadway P. O. Box 5887 Denver, CO 80217	62534	Red Dot Corporation 495 Andover Park E P. O. Box 58270 Seattle, WA 98188

ALPHABETICAL LISTING OF FSCM NUMBERS

8T694	Red Head Brass Company P.O. Box 566 643 Legion Drive Shreve, OH 44676	83448	Stewart Warner Alemite Sales Co. 930 North Eighth Street Philadelphia, PA 19123
21563	Sen-Dur Products, Inc. 25 Moffitt Boulevard Bay Shore, NY 11706	87946	Triangle Manufacturing Company 150 Libbey Avenue P. O. Box 1070 Oshkosh, WI 54901
77977	Signal Stat Corporation 1200 Commerce Avenue Union, NJ 11211	78977	Unity Manufacturing Company 1260 North Claybourn Avenue Chicago, IL 60610
60319	South Park Corporation 1019 North Concord Street P. O. Box 61 South St. Paul, MN 55075	79470	Weatherhead Division Dana Corporation 750 Beta Drive Cleveland, OH 44143
57273	Span Instruments- 1947 Avenue K, P. O. Box 709 Plano, TX 75074	71183	Westinghouse Electric Corporation Bryant Division 1421 State Street, P. O. Box D Bridgeport, CT 06602

GROUP 00 250 GPM MINI-PUMPER FIREFIGHTING TRUCK
GROUP 01 ACCESSORIES

SECTION II. REPAIR PARTS LIST

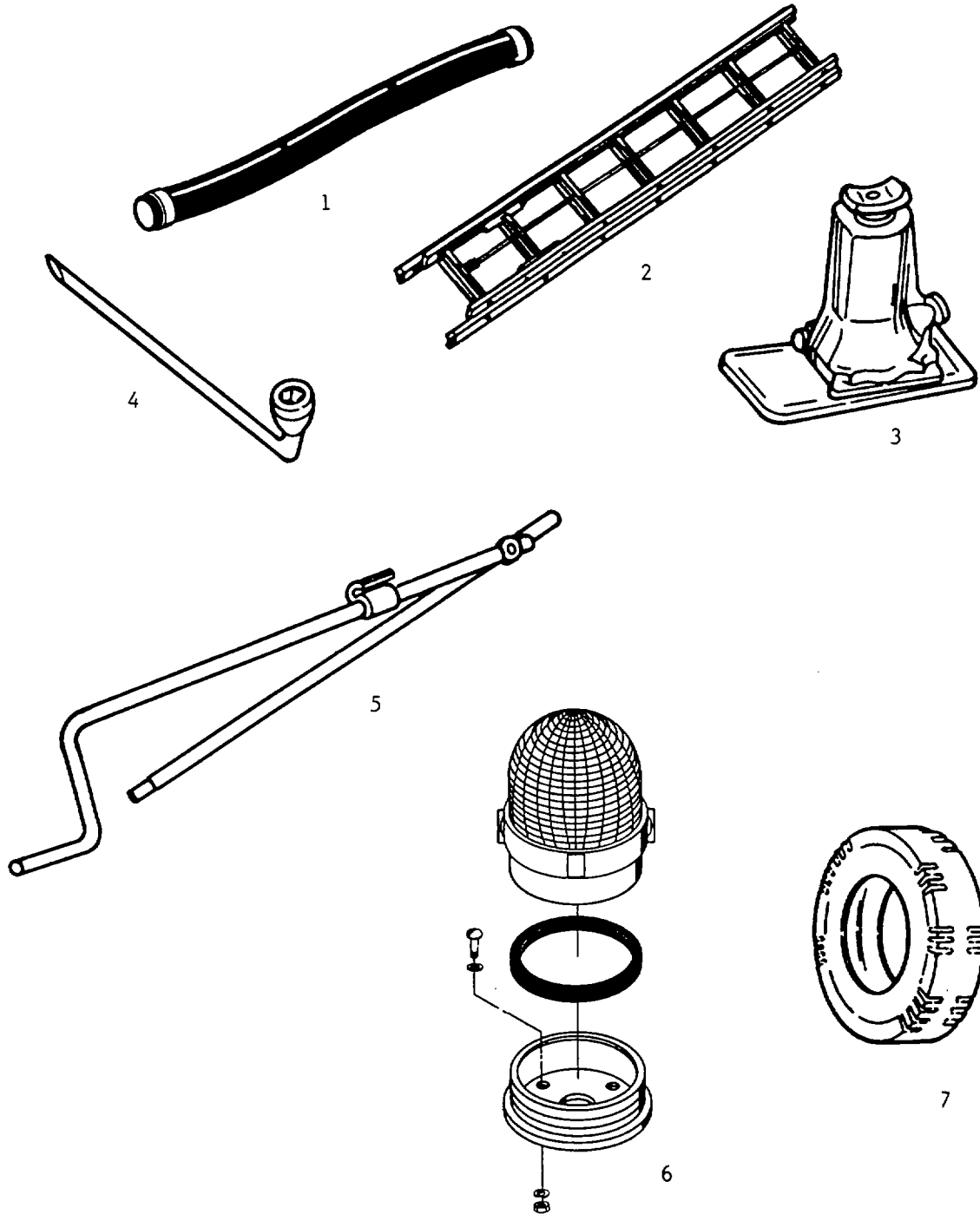
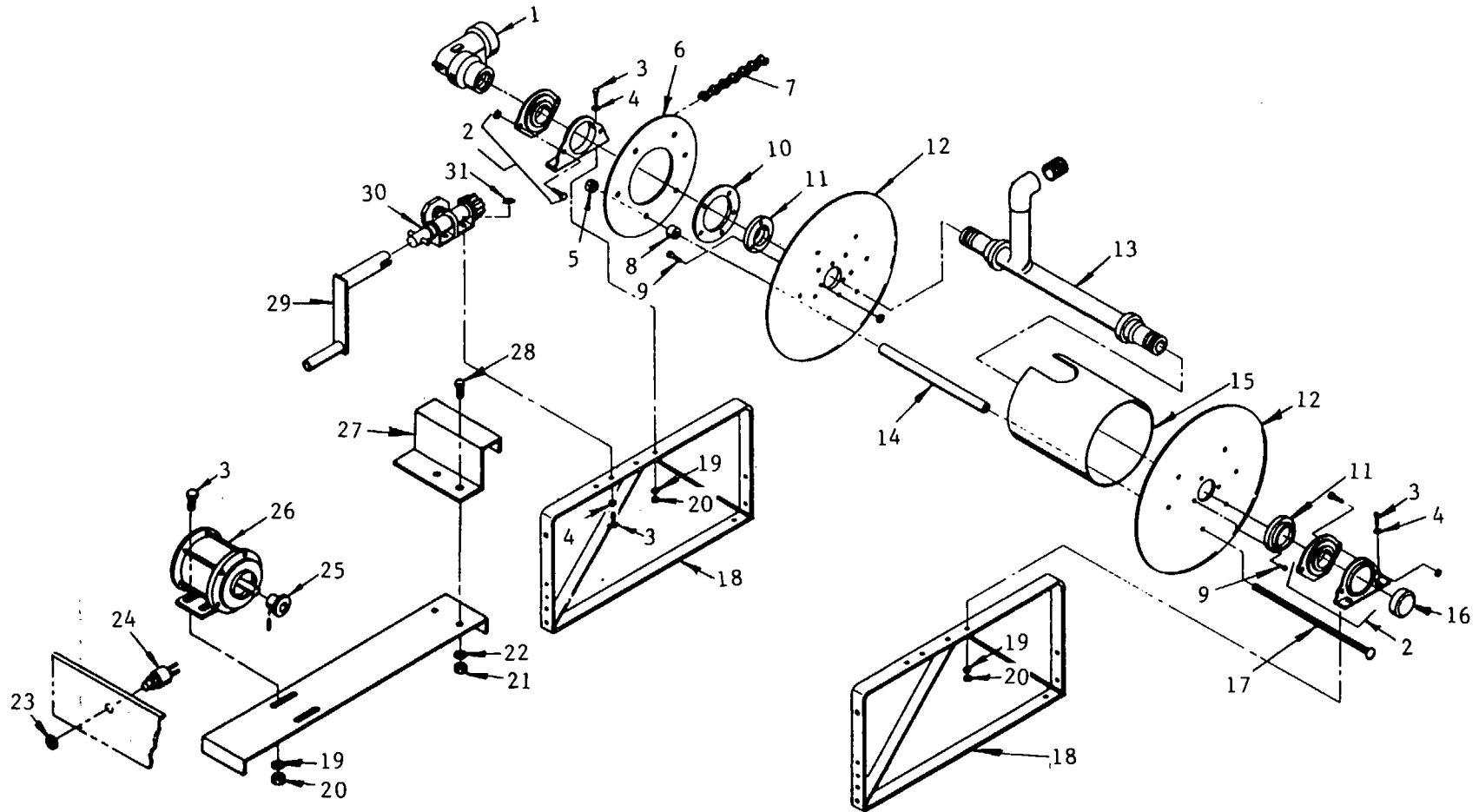


FIGURE E-01. ACCESSORIES

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**GROUP 01 ACCESSORIES
FIGURE E-01. ACCESSORIES**

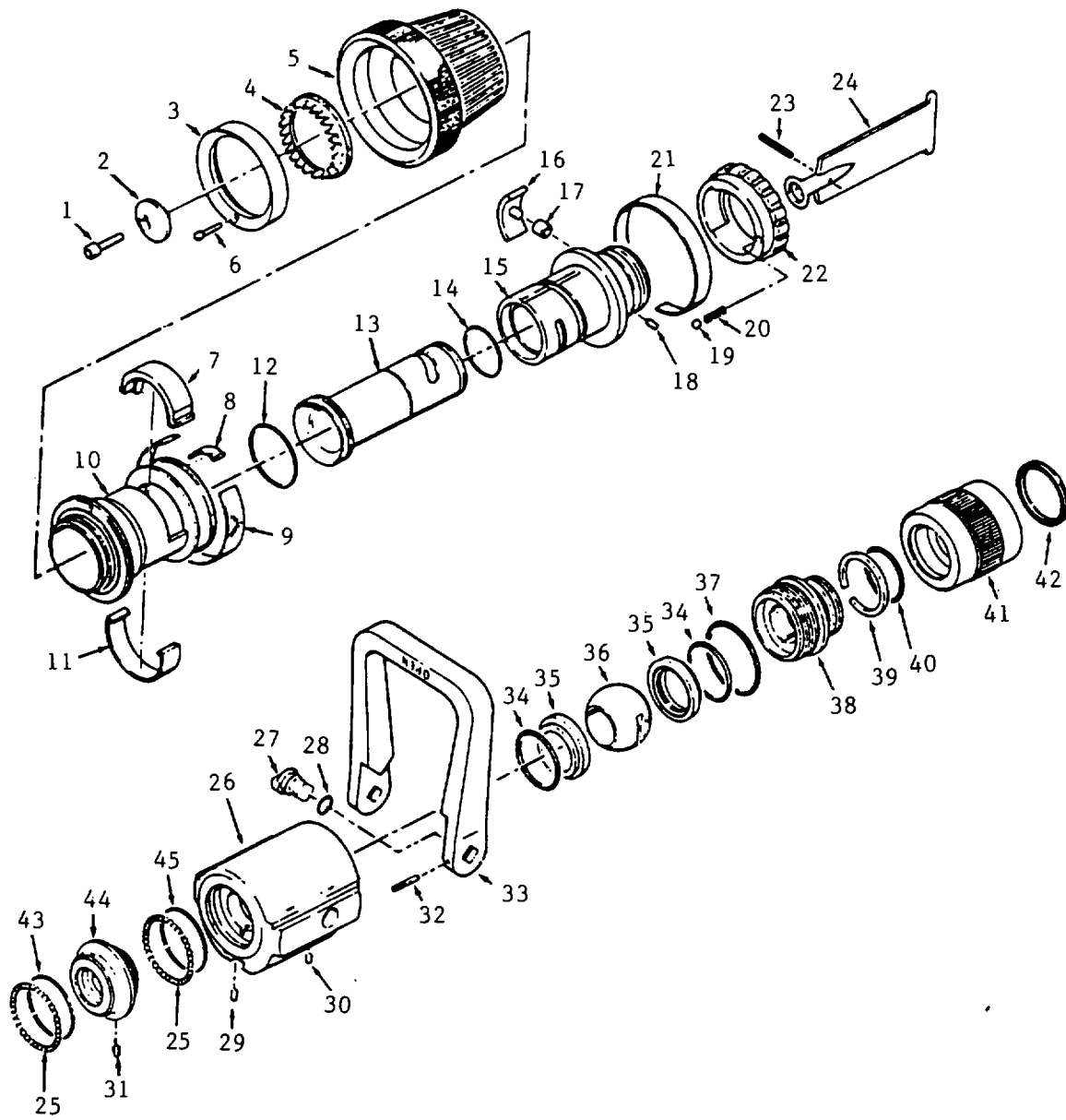
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556		59556	133-00002	Hose, Hard Suction, 3 inch dia., 8 foot	2
2.	70338	ALP-200-12	59556	132-00004	Ladder, Extension, 12 foot	1
3.	92677	1401-8603	59556	100-00001	Jack, Tire	1
4.	92677	1406-4610	59556	100-00002	Wrench, Lug	1
5.	92677	1400-7107	59556	100-00003	Crank, Hand	1
6.	8T694	Style 139	59556	135-00002	Strainer, 3 inch dia.	1
	8T694	M-30	59556	135-00002-1	Mount, Running Board, 3 inch	1
	----	COML			Bolt	2
	----	COML			Washer	2
	----	COML			Lockwasher	2
	----	COML			Nut	2
7.	92677	LT215/85R16	59556	013-00001	Tire, Spare	1



GROUP 02 HOSE REEL ASSEMBLY
FIGURE E-02. HOSE REEL ASSEMBLY

**GROUP 02 HOSE REEL ASSEMBLY
FIGURE E-02. HOSE REEL ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	77254	FR-AA-8057	59556	122-90009	Hose Reel Assembly	1
2.	77254	8000	59556	122-00008	Swing Joint	2
3.	77254	8001	59556	122-00009	Bearing Assembly	2
4.	----	COML			Bolt, 3/8-18x1/2	10
5.	----	COML			Washer, Flat, 3/8	6
6.	----	COML			Nut, 3/8-16 NC	6
7.	77254	8006	59556	122-00010	Sprocket, 138 Tooth	1
8.	77254	8005	59556	122-00011	Chain, AC-35	1
9.	59556	122-00015	59556	122-00015	Spacer, 1/2 Long	1
10.	----	COML			Bolt, 10-32x1/2	6
11.	77254	8007	59556	122-00012	Gear, Bevel	1
12.	59556	122-00004	59556	122-00004	Retainer, Bearing	2
13.	59556	122-90002-12	59556	122-90002-12	Disk	2
14.	59556	122-00016	59556	122-00016	Pipe, Outlet and Main Shaft	1
15.	59556	122-00017	59556	122-00017	Spacer, Tube	1
16.	59556	122-00018	59556	122-00018	Drum	1
17.	59556	403-00044-6	59556	403-00044-6	Cap, Pipe, 1 Inch	1
18.	59556	122-00019	59556	122-00019	Rod, Tie	1
19.	59556	122-90005	59556	122-90005	Frame, End	2
20.	----	COML			Washer, Lock, 3/8	8
21.	----	COML			Nut, 3/8-18	8
22.	----	COML			Nut, 1/4-20	2
23.	----	COML			Washer, Lock, 1/4	2
24.	----	COML			Nut, 3/8	1
25.	77254	8055	59556	122-00023	Button, Rewind	1
26.	77254	8027	59556	122-00013	Sprocket, 12 Tooth	1
27.	77254	8031	59556	122-00014	Motor	1
28.	59556	122-00020	59556	122-00020	Bracket, Cover	1
29.	----	COML			Bolt, 1/4-20xl	2
30.	59556	128-00001	59556	128-00001	Crank, Hand	1
31.	77254	8024	59556	122-90004	Brake Assembly	1
	----	COML			Nut, Lock, 3/8-18	2



**GROUP 02 HOSE REEL ASSEMBLY
FIGURE E-03. FIREHOSE NOZZLE ASSEMBLY**

**GROUP 02 HOSE REEL ASSEMBLY
FIGURE E-03. FIREHOSE NOZZLE ASSEMBLY**

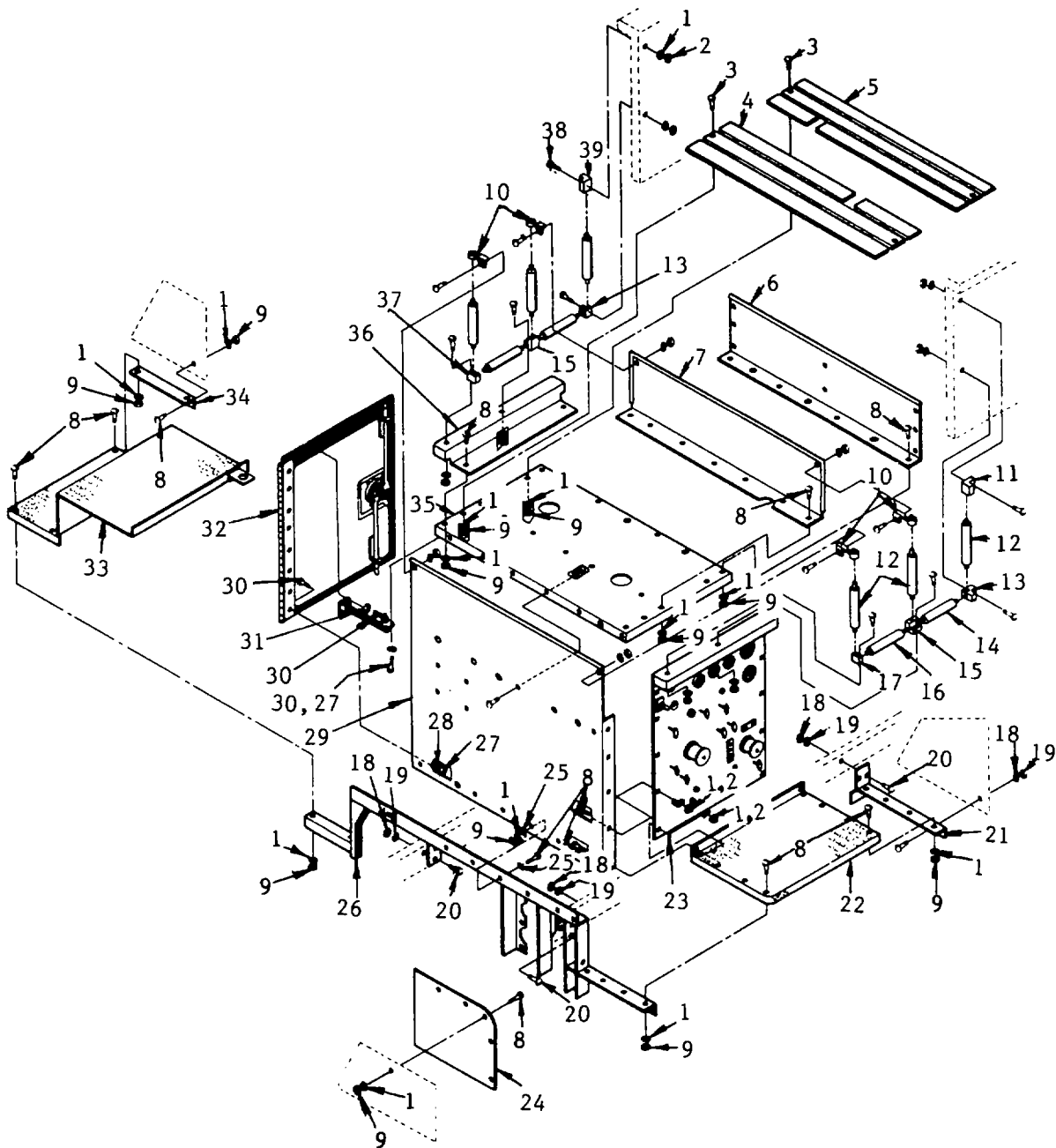
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	00912	1701	59556	139-00001	Fire Hose Nozzle Assembly	1
1.	00912	7-65-027	59556	139-00001-1	Screw, Cap, Socket Head	1
2.	00912	1710-00-2-0-14-001	59556	139-00001-2	Head, Baffle	1
3.	00912	1710-00-2-0-66-001	59556	139-00001-3	Ring, Retaining, Turbine	1
4.	00912	7-67-019	59556	139-00001-4	Screw, Cap, Socket Head	2
5.*	00912	7-72-024	59556	139-00001-5	Turbine	1
6.	00912	7-04-039	59556	139-00001-6	Bumper	1
7.	00912	7-06-153	59556	139-00001-7	Thread Insert	1
8.	00912	7-69-163	59556	139-00001-8	Spring, Sleeve Detent	1
9.	00912	7-03-235	59556	139-00001-9	Band, Indicating	1
10.	00912	1710-00-2-0-77-021	59556	139-00001-10	Sleeve, Pattern	1
11.	00912	7-04-035	59556	139-00001-11	Band, Retaining	1
12.	00912	7-57-089	59556	139-00001-12	O-Ring	1
13.	00912	1710-00-2-0-87-002	59556	139-00001-13	Tube, Discharge	1
14.	00912	7-57-090	59556	139-00001-14	O-Ring	1
15.	00912	1710-00-8-0-10-005	59556	139-00001-15	Body, Nozzle	1
16.	00912	7-06-154	59556	139-00001-16	Control Segment	1
17.	00912	7-58-106	59556	139-00001-17	Roller, Cam	1
18.	00912	7-27-017	59556	139-00001-18	Pin, Key	1
19.	00912	7-04-018	59556	139-00001-19	Ball, Detent	1
20.	00912	7-69-111	59556	139-00001-20	Spring, Detent	1
21.	00912	7-03-200	59556	139-00001-21	Band, Control Discharge, Gallon	1
21.	00912	7-03-207	59556	139-00001-22	Band, Control Discharge, Liters	1
22.**	00912	7-58-121	59556	139-00001-23	Ring, Control Discharge	1
23.	00912	7-44-081	59556	139-00001-24	Pin, Roll (included with item #24)	1
24.	00912	1710-00-0-1-14-001	59556	139-00001-25	Blade with Roll Pin	1
25.	00912	7-04-030	59556	139-00001-26	Ball, Locking	54

*Indicates parts included in Repair Kit #9115
**Discharge Control Band (#21) is also required.

**GROUP 02 HOSE REEL ASSEMBLY
FIGURE E-03. FIREHOSE NOZZLE ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
26.	00912	1715-00-8-0-10-010	59556	139-00001-27	Body, Shutoff	1
27.	00912	1715-00-2-0-88-003	59556	139-00001-28	Trunnion	2
28.	00912	7-57-034	59556	139-00001-29	O-Ring	2
29.	00912	7-66-015	59556	139-00001-30	Screw, Set, Socket Head	1
30.	00912	7-65-002	59556	139-00001-31	Screw, Set, Socket Head	1
31.	00912	7-65-002	59556	139-00001-32	Screw, Set, Socket Head	1
32.	00912	7-44-080	59556	139-00001-33	Pin, Roll	2
33.	00912	7-21-122	59556	139-00001-34	Handle	1
34.*	00912	7-57-050	59556	139-00001-35	O-Ring	2
35.*	00912	7-69-245	59556	139-00001-36	Seat	2
36.*	00912	7-04-006	59556	139-00001-37	Ball	1
37.	00912	7-57-032	59556	139-00001-38	O-Ring	1
38-41§	00912	1701-00-8-2-81-001	59556	139-00001-39	Swivel, Sub-Assembly (NH)	1
38-41§	00912	1701-00-8-2-81-002	59556	139-00001-40	Swivel, Sub-Assembly (NPSH)	1
42.*	00912	7-14-067	59556	139-00001-41	Casket	1
43.	00912	7-57-020	59556	139-00001-42	O-Ring	1
44.	00912	1701-00-8-0-01-001	59556	139-00001-43	Adapter, Nozzle Body	1
45.	00912	7-57-088	59556	139-00001-44	O-Ring	1

* Indicates parts included in Repair Kit #9115.
§ For other threads, order by description and thread size (ODM and TPI).



GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-04. PUMPHOUSE ASSEMBLY

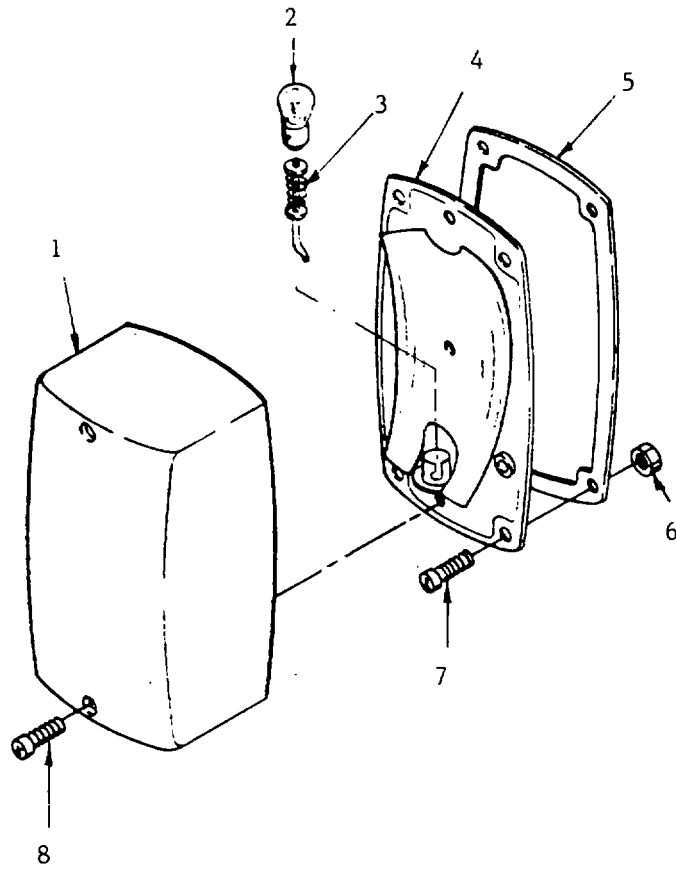
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**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-04. PUMPHOUSE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Pumphouse Assembly	69
2.	----	COML			Washer, Lock, 1/4	22
3.	----	COML			Nut, Acorn, 1/4-20	4
4.	59556	121-90012	59556	121-90012	Screw, Machine 1/4-20x1	1
5.	59556	121-90013	59556	121-90013	Hose Bed, 1-1/2, #1	1
6.	59556	101-00041	59556	101-00041	Hose Bed, 1-1/2, #2	1
7.	59556	101-00042	59556	101-00042	Divider, End, Small Hose Bed	1
8.	----	COML			Divider, Small Hose Bed	65
9.	----	COML			Bolt, 1/4-20x3/4	47
10.	59556	129-90001	59556	129-90001	Nut, 1/4-20	4
11.	59556	129-00002-B-D	59556	129-00002-B-D	Fingers, Hose Roller	1
12.	59556	129-0004-1	59556	129-90004-1	Blocks, Holders, Hose Roller	6
13.	59556	129-00002-A	59556	129-00002-A	Hose Roller, Vertical, Small	2
14.	59556	129-90004-2	59556	129-90004-2	Blocks, Holders, Hose Roller	2
15.	59556	129-00003	59556	129-00003	Hose Roller, Horizontal Rear, Small	2
16.	59556	129-90004-3	59556	129-90004-3	Roller Block	2
17.	59556	129-00002-C-D	59556	129-90004-3	Hose Roller, Horizontal Front, Small	1
18.	----	COML			Blocks, Holders, Hose Rollers	10
19.	----	COML			Nut, 3/8-18	10
20.	----	COML			Washer, Lock, 3/8	10
21.	59556	101-00029	59556	101-00029	Bolt, 3/8-18x1-1/4	2
22.	59556	101-00019	59556	101-00019	Bracket, Step Support	1
23.	59556	105-00007	59556	105-00007	Step, Gage Panel	1
24.	59556	080-00025	59556	080-00025	Panel, Gage	1
25.	----	COML			Plate, Cab Cover	16
26.	59556	101-90017	59556	101-90017	Washer, Flat, 1/4	1
27.	----	COML			Bracket, Pumphouse Support	12
28.	----	COML			Nut, Lock, 10-32	8
29.	59556	101-90019	59556	101-90019	Washer, Flat, #10	1
					Panel, Wall, Pumphouse	

**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-04. PUMPHOUSE ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
30.	----	COML			Screw, Machine 10-32x1-1/2	16
31.	----	COML			Washer, Lock, #10	4
32.	59556	103-90011	59556	103-90011	Door Assembly, Pumphouse	1
33.	59556	101-00046	59556	101-00046	Step, Pumphouse Door	1
34.	59556	101-00052	59556	101-00052	Bracket, Angle	1
35.	59556	101-00034	59556	101-00034	Panel, Pumphouse, Roof	1
36.	59556	104-00015	59556	104-00015	Guard, Rain, Pumphouse Door	1
37.	59556	129-00002-C-P	59556	129-00002-C-P	Blocks, Holders, Hose Roller	1
38.	----	COML			Bolt, 1/4-20x1/2	12
39.	59556	129-00002-B-P	59556	129-00002-B-P	Blocks, Holders, Hose Roller	1

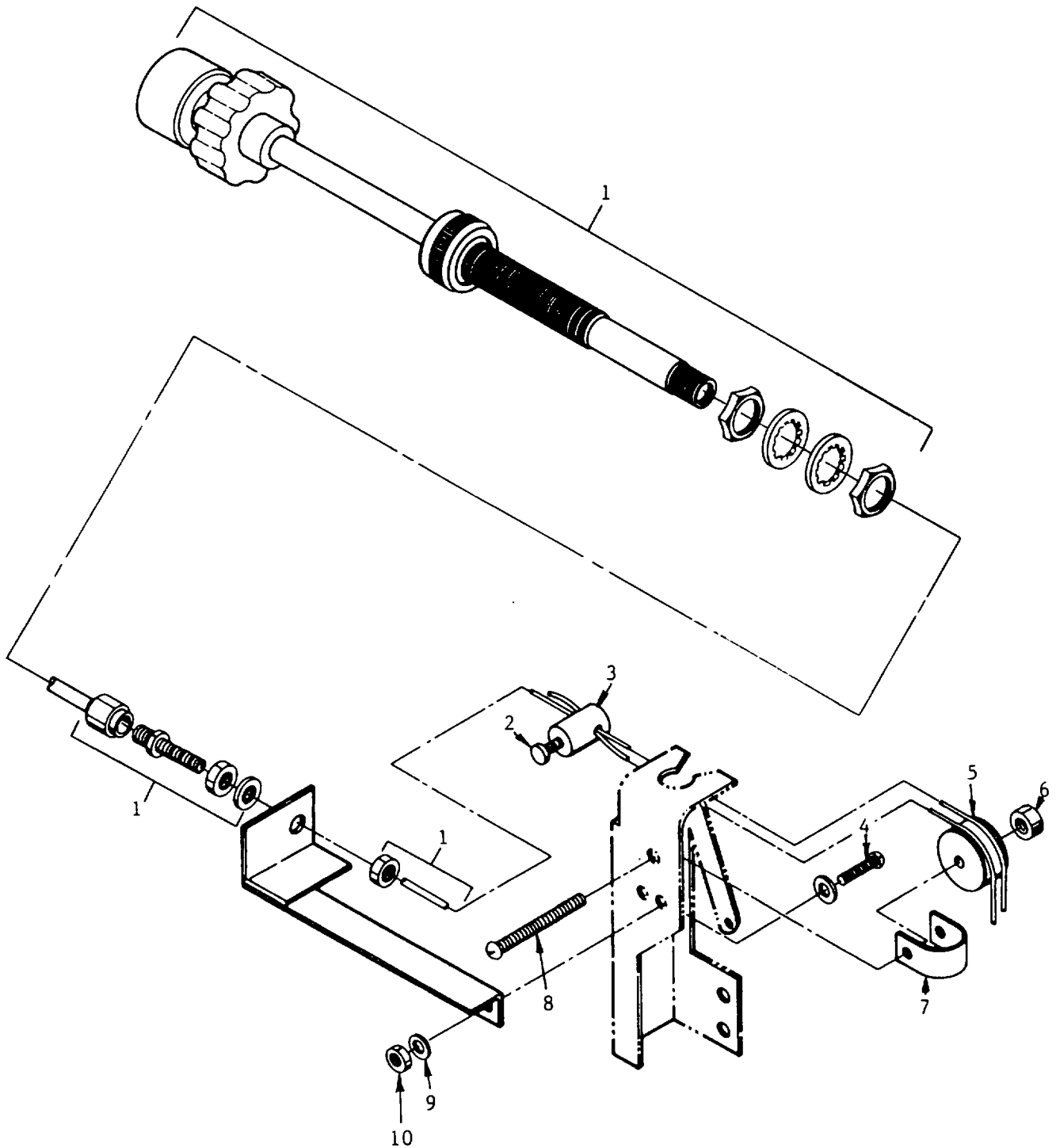


**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-05. COMPARTMENT LIGHT**

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**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-05. COMPARTMENT LIGHT**

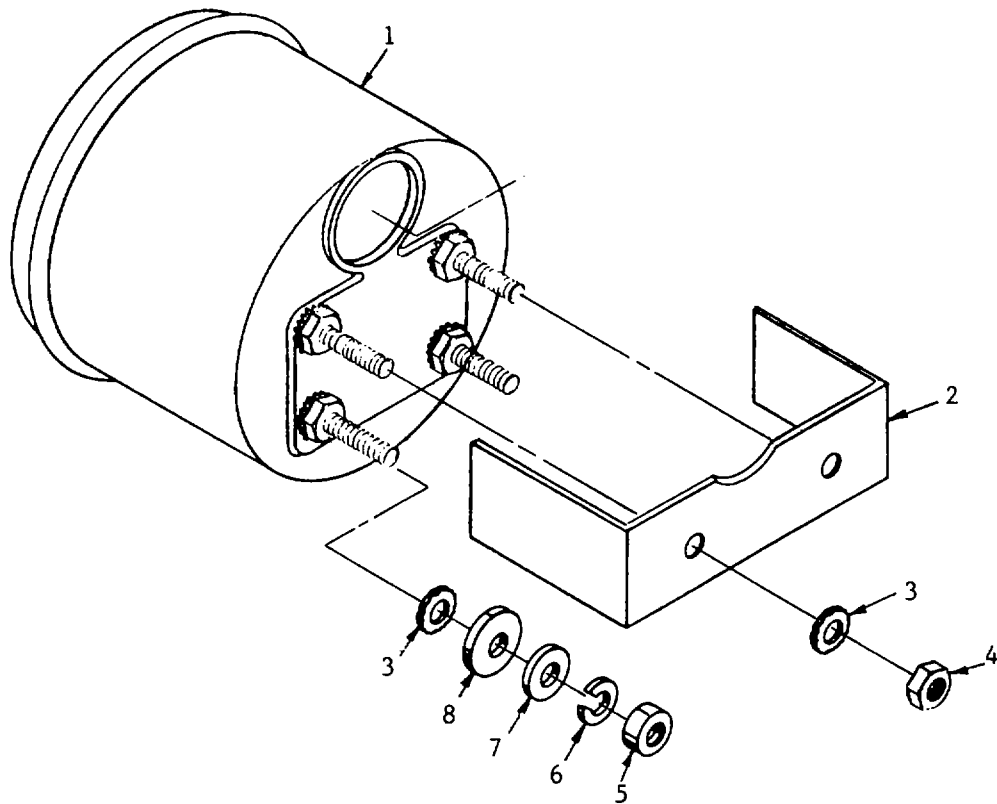
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	12662	M393	59556	156-00001	Light Assembly, Compartment	REF
1.	12662	306-25	59556	156-00001-1	Cover, Lens, Clear	1
2.	12662	1156	59556	156-00001-2	Bulb	1
3.	12662	110 0710	59556	156-00001-3	Pigtail	1
4.	12662	306 991	59556	156-00001-4	Housing	1
5.	12662	306 242	59556	156-00001-5	Gasket	1
6.	----	COML			Locknut, #10	2
7.	----	COML			Bolt, #10-34	2
8.	----	COML			Screw #8	2



**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-06. THROTTLE CABLE CONTROL**

**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-06. THROTTLE CABLE CONTROL**

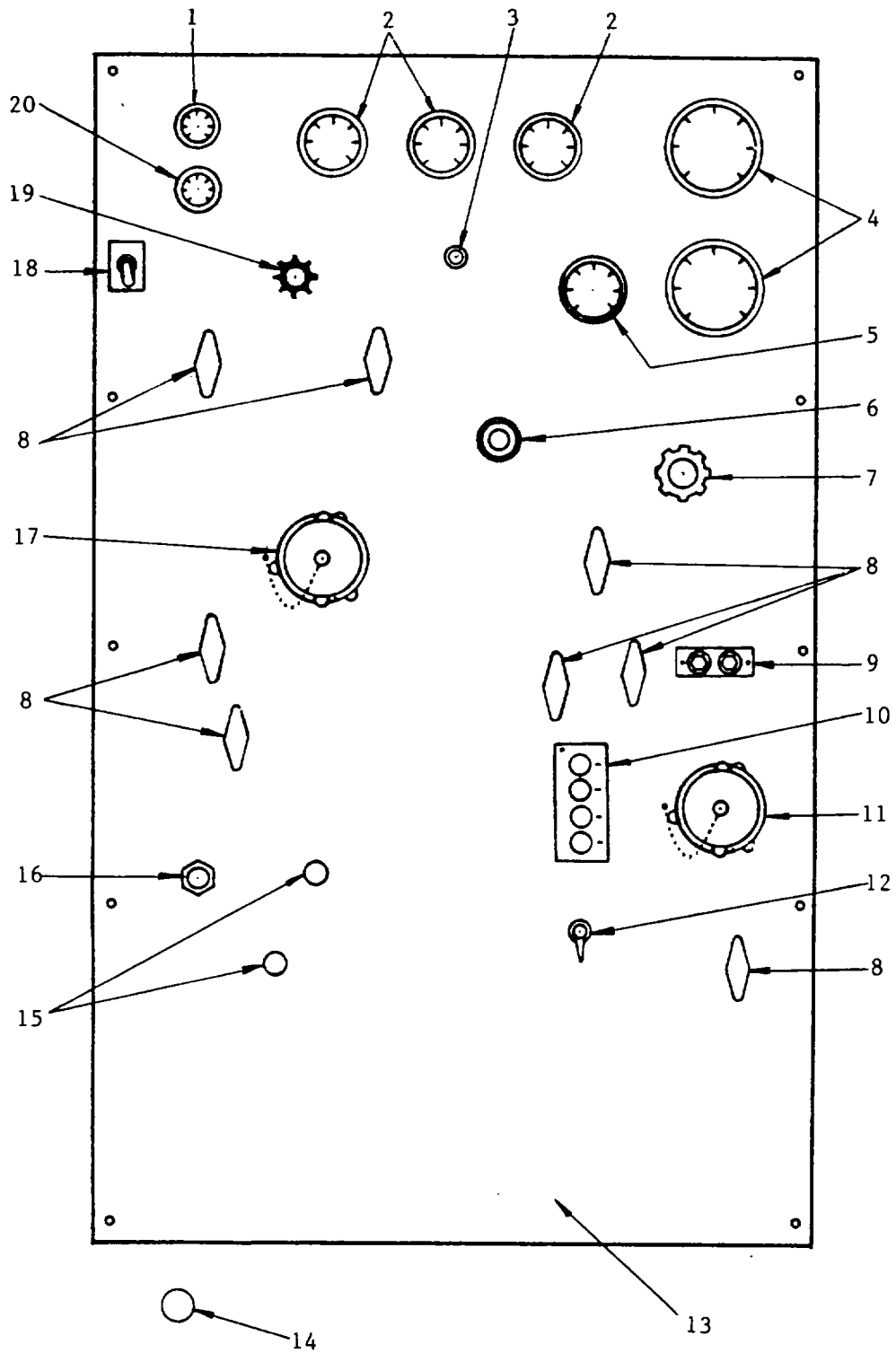
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	9X737	VCCTX15	59556	031-00002	Control, Throttle Cable	1
2.	----	COML			Screw, #8x1/4	1
3.	59556	032-00002	59556	032-00002	Stop, Throttle Cable	1
4.	----	COML			Screw, 3/16 NC x1	2
5.	59556	122-00003-1	59556	122-00003-1	Roller, Throttle	1
6.	----	COML			Nut, Lock,#10	1
7.	59556	122-00003-2	59556	122-00003-2	Strip, Throttle Roller	1
8.	----	COML			Screw, #10x1	1
9.	----	COML			Washer, Lock, #/16	2
10.	----	COML			Nut, 3/16 NC	2



**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-07. TACHOMETER**

**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-07. TACHOMETER**

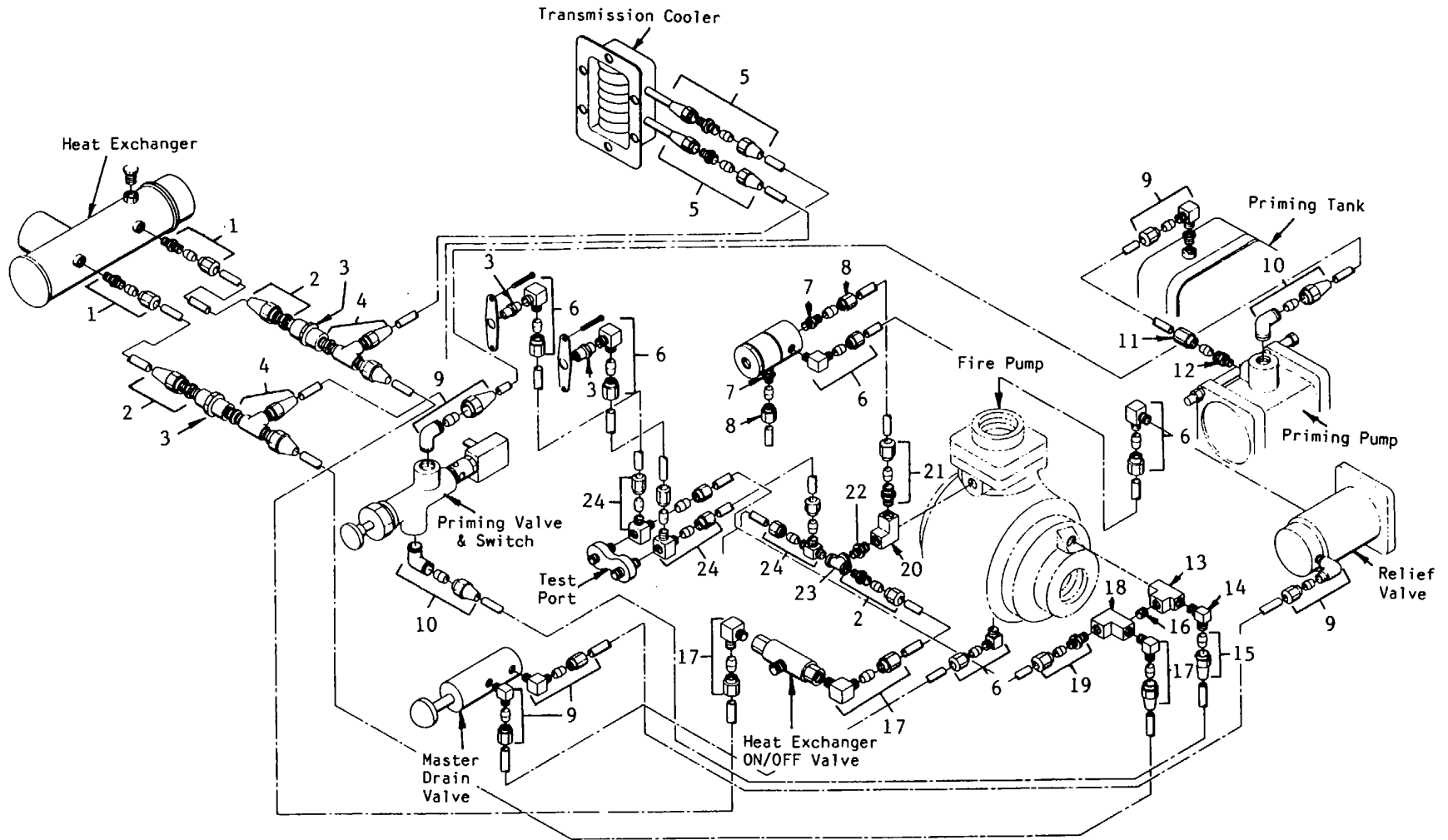
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	31211	7ATH-24042	59556	059-00013	Tachometer	REF
2.	31211	18-22	59556	059-00014	Bracket	1
3.	----	COML			Washer, Star, 10-32	6
4.	----	COML			Locknut, 10-32	2
5.	----	COML			Nut, 8-32	4
6.	----	COML			Lockwasher, 8-32	4
7.	----	COML			Washer, Flat, 8-32	4
8.	----	COML			Nut, Locking, 8-32	4



GROUP 03 PUMP COMPARTMENT ASSEMBLY
 FIGURE E-08. STREET SIDE PUMP PANEL ASSEMBLY

**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-08. STREET SIDE PUMP PANEL ASSEMBLY**

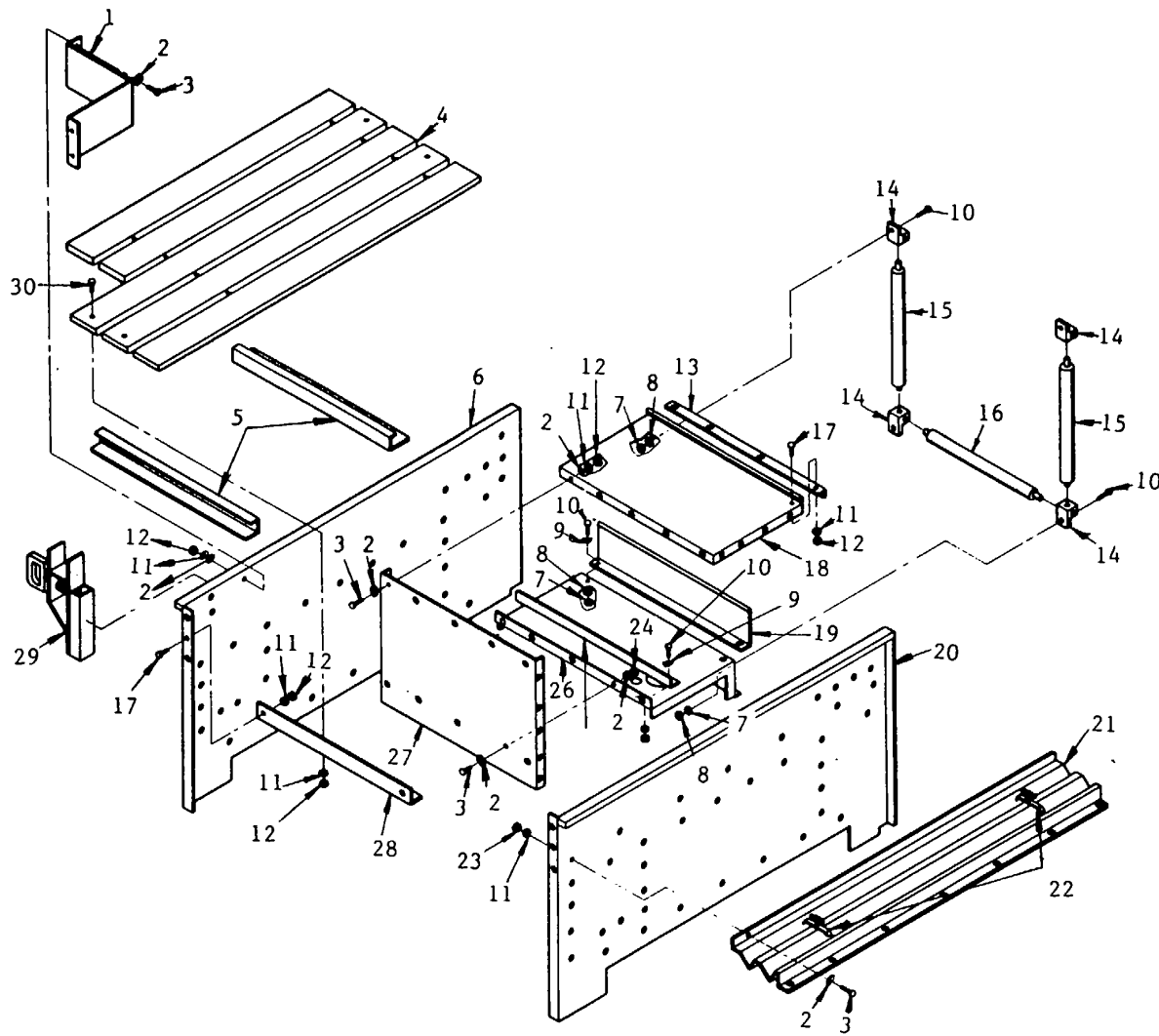
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	83448	82305	59556	059-00016	Gauge, Oil Pressure	1
2.	57273	LFP-220	59556	105-00008	Gauge, Pressure, 2-1/2	3
3.	15852	G19A2/S796-5	59556	059-00021	Counter, Speed (including cable)	1
4.	57273	LFP-310	59556	059-00017	Gauge, Pressure, Master, 3-1/2	2
5.	31211	7ATH24042	59556	76361-3	Tachometer	1
6.	15852	G229A2	59556	078-00032	Relief Valve Control Flush Knob	1
7.	15852	G124A26	59556	051-00002	Relief Valve Assembly (control knob)	REF
8.	60319	PH-602	59556	075-00014	Handle, Control Rod	8
9.	00912	Style 44	59556	059-00020	Panel, Test Gauge	1
10.	56212	MC-CAR-1	59556	059-00018	Gauge, Water Level	1
11.	60319	HCC-28-3.0	59556	157-00011	Cap with Chain	REF
12.	59556	263-B-8A	59556	078-00031	Valve , Heat Exchanger Control	1
13.	59556	105-00007	59556	105-00007	Panel, Gage	REF
14.	15852	G139A2	59556	078-00016	Valve, Master Drain (control knob)	REF
15.	00912	Style 7	59556	078-00030	Valve, Drain, 3/4" (control knob)	REF
16.	15852	G158A1	59556	055-00007-1	Valve, Primer (control knob)	REF
17.	60319	HCC-38-2.5	59556	157-00013	Cap with Chain, 2-1/2	REF
18.	13445	5520	59556	123-00028	Switch, Toggle	1
19.	9X737	VCGTX15	59556	031-00002	Control, Throttle Cable	REF
20.	09527	GPO-498	59556	059-00019	Gauge, Engine Oil Pressure	1



GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-09. PUMP COMPARTMENT TUBING ASSEMBLY

**GROUP 03 PUMP COMPARTMENT ASSEMBLY
FIGURE E-09. PUMP COMPARTMENT TUBING ASSEMBLY**

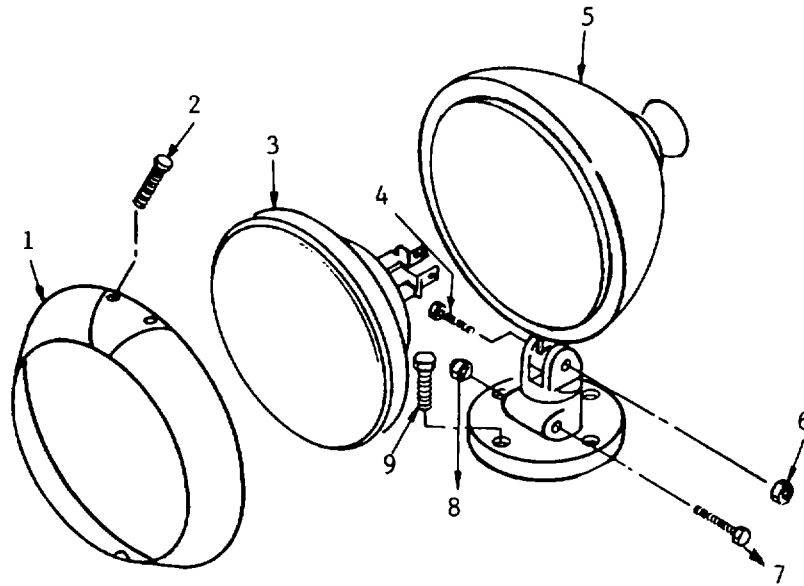
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	93061	68AB-6-6	59556	402-00056-6	Connector, Male	2
2.	93061	68NTA-8-4	59556	402-00051-10	Connector, Male	3
3.	93061	207P-4	59556	402-00060-2	Coupling	4
4.	93061	271AB-6-4	59556	402-00054-3	Tee, Male Run	2
5.	93061	62AB-6	59556	402-00057-2	Union	2
6.	93061	269C-4-4	59556	402-00031-8	Elbow, Male	5
7.	93061	68AB-6-4	59556	402-00056-5	Connector, Male	2
8.	93061	61NTA-6	59556	402-00052-3	Nut	2
9.	93061	269C-4-2	59556	402-00031-6	Elbow, Male	5
10.	93061	269AB-10-8	59556	402-00053-12	Elbow, Male	2
11.	93061	61NTA-4	59556	402-00052-2	Nut	1
12.	93061	68AB-4-4	59556	402-00056-2	Connector, Male	1
13.	93061	2225P-6	59556	402-00059-3	Tee, Street	1
14.	93061	269NTA-10-6	59556	402-00061-12	Elbow, Male	1
15.	93061	61AB-10	59556	402-00055-4	Nut	1
16.	93061	215PN-6	59556	403-00073-1	Nipple, Close	1
17.	93061	269NTA-8-6	59556	402-00061-10	Elbow, Male	3
18.	93061	2203P-6	59556	402-00074-5	Tee, Union	1
19.	93061	68NTA-4-6	59556	402-00051-5	Connector, Male	1
20.	93061	2225P-4	59556	402-00059-2	Tee, Street	1
21.	93061	68NTA-6-4	59556	402-00051-7	Elbow, Male	1
22.	93061	216P-4	59556	402-00062-2	Nipple, Hex	1
23.	93061	1203P-4	59556	402-00074-3	Tee, Union	1
24.	93061	271NTA-4-4	59556	402-00066-2	Tee, Male Run	3



GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-10. HOSE BODY ASSEMBLY

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-10. HOSE BODY ASSEMBLY**

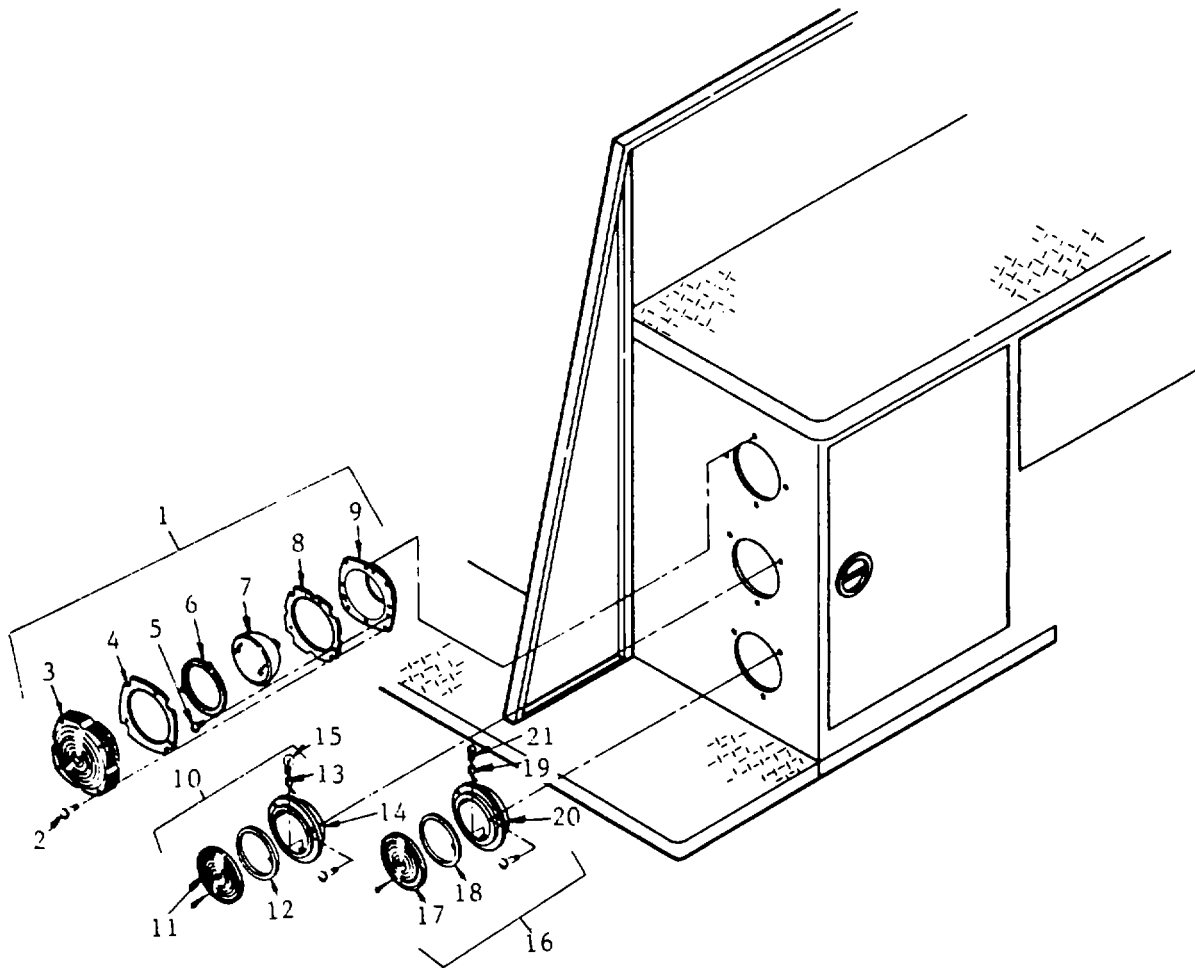
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556	120-00013	59556	120-00013	Separator, Fill Tower	1
2.	----	COML			Washer, Flat, 1/4	35
3.	----	COML			Bolt, 1/4-20x1/2	11
4.	59556	121-90011	59556	121-90011	Hose Bed Floor Slats	1
5.	59556	121-00004	59556	121-00004	Spacer, Main Hose Bed	2
6.	59556	101-00047	59556	101-00047	Main Panel, Curb Side	1
7.	----	COML			Nut, 5/16-18	10
8.	----	COML			Washer, Lock, 5/16	10
9.	----	COML			Washer, Flat, 5/16	6
10.	----	COML			Bolt, 5/16-18x1-1/4	10
11.	----	COML			Washer, Lock, 1/4	26
12.	----	COML			Nut, 1/4-20	19
13.	59556	101-00049	59556	101-00049	Angle	1
14.	59556	129-00002-A	59556	129-00002-A	Blocks, Hose Roller Holder	4
15.	59556	129-90002	59556	129-90002	Roller, Hose, Rear Vertical	2
16.	59556	129-90003	59556	129-90003	Roller, Hose, Rear Horizontal	1
17.	----	COML			Bolt, 1/4-20x3/4	6
18.	59556	101-00031	59556	101-00031	Roof, Hose Reel Compartment	1
19.	59556	101-00051	59556	101-00051	Panel, Hose Reel Compartment, Front	1
20.	59556	101-00030	59556	101-00030	Panel, Main Body, Street Side	1
21.	59556	260-00001	59556	260-00001	Hose Trough	1
22.	59556	260-00002	59556	260-00002	Bracket, Quick Release	2
23.	----	COML			Nut, Acorn, 1/4-20	7
24.	----	COML			Nut, Lock, 1/4-20	5
25.	59556	101-00050	59556	101-00050	Angle	1
26.	59556	101-00026	59556	101-00026	Floor, Hose Reel Compartment	1
27.	59556	101-00022	59556	101-00022	Wall, Front, Hose Reel Compartment	1
28.	59556	101-00023	59556	101-00023	Support, Hose Bed, 3 inch	1
29.	59556	131-00003	59556	131-00003	Brace, Ladder	2
30.	----	COML			Screw, Machine, 1/4-20x2	4



GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-11. HOSE BED PICK-UP LIGHT ASSEMBLY

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-11. HOSE BED PICK-UP LIGHT ASSEMBLY**

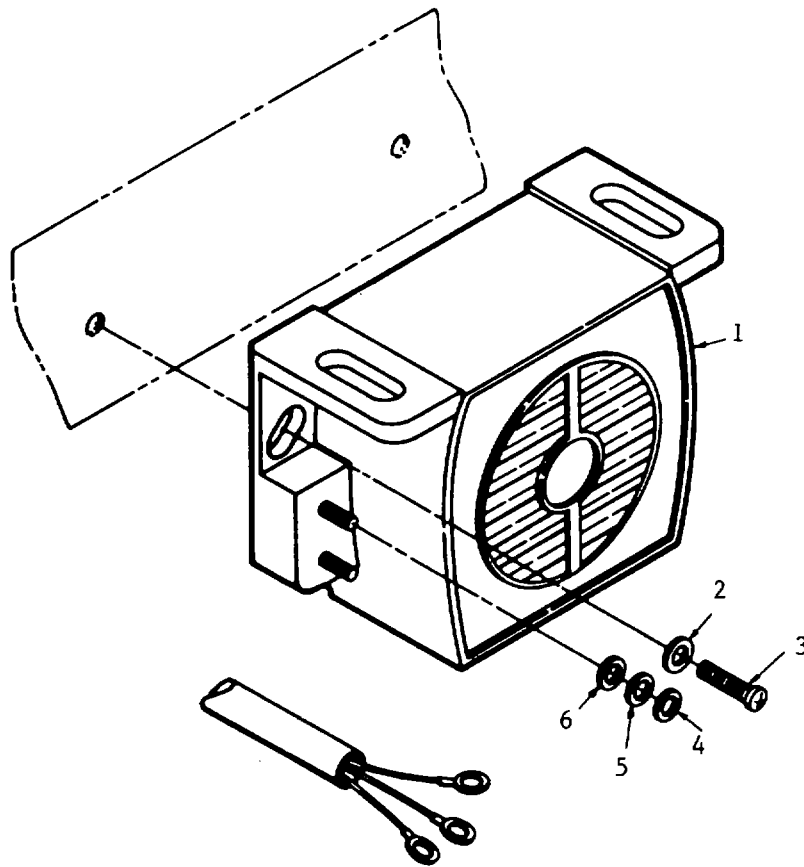
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	78977	AG-R-4413	59556	152-00003	Hose Bed Pick-Up Light Assembly	REF
1.	78977	6565-U	59556	152-00003-1	Retaining Ring	1
2.	----	COML			Screw, 8-32x1	2
3.	78977	4413	59556	152-00003-2	Lamp, Sealed Beam	1
4.	----	COML			Bolt, 5/16x1-1/4 NC	1
5.	78977	7178	59556	152-00003-3	Housing	1
6.	----	COML			Nut, Locking, 5/16	1
7.	----	COML			Bolt, 1/4x1-1/2 NC	1
8.	----	COML			Nut, 1/4	1
9.	----	COML			Screw, 8-32x3/4	4



GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-12. WARNING, BACK-UP AND STOP AND TURN LIGHT ASSEMBLIES

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-12. WARNING, BACK-UP AND STOP AND TURN LIGHT ASSEMBLIES**

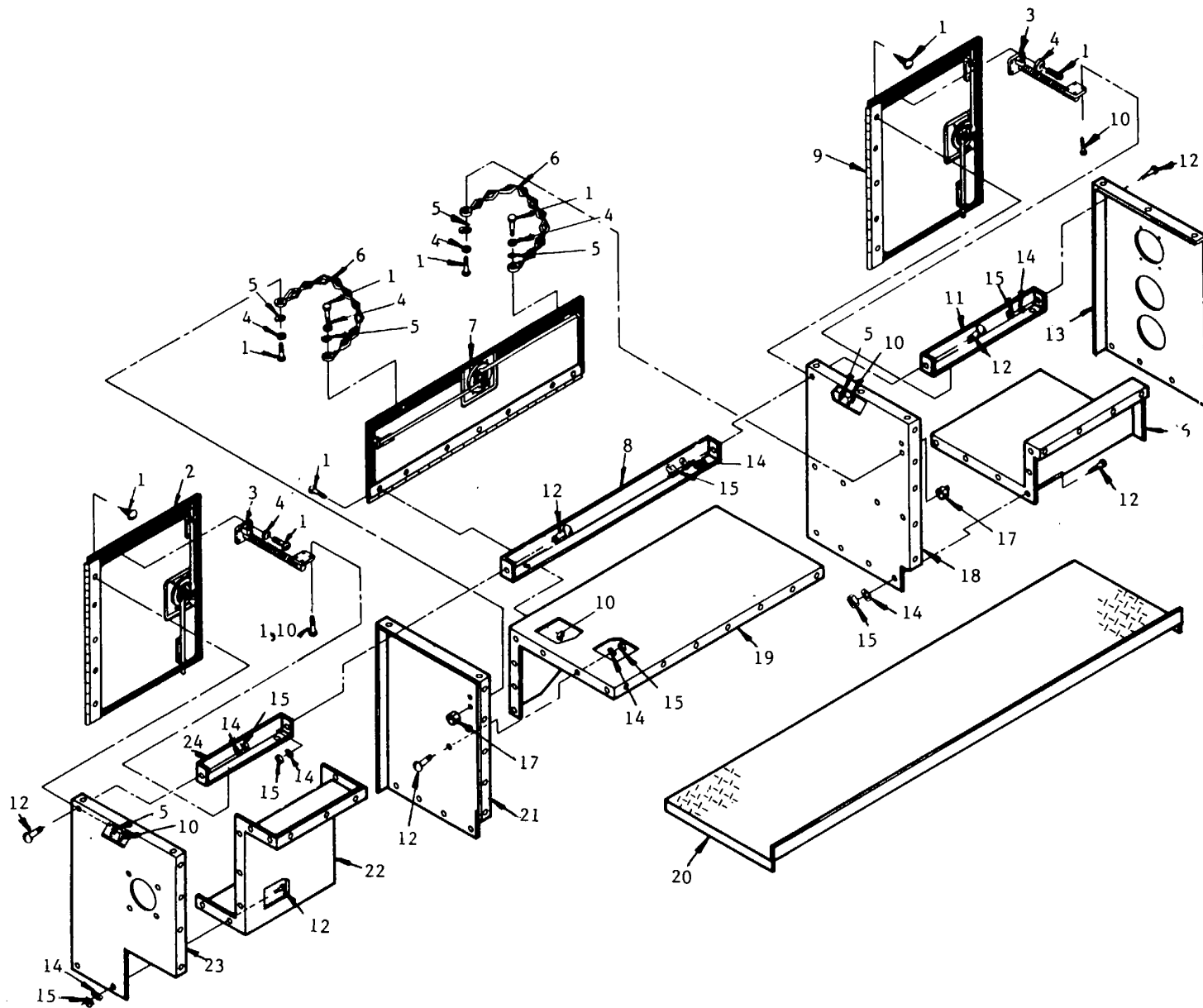
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	77977	CE-600-1R	59556	151-00003	Warning Light Assembly	2
2.	77977	31-50053-00000	59556	151-00003-1	Screw, 10-24x1/2, Phillips Pan Head	4
3.	77977	24-59383-10000	59556	151-00003-2	Lens, Red	1
4.	77977	15-59384-00000	59556	151-00003-3	Lens, Gasket	1
5.	77977	31-50050-72000	59556	151-00003-4	Screw, Retaining Ring	3
6.	77977	15-59381-00000	59556	151-00003-5	Ring, Retaining	1
7.	77977	24-59383-10000	59556	151-00003-6	Sealed Beam	1
8.	77977	15-59386-00003	59556	151-00003-7	Gasket Body	1
9.	77977	20-59388-10100	59556	151-00003-8	Body	1
10.	12662	411SC	59556	124-00003	Back Up Light Assembly	2
11.	12662	414 15	59556	124-00003-1	Lens, Clear	1
12.	12662	410 23	59556	124-00003-2	Gasket, Lens	1
13.	12662	411 07	59556	124-00003-3	Pigtail	1
14.	12662	425S 21	59556	124-00003-4	Housing	1
15.	12662	1156		124-00003-5	Bulb	1
16.	12662	4135	59556	124-00002	Stop and Turn Light Assembly	2
17.	12662	410 15R	59556	124-00002-1	Lens, Red	1
18.	12662	410 23	59556	124-00002-2	Gasket, Lens	1
19.	12662	413 07	59556	124-00002-3	Pigtail	1
20.	12662	425S 21	59556	124-00002-4	Housing	1
21.	12662	1157		124-00002-5	Bulb	1



GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-13. BACK-UP ALARM

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-13. BACK UP ALARM**

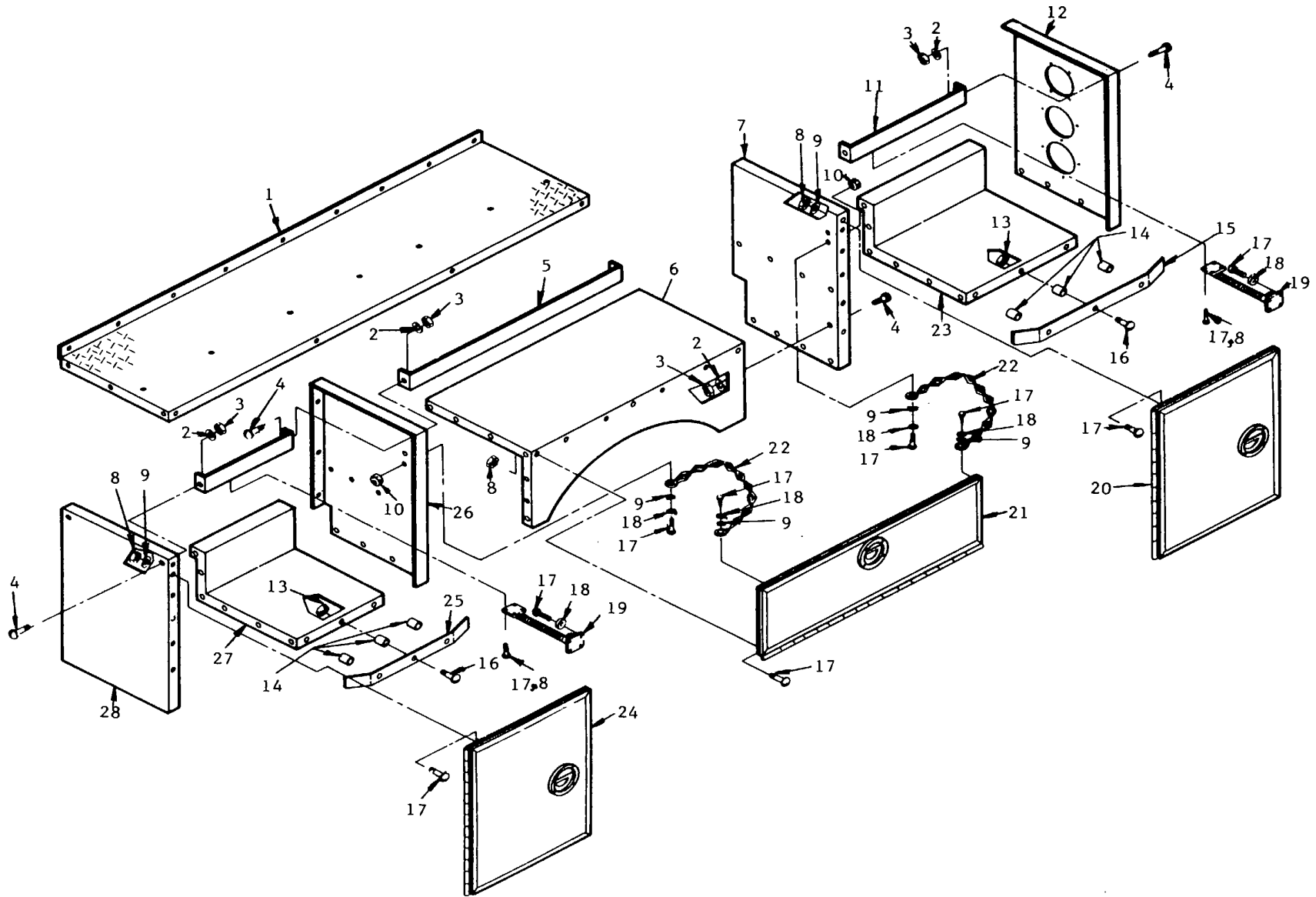
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	77977	322	59556	151-00004	Alarm, Back-Up	1
2.	----	COML			Washer, 1/4	2
3.	----	COML			Screw, 1/4-20x3/4	2
4.	----	COML			Nut, 8-32	2
5.	----	COML			Lockwasher, 8-32	2
6.	----	COML			Washer, 8-32	2



GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-14. STREET SIDE COMPARTMENT PANELS
E-38

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-14. STREET SIDE COMPARTMENT PANELS**

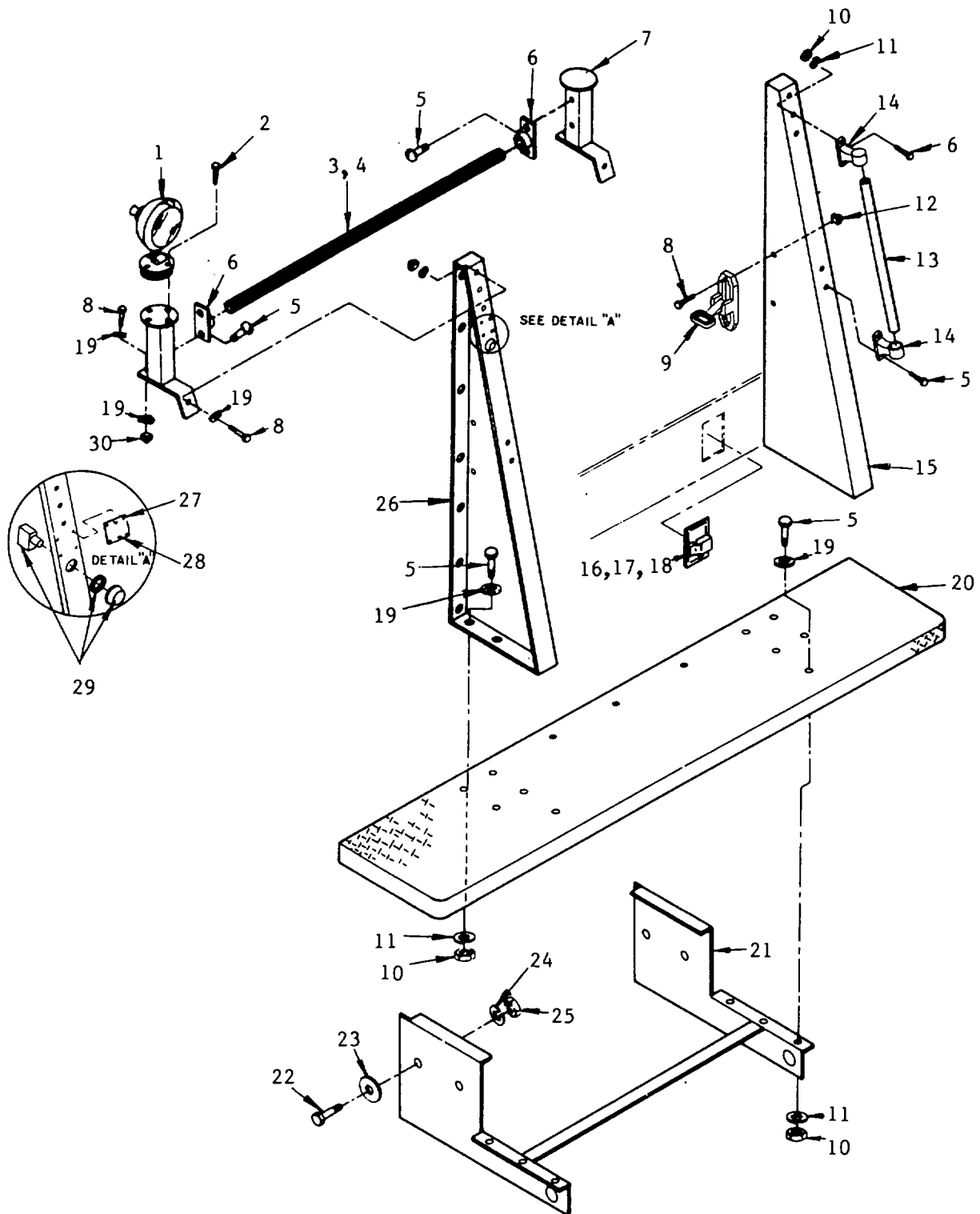
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Curb Side	
2.	59556	103-90010	59556	103-90010	Screw, Machine, 10-32x1/2	34
3.	55465	0115-2	59556	103-00002	Door Assembly, First Compartment	1
4.	----	COML			Door Stop	2
5.	----	COML			Washer, Lock, #10	12
6.	59556	103-90009-1	59556	103-90009-1	Washer, Flat, #10	12
7.	59556	103-90009	59556	103-90009	Chain	2
8.	59556	101-00044	59556	101-00044	Door Assembly, Second Compartment	1
9.	59556	103-90008	59556	103-90008	Bar, Second Compartment	1
10.	----	COML			Door Assembly, Third Compartment	1
11.	59556	101-00018	59556	101-00018	Nut, Lock, 10-32	22
12.	----	COML			Bar, Third Compartment	1
13.	59556	101-00033-P	59556	101-00033-P	Bolt, 1/4-20x1/2	24
14.	----	COML			Wall, Last	1
15.	----	COML			Washer, Lock, 1/4	24
16.	59556	101-00032-P	59556	101-00032-P	Nut, 1/4-20	24
17.	----	COML			Floor, Third Compartment	1
18.	59556	101-00038-P	59556	101-00038-P	Nut, Acorn, 10-32	2
19.	59556	101-00035	59556	101-00035	Wall, Third Compartment	1
20.	59556	101-00021-P	59556	101-00021-P	Wheel Well	1
21.	59556	101-00040	59556	101-00040	Roof, Side Compartment	1
22.	59556	101-00027	59556	101-00027	Wall, Second Compartment	1
23.	59556	101-00043	59556	101-00043	Floor, First Compartment	1
24.	59556	101-00017	59556	101-00017	Wall, First Compartment	1
					Bar, First Compartment	1



GROUP 04 HOSE BODY ASSEMBLY
 FIGURE E-15. CURB SIDE COMPARTMENT PANELS
 E-40

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-15. CURB SIDE COMPARTMENT PANELS**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556	101-00021-D	59556	101-00021-D	Street Side Roof, Side Compartment	1
2.	----	COML			Washer, Lock, 1/4	5
3.	----	COML			Nut, 1/4-20	5
4.	----	COML			Bolt, 1/4-20xl/2	5
5.	59556	101-00044-D	59556	101-00044-D	Bar, Second Compartment	1
6.	59556	101-00035	59556	101-00035	Wheel Well	1
7.	59556	101-00038-D	59556	101-00038-D	Wall, Third Compartment	1
8.	----	COML			Nut, Lock, 10-32	22
9.	----	COML			Washer, Flat, #10	12
10.	----	COML			Nut, Acorn	2
11.	59556	101-00018-D	59556	101-00018-D	Bar, Third Compartment	1
12.	59556	101-00033-D	59556	101-00033-D	Wall, Last	1
13.	----	COML			Nut, Lock, 1/4-20	12
14.	59556	101-00024-	59556	101-00024-	Spacer	12
15.	59556	101-00024-R	59556	101-00024-R	Rub Rail, Rear	2
16.	----	COML			Bolt, 1/4-20xl	12
17.	----	COML			Screw, Machine, 10-32xl/2	34
18.	----	COML			Washer, Lock, #10	12
19.	55465	0115-2	59556	103-00002	Door Stop	2
20.	59556	103-90008	59556	103-90008	Door Assembly, Third Compartment	1
21.	59556	103-90009	59556	103-90009	Door Assembly, Second Compartment	1
22.	59556	103-90009-1	59556	103-90009-1	Chain	2
23.	59556	101-00032-D	59556	101-00032-D	Floor, Third Compartment	1
24.	59556	103-90010	59556	103-90010	Door Assembly, First Compartment	1
25.	59556	101-00024-F	59556	101-00024-F	Rub Rail, Front	2
26.	59556	101-00039	59556	101-00039	Wall, Second Compartment	1
27.	59556	101-00028	59556	101-00028	Floor, First Compartment	1
28.	59556	101-00037	59556	101-00037	Wall, First Compartment	1



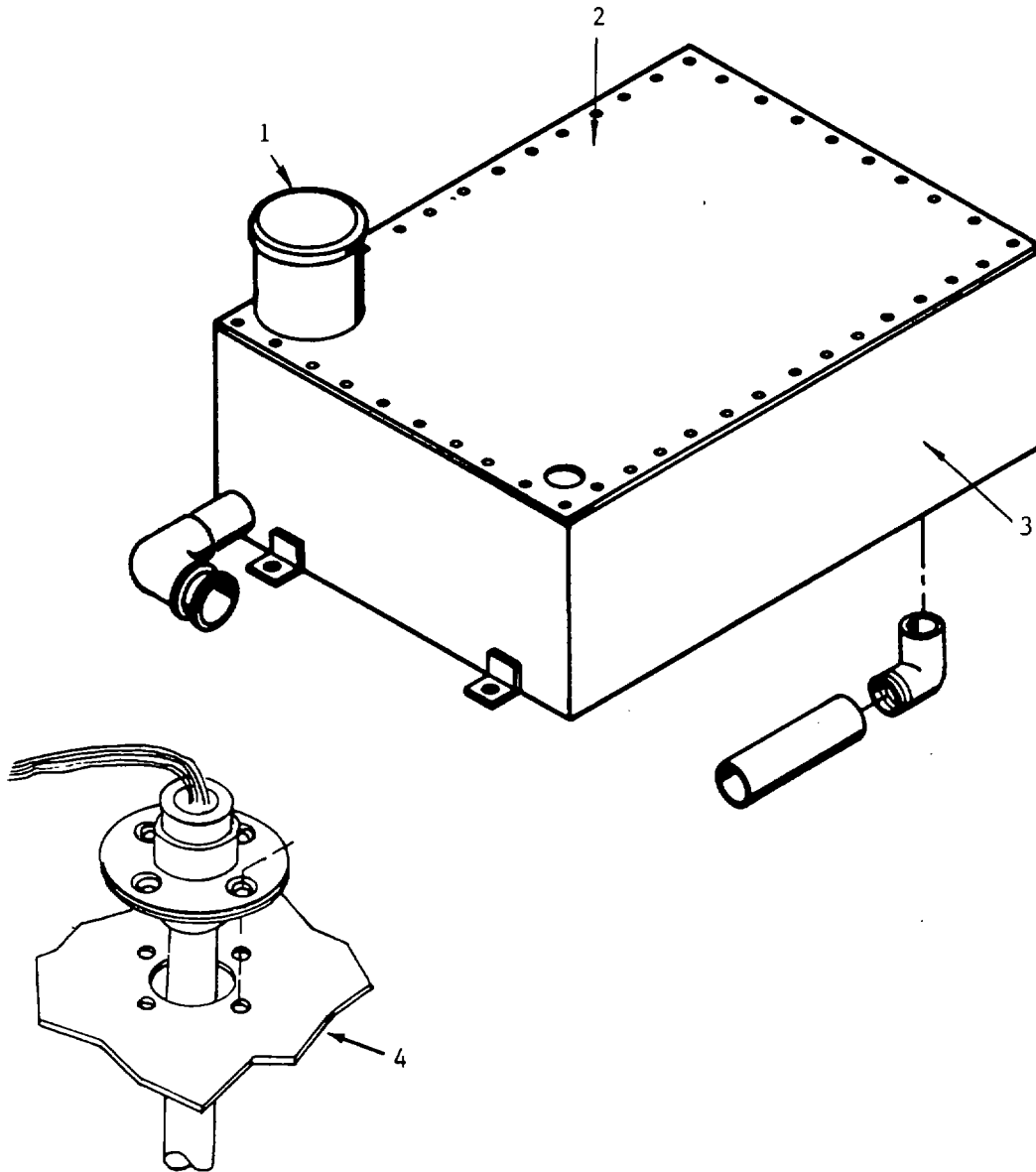
GROUP 04 HOSE BODY ASSEMBLY
 FIGURE E-16. REAR PLATFORM AND STEPS

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-16. REAR PLATFORM AND STEPS**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	78977	AG-R-4413	59556	152-00003	Rear Platform and Steps	
2.	----	COML			Spotlight	
3.	59556	117-00001-A	59556	117-00001-A	Screw, Machine, 10-32x3/4, Flat Head	8
4.	59556	117-00001-B	59556	117-00001-B	Handrail, Top Body	1
5.	----	COML			Cover, Rubber	1
6.	60319	HBP-64Z	59556	117-00001-C	Bolt, 1/4-20x3/4, Round Head Phillips	22
7.	59556	152-00004	59556	152-00004	End Cap, Top Handrail	2
8.	----	COML			Mount, Spotlight	2
9.	60319	FS-46Z	59556	176-00001	Bolt, 1/4-20xl, Round Head Phillips	8
10.	----	COML			Step, Fold Down	2
11.	----	COML			Nut, 1/4-20	18
12.	----	COML			Washer, Lock, 1/4	18
13.	59556	117-00001-D	59556	117-00001-D	Nut, Acorn, 1/4-20	4
14.	60319	ZRB-57	59556	117-00001-E	Handrail, Rear Body Side	2
15.	59556	101-00036-P	59556	101-00036-P	End Cap, Side Handrail	4
16.	71183	5378	59556	123-00026	Panel, Tail, Passenger Side	1
17.	62534	CCSV	59556	123-00027	Receptacle, 20 Amp, 125 Vac	1
18.	----	COML			Plate, Cover, Weatherproof	1
19.	----	COML			Screw, 8-32x3/4	2
20.	59556	101-00020	59556	101-00020	Washer, Flat, 1/4	14
21.	59556	101-90018	59556	101-90018	Platform, Rear	1
22.	----	COML			Support, Rear Platform	1
23.	----	COML			Bolt, 1/2-13x1-1/4	4
24.	----	COML			Washer, Flat, 1/2	4
25.	----	COML			Washer, Lock, 1/2	4
26.	59556	101-00036-D	59556	101-00036-D	Nut, 1/2-13	4
27.	59556	138-00013	59556	138-00013	Panel, Tail, Driver Side	1
28.	----	COML			Plate, Instruction	1
29.	13445	83280R	59556	151-00010	Rivet	2
30.	----	COML			Cover, Weatherproof	2
31.	13445	10030-04	59556	151-00009	Nut, Retaining	2
					Switch	2

**GROUP 04 HOSE BODY ASSEMBLY
FIGURE E-16. REAR PLATFORM AND STEPS**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
32.	-----	COML	-----		Nut, Lock, 1/4-20	4

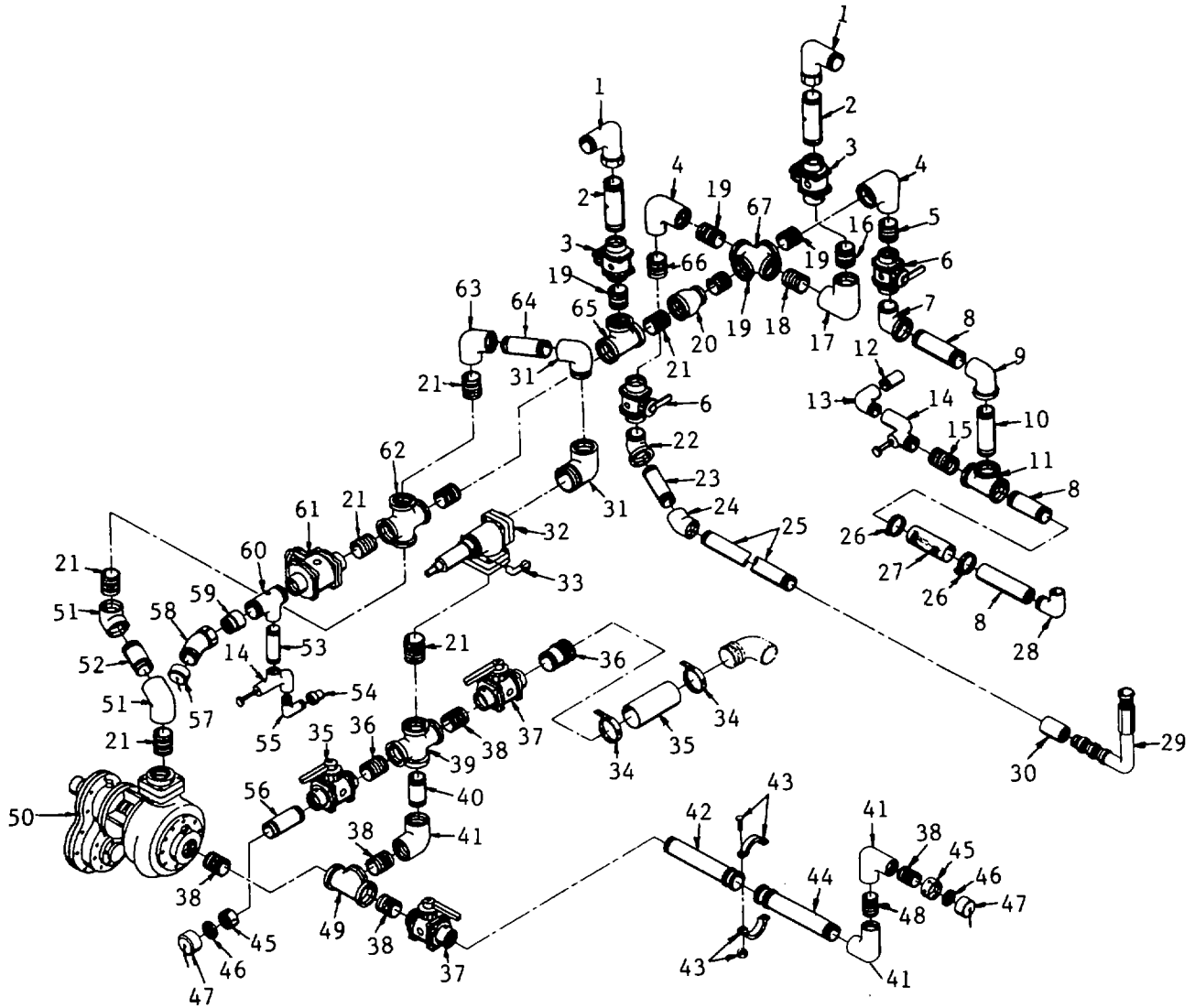


GROUP 05 WATER TANK ASSEMBLY
FIGURE E-17. WATER TANK ASSEMBLY

(E-45 blank)/E-46

**GROUP 05 WATER TANK ASSEMBLY
FIGURE E-17. WATER TANK ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556	120-90004-H	59556	120-90004-H	Screen	1
2.	59556	120-90004	59556	120-90004	Lid, Tank	1
3.	59556	120-90003	59556	120-90003	Tank Assembly, Water	1
4.	56212	A-1-1875	59556	024-00001	Level Sender, Water Tank	1



GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-18. PIPING SYSTEM

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-18. PIPING SYSTEM**

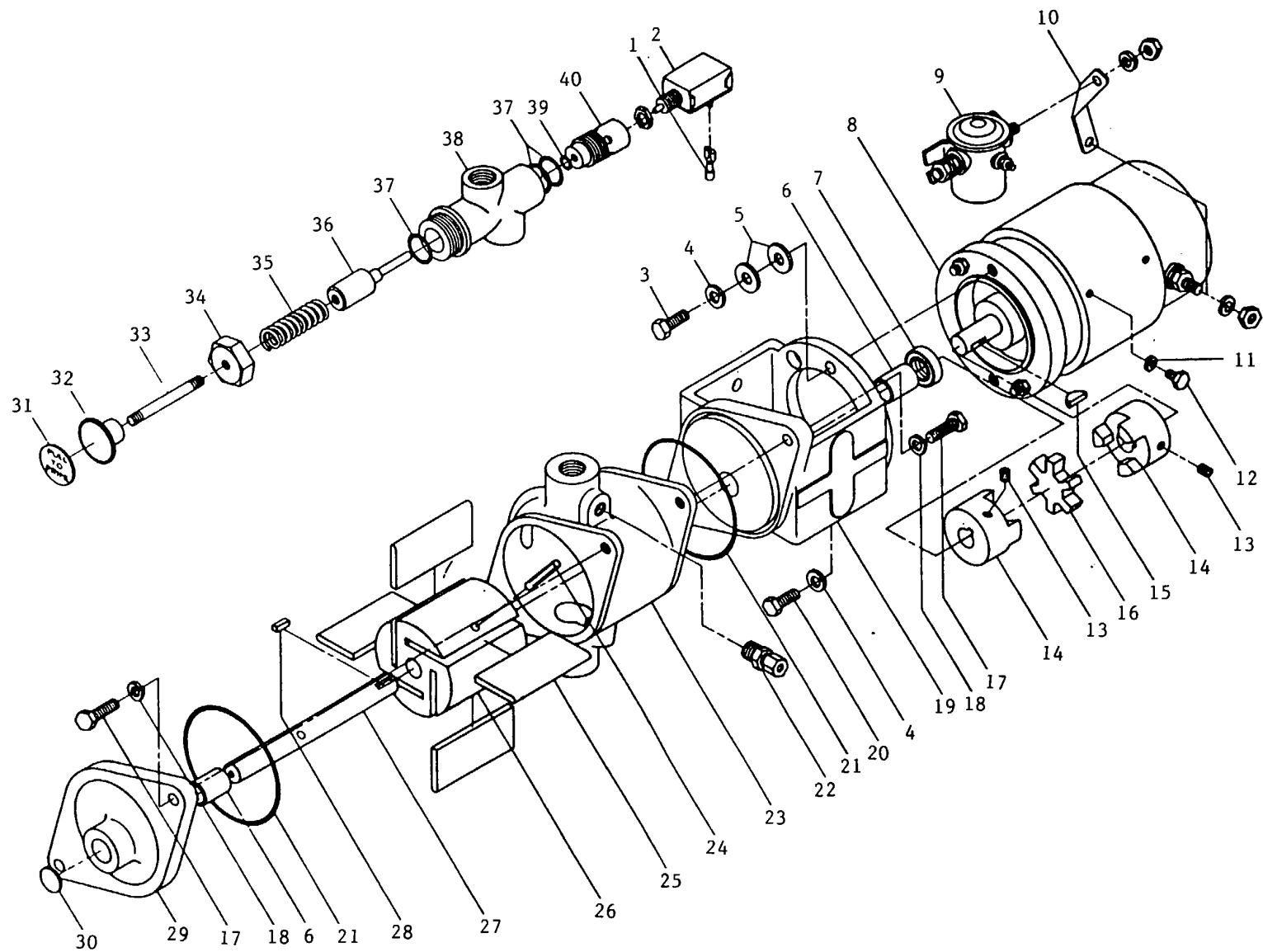
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	00912	Style 635	59556	157-00016	Adapter, Swivel, 900, 1-1/2	2
2.	59556	052-90003	59556	052-90003	Nipple, 1-1/2x6 long (modified)	2
3.	00912	Style 7825	59556	078-00025	Valve, Ball, 1-1/2, in-line	2
4.	59556	403-00001-27	59556	403-00001-27	Elbow, Reducing, 900, 1-1/2xl	2
5.	59556	403-00089-1	59556	403-00089-1	Nipple, 1 inch, close	1
6.	00912	Style 7810	59556	078-00024	Valve, Ball, 1 inch, in-line	2
7.	59556	403-00014-6	59556	403-00014-6	Elbow, Street, 900, 1 inch	1
8.	59556	403-00089-9	59556	403-00089-9	Nipple, 1x5-1/2 long	3
9.	59556	403-00001-6	59556	403-00001-6	Elbow, 900, 1 inch	1
10.	59556	403-00089-7	59556	403-00089-7	Nipple, 1x4-1/2 long	1
11.	59556	403-00024-43	59556	403-00024-43	Tee, 1x1x3/4	1
12.	59556	403-00084-18	59556	403-00084-18	Nipple, 3/4x2-1/4 long	1
13.	59556	403-00014-5	59556	403-00014-5	Elbow, Street, 900, 3/4 inch	1
14.	00912	Style 7	59556	078-00030	Valve, Drain, 3/4 inch	2
15.	59556	403-00084-2	59556	403-00084-2	Nipple, 3/4x1-1/2 long	2
16.	59556	403-00099-3	59556	403-00099-3	Nipple, 1-1/2x2-1/2 long	1
17.	59556	403-00001-8	59556	403-00001-8	Elbow, 900, 1-1/2	1
18.	59556	403-00099-4	59556	403-00099-4	Nipple, 1-1/2x3 long	1
19.	59556	403-00099-1	59556	403-00099-1	Nipple, 1-1/2 inch, close	4
20.	59556	403-00031-27	59556	403-00031-27	Reducer, 2-1/2x1-1/2	1
21.	59556	403-00109-1	59556	403-00109-1	Nipple, 2-1/2 inch, close	7
22.	59556	403-00019-6	59556	403-00019-6	Elbow, Street, 450, 1 inch	1
23.	59556	403-00089-13	59556	403-00089-13	Nipple, 1x9 long	1
24.	59556	403-00009-6	59556	403-00009-6	Elbow, 450, 1 inch	1
25.	59556	403-00089-18	59556	403-00089-18	Pipe, 1x81 long	1
26.	24161	32032	59556	050-00006-9	Clamp, Hose	2
27.	59556	999-00023-A5	59556	999-00023-A5	Hose, 1x5 long	1
28.	59556	403-00014-6	59556	403-00014-6	Elbow, Street, 900, 1 inch	1
29.	59556	064-90001	59556	064-90001	Hose Assembly, 25 inches long with 1 inch male swivel end	1

GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-18. PIPING SYSTEM (Continued)

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
30.	59556	403-00029-6	59556	403-00029-6	Coupling, 1 inch	1
31.	59556	403-00014-10	59556	403-00014-10	Elbow, Street, 90°, 2-1/2 inch	2
32.	15852	G124A26	59556	051-00002	Relief Valve Assembly	1
33.	93061	269C-6-4	59556	402-00031-18	Fitting, 900, 1/4 inch pipe to 3/8 inch tubing	1
34.	24161	32064	59556	050-00006-16	Clamp, Hose	2
35.	59556	999-00040-A4	59556	999-00040-A4	Hose, 3x4 long	1
36.	59556	403-00127-1	59556	403-00127-1	Nipple, Victaulic, 3x3	1
37.	00912	Style 7830	59556	078-00028	Valve, Ball, 3 inch, in-line	3
38.	59556	403-00114-1	59556	403-00114-1	Nipple, 3 inch, Close	6
39.	59556	403-00039-9	59556	403-00039-9	Cross, 3 inch	1
40.	59556	403-00114-9	59556	403-00114-9	Nipple, 3x7 long	1
41.	59556	403-00001-11	59556	403-00001-11	Elbow, 900, 3 inch	3
42.	59556	403-00127-70	59556	403-00127-70	Pipe, 3x27 long	1
43.	79154	Style 75	59556	403-00128-4	Coupling, Victaulic, 3 inch	1
44.	59556	403-00127-71	59556	403-00127-71	Pipe, 3x42 long	1
45.	60319	1L-35-3.0	59556	157-00010	Lug Bushing, 3 inch	2
46.	20266	62725	59556	157-00012	Filter, 3 inch	2
47.	60319	HCC-28-3.0	59556	157-00011	Cap with Chain, 3 inch	2
48.	59556	403-00114-2	59556	403-00114-2	Nipple, 3x3	1
49.	59556	403-00024-11	59556	403-0024-11	Tee, 3 inch	1
50.	15852	HM250	59556	051-00007	Fire Pump Assembly (See Figure E-20 for Breakdown)	1
51.	59556	403-00009-10	59556	403-00009-10	Elbow, 450, 2-1/2	2
52.	59556	403-00109-4	59556	403-00109-4	Nipple, 2-1/2x4 long	1
53.	59556	403-00084-13	59556	403-00084-13	Nipple, 3/4x8 long	1
54.	59556	999-00020-A12	59556	999-00020-A12	Hose, 3/4x12	1
55.	59556	C1040-1235	59556	403-000144	Elbow, 90°, 3/4 inch, Male	1
56.	59556	403-00114-11	59556	403-00114-11	Nipple, 3x9 long	1
57.	60319	HCC-38-2.5	59556	157-00013	Cap with Chain, 2-1/2 inch	1
58.	60319	SE 3945	59556	157-00014	Elbow, Suction, 45°	1

GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-18. PIPING SYSTEM (Continued)

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
59.	60319	1L-35-2.5	59556	157-00015	Lug Bushing, 2-1/2	1
60.	59556	138-00002	59556	138-00002	Tee, 2-1/2x2-1/2x3/4 (Modified)	1
61.	00912	Style 7825	59556	078-00027	Valve, Ball, 2-1/2 inch, in-line	1
62.	59556	403-00039-8	59556	403-00039-8	Cross, 2-1/2 inch	1
63.	59556	403-00001-10	59556	403-00001-10	Elbow, 90°-1/2 inch	1
64.	59556	403-00109-12	59556	403-00109-12	Nipple, 2-1/2x10 long	1
65.	59556	403-00024-87	59556	403-00024-87	Tee, 2-1/2x2-1/2x1-1/2	1
66.	59556	403-00089-1	59556	403-00089-1	Nipple, 1 inch, Close	1
67.	59556	403-00039-6	59556	403-00039-6	Cross, 1-1/2 inch	1



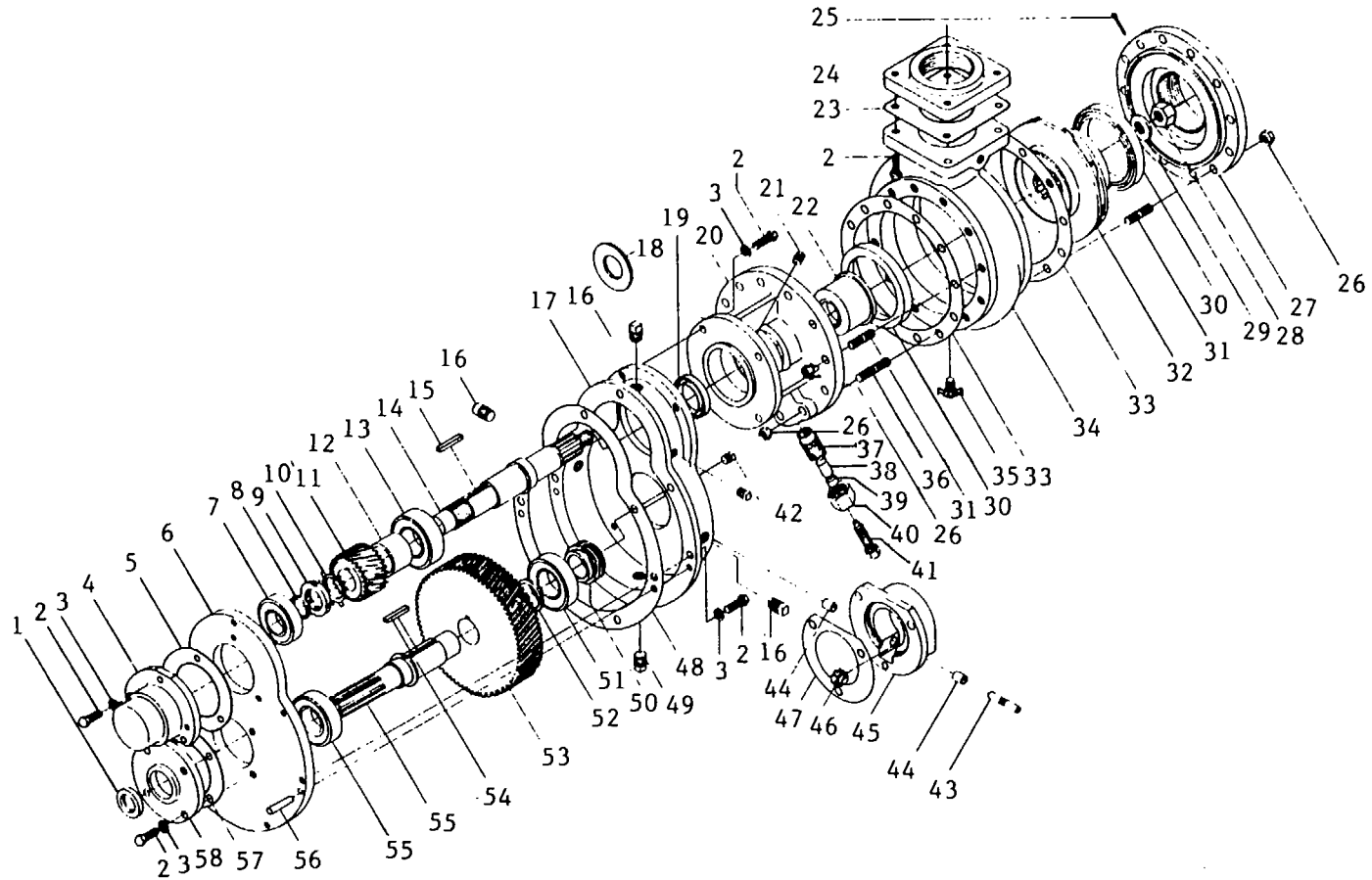
GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-19. ELECTRIC PRIMING PUMP ASSEMBLY

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-19. ELECTRIC PRIMING PUMP ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	15852	VGEAI/G158A1	59556	055-00007	Electric Priming Pump Assembly	REF
1.	15852	PA656	59556	055-00007-1	Wire Connector	2
2.	15852	PA251	59556	055-00007-2	Switch	1
3.	15852	Z10001216081	59556	055-00007-3	Hex Head Cap Screw	1
4.	15852	Z30001200001	59556	055-00007-4	Lockwasher	2
5.	15852	Z30101000001	59556	055-00007-5	Flat Washer	2
6.	15852	AA724-3	59556	055-00007-6	Bushing	2
7.	15852	G1194-5	59556	055-00007-7	Oil Seal	1
8.	15852	MDY7020-V53	59556	055-00007-8	Motor	1
9.	15852	PA029	59556	055-00007-9	Solenoid	1
10.	15852	V84	59556	055-00007-10	Conductor	1
11.	15852	Z30000800001	59556	055-00007-11	Lockwasher	2
12.	15852	Z10000820301	59556	055-00007-12	Hex Head Cap Screw	2
13.	15852	Z11100820031	59556	055-00007-13	Set Screw	2
14.	15852	PA012	59556	055-00007-14	Coupling Body	2
15.	15852	Z60400000001	59556	055-00007-15	Motor Shaft Key	1
16.	15852	Refer to Item #14	59556	055-00007-16	Coupling Spider	1
17.	15852	Z10001018081	59556	055-00007-17	Hex Head Cap Screw	4
18.	15852	Z30001000001	59556	055-00007-18	Lockwasher	4
19.	15852	V69	59556	055-00007-19	Cylinder Head	1
20.	15852	Z10001216061	59556	055-00007-20	Hex Head Cap Screw	1
21.	15852	G903-21	59556	055-00007-21	O-Ring	2
22.	15852	PA183	59556	055-00007-22	Straight Compression Fitting	1
23.	15852	V67	59556	055-00007-23	Cylinder	1
24.	15852	Z40200600101	59556	055-00007-24	Drive Lok Pin	1
25.	15852	V71	59556	055-00007-25	Rotor Vanes	4
26.	15852	V70	59556	055-00007-26	Rotor	1
27.	15852	V72	59556	055-00007-27	Rotor Shaft	1
28.	15852	Z6020060051	59556	055-00007-28	Rotor Shaft Key	1
29.	15852	V68	59556	055-00007-29	Cylinder Head	1
30.	15852	PA155	59556	055-00007-30	Freeze Plug	1

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-19. ELECTRIC PRIMING PUMP ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	15852	D168	59556	055-00007-31	Decal, Pull To Prime	1
32.	15852	G1782	59556	055-00007-32	Primer Valve Knob	1
33.	15852	G1697	59556	055-00007-33	Stem	1
34.	15852	G1696	59556	055-00007-34	Panel Valve Nut	1
35.	15852	G2060	59556	055-00007-35	Spring	1
36.	15852	G1681	59556	055-00007-36	Valve Plug	1
37.	15852	G903-5	59556	055-00007-37	O-Ring	3
38.	15852	G1680	59556	055-00007-38	Valve Body	1
39.	15852	G903-51	59556	055-00007-39	O-Ring	1
40	15852	G1682	59556	055-00007-40	Switch Holder	1



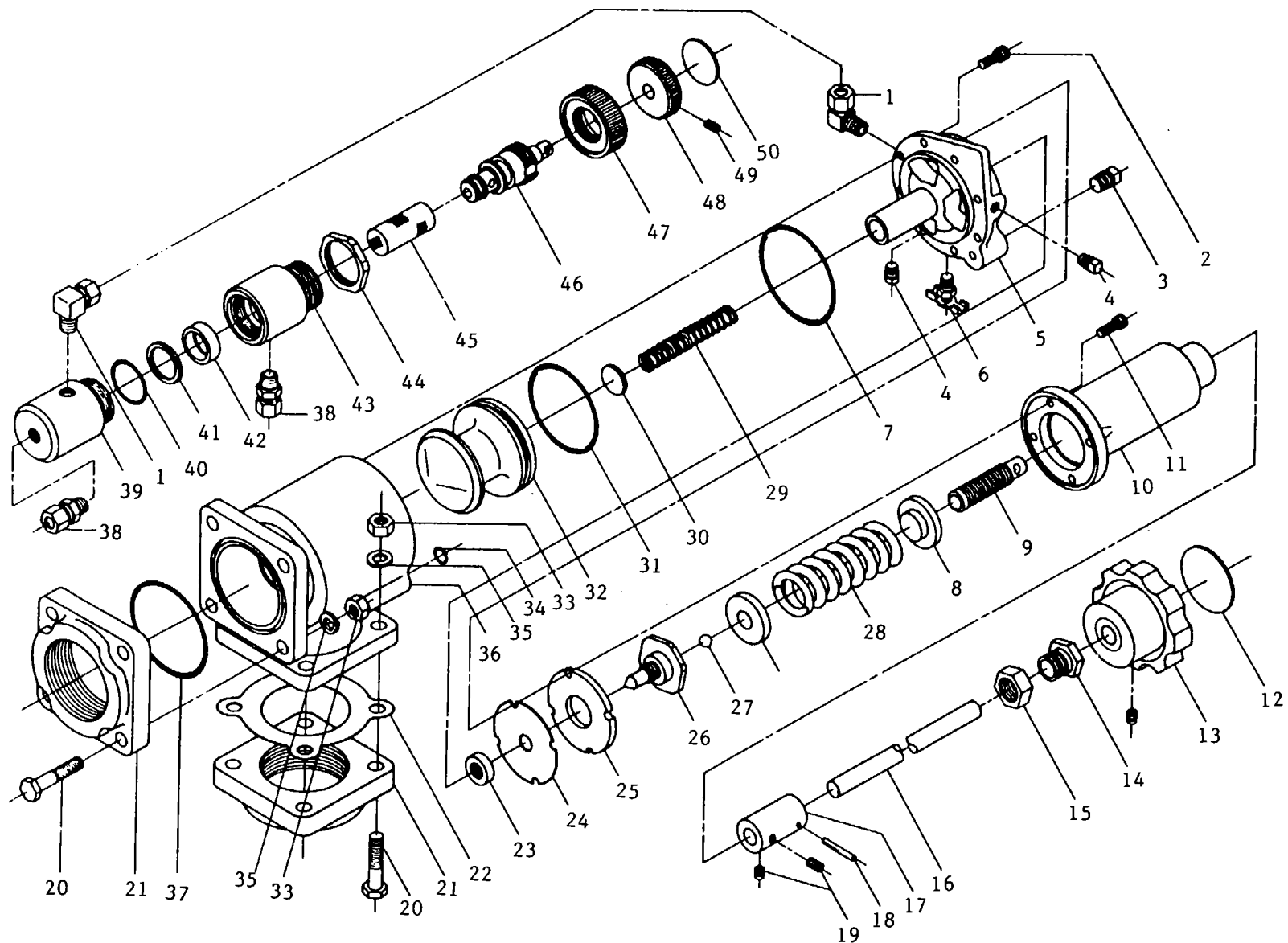
GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-20. FIRE PUMP ASSEMBLY (Continued)
(E-55 blank) /E-56

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-20. ELECTRIC PRIMING PUMP ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	15852	HM250	59556	051-00007	Type HM Assembly	REF
1.	15852	G1194-3	59556	051-00007-1	Oil Seal	1
2.	15852	Z100001018071	59556	051-00007-2	Hex Head Cap Screw	21
3.	15852	Z30001000001	59556	051-00007-3	Lockwasher	21
4.	15852	J7-2	59556	051-00007-4	Bearing Cap	1
5.	15852	H49	59556	051-00007-5	Bearing Cap Gasket	1
6.*	15852	H4	59556	051-00007-6	Gear Case Cover	1
7.	15852	PA056	59556	051-00007-7	Bearing	1
8.	15852	H194	59556	051-00007-8	Spacer	1
9.	15852	N06	59556	051-00007-9	Bearing Locknut	1
10.	15852	W06	59556	051-00007-10	Bearing Lockwasher	1
11.	15852	H53-4	59556	051-00007-11	Driven Pinion	1
12.	15852	J45	59556	051-00007-12	Spacer Bushing	1
13.	15852	207SFF	59556	051-00007-13	Bearing	1
14.	15852	H272	59556	051-00007-14	Impeller Shaft	1
15.	15852	H77	59556	051-00007-15	Pinion Key	1
16.	15852	Z71001218001	59556	051-00007-16	Pipe Plug	3
17.*	15852	H3-4	59556	051-00007-17	Gear Case	1
18.	15852	L30-4	59556	051-00007-18	Water Slinger	1
19.	15852	G1194-26	59556	051-00007-19	Oil Seal	1
20.	15852	H266	59556	051-00007-20	Inboard Head	1
21.	15852	G1717	59556	051-00007-21	Vent Plug	1
22.	15852	H272	59556	051-00007-22	Stuffing Box	1
23.	15852	G677	59556	051-00007-23	Discharge Flange Gasket	1
24.	15852	G847	59556	051-00007-24	Discharge Adapter Flange	1
25.	15852	Z60000400103	59556	051-00007-25	Cotter Key	1
26.	15852	Z20101216001	59556	051-00007-26	Hex Nuts	24
27.	15852	H279	59556	051-00007-27	Outboard Head	1
28.	15852	G1381	59556	051-00007-28	Impeller Nut	1
29.	15852	K165-1	59556	051-00007-29	Impeller Shaft Washer	1
30.	15852	H294	59556	051-00007-30	Seal Ring	2

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-20. FIRE PUMP ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	15852	G1889-2	59556	051-00007-31	Studs	22
32.	15852	H191-1R/L	59556	051-00007-32	Impeller	1
33.	15852	H169	59556	051-00007-33	Pump Casing Gasket	2
34.	15852	H162	59556	051-00007-34	Volute	1
35.	15852	307SFF	59556	051-00007-35	Drain Cock	1
36.	15852	G1889-5	59556	051-00007-36	Studs	2
37.	15852	H175	59556	051-00007-37	Packing Plunger Guide	1
38.	15852	PA926	59556	051-00007-38	Pump Packing (1 piece)	9
39.	15852	5439	59556	051-00007-39	Packing Plunger	1
40.	15852	A449	59556	051-00007-40	Gland Nut	1
41.	15852	H176	59556	051-00007-41	Placking Plunger Stud	1
42.	15852	Z71000427001	59556	051-00007-42	Pipe Plug	2
43.	15852	K521	59556	051-00007-43	Tachometer Drive Shaft	1
44.	15852	AA417	59556	051-00007-44	Bushings	2
45.	15852	H91	59556	051-00007-45	Bearing Cap	1
46.	15852	K523	59556	051-00007-46	Tachometer Gear	2
47.	15852	H49	59556	051-00007-47	Bearing Cap Gasket	1
48.	15852	H48	59556	051-00007-48	Gear Case Gasket	1
49.	15852	Z71101218001	59556	051-00007-49	Pipe Plug, Magnetic	1
50.	15852	K520	59556	051-00007-50	Tachometer Worm	1
51.	15852	305SFF	59556	051-00007-51	Bearing	2
52.	15852	J12-1	59556	051-00007-52	Spacer Bushing	1
53.	15852	H54	59556	051-00007-53	Drive Gear	1
54.	15852	H78	59556	051-00007-54	Gear Key	1
55.	15852	H90-1	59556	051-00007-55	Drive Shaft	1
56.	15852	Z40100000101	59556	051-00007-56	Taper Pin	2
57.	15852	H180	59556	051-00007-57	Bearing Cap Gasket	1
58.	15852	H89	59556	051-00007-58	Bearing Cap	1
<p>* #6 and #17 must be ordered as a set § Pump serial must be supplied when ordering parts.</p>						



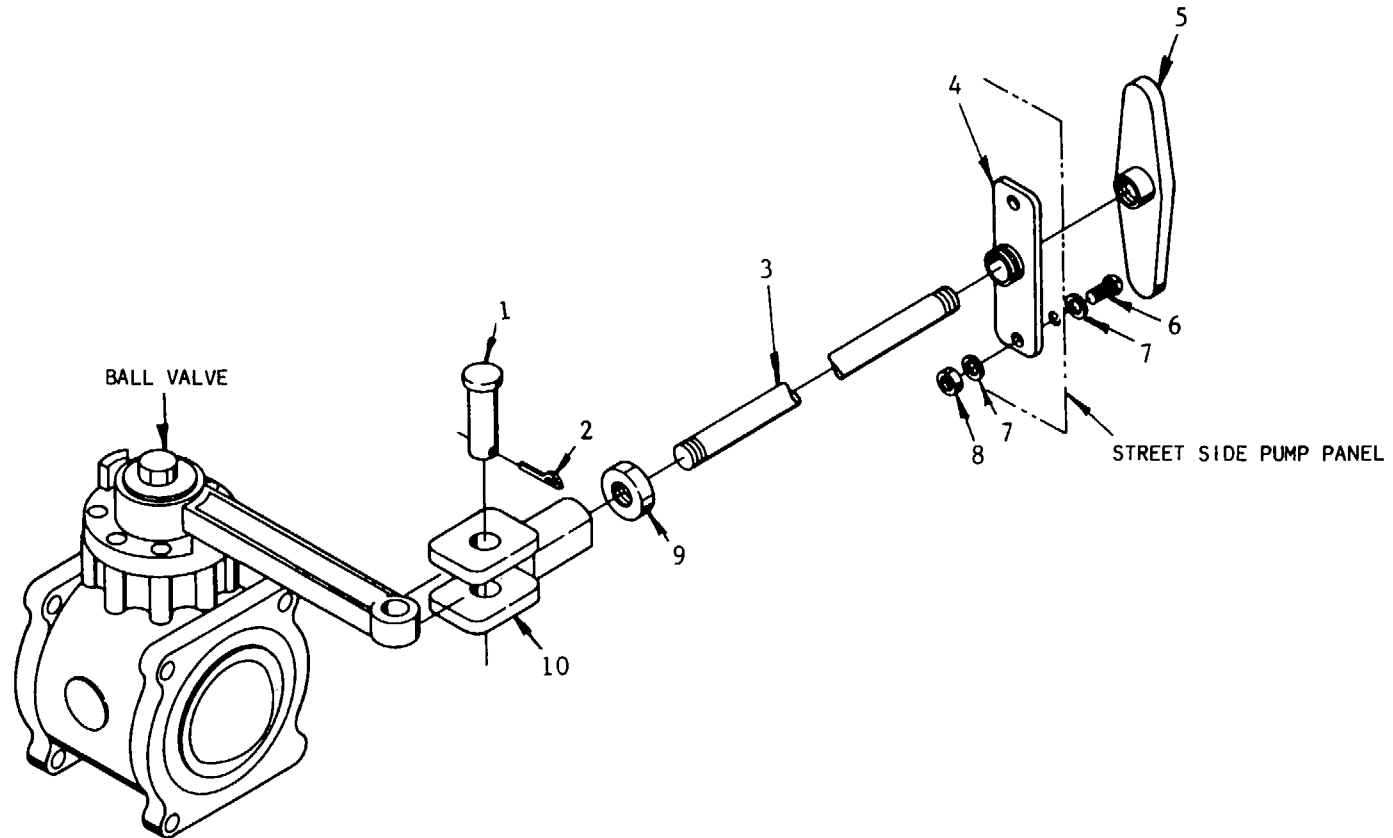
GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-21. RELIEF VALVE ASSEMBLY
(E-59 blank)/E-60

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-21. RELIEF VALVE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	15852	G124A26	59556	051-00002	Relief Valve Assembly	REF
1.	15852	PA195	59556	051-00002-1	Compression Fitting, 900	2
2.	15852	Z10100820051	59556	051-00002-2	Socket Head Cap Screw	8
3.	15852	Z71000818001	59556	051-00002-3	Pipe Plug	1
4.	15852	Z71000427001	59556	051-00002-4	Pipe Plug	2
5.	15852	G1350	59556	051-00002-5	Relief Valve Head	1
6.	15852	PA198	59556	051-00002-6	Drain Cock	1
7.	15852	G903-19	59556	051-00002-7	O-Ring, Head	1
8.	15852	G1397	59556	051-00002-8	Spring Retainer	2
9.	15852	G1822	59556	051-00002-9	Spring Tension Screw	1
10.	15852	G1577-1	59556	051-00002-10	Spring Housing	1
11.	15852	Z10100820061	59556	051-00002-11	Socket Head Caps Screws	4
12.	15852	PA503	59556	051-00002-12	Decal, Pressure Hi-Low	1
13.	15852	PA165	59556	051-00002-13	Handwheel	1
14.	15852	D8-1	59556	051-00002-14	Panel Bushing	1
15.	15852	Z20202814001	59556	051-00002-15	Jam Nut	1
16.	15852	LLYH50x16-1/2	59556	051-00002-16	Extension Rod	1
17.	15852	G1566	59556	051-00002-17	Coupling	1
18.	15852	Z40200500101	59556	051-00002-18	Drive Lok Pin	1
19.	15852	Z11101018-51	59556	051-00002-19	Set Screw	2
20.	15852	Z10001216121	59556	051-00002-20	Hex Head Cap Screw	8
21.	15852	G1625-1	59556	051-00002-21	Adapter Flange	2
22.	15852	G1446	59556	051-00002-22	Adapter Flange Gasket	1
23.	15852	G1375	59556	051-00002-23	Pilot Valve Nut	1
24.	15852	G1394	59556	051-00002-24	Diaphragm	1
25.	15852	G1272-1	59556	051-00002-25	Housing Pilot Ring	1
26.	15852	G1396	59556	051-00002-26	Pilot Valve	1
27.	15852	PA138	59556	051-00002-27	Cam Ball	1
28.	15852	G1290	59556	051-00002-28	Pressure Regulator Spring	1
29.	15852	G1387	59556	051-00002-29	Piston Spring	1
30.	15852	G1587	59556	051-00002-30	Piston Spring Center Plug	1

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-21. RELIEF VALVE ASSEMBLY**

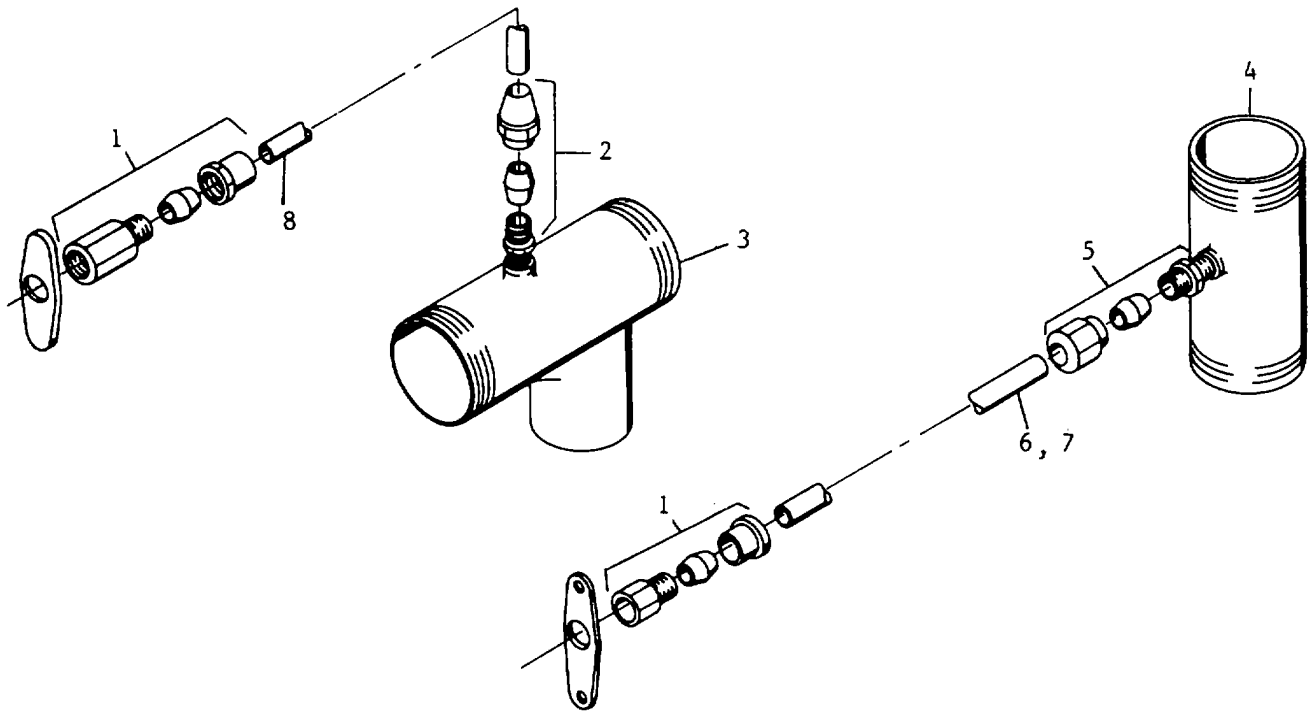
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	15852	G903-17	59556	051-00002-31	O-Ring, Piston	1
32.	15852	G2042	59556	051-00002-32	Relief Valve Piston	1
33.	15852	Z20001216001	59556	051-00002-33	Hex Nut	8
34.	15852	G903-29	59556	051-00002-34	O-Ring, Bleed Port	1
35.	15852	Z30001200001	59556	051-00002-35	Lockwasher	8
36.	15852	G1329	59556	051-00002-36	Relief Valve Body	1
37.	15852	G903-19	59556	051-00002-37	O-Ring, Flange	1
38.	15852	PA185	59556	051-00002-38	Straight Compression Fitting	2
39.	15852	G2127A	59556	051-00002-39	Flush Valve Body Half	1
40.	15852	G903-48	59556	051-00002-40	O-Ring, Flush Valve	1
41.	15852	G903-66	59556	051-00002-41	Quad Ring	1
42.	15852	G2126	59556	051-00002-42	Flush Valve Seat	1
43.	15852	G2127B	59556	051-00002-43	Flush Valve Body Half	1
44.	15852	G1986	59556	051-00002-44	Panel Nut	1
45.	15852	G1502-4	59556	051-00002-45	Screen	1
46.	15852	G1984-1	59556	051-00002-46	Flush Valve Stem	1
47.	15852	G1987	59556	051-00002-47	Stop Nut	1
48.	15852	G1985	59556	051-00002-48	Flush Valve Knob	1
49.	15852	Z111N1032031	59556	051-00002-49	Set Screw	1
50.	15852	PA304	59556	051-00002-50	Flush Decal	1



GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-22. CONTROL ROD ASSEMBLY
(E-63 blank)/E-64

**GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-22. CONTROL ROD ASSEMBLY**

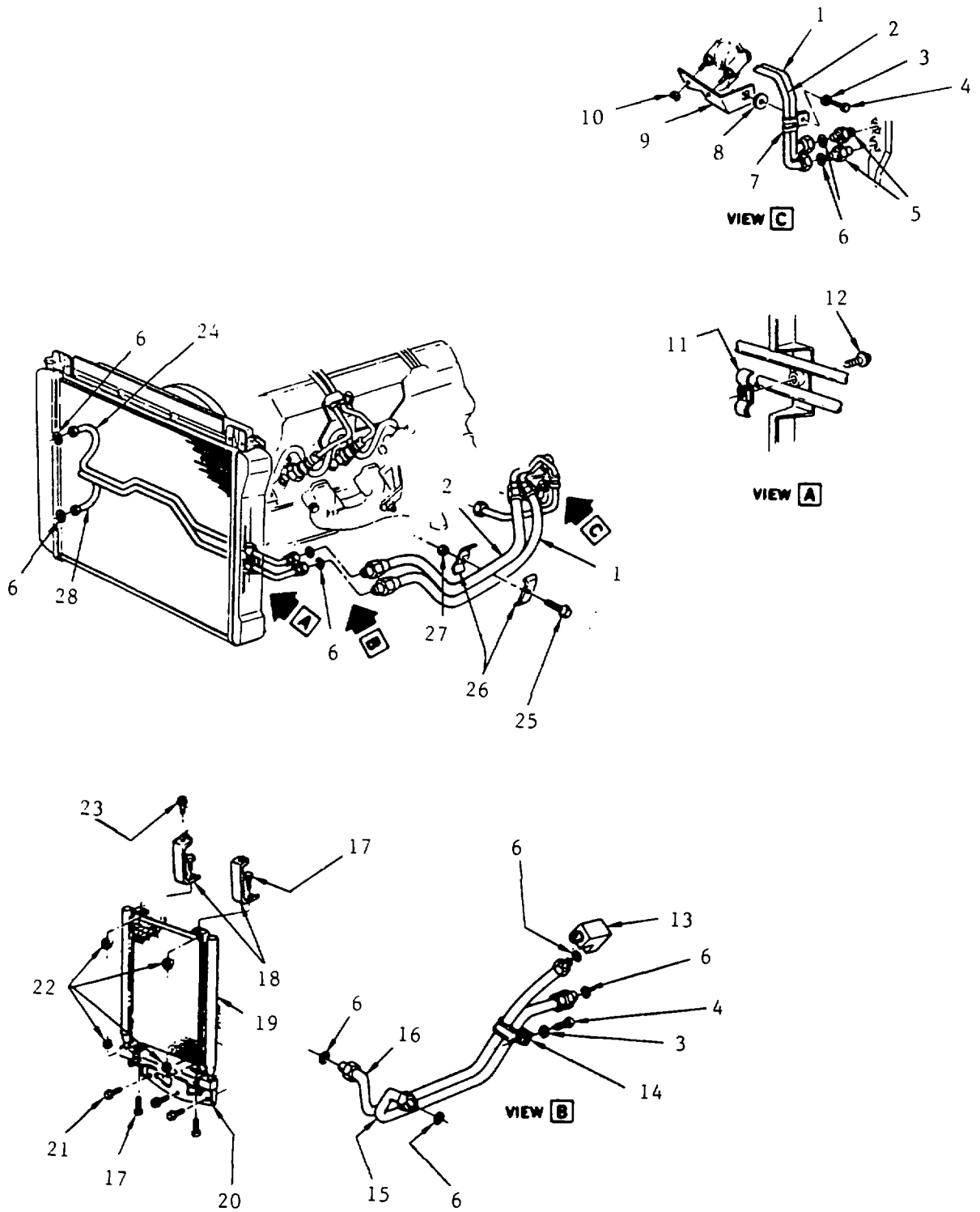
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Pin, Clevis	8
2.	----	COML			Pin, Cotter, 1/8xl	8
3.	59556	075-90003	59556	075-90003	Rod, Control, 37 Inch (Cut, bent and thread as needed)	8
4.	87946	FMN 8	59556	075-00013	Plate, Bushing	8
5.	60319	PH-602	59556	075-00014	Handle, Control Rod	REF
6.	----	COML			Screw	16
7.	----	COML			Washer, Flat	16
8.	----	COML			Nut	16
9.	----	COML			Nut, Jam, 1/2 NF	8
10.	----	COML			Clevis	8



GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-23. PRESSURE GAUGE TUBING ASSEMBLY
E-66

GROUP 06 FIRE PUMP AND PIPING SYSTEM
FIGURE E-23. PRESSURE GAUGE TUBING ASSEMBLY

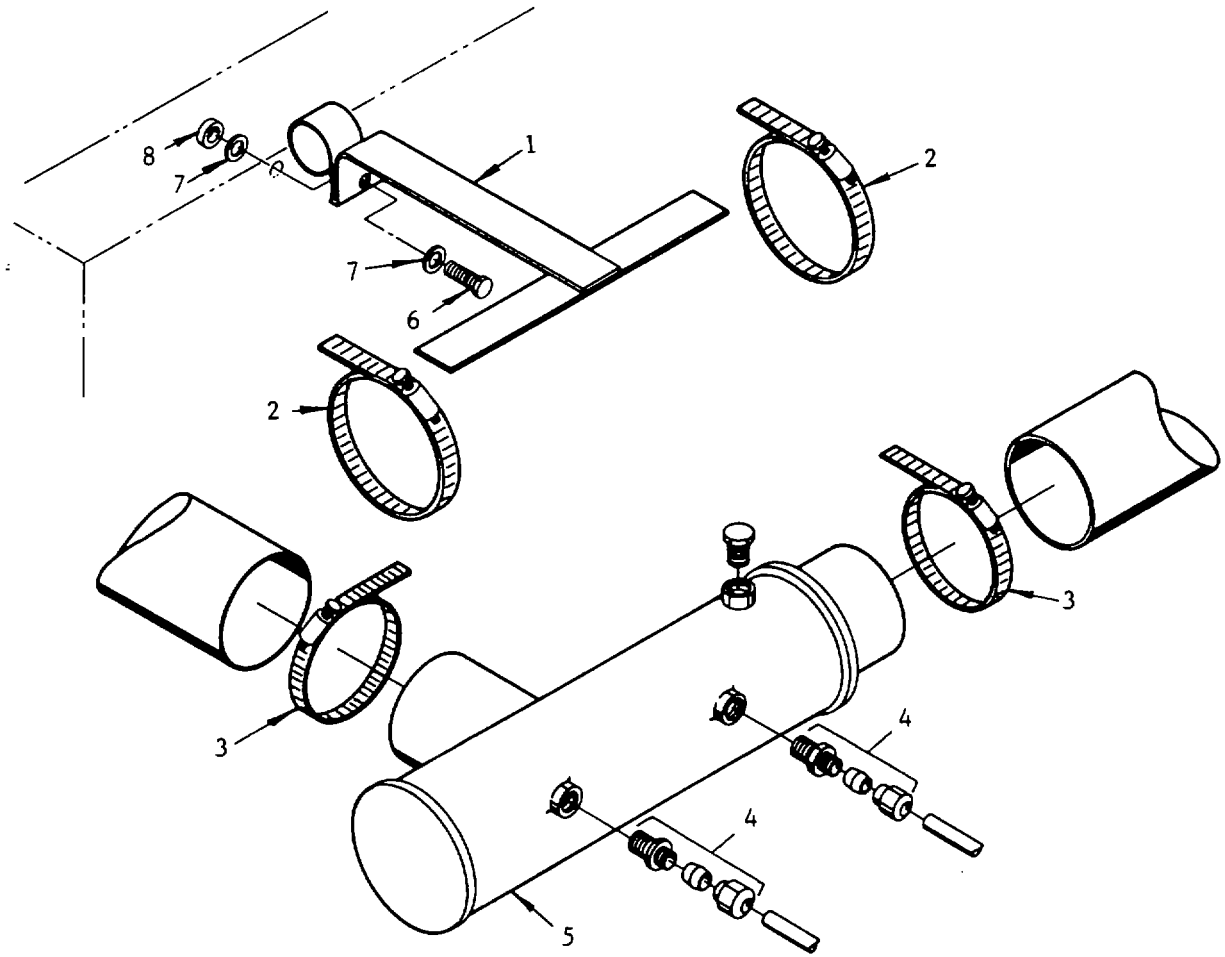
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	79470	1266x4x4	59556	402-00075-6	Connector, Female, 1/4x1/4	2
2.	93061	68AB-4-4	59556	402-00056-2	Connector, Male, 1/4x1/4	1
3.	59556	138-00002	59556	138-00002	Tee, 2-1/2x1-1/2x3/4 (Modified)	REF
4.	59556	052-90003	59556	052-90003	Nipple, 1-1/2	REF
5.	59556	68AB-4-2	59556	402-00056-1	Connector, Male, 1/4x1/2	1
6.	59556	999-00049-A26.25	59556	999-00049-A26.25	Tubing, 1/4 plastic, 26-1/4 long	1
7.	59556	999-00049-A17.75	59556	999-00049-A17.75	Tubing, 1/4 plastic, 17-3/4 long	1
8.	59556	999-00049-A13	59556	999-00049-A13	Tubing, 1/4 plastic, 13 long	1



GROUP 07 ENGINE COOLING SYSTEM
FIGURE E-24. DIESEL ENGINE OIL COOLER ASSEMBLY
 E-68

GROUP 07 ENGINE COOLING SYSTEM
FIGURE E-24. DIESEL ENGINE OIL COOLER ASSEMBLY

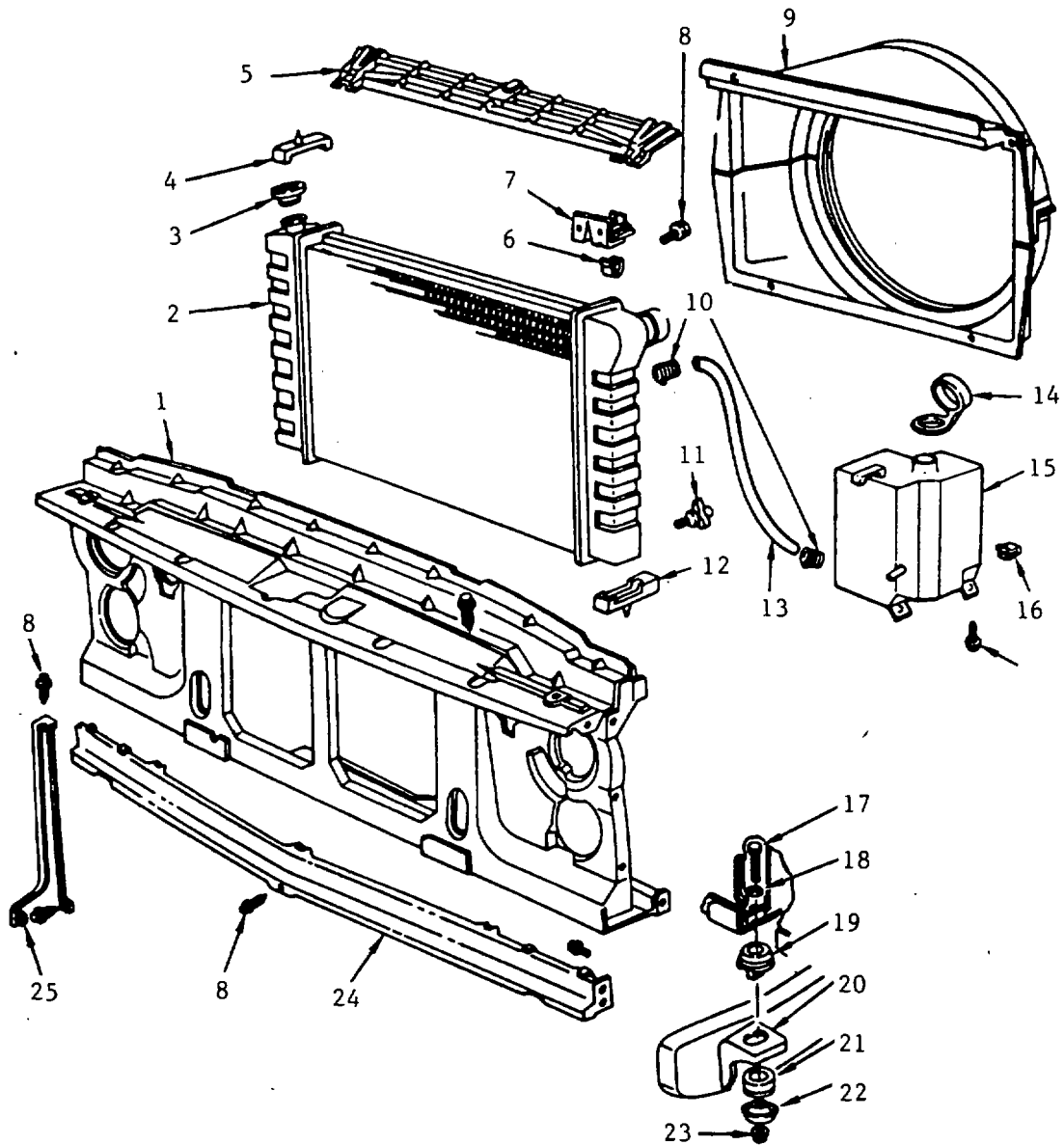
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	14061347	59556	050-90007-1	Diesel Engine Oil Cooler	1
2.	03608	14061346	59556	050-90007-2	Hose	1
3.	03608	9439510	59556	050-90007-3	Hose	AR
4.	03608	9438057	59556	050-90007-4	Washer, Spring Lock, 1/4	AR
5.	03608	14055586	59556	050-90007-5	Bolt, Hex, 1/4-20x3/4	2
6.	03608	14055585	59556	050-90007-6	Fitting	4
7.	03608	14047899	59556	050-90007-7	Seal, Oil	1
8.	03608	14061350	59556	050-90007-8	Clip	AR
9.	03608	14061348	59556	050-90007-9	Insulator	1
10.	03608	11508384	59556	050-90007-10	Bracket	AR
	03608	120386	59556	050-90007-11	Nut, Hex, M8x1.25	AR
11.	03608	14036784	59556	050-90007-12	Washer, Flat, 5/16 OD; 47/64 ID; 1/16 THK	1
12.	03608	9438112	59556	050-90007-13	Clip	AR
13.	03608	14061343	59556	050-90007-14	Bolt, Hex, 1/2-20xl	1
14.	03608	478601	59556	050-90007-15	Fitting	1
15.	03608	14061342	59556	050-90007-16	Clip	1
16.	03608	14061341	59556	050-90007-17	Pipe	1
17.	03608	3846202	59556	050-90007-18	Pipe	AR
18.	03608	14026211	59556	050-90007-19	Bolt, Hex, 5/16-18x7/8	1
19.	03608	3053355	59556	050-90007-20	Bracket	1
20.	03608	14027387	59556	050-90007-21	Cooler	1
21.	03608	1150118	59556	050-90007-22	Bracket	AR
22.	03608	3866846	59556	050-90007-23	Screw, Hex, M6.3x1.81x13	AR
23.	03608	180016	59556	050-90007-24	Nut, Hex, 1/4-20	AR
24.	03608	14061344	59556	050-90007-25	Bolt, Hex, 1/4-20x1/2	AR
25.	03608	180024	59556	050-90007-26	Pipe	1
26.	03608	14061352	59556	050-90007-27	Bolt, Hex, 1/4-20x1-1/4	AR
27.	03608	9439519	59556	050-90007-28	Clamp	1
28.	03608	14061345	59556	050-90007-29	Nut, Hex, 1/4-20	AR
					Pipe	1



GROUP 07 ENGINE COOLING SYSTEM
FIGURE E-25. HEAT EXCHANGER ASSEMBLY
E-70

**GROUP 07 ENGINE COOLING SYSTEM
FIGURE E-25. HEAT EXCHANGER ASSEMBLY**

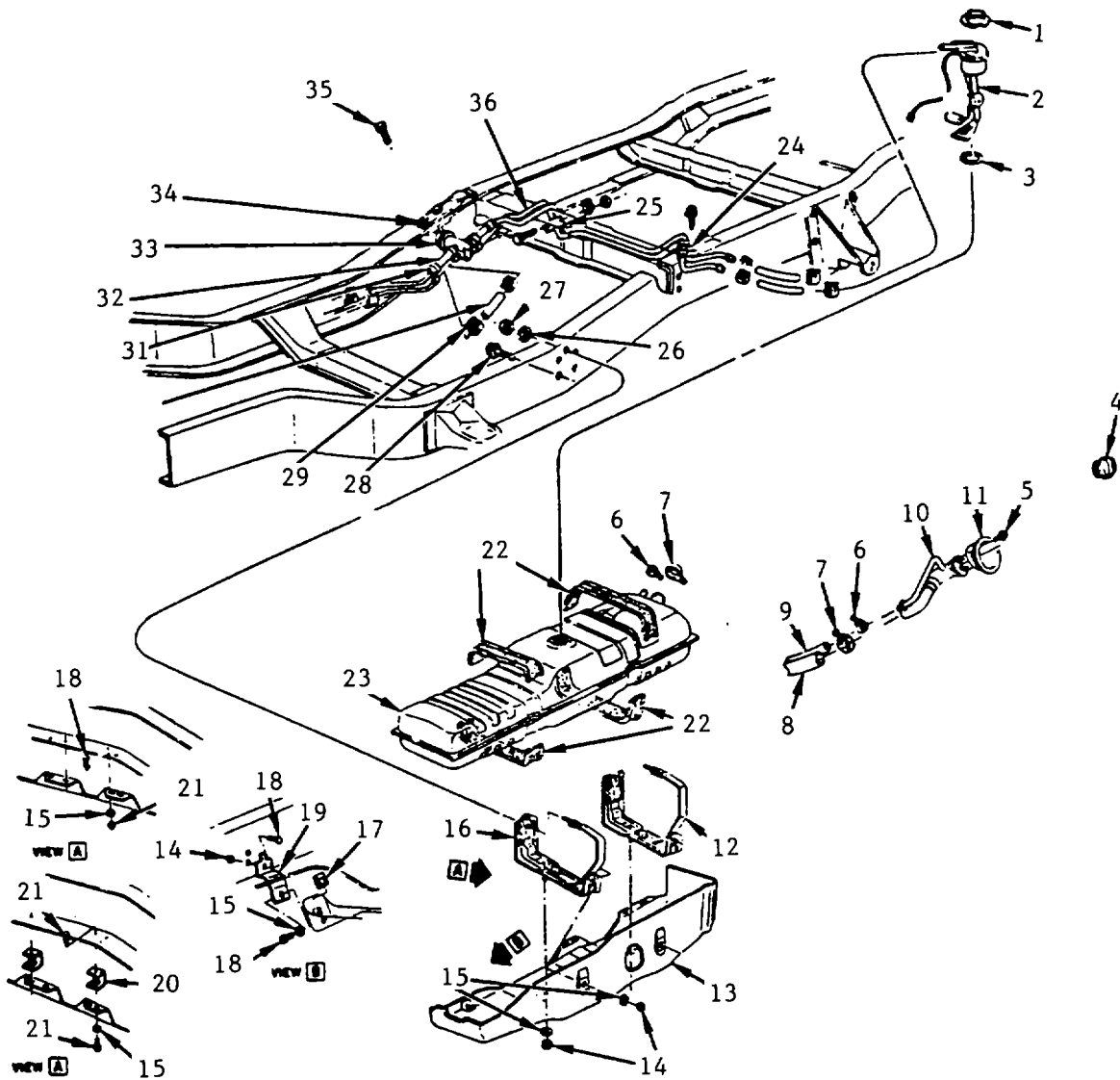
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556	050-00007	59556	050-00007	Bracket, Heat Exchanger	1
2.	24161	32052	59556	050-00006-14	Clamp, Hose	2
3.	24161	32032	59556	050-00006-9	Clamp, Hose	2
4.	93061	68AB-6-6	59556	402-00056-6	Connector, Male	2
5.	21563	1938/3/5	59556	050-00008	Heat Exchanger	1
6.	----	COML			Bolt	
7.	----	COML			Washer, Flat	
8.	----	COML			Nut	



GROUP 07 ENGINE COOLING SYSTEM
 FIGURE E-26. RADIATOR ASSEMBLY
 E-72

**GROUP 07 ENGINE COOLING SYSTEM
FIGURE E-26. RADIATOR ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	050-90006	59556	050-90006	Radiator Mounting and Related Parts	
1.	03608	15522682	59556	050-90006-1	Support, Radiator	1
2.	03608	3053686	59556	050-90006-2	Radiator	1
3.	03608	6410785	59556	050-90006-3	Cap, Radiator, Fill	1
4.	03608	6264100	59556	050-90006-4	Pad, Radiator Retainer, Upper	4
5.	03608	14039948	59556	050-90006-5	Panel, Radiator Mounting, Upper	1
6.	03608	3982098	59556	050-90006-6	Nut, U-Shaped, 1/4-20	AR
7.	03608	14063151	59556	050-90006-7	Bracket, Radiator Fan, LH	1
	03608	14063152	59556	050-90006-8	Bracket, Radiator Fan, RH	1
8.	03608	9437982	59556	050-90006-9	Bolt, Hex, 1/4-20x3/4	AR
9.	03608	14039951	59556	050-90006-10	Shroud, Radiator Fan	1
10.	03608	22518665	59556	050-90006-11	Clamp, Worm	AR
11.	03608	9437207	59556	050-90006-12	Cock, Drain, Type "C"	1
12.	03608	6264100	59556	050-90006-13	Pad, Radiator, Retainer, Lower	4
13.	03608	9439162	59556	050-90006-14	Hose, Bulk, 3/8 ID	AR
14.	03608	340750	59556	050-90006-15	Cap	1
15.	03608	15522743	59556	050-90006-16	Reservoir	1
16.	03608	11503615	59556	050-90006-17	Nut, U-Shaped, Multi-thread, Spg.	AR
17.	03608	9432580	59556	050-90006-18	Bolt, Hex, 1/2-13x5	AR
18.	03608	14049809	59556	050-90006-19	Washer, Radiator Support	AR
19.	03608	15597600	59556	050-90006-20	Cushion, Radiator Support, Upper	1
20.	03608	14029193	59556	050-90006-21	Bracket, Radiator Support	1
21.	03608	15597629	59556	050-90006-22	Cushion, Radiator Support, Lower	1
22.	03608	14027472	59556	050-90006-23	Retainer, Radiator Support Cushion	1
23.	03608	9414418	59556	050-90006-24	Nut, Hex, 1/2-13	AR
	03608	3983589	59556	050-90006-25	Washer, Split	AR
24.	03608	14043880	59556	050-90006-26	Panel, Front End	1
25.	03608	14021243	59556	050-90006-27	Support, Hood Latch	1



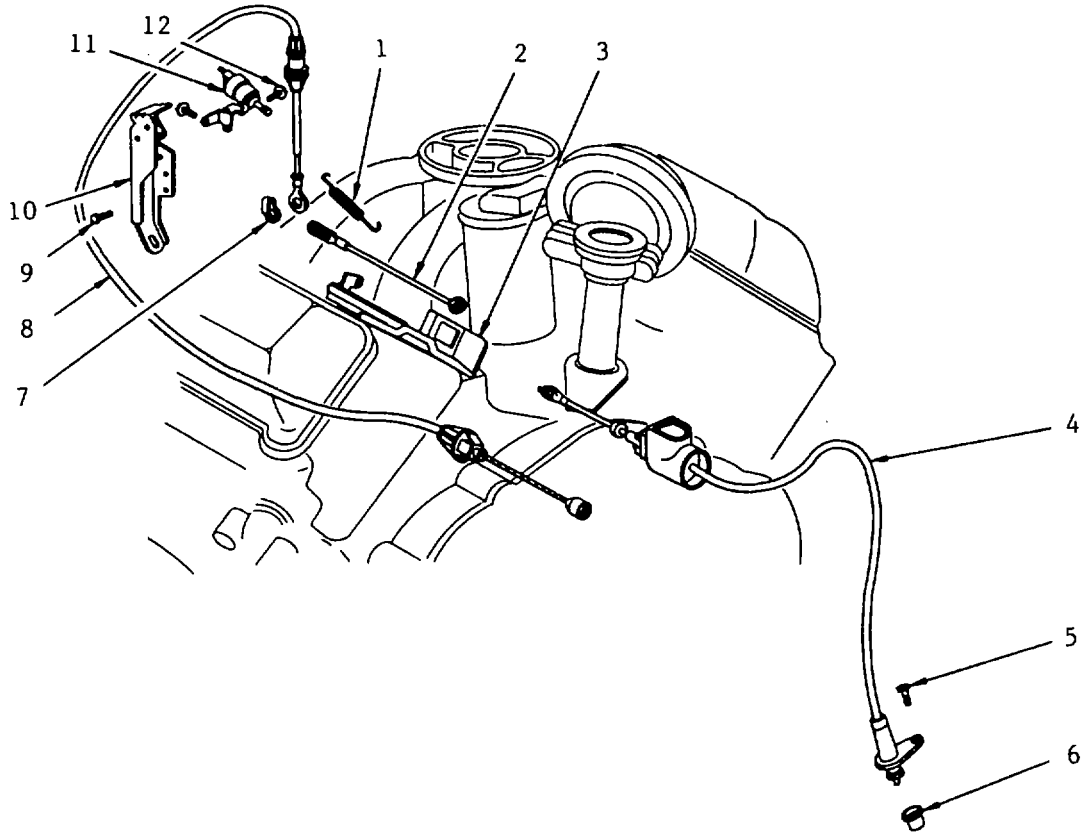
GROUP 08 ENGINE FUEL SYSTEM
FIGURE E-27. FUEL TANK ASSEMBLY
E-74

**GROUP 08 ENGINE FUEL SYSTEM
FIGURE E-27. FUEL TANK ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
					Fuel Tank and Supply	REF
1.	03608	22516548	59556	015-90002-1	Cam, Meter	1
2.	03608	25004083	59556	015-90002-2	Meter	1
	03608	25055272	59556	015-90002-3	Filter	1
3.	03608	22515965	59556	015-90002-4	Seal, Meter	1
4.	03608	22518914	59556	015-90002-5	Cap, Diesel	1
5.	03608	14071930	59556	015-90002-6	Housing, Filler Pipe	1
6.	----	COML			Clamp, 11/16-1-5/16	2
7.	03608	22518666	59556	015-90002-8	Clamp, Worm	2
8.	03608	14071956	59556	015-90002-9	Hose	1
9.	03608	14071958	59556	015-90002-10	Hose, Filler Vent	1
10.	03608	14040799	59556	015-90002-11	Neck, Filler Upper	1
11.	03608	14040235	59556	015-90002-12	Plate, Filler Neck	1
12.	03608	15592480	59556	015-90002-13	Support	1
13.	03608	14071996	59556	015-90002-14	Shield	1
14.	03608	9422295	59556	015-90002-15	Nut, 5/16-18	AR
15.	03608	14072667	59556	015-90002-16	Washer, Flat, 23.64 ID, 1 inch OD, .08 Thick	AR
16.	03608	15592478	59556	015-90002-17	Support, Front	1
17.	03608	10008002	59556	015-90002-18	Nut, U-Shaped, 5/16-18	1
18.	03608	9439920	59556	015-90002-19	Bolt, Hex, 5/16-18x1/2	1
19.	03608	14071993	59556	015-90002-20	Bracket, Shield	1
20.	03608	14071987	59556	015-90002-21	Spacer, Shield	1
21.	03608	9432487	59556	015-90002-22	Bolt, Hex, 5/16-18x7/8	AR
22.	03608	6263877	59556	015-90002-23	Insulator, Tank, Anti-Squeak	AR
23.	03608	14071994	59556	015-90002-24	Tank, 16 Gallon	1
24.	03608	14034543	59556	015-90002-25	Clip, Fuel Pipe	1
25.	03608	467524	59556	015-90002-26	Clip	1
26.	03608	502306	59556	015-90002-27	Washer, Flat, 7/16 ID, 3/4 OD	AR
27.	03608	451523	59556	015-90002-28	Nut, Hex, 7/16-14	AR
28.	03608	15598758	59556	015-90002-29	Bolt, Hex, 3/8-16x1-1/8	AR

**GROUP 08 ENGINE FUEL SYSTEM
FIGURE E-27. FUEL TANK ASSEMBLY**

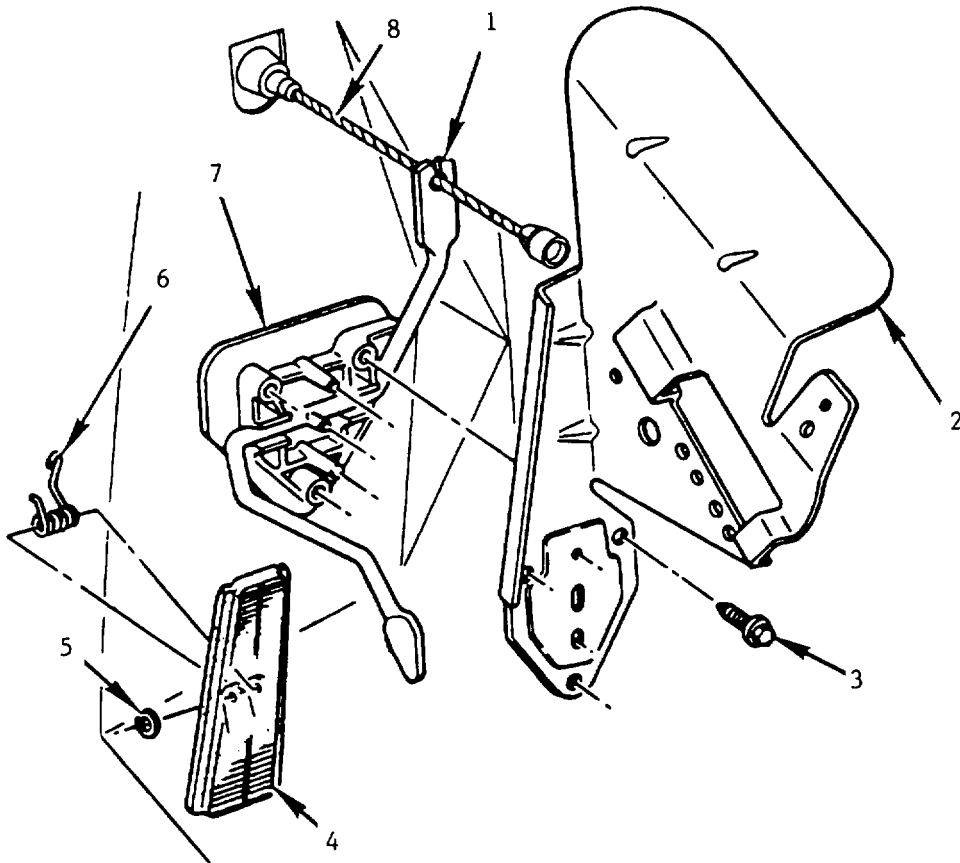
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
29.	03608	477402	59556	015-90002-30	Clamp, Fuel Feed	1
30.	03608	9439238	59556	015-90002-31	Hose, Fuel Feed, Bulk	AR
31.	03608	25518880	59556	015-90002-32	Clamp, Fuel Return	1
32.	03608	9439046	59556	015-90002-33	Hose, Fuel Return	1
33.	03608	14029228	59556	015-90002-34	Valve	1
34.	03608	14014785	59556	015-90002-35	Bracket	1
35.	03608	9440283	59556	015-90002-36	Bolt, Hex, 5/16-18xi	AR
36.	03608	3750950	59556	015-90002-37	Tubing, Fuel Fee, Bulk	AR
	03608	603827	59556	015-90002-38	Tubing Return, Bulk	AR



GROUP 08 ENGINE FUEL SYSTEM
FIGURE E-28. ACCELERATOR CONTROLS ASSEMBLY
(E-77 blank)/E-78

**GROUP 08 ENGINE FUEL SYSTEM
FIGURE E-28. ACCELERATOR CONTROLS ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	030-90003	59556	030-90003	Accelerator Controls, Engine Compartment	
1.	03608	14024997	59556	030-90003-1	Spring, Accelerator Control Cable	1
2.	03608	14038642	59556	030-90003-2	Rod, Transfer T. V. Control	1
3.	03608	14038643	59556	030-90003-3	Support, Transfer T. V. Control Cable	1
4.	03608	25515599	59556	030-90003-4	Cable, Transfer Throttle Valve	1
5.	03608	14002805	59556	030-90003-5	Bolt, Hex, with Connecting Washer	1
6.	03608	1262476	59556	030-90003-6	Seal, Transfer Throttle Valve Cable, Multi-Lip	1
7.	03608	1247872	59556	030-90003-7	Retainer, Cable Spring	1
8.	03608	14038644	59556	030-90003-8	Cable, Accelerator Control	1
9.	03608	11502670	59556	030-90003-9	Screw, Hex, Washer Hd	1
10.	03608	14038647	59556	030-90003-10	Support, Accelerator Control Cable	1
11.	03608	14066255	59556	030-90003-11	Solenoid, Idle	1
12.	03608	94002018	59556	030-90003-12	Bolt, Hex	1



GROUP 08 ENGINE FUEL SYSTEM
FIGURE E-29. ACCELERATOR PEDAL AND ROD ASSEMBLY
E-80

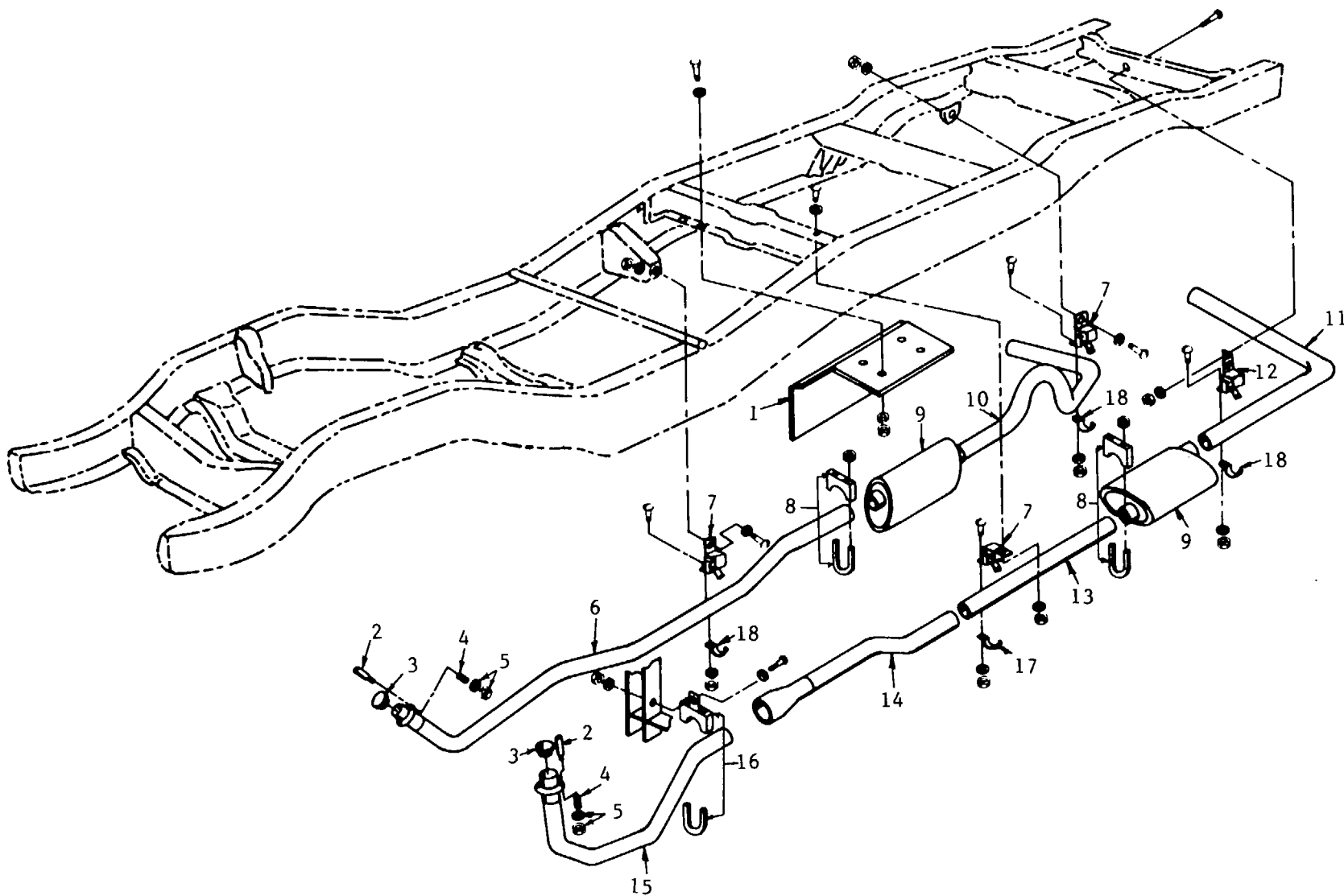
**GROUP 08 ENGINE FUEL SYSTEM
FIGURE E-29. ACCELERATOR PEDAL AND ROD ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556 03608	030-90002 15590123	59556 59556	030-90002 030-90002-1	Accelerator Pedal and Rod Assembly Rod	1 1
2.	03608	342405	59556	030-90002-2	Reinforcement, Accelerator Pedal Rod Assembly	1
3.	03608	11504744	59556	030-90002-3	Screw, Hex	AR
4.	03608	468234	59556	030-90002-4	Pedal, Accelerator	1
5.	03608	3909063	59556	030-90002-5	Nut, Push-On, Self Locking	AR
6.	03608	336989	59556	030-90002-6	Spring, Accelerator Pedal Tension	1
7.	03608	3993087	59556	030-90002-7	Support, Accelerator Pedal Rod	1
8.	03608	14038644	59556	030-90002-8	Cable, Accelerator Cont.	1

NOTE

**Group 09 DIESEL FUEL INJECTION
and
Group 10 EMISSION CONTROL SYSTEM
are included with Group 12 ENGINE and ACCESSORIES.**

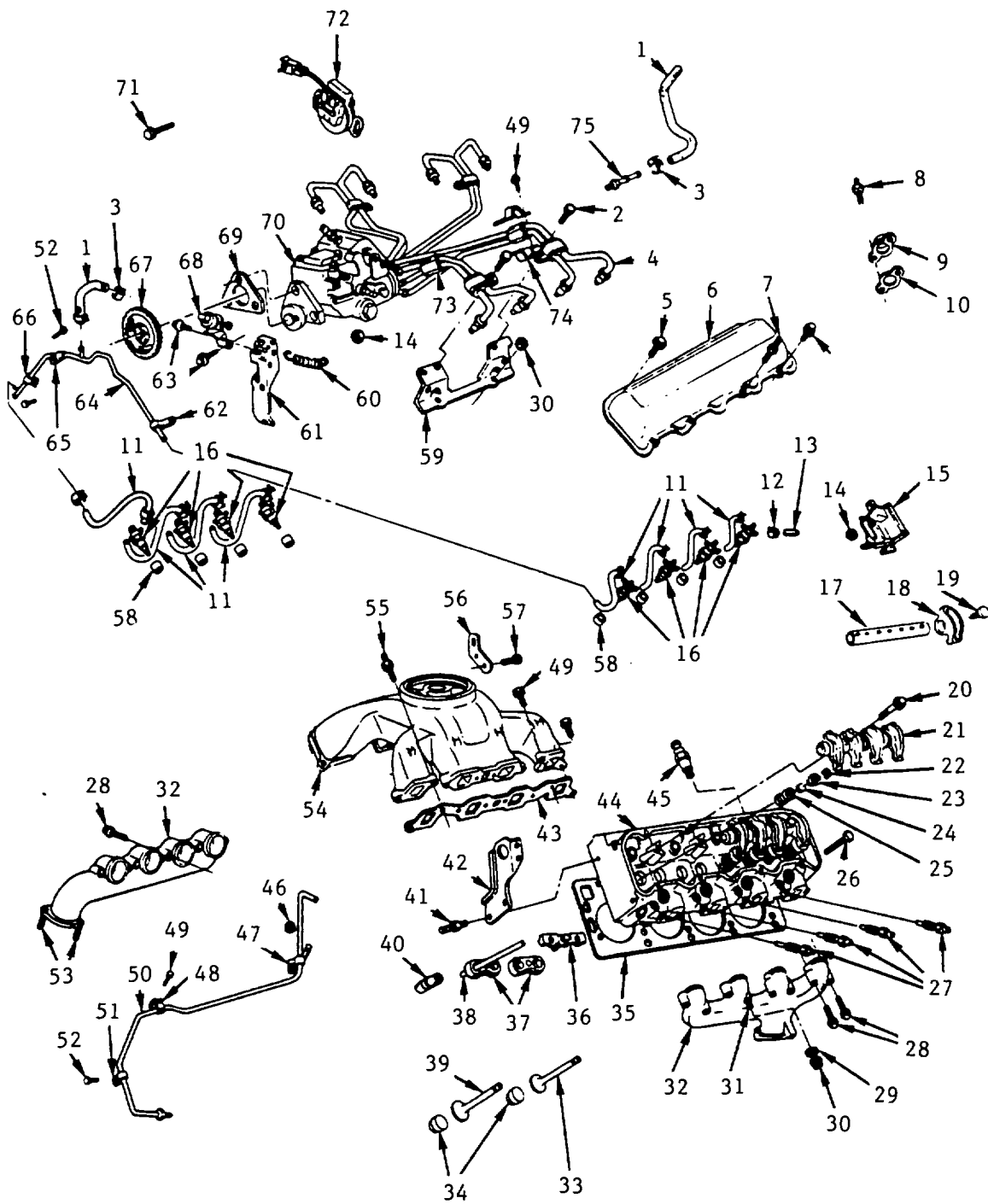
E-82



GROUP 11 ENGINE EXHAUST SYSTEM
FIGURE E-30. EXHAUST SYSTEM ASSEMBLY
 (E-83 blank)/E-84

**GROUP 11 ENGINE EXHAUST SYSTEM
FIGURE E-30. EXHAUST SYSTEM ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556	028-00001	59556	028-00001	Exhaust System Assembly	1
2.	03608	14022654	59556	027-90003-1	Heat Shield	1
3.	03608	14072686	59556	027-90003-2	Stud, Exhaust Pipe	2
4.	03608	587575	59556	027-90003-3	Seal, Exhaust Pipe	2
5.	03608	9422297	59556	027-90003-4	Spring, Exhaust Pipe Flange	3
6.	03608	120395	59556	027-90003-5	Nut, 3/8-16	2
7.	03608	14037856	59556	027-90003-6	Washer, 15/32 ID; 15/16 OD, 1/16 THK	2
8.	03608	14034512	59556	027-90003-7	Pipe, Exhaust, RH	1
9.	03608	14034502	59556	027-90003-8	Support Assembly, Exhaust Pipe, Front, RH	1
10.	03608	14072686	59556	027-90003-9	Support Assembly, Exhaust Pipe, Front, LH	1
11.	03608	15537759	59556	027-90003-10	Seal, Exhaust Pipe	2
12.	03608	14045008	59556	027-90003-11	Muffler	2
13.	59556	027-00010	59556	027-90003-12	Pipe, Muffler-Tail, RH	1
14.	59556	14034512	59556	027-00010	Pipe, Muffler-Tail, LH	1
15.	59556	027-00011	59556	027-90003-13	Support Assembly, Muffler and Tail Pipe	1
16.	59556	027-00012	59556	027-00011	Pipe, Muffler-Tail	1
17.	03608	14045521	59556	027-00012	Pipe, Muffler-Tail	1
18.	----	COML	59556	027-90003-14	Pipe, Exhaust, Front, LH	1
19.	03608	379360	59556	027-90003-15	Bracket , U-Bolt	1
20.	03608	467598	59556		Strap, Exhaust Pipe, Lower	2
21.					Strap, Tail Pipe, Lower	2



GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-31. DIESEL ENGINE ASSEMBLY
E-86

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-31. DIESEL ENGINE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556 03608	019-90001 9439402	59556 59556	019-90001 019-90001-111	Engine Assembly, Diesel Hose, Bulk, 1/4 ID	AR AR
2.	-----	COML			Screw, Hex, M4.3x1.41xLO	AR
3.	03608	25518880	59556	019-90001-112	Clamp, 1/4-5/8	AR
4.	03608	14033911	59556	019-90001-113	Pipe to Cylinder #1	1
	03608	14022912	59556	019-90001-114	Pipe to Cylinder #2	1
	03608	14033913	59556	019-90001-115	Pipe to Cylinder #3	1
	03608	14033914	59556	019-90001-116	Pipe to Cylinder #4	1
	03608	14033915	59556	019-90001-117	Pipe to Cylinder #5	1
	03608	14033916	59556	019-90001-118	Pipe to Cylinder #6	1
	03608	14033917	59556	019-90001-119	Pipe to Cylinder #7	1
	03608	14033918	59556	019-90001-120	Pipe to Cylinder #8	1
5.	03608	96051046	59556	019-90001-121	Bolt, M8x1.25x12	AR
6.	03608	14024233	59556	019-90001-122	Cover, Valve, Rocker	2
7.	03608	14033818	59556	019-90001-123	Stud, Valve Rocker Cover	AR
8.	03608	10035836	59556	019-90001-124	Stud, Cylinder Head, MIOx1.5x20	1
9.	03608	14028949	59556	019-90001-125	Cover, Cylinder Head Water Jacket	1
10.	03608	14028951	59556	019-90001-126	Gasket, Cylinder, Head Water Jacket Cover	2
11.	03608	14061569	59556	019-90001-127	Hose, Fuel Drain Back	1
12.	03608	3891759	59556	019-90001-128	Clamp, Fuel Drain Back Hose	AR
13.	03608	14066301	59556	019-90001-129	Cap, Fuel Injection Nozzle	2
14.	03608	11505057	59556	019-90001-130	Nut, Hex, MIOx1.5	AR
15.	03608	12040822	59556	019-90001-131	Controller, Glow Plug	1
16.	03608	14059057	59556	019-90001-132	Nozzle, Fuel Injector	8
17.	03608	23500075	59556	019-90001-133	Shaft, Valve Rocker Arm	4
18.	03608	23500074	59556	019-90001-134	Arm, Valve Rocker	16
19.	03608	23500076	59556	019-90001-135	Retaining Valve Rocker Arm	16
20.	03608	11508355	59556	019-90001-136	Bolt, Valve Rocker Arm Shaft	AR
21.	03608	N/S			Shaft, Valve Rocker	
22.	03608	3947770	59556	019-90001-137	Key, Valve Stem, Engine	32

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-31. DIESEL ENGINE ASSEMBLY (Continued)**

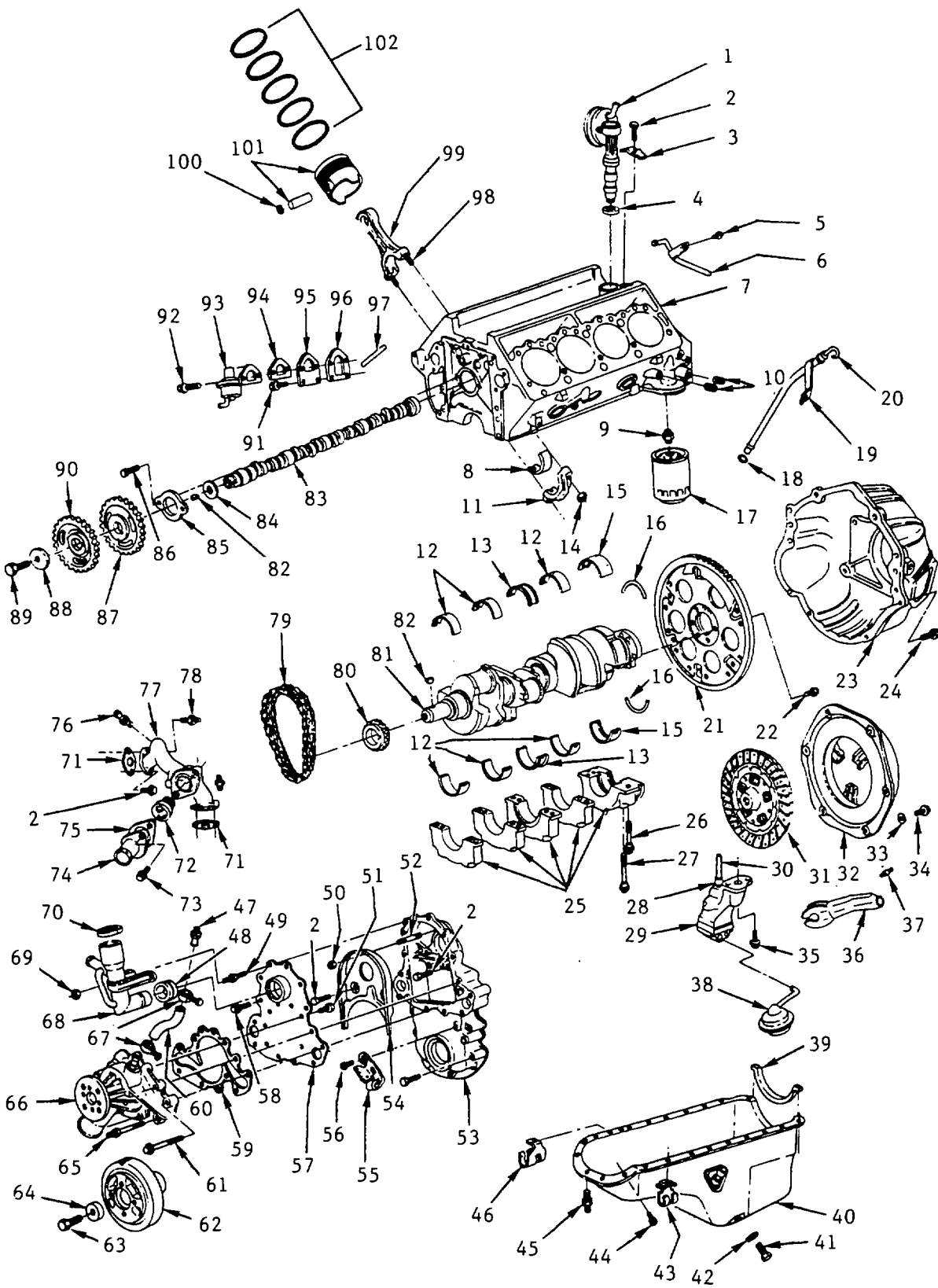
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
23.	03608	14022575	59556	019-90001-138	Rotator, Exhaust Valve	8
	03608	14003974	59556	019-90001-139	Cap, Inlet Valve Spring	8
24.	03608	14025515	59556	019-90001-140	Shield, Valve Stem, Oil	1
	03608	3835333	59556	019-90001-141	Seal, Valve Stem	16
25.	03608	14025512	59556	019-90001-142	Spring with Damper Valve	16
26.	03608	14077193	59556	019-90001-143	Bolt, Cylinder Head	34
27.	03608	5613738	59556	019-90001-144	Plug, Glow, Type 9G	8
28.	03608	11506088	59556	019-90001-145	Bolt, M10x1.5x70	AR
	03608	11508216	59556	019-90001-146	Bolt, M10x1.5x45	AR
29.	03608	11500323	59556	019-90001-147	Washer, Flat, M8x24x2.3 THK	AR
30.	03608	22501085	59556	019-90001-148	Nut, Hex, M8x1.25	AR
31.	03608	14028924	59556	019-90001-149	Stud, Exhaust Manifold	AR
32.	03608	14022657	59556	019-90001-150	Exhaust Manifold, LH	1
	03608	14025568	59556	019-90001-151	Exhaust Manifold, RH	1
33.	03608	14033928	59556	019-90001-152	Valve, Exhaust, Standard	8
	03608	14050661	59556	019-90001-153	Valve, Exhaust, .089 MM US	8
	03608	14050662	59556	019-90001-154	Valve, Exhaust, .394 MM US	8
34.	03608	23500131	59556	019-90001-155	Pre-Chamber, Standard	8
	03608	23500271	59556	019-90001-156	Pre-Chamber, .254 MM US	8
35.	03608	14066246	59556	019-90001-157	Gasket, Cylinder Head	2
36.	03608	14022640	59556	019-90001-158	Clamp, Hydraulic Valve Lifter Guide, Upper	4
37.	03608	14022639	59556	019-90001-159	Plate, Hydraulic Valve Lifter Guide, Upper	4
38.	03608	14057232	59556	019-90001-160	Rod, Push, Valve	16
39.	03608	14033927	59556	019-90001-161	Valve, Standard	8
	03608	14050658	59556	019-90001-162	Valve, .089 MM US	8
	03608	14050659	59556	019-90001-163	Valve, .394 MM US	8
40.	03608	5234530	59556	019-90001-164	Lifter, Standard	16
	03608	5234905	59556	019-90001-165	Lifter, .010 US	16
41.	03608	10035836	59556	019-90001-201	Stud, M10x1.5x20x20	1
	03608	14033946	59556	019-90001-202	Stud, M10x1.5x20x30.5	1

GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-31. DIESEL ENGINE ASSEMBLY (Continued)

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
42.	03608	14033945	59556	019-90001-166	Bracket, Engine Lift, Front	1
43.	03608	1404496	59556	019-90001-167	Gasket Kit	KT
44.	03608	14079304	59556	019-90001-168	Head with Pre-Chamber Cylinder	2
45.	03608	15599010	59556	019-90001-169	Switch, Glow Plug	2
46.	03608	11506101	59556	019-90001-170	Nut, Hex, MIOx1.5	AR
47.	03608	14063340	59556	019-90001-171	Clip, Fuel Pipe, Rear	1
48.	03608	14007619	59556	019-90001-172	Clip, Fuel Pump Pipe, Front	1
49.	03608	11507001	59556	019-90001-173	Bolt, Hex, MIOx1.5,30	7
	03608	11508208	59556	019-90001-174	Bolt, Hex, MIOx1.5x60	1
50.	03608	3750950	59556	019-90001-175	Tubing, Steel 3/8 OD x 25 ft.	AR
51.	03608	14007619	59556	019-90001-176	Clip, Fuel Pump Pipe, Front	1
52.	03608	11508202	59556	019-90001-177	Bolt, Hex, MIOx1.5x16	AR
	03608	2436163	59556	019-90001-178	Washer, Flat, 13/32 ID; 47/64 OD; 1/16 THK	AR
53.	03608	14022654	59556	019-90001-179	Stud, Exhaust Pipe	AR
54.	03608	14071068	59556	019-90001-180	Manifold, Intake	1
55.	03608	14028921	59556	019-90001-181	Stud, Hex, MIOx1.5x17x58	4
	03608	14033946	59556	019-90001-182	Stud, Hex, MIOx1.5x20x30	4
56.	03608	N/S			Bracket, Engine Lifting, Rear	1
57.	03608	11508202	59556	019-90001-183	Bolt, Hex Flange, MIOx1.5x20x9.8	AR
	03608	9439512	59556	019-90001-184	Washer, Lock, 3/8	AR
58.	03608	14025557	59556	019-90001-185	Gasket, Injection Nozzle	8
59.	03608	14033824	59556	019-90001-186	Bracket, Fuel Injection Pipe	1
60.	03608	14024997	59556	019-90001-187	Spring, Accelerator Control, CB1	1
61.	03608	14038647	59556	019-90001-188	Support, Accelerator Control, CB1	1
62.	03608	N/S			Clip, Fuel Drain Back Pipe	1
63.	03608	11508461	59556	019-90001-189	Bolt, Hex, M5xO.8x8	AR
64.	03608	14066252	59556	019-90001-190	Pipe, Fuel	1
65.	03608	N/S			Clip, Fuel Drain Back Pipe	1
66.	03608	2399078	59556	019-90001-191	Clip, Fuel Drain Back Pipe	1
67.	03608	14022652	59556	019-90001-192	Gear, Fuel Injection Pump, Driven	1

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-31. DIESEL ENGINE ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
68.	03608	14066255	59556	019-90001-193	Solenoid, Idle	1
69.	03608	14022651	59556	019-90001-194	Gasket, Fuel Injection Pump	1
70.	03608	23500251	59556	019-90001-195	Pump, Fuel Injection	1
71.	03608	180021	59556	019-90001-196	Bolt, Hex, 1/4-20x7/8	AR
72.	03608	14050405	59556	019-90001-197	Switch, Throttle Positive	1
73.	03608	14033953	59556	019-90001-198	Insert, Fuel Pipe Clip	1
74.	03608	560613	59556	019-90001-199	Clip, Fuel Pipe	1
75.	03608	603827	59556	019-90001-200	Tubing, Bulk, 1/4 OD	AR



**GROUP 12 ENGINE AND ACCESSORIES
 FIGURE E-32. DIESEL ENGINE ASSEMBLY
 (E-91 blank)/E-92**

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-32. DIESEL ENGINE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	019-90001	59556	019-90001	Diesel Engine Assembly	
1.	03608	7839416	59556	019-90001-1	Pump	1
2.	03608	11508931	59556	019-90001-2	Bolt, M10xl.5x25	1
3.	03608	14022650	59556	019-90001-3	Clamp	1
4.	03608	14022649	59556	019-90001-4	Gasket	1
5.	03608	11508255	59556	019-90001-5	Bolt, Hex, M8xl.25x16	AR
	03608	3834560	59556	019-90001-6	Washer, 11/32 ID; 11/16 OD; 9/64 THK	AR
6.	03608	14066252	59556	019-90001-7	Tube, Drain	1
7.	03608	14045059	59556	019-90001-8	Block, Fitted	1
	03608	14045061	59556	019-90001-9	Engine, Partial	1
8.	03608	18009094	59556	019-90001-10	Bearing, Connecting Rod, Standard	8
	03608	18009095	59556	019-90001-11	Bearing, Connecting Rod, .026 MM US	8
9.	03608	14022700	59556	019-90001-12	Connector, Oil Filter	1
10.	03608	3889330	59556	019-90001-13	Plug, Auto Hex, 1/4-18	1
11.	03608	N/S			Cap	1
12.	03608	18009096	59556	019-90001-14	Bearing Kit, Cross Shelf #1, 2, 4 (Upper and Lower)	3
	03608	18009097	59556	019-90001-15	Bearing Kit, Cross Shelf #1, 2, 4, .013 MM US	3
	03608	18009098	59556	019-90001-16	Bearing Kit, Cross Shelf #1, 2, 4, .026 MM US	3
13.	03608	14053399	59556	019-90001-17	Bearing Kit, Cross Shelf #3 Standard	1
	03608	14053400	59556	019-90001-18	Bearing Kit, Cross Shelf #3, .013 MM US	1
	03608	14055001	59556	019-90001-19	Bearing Kit, Cross Shelf #3, .026 MM US	1
14.	03608	14025527	59556	019-90001-20	Nut	16
15.	03608	14055002	59556	019-90001-21	Bearing Kit, Cross Shelf #5, Standard	1
	03608	14055003	59556	019-90001-22	Bearing Kit, Cross Shelf #5, .013 MM US	1
	03608	14055004	59556	019-90001-23	Bearing Kit, Cross Shelf #5, .026 MM US	1
16.	03608	14028939	59556	019-90001-24	Seal	2
17.	03608	6438384	59556	019-90001-25	Filter, Oil	1
18.	03608	274246	59556	019-90001-26	Seal, O-Ring	1
19.	03608	14045268	59556	019-90001-27	Tube, Oil Level	1
20.	03608	14050523	59556	019-90001-28	Indicator, Oil Level	1

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-32. DIESEL ENGINE ASSEMBLY (Continued)**

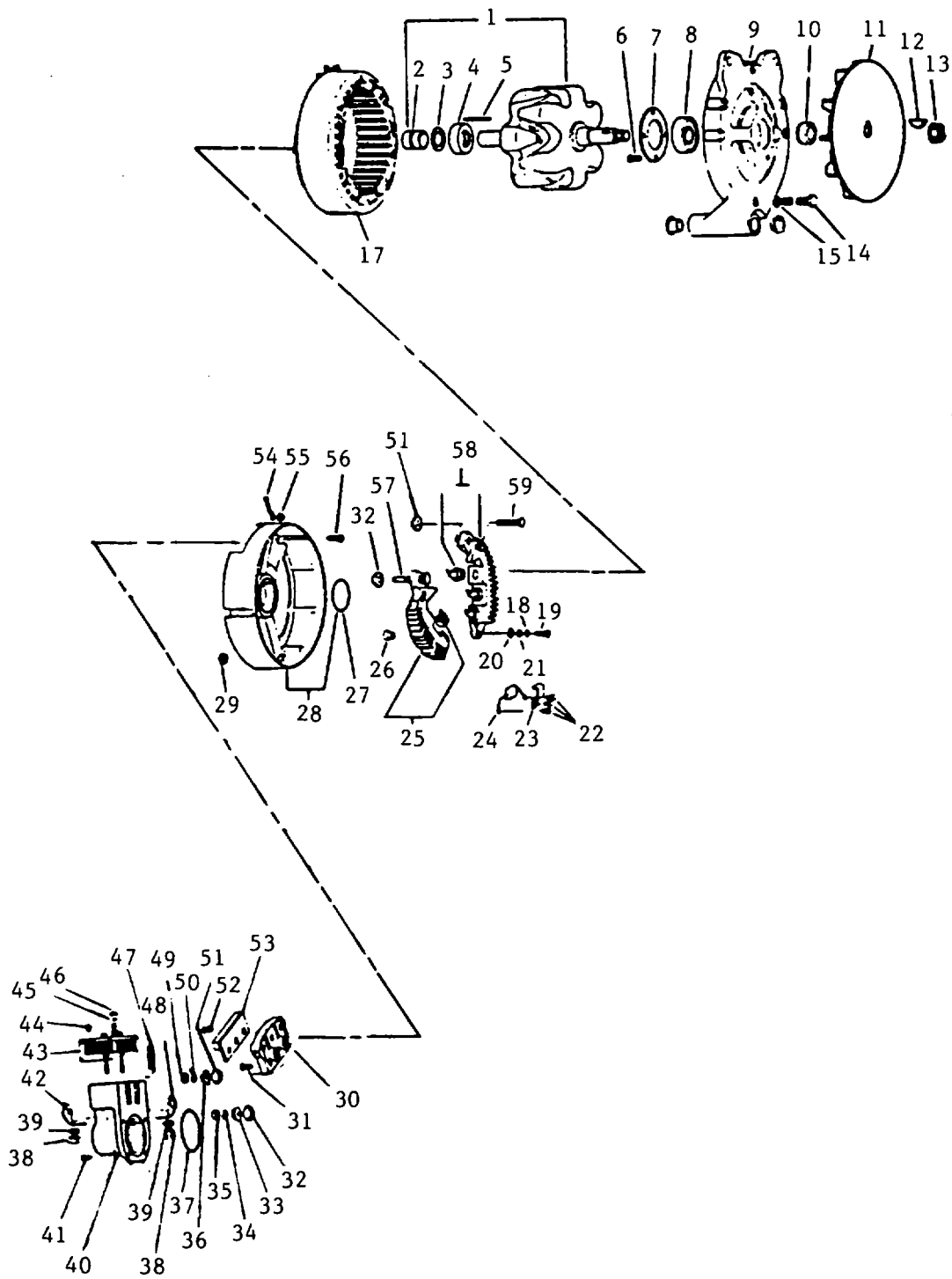
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
21.	03608	14077160	59556	019-90001-29	Flywheel	1
22.	03608	839756	59556	019-90001-30	Bolt	6
23.	03608	15530202	59556	019-90001-31	Housing, Clutch	1
24.	03608	3736035	59556	019-90001-32	Bolt, Hex, 3/8-16x1-19/64	AR
	03608	187372	59556	019-90001-33	Washer, Flat, 13/32 ID; 13/16 OD; 1/16 THK	AR
25.	03608	N/S			Cap, Crank Shaft Bearing	1
26.	03608	14077192	59556	019-90001-34	Bolt, Crank Shaft Bearing Cap, Outboard	10
27.	03608	14077195	59556	019-90001-35	Bolt, Crank Shaft Bearing Cap, Inboard	10
28.	03608	477249	59556	019-90001-36	Retainer, Distributor to Oil Pump Interior Shelf	1
29.	03608	14079426	59556	019-90001-37	Pump Kit, Oil	KT
30.	03608	14022699	59556	019-90001-38	Shaft, Oil Pump Interior to Vacuum Pump	1
31.	03608	15592285	59556	019-90001-39	Plate, Clutch Driven	1
32.	03608	15592289	59556	019-90001-40	Cover, with Pitman Clutch Pressure	1
33.	03608	9439512	59556	019-90001-41	Washer, Spring Lock, 3/8	AR
34.	03608	838653	59556	019-90001-42	Bolt, Clutch Cover and Pressure Pitman	6
35.	03608	14028914	59556	019-90001-43	Bolt, Oil Pump and Screen	1
36.	03608	15592270	59556	019-90001-44	Fork, Clutch	1
37.	03608	3729000	59556	019-90001-45	Stud, 3/16-16x1.38	1
38.	03608	14077182	59556	019-90001-46	Screen, Oil Pump	1
39.	03608	14022683	59556	019-90001-47	Seal	1
40.	03608	14061649	59556	019-90001-48	Pan, Oil	1
41.	03608	3923420	59556	019-90001-49	Screw, Magnetic, 7/16x1/2	1
42.	03608	3921989	59556	019-90001-50	Gasket, Oil Pan Drain Screw	1
43.	03608	1380949	59556	019-90001-51	Clamp, Transmission Oil Cooler Pipe	1
44.	03608	11505062	59556	019-90001-52	Screw, Hex, M6x1x16	24
45.	03608	14066307	59556	019-90001-53	Stud, Oil Pan	1
46.	03608	1380949	59556	019-90001-54	Clip	1
47.	03608	354501	59556	019-90001-55	Nipple	1
48.	03608	14028942	59556	019-90001-56	Grommet, Oil Separator	1
49.	03608	14045263	59556	019-90001-57	Stud, e 8x1.25x16.75x25	2

GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-32. DIESEL ENGINE ASSEMBLY (Continued)

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
50.	03608	11505057	59556	019-90001-58	Nut, Hex, M10x1.5x9	AR
51.	03608	11508255	59556	019-90001-59	Bolt, Hex, M8xl.25x16	AR
52.	03608	14024203	59556	019-90001-60	Stud, M10xl.5x20x15	2
	03608	10024396	59556	019-90001-61	Stud, M10xl.5x15x30	1
53.	03608	14044971	59556	019-90001-62	Cover with Pointer	1
54.	03608	14033820	59556	019-90001-63	Baffle with Case Vent	1
55.	03608	N/S			Pointer, Timing	1
56.	03608	N/S			Screw, Pointer, Timing	1
57.	03608	14024208	59556	019-90001-64	Plate, Water Pump Backing	1
58.	03608	11502605	59556	019-90001-65	Bolt, Hex, M8xl.25x20	AR
59.	03608	14024209	59556	019-90001-66	Gasket with Pump Pitman	1
60.	03608	495692	59556	019-90001-67	Hose, Rubber, 5/8 ID	1
61.	03608	10021332	59556	019-90001-68	Bolt, Hex, M10xl.5x95	AR
62.	03608	14022671	59556	019-90001-69	Damper, Torsional	1
63.	03608	14022672	59556	019-90001-70	Bolt, M16xl.5x50	1
64.	03608	14022673	59556	019-90001-71	Washer, M16x5x50.5x10	1
65.	03608	14071080	59556	019-90001-72	Stud, M10xl.5	3
66.	03608	23500133	59556	019-90001-73	Pump, Water	1
67.	03608	477402	59556	019-90001-74	Clamp, Worm, 11/16x1-5/16	AR
68.	03608	14071059	59556	019-90001-75	Tube, with Case Vent and 011 Filler	1
69.	03608	11509480	59556	019-90001-76	Nut, Hex, M8xl.25	AR
70.	03608	6410961	59556	019-90001-77	Cap, Oil Filler	1
71.	03608	14028951	59556	019-90001-78	Gasket, Cylinder Head Water Jacket Cover	2
72.	03608	14077122	59556	019-90001-79	Thermostat	1
73.	03608	11509160	59556	019-90001-80	Bolt, Hex, M10xl.5x35	AR
74.	03608	14028918	59556	019-90001-81	Outlet, Water	1
75.	03608	14028916	59556	019-90001-82	Gasket, Water Outlet	1
76.	03608	331967	59556	019-90001-83	Nipple, Heater Hose, 1/2-14x0.7 lg., 5/8 inch	AR
77.	03608	14028917	59556	019-90001-84	Housing, Water, with Cover and Thermostat	1
78.	03608	14033946	59556	019-90001-85	Stud, Water, with Cover and Thermostat Housing	AR

GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-32. DIESEL ENGINE ASSEMBLY (Continued)

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
79.	03608	14022647	59556	019-90001-86	Chain, Timing	1
80.	03608	14022646	59556	019-90001-87	Sprocket, Crank Shaft	1
81.	03608	23500247	59556	019-90001-88	Crankshaft	1
82.	03608	124549	59556	019-90001-89	Key, Woodruff #9, 3/16x3/4	1
83.	03608	14066308	59556	019-90001-90	Camshaft	1
84.	03608	14022643	59556	019-90001-91	Ring, Cam Shaft Sprocket Spacer	1
85.	03608	14022644	59556	019-90001-92	Bearing, Cam Shaft Thrust	1
86.	03608	11508255	59556	019-90001-93	Bolt, Hex Head, M8x1.25x16	AR
87.	03608	14022645	59556	019-90001-95	Sprocket, Cam Shaft	1
88.	03608	14022648	59556	019-90001-95	Washer, Cam Shaft	1
89.	03608	N/S			Bolt	AR
90.	03608	14022653	59556	019-90001-96	Gear, Fuel Injection Pump Drive	1
91.	03608	N/S			Bolt, Hex, M6x1x13	1
92.	03608	3895411	59556	019-90001-97	Screw with Lockwasher, 3/8-16x1-7/16	1
93.	03608	6471831	59556	019-90001-98	Pump Kit, Fuel	KT
94.	03608	3705044	59556	019-90001-99	Gasket, Fuel Pump	1
95.	03608	3719599	59556	019-90001-100	Plate, Fuel Pump Mounting	1
96.	03608	3705044	59556	019-90001-101	Gasket, Fuel Pump Mounting Plate	1
97.	03608	14050425	59556	019-90001-102	Rod, Fuel Pump Push	1
98.	03608	14025526	59556	019-90001-103	Bolt, Connecting Rod	16
99.	03608	14025523	59556	019-90001-104	Rod, Connecting	8
100.	03608	23500398	59556	019-90001-105	Piston, Retaining	16
101.	03608	23500391	59556	019-90001-106	Piston with Pin, Standard	8
	03608	23500392	59556	019-90001-107	Piston with Pin, Standard High	8
	03608	23500393	59556	019-90001-108	Piston with Pin, 0.75 MM US	8
102.	03608	15537018	59556	019-90001-109	Ring Kit, Standard	8
	03608	15537020	59556	019-90001-110	Ring Kit, 0.75 MM US	8



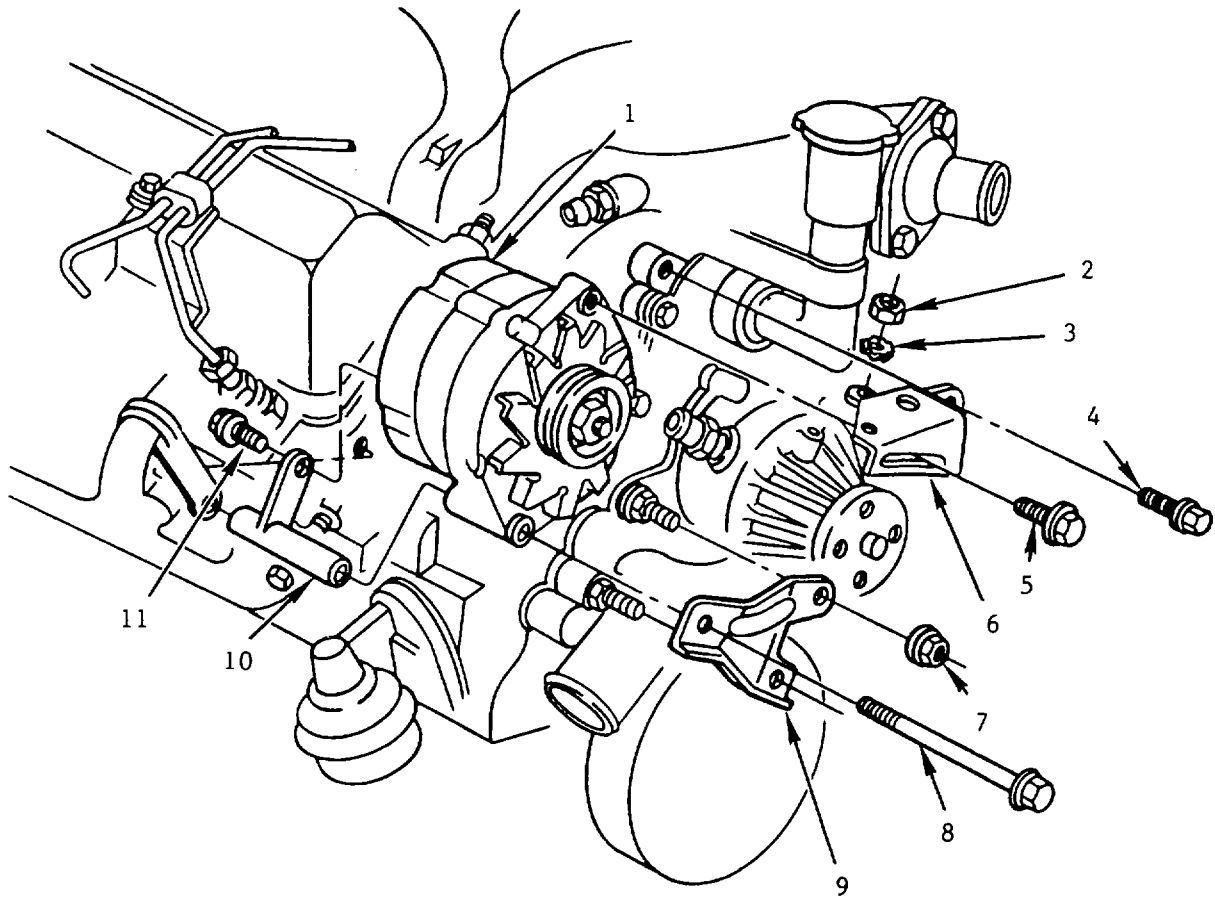
GROUP 12 ENGINE AND ACCESSORIES
 FIGURE E-33. ALTERNATOR ASSEMBLY
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**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-33. ALTERNATOR ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	35510	A0017706JA	59556	257-00009	Alternator Assembly	
1.	35510	95022	59556	257-00009-1	Rotor and Slip Ring Assembly	1
2.	35510	57462	59556	257-00009-2	Slip Ring Assembly	1
3.	35510	57626	59556	257-00009-3	Washer, Insulation	1
4.	35510	26853	59556	257-00009-4	Bearing, #203	1
5.	35510	30300	59556	257-00009-5	Wedge, Slot	1
6.	35510	58754	59556	257-00009-6	Screw, 10-32x.44 Flat Head, S-Tap	4
7.	35510	59234	59556	257-00009-7	Retainer, Bearing	1
8.	35510	57166	59556	257-00009-8	Bearing, #305	1
9.	35510	77773	59556	257-00009-9	Housing, D.E.	1
10.	35510	59324	59556	257-00009-10	Spacer, Fan	1
11.	35510	75633	59556	257-00009-11	Fan Assembly	1
12.	35510	6399	59556	257-00009-12	Key, Woodruff #8	1
13.	35510	74107	59556	257-00009-13	Nut, 5/8-18 Hex, Flat Lock	1
14.	35510	59972	59556	257-00009-14	Screw, 10-32x3.62 Hex Head St.	3
15.	35510	75451	59556	257-00009-15	Washer, Belleville	3
16.					ITEM NUMBER NOT USED	2
17.	35510	97078	59556	257-00009-17	Stator Assembly	1
18.	35510	2434	59556	257-00009-18	Lockwasher, #10	2
19.	35510	78337	59556	257-00009-19	Screw, 10-32x3/4 Pan Head	2
20.	35510	52066	59556	257-00009-20	Washer, Insulation	2
21.	35510	2385	59556	257-00009-21	Washer, Guard	2
22.	35510	73543	59556	257-00009-22	Screw, 6-32, Hex, S-Tap	3
23.	35510	73760	59556	257-00009-23	Clamp	1
24.	35510	96545	59556	257-00009-24	Capacitor Assembly	1
25.	35510	79193	59556	257-00009-25	Rectifier Assembly, Positive	1
26.	35510	73547	59556	257-00009-26	Bushing, Insulation	2
27.	35510	57597	59556	257-00009-27	O-Ring	1
28.	35510	71098	59556	257-00009-28	S.R.E. Housing and O-Ring Assembly	1
29.	35510	26175	59556	257-00009-29	Nut, 10-32 Elastic Stop	3

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-33. ALTERNATOR ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
30.	35510	73635	59556	257-00009-30	Insulator	1
31.	35510	73659	59556	257-00009-31	Screw, 10-32x.50 Square Head, St.	3
32.	35510	73546	59556	257-00009-32	Bushing, Insulation	2
33.	35510	73009	59556	257-00009-33	Nut, 5/16-18	1
34.	35510	3231	59556	257-00009-34	Lockwasher, 5/16	1
35.	35510	2364	59556	257-00009-35	Nut, 5/16-18 Hex, St.	1
36.	35510	59982	59556	257-00009-36	Nut, 1/4-20	1
37.	35510	57611	59556	257-00009-37	Ring, Sealing	1
38.	35510	5622	59556	257-00009-38	Nut, 6-32, Hex Head, Br.	2
39.	35510	13676	59556	257-00009-39	Lockwasher, #6, S-Proof	2
40.	35510	78524	59556	257-00009-40	Diode Trio	1
41.	35510	13622	59556	257-00009-41	Screw, 8-32x.44 Round Head, St.	4
42.	35510	78706	59556	257-00009-42	Jumper	1
43.	35510	77973	59556	257-00009-43	Regulator Assembly	1
44.	35510	97287	59556	257-00009-44	Screw, plastic	1
45.	35510	4534	59556	257-00009-45	Lockwasher, #10	1
46.	35510	4340	59556	257-00009-46	Nut, 10-24, Hex, St.	1
47.	35510	77302	59556	257-00009-47	Brush Assembly	2
48.	35510	78705	59556	257-00009-48	Jumper	1
49.	35510	2771	59556	257-00009-49	Nut, 1/4-20, Hex, St.	1
50.	35510	2523	59556	257-00009-50	Lockwasher, 1/4 inch	1
51.	35510	73545	59556	257-00009-51	Bushing, Insulation	2
52.	35510	79088	59556	257-00009-52	Screw, 10-32x.38 Round Head, St.	3
53.	35510	79026	59556	257-00009-53	Diode Trio	1
54.	35510	73657	59556	257-00009-54	Jumper Assembly	3
55.	35510	31587	59556	257-00009-55	Nut, Lock	3
56.	35510	5179	59556	257-00009-56	Screw, 10-32x.50 Round Head, St.	2
57.	35510	78336	59556	257-00009-57	Screw, Terminal	1
58.	35510	79415	59556	257-00009-58	Rectifier Assembly, Negative	1
59.	35510	58432	59556	257-00009-59	Screw, Terminal	1

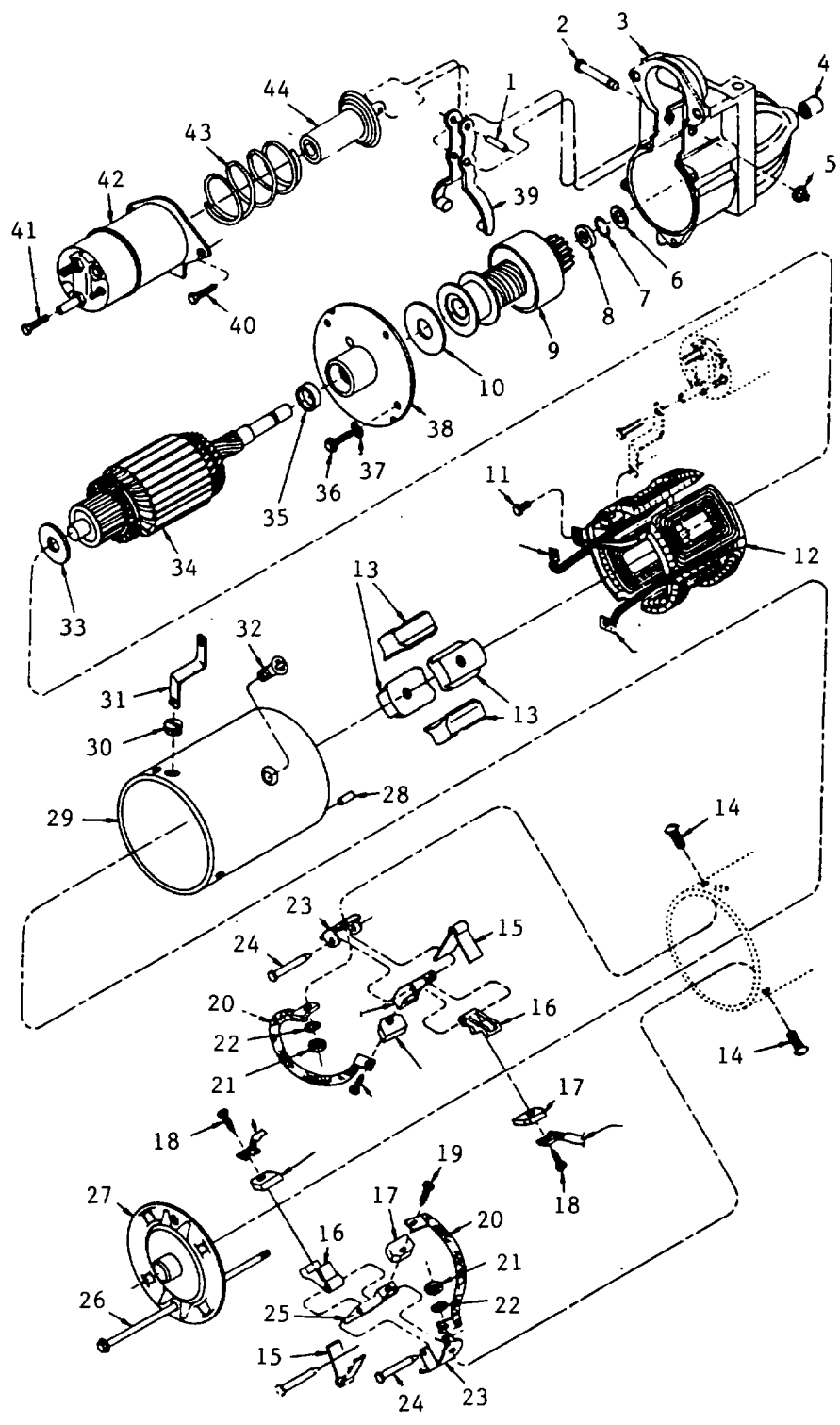


GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-34. DIESEL GENERATOR MOUNTING ASSEMBLY

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**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-34. DIESEL GENERATOR MOUNTING ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556 03608	138-90003 1100250	59556 59556	138-90003 138-90003-1	Diesel Generator Mounting Generator	1 1
2.	03608	11504108	59556	138-90003-2	Nut, Hex, M1Oxl.5	1
3.	03608	136857	59556	138-90003-3	Washer, External Tooth, Lock, 7/16	1
4.	03608	11502788	59556	138-90003-4	Bolt, Hex, MIOxl.5x25	1
5.	03608	11502788	59556	138-90003-5	Bolt, Hex, MIOxl.5x25	1
6.	03608	15592108	59556	138-90003-6	Bracket	1
7.	03608	11502812	59556	138-90003-7	Nut, MIOxl.5	1
	03608	2436164	59556	138-90003-8	Washer, Flat, 15/32 ID; 7/8 OD; 1/16 THK	1
8.	03608	14050450	59556	138-90003-9	Bolt	1
9.	03608	14033877	59556	138-90003-10	Bracket	1
10.	03608	14033878	59556	138-90003-11	Bracket	1
11.	03608	11502605	59556	138-90003-12	Bolt, Hex, M8xl.25x20	1



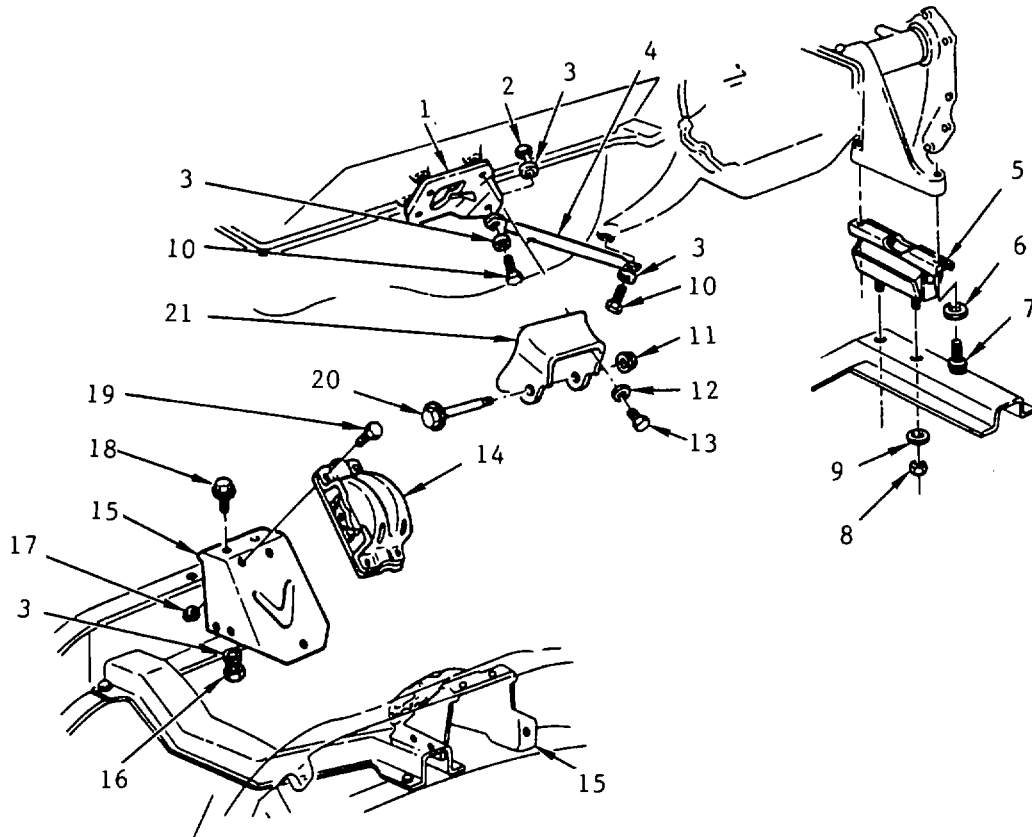
**GROUP 12 ENGINE AND ACCESSORIES
 FIGURE E-35. STARTER MOTOR , DIESEL**

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-35. STARTER MOTOR, DIESEL**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	03608	1998442	59556	123-90002	Starter Motor, Diesel	REF
1.	03608	1894321	59556	123-90002-1	Pin, Plunger	1
2.	03608	1945804	59556	123-90002-2	Shaft, Shift Lever	1
3.	03608	1979443	59556	123-90002-3	Housing, Drive	1
4.	03608	1839345	59556	123-90002-4	Bushing, D.E.	1
5.	03608	11505767	59556	123-90002-5	Ring, Retainer	AR
6.	03608	1928023	59556	123-90002-6	Washer	1
7.	03608	1928022	59556	123-90002-7	Ring	1
8.	03608	1928021	59556	123-90002-8	Collar	1
9.	03608	1893345	59556	123-90002-9	Drive	1
10.	03608	821453	59556	123-90002-10	Washer	1
11.	03608	3841575	59556	123-90002-11	Screw, 10-32x1/2	AR
12.	03608	1978123	59556	123-90002-12	Coil, Field	1
13.	03608	1887021	59556	123-90002-13	Pole, Shoe	4
14.	03608	120221	59556	123-90002-14	Screw, 10-24x1/2	AR
15.	03608	1986019	59556	123-90002-15	Spring, Brush	2
16.	03608	1926618	59556	123-90002-16	Holder, Brush Insulator	AR
17.	03608	1852880	59556	123-90002-17	Brush	4
18.	03608	1967747	59556	123-90002-18	Screw	2
19.	03608	9414224	59556	123-90002-19	Screw, 8-32x5/8	AR
20.	03608	1876361	59556	123-90002-20	Lead, Brush Guard	2
21.	03608	120361	59556	123-90002-21	Nut, Hex, #10-24	AR
22.	03608	9439514	59556	123-90002-22	Washer, Helical #10	AR
23.	03608	1876458	59556	123-90002-23	Support, Brush	2
24.	03608	1966923	59556	123-90002-24	Pin, Brush	2
25.	03608	1876359	59556	123-90002-25	Holder, Brush Guard	2
26.	03608	1960908	59556	123-90002-26	Bolt, Thru	AR
27.	03608	1978137	59556	123-90002-27	Frame, Commutator End	1
28.	03608	1976740	59556	123-90002-28	Pin, Dowel	1
29.	03608	1113590	59556	123-90002-29	Housing, (FRAME)	1
30.	03608	1955946	59556	123-90002-30	Grommet	1

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-35. STARTER MOTOR, DIESEL**

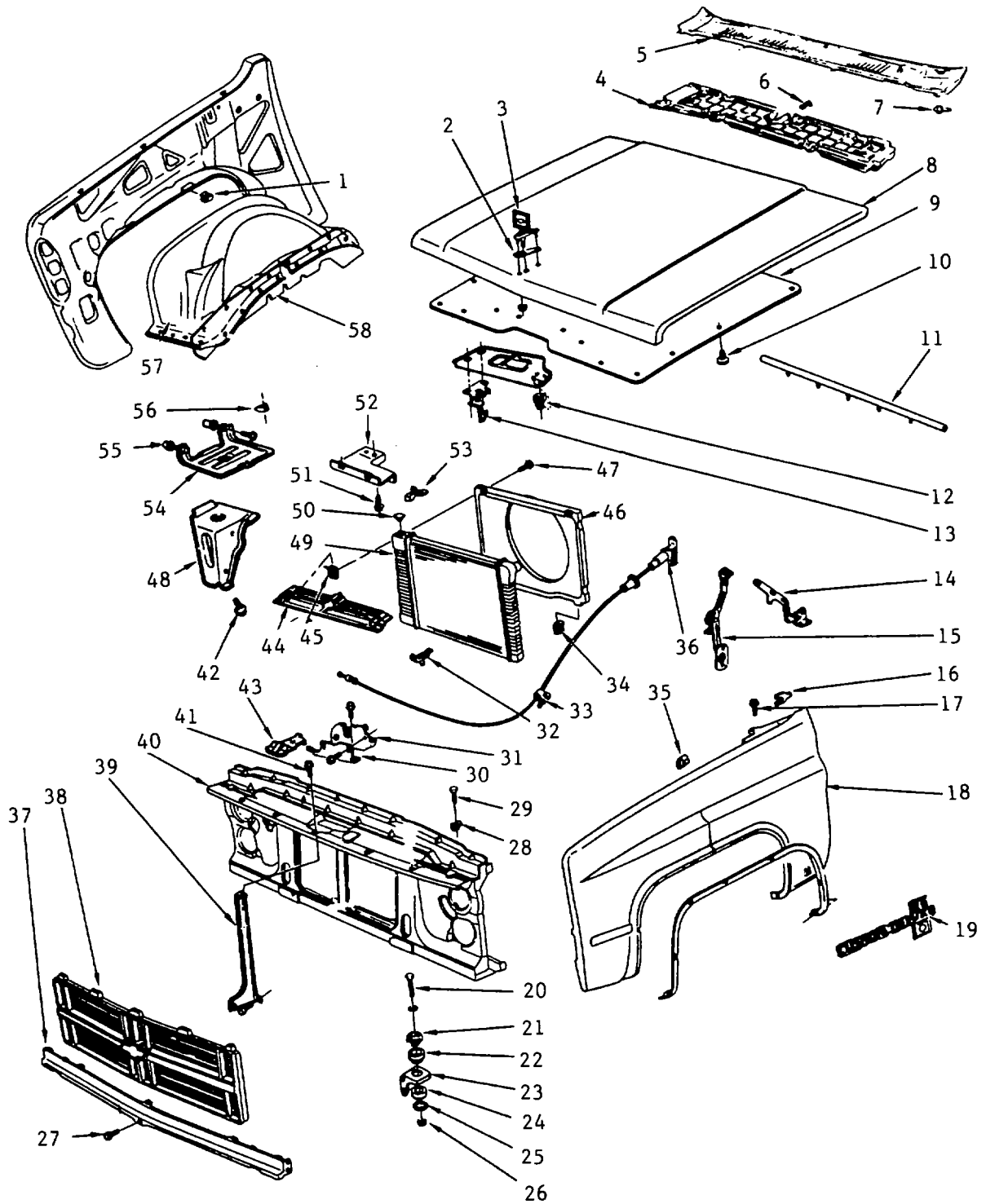
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	03608	1876358	59556	123-90002-31	Connector, Field Coils to SW	1
32.	03608	1968396	59556	123-90002-32	Screw, Pole Shoe	1
33.	03608	1914842	59556	123-90002-33	Washer, Brake	1
34.	03608	1974786	59556	123-90002-34	Armature	1
35.	03608	1894023	59556	123-90002-35	Bushing, Center Bearing	1
36.	----	COML			Screw, Center Bearing	1
37.	----	COML			Lockwasher, Center Bearing	1
38.	03608	1976882	59556	123-90002-36	Bearing, Center	1
39.	03608	801433	59556	123-90002-37	Lever, Shift	1
40.	03608	132264	59556	123-90002-38	Bolt, 1/4-20x3/4	1
41.	03608	9427815	59556	123-90002-39	Screw, Hex Tapping, 10-32x1/2	1
42.	03608	1114458	59556	123-90002-40	Switch, Solenoid	1
43.	03608	1978281	59556	123-90002-41	Spring, Plunger Return	1
44.	03608	1941113	59556	123-90002-42	Plunger	1



GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-36. ENGINE AND TRANSMISSION MOUNTING ASSEMBLY

**GROUP 12 ENGINE AND ACCESSORIES
FIGURE E-36. ENGINE AND TRANSMISSION MOUNTING ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	3705444	59556	018-90003-1	Engine and Transmission Mounting Bracket	2
2.	03608	9424985	59556	018-90003-2	Nut, Hex, 7/16-14	AR
3.	03608	3990160	59556	018-90003-3	Washer, Flat, 15/32 ID; 7/8 OD; 3/32 THK	AR
4.	03608	14037873	59556	018-90003-4	Brace	2
5.	03608	14049626	59556	018-90003-5	Mounting, Transmission	1
6.	03608	121744	59556	018-90003-6	Washer, Spring Lock, 18 inches	AR
7.	03608	14076109	59556	018-90003-7	Bolt, Hex, MIOxl.5x27	AR
8.	03608	2039107	59556	018-90003-8	Nut, Hex, MIOxl.5	AR
9.	03608	25517558	59556	018-90003-9	Washer, Split, Flat, Mlix20x2, Soft	AR
10.	03608	9440038	59556	018-90003-10	Bolt, Hex, 7/16-14xl/4	AR
11.	03608	6262212	59556	018-90003-11	Nut, 7/16-14	AR
12.	03608	331247	59556	018-90003-12	Washer, Flat, 3/8 ID; 3/4 OD; .12 THK	AR
13.	03608	9440249	59556	018-90003-13	Bolt, Hex, 3/8-16x1-1/4	AR
14.	03608	14071939	59556	018-90003-14	Mounting, Engine	2
15.	03608	14071969	59556	018-90003-15	Bracket, Engine Mounting Frame, LH	1
	03608	14071970	59556	018-90003-16	Bracket, Engine Mounting Frame, RH	1
16.	03608	9422299	59556	018-90003-17	Nut, Hex Lock, 7/16-14	AR
17.	03608	9422297	59556	018-90003-18	Nut, Hex Lock, 3/8-16	AR
18.	03608	9440356	59556	018-90003-19	Bolt, Hex, 7/16-14x1-1/4	AR
19.	03608	9424320	59556	018-90003-20	Bolt, Hex, 3/8-16x1	AR
20.	03608	460308	59556	018-90003-21	Bolt, Engine Mounting, LH	1
	03608	334972	59556	018-90003-22	Bolt, Engine Mounting, RH	1
21.	03608	14071967	59556	018-90003-23	Bracket, Engine Mounting	2



**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-37. SHEET METAL, FRONT END**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-37. SHEET METAL, FRONT END**

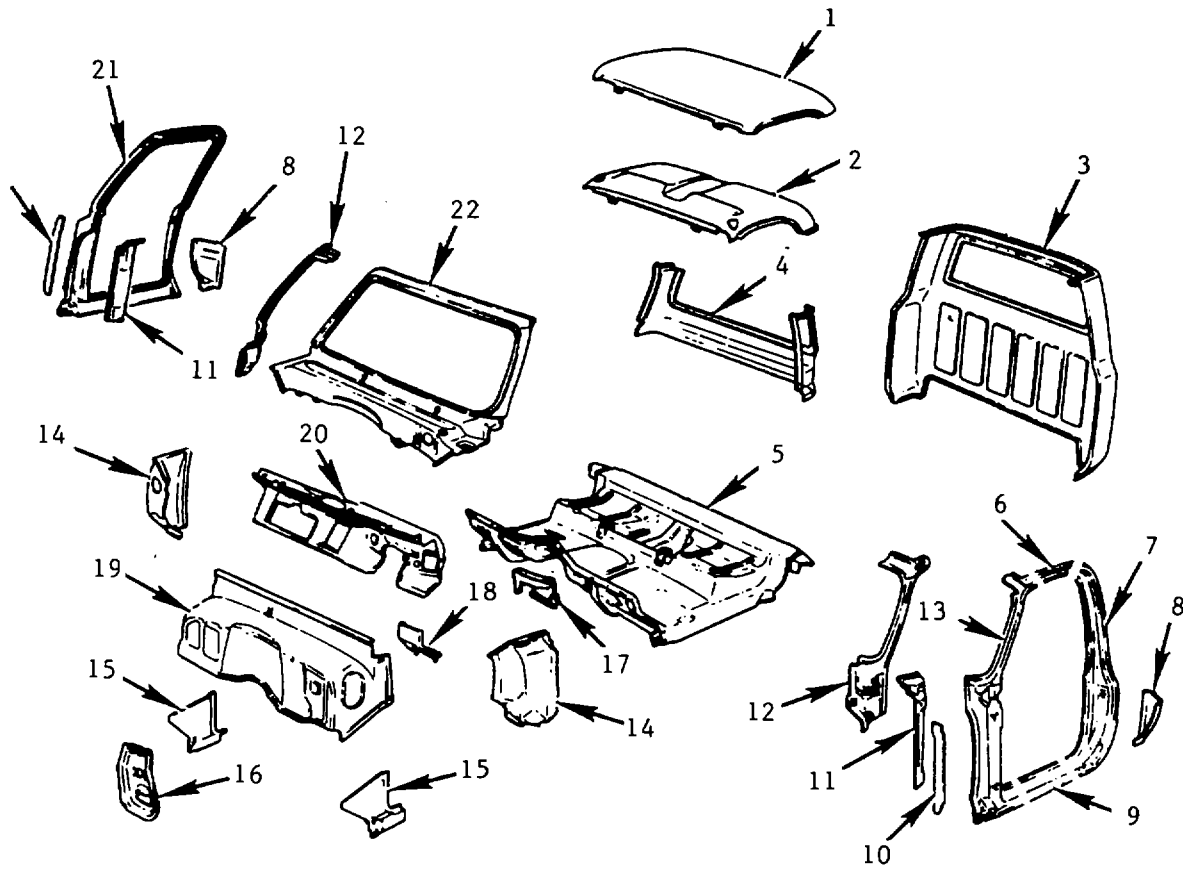
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Sheet Metal, Front End	
2.	03608	14032779	59556	081-90003-1	Nut, U-Type, 5/16-18	AR 1
3.	03608	14039999	59556	081-90003-2	Seal, Hood Ornament	1
4.	03608	15598709	59556	081-90003-3	Ornament, Hood	1
5.	03608	14038994	59556	081-90003-4	Screen, Windshield Frame	1
6.	03608	15598770	59556	081-90003-5	Panel, Cowl Top Vent	1
7.	03608	15598769	59556	081-90003-6	Bracket, Cowl Top Vent Mounting	AR
8.	03608	15599228	59556	081-90003-7	Retainer, Cowl Top Vent	AR
9.	03608	12306178	59556	081-90003-8	Hood	1
10.	03608	3977775	59556	081-90003-9	Insulator, Hood	1
11.	03608	14018523	59556	081-90003-10	Retainer, Hood Insulator	AR
12.	03608	14018532	59556	081-90003-11	Seal, Hood, Rear	1
13.	03608	14018526	59556	081-90003-12	Spring, Hood Pop-Up	1
14.	03608	14043823	59556	081-90003-13	Catch, Hood, Latch, Secondary	1
	03608	14043824	59556	081-90003-14	Hinge, Hood, LH	1
15.	03608	14021253	59556	081-90003-15	Hinge, Hood, RH	1
	03608	14021254	59556	081-90003-16	Linkage, Hood Hinge Assembly, LH	1
16.	03608	345819	59556	081-90003-17	Linkage, Hood Hinge Assembly, RH	1
17.	03608	334195	59556	081-90003-18	Shim, Front Fendor	AR
18.	03608	15522751	59556	081-90003-19	Screw with Washer, 3/8-16x1-1/2	2
	03608	15522752	59556	081-90003-20	Fender, Front, LH	1
19.	03608	14043697	59556	081-90003-21	Fender, Front, RH	1
20.	03608	9421419	59556	081-90003-22	Plate, Front Fender, Name	2
21.	03608	3946247	59556	081-90003-23	Bolt, 1/2-13x5	AR
22.	03608	15597600	59556	081-90003-24	Spacer, Radiator Support	2
23.	03608	14029193	59556	081-90003-25	Cushion, Radiator Support, Upper	2
24.	03608	15597629	59556	081-90003-26	Bracket, Radiator Support	2
25.	03608	14027472	59556	081-90003-27	Cushion, Radiator Support, Lower	2
26.	03608	120238	59556	081-90003-28	Reatiner, Radiator Support Cushion	2
					Nut, 1/2-13	AR

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-37. SHEET METAL, FRONT END (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
27.	03608	9432487	59556	081-90003-29	Screw, Hex, with Connecting Washer 5/16-18x7/8	AR
28.	03608	329882	59556	081-90003-30	Nut, Hood Panel Bumper	AR
29.	03608	472450	59556	081-90003-31	Bumper, Hood	2
30.	03608	14018531	59556	081-90003-32	Bracket, Hood Latch	1
31.	03608	14070703	59556	081-90003-33	Latch, Hood	1
32.	03608	6264100	59556	081-90003-34	Pad	4
33.	03608	3186659	59556	081-90003-35	Strap	AR
34.	03608	6262199	59556	081-90003-36	Clip	2
35.	03608	6262054	59556	081-90003-37	Bumper, Hood Panel, Side	6
36.	03608	14039963	59556	081-90003-38	Cable, Hood, Primary Latch Release	1
37.	03608	14043880	59556	081-90003-39	Panel, Front End	1
38.	03608	15598720	59556	081-90003-40	Grille, Radiator	1
39.	03608	14021243	59556	081-90003-41	Support, Hood Latch Catch	1
40.	03608	15522682	59556	081-90003-42	Support, Radiator	1
41.	03608	9432487	59556	081-90003-43	Screw, Hex, with Connecting Washer 5/16-18x7/8	AR
42.	03608	9432487	59556	081-90003-44	Screw, with Connecting Washer, 5/16-18-7/8	AR
43.	03608	14063151	59556	081-90003-45	Bracket, Radiator Fan Shroud, LH	1
	03608	14063152	59556	081-90003-46	Bracket, Radiator Fan Shroud, RH	1
44.	03608	14039948	59556	081-90003-47	Panel, radiator Upper Mounting	1
45.	03608	3982098	59556	081-90003-48	Nut, U-Type, 1/4-20	AR
46.	03608	14039951	59556	081-90003-49	Shroud, Radiator Fan	1
47.	03608	9432487	59556	081-90003-50	Screw with Washer, 5/16-18x7/8	AR
48.	03608	15594129	59556	081-90003-51	Support, Battery Tray	
49.	03608	3053686	59556	081-90003-52	Radiator, Engine Cooling	1
50.	03608	6410785	59556	081-90003-53	Cap, Radiator	1
51.	03608	363137	59556	081-90003-54	Retainer, Panel, Hole Diameter 1/4 inch	AR
52.	03608	14027795	59556	081-90003-55	Shield, Front with H Panel Splash, LH	1
	03608	14027796	59556	081-90003-56	Shield, Front with H Panel Splash, RH	1
53.	03608	6264100	59556	081-90003-57	Pad, Radiator Retainer, Upper	4

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-37. SHEET METAL, FRONT END (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
54.	03608	15594129	59556	081-90003-58	Tray, Battery, LH	1
	03608	15594128	59556	081-90003-59	Tray, Battery, RH	1
55.	03608	14038986	59556	081-90003-60	Nut, Tube Anchor	2
56.	03608	14005061	59556,	081-90003-61	Battery, Retainer	AR
57.	03608	15594889	59556	081-90003-62	Panel, Front with H, LH	1
	03608	15594890	59556	081-90003-63	Panel, Front with H, RH	1
58.	03608	14027645	59556	081-90003-64	Shield, LH	1
	03608	14027646	59556	081-90003-65	Shield, RH	1



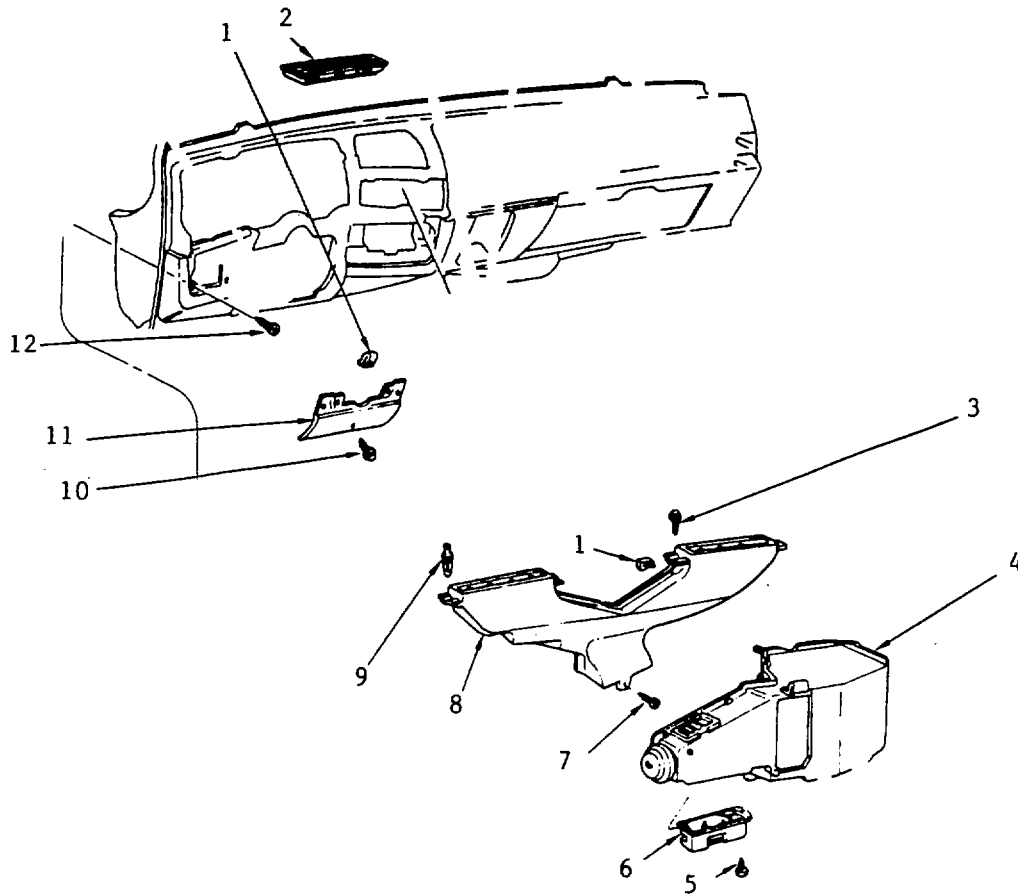
**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-38. SHEET METAL, CAB**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-38. SHEET METAL, CAB**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	685488	59556	081-90004-1	Panel, Roof, Outer	1
2.	03608	3999884	59556	081-90004-2	Panel, Roof, Inner	1
3.	03608	14067883	59556	081-90004-3	Panel, Body, Rear, Outer	1
4.	03608	467289	59556	081-90004-4	Panel, Body, Rear, Inner	1
5.	03608	14070523	59556	081-90004-5	Panel, Floor and Toe	1
6.	03608	347113	59556	081-90004-6	Frame, Front Door Upper, LH	1
	03608	347114	59556	081-90004-7	Frame, Front Door Upper, RH	1
7.	03608	347115	59556	081-90004-8	Pillar, Front Door Frame Lock, LH	1
	03608	347116	59556	081-90004-9	Pillar, Front Door Frame Lock, RH	1
8.	03608	15596901	59556	081-90004-10	Filler, Body Frame, LH	1
	03608	15596902	59556	081-90004-11	Filler, Body Frame, RH	1
9.	03608	14095607	59556	081-90004-12	Panel, Front Door, Frame Rocker, LH	1
	03608	14095608	59556	081-90004-13	Panel, Front Door, Frame Rocker, RH	1
10.	03608	6262042	59556	081-90004-14	Extension, Frame	1
11.	03608	377785	59556	081-90004-15	Reinforcement, Frame, LH	1
	03608	377786	59556	081-90004-16	Reinforcement, Frame, RH	1
12.	03608	14022847	59556	081-90004-17	Panel, Front Door Frame, LH	1
	03608	14022848	59556	081-90004-18	Panel, Front Door Frame, RH	1
13.	03608	347111	59556	081-90004-19	Pillar, Front Door Frame Hinge, LH	1
	03608	347112	59556	081-90004-20	Pillar, Front Door Frame Hinge, RH	1
14.	03608	14027481	59556	081-90004-21	Panel, LH	1
	03608	14029968	59556	081-90004-22	Panel, RH	1
15.	03608	14027477	59556	081-90004-23	Panel, Inner, LH	1
	03608	14027478	59556	081-90004-24	Panel, Inner, RH	1
16.	03608	15593577	59556	081-90004-25	Reinforcement, Dash Panel	1
17.	03608	14043813	59556	081-90004-26	Shield, Floor and Toe	1
18.	03608	467282	59556	081-90004-27	Brace, Brake Pedal Bracket	1
19.	03608	15593569	59556	081-90004-28	Panel, Dash and Cowl	1

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
 FIGURE E-38. SHEET METAL, CAB (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
20.	03608	15590559	59556	081-90004-29	Panel, Instrument	1
21.	03608	14039173	59556	081-90004-30	Frame, LH	1
22.	03608	15598706	59556	081-90004-31	Panel, Windshield Frame and Plenum	1

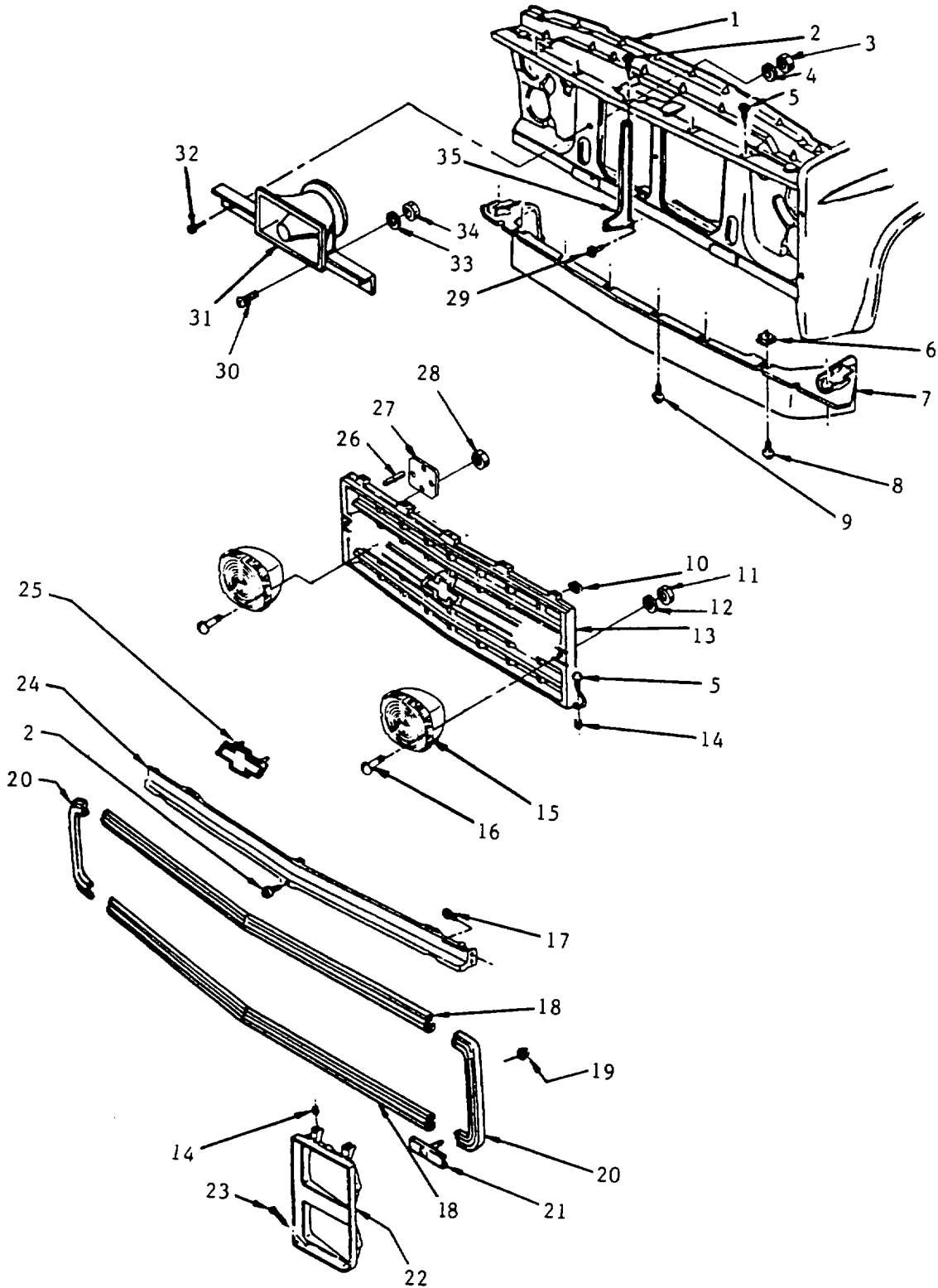


**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-39. AIR DISTRIBUTION SYSTEM ASSEMBLY**

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**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-39. AIR DISTRIBUTION SYSTEM ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	9417488	59556	150-90001-34	Air Distribution System Assembly	REF
2.	03608	14064924	59556	150-90001-41	Nut, U-Spring (8-18)	2
3.	03608	11509135	59556	150-90001-23	Grille, Defroster Duct	1
4.	03608	3054315	59556	150-90001-25	Screw, Hex Washer Head, M4.2x1.41x16	AR
5.	03608	11504059	59556	150-90001-30	Case Heater Assembly	1
6.	03608	14013122	59556	150-90001-31	Screw, Hex Washer Head Tap, 4.2x1.41x25	AR
7.	03608	9416223	59556	150-90001-28	Outlet Heater Air	1
8.	03608	14074319	59556	150-90001-32	Screw, Hex Washer Head Tap, 10-16x7/8	1
9.	03608	14019205	59556	150-90001-33	Nozzle, Defroster	1
10.	03608	11508947	59556	150-90001-37	Retainer, Windshield Defroster Nozzle	1
11.	03608	6274970	59556	150-90001-38	Screw, Pan Head, M4.2x1.41x16	AR
12.	03608	11509185	59556	150-90001-39	Cover, Instrument Panel , Strong Column, Lower	1
					Screw, Hex Washer Head Tap, M4.2x1.41x13	1



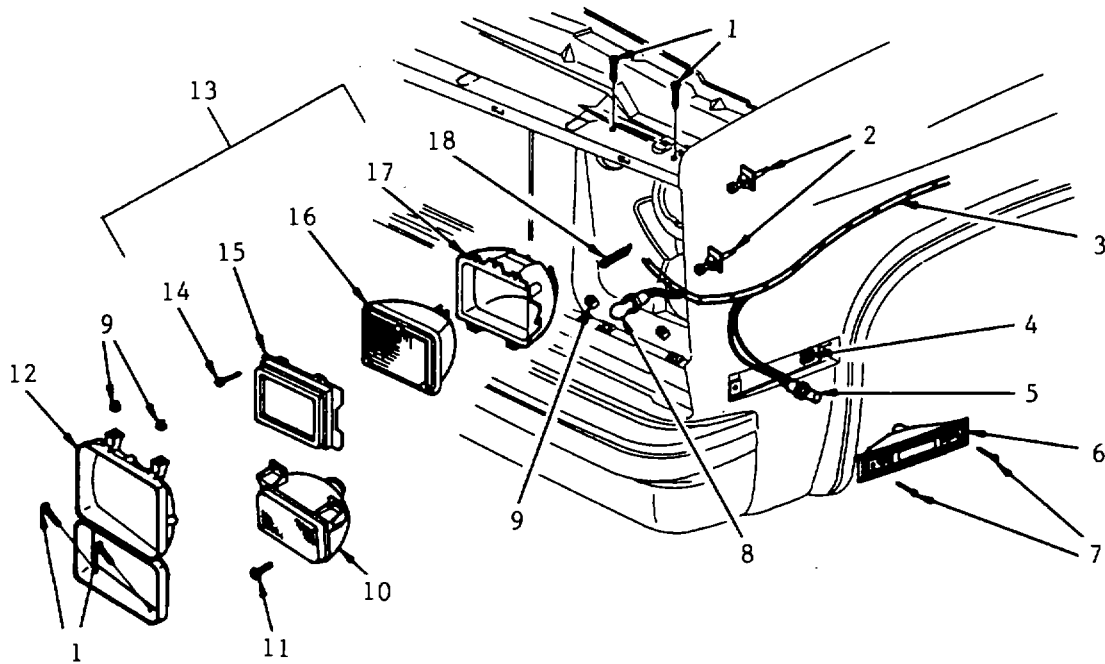
**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-40. RADIATOR GRILLE ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-40. RADIATOR GRILLE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556 03608	080-90014 15522682	59556 59556	080-90014 080-90014-1	Radiator Grille Support, Radiator Complete	1
2.	03608	473892	59556	080-90014-2	Bolt, Hex, with Connecting Washer	AR
3.	----	COML			Nut, 1/4-20	2
4.	----	COML			Washer, 1/4	2
5.	03608	11500751	59556	080-90014-3	Screw, Hex, with Flat Washer, Tap	AR
6.	03608	10008002	59556	080-90014-4	Nut, U-Shape, 5/16-18	AR
7.	03608	14033332	59556	080-90014-5	Deflector	1
8.	03608	11504765	59556	080-90014-6	Screw, Hex, M8x2.12x30	AR
9.	03608	9423842	59556	080-90014-7	Bolt, Hex, 5/16-18x1-3/8	AR
10.	03608	14088415	59556	080-90014-8	Nut, U-Shape, M4.2x1.41	AR
11.	----	COML			Nut, 3/16-18	4
12.	----	COML			Washer, 3/16	8
13.	03608	15598720	59556	080-90014-9	Grille, Radiator	1
14.	03608	347347	59556	080-90014-10	Nut	AR
15.	77977	CE-600-1R	59556	151-00003	Warning Light Assembly	2
16.	----	COML			Bolt, 3/16-18x2-1/2	8
17.	03608	2014469	59556	080-90014-11	Bolt, Hex, 5/16-18x7/8	AR
18.	03608	15594898	59556	080-90014-12	Moulding	1
	03608	15594897	59556	080-90014-13	Moulding	1
19.	03608	11501047	59556	080-90014-14	Nut, M5x15	AR
20.	03608	15593227	59556	080-90014-15	Moulding, LH	1
	03608	15593228	59556	080-90014-16	Moulding, RH	1
21.	03608	14072850	59556	080-90014-17	Clip	AR
22.	03608	15598725	59556	080-90014-18	Bezel, Headlamp, LH	1
	03608	15598726	59556	080-90014-19	Bezel, Headlamp, RH	1
23.	03608	11501877	59556	080-90014-20	Screw, M4.2x1.41x30	AR
24.	03608	14043880	59556	080-90014-21	Panel	1
25.	03608	14043879	59556	080-90014-22	Emblem	1

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-40. RADIATOR GRILLE ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
26.	59556	151-00011	59556	151-00011	Spacer, 1/4 OD x 1-1/8 Long	4
27.	59556	151-00002	59556	151-00002	Bracket, 5 Inch Sealed Beam	1
28.	----	COML			Nut, 3/16-18	4
29.	30608	473892	59556	080-90014-2	Bolt, Hex, with Connecting Washer	AR
30.	----	COML			Bolt, 10-32x1/2	2
31.	65063	TS 24	59556	125-00006	Speaker, External	1
32.		COML			Bolt, 1/4-20x3/4	2
33.	----	COML			Washer, #10	2
34.	----	COML			Nut, #10-32	2
35.	30608	14021243	59556	080-90014-23	Support, Hood Latch Catch	1



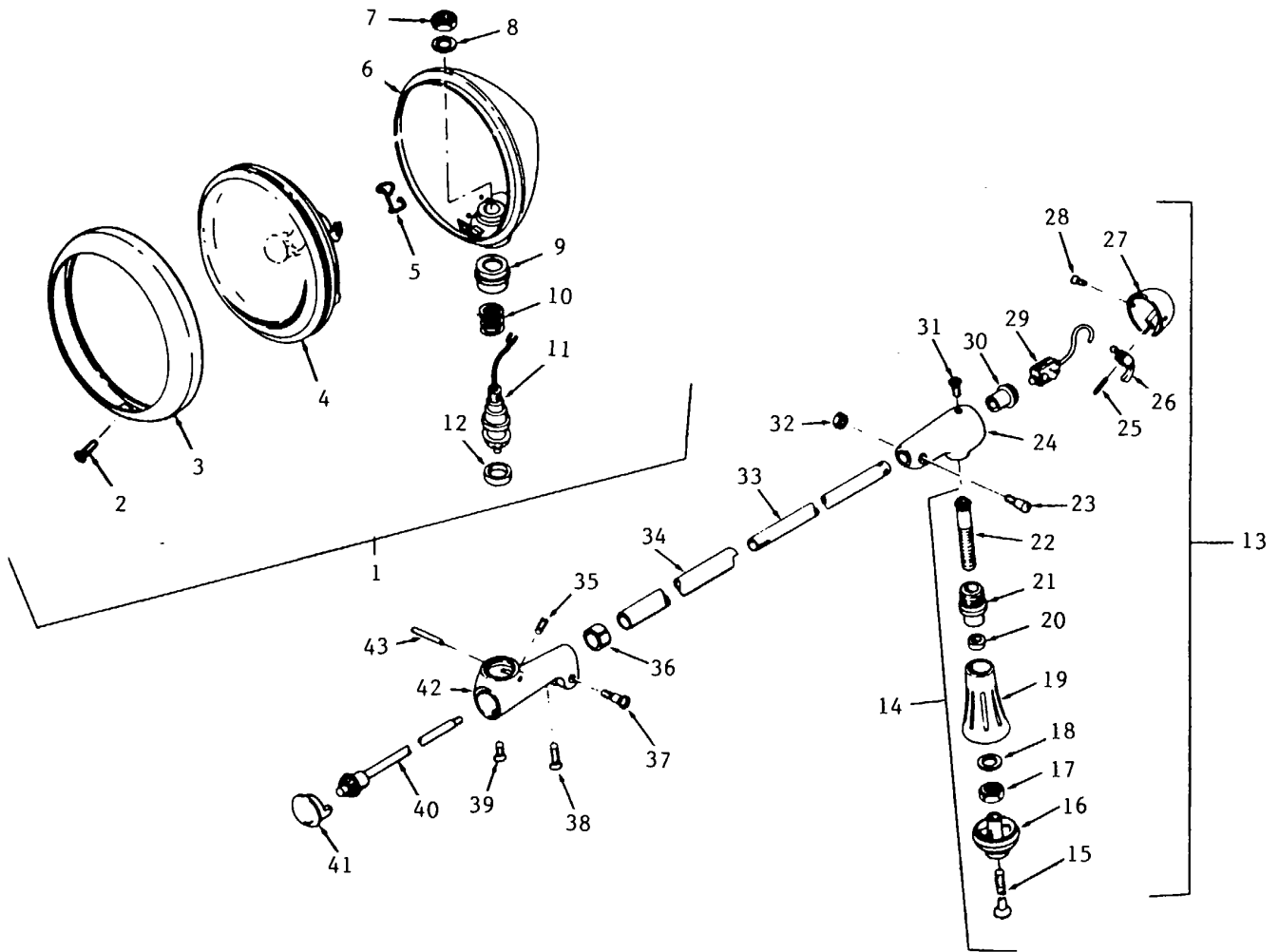
**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-41. HEADLIGHT ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-41. HEADLIGHT ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	11502796	59556	151-90001-1	Front Lamp (Single Lamp System)	4
2.	03608	362379	59556	151-90001-2	Screw, M4.2x1.41x20	4
3.	03608	12047128	59556	151-90001-3	Nut	1
4.	03608	9431530	59556	151-90001-4	Harness	2
5.	03608	6298886	59556	151-90001-5	Nut, Spring, 8-18	2
	03608	9421330	59556	151-90001-6	Socket	2
6.	03608	915449	59556	151-90001-7	Bulb	1
	03608	915450	59556	151-90001-8	Lamp, Side Marker, LH	1
7.	03608	11504662	59556	151-90001-9	Lamp, Side Marker, RH	4
8.	03608	12013813	59556	151-90001-10	Screw, M4.2x1.41x25	2
	03608	9438850	59556	151-90001-11	Socket	2
9.	03608	347347	59556	151-90001-12	Bulb	4
10.	03608	915908	59556	151-90001-13	Nut	2
11.	03608	9419004	59556	151-90001-14	Lamp	4
12.	03608	15598725	59556	151-90001-15	Bolt, 1/4-20x3/4	1
	03608	15598726	59556	151-90001-16	Bezel, Headlamp, LH	1
13.	03608	5968097	59556	151-90001-17	Bezel, Headlamp, RH	2
14.	03608	5966249	59556	151-90001-18	Capsule	4
15.	03608	5969466	59556	151-90001-19	Screw	2
16.	03608	5968098	59556	151-90001-20	Ring	2
17.	03608	5968095	59556	151-90001-21	Beam, Seal	2
18.	03608	459461	59556	151-90001-22	Ring	2
					Spring	2

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-41. HEADLIGHT ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	03608	1876358	59556	123-90002-31	Connector	1
32.	03608	1968396	59556	123-90002-32	Screw, Pole Shoe	1
33.	03608	1914842	59556	123-90002-33	Washer, Brake	1
34.	03608	1974786	59556	123-90002-34	Armature	1
35.	03608	1894023	59556	123-90002-35	Bushing	1
36.	03608	132264	59556	123-90002-36	Screw	AR
37.	03608	9439514	59556	123-90002-37	Lockwasher	AR
38.	03608	1976882	59556	123-90002-38	Bearing	1
39.	03608	801433	59556	123-90002-39	Lever, Shift	1
40.	03608	132264	59556	123-90002-40	Bolt, Machine, 1/4-20x3/4	AR
41.	03608	9427815	59556	123-90002-41	Screw, Hex Tapping, 10-32x1/2	AR
42.	03608	1114458	59556	123-90002-42	Switch, Solenoid	1
	03608	1956226	59556	123-90002-43	Contact	1
43.	03608	1978281	59556	123-90002-44	Spring, Plunger Return	1
44.	03608	1941113	59556	123-90002-45	Plunger	1



GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
 FIGURE E-42. SPOTLIGHT ASSEMBLY

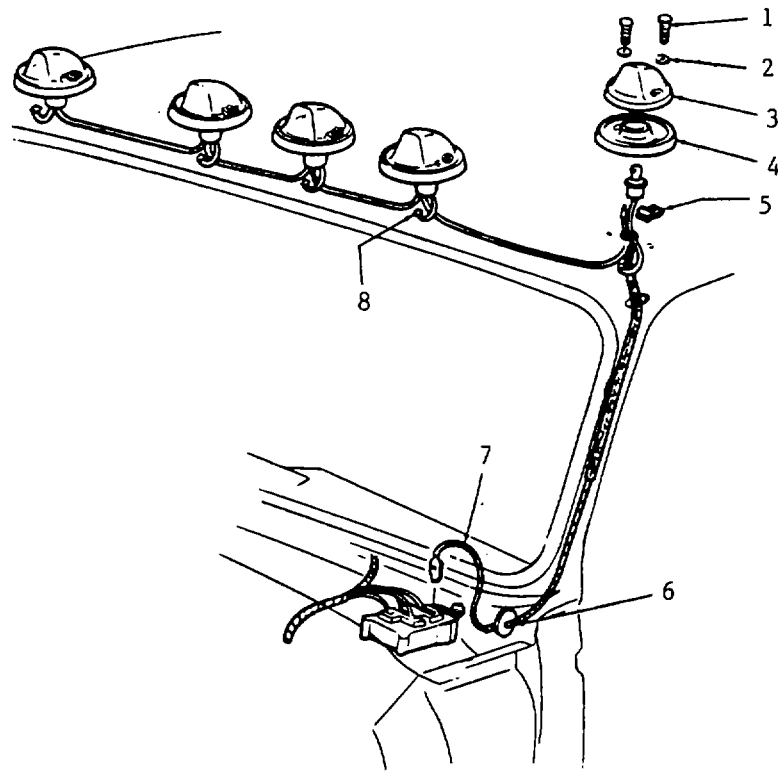
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**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-42. SPOTLIGHT ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	78977	225 B	59556	151-00007	Spotlight Assembly	
	78977	1L	59556	151-00007-1	Bracket Assembly, Spotlight	
1.	78977	6750	59556	151-00007-2	Head Assembly, Spotlight	1
2.	78977	6471	59556	151-00007-3	Screw, Machine	1
3.	78977	6565-U	59556	151-00007-4	Ring Assembly	1
4.	78977	M518005-4530	59556	151-00007-5	Lamp, Sealed Beam	1
5.	78977	6598	59556	151-00007-6	Spring, Lamp	4
6.	78977	6578	59556	151-00007-7	Shell Assembly	1
7.	78977	6209	59556	151-00007-8	Nut, Plain, Hex	1
8.	78977	3059	59556	151-00007-9	Washer, Flat	1
9.	78977	6421	59556	151-00007-10	Bushing	1
10.	78977	6473	59556	151-00007-11	Spring, Helical	1
11.	78977	6403A	59556	151-00007-12	Headpost Assembly	1
12.	78977	2017	59556	151-00007-13	Washer, Flat	1
13.	78977	6701	59556	151-00007-14	Handle and Housing Assembly	1
14.	78977	6750-FM	59556	151-00007-15	Sub-Handle Assembly	1
15.	78977	6350B	59556	151-00007-16	Screw, Machine	1
16.	78977	6350A-FM	59556	151-00007-17	Cap, Handle	1
17.	78977	6209	59556	151-00007-18	Nut, Pinion	1
18.	78977	3059	59556	151-00007-19	Washer, Lock	1
19.	78977	6450-FM	59556	151-00007-20	Handle, Tube	1
20.	78977	3089	59556	151-00007-21	Washer, Flat	1
21.	78977	6123	59556	151-00007-22	Bushing, Tube	1
22.	78977	6122	59556	151-00007-23	Pinion, Shaft	1
23.	78977	1836	59556	151-00007-24	Screw, Wedge	1
24.	78977	6001	59556	151-00007-25	Housing, Handle	1
25.	78977	6051A	59556	151-00007-26	Screw, Machine	1
26.	78977	6151-A	59556	151-00007-27	Switch, Toggle	1
27.	78977	6002	59556	151-00007-28	Switch, Cap	1
28.	78977	6051A	59556	151-00007-29	Screw, Machine	1

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-42. SPOTLIGHT ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
29.	78977	6453	59556	151-00007-30	Switch Assembly	1
30.	78977	6405	59556	151-00007-31	Gear Shaft	1
31.	78977	P313DD	59556	151-00007-32	Screw, Machine	1
32.	78977	1834	59556	151-00007-33	Bushing, Wedge	1
33.	78977	6428G	59556	151-00007-34	Tube, Intermediate	1
34.	78977	6029G	59556	151-00007-35	Tube, Outside	1
35.	78977	61418	59556	151-00007-36	Screw, Friction	1
36.	78977	3062	59556	151-00007-37	Bushing, Tube	1
37.	78977	6040A	59556	151-00007-38	Screw, Machine	1
38.	78977	6412	59556	151-00007-39	Screw, Machine	1
39.	78977	6441	59556	151-00007-40	Screw, Machine	1
40.	78977	6427G	59556	151-00007-41	Tube, Inside	1
41.	78977	6424	59556	151-00007-42	Plug, Handle	1
42.	78977	6100	59556	151-00007-43	Housing, Head	1
43.	78977	6140	59556	151-00007-44	Pin, Wedge	1

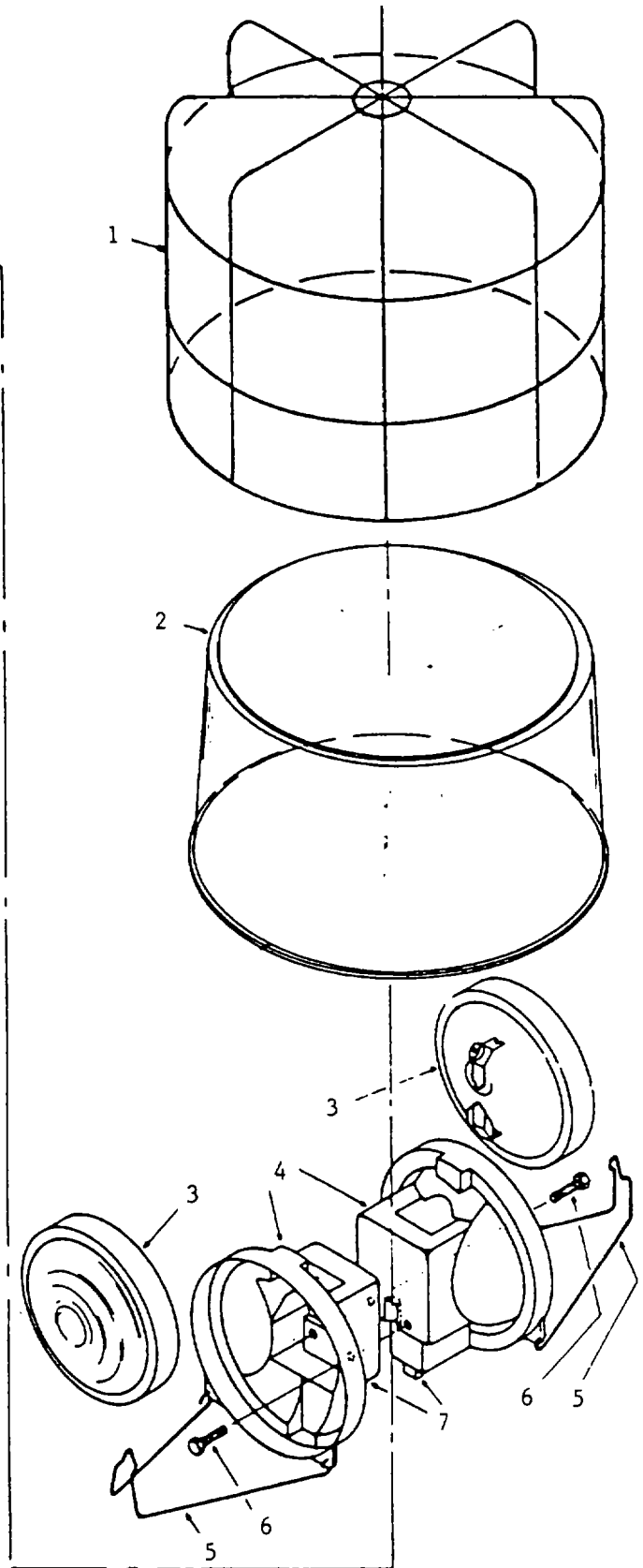
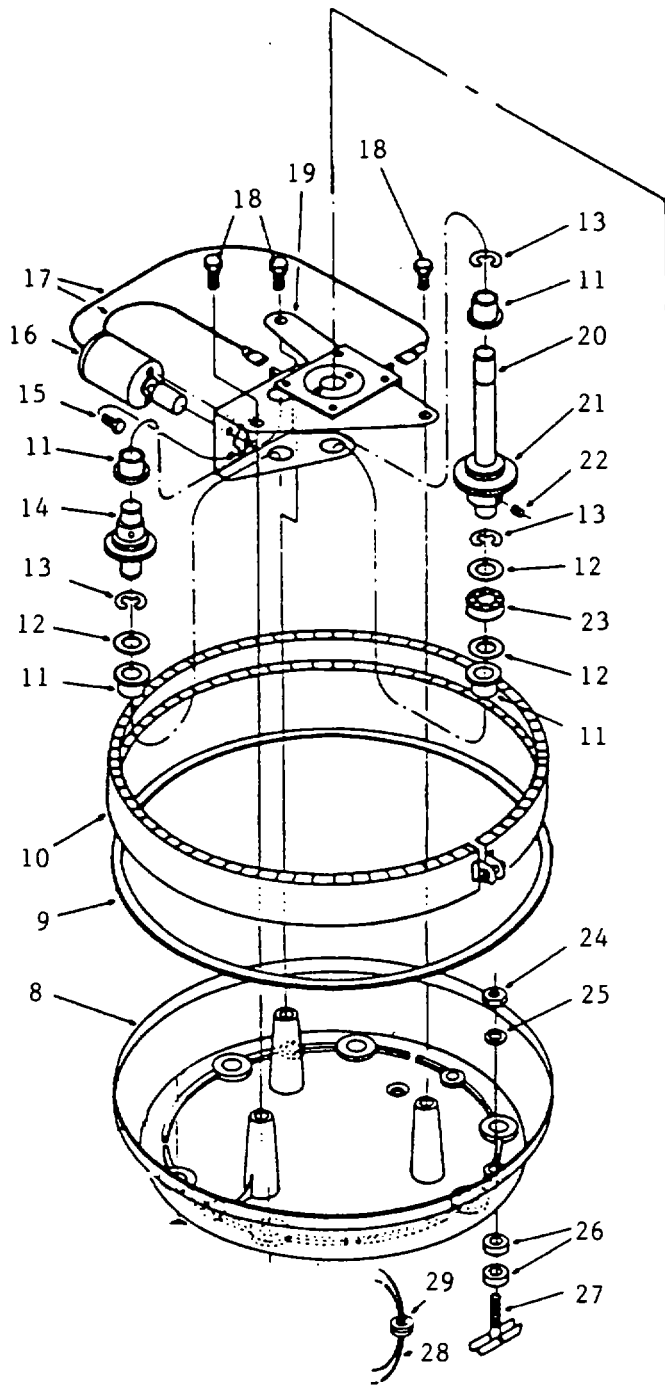


**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-43. ROOF MARKER LAMP ASSEMBLY**

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**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-43. ROOF MARKER LAMP ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608 -----	UO1 COML	59556	151-00005	Roof Marker Lamp "CK" Screw, 10-24x3/4	2
2.	03608	5943939	59556	151-00005-1	Washer, Roof Marker	2
3.	03608	684662	59556	151-00005-2	Lens, Roof Marker	1
4.	03608	3942898	59556	151-00005-3	Insulator	1
5.	03608	329882	59556	151-00005-4	Nut	1
6.	03608	3661804	59556	151-00005-5	Grommet	1
7.	03608	NSS			Wire	AR
8.	03608	694624	59556	151-00005-7	Socket Assembly	1
	03608	9421330	59556	151-00005-8	Bulb	1



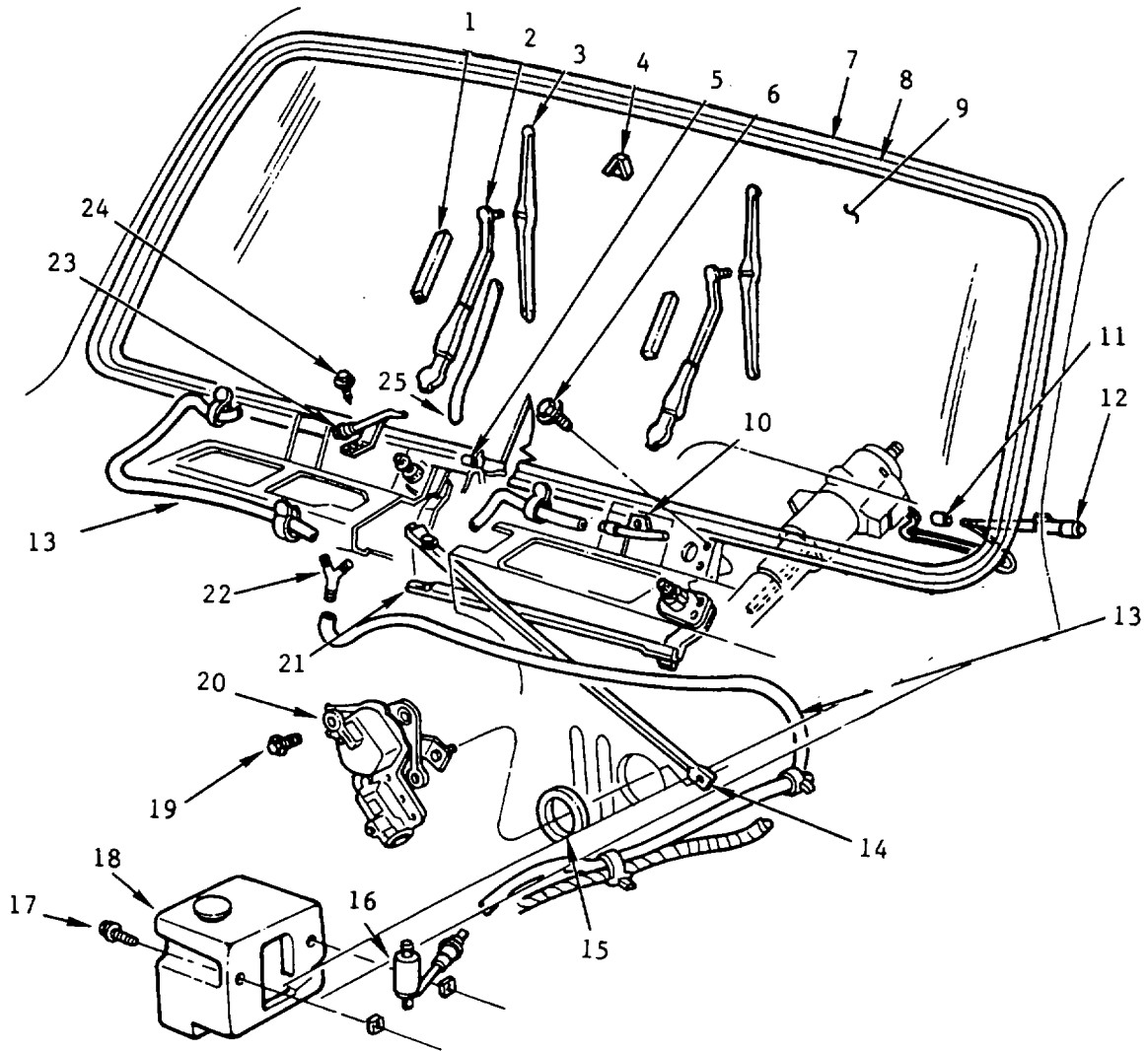
GROUP 13 CAB ASSEMBLY, LIGHTS,
 SWITCHES, GAUGES, CONTROLS AND INDICATORS.
 FIGURE E-44. ROOF WARNING (BEACON) LIGHT ASSEMBLY

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-44. ROOF WARNING (BEACON) LIGHT ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	65063	14-012C5B-R	59556	151-00006	Roof Beacon Light Assembly	REF
1.	59556	151-00006-1	59556	151-00006-1	Wire Cover, Light	1
2.	65063	8422C002-05	59556	151-00006-2	Dome, Acrylic, Clear	1
3.	65063	8107A033	59556	151-00006-3	Lamp, 14*012SE, GE4416 (12V)	2
4.	65063	8422B400A	59556	151-00006-4	Lampholder Assembly	2
5.	65063	8422B016	59556	151-00006-5	Wire Clamp, Lamp	2
6.	65063	7011A016-12	59556	151-00006-6	Screw, Hex Head, #70x3/4	2
7.	65063	8240A032	59556	151-00006-7	Spring, Brush	2
	65063	8240A031-01	59556	151-00006-8	Brush Replacement	AR
B.	65063	8422C377A	59556	151-00006-9	Base, Permanent Mounting	AR
9.	65063	8422A388A	59556	151-00006-10	Gasket	1
10.	65063	8422C381A-01	59556	151-00006-11	Retaining Band Assembly (Includes Nameplate)	AR
11.	65063	8422A011	59556	151-00006-12	Bearing, 3/8 ID	4
12.	65063	8449A021	59556	151-00006-13	Washer, Thrust 515W	3
13.	65063	8422A010	59556	151-00006-14	Ring, Retaining 5133-37	3
14.	65063	8422A395A	59556	151-00006-15	Shaft Assembly	AR
	65063	8422A393A	59556	151-00006-16	Shaft	1
	65063	8422B391A	59556	151-00006-17	Gear	1
	65063	7091A013	59556	151-00006-18	Rollpin	1
15.	65063	7006A016-04	59556	151-00006-19	Screw, Hex Head, 4-40 Sems	2
16.	65063	8422B399A-01	59556	151-00006-20	Motor, (*01258B) 12V	AR
17.	65063	310A450	59556	151-00006-21	Wireset	1
18.	65063	7011A016-08	59556	151-00006-22	Screw, Hex Head, #10xl/2	3
19.	65063	8422C398A	59556	151-00006-23	Bracket Assembly	1
20.	65063	8422A387A	59556	151-00006-24	Shaft, Lamp	1
21.	65063	8422A394A	59556	151-00006-25	Clutch Assembly	1
22.	65063	7007A001-04	59556	151-00006-26	Setscrew, Hex 10-32 Soc. Head Dg.	1
23.	65063	8449A022	59556	151-00006-27	Retainer, Thrust T515	1
24.	65063	7059A018	59556	151-00006-28	Nut, Hex Double Chmf. 1/4-20	3
25.	65063	7072A025	59556	151-00006-29	Washer, Flat	3
26.	65063	8422A033	59556	151-00006-30	Pad, Mounting	6

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
 FIGURE E-44. ROOF WARNING (BEACON) LIGHT ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
27.	65063	8422A032	59556	151-00006-31	Bolt, Toggle, 1/4-20x2	3
28.	65063	310A451	59556	151-00006-32	Wireset	1
29.	65063	8108A005	59556	151-00006-33	Grommet	1



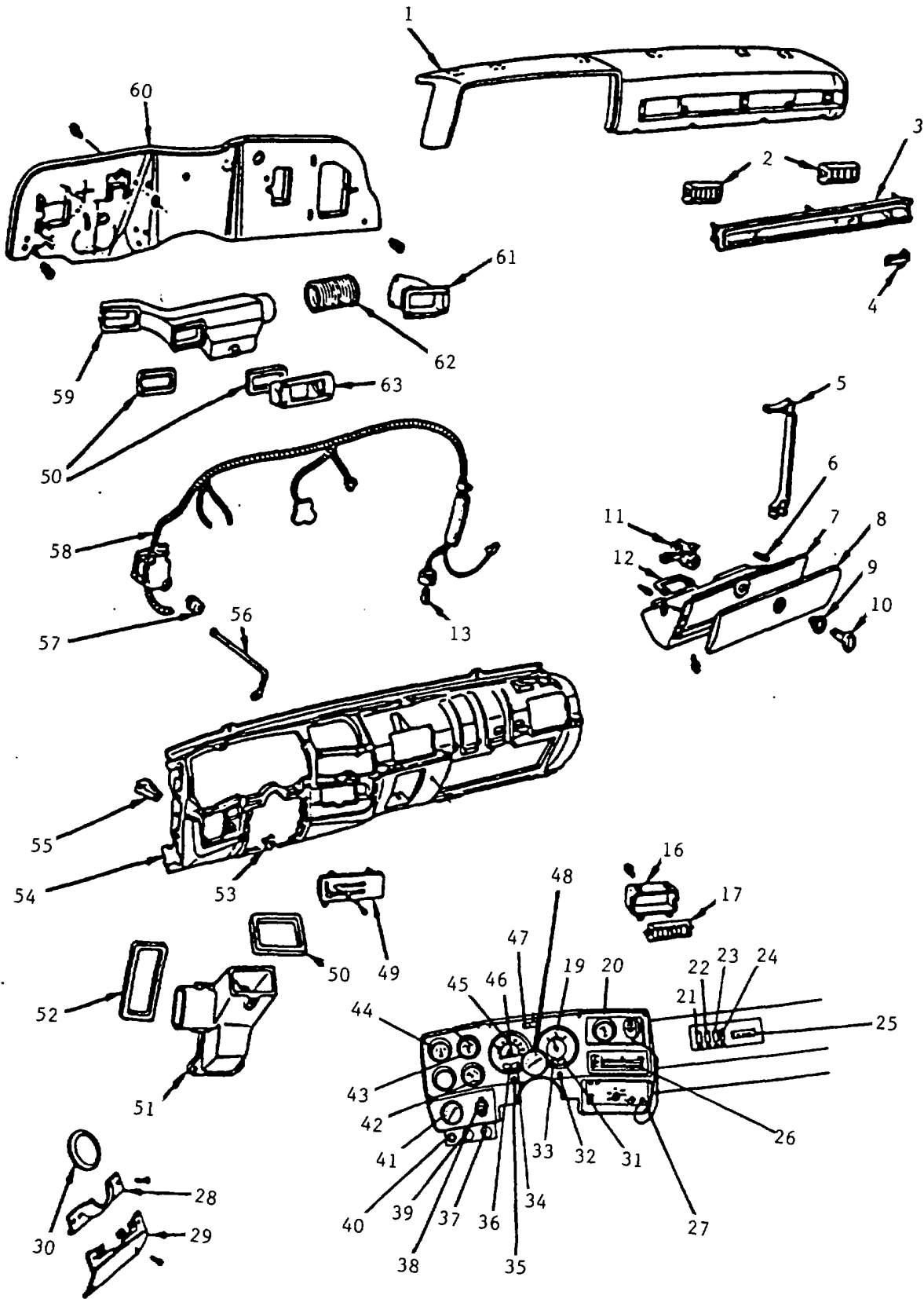
**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-45. WINDSHIELD WIPER SYSTEM ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-45. WINDSHIELD WIPER SYSTEM ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	087-90001	59556	087-90001	Wiper System, Windshield	REF
1.	03608	15536442	59556	087-90001-1	Guard, Windshield Wiper Arm Hose	1
2.	03608	15522766	59556	087-90001-2	Arm, Winshield Wiper	1
3.	03608	15593246	59556	087-90001-3	Blade, Winshield Wiper	1
	03608	14089144	59556	087-90001-4	Insert, Windshield Wiper Blade	1
4.	03608	9831062	59556	087-90001-5	Support, Rear View Mirror	1
5.	03608	334150	59556	087-90001-6	Cap	1
6.	03608	20566223	59556	087-90001-7	Bolt, Windshield Wiper Transmission	AR
7.	03608	471009	59556	087-90001-8	Weatherstrip, Windshield	1
8.	03608	466157	59556	087-90001-9	Molding, Windshield, Reveal (Black)	1
	03608	464471	59556	087-90001-10	Molding, Windshield, Reveal (Chrome)	1
9.	03608	14018595	59556	087-90001-11	Glass, Windshield, Clear	1
10.	03608	15599457	59556	087-90001-12	Connector, Windshield Wiper Nozzle Hose, Left Hand	1
11.	03608	22524202	59556	087-90001-13	Insulator	1
12.	03608	22510143	59556	087-90001-14	Lever, Multi-Functional	1
13.	----	COML			Hose, Windshield Wiper, Bulk, 5/32 ID	AR
14.	03608	22048312	59556	087-90001-15	Transmission, Windshield Wiper, Left Hand	1
15.	03608	9832955	59556	087-90001-16	Gasket, Windshield Wiper, Motor	1
16.	03608	22054183	59556	087-90001-17	Pump, Windshield Washer, Solvent	1
17.	03608	171031	59556	087-90001-18	Screw, Hex, 1/4-20x7/8	AR
18.	03608	22054185	59556	087-90001-19	Container, Windshield Washer Solvent	1
19.	03608	3824124	59556	087-90001-20	Bolt, Windshield Wiper and Windshield Washer Motor	AR
20.	03608	22049809	59556	087-90001-21	Motor, Windshield Wiper	1
	03608	22021690	59556	087-90001-22	Gear	1
	03608	22054184	59556	087-90001-23	Crank Arm	1
	03608	22038924	59556	087-90001-24	Cap, Windshield Wiper	1
	03608	22038808	59556	087-90001-25	Switch, Windshield Motor Park	1
	03608	22038809	59556	087-90001-26	Cover Kit, Windshield Wiper, Motor	KT
21.	03608	22048313	59556	087-90001-27	Transmission, Windshield Wiper, Right Hand	1
22.	03608	22049831	59556	087-90001-28	Connector, Windshield Washer Nozzle Hose	1
23.	03608	15599458	59556	087-90001-29	Connector, Windshield Washer Nozzle Hose, Right Hand	1

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
 FIGURE E-45. WINDSHIELD WIPER SYSTEM ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
24. 25.	---- 03608	COML N/S			Screw, Hex, M4.2x1.4x13 Hose, 3/32 ID	AR 1



GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-46. INSTRUMENT PANEL ASSEMBLY

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-46. INSTRUMENT PANEL ASSEMBLY**

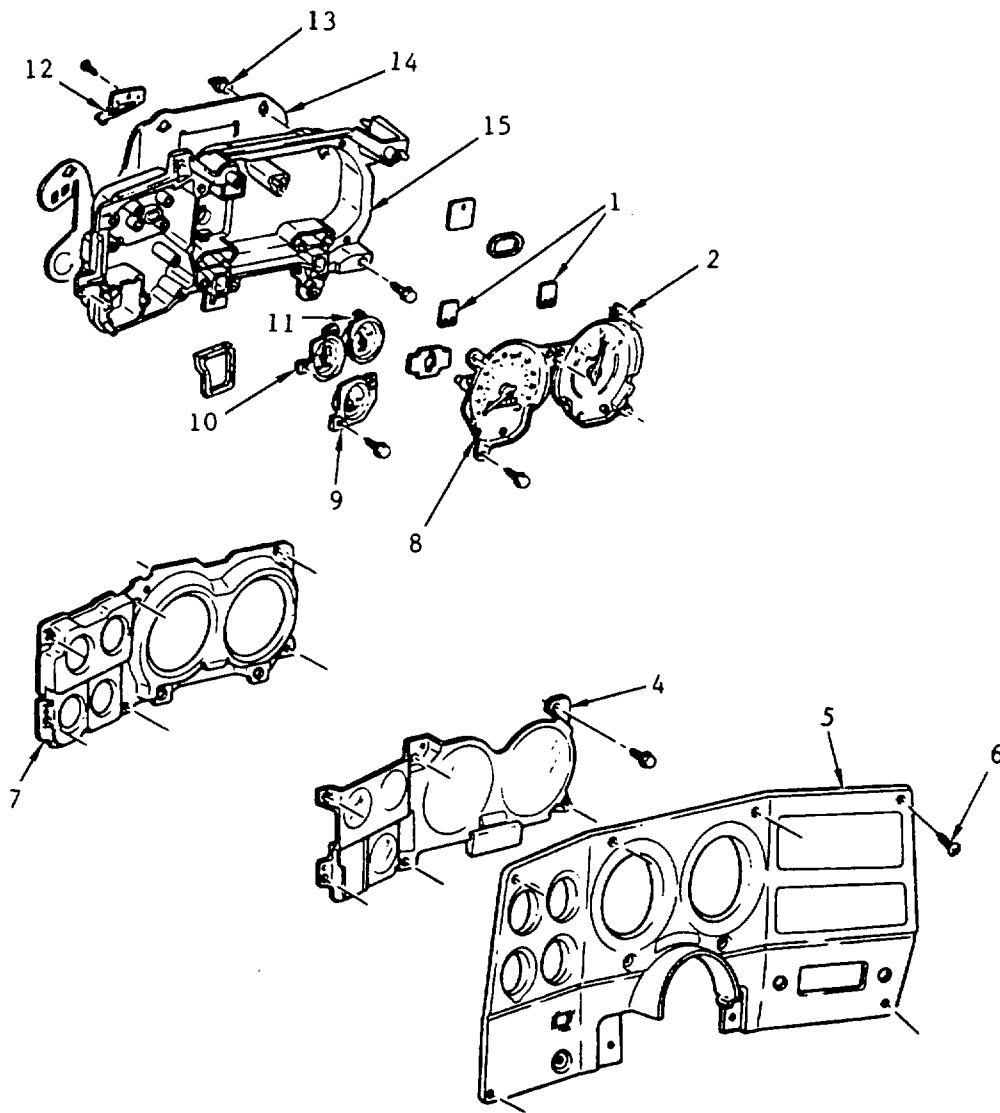
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556	086-90001-1	59556	086-90001-1	Instrument Panel Assembly	REF
2.	03608	14014536	59556	086-90001-2	Pad, Instrument Panel Trim	1
3.	03608	14023039	59556	086-90001-3	Deflector, Outer Air Outlet	2
4.	03608	14023045	59556	086-90001-4	Moulding, Instrument Panel Pad	1
5.	03608	14068287	59556	086-90001-5	Plate, Instrument Panel Name, "Custom Deluxe"	1
6.	03608	3765243	59556	086-90001-6	Moulding, Instrument Panel, Lower, Left Hand	1
7.	03608	343915	59556	086-90001-7	Bumper, Instrument Panel, Compartment Door	2
8.	03608	6264131	59556	086-90001-8	Compartment, Instrument Panel	1
9.	03608	3957093	59556	086-90001-9	Door, Instrument Panel Compartment	1
10.	03608	6260421	59556	086-90001-10	Escutcheon, Instrument Panel, Lock	1
11.	03608	14044471	59556	086-90001-11	Cylinder, Instrument Panel, Compartment Door Lock	1
12.	03608	6274550	59556	086-90001-12	Case, Instrument Panel Compartment Door Lock	1
13.	03608	455490	59556	086-90001-13	Sticker, Instrument Panel Door Lock	1
14.					Bulb, CTSY Lamp #1003	1
15.					Item Number Not Used	
16.	03608	6262684	59556	086-90001-16	Item Number Not Used	
17.	03608	3979751	59556	086-90001-17	Adapter, Center Air Outlet Duct, Left Hand	1
18.					Deflector, Air Condition, Air Outlet	1
19.	03608	6433366	59556	086-90001-19	Item Number Not Used	
20.	59556	15402	59556	086-00006	Fuel Gauge	1
21.	59556	410239-1	59556	086-90002-1	Ammeter	1
22.	59556	410239-2	59556	086-90002-2	Engine Compartment Lights Control Switch	1
23.	59556	410239-3	59556	086-90002-3	Cab Beacon Control Switch	1
24.	59556	410239-4	59556	086-90002-4	Front Flashers Control Switch	1
25.	56212	AS26H/AA69	59556	086-00007	Rear Flashers Control Switch	1
26.	03608		59556	086-90001-20	Water Tank Level Gauge	1
27.	66461	3693	59556	151-90002	Heater/Defroster Controls	1
28.	03608	14023008	59556	086-90001-21	Siren/Public Address System	REF
29.	03608	6274970	59556	086-90001-22	Filler, Instrument Panel, Steering Column Opening	1
30.	03608	14069365	59556	086-90001-23	Cover, Instrument Panel, Steering Column Lower	1
					Seal, Steering Column	1

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-46. INSTRUMENT PANEL ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	03608	25076846	59556	086-90001-24	Brake Warning Indicator Light	1
32.	03608	6497476	59556	086-90001-25	Right Turn Signal Indicator Light	1
33.	03608	25022884	59556	086-90001-26	Fasten Seat Belt Indicator Light	1
34.	03608	25049900	59556	086-90001-27	Low Coolant Warning Indicator Light	1
35.	03608	6497476	59556	086-90001-28	Left Turn Signal Indicator Light	1
36.	03608	25049900	59556	086-90001-29	4-Wheel Drive Indicator Light	1
37.	59556	02-640-157	59556	049-00006	Micro-Lock Brake Control Knob	1
38.	03608	1995216	59556	086-90001-30	Headlight Control Switch	1
39.	11757		59556		Pump/PTO Control Knob	1
40.	11757		59556		Pump/PTO Engaged Indicator	1
41.	57273	LFP-220	59556	105-00008	Pump Pressure Gauge	1
42.	03608	8993982	59556	086-90001-31	Engine Coolant Temperature Gauge	1
43.	03608	25025563	59556	086-90001-32	Engine Oil Pressure Gauge	1
44.	03608	6474584	59556	086-90001-33	Voltmeter	1
45.	03608	25051889	59556	086-90001-34	Speedometer/Odometer	1
46.	03608	6497475	59556	086-90001-35	Headlight High Beam Indicator Light	1
47.	03608	14035189	59556	086-90001-36	Diesel Glow Plug/Water In Fuel Indicator Light	1
48.	31211	7ATH24042	59556	76361-3	Tachometer/Hourmeter	
49.	03608	16034561	59556	086-90001-37	Control, Heater	1
	03608	16034591	59556	086-90001-38	Control, Heater and Air Conditioning	1
50.	03608	363139	59556	086-90001-39	Seal, Foam, 1/2 Wide, 36" Thick, 45-1/2" Long	3
51.	03608	6262679	59556	086-90001-40	Duct, Air Distributor, Lower	1
52.	03608	3963784	59556	086-90001-41	Gasket, Air Distributor, Duct	1
53.	03608	6258213	59556	086-90001-42	Nut, Light Switch Rod	1
54.	03608	15590559	59556	086-90001-43	Panel, Instrument	1
55.	03608	1995216	59556	086-90001-44	Switch, Headlamp	1
56.	03608	351789	59556	086-90001-45	Brace, Instrument Panel	1
57.	03608	6450089	59556	086-90001-46	Flasher, Hazard, Lamp and Turn Signal	1
58.	03608	12049703	59556	086-90001-47	Harness, Instrument Panel	1
59.	03608	14014556	59556	086-90001-48	Duct, Center Air Outlet	1
60.	03608	15593831	59556	086-90001-49	Insulator, Dash Panel	1

GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-46. INSTRUMENT PANEL ASSEMBLY (Continued)

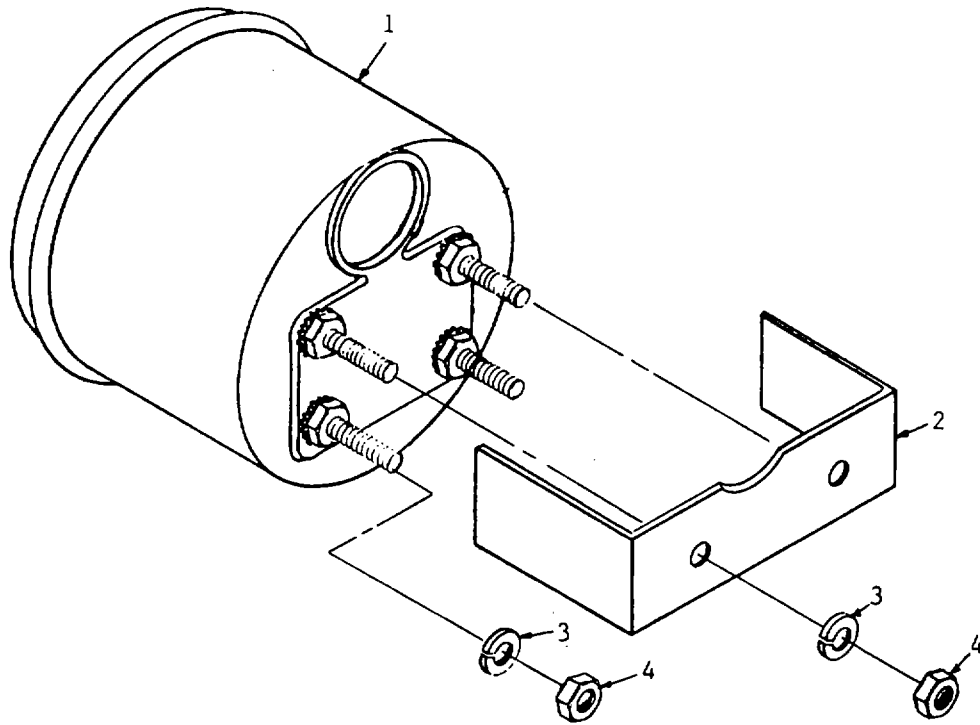
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
61.	03608	14014538	59556	086-90001-50	Duct, Air Side, Right Hand	1
62.	03608	1234988	59556	086-90001-51	Hose, Air, 3.25" ID, 72" Long	1
63.	03608	14014539	59556	086-90001-52	Adapter, Center Air Outlet	1



**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-47. INSTRUMENT CLUSTER**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-47. INSTRUMENT CLUSTER**

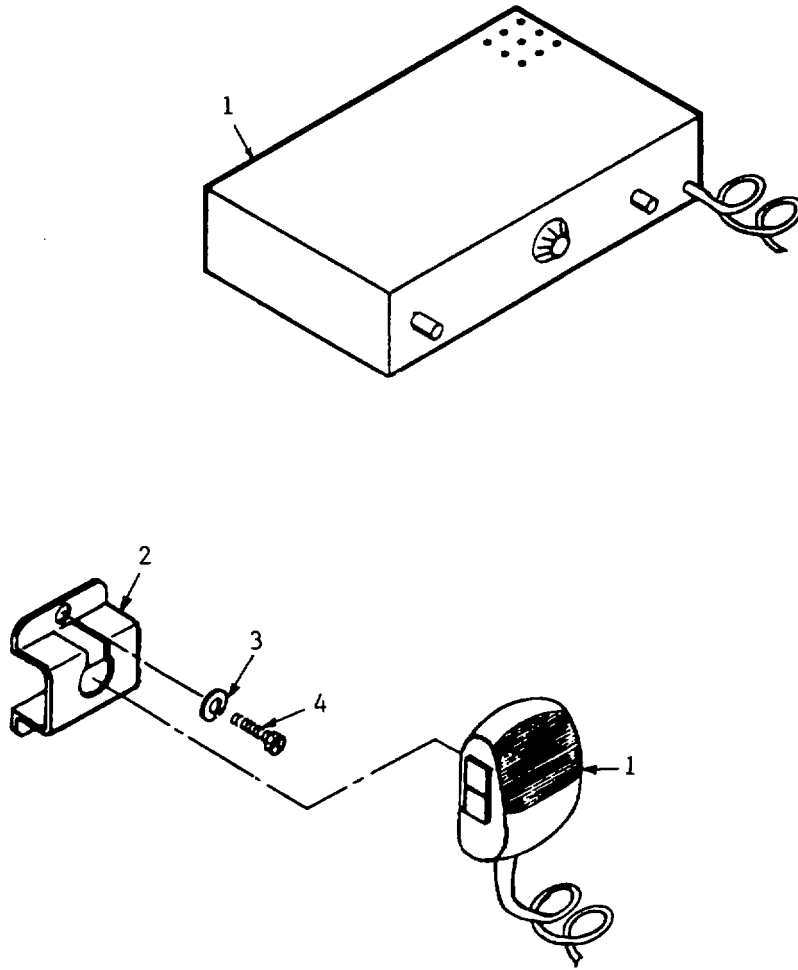
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	6497476	59556	086-90001-53	Instrument Cluster	1
2.	03608	6433366	59556	086-90001-54	Filter, Tell Tale (Directional Signal)	1
3.					Gauge Assembly, Fuel	1
4.	03608	25017377	59556	086-90001-56	Item Number Not Used	
5.	59556	086-9001-57	59556	086-90001-57	Lens	1
6.	----	COML			Plate, Instrument Panel Cluster Trim	1
7.	03608	25022378	59556	086-90001-58	Screw, 8-18xl-1/8	1
8.	03608	25051889	59556	086-90001-59	Retainer	1
9.	03608	8993982	59556	086-90001-60	Head Assembly, Speedometer	1
10.	03608	6474584	59556	086-90001-61	Gauge Assembly, Thermo and Resistor	1
11.	03608	25025563	59556	086-90001-62	Ammeter, Electrical Output	1
12.	03608	334963	59556	086-90001-63	Gauge Assembly, Oil Pressure	1
13.	03608	2973932	59556	086-90001-64	Spring, Speedometer Cable, Lock	1
14.	03608	25044897	59556	086-90001-65	Socket	1
15.	03608	25051838	59556	086-90001-66	Circuit, Printed Wiring	1
					Case	1



**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-48. GAUGE ASSEMBLIES**

GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-48. GAUGE ASSEMBLIES

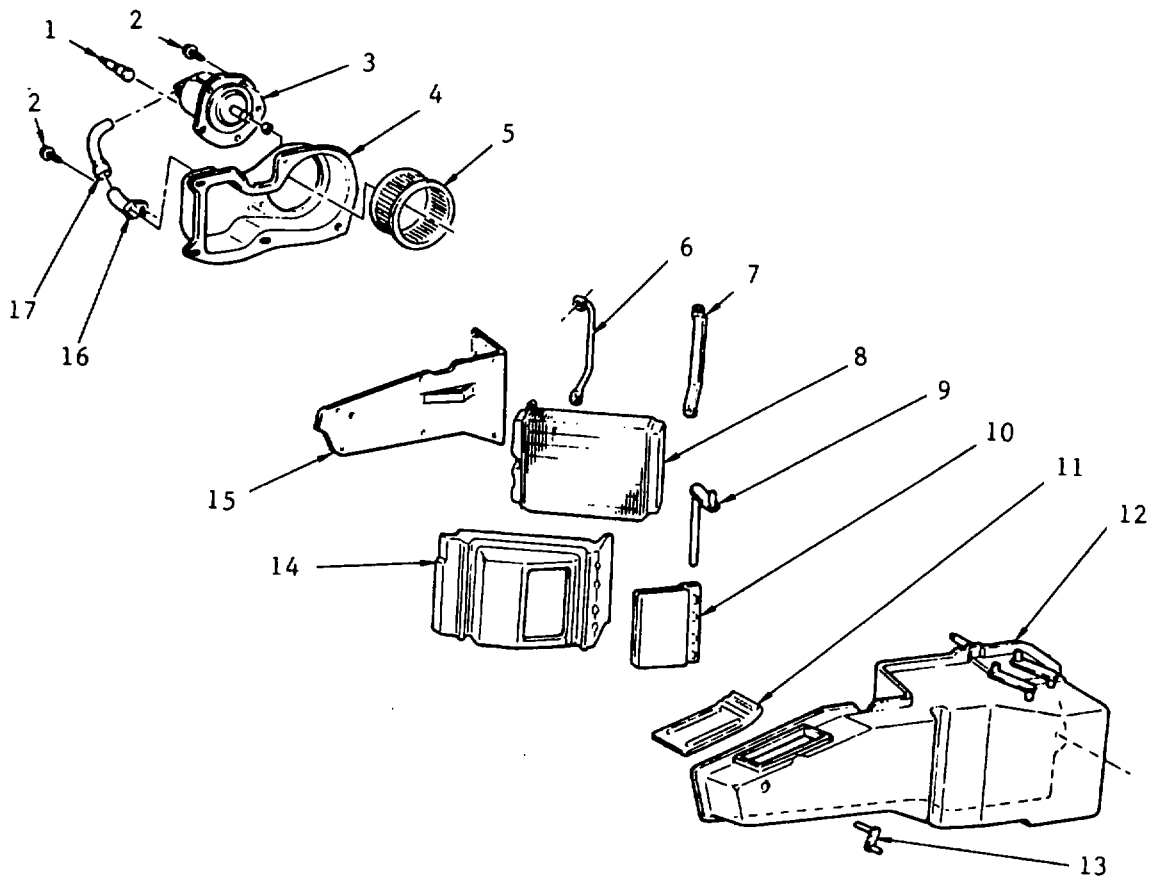
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556	15402	59556	086-00006	Ammeter	REF
	03608	25025563	59556	086-90001-32	Engine Oil Pressure Gauge	REF
	03608	8993982	59556	086-90001-31	Engine Water Temperature Gauge	REF
	03608	6474584	59556	086-90001-33	Voltmeter	REF
	03608	6433366	59556	086-90001-19	Fuel Level Gauge	REF
2.	03608	NSS		Bracket	1	
3.	----	COML		Lockwasher, 10-32	4	
4.	----	COML		Nut, 10-32	4	



**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-49. SIREN AND PA SYSTEM ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-49. SIREN AND PA SYSTEM ASSEMBLY**

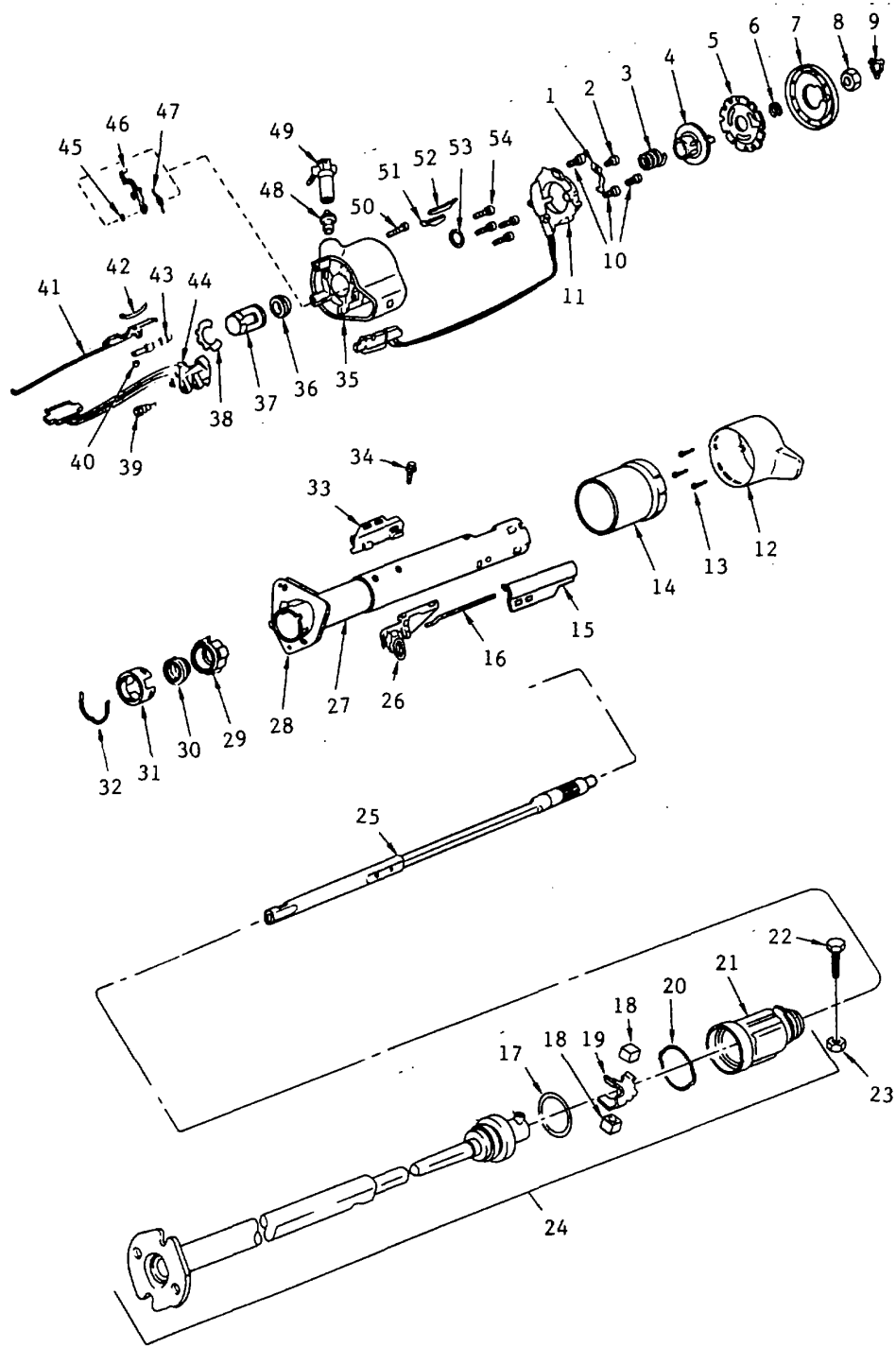
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	66461	3693	59556	151-90002	Siren and PA System Assembly	1
2.	66461	T00631	59556	151-00008	Bracket, Microphone	1
3.	----	COML			Screw, 10-32x1/2	2
4.	----	COML			Lockwasher, 10-32	2



**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-50. HEATER/DEFROSTER SYSTEM ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-50. HEATER/DEFROSTER SYSTEM ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	150-90001	59556	150-90001	Heater/Defroster and Blower Details	
1.	03608	6288704	59556	150-90001-1	Connector, Electrical	1
2.	03608	11509185	59556	150-90001-2	Screw, Hex, M4.2x1.41x13	AR
3.	03608	22020945	59556	150-90001-3	Motor, Blower	1
4.	03608	3029730	59556	150-90001-4	Case, Heater Blower	1
5.	03608	3037550	59556	150-90001-5	Fan, Blower	1
6.	03608	3025501	59556	150-90001-6	Clamp, Core Mounting (Holder Tank)	1
7.	03608	3024673	59556	150-90001-7	Clamp, Core Mounting (In-Out Tank)	1
8.	03608	3027247	59556	150-90001-8	Core with Fitting, Heater	1
9.	03608	3030075	59556	150-90001-9	Shaft with Louver, Temperature Valve	1
10.	03608	3024867	59556	150-90001-10	Valve, with Seal, Temperature	1
11.	03608	3027308	59556	150-90001-11	Valve, Defrost	1
12.	03608	3054316	59556	150-90001-12	Case, Heater	1
	03608	3054315	59556	150-90001-13	Case Assembly, Heater	1
13.	03608	3030072	59556	150-90001-14	Shaft with Louver, Defrost Valve	1
14.	03608	3048083	59556	150-90001-15	Shroud with Valve Seat	1
15.	03608	3048067	59556	150-90001-16	Plate, Front	1
16.	03608	3013475	59556	150-90001-17	Elbow, Motor Cooling Tube	1
17.	03608	3036927	59556	150-90001-18	Tube, Motor Cooling	1



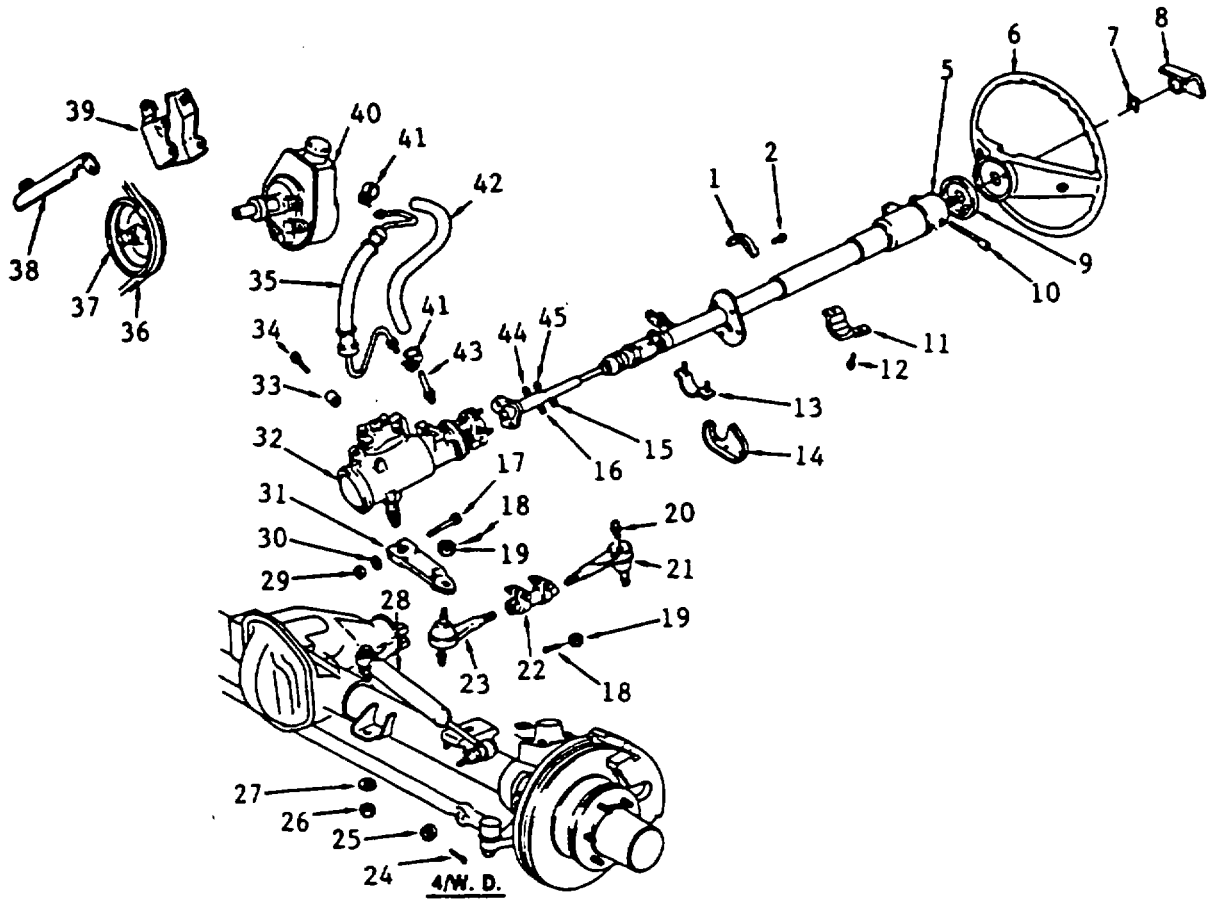
**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-51. STEERING COLUMN ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-51. STEERING COLUMN ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
		016-90001	59556	016-90001	Steering Column, Non-Tilt/Floor Shift Assembly	REF
1.	03608	7843400	59556	016-90001-1	Arm	1
2.	03608	11504678	59556	016-90001-2	Screw, M4.2x1.41x20	AR
3.	03608	7819898	59556	016-90001-3	Spring	1
4.	03608	7812136	59556	016-90001-4	Cam	1
5.	03608	7837185	59556	016-90001-5	Lock	1
6.	03608	580074	59556	016-90001-6	Retainer	1
7.	03608	7819738	59556	016-90001-7	Cover	1
8.	----	COML			Nut, Hex M14xl.5	1
9.	03608	419454	59556	016-90001-8	Retainer	1
10.	03608	7809128	59556	016-90001-9	Screw	1
11.	03608	1997983	59556	016-90001-10	Switch	1
12.	03608	7830208	59556	016-90001-11	Bowl	1
13.	03608	7809128	59556	016-90001-12	Screw	AR
14.	03608	7833436	59556	016-90001-13	Shroud	1
15.	03608	7830335	59556	016-90001-14	Protector	1
16.	03608	7843783	59556	016-90001-15	Rod	1
17.	03608	78±7454	59556	016-90001-16	Washer	AR
18.	03608	5671921	59556	016-90001-17	Bearing	1
19.	03608	7809409	59556	016-90001-18	Spring	1
20.	03608	7809408	59556	016-90001-19	Retainer	1
21.	03608	7831571	59556	016-90001-20	Coupling	1
22.	03608	7832907	59556	016-90001-21	Bolt	AR
23.	03608	11509415	59556	016-90001-22	Nut, Hex Ml-xl.5	AR
24.	03608	7831570	59556	016-90001-23	Shaft	1
25.	03608	7831538	59556	016-90001-24	Shaft	1
26.	03608	7844166	59556	016-90001-25	Switch	1
27.	03608	7842685	59556	016-90001-26	Jacket	1
28.	03608	7814387	59556	016-90001-27	Seal	1
29.	03608	7805822	59556	016-90001-28	Adapter	1
30.	03608	7805700	59556	016-90001-29	Bearing	1

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-51. STEERING COLUMN ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	03608	7804440	59556	016-90001-30	Reinforcement	1
32.	03608	7804439	59556	016-90001-31	Clip	1
33.	03608	1990115	59556	016-90001-32	Switch	1
34.	03608	7806433	59556	016-90001-33	Screw	1
	03608	7846418	59556	016-90001-34	Stud	1
35.	03608	7837035	59556	016-90001-35	Housing Kit	KT
36.	03608	7819517	59556	016-90001-36	Bearing	1
37.	03608	7829069	59556	016-90001-37	Bushing	1
38.	03608	7832311	59556	016-90001-38	Retainer	1
39.	03608	7830384	59556	016-90001-39	Pin	1
40.	03608	7805950	59556	016-90001-40	Washer	1
41.	03608	7842682	59556	016-90001-41	Rod	1
	03608	7810020	59556	016-90001-42	Rack	1
42.	03608	7804410	59556	016-90001-43	Spring	1
43.	03608	7806185	59556	016-90001-44	Bolt, With Spring	AR
44.	03608	7840274	59556	016-90001-45	Switch, Dimmer	1
45.	03608	7811188	59556	016-90001-46	Washer	AR
46.	03608	7819515	59556	016-90001-47	Lever	1
47.	03608	7810516	59556	016-90001-48	Spring	1
48.	03608	7812526	59556	016-90001-49	Sector	1
49.	03608	7830380	59556	016-90001-50	Lock	1
50.	03608	7830377	59556	016-90001-51	Screw	AR
51.	03608	7830375	59556	016-90001-52	Clip	AR
52.	03608	7804414	59556	016-90001-53	Switch	1
53.	03608	7800580	59556	016-90001-54	Washer	1
54.	03608	7806867	59556	016-90001-55	Screw	1



GROUP 13 CAB ASSEMBLY, LIGHTS,
 SWITCHES, GAUGES, CONTROLS AND INDICATORS
 FIGURE E-52. STEERING SYSTEM AND RELATED PARTS

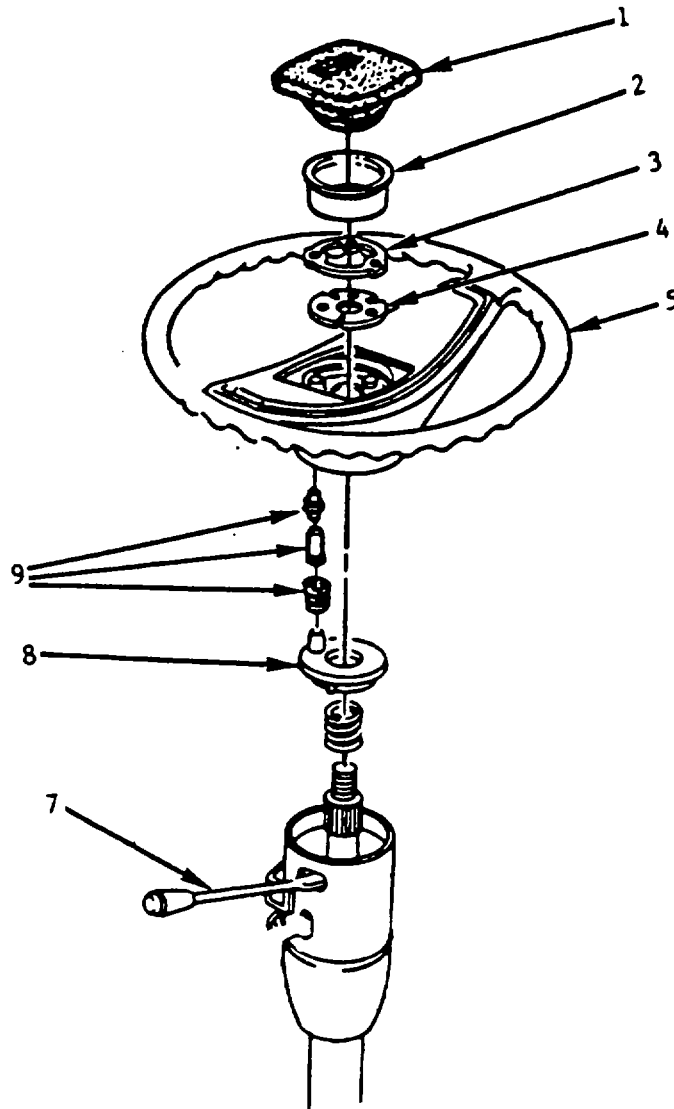
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GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-52. STEERING SYSTEM AND RELATED PARTS

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	14027746	59556	016-90001-56	Steering System and Related Parts	1
2.	----	COML			Cover, Steering Column Dash, Upper	1
3.					Screw, Hex Washer Head Top, M6.3x1.81x20	1
4.					Item Number Not Used	
5.	03608	7842668	59556	016-90001-59	Item Number Not Used	
6.	03608	9762199	59556	016-90001-60	Column, Steering	1
7.	03608	419454	59556	016-90001-61	Wheel, Steering	1
8.	03608	9768810	59556	016-90001-62	Retainer, Steering Wheel Nut	1
9.	03608	7819738	59556	016-90001-63	Cap, Horn Button	1
10.	03608	22510143	59556	016-90001-64	Cover, Steering Shift Lock Plate	1
11.	03608	7809925	59556	016-90001-65	Lever, with Knob, Turn Signal	1
12.	----	COML			Support, Steering Column, Upper	1
13.	03608	467283	59556	016-90001-66	Bolt, M8x1.25x12	1
14.	03608	14027745	59556	016-90001-67	Clamp, Steering Column Dash	1
15.	----	COML			Cover, Steering Column Dash Lower	1
16.	----	COML			Nut, Hex, 3/8-24	1
17.	----	COML			Washer, Lock, 3/8	1
18.	----	COML			Bolt, 5/8-18x3-1/2	1
19.	----	COML			Pin, Cotter, 1/8x1/2	2
20.	----	COML			Nut, Slotted Hex, 3/8-18	2
21.	03608	362297	59556	016-90001-68	Fitting, Lubrication, 1/4-28x1/2	1
22.	03608	14007644	59556	016-90001-69	Socket, Steering Connecting Rod Short	1
23.	03608	362298	59556	016-90001-70	Sleeve, Steering Connecting Rod Adjusting	1
24.	----	COML			Socket, Steering Connecting Rod Long	1
25.	----	COML			Pin, Cotter, 3/32x1	1
26.	----	COML			Nut, Slotted Hex, 1/2-20	1
27.	----	COML			Nut, Hex, 1/2-20	1
28.	03608	4993563	59556	016-90001-71	Washer, Lock, 1/2	1
29.	----	COML			Absorber, Steering Relay and Rod Shock	1
					Nut, 9/16-18	1

GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-52. STEERING SYSTEM AND RELATED PARTS (Continued)

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
30.	----	COML			Washer, 9/16x1-1/8x1/16	1
31.	03608	14064660	59556	016-90001-72	Arm, Pitman	1
32.	03608	7846959	59556	016-90001-73	Gear, Steering	1
33.	03608	343179	59556	016-90001-74	Spacer, Steering Gear to Frame	1
34.	03608	343178	59556	016-90001-75	Bolt, Steering Gear to Frame, 7/16-14x2-1/8	1
35.	03608	7833371	59556	016-90001-76	Hose Assembly, Hydraulic Steering Pump Outlet	1
36.	03608	9433735	59556	016-90001-77	Belt, Hydraulic Steering	1
37.	03608	14087539	59556	016-90001-78	Pulley, Hydraulic Steering Pump	1
38.	03608	14015391	59556	016-90001-79	Brace, Hydraulic Steering Pump	1
39.	03608	14015392	59556	016-90001-80	Bracket, Hydraulic Steering Pump	1
40.	03608	7839816	59556	016-90001-81	Pump, Hydraulic Steering	1
41.	----	COML			Clamp, Hose Pump Return, 1/2-5/8	1
42.	03608	14010767	59556	016-90001-82	Hose, Pump Return (cut from bulk)	1
43.	03608	22514738	59556	016-90001-83	Pipe Assembly, Hydraulic Steering Gear Outlet	1
44.	----	COML			Washer, Lock, M8	1
45.	----	COML			Nut, Hex, 5/16-24	1

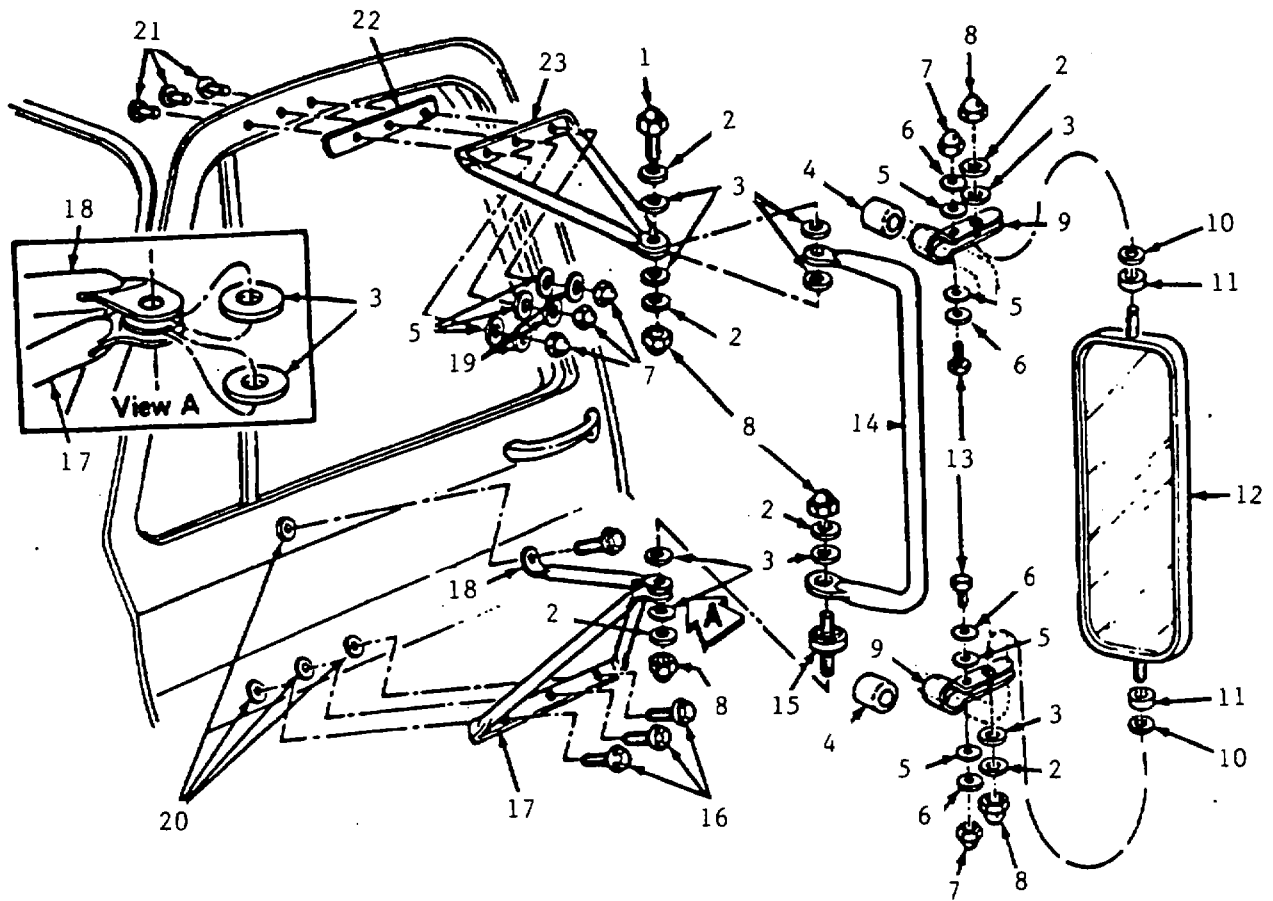


**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-53. HORN BUTTON AND CONTACT ASSEMBLY**

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**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
 FIGURE E-53. HORN BUTTON AND CONTACT ASSEMBLY**

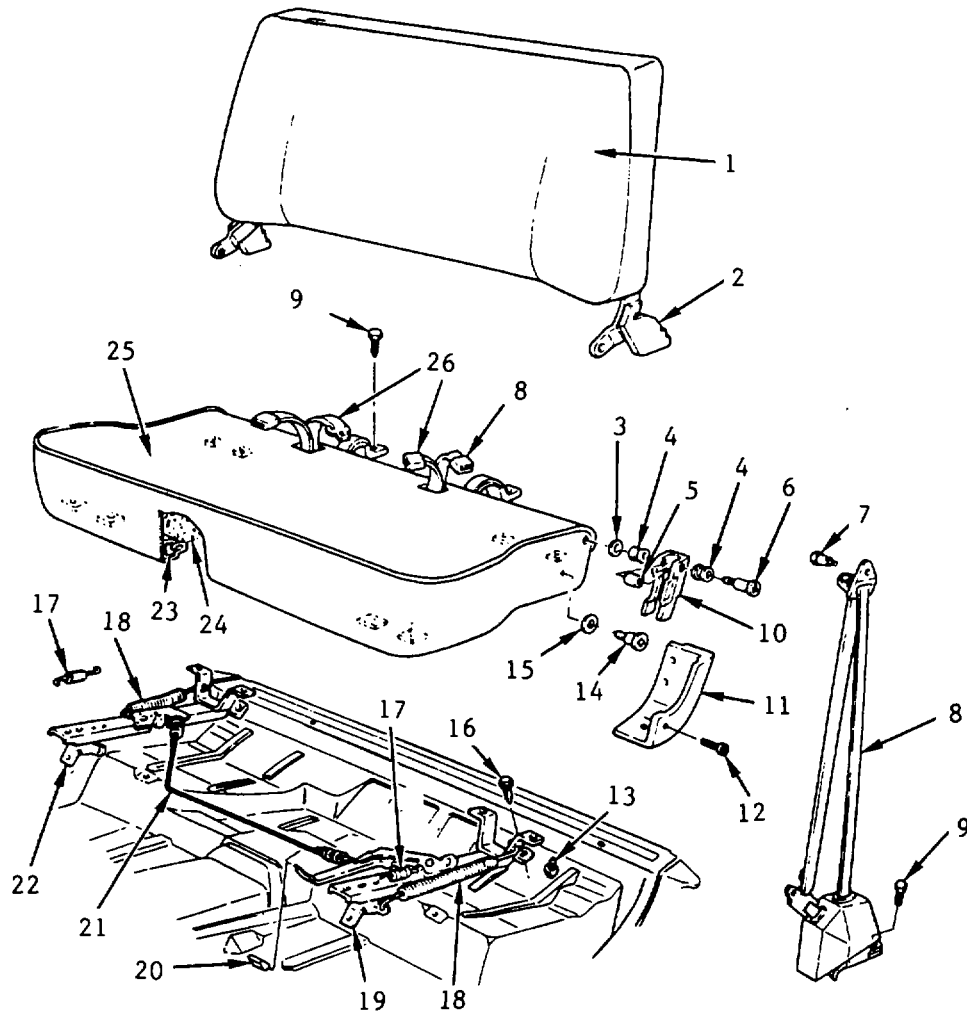
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	73331	9761175	59556	016-90001-84	Horn Button and Contact	1
2.	73331	9748190	59556	016-90001-85	Cap Assembly, Horn Button	1
3.	73331	9754764	59556	016-90001-86	Cup, Horn Button Cap	1
4.	73331	404234	59556	016-90001-87	Bushing, Horn Button Cap Adapter	1
5.	73331	9762199	59556	016-90001-88	Spring, Horn Contact	1
6.					Wheel, Steering	1
7.	73331	22510143	59556	016-90001-90	Item Number Not Used	
8.	73331	7812136	59556	016-90001-91	Lever, Turn Signal	1
9.	73331	474102	59556	016-90001-92	Cam, Cancelling	1
					Contact Unit, Horn Button	1



GROUP 13 CAB ASSEMBLY, LIGHTS,
 SWITCHES, GAUGES, CONTROLS AND INDICATORS
 FIGURE E-54. MIRROR ASSEMBLY

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-54. MIRROR ASSEMBLY**

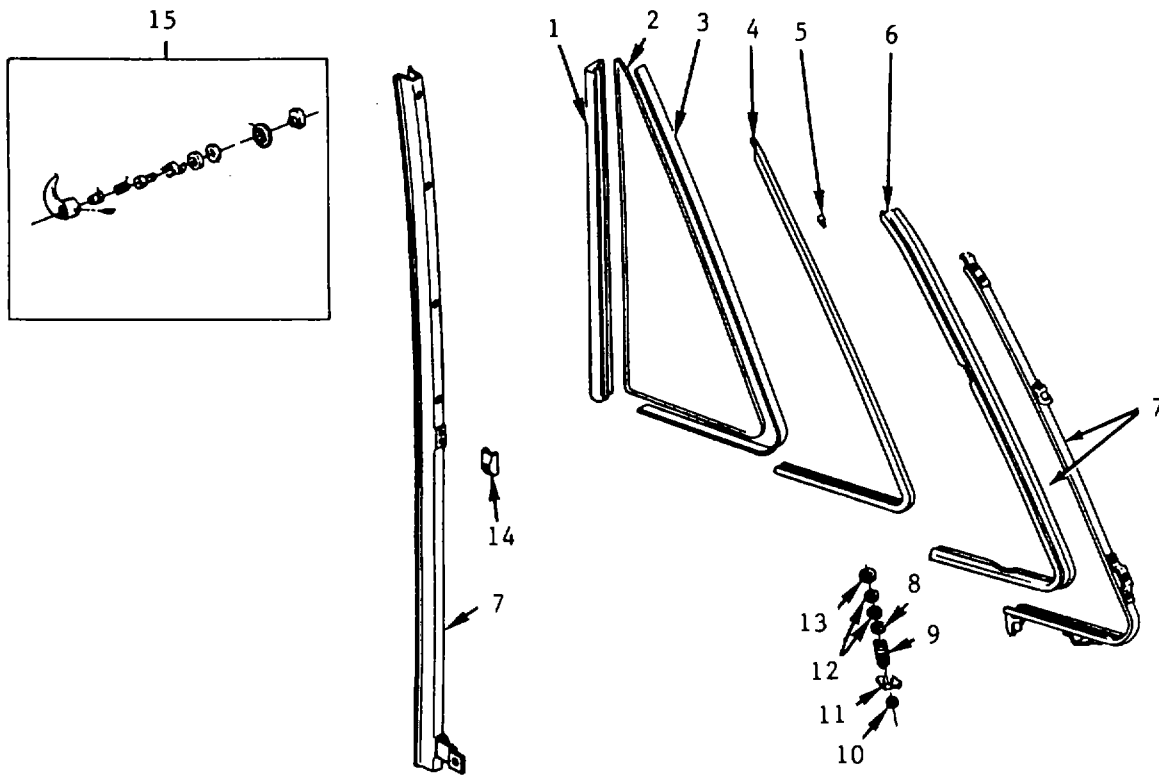
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Mirror Assembly	1
2.	73331	14001717	59556	095-90001-1	Bolt, 3/8-16x1, Crown	6
3.	73331	14001718	59556	095-90001-2	Washer	7
4.	73331	3768865	59556	095-90001-3	Washer	2
5.	73331	14016581	59556	095-90001-4	Gasket	7
6.	73331	14016675	59556	095-90001-5	Washer	4
7.	73331	329121	59556	095-90001-6	Washer	5
8.	73331	331545	59556	095-90001-7	Nut	5
9.	73331	14016685	59556	095-90001-8	Nut	2
10.	73331	331540	59556	095-90001-9	Bracket	2
11.	73331	331544	59556	095-90001-10	Washer	2
12.	73331	14016682	59556	095-90001-11	Washer	1
13.	73331	14016674	59556	095-90001-12	Mirror	2
14.	73331	14016684	59556	095-90001-13	Bolt	1
15.	73331	14021236	59556	095-90001-14	Support	1
16.	73331	14007511	59556	095-90001-15	Pivot	1
17.	73331	14016686	59556	095-90001-16	.9olt	3
18.	73331	14016693	59556	095-90001-17	Arm	1
19.	73331	14016675	59556	095-90001-18	Brace	1
20.	73331	367292	59556	095-90001-19	Washer	3
21.	73331	331531	59556	095-90001-20	Nut	4
22.	73331	3896473	59556	095-90001-21	Bolt	3
23.	73331	14016691	59556	095-90001-22	Gasket	1
	73331	14016692	59556	095-90001-23	Arm, Mirror Support, Upper LH	1
					Arm, Mirror Support, Upper RH	1



**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-55. BENCH SEAT ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-55. BENCH SEAT ASSEMBLY**

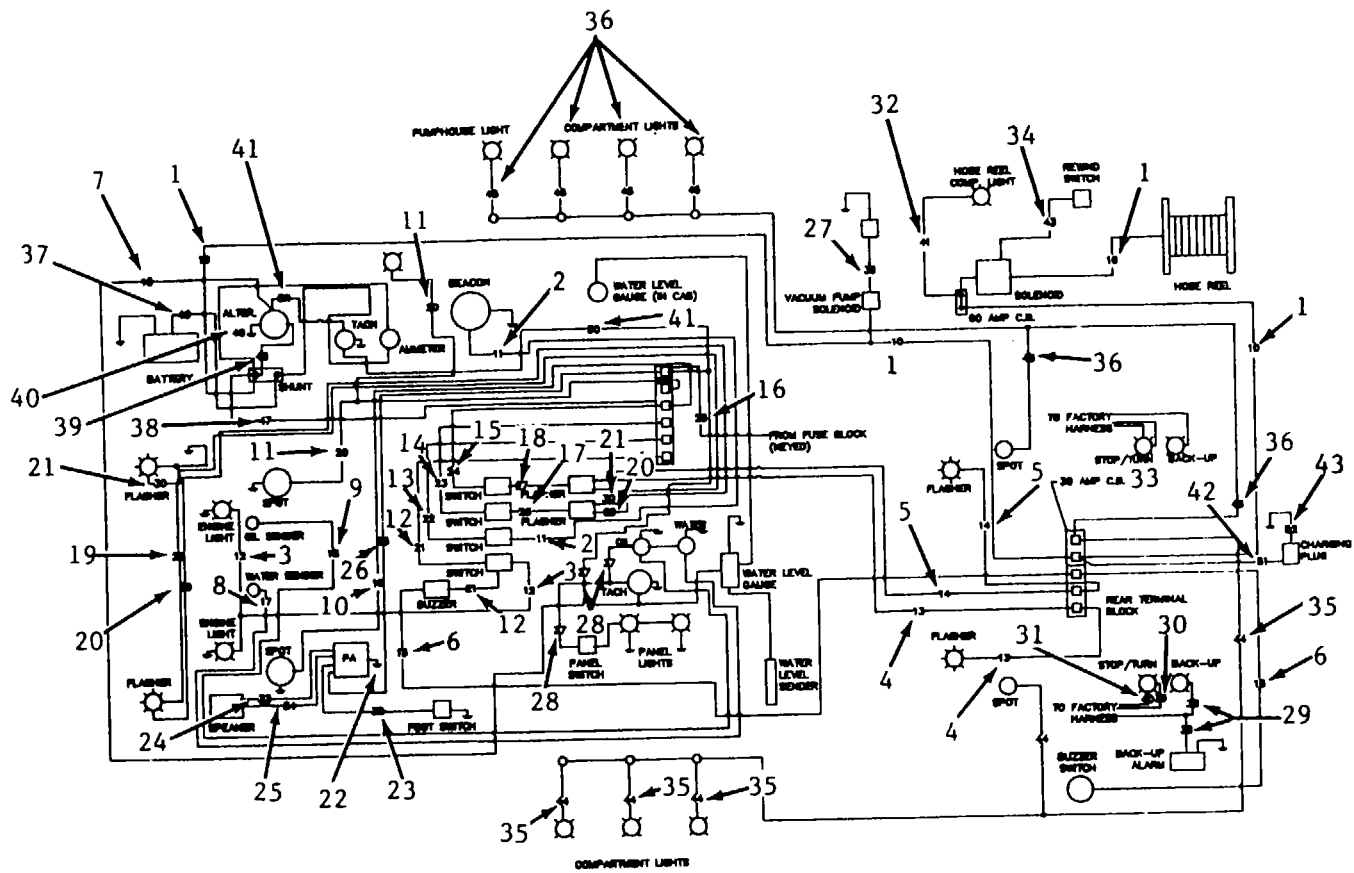
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	094-90001	59556	094-90001	Bench Seat	
1.	03608	15594724	59556	094-90001-1	Trim, Seat Back Cushion	1
2.	03608	15598767	59556	094-90001-2	Frame with Pad, Seat Back Cushion	1
3.	03608	3914674	59556	094-90001-3	Washer, Flat, 3/8 ID; 1 OD; .01 THK	AR
4.	03608	14066195	59556	094-90001-4	Bushing, Seat Back Trim Cloth	1
5.	03608	14066196	59556	094-90001-5	Grommet	1
6.	03608	14021211	59556	094-90001-6	Striker	1
7.	03608	342221	59556	094-90001-7	Bolt	1
8.	03608	14070559	59556	094-90001-8	Belt, Seat, LH	1
	03608	14070560	59556	094-90001-9	Belt, Seat, RH	1
9.	03608	471083	59556	094-90001-10	Bolt, Seat Belt to Floor	AR
10.	03608	14021209	59556	094-90001-11	Catch, Seat Back Cushion, LH	1
	03608	14021210	59556	094-90001-12	Catch, Seat Back Cushion, RH	1
11.	03608	14037059	59556	094-90001-13	Cover, Seat Hinge Armature, LH	1
	03608	14037060	59556	094-90001-14	Cover, Seat Hinge Armature, RH	1
12.	03608	14022885	59556	094-90001-15	Screw	AR
13.	03608	2014469	59556	094-90001-16	Bolt, Hex, 5/16-18x7/8	AR
14.	03608	14021213	59556	094-90001-17	Bolt	AR
15.	03608	343978	59556	094-90001-18	Washer	AR
16.	03608	9431970	59556	094-90001-19	Screw, 3/8-16x1-1/8	AR
17.	03608	329457	59556	094-90001-20	Spring	2
18.	03608	9728051	59556	094-90001-21	Spring	2
19.	03608	14022777	59556	094-90001-22	Adjuster, Seat, LH	1
20.	03608	465536	59556	094-90001-23	Knob	AR
21.	03608	14022786	59556	094-90001-24	Wire	1
22.	03608	14022778	59556	094-90001-25	Adjuster, Seat, RH	1
23.	03608	14021204	59556	094-90001-26	Spring	1
24.	03608	15598766	59556	094-90001-27	Pad, Seat Cushion	1
25.	03608	15594729	59556	094-90001-28	Trim, Seat Cushion	1
26.	03608	14070566	59556	094-90001-29	Belt, Seat Center	1



**GROUP 13 CAB ASSEMBLY, LIGHTS,
SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-56. FRONT DOOR VENT WINDOW ASSEMBLY**

**GROUP 13 CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
FIGURE E-56. FRONT DOOR VENT WINDOW ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	20264730	59556	080-90015-1	Front Door Vent Window	
	03608	20264731	59556	080-90015-2	Weatherstrip, LH	1
2.	03608	20264743	59556	080-90015-3	Weatherstrip, RH	1
	03608	20264744	59556	080-90015-4	Glass, LH	1
3.	03608	370390	59556	080-90015-5	Glass, RH	1
4.	03608	20264736	59556	080-90015-6	Filler, Glass Channel	AR
	03608	20264737	59556	080-90015-7	Sash, LH	1
5.	03608	14011684	59556	080-90015-8	Sash, RH	1
6.	03608	20354945	59556	080-90015-9	Rivet, Hinge	AR
	03608	20354946	59556	080-90015-10	Weatherstrip, Front, LH	1
7.	03608	20307715	59556	080-90015-11	Weatherstrip, Front, RH	1
	03608	20307716	59556	080-90015-12	Ventilator Assembly, LH	1
8.	03608	4162193	59556	080-90015-13	Ventilator Assembly, RH	1
9.	03608	3716643	59556	080-90015-14	Washer, Spring, Retainer	AR
10.	----	COML			Spring, Pivot, Pin	AR
11.	03608	4172352	59556	080-90015-15	Nut, Hex, 5/16-24	AR
12.	03608	365443	59556	080-90015-16	Washer, Tab	AR
13.	03608	3762400	59556	080-90015-17	Washer, Pivot, Pin	AR
14.	03608	20264728	59556	080-90015-18	Stop, Pivot, Pin	AR
15.	03608	12300197	59556	080-90015-19	Striker, Lock, Handle	2
	03608	12300198	59556	080-90015-20	Kit, Handle, LH	KT
					Kit, Handle, RH	KT



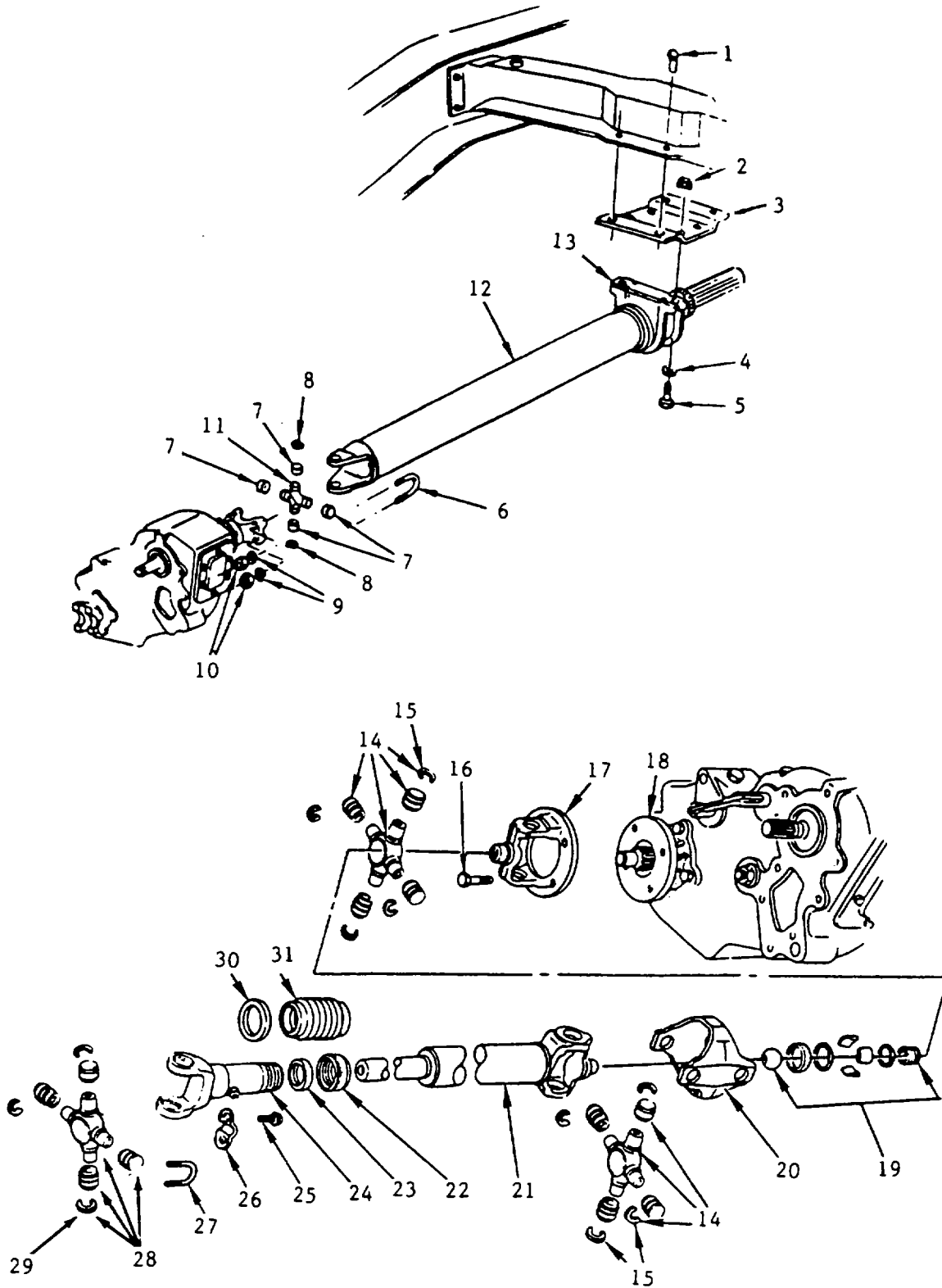
GROUP 14 ELECTRICAL SYSTEM
 FIGURE E-57. BODY ELECTRICAL SYSTEM ASSEMBLY

**GROUP 14 ELECTRICAL SYSTEM
FIGURE E-57. BODY ELECTRICAL SYSTEM ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	123-90003	59556	123-90003	Body Electrical System	
1.	59556	123-90003-1	59556	123-90003-1	Rear Body Compartment Lights Power (Wire #10)	1
2.	59556	123-90003-2	59556	123-90003-2	Beacon Light (Wire #11)	1
3.	59556	123-90003-3	59556	123-90003-3	Engine Compartment From Switch (Wire #12)	1
4.	59556	123-90003-4	59556	123-90003-4	Rear Flasher, Left, From Flasher Unit (Wire #13)	1
5.	59556	123-90003-5	59556	123-90003-5	Rear Flasher, Right, From Flasher Unit (Wire #14)	1
6.	59556	123-90003-6	59556	123-90003-6	Buzzer to Button (Wire #15)	1
7.	59556	123-90003-7	59556	123-90003-7	Alternator Sensor (Wire #16)	1
8.	59556	123-90003-8	59556	123-90003-8	Water Temperature Sender (Wire #17)	1
9.	59556	123-90003-9	59556	123-90003-9	Oil Pressure Sender (Wire #18)	1
10.	59556	123-90003-10	59556	123-90003-10	Left Spotlight, To Breaker From Switch (Wire #19)	1
11.	59556	123-90003-11	59556	123-90003-11	Right Spotlight And Dome, To Breaker From Switch (Wire #20)	1
12.	59556	123-90003-12	59556	123-90003-12	Engine Compartment And Buzzer, To Breaker From Switch (Wire #21)	1
13.	59556	123-90003-13	59556	123-90003-13	Roof Beacon, To Breaker From Switch (Wire #22)	1
14.	59556	123-90003-14	59556	123-90003-14	Front Flasher, To Breaker From Switch (Wire #23)	1
15.	59556	123-90003-15	59556	123-90003-15	Rear Flasher, To Breaker From Switch (Wire #24)	1
16.	59556	123-90003-16	59556	123-90003-16	Auxiliary, Fron Fuse Block To Breaker (Wire #25)	1
17.	59556	123-90003-17	59556	123-90003-17	Switch To Front Flasher (Wire #26)	1
18.	59556	123-90003-18	59556	123-90003-18	Switch To Rear Flasher (Wire #27)	1
19.	59556	123-90003-19	59556	123-90003-19	Front Flasher Lights To Ground (Wire #28)	1
20.	59556	123-90003-20	59556	123-90003-20	Left Front Flasher Lights To Ground (Wire #29)	1
21.	59556	123-90003-21	59556	123-90003-21	Right Front Flasher Lights To Ground (Wire #30)	1
22.	59556	123-90003-22	59556	123-90003-22	Ground to PA System (Wire #31)	1
23.	59556	123-90003-23	59556	123-90003-23	Foot Switch to PA System (Wire #32)	1
24.	59556	123-90003-24	59556	123-90003-24	Speaker (Blue) (Wire #33)	1
25.	59556	123-90003-25	59556	123-90003-25	Speaker (Brown) (Wire #34)	1
26.	59556	123-90003-26	59556	123-90003-26	Breather To PA System (Wire #35)	1
27.	59556	123-90003-27	59556	123-90003-27	Prime Switch To Vacuum Pump Solenoid (Wire #36)	1
28.	59556	123-90003-28	59556	123-90003-28	Ignition To Panel (Wire #37)	1
29.	59556	123-90003-29	59556	123-90003-29	Reverse Light (Wire #38)	1

**GROUP 14 ELECTRICAL SYSTEM
FIGURE E-57. BODY ELECTRICAL SYSTEM ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
30.	59556	123-90003-30	59556	123-90003-30	Running Light (Wire #39)	1
31.	59556	123-90003-31	59556	123-90003-31	Left Turn (Wire #40)	1
32.	59556	123-90003-32	59556	123-90003-32	Hose Reel Compartment Light To Breaker (Wire #41)	1
33.	59556	123-90003-33	59556	123-90003-33	Right Turn (Wire #42)	1
34.	59556	123-90003-34	59556	123-90003-34	Hose Reel Rewind Button To Solenoid (Wire #43)	1
35.	59556	123-90003-35	59556	123-90003-35	Left Hand Compartment Harness (Wire #44)	1
36.	59556	123-90003-36	59556	123-90003-36	Right Hand Compartment Harness (Wire #45)	1
37.	59556	123-90003-37	59556	123-90003-37	Battery Shunt (Wire #46)	1
38.	59556	123-90003-38	59556	123-90003-38	Shunt To Breaker Buzzer Bar (Wire #47)	1
39.	59556	123-90003-39	59556	123-90003-39	Alternator To Shunt (Wire #48)	1
40.	59556	123-90003-40	59556	123-90003-40	Alternator To Ground (Wire #49)	1
41.	59556	123-90003-41	59556	123-90003-41	Cab Tachometer Cable (Wire #50)	1
42.	59556	123-90003-42	59556	123-90003-42	Charging Plug To 30 Amp Breaker (Wire #51)	1
43.	59556	123-90003-43	59556	123-90003-43	Charging Plug To Ground (Wire #52)	1



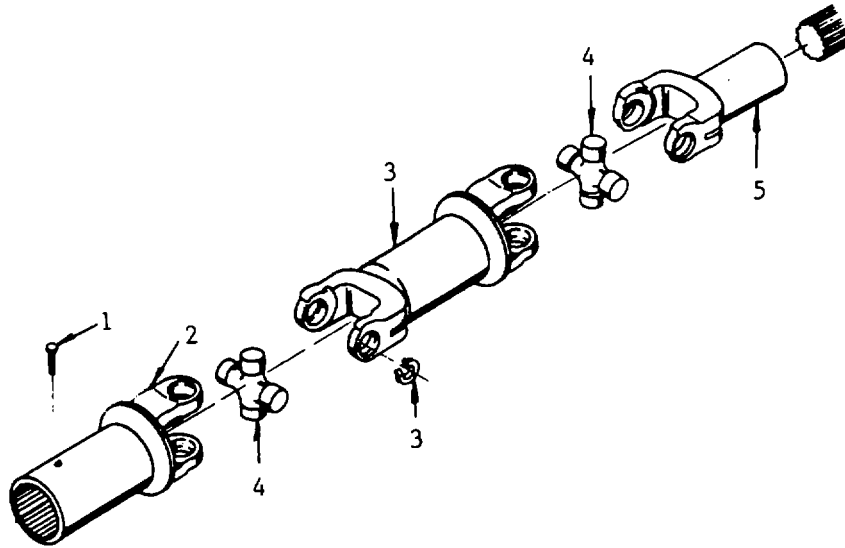
GROUP 15 PROPELLER SHAFT ASSEMBLY
FIGURE E-58. PROPELLER SHAFT ASSEMBLY

**GROUP 15 PROPELLER SHAFT ASSEMBLY
FIGURE E-58. PROPELLER SHAFT ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Propeller Shaft Assembly	2
2.	----	COML			Rivet, 3/8x7/8	2
3.	03608	14029230	59556	264-90001-1	Nut, Hex Flange, 7/16-14	1
4.	----	COML			Hanger, Front Support	2
5.	----	COML			Washer, 7/16	2
6.	03608	1358938	59556	264-90001-2	Bolt, Hex, 7/16-14x1-1/8	2
7.	03608	5548	59556	264-90001-3	Bolt, Propeller Shaft, "U"	4
8.	----	COML			Bearing, "U" Joint	2
9.	----	COML			Ring, Lock, "U" Joint Trunnion Bearing Snap	2
10.	----	COML			Washer, Lock, 5/16	2
11.	03608	372246	59556	264-90001-4	Nut, Hex, 5/16-18	1
12.	03608	14007166	59556	264-90001-5	Trunnion, "U" Joint	1
13.	03608	5598	59556	264-90001-6	Shaft Assembly	1
14.	03608	7806140	59556	264-90001-7	Center Bearing	2
15.	03608	1456507	59556	264-90001-8	Joint Kit, Universal	8
16.	03608	1245509	59556	264-90001-9	Ring, Universal Joint Yoke Trunnion Bearing	4
17.	03608	7815849	59556	264-90001-10	Bolt, Auxiliary Front Propeller Shaft	1
18.	03608	460835	59556	264-90001-11	Yoke, Rear Support	1
19.	03608	7815848	59556	264-90001-12	Yoke Assembly, Transfer Case Front Output	1
20.	03608	7809057	59556	264-90001-13	Ball Kit, Universal	1
21.	03608	7845045	59556	264-90001-14	Yoke, Link	1
22.	03608	458418	59556	264-90001-15	Shaft Assembly, Auxiliary Front Propeller Shaft	1
23.	03608	7827942	59556	264-90001-16	Cap, Universal Joint Sleeve Yoke Dust	1
24.	03608	7826624	59556	264-90001-17	Seal, Slip Spline	1
25.	03608	14018700	59556	264-90001-18	Yoke, Slip	1
26.	03608	3882979	59556	264-90001-19	Bolt, Propeller Shaft and Universal Strap	1
27.	03608	1358938	59556	264-90001-20	Strap, Propeller Shaft and Universal Joint	1
28.	03608	386451	59556	264-90001-21	Bolt, "U" Universal Joint to Trans.	1
29.	03608	3721887	59556	264-90001-22	Repair Kit, Universal Joint	1
					Ring, Universal Joint Yoke Trunnion Bearing, Snap	1

**GROUP 15 PROPELLER SHAFT ASSEMBLY
FIGURE E-58. PROPELLER SHAFT ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
30. 31.	03608 03608	7840235 1358938	59556 59556	264-90001-23 264-90001-24	Clamp, Boot Bolt, "U" Joint	1 1

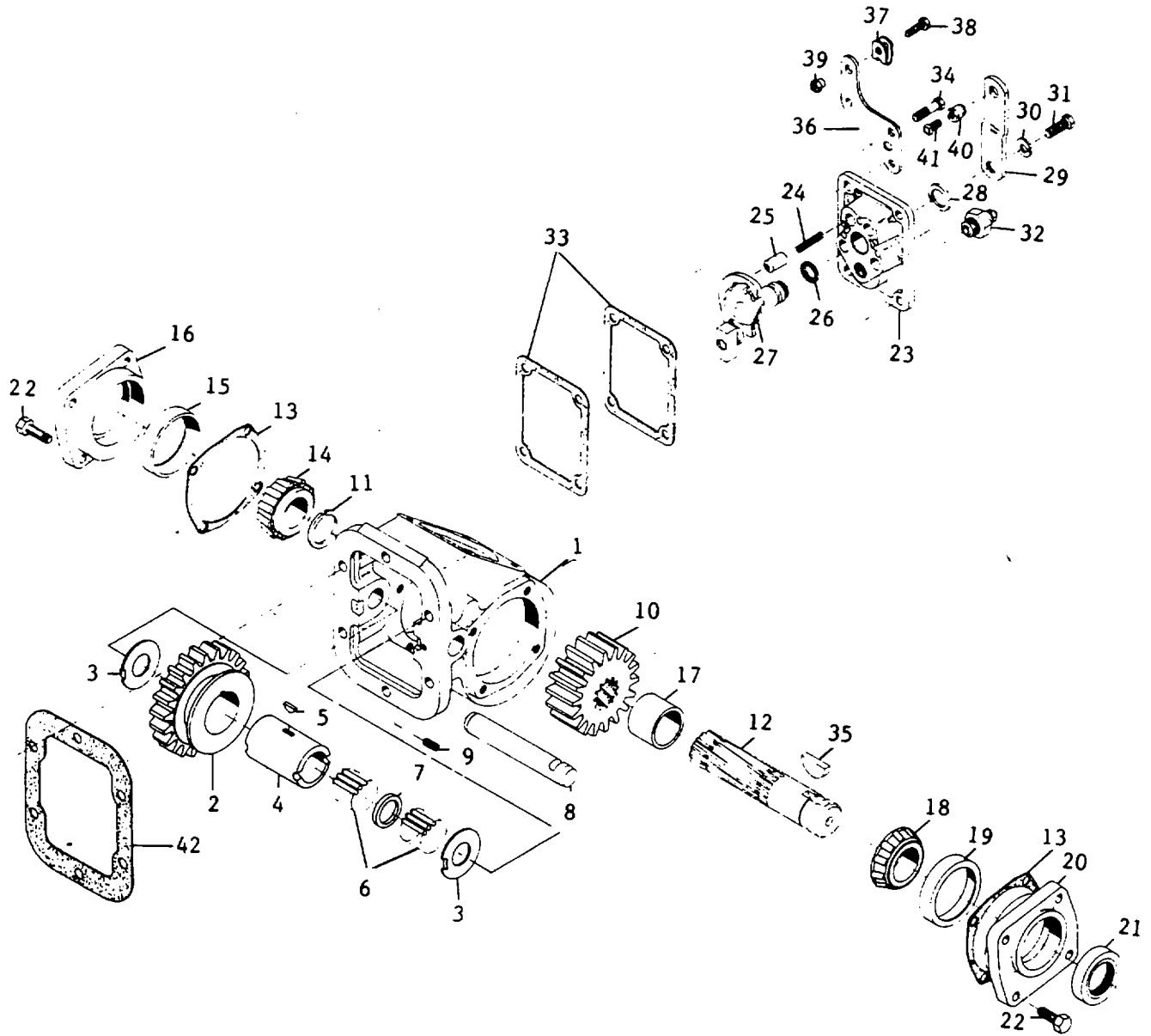


GROUP 15 PROPELLER SHAFT ASSEMBLY
FIGURE E-59. FIRE PUMP PROPELLER SHAFT ASSEMBLY

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GROUP 15 PROPELLER SHAFT ASSEMBLY
FIGURE E-59. FIRE PUMP PROPELLER SHAFT ASSEMBLY

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	-----	COML			Bolt, 3/8 NCx1/2	
2.	72447	2-4-533	59556	045-00044	Yoke	1
3.	59556	045-90001	59556	045-90001	Tube	1
4.	72447	5-153X	59556	045-00046	Universal Joint	2
5.	72447	2-4-1671	59556	045-00045	Yoke	1



**GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-60. POWER TAKE-OFF SYSTEM ASSEMBLY**

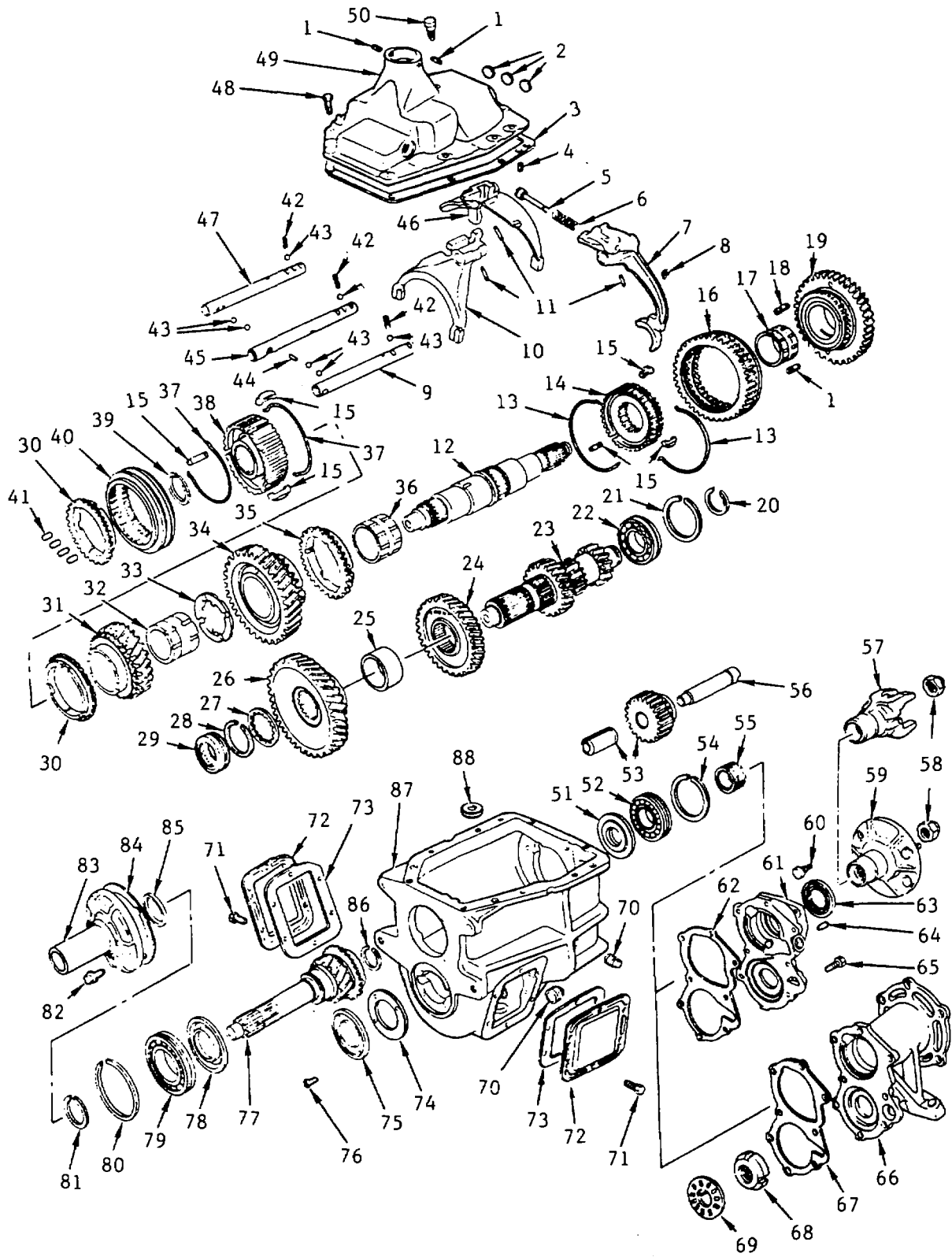
**GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-60. POWER TAKE-OFF SYSTEM ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	11757	4100XUBQXW6XD	59556	161-00002	Power Take-Off	REF
1.	11757	1-P-195	59556	161-00002-1	Housing, Standard Mount	1
2.	11757	5-P-357	59556	161-00002-2	Sliding Gear, Input	1
	11757	328889X	59556	161-00002-3	Needle Bearing and Idler Shaft Service Kit (contains items 3-9)	1
3.	11757	31-P-78	59556	161-00002-4	Thrust Washer, 1-3/4 Outside Diameter	2
4.	11757	6-P-14	59556	161-00002-5	Bearing Sleeve	1
5.	11757	378210	59556	161-00002-6	Hi-Pro Key	1
	11757	328297-100X	59556	161-00002-7	Needle Bearing Replacement Kit, (contains item 6)	1
6.	11757	379114	59556	161-00002-8	Needle Bearing, (two sets, 15 per set)	30
7.	11757	14-P-63	59556	161-00002-9	Needle Bearing Spacer, .225" Wide	1
8.	11757	9-P-60	59556	161-00002-10	Idler Shaft	1
9.	11757	378452-7	59556	161-00002-11	Set Screw, For Standard Mount, 1/4-20x1/2	1
10.	11757	2-P-357	59556	161-00002-12	Gear, Output	1
*11.	11757	378391	59556	161-00002-13	Lock Ring	1
12.	11757	3-P-202	59556	161-00002-14	Drive Shaft, Output, 1-1/4" Round	1
*13.	11757	22-P-24-1	59556	161-00002-15	Bearing Cap Gasket, (.010")	AR
	11757	22-P-24-2	59556	161-00002-16	Bearing Cap Gasket, (.020")	AR
14.	11757	550532	59556	161-00002-17	Bearing Cone, Closed End	1
	11757	328274X	59556	161-00002-18	Bearing Cap Assembly, Closed End, (contains 15-16)	1
15.	11757	550221	59556	161-00002-19	Bearing Cup, Closed End	1
16.	11757	21-P-131	59556	161-00002-20	Bearing Cap, Closed End	1
17.	11757	4-P-63	59556	161-00002-21	Drive Shaft Spacer	1
18.	11757	550397	59556	161-00002-22	Bearing Cone, Output	1
	11757	328273X	59556	161-00002-23	Bearing Cap Assembly, Output (contains items 19-20)	1
19.	11757	550221	59556	161-00002-24	Bearing Cup, Output	1
20.	11757	21-P-130	59556	161-00002-25	Bearing Cap, Output	1
*21.	11757	28-P-52	59556	161-00002-26	Oil Seal, Output	1
22.	11757	378430-10	59556	161-00002-27	Screw, Hex Head, (Eslock 5/16-18x1)	8
	11757	328818-1X	59556	161-00002-28	Wire Shift Cover Assembly, (Contains items 23-32)	1
23.	11757	34-P-74	59556	161-00002-29	Shifter Cover	1

**GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-60. POWER TAKE-OFF SYSTEM ASSEMBLY (Continued)**

INSERT TITLE

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
24.	11757	37-P-19	59556	161-00002-30	Shifter Spring	1
25.	11757	63-P-16	59556	161-00002-31	Poppet	1
*26.	11757	28-P-49	59556	161-00002-32	O-Ring, 3/4 Outside Diameter	1
27.	11757	328817-1X	59556	161-00002-33	Post and Plate Assembly	1
28.	11757	378004	59556	161-00002-34	Flat Washer, 1 inch Outside Diameter	1
29.	11757	51-P-22	59556	161-00002-35	Shifter Lever	1
30.	11757	378003	59556	161-00002-36	Lockwasher, 5/16	1
31.	11757	500409-6	59556	161-00002-37	Screw, Hex Head, 5/16-24x5/8	1
32.	11757	378969	59556	161-00002-38	Indicator Switch	1
*33.	11757	35-P-8	59556	161-00002-39	Shifter Cover Gasket, (.020")	2
34.	11757	378430-10	59556	161-00002-40	Screw, Hex Head, (Eslock 5/16-18xl)	4
35.	11757	500007-29	59556	161-00002-41	Woodruff Key	1
	11757	328346-10X	59556	161-00002-42	Wire Control Cable Assembly (10x=10 Foot Cable)	1
	11757	32838OX	59556	161-00002-43	Wire Control Mounting Parts, (contains items 36-41)	
36.	11757	50-P-17	59556	161-00002-44	Bracket	1
37.	11757	50-P-19	59556	161-00002-45	Swivel Bracket	1
38.	11757	500396-8	59556	161-00002-46	Screw, Hex Head, 1/4-20x3/4	1
39.	11757	378326	59556	161-00002-47	Nut, Hex, 1/4-20	1
40.	11757	378019	59556	161-00002-48	Pivot Pin	1
41.	11757	500568-4	59556	161-00002-49	Set Screw, 1/4-20xl/2	1
*42.	11757	35-P-9-1	59556	161-00002-50	Gasket, Housing, (.010")	AR
	11757	35-P-9-2	59556	161-00002-51	Gasket, Housing, (.020")	AR
43.	11757	1-P-195	59556	161-00002-52	Case Pump Flange and Shaft	1
	11757	328170-76X	59556	161-00002-53	PTO Mounting Stud Kit, For Standard Mount	KT
*	11757	328356-13X	59556	161-00002-54	Gasket and Seal Kit	KT



GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-61. TRANSMISSION ASSEMBLY

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**GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-61. TRANSMISSION ASSEMBLY**

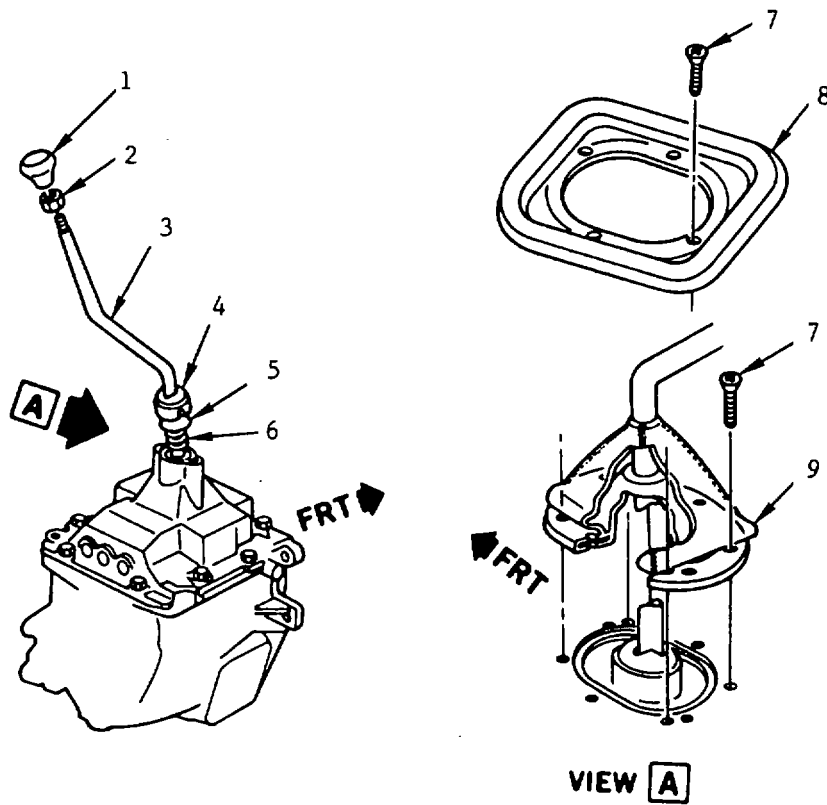
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	03608	RPO-MM4	59556	039-90007	Transmission, 4-Speed, Manual	
1.	03608	456587	59556	039-90007-1	Pin, Spring, 5/16x3/4	1
2.	03608	9427698	59556	039-90007-2	Plug, Expansion, 1 Inch	1
3.	03608	15594369	59556	039-90007-3	Gasket, Cover	1
4.	03608	456713	59556	039-90007-4	Pin, Dowel, 3/8x7/8	1
5.	03608	3864968	59556	039-90007-5	Plunger, Reverse Shift Fork	1
6.	03608	3978731	59556	039-90007-6	Spring, Reverse Shift Fork	1
7.	03608	3978730	59556	039-90007-7	Fork, Reverse Shift	1
8.	03608	3727182	59556	039-90007-8	Retainer, Reverse Shift Fork Plunger	1
9.	02608	15592254	59556	039-90007-9	Shaft, Reverse Shift Fork	1
10.	03608	3901138	59556	039-90007-10	Fork, Third and Fourth Shift	1
11.	03608	456368	59556	039-90007-11	Pin, Spring, 3/16x1-1/8	1
12.	03608	14020859	59556	039-90007-12	Shaft, Main	1
13.	03608	3866646	59556	039-90007-13	Spring, First and Second Speed, Clutch Key	1
14.	03608	3946776	59556	039-90007-14	Hub, First and Second Speed, Clutch	1
15.	03608	3866358	59556	039-90007-15	Key, First; Second; Third and Fourth Speed Clutch	1
16.	03608	3901170	59556	039-90007-16	Gear, Reverse	1
17.	03608	465455	59556	039-90007-17	Bushing, First Speed Gear	1
18.	03608	456587	59556	039-90007-18	Pin, Spring, 5/16x3/4	1
19.	03608	476766	59556	039-90007-19	Gear, with Pin, First Speed	1
20.	03608	3866346	59556	039-90007-20	Ring, Countergear, Retaining	1
21.	03608	2600236	59556	039-90007-21	Ring, Countergear, Rear, Bearing Retaining	1
22.	03608	907474	59556	039-90007-22	Bearing, Countergear, Rear	1
23.	03608	14053671	59556	039-90007-23	Gear, Counter	1
24.	03608	3968038	59556	039-90007-24	Gear, Third Speed	1
25.	03608	14020811	59556	039-90007-25	Spacer, Countergear	1
26.	03608	3955570	59556	039-90007-26	Countergear, with Spacer, Clutch	1
27.	03608	3901153	59556	039-90007-27	Washer, Countergear, Thrust	1
28.	03608	3920703	59556	039-90007-28	Ring, Clutch, Countergear Retainer	1
29.	02608	7451785	59556	039-90007-29	Bearing, Countergear	1

**GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-61. TRANSMISSION ASSEMBLY (Continued)**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
30.	03608	3993036	59556	039-90007-30	Cone, Third and Fourth Speed Gear, Synchronizer	1
31.	03608	3901161	59556	039-90007-31	Gear, Third Speed	1
32.	03608	3932274	59556	039-90007-32	Bushing, Third Speed Gear	1
33.	03608	3932267	59556	039-90007-33	Washer, Third Speed	1
34.	03608	3901158	59556	039-90007-34	Gear, Second Speed	1
35.	03608	3950367	59556	039-90007-35	Cone, Second Speed Gear, Synchronizer	1
36.	03608	3932253	59556	039-90007-36	Bushing, Second Speed Gear	1
37.	03608	3866359	59556	039-90007-37	Spring, Third and Fourth Speed, Clutch Key	1
38.	03608	3901164	59556	039-90007-38	Hub, Third and Fourth Speed Clutch	1
39.	03608	3901166	59556	039-90007-39	Ring, Third and Fourth Speed Clutch Hub Retainer	1
40.	03608	3901165	59556	039-90007-40	Clutch, Third and Fourth Speed	1
41.	03608	9422666	59556	039-90007-41	Bearing, Main Shaft Pilot Roller	1
42.	03608	551946	59556	039-90007-42	Spring, Reverse Shift Lever Detent Ball	1
43.	03608	453593	59556	039-90007-43	Ball, Steel, 3/8	1
44.	03608	3901139	59556	039-90007-44	Pin, Shift, Interlock	1
45.	03608	15592256	59556	039-90007-45	Shaft, Third and Fourth Shift Fork	1
46.	03608	3901137	59556	039-90007-46	Fork, First and Second Shift	1
47.	03608	15592255	59556	039-90007-47	Shaft, First and Second Shift Fork	1
48.	03608	3911926	59556	039-90007-48	Bolt, Rear Bearing Retainer	1
49.	03608	3952668	59556	039-90007-49	Cover, Transmission	1
50.	03608	8640496	59556	039-90007-50	Ventilator, Transmission	1
51.	03608	465450	59556	039-90007-51	Washer, First Speed Gear Thrust	1
52.	03608	907474	59556	039-90007-52	Bearing, Main Shaft, Rear	1
53.	03608	3901141	59556	039-90007-53	Gear with Bushing, Reverse Idler	1
54.	03608	2600236	59556	039-90007-54	Ring, Main Shaft Rear Bearing Retainer	1
55.	03608	3866742	59556	039-90007-55	Gear, Speedo Drive, 7 Tooth	1
56.	03608	3901144	59556	039-90007-56	Shaft, Reverse Idler	1
57.	03608	3915056	59556	039-90007-57	Flange, Universal Joint, Front	1
58.	03608	3830575	59556	039-90007-58	Nut, Universal Joint, Front Flange Lock	1
59.	03608	3866674	59556	039-90007-59	Flange, Universal Joint, Front	1

**GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-61. TRANSMISSION ASSEMBLY (Continued)**

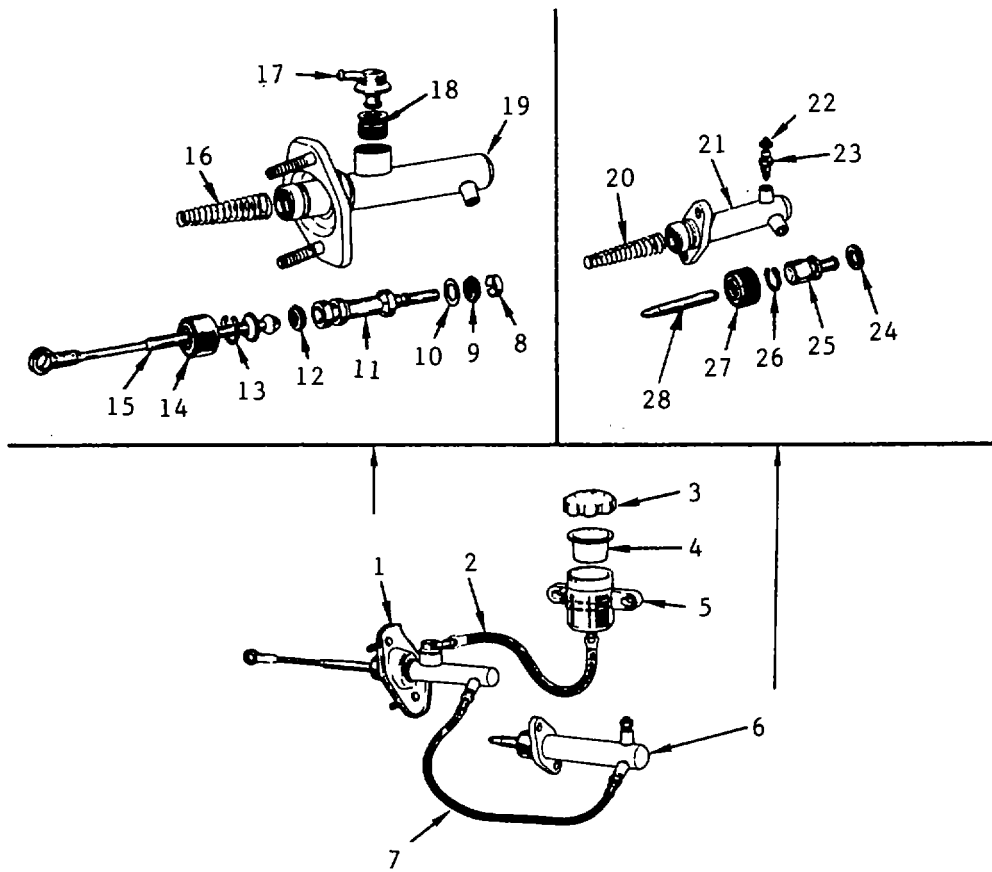
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
60.	03608	3866676	59556	039-90007-60	Bolt, Universal Joint Front Flange	1
61.	03608	465217	59556	039-90007-61	Retainer, Rear Bearing	1
	03608	3901182	59556	039-90007-62	Retainer, Transmission, Rear Bearing	1
62.	03608	3901180	59556	039-90007-63	Gasket, Rear Bearing Retainer	1
63.	03608	3911917	59556	039-90007-64	Seal, Universal Joint Front Flange	1
64.	03608	456587	59556	039-90007-65	Pin, Dowel, 5/16x3/4	1
65.	03608	3911926	59556	039-90007-66	Bolt, Rear Bearing Retainer	1
66.	03608	15597792	59556	039-90007-67	Adapter, Transfer Case	1
67.	03608	3901180	59556	039-90007-68	Gasket, Adapter to Transmission	1
68.	03608	127711	59556	039-90007-69	Nut, Round, 4 Slots, Bearing Lock	1
69.	03608	335366	59556	039-90007-70	Washer, Main Shaft Bearing Lock	1
70.	03608	444746	59556	039-90007-71	Plug, 1/2-14	1
71.	03608	9440034	59556	039-90007-72	Bolt, Hex, 3/8-16x5/8	AR
72.	03608	6273213	59556	039-90007-73	Cover, Power Take Off	1
73.	03608	6273214	59556	039-90007-74	Gasket, Power Take Off Cover	1
74.	03608	3866348	59556	039-90007-75	Gasket, Countergear Front Bearing Cap	1
75.	03608	3866347	59556	039-90007-76	Cap, Countergear Front Bearing	1
76.	03608	155908	59556	039-90007-77	Screw, Pan Head, 10-24x3/8	AR
77.	03608	15588219	59556	039-90007-78	Gear, Main Drive	1
78.	03608	3901177	59556	039-90007-79	Slinger, Main Drive Gear Bearing Oil	1
79.	03608	907993	59556	039-90007-80	Bearing, Main Drive Gear	1
80.	03608	3866655	59556	039-90007-81	Ring, Main Drive Gear Bearing Retainer	1
81.	03608	3901152	59556	039-90007-82	Ring, Main Drive Gear Retainer	1
82.	03608	3920784	59556	039-90007-83	Screw, with Lockwasher	1
83.	03608	3901178	59556	039-90007-84	Retainer, Main Drive Gear Bearing	1
84.	03608	3866651	59556	039-90007-85	Gasket, Main Drive Gear Bearing Retainer	1
85.	03608	3987937	59556	039-90007-86	Seal, Main Drive Gear Bearing Oil	1
86.	03608	3901166	59556	039-90007-87	Ring, Main Retainer Oil	1
87.	03608	465453	59556	039-90007-88	Case,	1
88.	03608	3787240	59556	039-90007-89	Magnet, Chip Collector	1



GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-62. 4-SPEED SHIFT CONTROL ASSEMBLY

**GROUP 16 TRANSMISSION ASSEMBLY
FIGURE E-62. 4-SPEED SHIFT CONTROL ASSEMBLY**

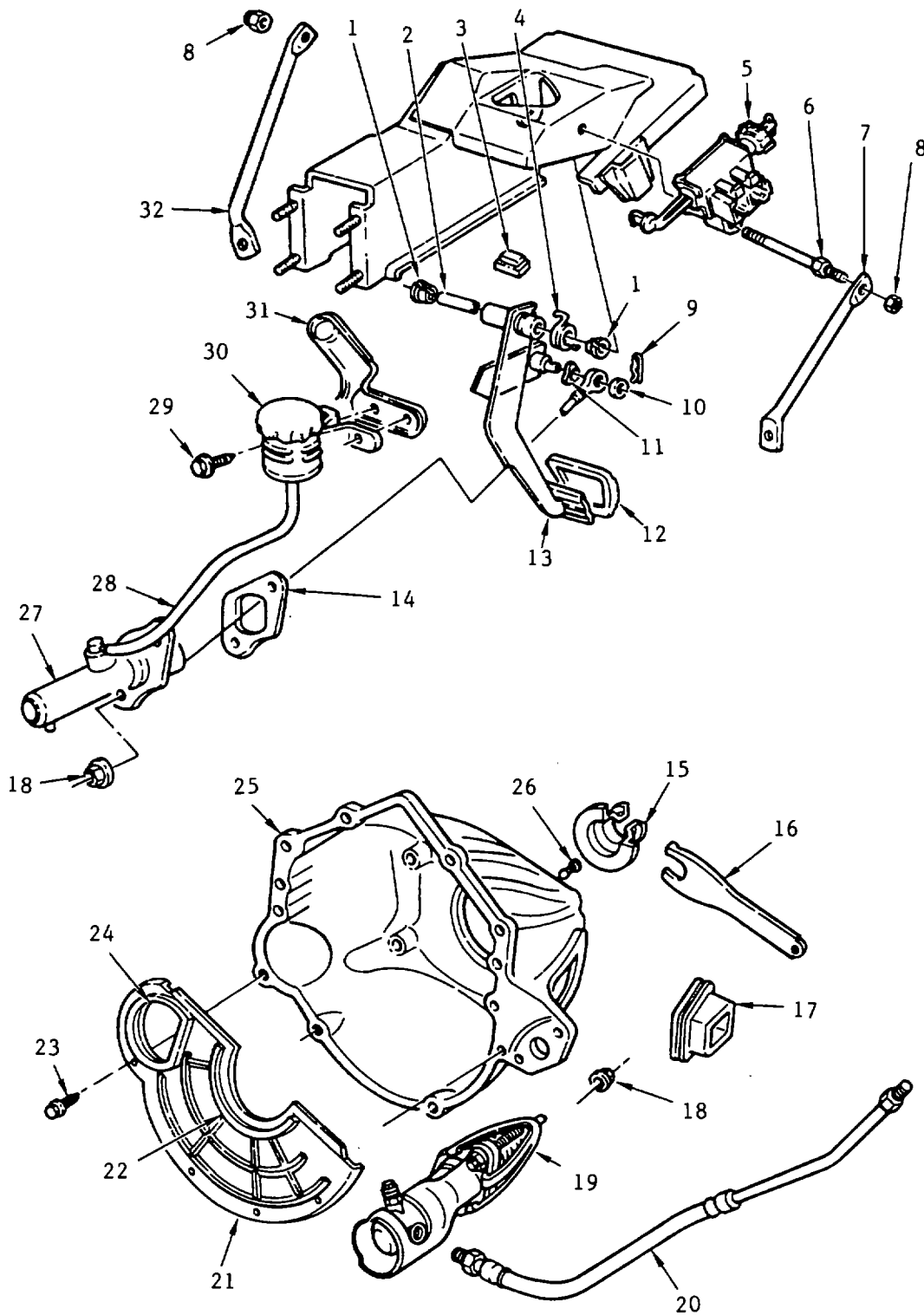
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	041-90001	59556	041-90001	4-Speed Shift Control	
1.	03608	14072696	59556	041-90001-1	Knob, Transmission Control Lever	1
2.	03608	114547	59556	041-90001-2	Nut, Hex, 3/8-24	AR
3.	03608	6274077	59556	041-90001-3	Lever, Transmission Control	1
4.	03608	3988627	59556	041-90001-4	Cap, Transmission Control Lever	1
5.	03608	3988628	59556	041-90001-5	Cup, Transmission Control Lever Spring	1
6.	03608	3683582	59556	041-90001-6	Spring, Transmission Control Lever	1
7.	03608	9437376	59556	041-90001-7	Screw, Oval Head, 10-16xl	AR
8.	03608	14072669	59556	041-90001-8	Plate, Transmission Control Lever, Boot	1
9.	03608	14071982	59556	041-90001-9	Boot, Transmission Control Lever	1



GROUP 17 CLUTCH ASSEMBLY
FIGURE E-63. CLUTCH CYLINDER/HYDRAULIC, ASSEMBLY

**GROUP 17 CLUTCH ASSEMBLY
FIGURE E-63. CLUTCH CYLINDER/HYDRAULIC, ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
					Clutch Cylinders/Hydraulic	REF
1.	03608	15537761	59556	038-90002-1	Cylinder	1
2.	03608	8885125	59556	038-90002-2	Hose, Bulk	1
3.	03608	15594155	59556	038-90002-3	Cap, Reservoir	1
4.	03608	15594156	59556	038-90002-4	Seal, Reservoir Cap Moisture	1
5.	03608	15594154	59556	038-90002-5	Reservoir, Hydraulic Clutch Fluid	1
6.	03608	15537762	59556	038-90002-6	Cylinder, Hydraulic Clutch Sec.	1
7.	03608	15537760	59556	038-90002-7	Pipe, Hydraulic Clutch	1
8.	03608	15537760	59556	038-90002-8	Cup	1
9.	03608	N/S			Seal, Recuperating	1
10.	03608	N/S			Washer, Plunger	1
11.	03608	N/S			Piston	1
12.	03608	N/S			Seal, "L"	1
13.	03608	N/S			Retainer, Piston	1
14.	03608	15537766	59556	038-90002-9	Cover, Master Cylinder, Push Rod Dust	1
15.	03608	15537765	59556	038-90002-10	Rod, Master Cylinder Push	1
16.	03608	N/S			Spring, Master Cylinder	1
17.	03608	15594148	59556	038-90002-11	Kit, Repair	KT
18.	03608	N/S			Seal, Adaptor	1
19.	03608	N/S			Body, Master Cylinder	1
20.	03608	15537768	59556	038-90002-12	Spring, Sec. Cylinder	1
21.	03608	N/S			Body, Sec. Cylinder	1
22.	03608	N/S			Cap, Bleed Screw Dust	1
23.	03608	15594157	59556	038-90002-13	Screw, Bleed	1
24.	03608	N/S			Seal	1
25.	03608	N/S			Piston, Sec. Cylinder	1
26.	03608	N/S			Retainer, Piston	1
27.	03608	15537764	59556	038-90002-14	Cover, Sec. Cylinder Push Rod Dust	1
28.	03608	15537763	59556	038-90002-15	Rod, Sec. Cylinder Push	1



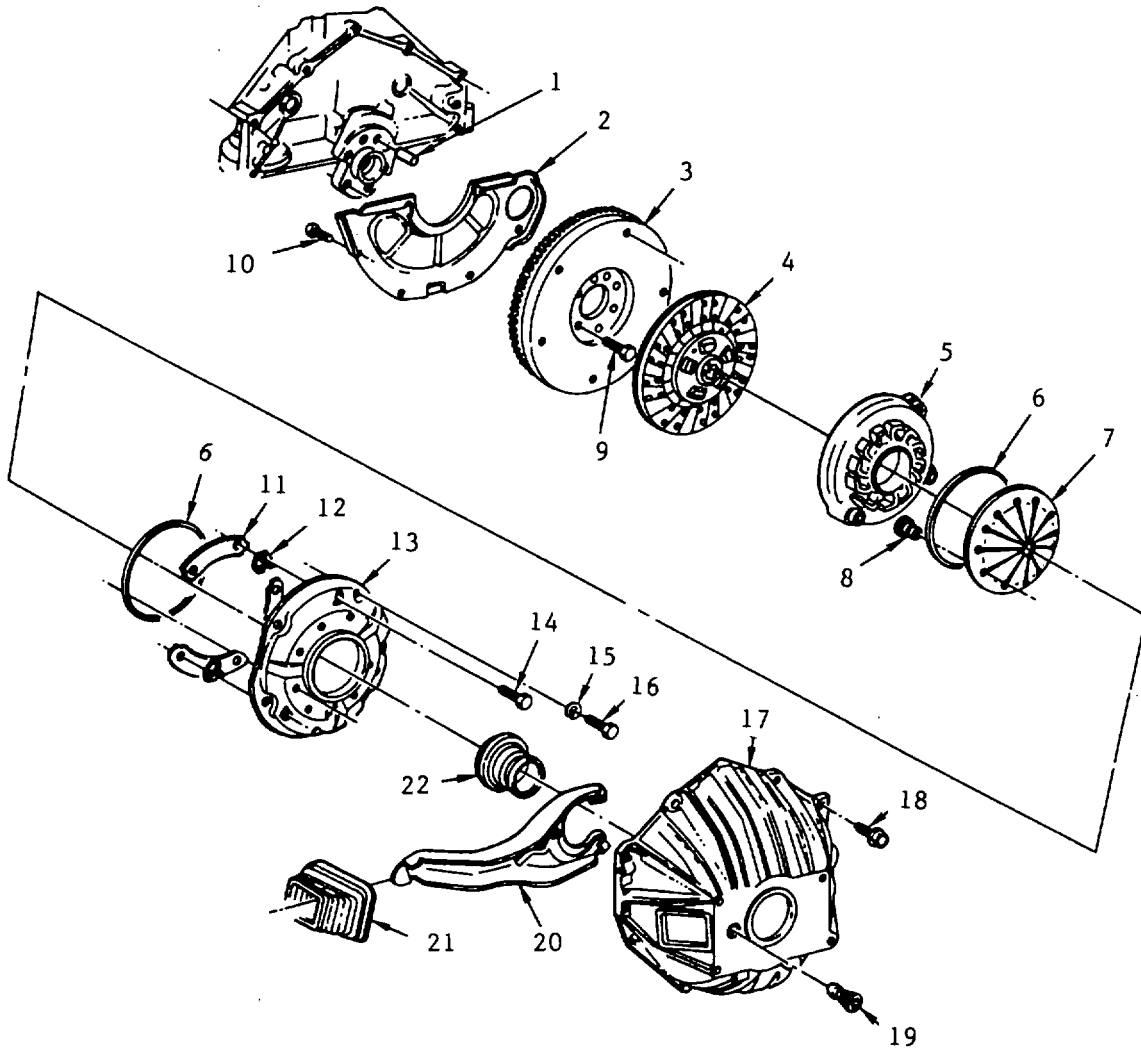
**GROUP 17 CLUTCH ASSEMBLY
FIGURE E-64. CLUTCH LINKAGE ASSEMBLY**

**GROUP 17 CLUTCH ASSEMBLY
FIGURE E-64. CLUTCH LINKAGE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	044-90001	59556	044-90001	Clutch Linkage Assembly	REF
1.	03608	346381	59556	044-90001-1	Bushing	1
2.	03608	15592274	59556	044-90001-2	Spacer	1
3.	03608	14046866	59556	044-90001-3	Bumper	1
4.	03608	15592276	59556	044-90001-4	Spring	1
5.	03608	15598491	59556	044-90001-5	Switch	1
6.	03608	15521992	59556	044-90001-6	Stud	1
7.	03608	15521991	59556	044-90001-7	Brace	1
8.	03608	9422299	59556	044-90001-8	Nut, Hex Lock	AR
9.	03608	1244707	59556	044-90001-9	Spring, Steel	1
10.	03608	1368917	59556	044-90001-10	Washer	1
11.	03608	1193696	59556	044-90001-11	Washer	AR
12.	03608	3988198	59556	044-90001-12	Cover	1
13.	03608	15592273	59556	044-90001-13	Pedal	1
14.	03608	15592279	59556	044-90001-14	Gasket	1
15.	03608	15590168	59556	044-90001-15	Bearing, Clutch	1
16.	03608	15592270	59556	044-90001-16	Fork, Clutch	1
17.	03608	15590132	59556	044-90001-17	Boot	1
18.	03608	11061932	59556	044-90001-18	Nut, M8xl.25	AR
	03608	11500323	59556	044-90001-19	Washer, Flat	AR
19.	03608	15537762	59556	044-90001-20	Secondary Cylinder Head	1
20.	03608	15537760	59556	044-90001-21	Pipe	1
21.	03608	15592296	59556	044-90001-22	Cover, Flywheel Housing	1
22.	03608	14074894	59556	044-90001-23	Seal, Flywheel Housing	1
23.	03608	180016	59556	044-90001-24	Bolt, Hex	AR
	03608	120423	59556	044-90001-25	Washer, External Tooth Lock	AR
24.	03608	14074894	59556	044-90001-26	Seal, Flywheel Housing	1
25.	03608	15530202	59556	044-90001-27	Housing	1
26.	03608	15592268	59556	044-90001-28	Stud	1
27.	03608	15537761	59556	044-90001-29	Master Cylinder	1

**GROUP 17 CLUTCH ASSEMBLY
FIGURE E-64. CLUTCH LINKAGE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
28.	03608	8885125	59556	044-90001-30	Hose	1
29.	03608	11504311	59556	044-90001-31	Screw, Hex	AR
30.	03608	15594154	59556	044-90001-32	Reservoir	1
	03608	15594155	59556	044-90001-33	Cap	1
	03608	15594156	59556	044-90001-34	Seal	1
31.	03608	15590106	59556	044-90001-35	Bracket	1
32.	03608	15522108	59556	044-90001-36	Brace	1

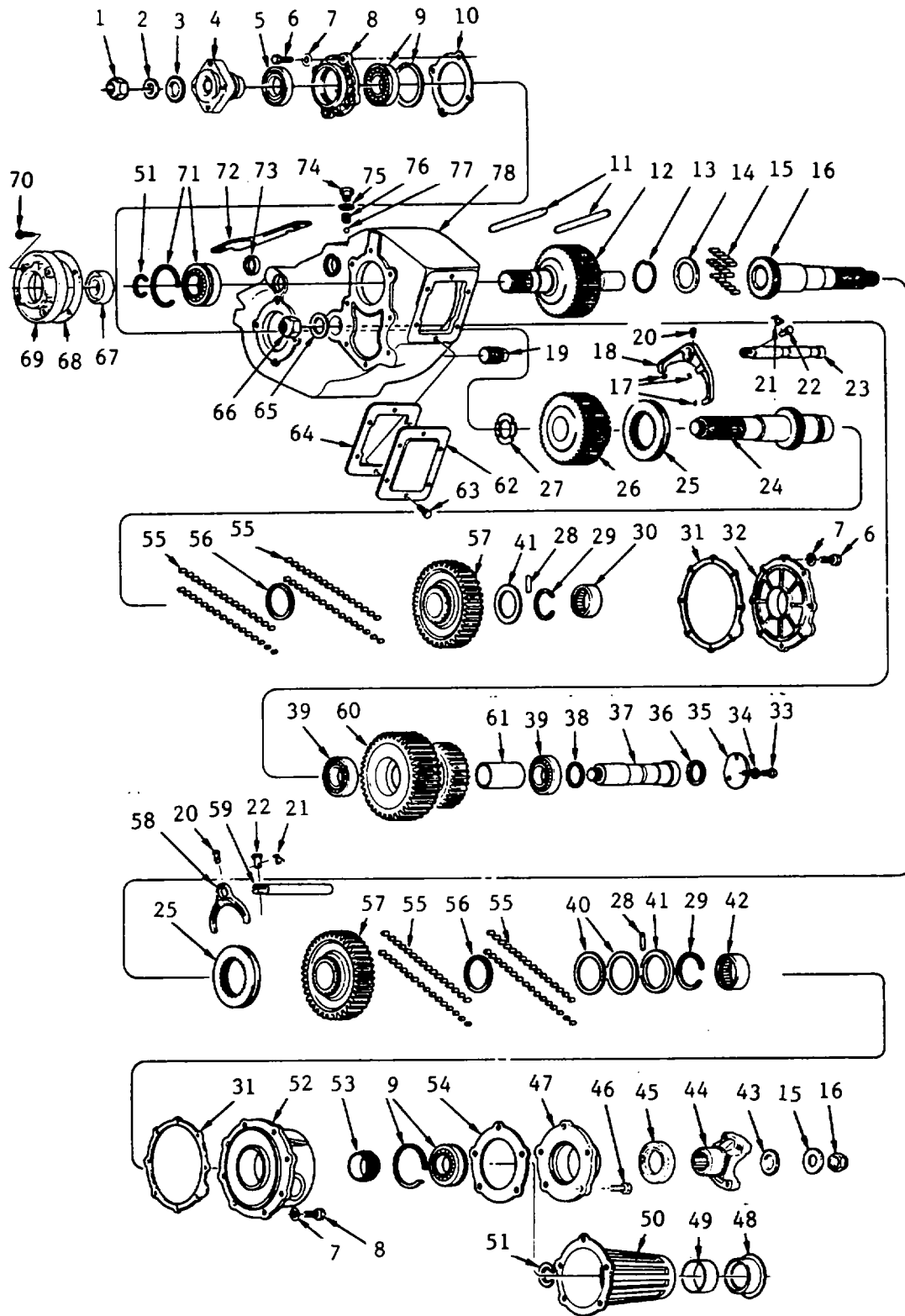


GROUP 17 CLUTCH ASSEMBLY
FIGURE E-65. SPRING TYPE CLUTCH ASSEMBLY

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**GROUP 17 CLUTCH ASSEMBLY
FIGURE E-65. SPRING TYPE CLUTCH ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	038-90001	59556	038-90001	Diaphragm Spring Type Clutch Assembly	
1.	03608	3701679	59556	038-90001-1	Pin, Flywheel, Dowel	1
2.	03608	15592296	59556	038-90001-2	Cover, Flywheel Housing	1
3.	03608	14077160	59556	038-90001-3	Flywheel, Crankshaft (Includes Ring Gear)	1
	03608	14077156	59556	038-90001-4	Gear, Flywheel Ring	1
4.	03608	15592285	59556	038-90001-5	Plate, Clutch Driven	1
5.	03608	N/A			Plate, Clutch Pressure (Part of #13)	1
6.	03608	N/A			Ring, Clutch Spring Pivot (Part of #13)	1
7.	03608	N/A			Spring, Clutch (Part of #13)	1
8.	03608	N/A			Pin, Clutch Spring Retainer (Part of #13)	1
9.	03608	839756	59556	038-90001-6	Bolt, Flywheel	6
10.	03608	180016	59556	038-90001-7	Bolt, Hex, 1/4-20x1/2	AR
	03608	121753	59556	038-90001-8	Washer, External Tooth, Lock, 1/4	AR
11.	03608	N/A			Strap, Clutch Pressure Plate Drive (Part of #13)	1
12.	03608	N/A			Spring, Clutch Pressure Plate Retainer	1
13.	03608	15592289	59556	038-90001-9	Cover with Plate, Clutch Pressure	1
14.	----	COML			Bolt, Hex Flange Head, 5/16-18x5/8	AR
15.	03608	9439511	59556	038-90001-11	Washer, Spring Lock, 5/16	AR
16.	----	COML			Bolt, Hex, 5/16-18x7/8	AR
17.	03608	15530202	59556	038-90001-13	Housing, Clutch, (Includes #19)	1
18.	03608	3736035	59556	038-90001-14	Bolt, Hex, 3/8-16x1-19/64	AR
	03608	120394	59556	038-90001-15	Washer, Flat, 13/32 ID; 13/16 OD; 1/16 THK	AR
19.	03608	15592268	59556	038-90001-16	Stud, Clutch Fork Ball	1
20.	03608	15592270	59556	038-90001-17	Fork, Clutch	1
21.	03608	15590132	59556	038-90001-18	Boot, Clutch Fork	1
22.	03608	15590168	59556	038-90001-19	Bearing, Clutch Release	1



GROUP 18 TRANSFER CASE ASSEMBLY
 FIGURE E-66. TRANSFER CASE ASSEMBLY

**GROUP 18 TRANSFER CASE ASSEMBLY
FIGURE E-66. TRANSFER CASE ASSEMBLY**

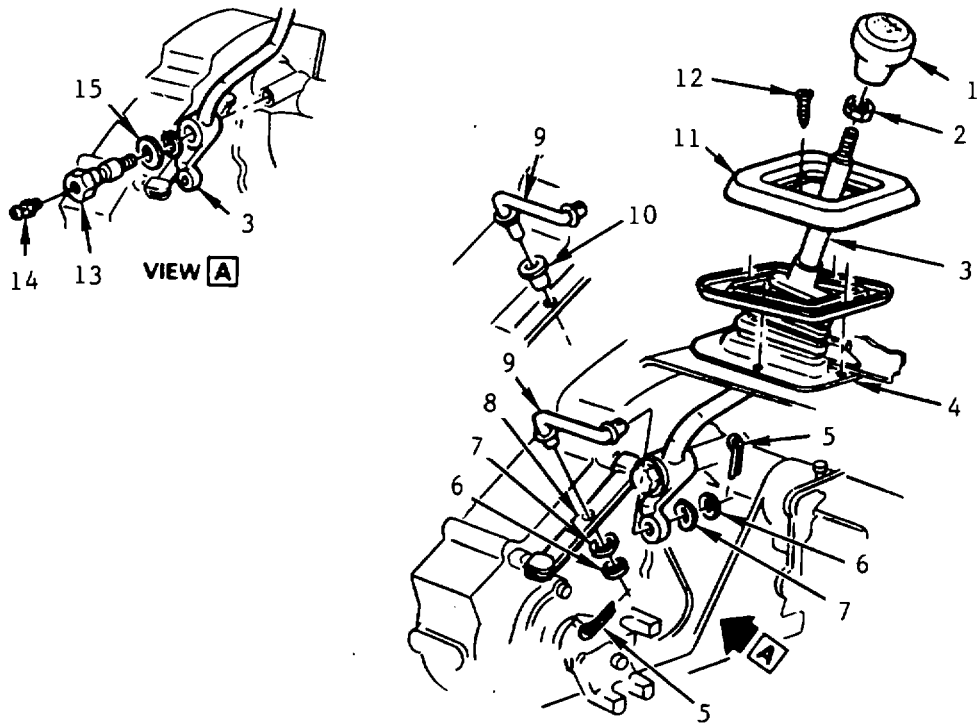
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	148-90001	59556	148-90001	Transfer Case	REF
1.	----	COML	59556	148-90001-1	Nut, Prev. Torque, 3/4-16	AR
2.	03608	2423517	59556	148-90001-2	Washer, Front OTPT Yoke	AR
3.	03608	14022212	59556	148-90001-3	Washer, Front OTPT Shaft Flange	AR
4.	03608	460835	59556	148-90001-4	Yokr, Front OTPT	1
5.	03608	456483	59556	148-90001-5	Seal, Front OTPT Shaft	1
6.	03608	9438142	59556	148-90001-6	Bolt, Hex, 3/8-16x1	AR
7.	03608	138489	59556	148-90001-7	Washer, External Tooth Lock, 3/8	AR
8.	03608	465482	59556	148-90001-8	Retainer Assembly, Front OTPT	1
9.	03608	908182	59556	148-90001-9	Bearing Assembly With Snap Ring	1
10.	03608	14047928	59556	148-90001-10	Gasket, Front OTPT Shaft	1
11.	03608	3975716	59556	148-90001-11	Plunger Shift Rail	2
12.	03608	15594158	59556	148-90001-12	Gear Input Main Drive	1
13.	03608	471896	59556	148-90001-13	Ring Pilot Roller Return	1
14.	03608	3967895	59556	148-90001-14	Washer, Rear OTPT Shaft	1
15.	03608	9431705	59556	148-90001-15	Roller Rear OTPT Shaft Pilot	AR
16.	03608	14022216	59556	148-90001-16	Shaft Assembly Rear OTPT	1
17.	03608	2381963	59556	148-90001-17	Insert Front Wheel Shift Fork	3
18.	03608	14037921	59556	148-90001-18	Fork Front Wheel Shift	1
19.	03608	444746	59556	148-90001-19	Plug Fill and Drain	1
20.	03608	9437415	59556	148-90001-20	Pin Coiled Spring Shift Head, 7/32x1-1/8	1
21.	03608	14022210	59556	148-90001-21	Clip Shift Link Clevis	1
22.	03608	121741	59556	148-90001-22	Pin Clevis Shift Shaft Link, 5/16x15/16	1
23.	03608	14022221	59556	148-90001-23	Shaft Front Wheel Shift	1
24.	03608	471727	59556	148-90001-24	Shaft Front OTPT	1
25.	03608	3967878	59556	148-90001-25	Hub Clutch	1
26.	03608	3975705	59556	148-90001-26	Gear Front OTPT Shaft Front	1
27.	03608	3979450	59556	148-90001-27	Washer, Front OTPT Shaft	1
28.	03608	9431704	59556	148-90001-28	Pin Solid Thrust Washer Retainer, 1/8x17/64	1
29.	03608	361119	59556	148-90001-29	Ring Front and Rear OTPT	1
30.	03608	9427115	59556	148-90001-83	Bearing Assembly Roller, Front OTPT	AR

**GROUP 18 TRANSFER CASE ASSEMBLY
FIGURE E-66. TRANSFER CASE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
31.	03608	6259083	59556	148-90001-30	Gasket, Front and Rear OTPT	1
32.	03608	3995881	59556	148-90001-31	Retainer, Front OTPT	1
33.	03608	443899	59556	148-90001-32	Bolt, Hex, 5/16-18x3/4	AR
34.	03608	136857	59556	148-90001-33	Washer, External Tooth Lock, 7/16	AR
35.	03608	3975710	59556	148-90001-34	Cover, Idler Shaft	1
36.	03608	3975711	59556	148-90001-35	Gasket, Idler Shaft Cover	1
37.	03608	3975703	59556	148-90001-36	Shaft Idler Gear	1
38.	03608	3975698	59556	148-90001-37	Shim Idler Gear Bearing (.004)	AR
	03608	3975700	59556	148-90001-38	Shim Idler Gear Bearing (.0125)	AR
	03608	3975701	59556	148-90001-39	Shim Idler Gear Bearing (.015)	AR
39.	03608	457449	59556	148-90001-40	Bearing Assembly Idler Gear	1
40.	03608	3967881	59556	148-90001-41	Washer, Rear OTPT Shaft	1
41.	03608	3967877	59556	148-90001-42	Washer, Front and Rear OTPT	1
42.	03608	9428004	59556	148-90001-43	Bearing Rear OTPT Shaft Retainer	1
43.	03608	14022211	59556	148-90001-44	Washer, Rear OTPT Shaft Flange	1
44.	03608	6259081	59556	148-90001-45	Yoke, Rear OTPT Shaft	1
45.	03608	3967876	59556	148-90001-46	Seal, Rear OTPT Shaft Bearing Retainer Oil	1
46.	03608	9440239	59556	148-90001-47	Bolt, Hex, 3/8-16x7/8	AR
	03608	138489	59556	148-90001-48	Washer, External Tooth Lock	AR
47.	03608	3967897	59556	148-90001-49	Retainer, Rear OTPT	1
48.	03608	8625893	59556	148-90001-50	Seal, Rear OTPT Shaft External Oil	1
49.	03608	3978765	59556	148-90001-51	Bushing, Rear OTPT Shaft External	1
50.	03608	14022213	59556	148-90001-52	Extersion, Rear OTPT Shaft	1
51.	03608	6259192	59556	148-90001-53	Ring, Input Gear Bearing, Snap	AR
52.	03608	474071	59556	148-90001-54	Retainer Assembly, Rear OTPT Shaft Bearing	1
53.	03608	6273992	59556	148-90001-55	Gear, Speedo Drive (Plastic)	1
54.	03608	3979453	59556	148-90001-56	Gasket, Oil Seal Retainer	1
55.	03608	9419284	59556	148-90001-57	Roller, Front and Rear OTPT	AR
56.	03608	3967883	59556	148-90001-58	Spacer, Front and Rear OTPT	1
57.	03608	3967882	59556	148-90001-59	Gear, Front and Rear OTPT	1
58.	03608	3975715	59556	148-90001-60	Fork, Rear Wheel Shift	1

**GROUP 18 TRANSFER CASE ASSEMBLY
FIGURE E-66. TRANSFER CASE ASSEMBLY**

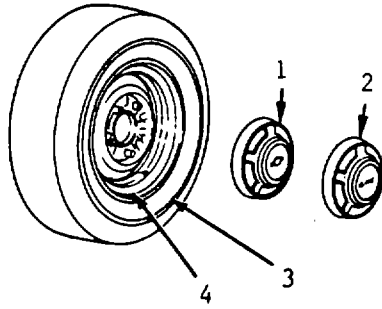
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
59.	03608	6259153	59556	148-90001-61	Shaft, Rear Wheel Shift	1
60.	03608	3967884	59556	148-90001-62	Gear Case Idler	1
61.	03608	3967898	59556	148-90001-63	Spacer Idler Gear Bearing	1
62.	03608	6273213	59556	148-90001-64	Cover Power Takeoff	1
63.	03608	9428638	59556	148-90001-65	Bolt, Hex, 3/8-16x5/8	AR
64.	03608	6273214	59556	148-90001-66	Gasket, Power Takeoff	1
65.	03608	3967887	59556	148-90001-67	Washer, Idler Shaft	1
66.	03608	3967888	59556	148-90001-68	Nut, Idler Shaft	1
67.	03608	14095609	59556	148-90001-69	Seal, INPT Drive Gear	1
68.	03608	335200	59556	148-90001-70	Gasket, Input Shaft Bearing Retainer	1
69.	03608	15591376	59556	148-90001-71	Retainer, Input Shaft Bearing	1
70.	03608	346323	59556	148-90001-72	Bolt, Input Bearing Retainer	AR
71.	03608	9422715	59556	148-90001-73	Bearing, With Snap Ring	1
72.	03608	14069597	59556	148-90001-74	Link, Shift Shaft	1
73.	03608	3979626	59556	148-90001-75	Seal, Shaft Oil	1
74.	03608	3975717	59556	148-90001-76	Plug Poppet Rear Wheel Shift Shaft	1
	03608	15594176	59556	148-90001-77	Switch, Front Wheel Drive Indicator Light	1
75.	03608	3967885	59556	148-90001-78	Gasket, Poppet Plug	1
76.	03608	3967886	59556	148-90001-79	Spring, Poppet Plug	1
77.	03608	1049191	59556	148-90001-80	Ball, 5/16	1
78.	03608	14037909	59556	148-90001-81	Case, Transfer	1
	03608	3787240	59556	148-90001-82	Magnet Clip Collector	1



GROUP 18 TRANSFER CASE ASSEMBLY
FIGURE E-67. SHIFT CONTROL ASSEMBLY

**GROUP 18 TRANSFER CASE ASSEMBLY
FIGURE E-67. SHIFT CONTROL ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
					Shift Control/Transfer Case	REF
1.	03608	15588504	59556	148-90001-83	Knob, Control Lever	1
2.	03608	3841497	59556	148-90001-84	Nut, Control Lever, Knob	1
3.	03608	14055531	59556	148-90001-85	Lever, Control (Plain)	1
4.	03608	14071955	59556	148-90001-87	Boot, Control Lever	1
5.	03608	103374	59556	148-90001-88	Pin, Cotter, 3/32x1	1
6.	03608	6255640	59556	148-90001-89	Washer, Flat, 13/32 ID 13/16 OD 48 Thick	AR
7.	03608	3953987	59556	148-90001-90	Washer, Arched Spring, 25/64 ID 15/16 OD	AR
8.	03608	14069597	59556	148-90001-91	Link, Shift Shaft	1
9.	03608	14054220	59556	148-90001-92	Rod, Selector	1
10.	03608	14049556	59556	148-90001-93	Grommet, Selector Rod	1
11.	03608	14032789	59556	148-90001-94	Plate, Control Lever Boot Trim	1
12.	03608	9437376	59556	148-90001-95	Screw, Oval, 10-16x1	AR
13.	03608	14009313	59556	148-90001-96	Bolt, Control Lever	AR
14.	03608	9417901	59556	148-90001-97	Fitting, Lubricate Straight, 1/4-28x1/2	1
15.	03608	2423517	59556	148-90001-98	Washer	1

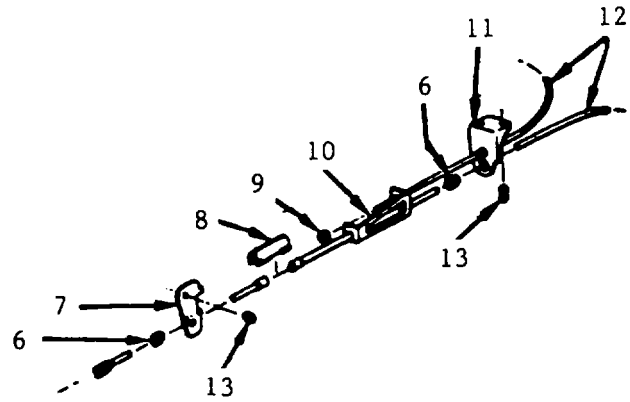
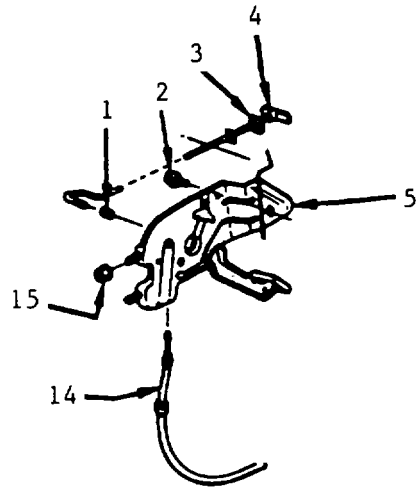


**GROUP 19 WHEEL ASSEMBLY
FIGURE E-68. WHEEL ASSEMBLY**

E-200

**GROUP 19 WHEEL ASSEMBLY
FIGURE E-68. WHEEL ASSEMBLY**

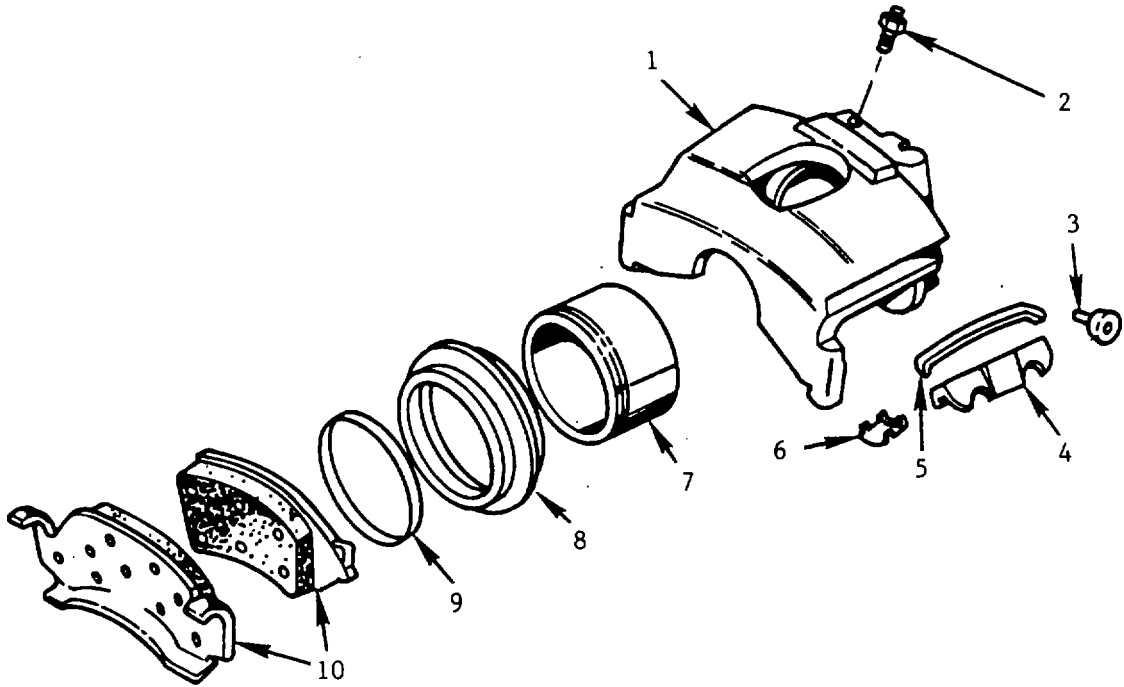
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	362013	59556	012-00001	Wheel Covers and Hub Caps Cap, Hub, Rear Only	2
2.	03608	472587	59556	012-00002	Cap, Hub, Front Only	2
3.	03608	14035381	59556	012-00003	Wheel	4
4.	03608	LT215/85R16M+S	59556	012-00004	Cap, Hub, Front Only	4



GROUP 20 BRAKE SYSTEM
FIGURE E-69. PARKING BRAKE SYSTEM ASSEMBLY

**GROUP 20 BRAKE SYSTEM
FIGURE E-69. PARKING BRAKE SYSTEM ASSEMBLY**

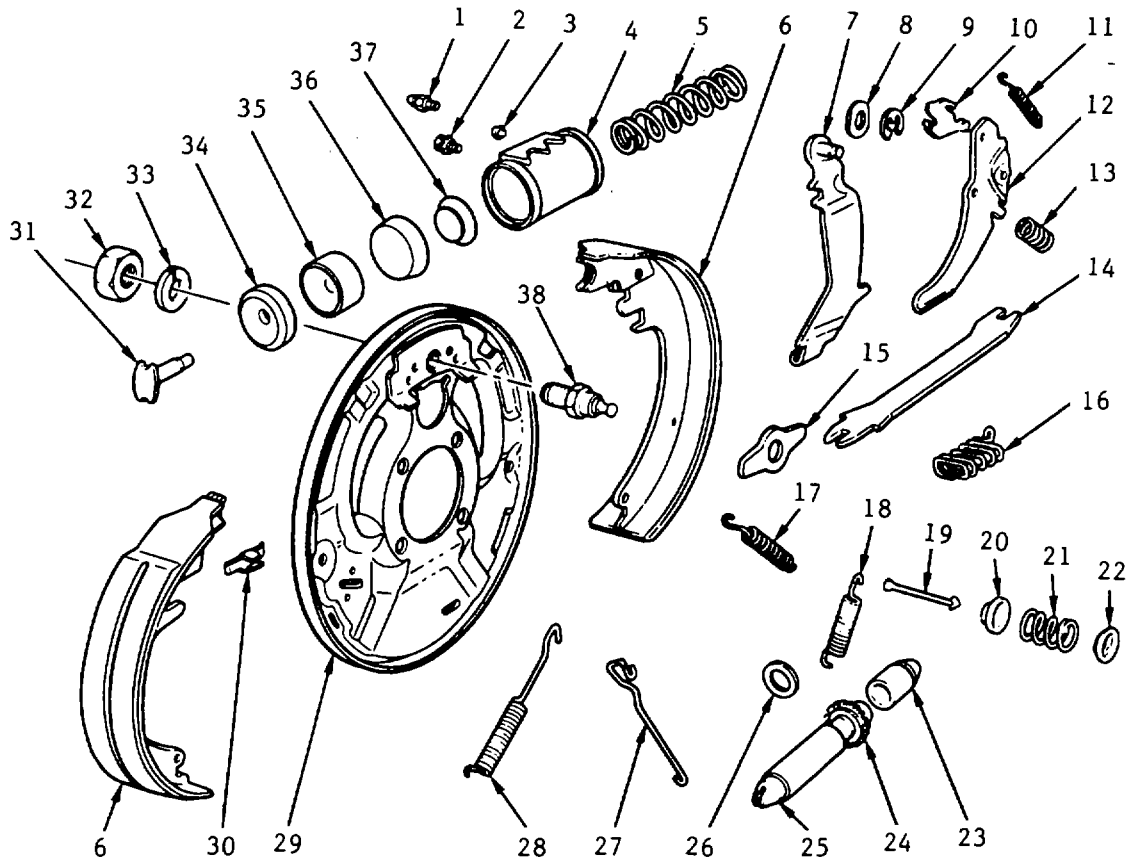
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	047-90001	59556	047-90001	Brake System/Parking	REF
1.	03608	334541	59556	047-90001-1	Retainer, Pedal Release Rod	1
2.	03608	180081	59556	047-90001-2	Bolt, Hex, 5/16-18x7/8	AR
	03608	120638	59556	047-90001-3	Washer, Lock, 5/16	AR
3.	03608	341990	59556	047-90001-4	Grommet, Release Rod	1
4.	03608	334540	59556	047-90001-5	Handle, Park Brake Release	1
5.	03608	362280	59556	047-90001-6	Pedal, Park Brake	1
6.	03608	14038889	59556	047-90001-7	Grommet, Cable Bracket	1
7.	03608	14053598	59556	047-90001-8	Bracket, Front Cable Check (03-16-43)	1
8.	03608	25516531	59556	047-90001-9	Connector, Front to Rear Cable	1
9.	----	COML			Nut, Hex Lock, 5/16-18	AR
10.	03608	14072692	59556	047-90001-10	Equalizer, Park Brake Cable	1
11.	03608	14072689	59556	047-90001-11	Bracket, Rear Cable	1
12.	03608	14064667	59556	047-90001-12	Cable, Rear-Left Hand, With Dual Wheels and DANA	1
13.	03608	N/S	59556	047-90001-13	Rivet	2
14.	03608	14053596	59556	047-90001-14	Cable, Front	1
15.	----	COML	59556		Nut, Hex, 5/16-18	AR
	----	COML	59556		Washer, External Tooth Lock (M-8)	AR



GROUP 20 BRAKE SYSTEM
FIGURE E-70. FRONT DISC BRAKE CALIPER SYSTEM

**GROUP 20 BRAKE SYSTEM
FIGURE E-70. FRONT DISC BRAKE CALIPER SYSTEM**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	59556 03608 03608	049-90007 14002543 14002544	59556 59556 59556	049-90007 049-90007-1 049-90007-2	Front Disc Brake Caliper Assembly Housing, Caliper Front, LH Housing, Caliper Front, RH	1 1 1
2.	03608	14002542	59556	049-90007-3	Valve, Bleeder	1
3.	03608	331478	59556	049-90007-4	Screw, Caliper Support	1
4.	03608	14023439	59556	049-90007-5	Lock, Caliper Support	1
5.	03608	14023437	59556	049-90007-6	Spring, Caliper Support	1
6.	03608	14023438	59556	049-90007-7	Clip, Pad, Anti-Rattle	1
7.	03608	6259034	59556	049-90007-8	Piston, Caliper	1
8.	03608	338269	59556	049-90007-9	Boot, Caliper Piston	1
9.	03608	6259033	59556	049-90007-10	Seal, Caliper Piston	1
10.	03608	14055091	59556	049-90007-11	Pad Kit, Brake	KT



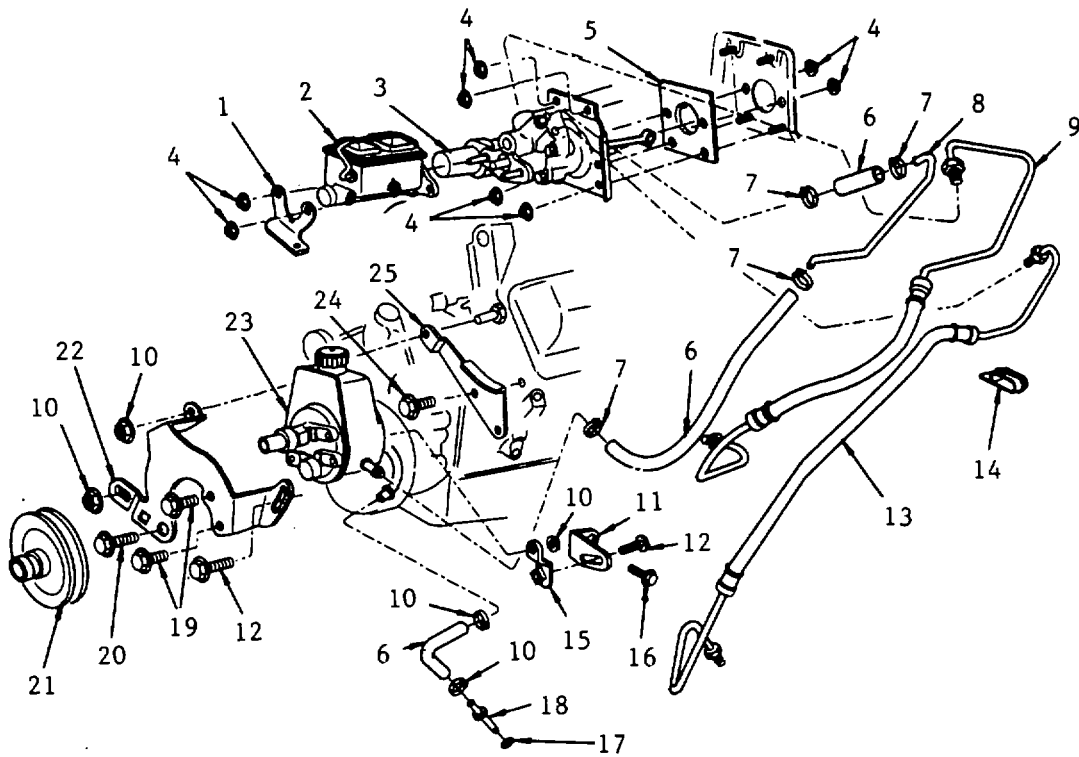
GROUP 20 BRAKE SYSTEM
FIGURE E-71. REAR DRUM BRAKE ASSEMBLY

**GROUP 20 BREAK SYSTEM
FIGURE 3-71. REAR DRUM BREAK ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	049-90008	59556	049-90008	Brake Assembly/Rear Drum	REF
1.	03608	18003151	59556	049-90008-1	Valve Kit, Wheel Cylinder Bleeder	2
2.	03608	456938	59556	049-90008-2	Bolt, Hex, 5/16-18x9/16	AR
3.	03608	18004609	59556	049-90008-3	Insert, Wheel Cylinder Inlet	2
4.	03608	18004609	59556	049-90008-4	Cylinder, Rear Brake	2
5.	03608	5466565	59556	049-90008-5	Spring, Wheel Cylinder Piston	2
6.	03608	15596619	59556	049-90008-6	Shoe Kit, Brake	1
7.	03608	334307	59556	049-90008-7	Lever, Park Brake, Left Hand	1
	03608	334308	59556	049-90008-8	Lever, Park Brake, Right Hand	1
8.	03608	5454797	59556	049-90008-9	Washer, Wave and Spring, 13/32 ID 3/4 OD	AR
9.	03608	9413523	59556	049-90008-10	Ring	AR
10.	03608	3856855	59556	049-90008-11	Pivot, Left Hand	1
	03608	3856856	59556	049-90008-12	Pivot, Right Hand	1
11.	03608	5461145	59556	049-90008-13	Spring, Auto Adjuster	2
12.	03608	357845	59556	049-90008-14	Lever, Auto Adjuster, Left Hand	1
	03608	357846	59556	049-90008-15	Lever, Auto Adjuster, Right Hand	1
13.	03608	5461984	59556	049-90008-16	Spring, Auto Adjuster	2
14.	03608	3898059	59556	049-90008-17	Strut, Park Brake Shoe Lever	2
15.	03608	18002428	59556	049-90008-18	Plate Shoe Guide	1
16.	03608	1312281	59556	049-90008-19	Spring, Park Brake Shoe Lever	2
17.	03608	3856843	59556	049-90008-20	Spring, Shoe Pull Back	2
18.	03608	3856850	59556	049-90008-21	Spring Shoe	2
19.	03608	N/S			Pin	1
20.	03608	N/S			Cup	1
21.	03608	N/S			Spring	1
22.	03608	N/S			Cup	1
23.	03608	3697400	59556	049-90008-22	Socket Shoe	2
24.	03608	335697	59556	049-90008-23	Screw, Left Hand	1
	03608	335698	59556	049-90008-24	Screw, Right Hand	1
25.	03608	334301	59556	049-90008-25	Nut, Left Hand	1
	03608	334302	59556	049-90008-26	Nut, Right Hand	1

**GROUP 20 BRAKE SYSTEM
FIGURE E-71. REAR DRUM BRAKE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
26.	03608	3856849	59556	049-90008-27	Washer	2
27.	03608	3856857	59556	049-90008-28	Link, Left Hand	1
28.	03608	3767138	59556	049-90008-29	Spring, Shoe Pull Back	2
29.	03608	14068905	59556	049-90008-30	Plate, Brake Flange, Left Hand	1
	03608	14068906	59556	049-90008-31	Plate, Brake Flange, Right Hand	1
30.	03608	475516	59556	049-90008-32	Cover, Flange Plate	AR
31.	03608	2622667	59556	049-90008-33	Rod, Wheel Cylinder	4
32.	03608	9414953	59556	049-90008-34	Nut, Hex, 3/4-16	AR
	03608	3760300	59556	049-90008-35	Nut, Brake Shoe	AR
33.	03608	131046	59556	049-90008-36	Washer	AR
34.	03608	N/S	59556		Boot, Wheel Cylinder	1
35.	03608	N/S	59556		Piston, Wheel Cylinder	1
36.	03608	N/S	59556		Seal, Wheel Cylinder Piston	1
37.	03608	N/S	59556		Cup, Wheel Cylinder Piston Spring	1
38.	03608	3856834	59556	049-90008-37	Pin, Shoe Anchor	2

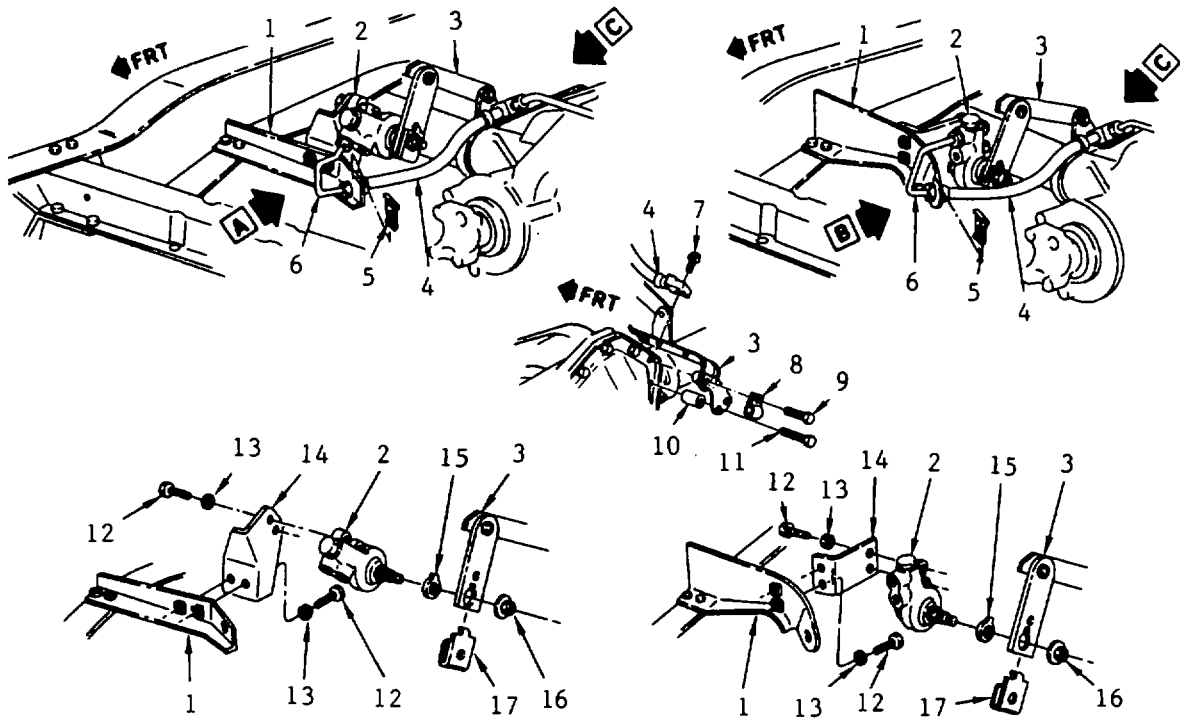


GROUP 20 BRAKE SYSTEM
FIGURE E-72. BRAKE PUMP MOUNTING AND LINES ASSEMBLY

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**GROUP 20 BRAKE SYSTEM
FIGURE E-72. BRAKE PUMP MOUNTING AND LINES ASSEMBLY**

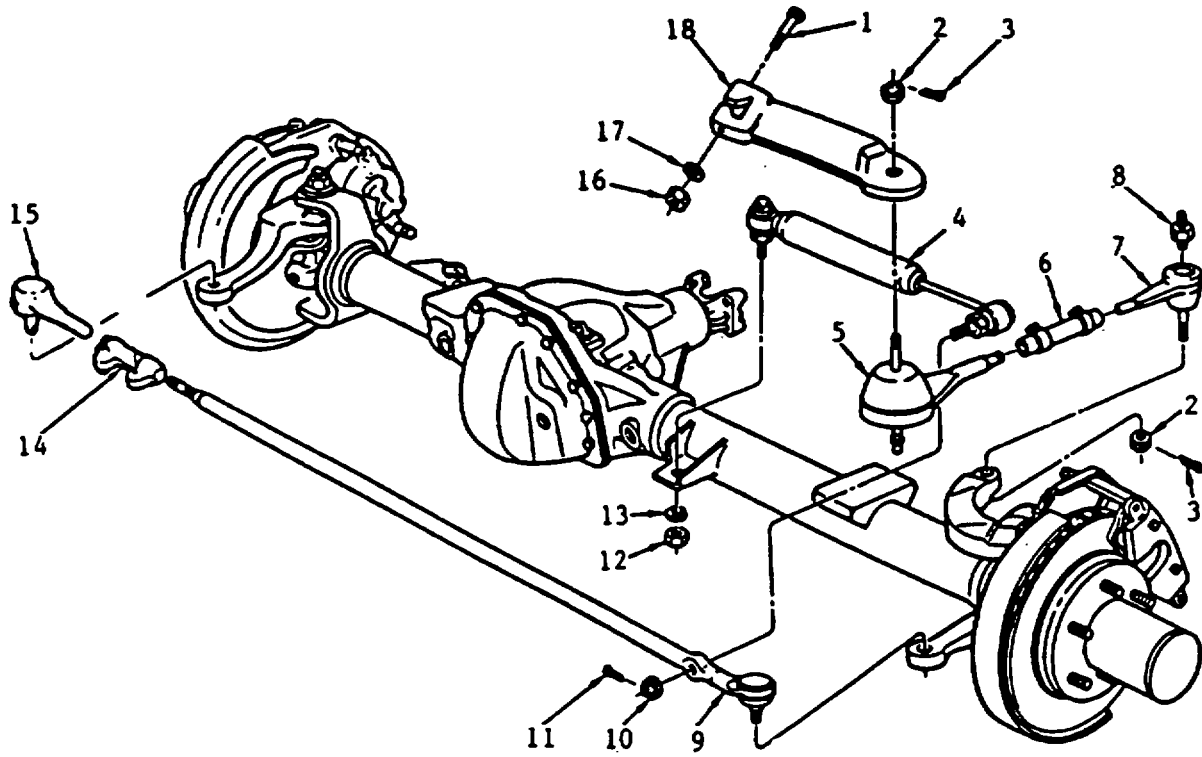
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
					Steering/Brake Pump Mounting and Lines	REF
1.	03608	14045698	59556	049-90009-1	Bracket	1
2.	03608	14066425	59556	049-90009-2	Cylinder	1
3.	03608	14055057	59556	049-90009-3	Booster	1
4.	03608	11502812	59556	049-90009-4	Nut, Hex, M10x1.5	AR
5.	03608	14004810	59556	049-90009-5	Gasket	1
6.	03608	9439238	59556	049-90009-6	Hose, 3/8 ID	1
7.	03608	477402	59556	049-90009-7	Clamp, Hex, 5/16 to 3/4	1
8.	03608	3750950	59556	049-90009-8	Tubing, 3/8 OD	1
9.	03608	7838941	59556	049-90009-9	Hose	1
10.	03608	11508710	59556	049-90009-10	Nut, Hex, M10x1.5	1
11.	03608	14033880	59556	049-90009-11	Bracket	1
12.	03608	11502788	59556	049-90009-12	Bolt, Hex M10x1.5x20	AR
13.	03608	7838942	59556	049-90009-13	Hose	1
14.	03608	338696	59556	049-90009-14	Clip	1
15.	03608	14033881	59556	049-90009-15	Brace, Pump	1
16.	03608	11502788	59556	049-90009-16	Bolt, Hex, M10x1.5x20	AR
	03608	120394	59556	049-90009-17	Washer, Flat, 13/32 ID 13/16 OD 1/16 Thick	AR
17.	03608	7829923	59556	049-90009-18	Seal	1
18.	03608	22514738	59556	049-90009-19	Pipe	1
19.	03608	11503451	59556	049-90009-20	Bolt, Hex, M10x1.5x16	AR
20.	03608	11507023	59556	049-90009-21	Bolt, Hex, M10x1.5x30	AR
	03608	120394	59556	049-90009-22	Washer, Flat 13/32 ID 13/16 OD 1/16 Thick	AR
	03608	11041262	59556	049-90009-23	Washer, Bowed, M10.5	AR
21.	03608	15592123	59556	049-90009-24	Pulley, Pump	1
22.	03608	14033879	59556	049-90009-25	Bracket	1
23.	03608	7838936	59556	049-90009-26	Pump, Power Steering/Power Brake	1
24.	03608	11502788	59556	049-90009-27	Bolt, Hex, M10x1.5x20	AR
	03608	120394	59556	049-90009-28	Washer, Flat, 13/32 ID 13/16 OD 1/16 Thick	AR
25.	03608	14033883	59556	049-90009-29	Bracket, Pump	1



GROUP 20 BRAKE SYSTEM
FIGURE E-73. HEIGHT SENSING AND PROPORTIONAL VALVE ASSEMBLY

**GROUP 20 BRAKE SYSTEM
FIGURE E-73. HEIGHT SENSING AND PROPORTIONAL VALVE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	14036789	59556	047-90001-15	Brake/Height Sensing and Proportional Valve Assembly	1
2.	03608	15538211	59556	047-90001-16	Bracket, Rear Brake Hose	1
3.	03608	15538216	59556	047-90001-17	Valve, Control	1
4.	03608	17981073	59556	047-90001-18	Lever, Control Valve	1
5.	03608	334961	59556	047-90001-19	Hose, Rear Brake	1
6.	03608	14036792	59556	047-90001-20	Spring	1
7.	03608	1239146	59556	047-90001-21	Pipe, Control Valve	1
8.	03608	137188	59556	047-90001-22	Bolt, Rear Brake Hose to Axle	AR
9.	03608	358000	59556	047-90001-23	Clip, Pipe	1
10.	03608	14055556	59556	047-90001-24	Bolt, Control Valve Lever	AR
11.	03608	9439637	59556	047-90001-25	Spacer, Control Valve Lever	1
12.	03608	180075	59556	047-90001-26	Bolt, Hex, 3/8-16x1-3/4	AR
13.	03608	120638	59556	047-90001-27	Bolt, Hex, 5/16-18x5/8	AR
14.	03608	14036773	59556	047-90001-28	Washer, Lock, 5/16	AR
15.	03608	14036775	59556	047-90001-29	Bracket, Control Valve	1
16.	03608	9439493	59556	047-90001-30	Bushing, Control Valve Lever	1
17.	03608	NSS			Nut, Hex, 5/16-18	AR
					Clip, Control Valve Lever	1



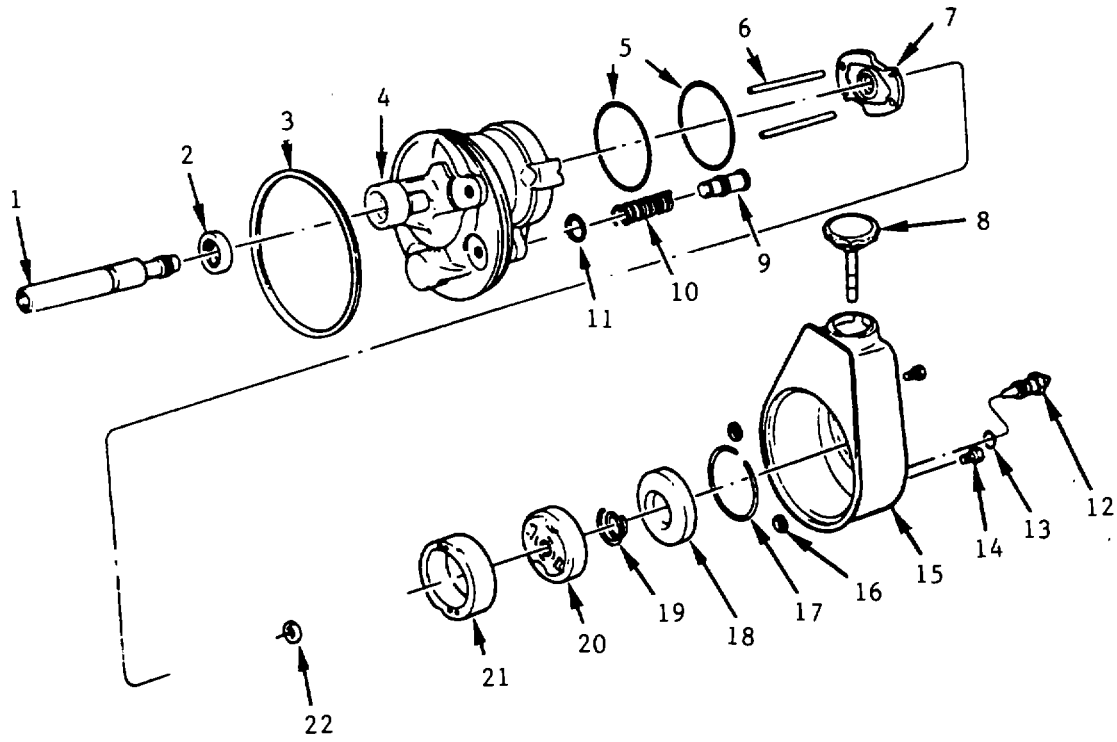
GROUP 21 STEERING ASSEMBLY
FIGURE E-74. STEERING LINKAGE ASSEMBLY

**GROUP 21 STEERING ASSEMBLY
FIGURE E-74. STEERING LINKAGE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Steering Linkage Assembly	1
2.	----	COML			Bolt, Hex, 9/16-8x3-1/2	2
3.	----	COML			Nut, Hex, Slotted, 5/8-18	2
4.	03608	4993563	59556	016-90003-1	Pin, Cotter, 1/8x1-1/2	1
5.	03608	362297	59556	016-90003-2	Absorber, Shock	1
6.	03608	14007644	59556	016-90003-3	Socket, Connecting Rod, Short	1
7.	03608	362298	59556	016-90003-4	Sleeve, Connecting Rod	1
8.	----	COML			Socket, Connecting Rod, Long	1
9.	03608	458479	59556	016-90003-5	Fitting, Lubrication, 1/4-28x1/2	1
	03608	462821	59556	016-90003-6	Socket, Tie Rod, LH	1
10.	----	COML			Socket, Tie Rod, LH	1
11.	----	COML			Nut, Slotted, Hex, 1/2-20	1
12.	----	COML			Pin, Cotter, 3/32x1	1
13.	----	COML			Nut, Hex, 1/2-20	1
14.	03608	458481	59556	016-90003-7	Washer, Lock, 1/2	1
15.	03608	458480	59556	016-90003-8	Sleeve, Tie Rod Adjusting	1
16.	----	COML			Socket, Tie Rod, RH	1
17.	----	COML			Nut, Prevailing Torque, Lock, 9/16-18	1
18.	03608	14064660	59556	016-90003-9	Washer, 9/16x1-1/8x16	1
					Arm, Pitman	1

**GROUP 22 POWER STEERING SYSTEM
FIGURE E-75. POWER STEERING GEAR ASSEMBLY**

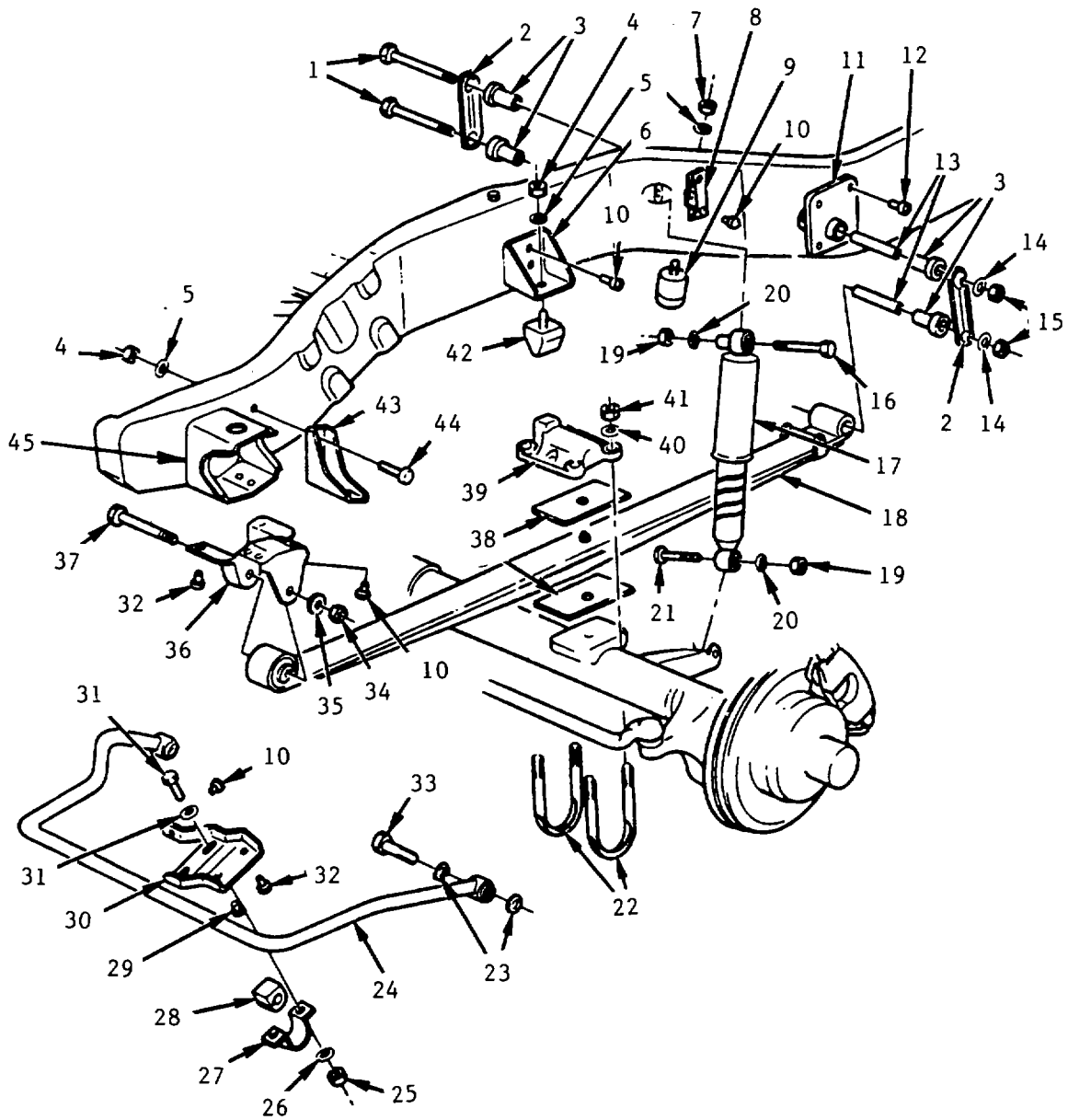
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	016-90002	59556	016-90002	Power Steering Gear Assembly	
1.	03608	7817485	59556	016-90002-1	Seal Kit, End Plug	KT
2.	03608	5686815	59556	016-90002-2	Plug, Housing End	1
3.	03608	7817529	59556	016-90002-3	Rack, Steering Gear with Piston and Nut	1
4.	03608	7817487	59556	016-90002-4	Seal Kit with Seal and Ring	KT
5.	03608	7817355	59556	016-90002-5	Plug, Piston End	1
6.	03608	5696151	59556	016-90002-6	Screw with Lockwasher, Bearing	AR
7.	03608	5686539	59556	016-90002-7	Clamp, Ball Return Guide	1
8.	03608	7817484	59556	016-90002-8	Cover Assembly, Housing Side	1
9.	03608	7818809	59556	016-90002-9	Gear Kit, Pitman	KT
10.	03608	7817486	59556	016-90002-10	Seal Kit, Housing Side Cover	KT
11.	03608	7834333	59556	016-90002-11	Housing Assembly with Ring Steering Gear	1
12.	03608	7834284	59556	016-90002-12	Valve Kit, Check	KT
13.	03608	7826850	59556	016-90002-13	Bearing Kit, Lower Thrust	KT
14.	03608	7846626	59556	016-90002-14	Valve Assembly, Steering Gear	1
15.	03608	5687182	59556	016-90002-15	Seal Kit, Valve Ring	1
16.	03608	5697804	59556	016-90002-16	Bearing, Pitman Shaft Gear	1
17.	03608	7826470	59556	016-90002-17	Seal Kit, Pitman Shaft	1
18.	03608	5697702	59556	016-90002-18	Washer, Pitman Arm Lock, 7/8	AR
19.	03608	5667628	59556	016-90002-19	Nut, Pitman Arm, 7/8-14	AR
20.	03608	7832731	59556	016-90002-20	Plug Assembly, Adjusting	1
21.	03608	7832730	59556	016-90002-21	Seal Kit, Adjusting Plug	KT
22.	03608	7832729	59556	016-90002-22	Bearing Kit, Upper Thrust	1
23.	03608	7826012	59556	016-90002-23	Nut, Adjusting Plug, 2-1/4-20	AR
24.	03608	7816516	59556	016-90002-24	Bolt, Housing Side Cover	AR
25.	03608	5687973	59556	016-90002-25	Nut, Lash Adjusting	AR



GROUP 22 POWER STEERING SYSTEM
FIGURE E-76. POWER STEERING PUMP ASSEMBLY

**GROUP 22 POWER STEERING SYSTEM
FIGURE E-76. POWER STEERING PUMP ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	017-90001	59556	017-90001	Steering Pump Assembly	
1.	03608	7837321	59556	017-90001-1	Shaft, Steering Oil Pump	1
2.	03608	7808195	59556	017-90001-2	Seal, Steering Oil Pump	1
3.	03608	5688015	59556	017-90001-3	Seal, Reservoir, O-Ring	1
4.	03608	7830236	59556	017-90001-4	Housing Assembly, Steering	1
5.	03608	7848522	59556	017-90001-5	Seal Pump End and Press Plate	1
6.	03608	5689357	59556	017-90001-6	Pin Pump Ring Dowel	2
7.	03608	7836369	59556	017-90001-7	Plate, Thrust	1
8.	03608	7834183	59556	017-90001-8	Cap, Filler	1
9.	03608	7809232	59556	017-90001-9	Valve Assembly, Flow Control	1
10.	03608	5688037	59556	017-90001-10	Spring Flow Control	1
11.	03608	5688035	59556	017-90001-11	Seal	1
12.	03608	7830913	59556	017-90001-12	Fitting with Orifice	1
13.	03608	7829923	59556	017-90001-13	Seal, Fitting	1
14.	03608	180120	59556	017-90001-14	Bolt, Hex, 3/8-16x3/4	AR
15.	03608	7839499	59556	017-90001-15	Reservoir Assembly, Steering Oil Pump	1
16.	03608	7848522	59556	017-90001-16	Seal, Reservoir	1
17.	03608	5688014	59556	017-90001-17	Ring, End Plate Retaining	1
18.	03608	5689358	59556	017-90001-18	Plate, Pump Housing End	1
19.	03608	7839667	59556	017-90001-19	Spring, Pressure Plate	1
20.	03608	7839669	59556	017-90001-20	Plate, Pressure	AR
21.	03608	7837322	59556	017-90001-21	Ring Kit, Pump Rotor	KT
22.	03608	7837284	59556	017-90001-22	Ring, Shaft Retaining	1



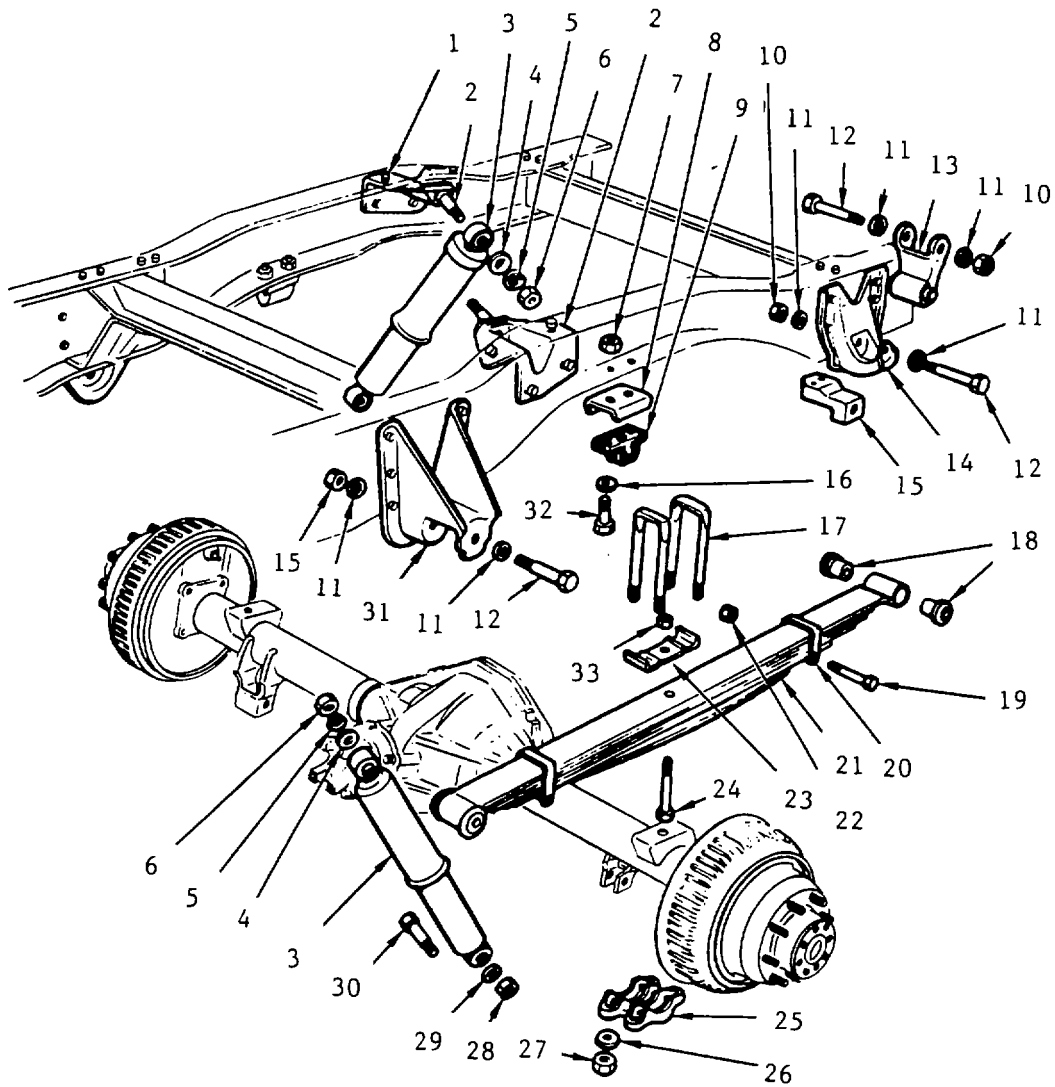
GROUP 23 FRONT SUSPENSION ASSEMBLY
FIGURE E-77. FRONT SUSPENSION ASSEMBLY

GROUP 23 FRONT SUSPENSION ASSEMBLY
FIGURE E-77. FRONT SUSPENSION ASSEMBLY

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	004-90001	59556	004-90001	Suspension/Front Assembly	REF
1.	03608	9430789	59556	004-90001-1	Bolt, 7/16-20x5	AR
2.	03608	6272088	59556	004-90001-2	Shackle Assembly Front Spring	4
3.	03608	363913	59556	004-90001-3	Bushing Front Spring Shackle	4
4.	03608	9414034	59556	004-90001-4	Nut, 3/8-16	AR
5.	03608	9439512	59556	004-90001-5	Washer, 3/8	AR
6.	03608	14045654	59556	004-90001-6	Bracket, Front Spring Bumper	1
7.	03608	9414034	59556	004-90001-7	Nut, 3/8-16	AR
8.	03608	3943493	59556	004-90001-8	Bracket, Front Shock Absorber Frame, Left Hand	1
	03608	3943494	59556	004-90001-9	Bracket, Front Shock Absorber Frame, Right Hand	1
9.	03608	359877	59556	004-90001-10	Bumper, Front Spring	2
10.	----	COML			Rivet, 3/8x7/8	1
11.	03608	6271344	59556	004-90001-11	Hanger, Front Spring Rear	2
12.	----	COML			Rivet, 3/8x1-1/4	1
13.	03608	3975204	59556	004-90001-12	Spacer Front Spring Shackle	4
14.	03608	492346	59556	004-90001-13	Washer, 7/16	AR
15.	03608	9440271	59556	004-90001-14	Nut, 7/16-20	AR
16.	03608	9421430	59556	004-90001-15	Bolt, 1/2-13x3-1/2	AR
17.	03608	3187846	59556	004-90001-16	Absorber, Assembly, Front Shock	2
18.	03608	460354	59556	004-90001-17	Spring, Assembly Front	2
19.	03608	9414511	59556	004-90001-18	Nut, 1/2-13	AR
20.	03608	94395+4	59556	004-90001-19	Washer, 1/2	AR
21.	03608	455003	59556	004-90001-20	Bolt, 1/2-13x2-3/4	AR
22.	03608	370053	59556	004-90001-21	Bolt, "U", Front Spring	2
23.	03608	2436168	59556	004-90001-22	Washer, 13/16	AR
24.	03608	328132	59556	004-90001-23	Shaft Front Stabilizer	1
25.	03608	3930109	59556	004-90001-24	Nut, 7/16-14	AR
26.	03608	3990160	59556	004-90001-25	Washer, 15/32	AR
27.	03608	14015726	59556	004-90001-26	Bracket, Front Stabilizer	2
28.	03608	328128	59556	004-90001-27	Bushing, Front Back To Frame, 1-1/4 ID x1-1/2	2

GROUP 23 FRONT SUSPENSION ASSEMBLY
FIGURE E-77. FRONT SUSPENSION ASSEMBLY

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
29.	----	COML			Rivet, 3/8x1-1/8	1
30.	03608	328059	59556	004-90001-28	Bracket, Front Stabilizer Shaft Frame, Left Hand	1
	03608	328060	59556	004-90001-29	Bracket, Front Stabilizer Shaft Frame, Right Hand	1
31.	03608	9440356	59556	004-90001-30	Bolt, 7/16-14x1-1/2	AR
32.	----	COML			Rivet, 3/8x1	1
33.	03608	328130	59556	004-90001-31	Bolt, Front Stabilizer Shaft, 3/4-10x3-1/2	2
34.	03608	9424987	59556	004-90001-32	Nut, 9/16-18	AR
35.	03608	3697355	59556	004-90001-33	Washer, 9/32	AR
36.	03608	326439	59556	004-90001-34	Hanger Front Spring Front, Left Hand	1
	03608	326440	59556	004-90001-35	Hanger Front Spring Front, Right Hand	1
37.	----	COML			Bolt, 9/16-18x5	1
38.	03608	3970988	59556	004-90001-36	Spacer, Front Spring, 5-1/2 OL x 2-1/2 Thick	AR
39.	03608	370055	59556	004-90001-37	Plate, Front Spring Anchor, Left Hand	1
40.	03608	131016	59556	004-90001-38	Washer, 21/32 ID 1-1/4 OD 3/32 Thick	AR
41.	03608	9424988	59556	004-90001-39	Nut, 5/8-18	AR
42.	03608	359878	59556	004-90001-40	Bumper, Front Spring	2
43.	03608	14029194	59556	004-90001-41	Reinforcement, Front Spring Front Flange	2
44.	03608	9439824	59556	004-90001-42	Bolt, 3/8-16xl	AR
45.	03608	14029193	59556	004-90001-43	Bracket, Radiator Support	2



**GROUP 24 REAR SUSPENSION ASSEMBLY
FIGURE E-78. REAR SUSPENSION ASSEMBLY**

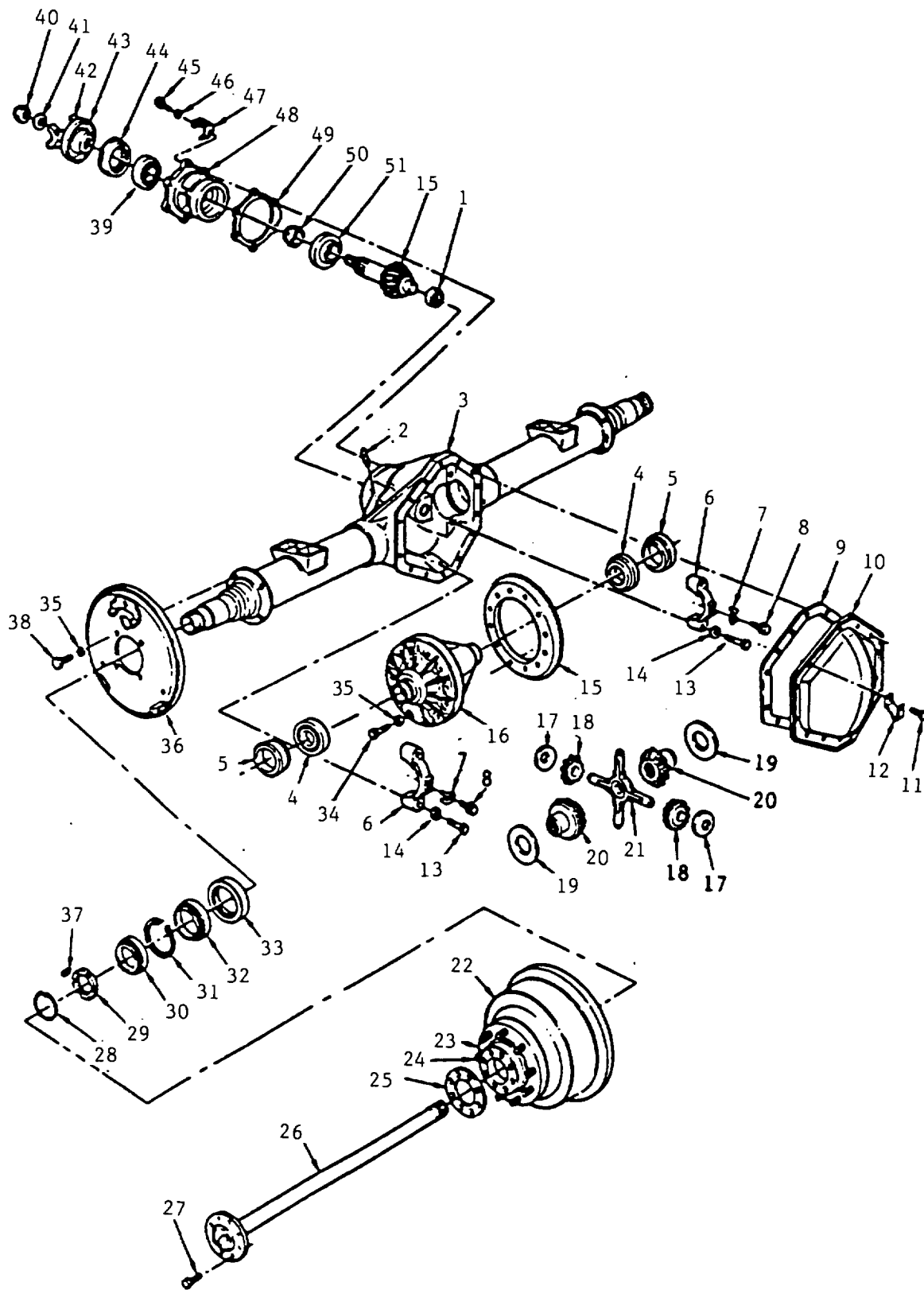
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**GROUP 24 REAR SUSPENSION ASSEMBLY
FIGURE E-78. REAR SUSPENSION ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	----	COML			Rear Suspension Assembly	
2.	03608	334666	59556	008-90002-1	Rivet, 3/8x1	4
3.	03608	3187845	59556	008-90002-2	Bracket, Rear Shock Absorber Frame	2
4.	----	COML			Absorber Assembly, Rear Shock	2
5.	----	COML			Washer, 1/2	2
6.	----	COML			Washer, 1/2	2
7.	----	COML			Nut, 1/2-13	2
8.	03608	14000214	59556	008-90002-3	Nut, 5/15-18	1
9.	03608	359877	59556	008-90002-4	Bracket, Rear Axle	1
10.	----	COML			Bumper, Rear Axle	1
11.	----	COML			Nut, 9/16	3
12.	----	COML			Washer, 5/8 ID; 1-1/2 OD; 3/32 THK	6
13.	03608	14022597	59556	008-90002-5	Bolt, 9/16-12x4-1/2	3
14.	03608	14000211	59556	008-90002-6	Shackle Assembly, Rear	1
15.	03608	14000212	59556	008-90002-7	Hanger, Rear Spring Rear	1
16.	----	COML			Reinforcement, Hanger, Rear	1
17.	03608	471665	59556	008-90002-8	Washer, 11/32	1
18.	03608	468481	59556	008-90002-9	Bolt, "U" Rear Spring	1
19.	----	COML			Bushing, Rear Spring Shackle and Rear Spring Front and Rear Eye	1
20.	----	COML			Bolt, 3/8-16x3-3/8	1
21.	03608	14071877	59556	008-90002-10	Clip, Rear Spring, 2-19/32	1
22.	----	COML			Spring, Rear	1
23.	03608	471659	59556	008-90002-11	Nut, 3/8-16	1
24.	----	COML			Spacer, "U" Bolt	1
25.	03608	362275	59556	008-90002-12	Bolt, Spring Center, 3/8-24x3-3/4	1
26.	----	COML			Plate, Anchor	1
27.	----	COML			Washer, 5/8	1
28.	----	COML			Nut, 5/8-18	1
					Nut, 9/16-12	1

**GROUP 24 REAR SUSPENSION ASSEMBLY
FIGURE E-78. REAR SUSPENSION ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
29.	----	COML			Washer, 9/16	1
30.	----	COML			Bolt, 9/16-12x3	1
31.	03608	14000209	59556	008-90002-13	Hanger, Rear Spring Front	1
32.	----	COML			Bolt, 5/16-18x2-1/2	1
33.	----	COML			Nut, 3/8-24	1



GROUP 25 REAR AXLE ASSEMBLY
FIGURE E-79. REAR AXLE ASSEMBLY

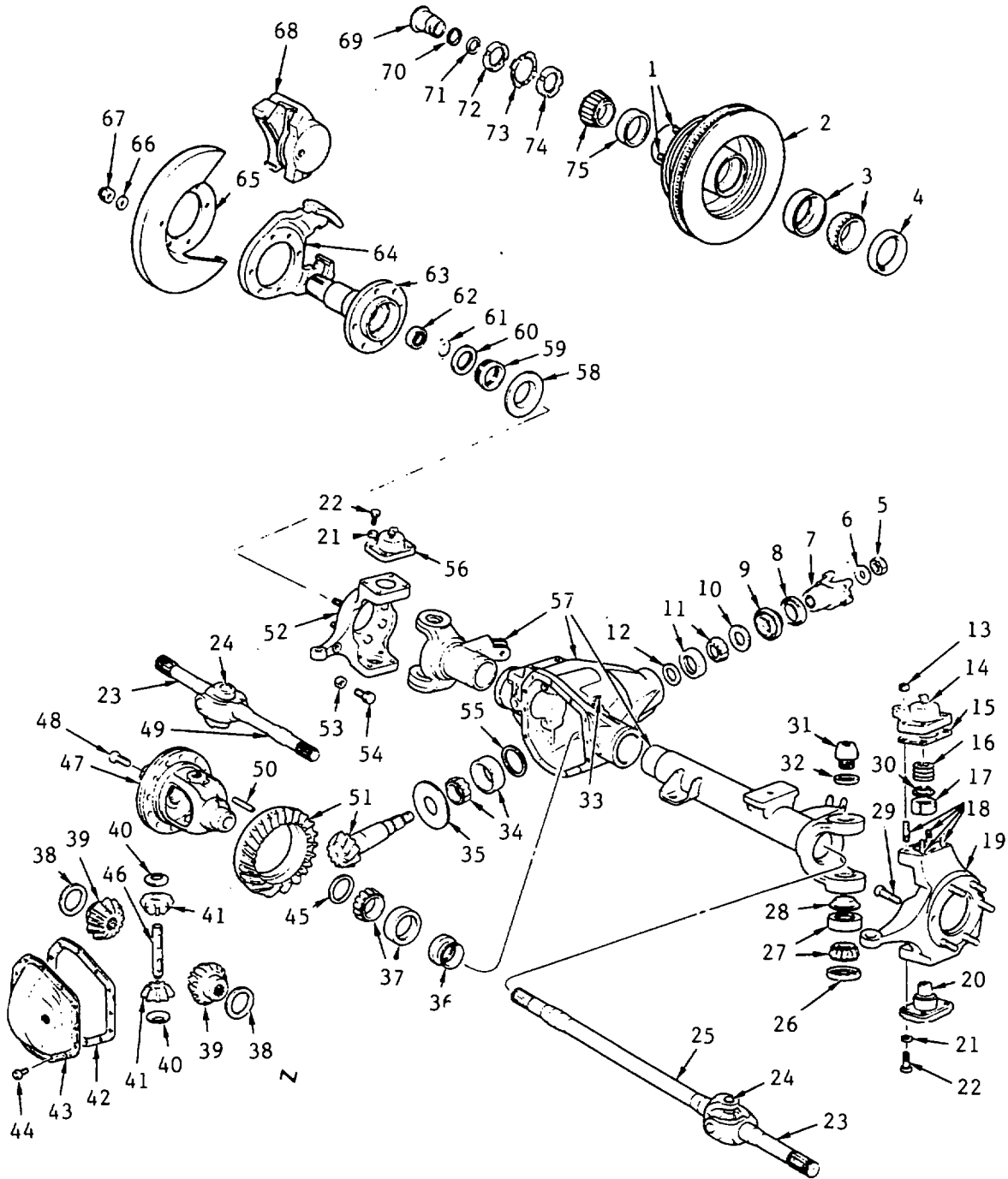
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GROUP 25 REAR AXLE ASSEMBLY
FIGURE E-79. REAR AXLE ASSEMBLY

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	009-90005			Rear Axle Assembly	
1.	03608	15595830	59556	009-90005-1	Bearing	1
2.	03608	14056297	59556	009-90005-2	Connector, Rear Axle Vent Hose (Curved)	1
3.	03608	15537160	59556	009-90005-3	Housing, with Tube	1
4.	03608	7451928	59556	009-90005-4	Bearing, Differential Bearing, Outer	2
5.	03608	3977325	59556	009-90005-5	Nut, Differential Bearing Adjuster	2
6.	03608	NSS			Cap, Differential Bearing	1
7.	03608	3977326	59556	009-90005-7	Lock, Differential Adjuster Nut	2
8.	----	COML			Bolt, Hex, 5/16-18x1/2	2
	----	COML			Washer, Differential Adjuster Nut	2
9.	03608	3977387	59556	009-90005-8	Gasket, Differential Carrier	1
10.	03608	3977386	59556	009-90005-9	Cover, Differential Carrier	1
11.	----	COML			Bolt, Hex Serrated Washer Head 3/8-16x3/4	1
12.	03608	331416	59556	009-90005-1C	Clip, Rear Brake Cover Pipe	1
13.	03608	3977453	59556	009-90005-11	Bolt, Differential Carrier Bearing Cap	2
14.	----	COML			Washer, Spring Lock, 9/16	2
15.	03608	471871	59556	009-90005-12	Gear Kit, RG and PNG, 10-1/2 diameter range	2
16.	03608	6258336	59556	009-90005-13	Case, Differential	1
17.	03608	3977346	59556	009-90005-14	Washer, Differential PNG Thrust	2
18.	03608	3993448	59556	009-90005-15	Pinion, Differential	2
19.	03608	3977345	59556	009-90005-16	Washer, Differential Side Gear Thrust	2
20.	03608	3977344	59556	009-90005-17	Gear, Differential Side	1
21.	03608	3663696	59556	009-90005-18	Spider, Differential PNG	1
22.	03608	6260831	59556	009-90005-19	Drum, Rear Brake (W/JB8), 13x3-1/2	1
23.	03608	352982	59556	009-90005-20	Hub, Rear Wheel	1
24.	03608	355815	59556	009-90005-21	Bolt, Rear Wheel	1
25.	03608	327739	59556	009-90005-22	Gasket, Rear Wheel Hub	1
26.	03608	3977383	59556	009-90005-23	Shaft, Rear Axle, LH	1
	03608	3977384	59556	009-90005-24	Shaft, Rear Axle, RH	1
27.	03608	376869	59556	009-90005-25	Bolt, Rear Axle Shaft, 1/2-12x1-1/4	1
28.	03608	341511	59556	009-90005-26	Retainer, Rear Wheel Hub Adjusting Nut Key	1

**GROUP 25 REAR AXLE ASSEMBLY
FIGURE E-79. REAR AXLE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
29.	03608	341509	59556	009-90005-27	Nut, Rear Wheel Hub Adjuster	1
30.	03608	9428908	59556	009-90005-28	Bearing, Rear Wheel Hub, Outer	1
31.	03608	474309	59556	009-90005-29	Ring, Rear Wheel Bearing Retainer	1
32.	03608	7451928	59556	009-90005-30	Bearing, Rear Wheel Hub, Inner	1
33.	03608	469694	59556	009-90005-31	Seal, Rear Wheel Hub Inner Bearing Oil	1
34.	03608	331422	59556	009-90005-32	Bolt, Hypoid Drive Gear	1
35.	----	COML			Washer, Spring Lock, 1/2	2
36.	03608	14068905	59556	009-90005-33	Plate, Rear Bearing Flange, LH	1
	03608	14068906	59556	009-90005-34	Plate, Rear Bearing Flange, RH	1
37.	03608	341510	59556	009-90005-35	Key, Rear Wheel Hub Adjusting Nut	1
38.	----	COML			Bolt, Hex, 1/2-20x1	1
39.	03608	7451155	59556	009-90005-36	Bearing, PNG Front	1
40.	03608	644536	59556	009-90005-37	Nut, Propeller Shaft PNG Flange and Deflector	1
41.	03608	3977360	59556	009-90005-38	Washer, Propeller Shaft PNG Flange	1
42.	03608	3977356	59556	009-90005-39	Flange, Propeller Shaft PNG	1
43.	03608	3977358	59556	009-90005-40	Deflector, Propeller Shaft PNG Flange	1
44.	03608	3977359	59556	009-90005-41	Seal, Propeller Shaft PNG Flange Oil	1
45.	----	COML			Bolt, Hex, 7/16-14x1-1/8	1
46.	----	COML			Washer, Spring Lock, 7/16	1
47.	03608	14054122	59556	009-90005-42	Clip, Parking Brake, Rear Cable	1
48.	03608	3977354	59556	009-90005-43	Retainer, PNG Bearing	1
49.	03608	334362	59556	009-90005-44	Shim, PNG Bearing (.006)	1
50.	03608	3977355	59556	009-90005-45	Spacer, PNG Bearing	1
51.	03608	7451888	59556	009-90005-46	Bearing, PNG Inter.	1



**GROUP 26 FRONT AXLE ASSEMBLY
FIGURE E-80. FRONT AXLE ASSEMBLY**

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**GROUP 26 FRONT AXLE ASSEMBLY
FIGURE E-80. FRONT AXLE ASSEMBLY**

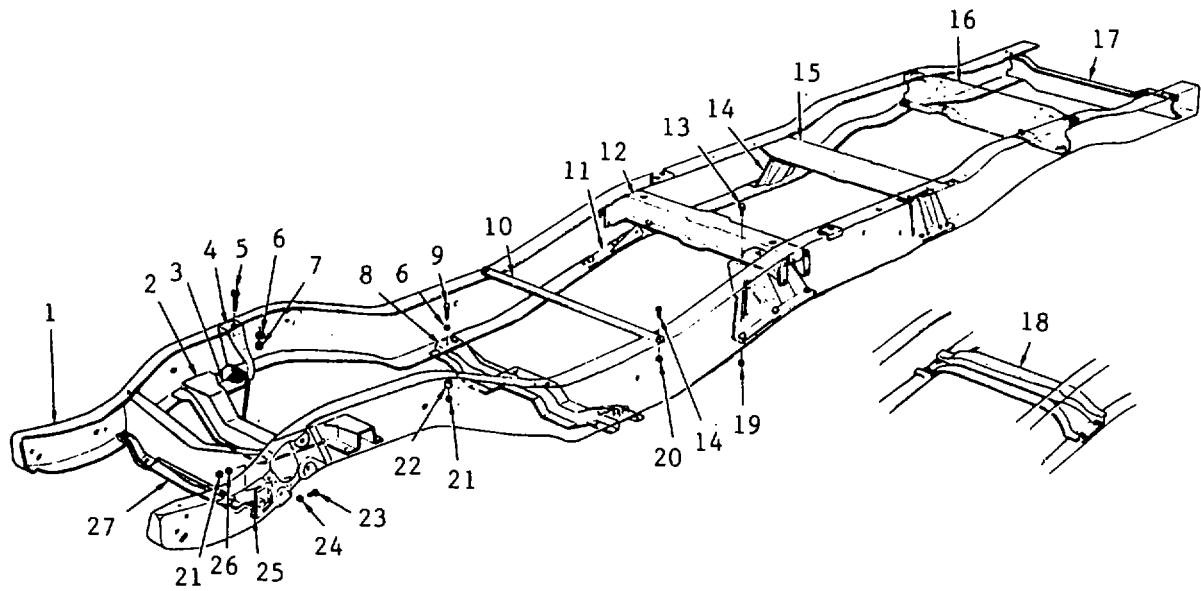
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	006-90001	59556	006-90001	Front Axle Assembly	
1.	03608	14002236	59556	006-90001-1	Bolt, Wheel	AR
2.	03608	14079008	59556	006-90001-2	Hub, with Disc	2
3.	03608	7451928	59556	006-90001-3	Bearing Assembly, Hub, Inner	2
4.	03608	463748	59556	006-90001-4	Seal, Hub to Spindle Inner	1
5.	03608	9422310	59556	006-90001-5	Nut, Prevailing Torque, Hex Lock, 7/8-14	AR
6.	03608	2353015	59556	006-90001-6	Washer, Drive Pinion Oil Slinger Nut	AR
7.	03608	462859	59556	006-90001-7	Flange, Propeller Shaft Pinion	1
8.	03608	462861	59556	006-90001-8	Deflector, Propeller Shaft Pinion Flange	1
9.	03608	14079089	59556	006-90001-9	Seal, Pinion Flange Oil	2
10.	03608	2353014	59556	006-90001-10	Slinger, Drive Pinion Oil	2
11.	03608	9413133	59556	006-90001-11	Bearing Assembly, Drive Pinion, Outer	1
12.	03608	2353010	59556	006-90001-12	Shim, Pinion Bearing Adjustment, .003	2
	03608	2353011	59556	006-90001-13	Shim, Pinion Bearing Adjustment, .005	2
	03608	2353012	59556	006-90001-14	Shim, Pinion Bearing Adjustment, .010	2
	03608	2353013	59556	006-90001-15	Shim, Pinion Bearing Adjustment, .030	2
13.	03608	3680920	59556	006-90001-16	Nut, Steering Arm	AR
14.	03608	462801	59556	006-90001-17	Arm, Steering	1
15.	03608	462800	59556	006-90001-18	Gasket, Steering, Knuckle King Pin Cap	1
16.	03608	462799	59556	006-90001-19	Spring, Steering Knuckle King Pin Compressor	2
17.	03608	462798	59556	006-90001-20	Bushing, King Pin	2
18.	03608	462855	59556	006-90001-21	Stud, Steering Arm Mounting	AR
19.	03608	462853	59556	006-90001-22	Knuckle Assembly, Steering, LH	1
20.	03608	462803	59556	006-90001-23	Cap, King Pin Bearing	2
21.	03608	9439514	59556	006-90001-24	Washer, Spring Lock, 1/2	AR
22.	03608	9424113	59556	006-90001-25	Bolt, King Pin Bearing Cap, Hex, 1/2-20x1-1/4	AR
23.	03608	14039120	59556	006-90001-26	Shaft, Axle, Outer	2
24.	03608	462809	59556	006-90001-27	Repair Kit, Axle, U-Joint	1
25.	03608	462807	59556	006-90001-28	Shaft, Axle, Inner, LH	1
26.	03608	462805	59556	006-90001-29	Seal, King Pin Bearing Cap, Lubrication	2

**GROUP 26 FRONT AXLE ASSEMBLY
FIGURE E-80. FRONT AXLE ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
27.	03608	9418355	59556	006-90001-30	Bearing Assembly, King Pin Cap	2
28.	03608	462804	59556	006-90001-31	Retainer, King Pin Bearing Cap	2
29.	03608	462856	59556	006-90001-32	Bolt, Spindle Mounting	AR
30.	03608	475504	59556	006-90001-33	Retainer, King Pin Bushing Spring	2
31.	03608	462794	59556	006-90001-34	Pin, King	2
32.	03608	14009612	59556	006-90001-35	Seal, King Pin	2
33.	03608	14056299	59556	006-90001-36	Connector, Vent Hose	1
34.	03608	9413168	59556	006-90001-37	Bearing Assembly, Drive Pinion Rear	1
35.	03608	462863	59556	006-90001-38	Slinger, Pinion Bearing, Inner	2
36.	03608	462857	59556	006-90001-39	Seal Assembly, with Guide Inner Shelf	2
37.	03608	9412411	59556	006-90001-40	Bearing Assembly, Differential Side	2
38.	03608	2236255	59556	006-90001-41	Washer, Differential Side Gear Thrust	2
39.	03608	345661	59556	006-90001-42	Gear, Differential Side	2
40.	03608	2236256	59556	006-90001-43	Washer, Differential Pinion Thrust	2
41.	03608	650074	59556	006-90001-44	Gear, Differential Pinion	2
42.	03608	6273951	59556	006-90001-45	Gasket, Differential Carrier Cover	1
43.	03608	14075383	59556	006-90001-46	Cover, Differential Carrier	1
44.	03608	650072	59556	006-90001-47	Bolt, Differential Carrier Cover	AR
45.	03608	2358873	59556	006-90001-48	Shim, Differential Bearing Adjuster, .003	2
	03608	2358874	59556	006-90001-49	Shim, Differential Bearing Adjuster, .005	2
	03608	2358875	59556	006-90001-50	Shim, Differential Bearing Adjuster, .010	2
	03608	2358876	59556	006-90001-51	Shim, Differential Bearing Adjuster, .030	2
46.	03608	2358883	59556	006-90001-52	Shaft, Differential Pinion	1
47.	03608	2358880	59556	006-90001-53	Case Assembly, Differential	1
48.	03608	2358877	59556	006-90001-54	Bolt, Hydraulic Drive Gear	AR
49.	03608	462808	59556	006-90001-55	Shaft, Axle, Inner, RH	1
50.	03608	273541	59556	006-90001-56	Pin, Pinion Shaft, Lock	2
51.	03608	3965147	59556	006-90001-57	Gear Kit, Ring and Pinion	1
52.	03608	462854	59556	006-90001-58	Knuckle Assembly, Steering, RH	1
53.	03608	225854	59556	006-90001-59	Nut, Hex, 3/8-24	AR

**GROUP 26 FRONT AXLE ASSEMBLY
FIGURE E-80. FRONT AXLE ASSEMBLY**

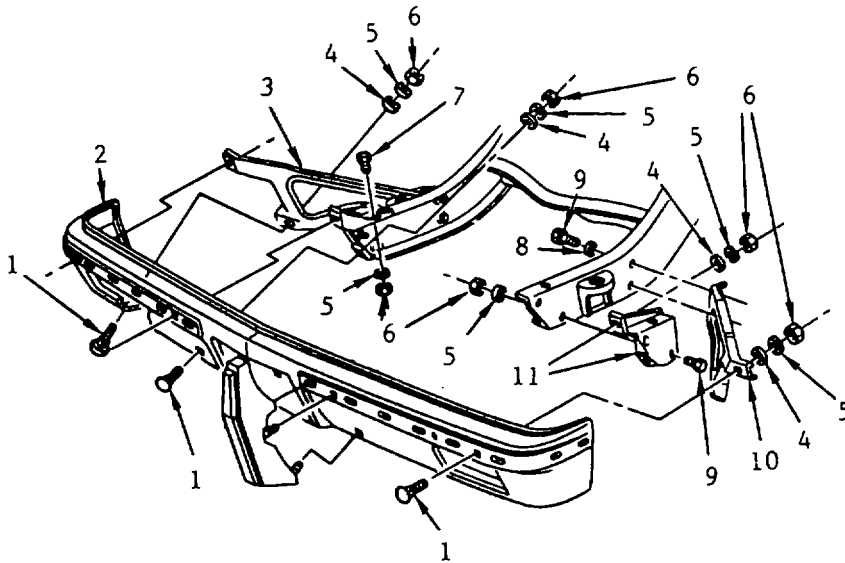
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
54.	03608	3711876	59556	006-90001-60	Bolt, Steering Knuckle, Stop	2
55.	03608	2358870	59556	006-90001-61	Shim, Pinion Bearing, .003	2
	03608	2358871	59556	006-90001-62	Shim, Pinion Bearing, .005	2
	03608	2358872	59556	006-90001-63	Shim, Pinion Bearing, .010	2
56.	03608	471750	59556	006-90001-64	Cap, Steering Knuckle, King Pin	2
57.	03608	14050688	59556	006-90001-65	Housing, Front Axle	1
58.	03608	14009611	59556	006-90001-66	Deflector, Outer Shaft Oil	2
59.	03608	462811	59556	006-90001-67	Seal, Outer Shaft, Oil	2
60.	03608	462812	59556	006-90001-68	Spacer, Outer Shaft Bearing	2
61.	03608	14012967	59556	006-90001-69	Seal, Spindle	2
62.	03608	14009626	59556	006-90001-70	Bearing, Spindle, Outer Shelf	2
63.	03608	476075	59556	006-90001-71	Spindle, Kit, Wheel	2
64.	03608	462823	59556	006-90001-72	Bracket, Brake Caliper Mounting, LH	1
	03608	462824	59556	006-90001-73	Bracket, Brake Caliper Mounting, RH	1
65.	03608	462813	59556	006-90001-74	Shield, Disc Brake Splash, LH	1
	03608	462814	59556	006-90001-75	Shield, Disc Brake Splash, RH	1
66.	03608	14009617	59556	006-90001-76	Washer, Spindle Mounting	AR
67.	03608	9422302	59556	006-90001-77	Nut, Hex Prevailing Torque, 1/2-20	AR
68.	03608	14002543	59556	006-90001-78	Housing Assembly with Caliper, LH	1
	03608	14002544	59556	006-90001-79	Housing Assembly with Caliper, RH	1
69.	03608	15521883	59556	006-90001-80	Lock, Front Axle Hub (Manual Lock) Complete	2
70.	03608	464141	59556	006-90001-81	Ring, Drive Gear Retainer	2
71.	03608	14050680	59556	006-90001-82	Retainer, Shelf Thrust Washer	2
72.	03608	14050679	59556	006-90001-83	Nut, Front Wheel Bearing Adjuster Nut Lock	2
73.	03608	14038051	59556	006-90001-84	Ring, Wheel Bearing Nut and Drag Sleeve Lock	2
74.	03608	14050681	59556	006-90001-85	Nut, with Pin Front Wheel Bearing Adjuster	AR
75.	03608	9428908	59556	006-90001-86	Bearing Assembly, Hub, Outer	2



**GROUP 27 FRAME ASSEMBLY
FIGURE E-81. FRAME ASSEMBLY**

**GROUP 27 FRAME ASSEMBLY
FIGURE E-81. FRAME ASSEMBLY**

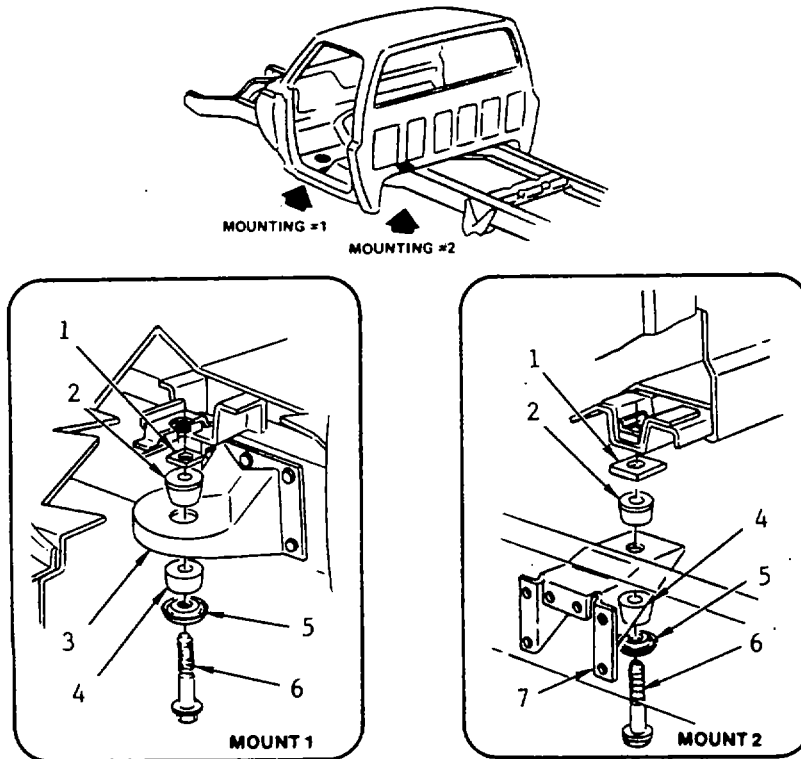
ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	001-90007	59556	001-90007	Frame Assembly	
1.	03608	14072657	59556	001-90007-1	Member, Side, LH	1
	03608	14072658	59556	001-90007-2	Member, Side, RH	1
2.	03608	14072695	59556	001-90007-3	Support, Engine Front	1
3.	03608	14072690	59556	001-90007-4	Reinforcement, Engine Front Support	1
4.	03608	15598062	59556	001-90007-5	Reinforcement	1
5.	03608	9440344	59556	001-90007-6	Bolt, Hex, Flanged Head, 7/16-14x1-1/8	AR
6.	03608	3990160	59556	001-90007-7	Washer, Flat, 15/32 ID; 7/8 OD; 3/32 THK	AR
7.	03608	9422299	59556	001-90007-8	Nut, Prev. Torque, Hex Lock, 7/16-14	AR
8.	03608	15538276	59556	001-90007-9	Support, Transmission	1
9.	03608	343178	59556	001-90007-10	Bolt, Transmission Support	AR
10.	03608	14064614	59556	001-90007-11	Brace	1
11.	03608	15593979	59556	001-90007-12	Brace, LH	1
	03608	15593980	59556	001-90007-13	Brace, RH	1
12.	03608	15593955	59556	001-90007-14	Member	1
13.	03608	9424320	59556	001-90007-15	Bolt, Hex, 3/8-16x1	AR
14.	03608	14041286	59556	001-90007-16	Brace, Chamber, LH and RH	2
15.	03608	15538347	59556	001-90007-17	Member, Rear Spring Cross	1
16.	03608	14067782	59556	001-90007-18	Member, Fuel Tank Cross	1
17.	03608	14024585	59556	001-90007-19	Member, Rear, Cross	1
18.	03608	14014791	59556	001-90007-20	Support, Propeller Shaft	1
19.	03608	9422297	59556	001-90007-21	Nut, Prev. Torque, Hex Lock, 3/8-16	AR
20.	03608	9414034	59556	001-90007-22	Nut, Hex, 3/8-16	AR
21.	03608	9424985	59556	001-90007-23	Nut, Hex, 7/16-14	AR
22.	03608	343179	59556	001-90007-24	Spacer, Transmission Support	1
23.	03608	435611	59556	001-90007-25	Bolt, Hex, 3/8-16x1-1/8	AR
24.	03608	3824159	59556	001-90007-26	Washer, Flat, 3/8 ID; 3/4 OD; 1/16 THK	AR
25.	03608	14024593	59556	001-90007-27	Reinforcement, Front Chamber, LH Only	1
26.	03608	9423406	59556	001-90007-28	Washer, Spring Lock, 3/8	AR
27.	03608	14024587	59556	001-90007-29	Member, Front Cross	1



GROUP 27 FRAME ASSEMBLY
FIGURE E-82. FRONT BUMPER ASSEMBLY

**GROUP 27 FRAME ASSEMBLY
FIGURE E-82. FRONT BUMPER ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
1.	03608	340734	59556	002-90001-1	Front Bumper Assembly	AR
2.	03608	14043720	59556	002-90001-2	Bolt, Round Head, Square Neck with Stainless Steel Cap 1/2-13x2	1
3.	03608	14045516	59556	002-90001-3	Bar, Bumper (Chrome Except Strip)	1
4.	03608	120396	59556	002-90001-4	Brace, Bar, Outer, RH	AR
5.	03608	9439514	59556	002-90001-5	Washer, Flat, 17/32 ID; 1-1/16 OD; 3/32 THK	AR
6.	03608	120238	59556	002-90001-6	Washer, Lock, 1/2	AR
7.	03608	180579	59556	002-90001-7	Nut, Hex, 1/2-13	AR
8.	03608	9418924	59556	002-90001-8	Bolt, Hex, 1/2-13x1-1/4	AR
9.	03608	9424069	59556	002-90001-9	Washer, 11/32 ID; 1-1/8 OD; 1/8 THK	AR
10.	03608	14045515	59556	002-90001-10	Bolt, Hex, 7/16-14x1-1/4	AR
11.	03608	14064637	59556	002-90001-11	Brace, Bar, Outer, LH	1
	03608	14064638	59556	002-90001-12	Bracket, Bar, Outer, LH	1
					Bracket, Bar, Outer, RH	1



GROUP 27 FRAME ASSEMBLY
FIGURE E-83. BODY MOUNTING ASSEMBLY

**GROUP 27 FRAME ASSEMBLY
FIGURE E-83. BODY MOUNTING ASSEMBLY**

ITEM NO.	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY.
	59556	079-90002	59556	079-90002	Body Mounting Assembly	REF
1.	03608	1489411	59556	079-90002-1	Shim Body	1
2.	03608	15597600	59556	079-90002-2	Cushion, Body Mounting, Upper	1
3.	03608	14040692	59556	079-90002-3	Bracket, Body Mounting	1
4.	03608	15597629	59556	079-90002-4	Cushion, Body Mounting, Lower	1
5.	03608	14027472	59556	079-90002-5	Retainer, Body Mounting, Cushion Lower	1
6.	03608	455005	59556	079-90002-6	Bolt, Hex, 1/2-13x3-1/2	AR
	03608	2436166	59556	079-90002-7	Washer, Flange, 9/16 ID 1-1/8 OD 1/16 Thick	AR
7.	03608	14024567	59556	079-90002-8	Bracket, Body Mounting	1

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**APPENDIX F
TORQUE LIMITS**

This appendix lists general torque values to be used throughout the truck except the engine. Specific torque values and sequences are indicated in the maintenance procedures for applicable components.

BOLTS AND NUTS		STUDS	
THREAD DIAMETER	FT LB	THREAD DIAMETER	FT LB
1/4	9 ϕ 3	1/4	5 ϕ 2
5/16	18 ϕ 5	5/16	10 ϕ 3
3/8	32 ϕ 5	3/8	20 ϕ 3
7/16	50 ϕ 10	7/16	30 ϕ 5
1/2	75 ϕ 10	1/2	40 ϕ 5
9/16	110 ϕ 15	9/16	60 ϕ 10
5/8	150 ϕ 20	5/8	75 ϕ 10
3/4	265 ϕ 35	3/4	110 ϕ 15
7/8	420 ϕ 60	7/8	170 ϕ 20
1	640 ϕ 80	1	260 ϕ 30
1-1/8	800 ϕ 100	1-1/8	320 ϕ 30
1-1/4	1000 ϕ 120	1-1/4	400 ϕ 40
1-3/8	1200 ϕ 150	1-3/8	480 ϕ 40
1-1/2	1500 ϕ 300	1-1/2	550 ϕ 50

Self-Locking Nut Breakway Torque Values

Thread Size	Minimum Breakway Torque (In.-Lbs.)	Thread Size	Minimum Breakway Torque (In.-Lbs.)
10-32	2.0	5/8-18	32.0
1/4-28	3.5	3/4-16	50.0
5/16-24	6.5	7/8-14	70.0
3/8-24	9.5	1-12	90.0
7/16-20	14.0	1-1/8-12	117.0
1/2-20	18.0	1-1/4-12	143.0
9/16-18	24.0		

NOTE

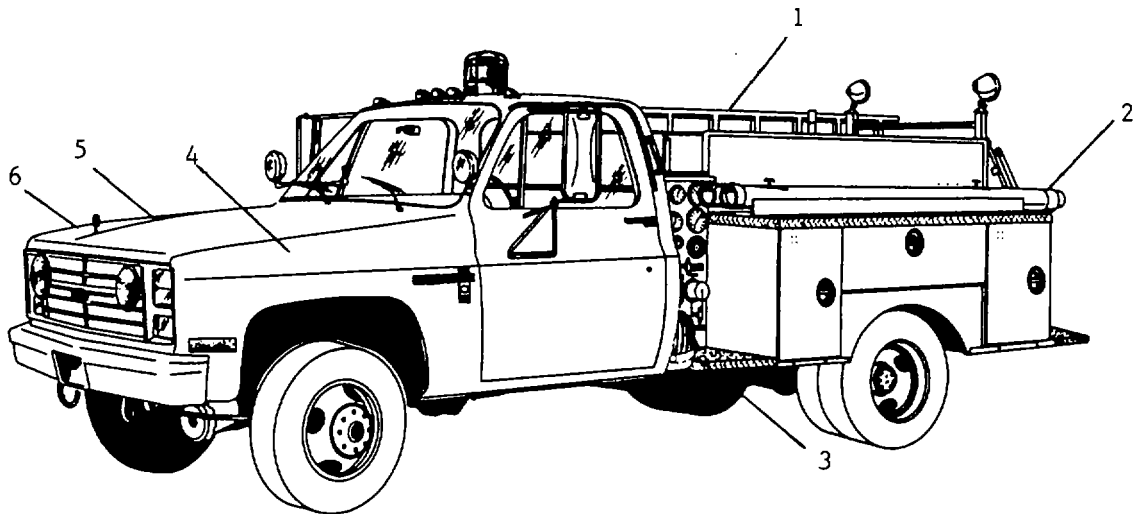
To determine breakway torque, thread nut onto screw or bolt until at least two threads stick out. Nut shall not make contact with a mating part. Stop the nut. Torque necessary to begin turning nut again is the breakway torque. Do not reuse self-locking nuts that do not meet minimum breakway torque.

**APPENDIX G
STOWAGE GUIDE**

G-1. SCOPE.

This appendix shows the locations for stowage of equipment and material required to be carried on the 250 GPM Mini-Pumper Firefighting Truck.

**MINI-PUMPER FIREFIGHTING TRUCK
Street Side View**



LOAD PLAN	
NO.	ITEM
1	12 Foot Extension Ladder
2	8 Foot Hard Suction Hose (2)
3	Strainer
4	Tire Jack
5	Hand Crank
6	Lug Wrench

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigram = .035 ounce
 1 decagram = 10 grams = .35 ounce
 1 hectogram = 10 decagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
----	------------------------	----------------------------	---------------------	----

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