

**TECHNICAL MANUAL**

**OPERATOR'S, ORGANIZATIONAL,**

**DIRECT SUPPORT, and GENERAL SUPPORT**

**MAINTENANCE MANUAL**

**(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)**

**for**

**TWIN AGENT 4x4 FIREFIGHTING TRUCK**

**MODEL NO. CM-KFT-8**

**NSN: 4210-00-484-5729**

**Approved for public release; distribution is unlimited**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**  
**17 JUNE 1987**

## SAFETY SUMMARY

The following warnings and cautions apply to this technical manual. The applicable warning and caution 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.

**WARNING**

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 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.

**WARNING**

A jack should never be used alone to support vehicle while under-chassis service is being performed. The jack may lower and serious personal injury could result. Always support vehicle with floor stands.

**WARNING**

The vehicle is equipped with locking slip differential, power will be transmitted to the opposite wheel should one of the wheels slip. Both wheels must be raised free of the ground should it be necessary to operate one wheel with the vehicle stationary. Otherwise the wheel that is not raised will pull the vehicle off its supports, possibly resulting in personal injury.

**NOTE**

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.

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT  
AND GENERAL SUPPORT MAINTENANCE MANUAL  
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)  
for  
TWIN AGENT 4x4 FIREFIGHTING TRUCK  
MODEL NO.: CM-KFT-8  
NSN: 4210-00-484-5729**

**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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**TABLE OF CONTENTS**

	Page
<b>CHAPTER 1 INTRODUCTION .....</b>	1-1
Section I General Information.....	1-1
Section II Equipment Description.....	1-3
<b>CHAPTER 2 OPERATING INSTRUCTIONS .....</b>	2-1
Section I Description and Use of Operator's Controls and Indicators.....	2-1
Section II Operator Preventive Maintenance Checks and Services (PMCS) .....	2-46
Section III Operation Under Usual Conditions.....	2-55
Section IV Operation Under Unusual Conditions .....	2-76
<b>CHAPTER 3 OPERATOR MAINTENANCE INSTRUCTIONS .....</b>	3-1
Section I Operator Troubleshooting Procedures.....	3-1
Section II Maintenance of Tire Rim Assembly.....	3-3
<b>CHAPTER 4 ORGANIZATIONAL MAINTENANCE INSTRUCTIONS.....</b>	4-1
Section I Repair Parts, Special Tools, TMDE, and Support Equipment .....	4-2
Section II Service Upon Receipt .....	4-2
Section III Organizational Preventive Maintenance Checks and Services (PMCS).....	4-5
Section IV Lubrication Instructions .....	4-13
Section V Organizational Troubleshooting Procedures.....	4-16
Section VI Maintenance of Accessories.....	4-30
Section VII Maintenance of Auxiliary Firefighting Equipment .....	4-32
Section VIII Maintenance of Twin Agent Firefighting System.....	4-37
Section IX Maintenance of Remote Manual Twin Agent Turret Assembly.....	4-46
Section X Maintenance of Hose Reel Assembly.....	4-51

<b>CHAPTER 4</b>	<b>ORGANIZATIONAL MAINTENANCE INSTRUCTIONS (Continued)</b>	Page
Section XI	Maintenance of Fire Body Assembly .....	4-59
Section XII	Maintenance of Engine Cooling System .....	4-72
Section XIII	Maintenance of Engine Fuel System .....	4-81
Section XIV	Maintenance of Diesel Fuel Injection System .....	4-86
Section XV	Maintenance of Engine Exhaust System .....	4-93
Section XVI	Maintenance of Engine and Accessories .....	4-95
Section XVII	Maintenance of Cab Assembly, Lights, Switches, Gauges, Controls and Indicators.....	4-106
Section XVIII	Maintenance of Electrical System .....	4-158
Section XIX	Maintenance of Propeller Shaft Assembly .....	4-160
Section XX	Maintenance of Transmission Assembly .....	4-164
Section XXI	Maintenance of Transfer Case Assembly .....	4-168
Section XXII	Maintenance of Tire Rim Assembly.....	4-171
Section XXIII	Maintenance of Air Brake System .....	4-174
Section XXIV	Maintenance of Steering Assembly .....	4-186
Section XXV	Maintenance of Power Steering System .....	4-189
Section XXVI	Maintenance of Front Suspension Assembly .....	4-193
Section XXVII	Maintenance of Rear Suspension Assembly.....	4-202
Section XXVIII	Maintenance of Rear Axle Assembly.....	4-204
Section XXIX	Maintenance of Front Axle Assembly .....	4-210
Section XXX	Maintenance of Frame Assembly.....	4-214
Section XXXI	Preparation for Shipment or Storage.....	4-217
<b>CHAPTER 5</b>	<b>DIRECT SUPPORT MAINTENANCE INSTRUCTIONS</b> .....	5-1
Section I	Repair Parts, Special Tools, TMDE, and Support Equipment .....	5-1
Section II	Direct Support Troubleshooting Procedures .....	5-1
Section III	Maintenance of Auxiliary Firefighting Equipment .....	5-8
Section IV	Maintenance of Diesel Fuel Injection System .....	5-24
Section V	Maintenance of Engine and Accessories .....	5-25
Section VI	Maintenance of Cab Assembly, Lights, Switches, Gauges, Controls and Indicators.....	5-38
Section VII	Maintenance of Air Brake System .....	5-43
Section VIII	Maintenance of Power Steering System.....	5-54
Section IX	Maintenance of Frame Assembly.....	5-59
<b>CHAPTER 6</b>	<b>GENERAL SUPPORT MAINTENANCE INSTRUCTIONS</b> .....	6-1
Section I	Repair Parts, Special Tools, TMDE, and Support Equipment .....	6-1
Section II	Maintenance of Engine and Accessories .....	6-1
Section III	Maintenance of Transmission Assembly. ....	6-43
Section IV	Maintenance of Transfer Case Assembly .....	6-95
<b>APPENDIX A</b>	<b>REFERENCES</b> .....	A-1
<b>APPENDIX B</b>	<b>MAINTENANCE ALLOCATION CHART</b> .....	B-1
Section I	Introduction.....	B-1
Section II	Maintenance Allocation Chart .....	B-4
Section III	Tool and Equipment Requirements.....	B-13
Section IV	Remarks .....	B-16
<b>APPENDIX C</b>	<b>COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST</b> .....	C-1
Section I	Items List .....	C-1
Section II	Components of End Item .....	C-2
<b>APPENDIX D</b>	<b>EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST</b> .....	D-1
Section I	Introduction.....	D-1
Section II	Expendable/Durable Supplies and Materials List.....	D-2

<b>APPENDIX E REPAIR PARTS AND SPECIAL TOOLS LIST</b> .....	Page E-1
Section I Introduction .....	E-1
Section II Repair Parts List .....	E-6
Group 00 Twin Agent 4x4 Firefighting Truck .....	E-6
Group 01 Accessories .....	E-6
Group 02 Auxiliary Firefighting Equipment .....	E-8
Group 03 Twin Agent Firefighting System .....	E-34
Group 04 Remote Manual Twin Agent Turret Assembly .....	E-50
Group 05 Hose Reel Assembly .....	E-64
Group 06 Fire Body Assembly .....	E-68
Group 07 Engine Cooling System .....	E-84
Group 08 Engine Fuel System .....	E-98
Group 09 Diesel Fuel Injection System .....	E-112
Group 10 Engine Exhaust System .....	E-142
Group 11 Engine and Accessories .....	E-144
Group 12 Cab Assembly, Lights, Switches, Gauges, Controls and Indicators .....	E-206
Group 13 Electrical System .....	E-311
Group 14 Propeller Shaft Assembly .....	E-328
Group 15 Transmission Assembly .....	E-332
Group 16 Transfer Case Assembly .....	E-378
Group 17 Tire Rim Assembly .....	E-399
Group 18 Air Brake System .....	E-412
Group 19 Steering Assembly .....	E-430
Group 20 Power Steering System .....	E-432
Group 21 Front Suspension Assembly .....	E-440
Group 22 Rear Suspension Assembly .....	E-448
Group 23 Rear Axle Assembly .....	E-452
Group 24 Front Axle Assembly .....	E-458
Group 25 Frame Assembly .....	E-466
 <b>APPENDIX F TORQUE LIMITS</b> .....	 F-1
 <b>APPENDIX G STOWAGE GUIDE</b> .....	 G-1
 <b>INDEX</b> .....	 I-1

**LIST OF ILLUSTRATIONS**

Figure		Page
1-1	Twin Agent 4x4 Firefighting Truck .....	1-0
1-2	Cab .....	1-5
1-3	Chassis .....	1-5
1-4	Service Brakes .....	1-6
1-5	Body .....	1-6
1-6	Twin Agent System .....	1-7
1-7	Hose Reel .....	1-7
1-8	Engine .....	1-8
1-9	Transmission .....	1-8
1-10	Front and Rear Axles .....	1-9
1-11	Suspension .....	1-9
1-12	Wheels and Tires .....	1-10
1-13	Steering System .....	1-10

Figure	<b>LIST OF ILLUSTRATIONS (Continued).</b>	Page
1-14	Exhaust System .....	1-11
1-15	Electrical System.....	1-11
1-16	Information Plate.....	1-12
2-1	Twin Agent Controls and Indicators .....	2-2
2-2	Remove Turret Controls and Indicators .....	2-9
2-3	Cab Controls and Instruments .....	2-13
2-4	Instrument Panel and Controls .....	2-17
2-5	Electronic Siren Controls.....	2-28
2-6	Inverter Controls.....	2-31
2-7	Power Saw Controls .....	2-34
2-8	Hydraulic Rescue Tool Control .....	2-39
2-9	Hydraulic Rescue Tool Power Unit Controls.....	2-41
2-10	10 Ton Hydraulic Rescue Kit Controls .....	2-43
2-11	Lighting and Vision Equipment .....	2-57
4-1	Chassis Lubrication Schematic.....	4-13
E-1	Accessories.....	E-6
E-2	Hydraulic Rescue Tool .....	E-8
E-3	Hydraulic Rescue Tool Power Unit .....	E-12
E-4	Aircraft Crash Rescue Tool Kit .....	E-16
E-5	10 Ton Hydraulic Rescue Kit .....	E-16
E-6	Rescue Saw .....	E-20
E-7	Inverter.....	E-32
E-8	Twin Agent Firefighting System.....	E-34
E-9	Piping, Valves, Fittings, and Regulator .....	E-38
E-10	Pressure Regulation and Manifold .....	E-44
E-11	Handrails .....	E-48
E-12	Remote Manual Twin Agent Turret Assembly .....	E-50
E-13	Monitor Assembly.....	E-52
E-14	Turret Box .....	E-56
E-15	Turret Piping, Controls and Gauges.....	E-60
E-16	Hose Reel Assembly .....	E-64
E-17	Fire Body Assembly .....	E-68
E-18	Deck .....	E-72
E-19	Inverter Receptacle .....	E-72
E-20	Rear Quartz Spotlight .....	E-74
E-21	Back-Up Light .....	E-78
E-22	Turn and Stop Light .....	E-78
E-23	Back-Up .....	E-82
E-24	Compartment Light.....	E-82
E-25	Deaeration Tank.....	E-84
E-26	Fan, Water Pump and Thermostat .....	E-86
E-27	Radiator Hoses and Piping .....	E-90
E-28	Radiator and Shroud .....	E-92
E-29	Radiator Collar and Stay Rod .....	E-94
E-30	Air Cleaner.....	E-98
E-31	Fuel Filter .....	E-100
E-32	Fuel Tank and Lines.....	E-102
E-33	Accelerator Pedal and Control Assembly.....	E-106
E-34	Engine Shutdown Control and Linkage .....	E-110
E-35	Injection Lines .....	E-112
E-36	Injection Pump .....	E-118
E-37	Injection Pump Governor Assembly.....	E-124

Figure	<b>LIST OF ILLUSTRATIONS (Continued).</b>	Page
E-38	Injection Pump Solenoid.....	E-132
E-39	Injection Pump Aneroid.....	E-132
E-40	Fuel Supply Pump.....	E-136
E-41	Injection Pump Linkage.....	E-136
E-42	Injection Nozzle.....	E-140
E-43	Engine Exhaust System.....	E-142
E-44	Batteries and Cables.....	E-144
E-45	Alternator Mounting.....	E-146
E-46	Alternator Assembly.....	E-148
E-47	Starter Mounting and Wiring.....	E-154
E-48	Starter Assembly.....	E-160
E-49	Turbocharger.....	E-166
E-50	Intake and Exhaust Manifolds.....	E-170
E-51	Valve Cover, Rocker Arms, Shafts, Pushrods, Cylinder Head and Valves.....	E-172
E-52	Front Cover.....	E-176
E-53	Camshaft and Gear Train.....	E-180
E-54	Dipstick, Tube, and Crankcase.....	E-182
E-55	Oil Pump and Filters.....	E-186
E-56	Oil Cooler Assembly.....	E-190
E-57	Oil Pan.....	E-194
E-58	Crankcase Vent Assembly.....	E-194
E-59	Pistons, Connecting Rods, Flywheel, Crankshaft, and Main Bearings.....	E-198
E-60	Front Engine Mounting.....	E-202
E-61	Rear Engine Mounting.....	E-204
E-62	Headlights.....	E-206
E-63	Front Clearance Lights.....	E-206
E-64	Front Turn Signal Lights.....	E-208
E-65	Cab Dome Lights.....	E-208
E-66	Cab Spotlights.....	E-212
E-67	Quartz Light, Front Bumper and Grille.....	E-216
E-68	Engine Compartment Light.....	E-220
E-69	Roof Warning Light.....	E-222
E-70	Air Horns.....	E-224
E-71	Windshield Wipers and Motor.....	E-228
E-72	Windshield Washer.....	E-232
E-73	Speedometer Cable Assembly.....	E-234
E-74	Instrument Panel Assembly.....	E-236
E-75	Instrument Cluster.....	E-240
E-76	Siren/PA System.....	E-244
E-77	External Speaker Installation.....	E-244
E-78	Heater Control Assembly.....	E-248
E-79	Heater Assembly.....	E-250
E-80	Heater Duct Assembly.....	E-254
E-81	Steering Wheel and Column.....	E-258
E-82	Hood Assembly.....	E-262
E-83	Splash Guard and Stone Deflector.....	E-266
E-84	Hood Cable and Emblem.....	E-270
E-85	Mirror Assembly.....	E-272
E-86	Door Installation.....	E-276
E-87	Door Assembly.....	E-278
E-88	Seats and Seatbelts.....	E-284
E-89	Cab Glass.....	E-288

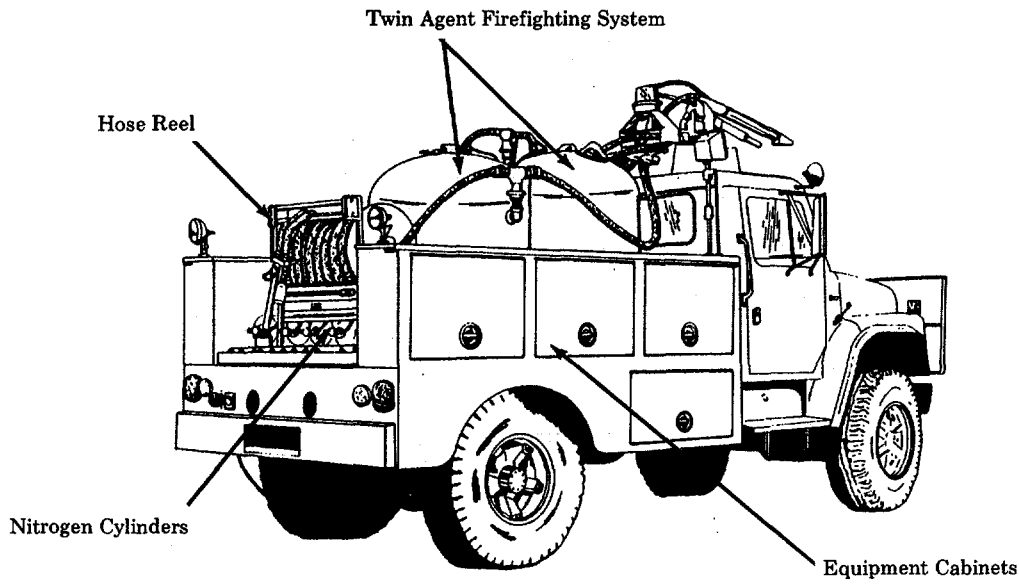


Figure	<b>LIST OF ILLUSTRATIONS (Continued).</b>	Page
E-90	Sun Visor and Product Graphic .....	E-292
E-91	Engine and Transmission Cover .....	E-294
E-92	Floor Mat .....	E-298
E-93	Front Sheet Metal .....	E-300
E-94	Cab Underbody and Side Panel .....	E-302
E-95	Roof Panel .....	E-306
E-96	Cab Stay Rods and Mounting .....	E-308
E-97	Cab Electrical System .....	E-312
E-98	Body Electrical System .....	E-321
E-99	Propeller Shaft Assembly .....	E-328
E-100	Transmission Installation .....	E-332
E-101	Torque Converter and Cover Assembly .....	E-334
E-102	Oil Pump and Front Support .....	E-338
E-103	Forward Clutch and Turbine Shaft .....	E-342
E-104	Fourth Clutch .....	E-346
E-105	Third Clutch, Center Support, and Second Clutch .....	E-348
E-106	Gear Unit and Main Shaft .....	E-352
E-107	Transmission Housing, Oil Filter and Oil Pan .....	E-356
E-108	First Clutch .....	E-360
E-109	Rear Cover .....	E-362
E-110	Control Valve .....	E-366
E-111	Modulated Lockup Valve .....	E-370
E-112	Oil Cooler Piping and Oil Level Gauge .....	E-372
E-113	Transmission Shift Control .....	E-376
E-114	Transfer Case Installation .....	E-378
E-115	Front Output Shaft .....	E-382
E-116	Rear Output Shaft .....	E-382
E-117	Intermediate Shaft .....	E-386
E-118	Input Shaft .....	E-386
E-119	Manual Shift .....	E-390
E-120	Manual Front Drive Declutch .....	E-392
E-121	Transfer Case Housing .....	E-394
E-122	Transfer Case Shift Lever and Linkage .....	E-396
E-123	Tires and Rims .....	E-399
E-124	Slack Adjuster .....	E-400
E-125	Air Brake Chamber .....	E-400
E-126	Air Compressor Assembly and Filter .....	E-404
E-127	Air Compressor Governor .....	E-408
E-128	Air Dryer .....	E-408
E-129	Front Service Brakes .....	E-412
E-130	Rear Service Brake .....	E-416
E-131	Limiting Valve and Quick Release Valve .....	E-420
E-132	Parking Brake Control Valve .....	E-422
E-133	Brake Pedal and Control Valve .....	E-422
E-134	Air Tank .....	E-426
E-135	Drag Link .....	E-430
E-136	Power Steering Gear .....	E-432
E-137	Power Steering Pump .....	E-436
E-138	Front Shock Absorber .....	E-440
E-139	Front Wheel Assembly .....	E-440
E-140	Leaf Springs and Bushings .....	E-444
E-141	Leaf Springs and Bushings .....	E-448

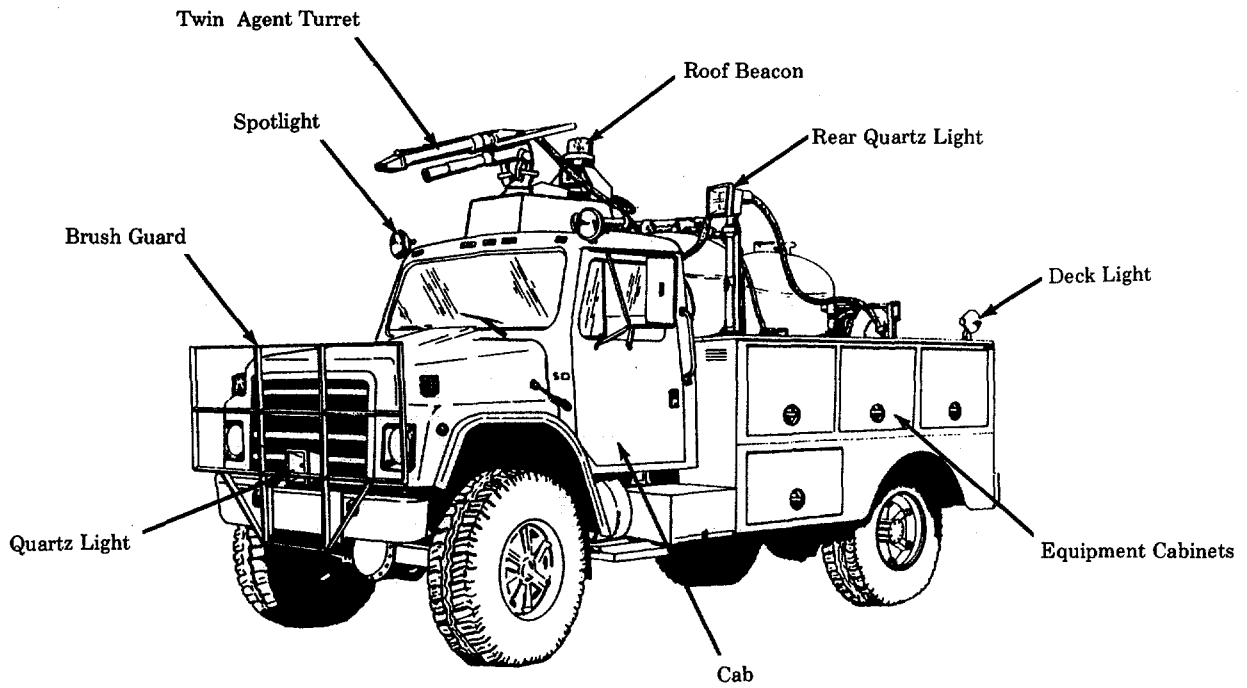
		<b>LIST OF ILLUSTRATIONS (Continued).</b>	Page
Figure			
E-142	Wheel Assembly .....		E-452
E-143	Rear Axle .....		E-454
E-144	Front Axle .....		E-458
E-145	Crossmembers and Frame Rails .....		E-466

**LIST OF TABLES**

Figure		Page
2-1	Twin Agent System Controls and Indicators .....	2-3
2-2	Remote Turret Controls .....	2-10
2-3	Cab Controls and Instruments .....	2-14
2-4	Instrument Panel and Controls .....	2-18
2-5	Electronic Siren Controls .....	2-29
2-6	Inverter Controls .....	2-32
2-7	Power Saw Controls .....	2-35
2-8	Hydraulic Rescue Tool Controls .....	2-40
2-9	Hydraulic Rescue Tool Power Unit Controls .....	2-42
2-10	10 Ton Hydraulic Rescue Kit Controls .....	2-44
2-11	Operator/Crew Preventive Maintenance Checks and Services (PMCS) .....	2-49
2-12	AFFF Vessel Fill Readings .....	2-74
3-1	Operator Troubleshooting Chart .....	3-2
4-1	Inspection Prior To Use .....	4-3
4-2	Organizational Preventive Maintenance Checks and Services (PMCS) .....	4-6
4-3	SAE Oil Viscosity Recommendations .....	4-15
4-4	Organizational Troubleshooting Chart .....	4-19
5-1	Direct Support Troubleshooting Chart .....	5-3
5-2	Compressor Component Tolerances .....	5-46



**CURB SIDE**



**STREET SIDE**

**FIGURE 1-1. TWIN AGENT 4X4 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
List of Abbreviations .....	1-5	Scope .....	1-1
Maintenance Forms and Records .....	1-2	Warranty Information .....	1-4
Preparation for Storage or Shipment .....	1-7		

**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-8, Twin Agent 4x4 Firefighting Truck.
- c. *Purpose of Equipment.* The CM-KFT-8 Firefighting Truck is designed to combat aircraft and automotive fires. The truck will accomplish the firefighting mission by providing aqueous film forming foam (AFFF) and dry chemical (P-K-P) from a self-contained agent system.
- 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 Twin Agent 4x4 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 Twin Agent 4x4 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	min	minimum or minute
AFFF	Aqueous Film Forming Foam	mm	millimeters
AR	As Required	mph	miles per hour
BII	Basic Issue Items	N.m	Newton-meters
C	Celsius	No.	Number(s)
COEIL	Components of End Item List	NSN	National Stock Number
cont	continued	NSS	Not Sold/Service Separately
DA	Department of the Army	P/N	Part Number
DS	Direct Support	para.	paragraph(s)
EIRs	Equipment Improvement Recommendations	PMCS	Preventive Maintenance Checks and Services
ES&ML	Expendable Supplies and Materials List	psi	pounds per square inch
F	Fahrenheit	qty	quantity
FM	Field Manual	RH	Right Hand
GPM	Gallons Per Minute	rpm	revolutions per minute
Hz	Hertz	TAMMS	The Army Maintenance Management System
Km	Kilometers	TB	Technical Bulletin
Km/h	Kilometers/hour	TM	Technical Manual
l	liters	TMDE	Test Measurement and Diagnostic Equipment
LH	Left Hand	U/M	Unit of Measurement
LO	Lubrication Order	VAC	Volts Alternating Current
m	meter	wt	weight
max	maximum		
mfg	manufacturing		

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

Command decision, in accordance with the tactical situation will determine when destruction of the Twin Agent 4x4 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-8 is a commercial type, 4x4, front wheel steer, truck cab and chassis fire truck powered by a DT-466 diesel engine. The fire truck is equipped with an aqueous film forming foam (AFFF) and dry chemical (P-K-P) agent system with a hose reel and remote controlled twinned roof turret for dispensing the twin agent firefighting chemicals.
- b. *Capabilities.* The fire truck is capable of satisfactory performance in any normal ambient temperature from +125° (51.6°C) to 32°F (0°C). The twin agent system will provide simultaneously, an average flow rate of 55 gpm of AFFF agent and 5.0 lbs (2.3 kg) per second of dry chemical at any hose length from 25 to 100 feet (7.62 to 30.4 m) at the above stated temperatures.

The truck, when fully loaded with all specified equipment, filled twin agent system, fuel tank, and crew, is capable of the following road performance at sea level:

- (1) Parking brake holding the truck on a 30% grade in both ascending and descending position.
- (2) Service brakes holding the truck on a 30% grade in both ascending and descending position.
- (3) Service brakes bringing the truck to a stop within a braking distance of 30 feet (9.14 m) from a speed of 20 mph (32.2 km/h) on a dry, level, paved roadway.
- (4) Attaining a maximum speed of 65 mph (104.6 km/h) on a dry, level, paved roadway.
- (5) Accelerating on a level road from a standing start to a speed of 50 mph (80.4 km/h) in 30 seconds.
- (6) Negotiating a 50% grade in the low speed range traveling both up and down the grade.
- (7) There will be no evidence of body distortion, leakage, tire and body contact, malfunction of components, irregular chassis noise, vibration, or sway when subjected to a road test of 100 miles (160.9 km) over paved roadway at speeds up to 55 mph (88.5 km/h); 25 miles (40.2 km) over graded unpaved roadway at speeds up to 25 mph (40.2 km/h); and 25 miles (40.2 km) off highway over cross-country terrain at speeds up to 15 mph (24.1 km/h) in four-wheel drive.
- (8) Negotiating side slopes up to 20% on a surface reasonably hard in both directions.

## 1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

- a. *General Description.* The Twin Agent 4x4 Firefighting Truck (Figures 1-2 through 1-15) is complete with all primary and support equipment required for firefighting purposes. The vehicle consists of the following major components:

- |                       |                             |
|-----------------------|-----------------------------|
| (1) Cab               | (8) Transmission            |
| (2) Chassis           | (9) Front and Rear Axles    |
| (3) Service Brakes    | (10) Suspension System      |
| (4) Body              | (11) Wheels, Rims and Tires |
| (5) Twin Agent System | (12) Steering System        |
| (6) Hose Reel         | (13) Exhaust System         |
| (7) Engine            | (14) 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 Twin Agent 4x4 Firefighting Truck.

- (1) *Cab.* The cab is a standard closed compartment forward-type.
- (a) *Seating.* Seating is provided for 2 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.
- (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.
- (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 right 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 the wiper control switch. The reservoir for the washer fluid is mounted under the engine compartment hood.

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

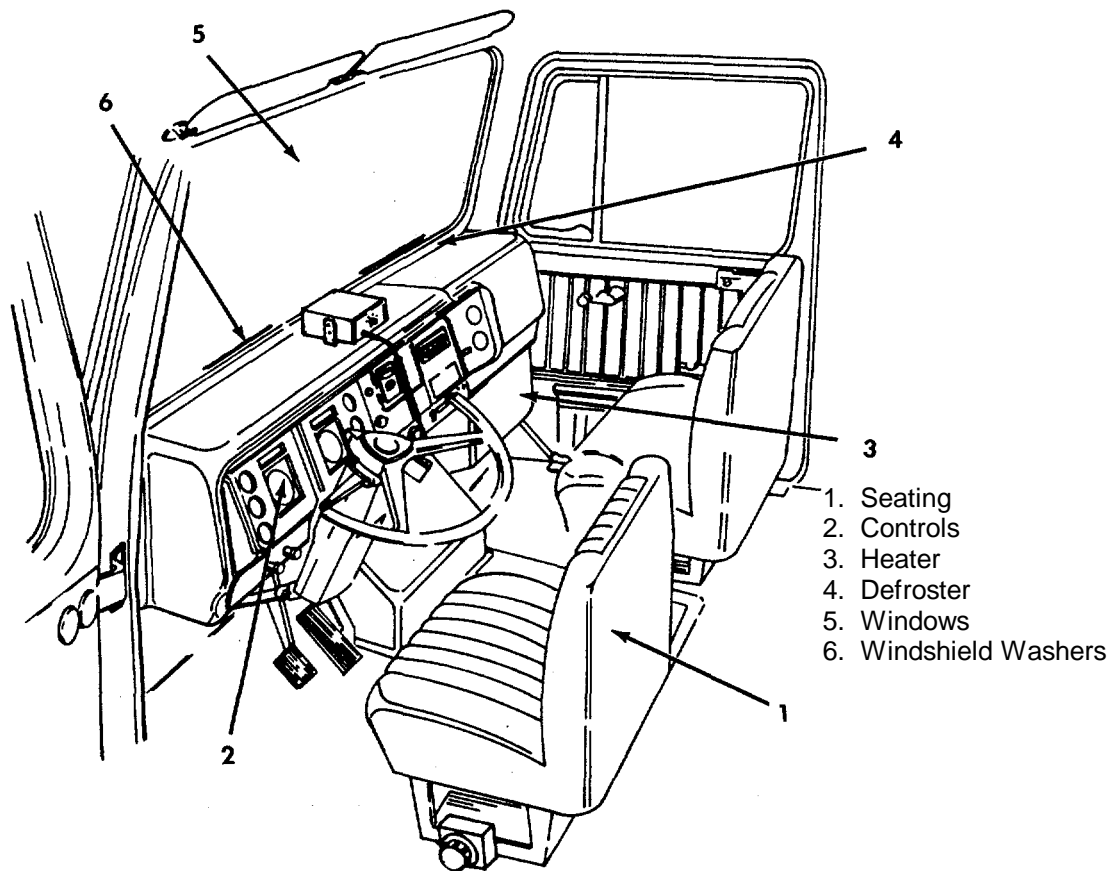


FIGURE 1-2. CAB

(2) *Chassis.* The chassis is a 4-wheel or rear drive with front engine mounting. The front axle is a hypoid gear axle equipped with steering knuckles, 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.

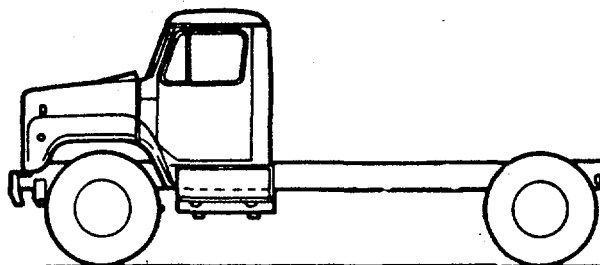


FIGURE 1-3. CHASSIS



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

(3) *Service Brakes*. The truck is equipped with air activated, 4 wheel service brakes.

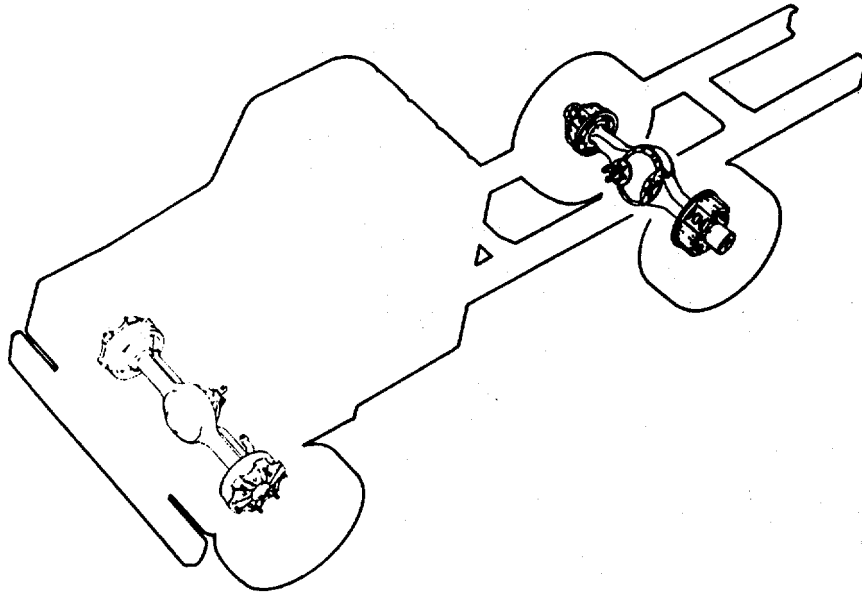


FIGURE 1-4. SERVICE BRAKES

(4) *Body*. The body, which is separate from the cab, incorporates the twin agent firefighting system, equipment cabinets, hose reel, and mounting brackets for the auxiliary firefighting equipment.

1. Twin Agent Firefighting System
2. Equipment Cabinets
3. Hose Reel



FIGURE 1-5. BODY  
1-6

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

(5) *Twin Agent System.* The firefighting system consists of a remote controlled twinned agent turret, dry chemical and AFFF pressure vessels, hose reel, remote handline, nitrogen cylinders and piping and controls for discharging, filling, draining and operating the firefighting system.

- 1. Dry Chemical Tank
- 2. Foam Tank
- 3. Hose Reel
- 4. Remote Handline
- 5. Nitrogen Cylinders
- 6. Twin Agent Turret

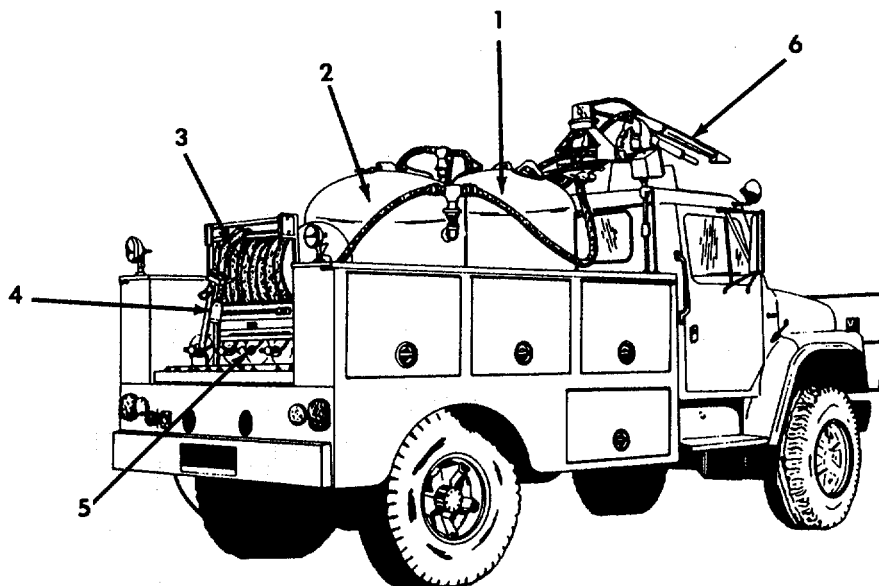


FIGURE 1-6. TWIN AGENT SYSTEM

(6) *Hose Reel.* One hose reel is mounted on the twin agent at the rear of the fire body. One 100-foot (30.48 m) length of non-collapsible twin hose is installed on the hose reel. A twinned handline nozzle with a pistol grip is provided with the hose. An electric motor rewinds the hose. A manual crank is provided in case of motor failure.

- 1. Hose Reel
- 2. Twinned Handline Nozzle

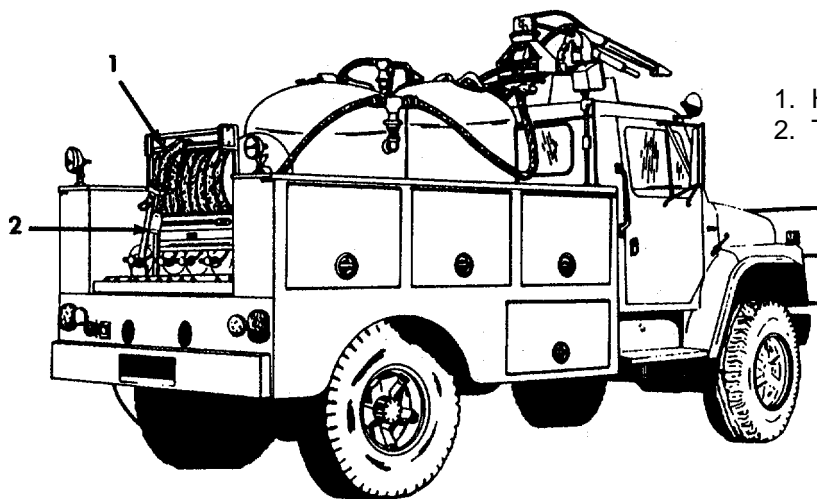


FIGURE 1-7. HOSE REEL

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

(7) *Engine.* The engine is a 6 cylinder, in-line, valve-in-head, 4 cycle diesel engine, rated at 210 horsepower at 2,600 rpm. The engine is equipped with a turbocharger, oil cooler, full flow oil filter, fuel oil filters, air cleaner, air compressor, fan, emission control system, starting motor, and an exhaust system.

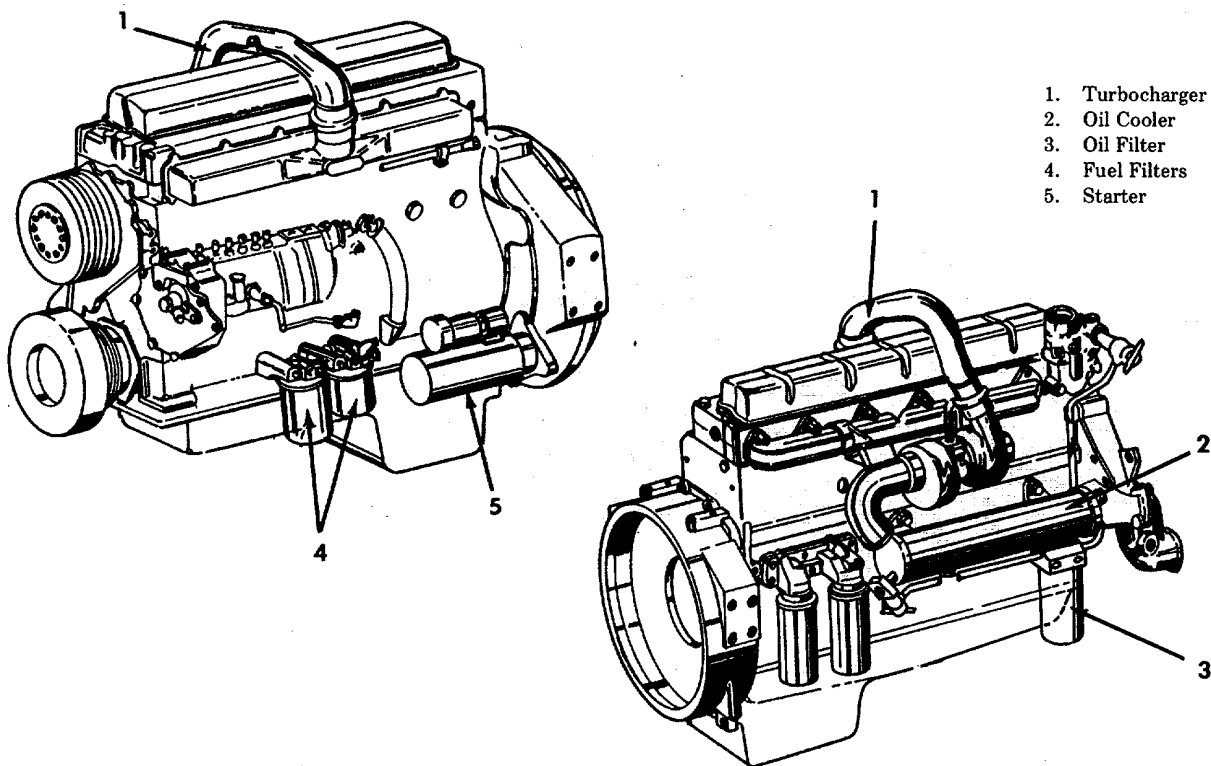


FIGURE 1-8. ENGINE

(8) *Transmission.* The transmission provides four forward speeds and one reverse. Gear shifting is done automatically. 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

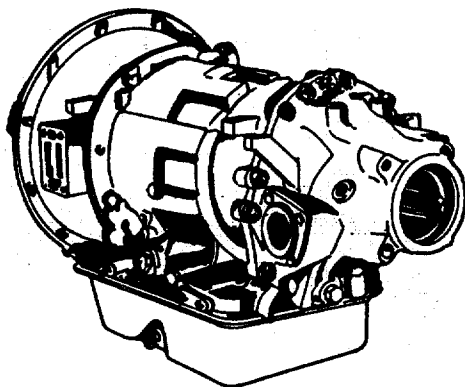


FIGURE 1-9. TRANSMISSION

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

- (9) *Front and Rear Axles.* The front axle is a hypoid gear axle equipped with steering knuckles 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.

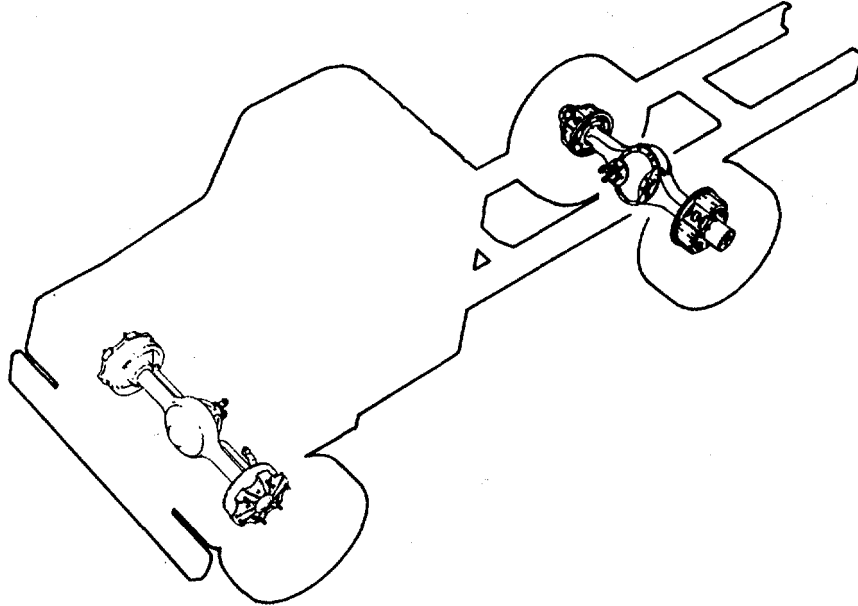


FIGURE 1-10. FRONT AND REAR AXLES

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

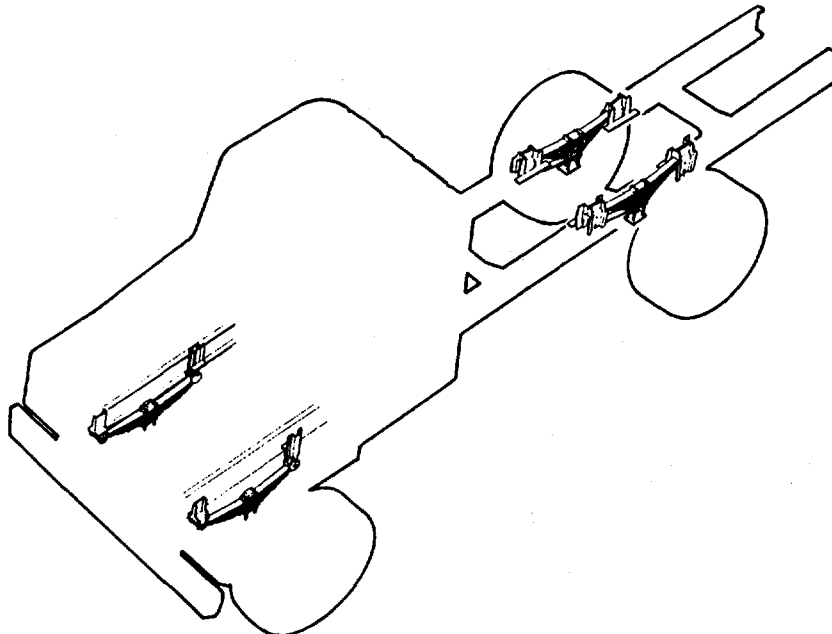


FIGURE 1-11. SUSPENSION

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

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

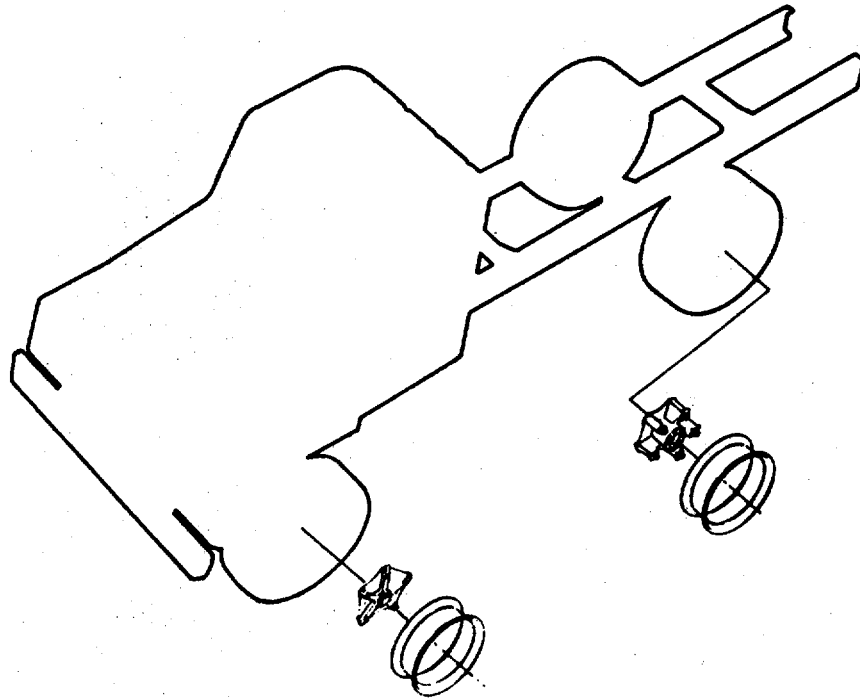


FIGURE 1-12. WHEELS, RIMS, AND TIRES

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

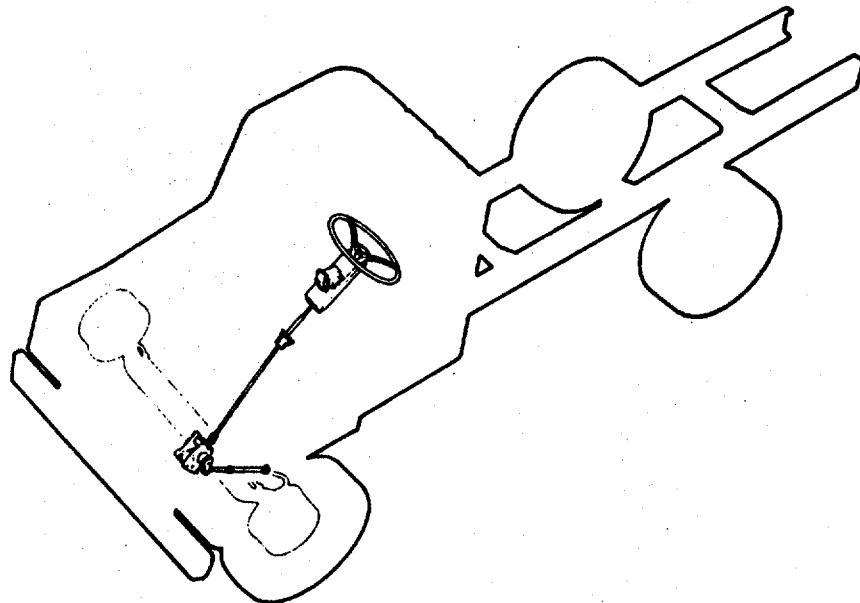


FIGURE 1-13. STEERING SYSTEM

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

(13) *Exhaust System.* The exhaust system includes a muffler, tail pipes and piping to remove exhaust gases and other discharges from the vehicle.

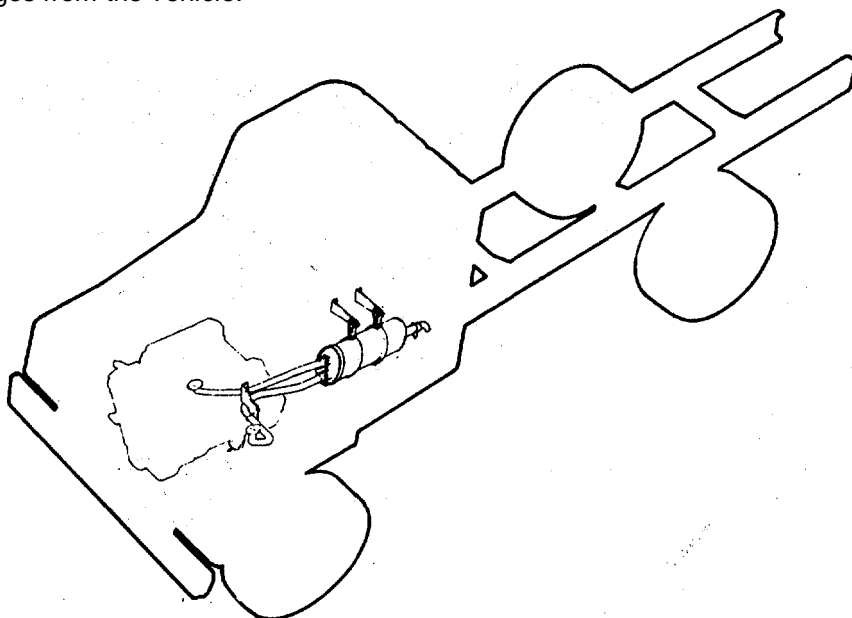
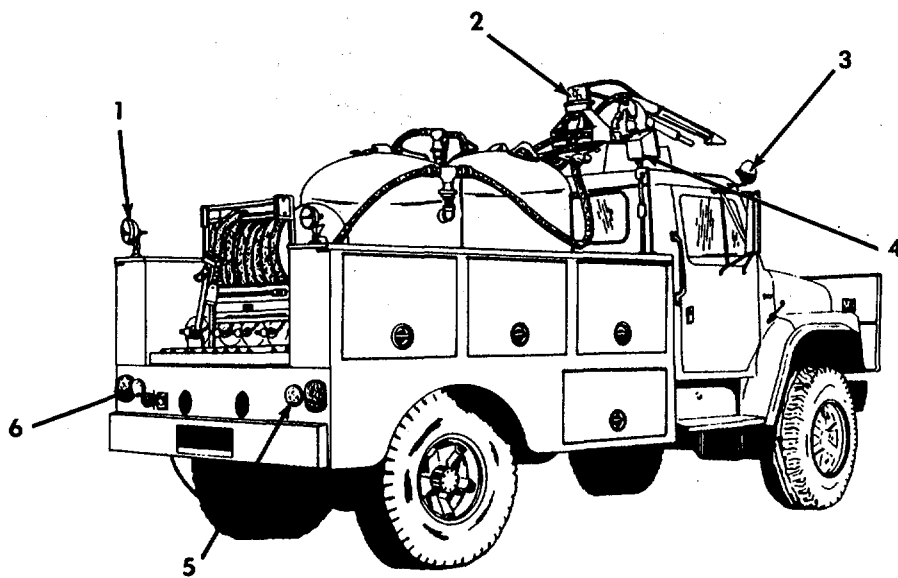


FIGURE 1-14. EXHAUST SYSTEM

(14) *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 125 am-pere power. A 3000 watt inverter is also provided for AC power.



- 1. Hose Pick-Up Light
- 2. Roof Beacon Light
- 3. Cab Spot Light
- 4. Quartz Light
- 5. Rear Back-Up Light
- 6. Tail Light

FIGURE 1-15. 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 Twin Agent 4x4 Firefighting Truck. The information plate is shown on Figure 1-16.

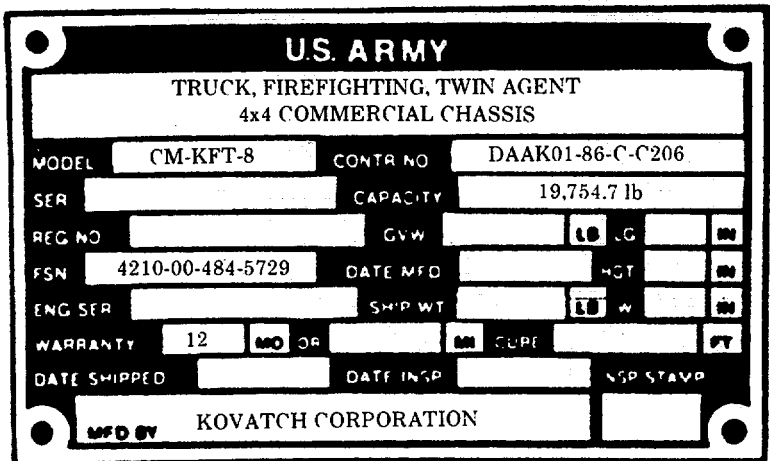


FIGURE 1-16. INFORMATION PLATE

b. *Tabulated Data.*

**GENERAL**

Type ..... Truck, Firefighting, Twin Agent 4x4  
 Federal Stock Number ..... NSN 4210-00-484-5729  
 Serial Number Range ..... CN1436 thru 1442, 1484 thru 1493, 2567 thru 2575  
 Manufacturer ..... Kovatch Corporation  
 Model ..... CM-KFT-8  
 Contract Number ..... DAAK01-86-C-C206  
 Truck Length ..... 231 in (5867.4 mm)  
 Truck Width ..... 95 in (28.9 mm)  
 Truck Height ..... 133 in (40.5 mm)  
 Capacity or Payload ..... 19,754.7 lb (8,960.7 kg)  
 Shipping Weight ..... 18,350 lb (8,323.5 kg)

**CAB**

Manufacturer ..... Navistar International  
 Model ..... "S" Series  
 Capacity ..... 2 Persons

**CHASSIS**

Manufacturer ..... Navistar International  
 Model ..... 1854 4x4  
 Wheel Base ..... 152 in (3.85 m)

**ENGINE**

Manufacturer ..... Navistar International  
 Model ..... DT 466C-B210F  
 Fuel ..... Diesel

1-10. EQUIPMENT DATA (Continued).

TRANSMISSION

Manufacturer .....Detroit Allison  
 Model ..... MT643  
 Type .....4 Speed Automatic

TRANSFER CASE

Manufacturer .....Fabco  
 Model .....TC-35

TWIN AGENT FIREFIGHTING SYSTEM

Manufacturer ..... C-D-N Nordic  
 Model .....1013-79.1  
 Discharge Rate: AFFF .....150 GPM (567.8 l)  
 Discharge Rate: Dry Chemical .....15 lb/sec (6.8 kg/sec)  
 Propellant .....Nitrogen Gas Cylinders @ 1840 psi

HOSE REEL

Manufacturer ..... C-D-N Nordic  
 Model .....93231130-10BR  
 Rewind .....Electric  
 Voltage .....12 VDC

AIR COMPRESSOR

Manufacturer .....Midland  
 Model .....N-7602A

AIR DRYER

Manufacturer .....Brakemaster  
 Model .....62

POWER STEERING PUMP

Manufacturer .....Eaton  
 Model .....781

STEERING GEAR

Manufacturer .....Ross  
 Model .....HFB-64

STARTING MOTOR

Manufacturer .....Delco Remy  
 Model .....1990405  
 Volts .....12 VDC

ALTERNATOR

Manufacturer .....Leece-Neville  
 Model .....8050AB  
 Volts .....14

BEACON LIGHT

Manufacturer .....Mars Signal Light  
 Model .....SW-2  
 Voltage .....12 VDC



1-10. EQUIPMENT DATA (Continued).

SPOTLIGHTS

Manufacturer ..... Unity Manufacturing Company  
 Model ..... S-6-225  
 Voltage ..... 12 VDC

HOSE PICK-UP LIGHTS

Manufacturer ..... Unity Manufacturing Company  
 Model ..... AG-R-4413  
 Voltage ..... 12 VDC

QUARTZ LAMP

Manufacturer ..... Havis Shields Equipment Corporation  
 Model ..... 605

BATTERIES (CHASSIS)

Manufacturer ..... Exide  
 Model ..... COM-8D  
 Voltage ..... 12 VDC

ELECTRONIC SIREN

Manufacturer ..... Public Safety Equipment  
 Model ..... 3691  
 Voltage ..... 12 VDC

POWER RESCUE TOOL (JAWS OF LIFE)

Manufacturer ..... FM Brick Industries, Inc.  
 Model ..... 9999-6000

POWER UNIT, POWER RESCUE TOOL

Manufacturer ..... Briggs and Stratton  
 Model ..... 91708-0015

RESCUE SAW

Manufacturer ..... Partner  
 Model ..... K-1200  
 Engine ..... 100 C.C.

HYDRAULIC RESCUE KIT

Manufacturer ..... Black Hawk  
 Model ..... 65066 Porto-Power "SS"

AIRCRAFT RESCUE TOOL KIT

Manufacturer ..... Sierra  
 Model ..... CRK5

INVERTER

Manufacturer ..... Dynamote  
 Model ..... A40-120  
 Input ..... 12 VDC  
 Output ..... 120V 60 Hz AC

1-10. EQUIPMENT DATA (Continued).

TIRES

Manufacturer ..... Goodyear  
Model ..... Super Single  
Size ..... 16.5x22.5  
Load Range ..... H

CAPACITIES

Fuel Tank ..... 30 gal (113.65 l)  
Cooling System ..... 18 quarts (17.0 l)  
Crankcase ..... 54 quarts (51.0 l)  
Transmission ..... 16 quarts (15.1 l)  
Transfer Case ..... 7 quarts (6.62 l)  
AFFF Tank ..... 225 gal (851.7 l)  
Dry Chemical Tank ..... 1,404.7 lb (637.17 kg)  
Front Axle ..... 17 3/4 pints (8.42 l)  
Rear Axle ..... 24 pints (11.35 l)

**CHAPTER 2  
OPERATING INSTRUCTIONS**

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

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

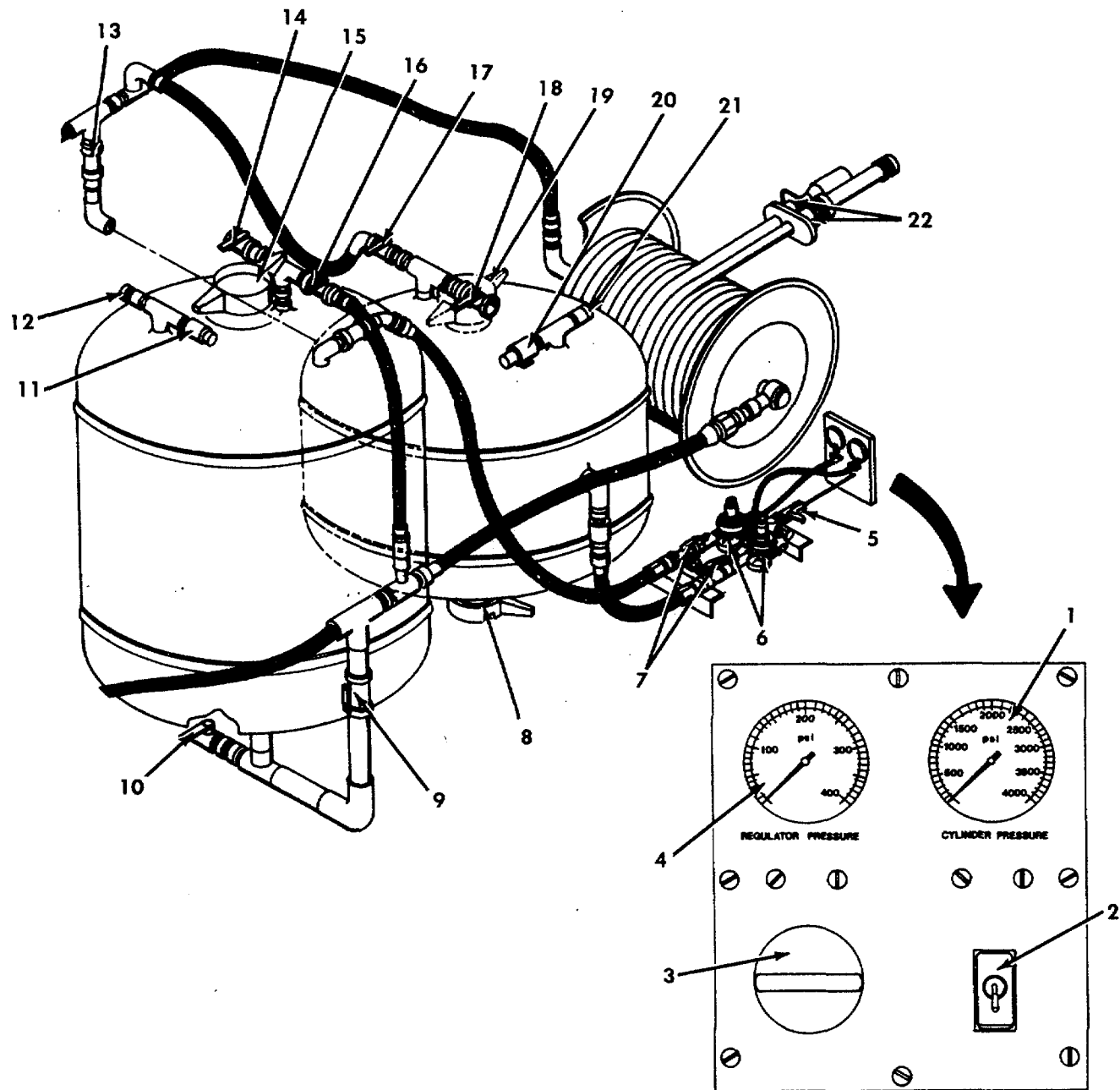
	Para.		Para.
Description and Use of Controls and Indicators ...	2-2	General .....	2-1

**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 Twin Agent 4x4 Firefighting Truck.

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

Tables and illustrations 2-1 through 2-10 illustrate and describe the functional use and show you the location of the controls and indicators on the Twin Agent 4x4 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. Cylinder Pressure Gauge                     | 12. Heat Sensitive Relief Valve           |
| 2. Twin Agent Pressure Activator Switch        | 13. Dry Chemical Emergency Shut-Off Valve |
| 3. Manual Twin Agent Pressure Activator Handle | 14. Bleed Valve                           |
| 4. Regulator Pressure Gauge                    | 15. AFFF Tank Fill Cap                    |
| 5. Master Control Valve                        | 16. Purge Valve                           |
| 6. Test Gauges                                 | 17. Purge Valve                           |
| 7. Test Valves                                 | 18. Bleed Valve                           |
| 8. Dry Chemical Tank Drain Cap                 | 19. Dry Chemical Tank Fill Cap            |
| 9. AFFF Emergency Shut-Off Valve               | 20. Pressure Relief Valve                 |
| 10. AFFF Tank Drain Valve                      | 21. Heat Sensitive Relief Valve           |
| 11. Pressure Relief Valve                      | 22. Dual Agent Handline Control Handles   |

FIGURE 2-1. TWIN AGENT CONTROLS AND INDICATORS  
2-2

Table 2-1. Twin Agent System Controls and Indicators  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-1)

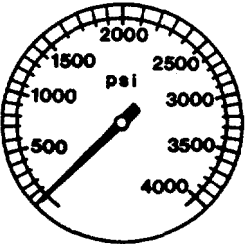

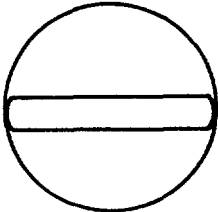
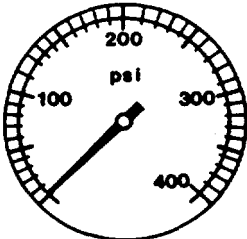
Key	Control or Indicator	Function
1	Cylinder Pressure Gauge	The Cylinder Pressure Gauge indicates the pressure in the nitrogen cylinders.
		
2	Twin Agent Pressure Activator Switch	The twin Agent Pressure Activator Switch activates the master control valve which pressurizes the system for firefighting operations.
		
3	Manual Twin Agent Pressure Activator Handle	The Manual Twin Agent Pressure Activator Handle manually opens the master control valve to pressurize the system for firefighting operations.
		
4	Regulator Pressure Gauge	The Regulator Pressure Gauge indicates the regulated nitrogen gas pressure. The gauge reads zero until the unit is pressurized.
		

Table 2-1. Twin Agent System Controls and Indicators (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-1)

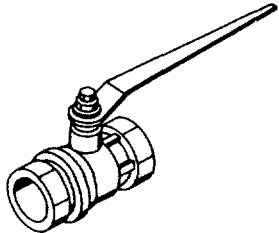
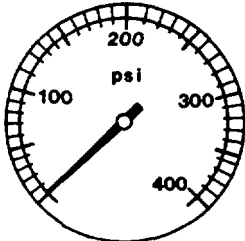
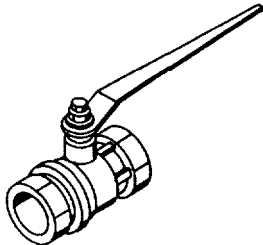

Key	Control or Indicator	Function
5	Master Control Valve	<p>The Master Control Valve is a quarter turn valve and is located in the high pressure line. The control valve pressurizes the system and may be activated from a location at the rear of the unit or from inside the cab.</p> 
6	Test Gauges	<p>The Test Gauges indicate regulated nitrogen pressure in the agent tanks.</p> 
7	Test Valves	<p>The Test Valves are located in the low pressure line between the main regulators and the check valves. Their function is to allow the reduced pressure system to be tested under pressure, without the agent tanks being charges.</p> 
8	Dry Chemical Tank Drain Cap	<p>The Dry Chemical Tank Drain Cap is removed when inspecting or cleaning the agent tank.</p> <p>To remove cap, turn counterclockwise.</p> 

Table 2-1. Twin Agent System Controls and Indicators (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-1)

Key	Control or Indicator	Function
9	AFFF Emergency Shut-Off Valve	The AFFF Emergency Shut-Off Valve serves as a discharge charge shut-off in the event of a valve failure or hose rupture. It is located at the AFFF tank outlet and is in the OPEN position during normal operating conditions.
10	AFFF Tank Drain Valve	The AFFF Tank Drain Valve is located on the underside of the AFFF Tank and provides for the draining of the tank for inspections.
11	Pressure Relief Valve	The Pressure Relief Valve is located on the AFFF Tank. The relief valve protects the tank and low pressure line from over-pressure and is set at 300 psi (2068 kPa).

Table 2-1. Twin Agent System Controls and Indicators (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-1)

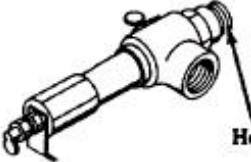
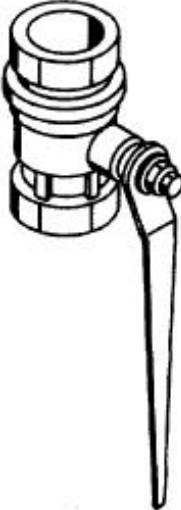
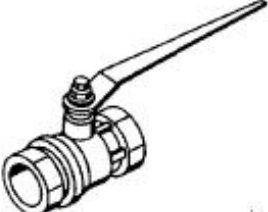
Key	Control or Indicator	Function
12	Heat Sensitive Relief Valve	<p>The Heat Sensitive Relief Valve is located on the AFFF Tank. The relief valve protects the tank and low pressure line from extreme heat and is set at 212 • F • 10 • F (100 • C • 5.5 • C).</p>  <p style="text-align: right;"><b>Heat Sensitive Relief Valve</b></p>
13	Dry Chemical Emergency Shut-Off Valve	<p>The Dry Chemical Emergency Shut-Off Valve serves as a discharge shut off in the event of a valve failure or hose rupture. It is located on the Dry Chemical Tank outlet and is in the OPEN position during normal operating conditions.</p> 
14	Bleed Valve	<p>The Bleed Valve is located on the AFFF Tank. When opened, it allows the AFFF Tank to depressurize.</p> <p>The bleed valve must be in the CLOSED position during normal operating conditions.</p> 



Table 2-1. Twin Agent System Controls and Indicators (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-1)


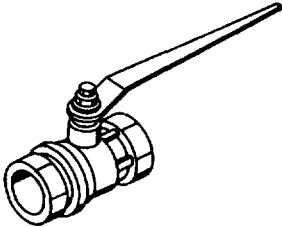
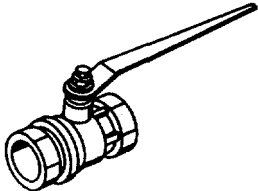

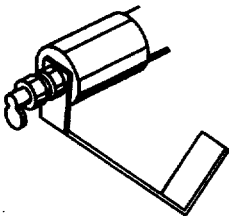
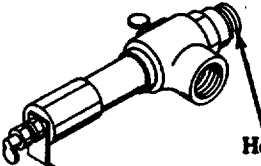
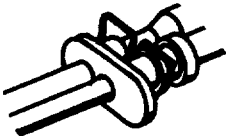
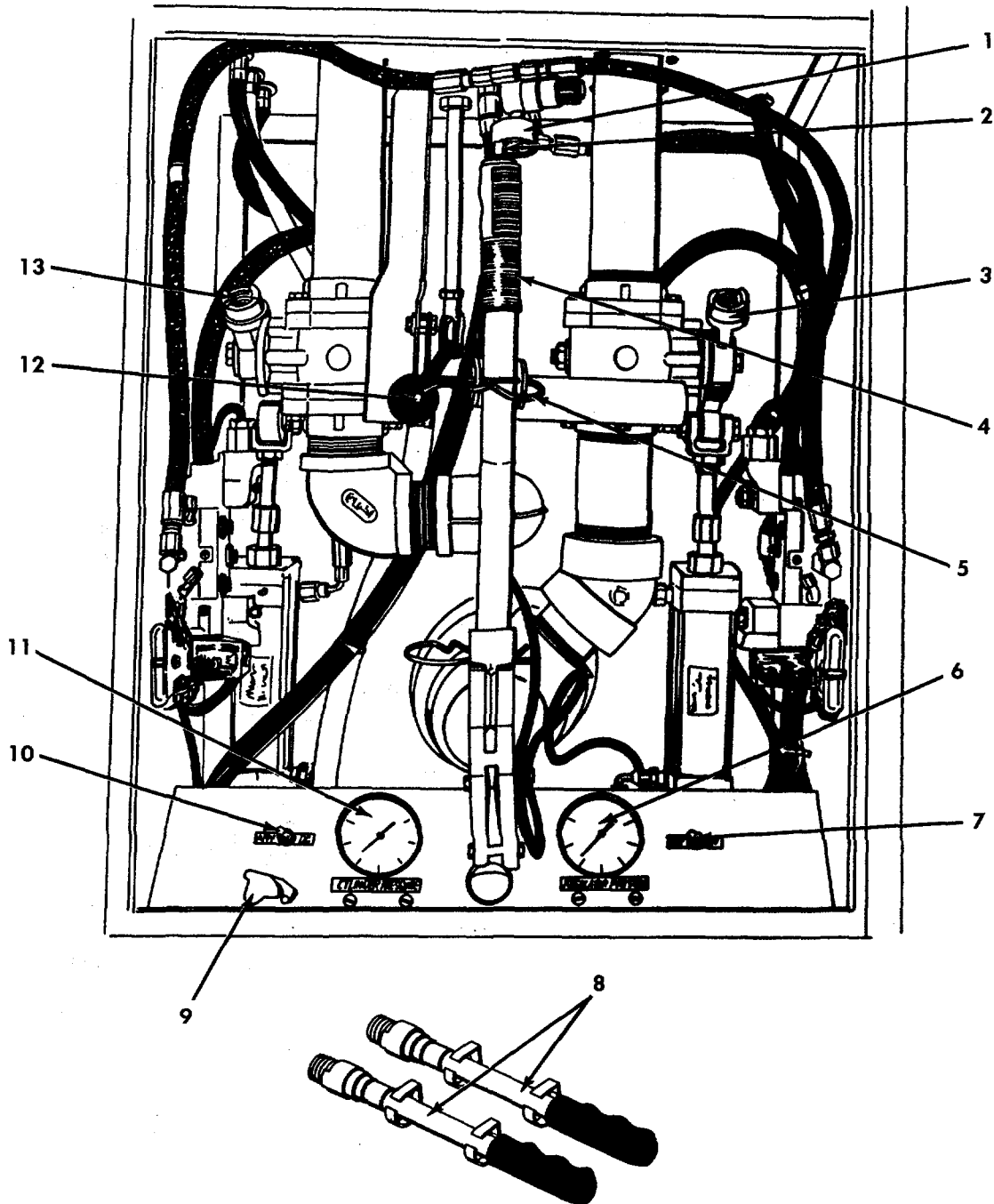
Key	Control or Indicator	Function
15	AFFF Tank Fill Cap	<p>The AFFF Tank Fill Cap is a threaded pressure lug cap that seals the fill opening.</p> 
16 & 17	Purge Valves	<p>The Purge Valves are located on the Dry Chemical and AFFF Tanks. When opened, they purge the agent lines and bleed any trapped pressure out of the respective tank.</p> <p>The purge valves are in the CLOSED position during normal operating conditions.</p> 
18	Bleed Valve	<p>The Bleed Valve is located on the Dry Chemical Tank. When opened, it allows the Dry Chemical Tank to depressurize.</p> <p>The bleed valve are in the CLOSED position during normal operating conditions.</p> 
19	Dry Chemical Tank Fill Cap	<p>The Dry Chemical Tank Fill Cap is a threaded pressure lug cap that seals the fill opening.</p> 

Table 2-1. Twin Agent System Controls and Indicators (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-1)

Key	Control or Indicator	Function
20	Pressure Relief Valve	The Pressure Relief Valve is located on the Dry Chemical Tank. The relief valve protects the tank and low pressure line from extreme heat and is set at 212± 10 F (100± 5.5° C).
		
21	Heat Sensitive Relief Valve	The Heat Sensitive Relief Valve is located on the Dry Chemical tank. The relief valve protects the tank and low pressure line from extreme heat and is set at 212± 10 F (100± 5.5° C).
		 <p><b>Heat Sensitive Relief Valve</b></p>
22	Dual Agent Handline Control Handles	The Dual Agent Handline Control Handles operate the hose reel handline nozzles. To operate the nozzles, select agent or both agents as required and open valves using the handles.
		



- |   |  |
|---|--|
| 1. Remote Turret Regulator Gauge        | 8. Manual Override Control Levers          |
| 2. Twin Agent Activating Button         | 9. Remote Turret Pressure Activator Switch |
| 3. Dry Chemical Manual Override         | 10. AFFF/DC Selector Switch                |
| 4. Twin Agent Control Handle            | 11. Cylinder Pressure Gauge                |
| 5. Control Handle Retaining Pin         | 12. AFFF Turret Nozzle Shaper Control      |
| 6. Regulator Pressure Gauge             | 13. AFFF Manual Override                   |
| 7. Twin Agent Solenoid Activator Switch |  |

FIGURE 2-2. REMOTE TURRET CONTROLS AND INDICATORS

Table 2-2. Remote Turret Controls  
Twin Agent 4x4 Firefighting Truck  
(Refer to Figure 2-2)

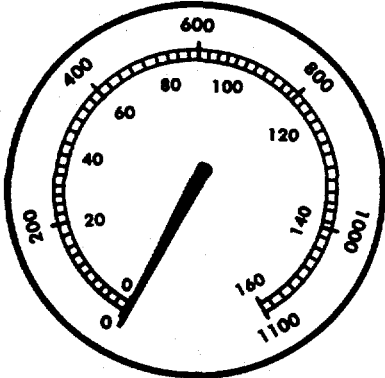



Key	Control or Indicator	Function
1	Remote Turret Regulator	<p>The Remote Regulator Gauge indicates the 230 psig (1585.85 kPa) working pressure for the turret air cylinder valves.</p> 
2	Twin Agent Activating Button	<p>The Twin Agent Activating Button operates the desired discharge turret nozzle.</p> <p>To activate system, press the button in. The discharge of the selected agent will continue as long as the button is held in. Releasing the button will stop the flow of the discharge agent.</p> <p>To close the operating valve, attach handle (8) and manually close the valve.</p> 
3	Dry Chemical Manual Override	<p>The Dry Chemical Manual Override is used when the dry chemical mode of the turret is used and the nitrogen cylinder pressure is depleted.</p> 
4	Twin Agent Control Handle	<p>The Twin Agent Control Handle controls the elevation and rotation of the remote turret nozzle assembly.</p> 

Table 2-2. Remote Turret Controls (Continued).  
Twin Agent 4x4 Firefighting Truck  
(Refer to Figure 2-2)

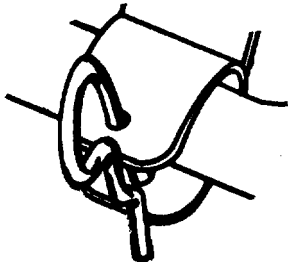
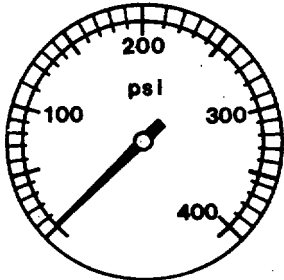

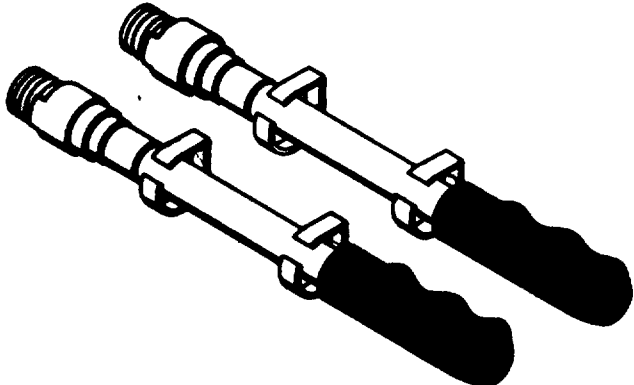


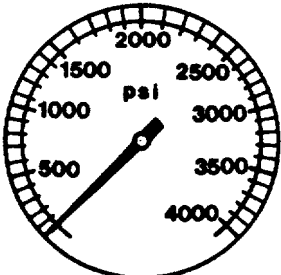
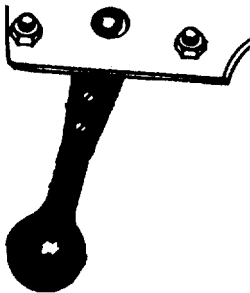

Key	Control or Indicator	Function
5	Control Handle Retaining Pin	<p>The Control Handle Retaining Pin secures the control handle in the travel position allowing normal vehicle road operations.</p> 
6	Regulator Pressure Gauge	<p>The Regulator Pressure Gauge indicates the regulated nitrogen gas pressure. The gauge reads zero until the unit is energized.</p> 
7	Twin Agent Solenoid Activator Switch	<p>The Twin Agent Solenoid Activator Switch activates the solenoids and relays required to operate the twin agent turret nozzles.</p> 
8	Manual Override Control Levers	<p>The Manual Override Control Levers are used to manually close the Dry Chemical and AFFF Remote Turret operating valves when nitrogen cylinder pressure is spent.</p> 

Table 2-2. Remote Turret Controls (Continued).  
Twin Agent 4x4 Firefighting Truck  
(Refer to Figure 2-2)

Key	Control or Indicator	Function
9	Remote Turret Pressure Activator Switch	The Remote Turret Pressure Activator Switch activates the master cylinder valve which pressurizes the system for firefighting operations. 
10	AFFF/DC Selector Switch	The AFFF/DC Selector Switch selects which firefighting agent will be used in the applicable firefighting operation. 
11	Cylinder Pressure Gauge	The Cylinder Pressure Gauge indicates the pressure in the nitrogen cylinders. 
12	AFFF Turret Nozzle Shaper Control	The AFFF Turret Nozzle Shaper Control operates the deflectors on the AFFF nozzle. Placing the control fully forward emits a dispersed pattern, while placing the control all the way back emits a straight stream. 
13	AFFF Manual Override	The AFFF Manual Override is used when the AFFF mode of the turret is used and the nitrogen cylinder pressure is depleted.  To close the operating valve, attach handle (8) and manually close the valve. 

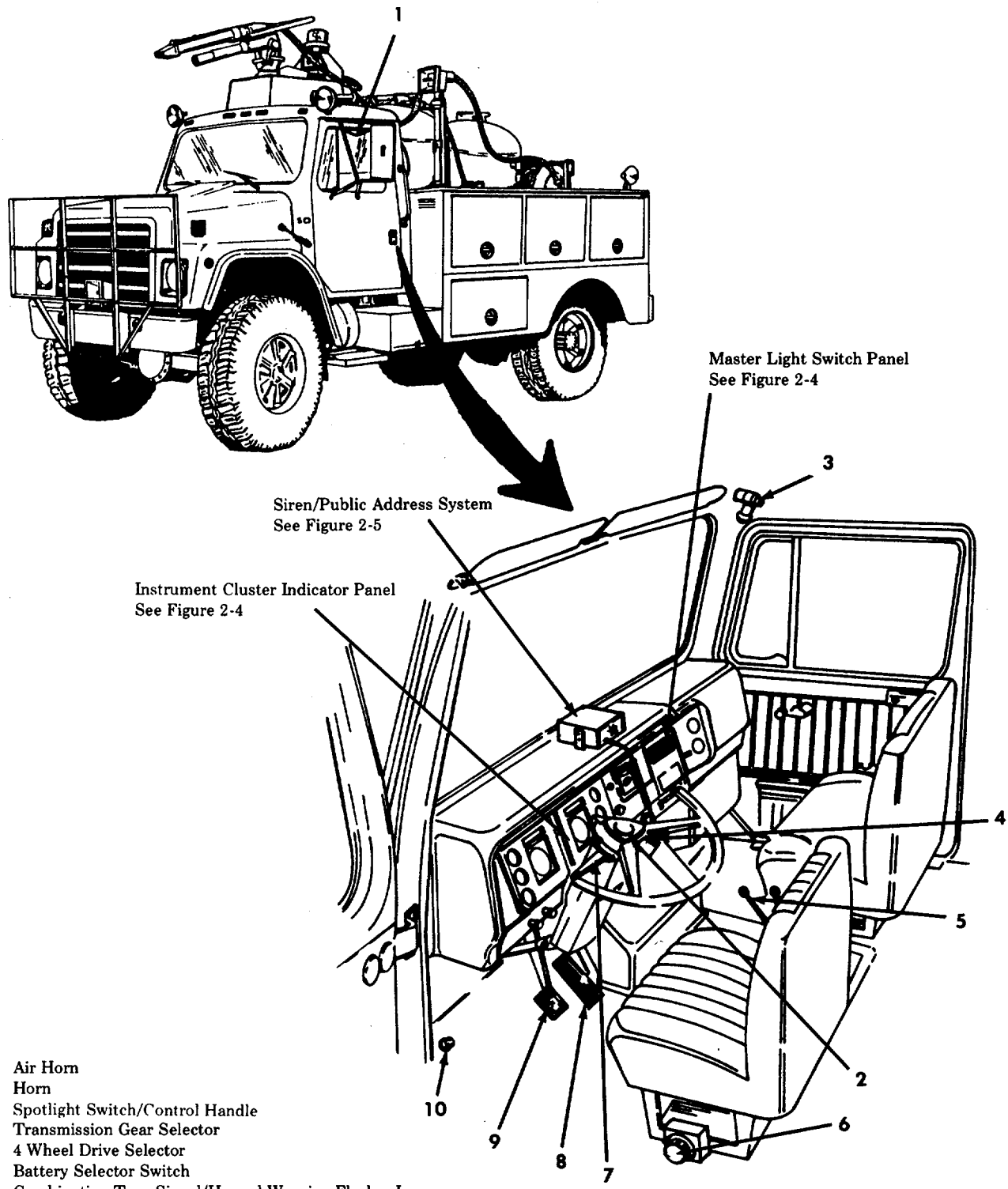


FIGURE 2-3. CAB CONTROLS AND INSTRUMENTS  
2-13

Table 2-3. Cab Controls and Instruments  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-3)

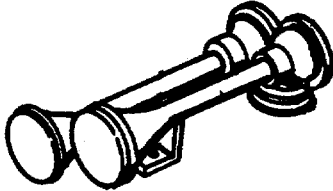
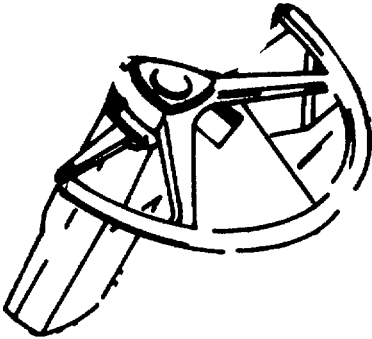

Key	Control or Indicator	Function
1	Air Horn	The Air Horn is used as the primary warning system. To actuate the air horn, pull down firmly on the cord.
		
2	Horn	The Horn is used as an auxiliary warning system. To actuate the horn, press firmly on the pad in the center of the steering wheel.
		
3	Spotlight Switch (Located in Handle)	The Spotlight Switch activates the spotlight assembly to assist in firefighting operations.
		



Table 2-3. Cab Controls and Instruments (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-3)

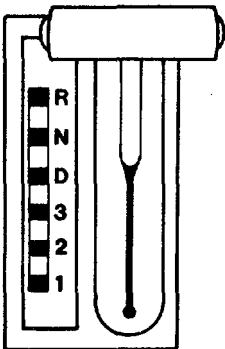
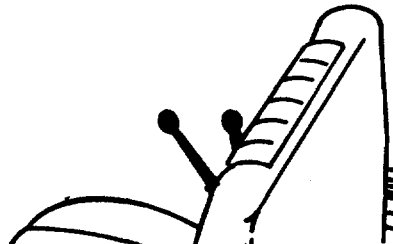
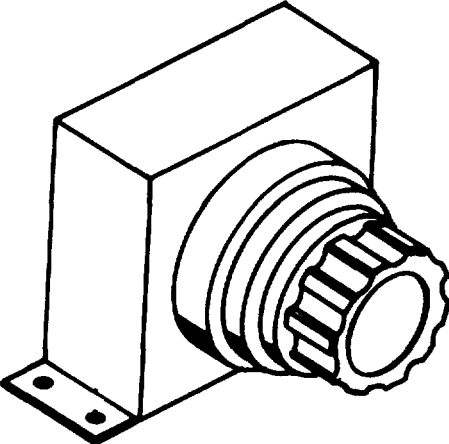
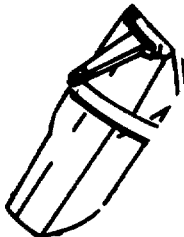



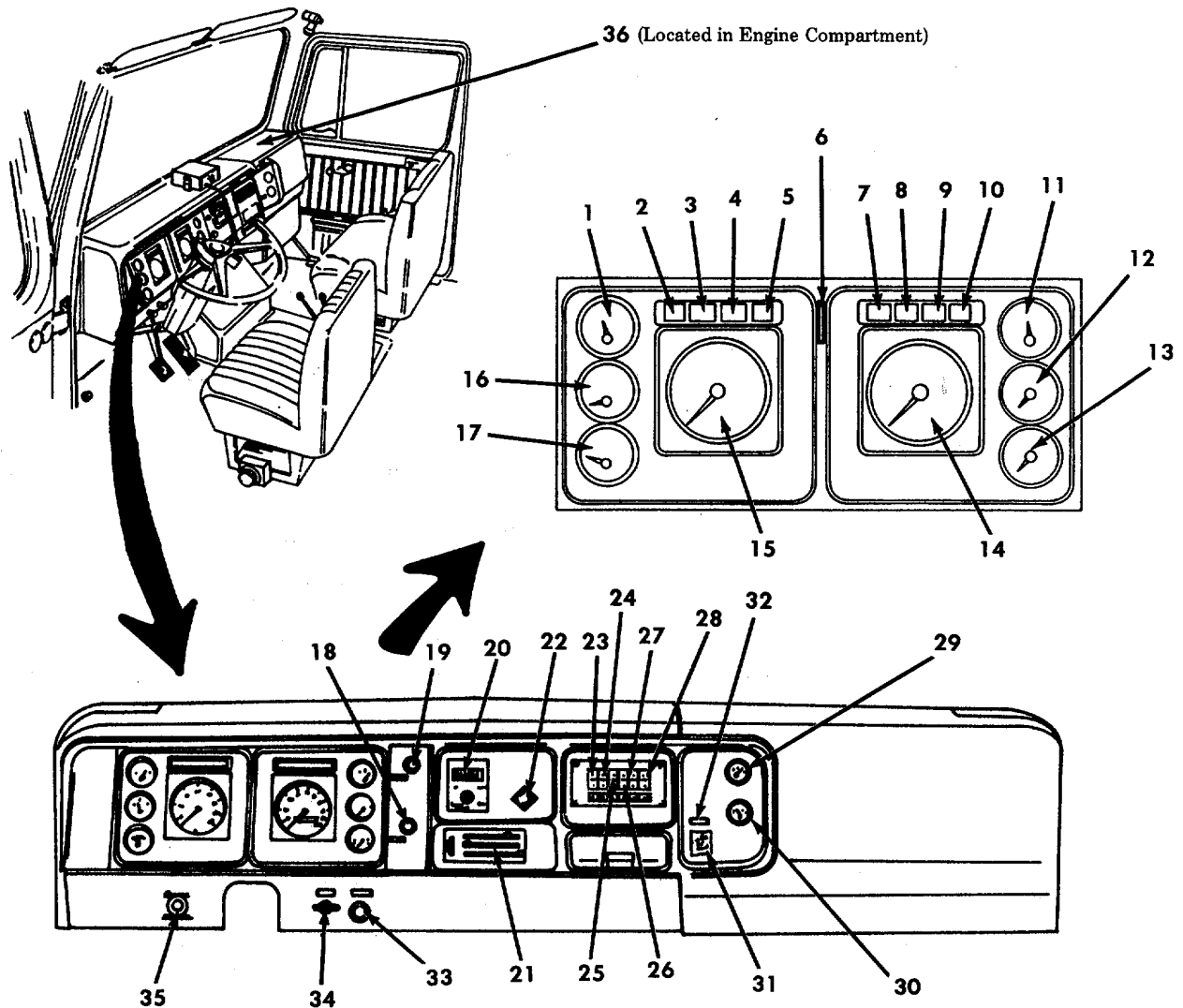
Key	Control or Indicator	Function
4	Transmission Gear Selector	<p>The Transmission Gear Selector is used to shift the transmission gears to the desired positions. The transmission gear selector is located on the curbside of the steering column at the center of the cab instrument panel.</p> 
5	4 Wheel Drive Selector	<p>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 cab instrument panel. Refer to Figure 2-4.</p> 
6	Battery Selector Switch	<p>The Battery Selector Switch has four positions: OFF, BATTERY 1, BATTERY 2 and BOTH. The battery selector switch selects the operational mode of the battery when the engine is running.</p> 

Table 2-3. Cab Controls and Instruments (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-3)

Key	Control or Indicator	Function
7	Combination Turn Signal/ Hazard Warning Flasher Lever	The Combination Turn Signal/Hazard Warning Flasher Lever is mounted on the left side of steering column below the steering wheel. 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 turn signals are working. To activate the hazard warning system, pull the lever out. To turn off the flasher, push the lever in.
		
8	Accelerator Pedal	The Accelerator Pedal increases engine rpm by depressing pedal with the right foot
		
9	Brake Pedal	The Brake Pedal slows the vehicle by the air brakes. To operate, depress brake pedal with right foot.
		
10	High Beam Dimmer Switch	The High Beam Dimmer Switch activates the high beam mode of the headlights. To turn high beam lamps ON or OFF, depress the switch with the left foot.
		



- |   |  |
|---|--|
| 1. Water Temperature Gauge                  | 19. Headlight Control Knob                       |
| 2. Left Hand Turn Signal Indicator          | 20. Inverter Remote Control Voltmeter and Switch |
| 3. Oil Pressure/Water Temperature Indicator | 21. Heater/Defroster Controls                    |
| 4. Service EGR (Not Used)                   | 22. Parking Brake Control Knob                   |
| 5. Power Divider Lock Indicator (Not Used)  | 23. Roof Beacon Switch                           |
| 6. High Beam Indicator                      | 24. Compartment Lights Switch                    |
| 7. Parking Brake Indicator                  | 25. Blank (Not Used)                             |
| 8. Glow Plug Indicator (Not Used)           | 26. Streetside Quartz Flood Light Switch         |
| 9. Brake Pressure Indicator                 | 27. Front Quartz Flood Light Switch              |
| 10. Right Hand Turn Signal Indicator        | 28. Curbside Quartz Flood Light Switch           |
| 11. Fuel Gauge                              | 29. Ammeter                                      |
| 12. Air Pressure Gauge                      | 30. Transmission Temperature Gauge               |
| 13. Air Pressure Gauge                      | 31. Transfer Case Operating Label                |
| 14. Speedometer                             | 32. Front Axle Engaged Light                     |
| 15. Tachometer                              | 33. Vent Control Knob                            |
| 16. Oil Pressure Gauge                      | 34. Engine Stop Control Handle                   |
| 17. Voltmeter                               | 35. Ignition Switch                              |
| 18. Wiper/Washer Control Knob               | 36. Air Restriction Gauge                        |

FIGURE 2-4. INSTRUMENT PANEL AND CONTROLS

Table 2-4. Instrument Panel and Controls  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)

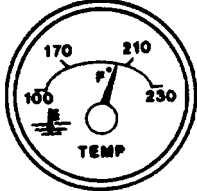






Key	Control or Indicator	Function
1	Water Temperature Gauge	<p>The Water Temperature Gauge indicates engine coolant temperatures.</p> 
2	Left Turn Signal Indicator	<p>The Left Turn Signal Indicator activates when the combination turn signal/hazard warning flasher lever is moved down to the stop position indicating a left hand turn.</p> 
3	Oil Pressure/Water Temperature Indicator	<p>The Oil Pressure/Water Temperature Indicator illuminates when the coolant is above the normal operating range.</p> 
4	Service EGR Indicator	<p>The Service EGR Indicator is not used on this vehicle.</p> 
5	Power Divider Lock Indicator	<p>The Power Divider Lock Indicator is not used on this vehicle.</p> 
6	High Beam Indicator	<p>The High Beam Indicator will be activated whenever the high beams are in use.</p> 
7	Parking Brake Indicator	<p>The Parking Brake Indicator will activate when the parking brake control knob (22) is pulled out.</p> 

Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)



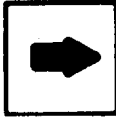
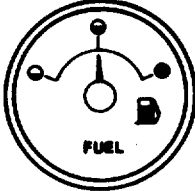
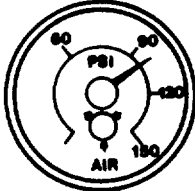
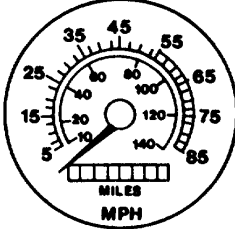
Key	Control or Indicator	Function
8	Glow Plug Indicator	The Glow Plug Indicator is not used on this vehicle  
9	Brake Pressure Indicator	The Brake Pressure Indicator activates when there is a faulty condition or low air pressure in the brake system  
10	Right Turn Signal Indicator	The Right turn Signal Indicator activates when the combination turn signal/hazard warning flasher lever is moved up to the stop position indicating a right hand turn  
11	Fuel Gauge	The Fuel Gauge registers the approximate fuel level in the fuel tank when the ignition is in the run position  
12 & 13	Air Pressure Gauge	The Air Pressure Gauge indicates air pressure in the brake system.  
14	Speedometer	The Speedometer indicates vehicle speed in miles or kilometers per hour  

Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)

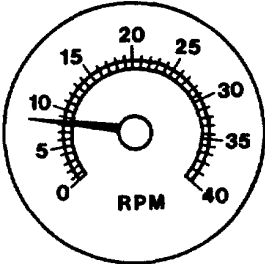
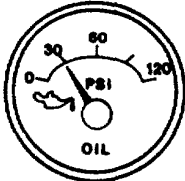
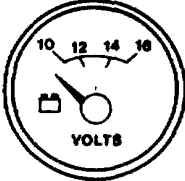

Key	Control or Indicator	Function
15	Tachometer	<p>The Tachometer is used to measure engine revolutions per minute in the hundredths (0 to 40 rpm).</p> 
16	Oil Pressure Gauge	<p>The Oil Pressure Gauge indicates the pressure at which oil is being delivered to the various parts of the engine requiring lubrication.</p> 
17	Voltmeter	<p>The Voltmeter indicates the charging system voltage.</p> 
18	Wiper/Washer Control Knob	<p>The Wiper/Washer Control Knob activates the windshield wipers to remove debris and rain from the windshield.</p> <p>To activate the wipers, pull the knob outward or turn the knob clockwise.</p> <p>To activate the washers, press the knob to spray solutions on the windshield. Turn the wipers to clean the windshield.</p> 

Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)


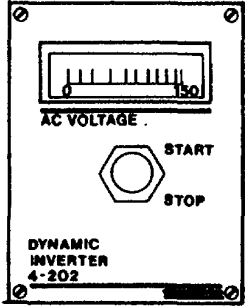
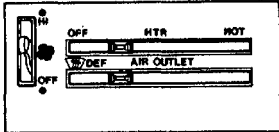
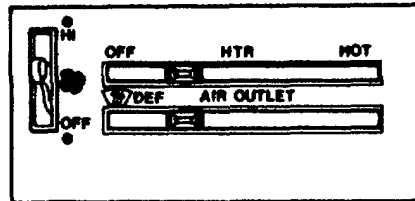
Key	Control or Indicator	Function
19	Headlight Control Knob	<p>The Headlight Control Knob is a three position light switch which controls the headlights, tail lights, parking lights, side marker lights, instrument dash lights and dome light. Instrument light intensity can be varied by turning the knob clockwise or counterclockwise. Full counterclockwise position activates the interior light</p> 
20	Inverter Remote Control Voltmeter and Switch	<p>The Inverter Remote Control Voltmeter and Switch operates the inverter from the cab.</p> <p>Push switch in and release to activate the inverter.</p> <p>Push switch in and release to discontinue operation.</p> <p>The AC Voltmeter registers the amount of AC Voltage. The voltage should stay between 110 and 120 volts.</p> 
21	Heater/Defroster Controls	<p>The Heater/Defroster Controls regulate the heater and defroster systems when used in cooler climates.</p> <p>FAN LEVER. This lever (OFF-HI) controls the fan speed in all air selector lever positions.</p> 

Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)

Key	Control or Indicator	Function
21	Heater/Defroster Controls (Continued).	<p>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 (OFF) provides minimum heated air.</p> <p>AIR SELECTOR LEVER. This lever activates the heater or defroster system.</p> <p>DEF (Defrost). In this position, most of the air is delivered to the windshield with a small amount to the floor outlets.</p> <p>AIR OUTLET. This position provides the desired air flow distribution between heat and defrost.</p>



22. Parking Brake Control Knob

The Parking Brake control Knob activates the air brake system to hold the vehicle in a parked position and to assist in bringing the vehicle to an emergency stop.

To apply the parking brake, pull out control knob.

To release the parking brake, push in on control knob.





Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)

Key	Control or Indicator	Function
23	Roof Beacon Switch	<p>The Roof Beacon Switch activates the roof beacon warning light during firefighting operation.</p> <p>The switch is a rocker-type ON/OFF switch with a built in light.</p> <p>To activate the roof beacon warning light, push the top portion of the switch.</p> <p>To turn off the roof beacon warning light, push the bottom portion of the switch.</p> <div style="text-align: center;"> </div>
24	Compartment Lights Switch	<p>The Compartment Lights Switch activates the 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 compartment lights, push the top portion of the switch.</p> <p>To turn off the compartment lights, push the bottom portion of the switch.</p> <div style="text-align: center;"> </div>

Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)


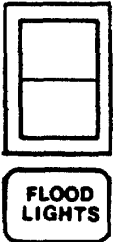
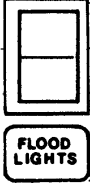
Key	Control or Indicator	Function
25	Blank Switch Space	The Blank Switch Space is not used on this vehicle but is added for future electrical operation if needed.
		
26	Streetside Quartz Flood Light Switch	<p>The Streetside Quartz Flood Light Switch activates the streetside quartz flood light during firefighting operations.</p> <p>The switch is a rocker-type ON/OFF switch with a built in light.</p> <p>To activate the streetside quartz flood light, push the top portion of the switch.</p> <p>To turn off the streetside quartz flood light, push the bottom portion of the switch.</p>
		

Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)

Key	Control or Indicator	Function
27	Front Quartz Flood Light Switch	<p>The Front Quartz Flood Light Switch activates the front quartz flood 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 front quartz flood light, push the top portion of the switch.</p> <p>To turn off the front quartz flood light, push the bottom portion of the switch.</p> 


28	Curbside Quartz Flood Light Switch	<p>The Curbside Quartz Flood Light Switch activates the curbside quartz flood 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 curbside quartz flood light, push the top portion of the switch.</p> <p>To turn off the curbside quartz flood light, push the bottom portion of the switch</p> 
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Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)

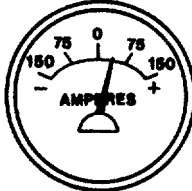
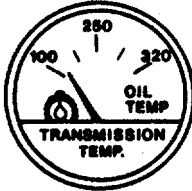
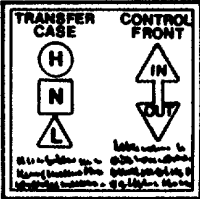

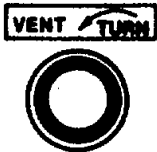


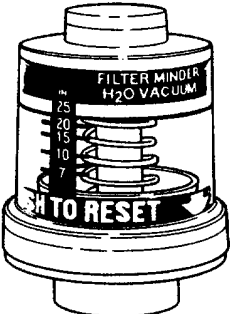
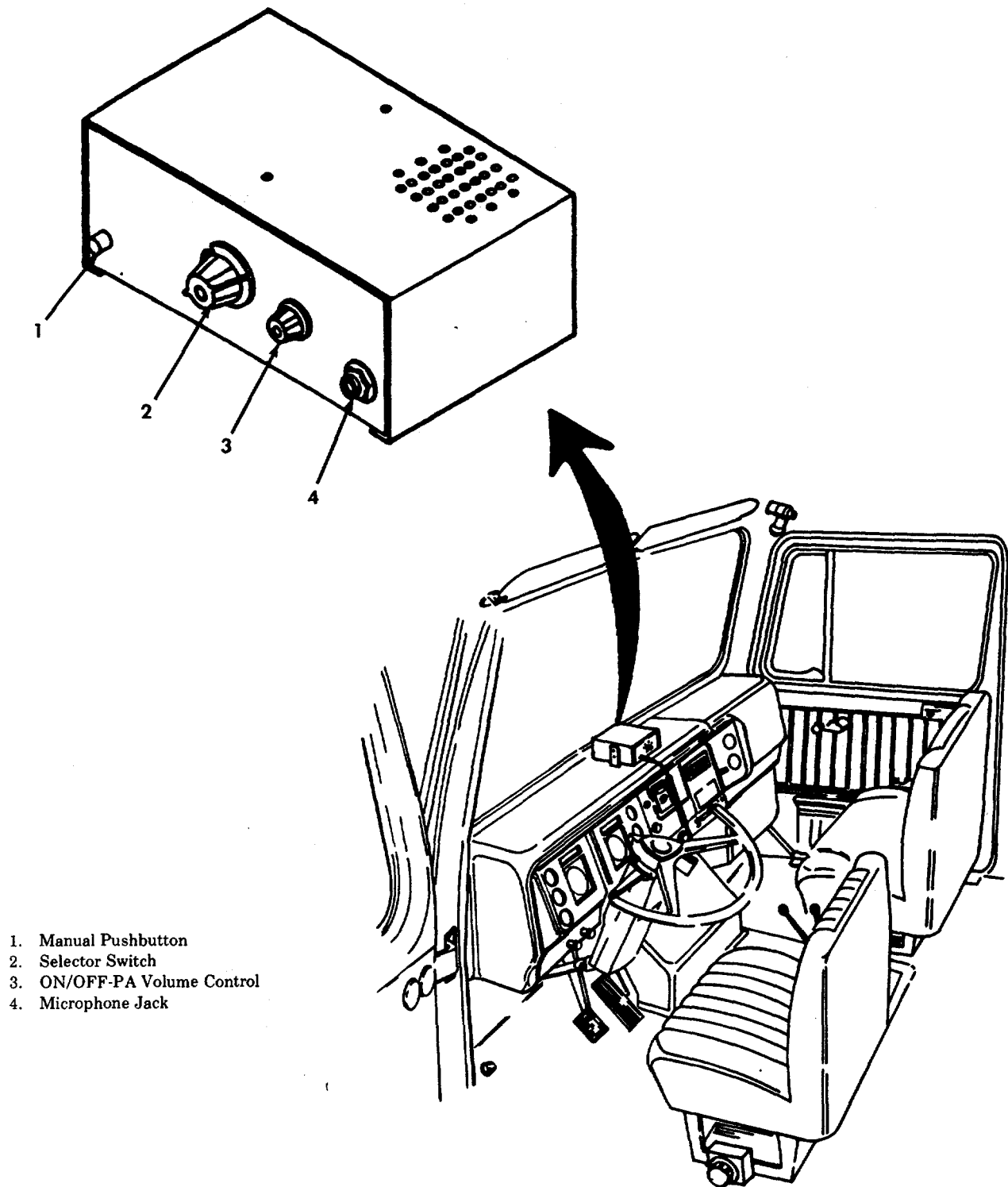
Key	Control or Indicator	Function
29	Ammeter	The Ammeter indicates the rate of charge of electric current supplied BY the alternator to the battery.
		
30	Transmission Temperature Gauge	The Transmission Temperature Gauge indicates transmission oil operating temperature.
		
31	Transfer Case Operating Label	The Transfer Case Operating Label indicates the operating positions of the transfer case shift levers.
		
32	Front Axle Engaged Light	The Front Axle Engaged Light informs the operator when the vehicle is in (4L) or(4H) position. The light will remain on until the transfer case is placed in neutral.
		
33	Vent Control Knob	The Vent Control Knob controls the ventilation system.  To activate vent system, turn knob clockwise to allow air flow through instrument panel outlets and floor dump.  To turn off vent system, turn knob counterclockwise.
		

Table 2-4. Instrument Panel and Controls (Continued)  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-4)

Key	Control or Indicator	Function
34	Engine Stop Control Handle	<p>The Engine Stop Control Handle shuts off fuel to the engine.</p> 
35	Ignition Switch	<p>The Ignition Switch is used to start the vehicle.</p> <p>Turn key clockwise to start engine, counterclockwise to stop engine.</p> 
36	Air Restriction Gauge	<p>The Air Restriction Gauge indicates how much engine air cleaner filter capacity has been used and how much filter capacity remains. The gauge measures maximum restriction of the filter element when the engine is operated at full load and locks at that point.</p> <p>The gauge is mounted on the air cleaner located in the engine compartment.</p> 



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

FIGURE 2-5. ELECTRONIC SIREN CONTROLS

Table 2-5. Electronic Siren Controls  
Twin Agent 4x4 Firefighting Truck  
(Refer to Figure 2-5)

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

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.

1 Manual Pushbutton

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.

It produces the WAIL tone when the selector switch is in STANDBY.

It produces the YELP tone when the selector switch is in WAIL.

It has no effect when the selector switch is in YELP.

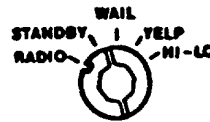
It produces the YELP tone when the selector switch is in HI-LO.



2 Selector Switch

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

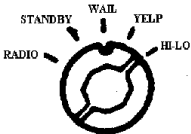
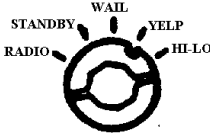
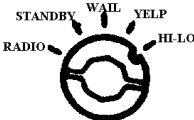


RADIO. In this position, incoming radio messages are amplified by the siren and rebroadcast over the external speaker. Siren tones (WAIL, YELP, HI-LO) do not operate in this position.



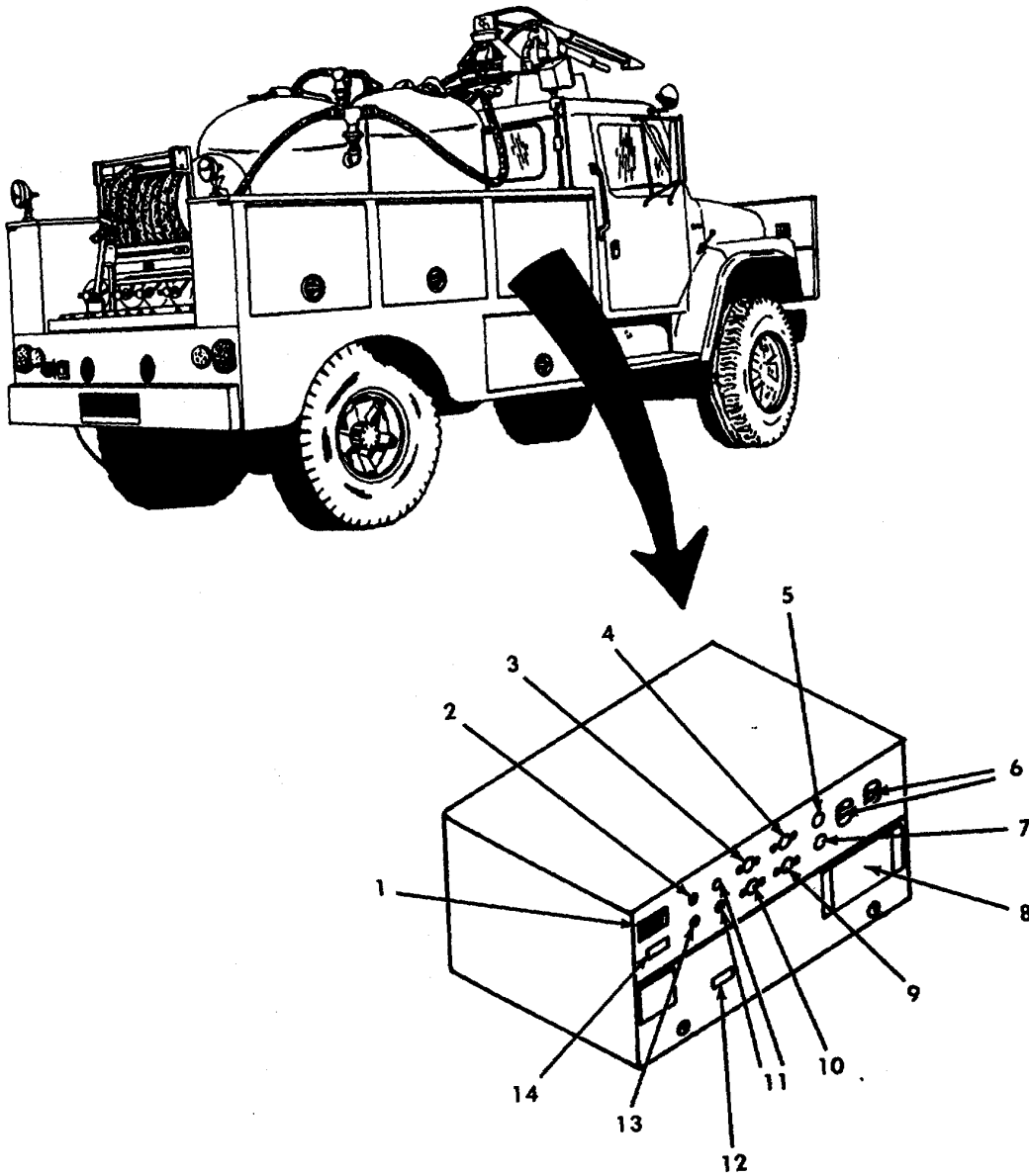
STANDBY. In this position, it is possible to operate the siren by activating the manual pushbutton. A WAIL tone will be produced using the manual pushbutton.



Table 2-5. Electronic Siren Controls  
Twin Agent 4x4 Firefighting Truck  
(Refer to Figure 2-5)

Key	Control or Indicator	Function
2	Selector Switch (Continued).	<p>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.</p>  <p>YELP. In this position, a continuous rapid warbled tone is generated. Depressing the manual pushbutton will have no effect.</p>  <p>HI-LO. In this position, a two-tone sound will be heard. Depressing the manual push button will produce the YELP tone.</p> 
3	ON/OFF PA Volume Control	<p>The ON/OFF PA Volume Control is used to turn the siren ON and OFF. It is 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.</p> 
4	Microphone Jack	<p>The Microphone Jack is designed for common microphone use.</p> 





- 1. AC Voltmeter
- 2. Start Switch
- 3. Commutation Fuse
- 4. Commutation Fuse
- 5. Output Fuse
- 6. Output Receptacles
- 7. Output Fuse

- 8. Voltage Regulator
- 9. Commutation Fuse
- 10. Commutation Fuse
- 11. Control Fuse
- 12. Test Module
- 13. Stop Switch
- 14. Remote Control Head

FIGURE 2-6. INVERTER CONTROLS

Table 2-6. Inverter Controls  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-6)

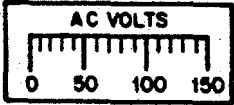
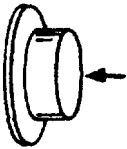


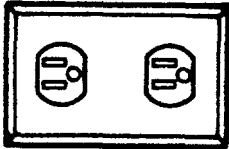

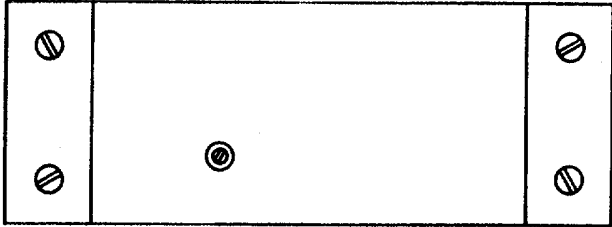


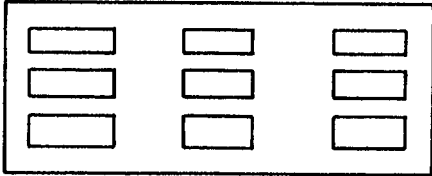
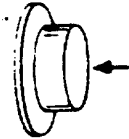

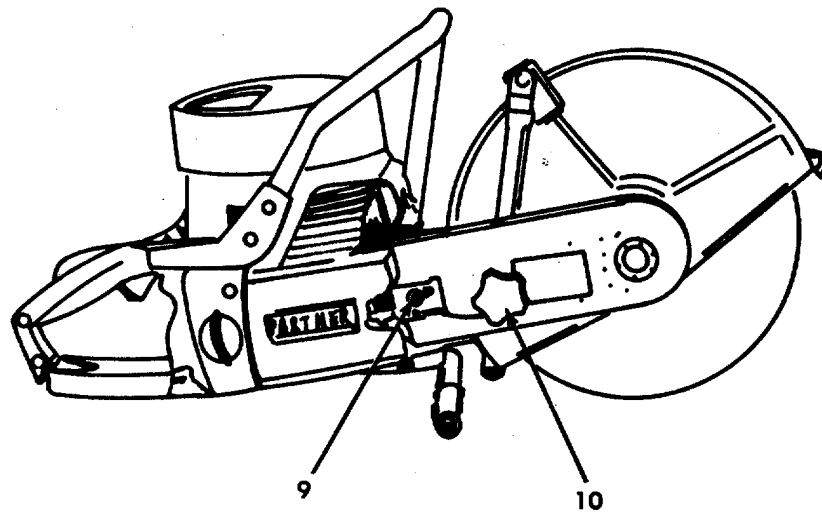
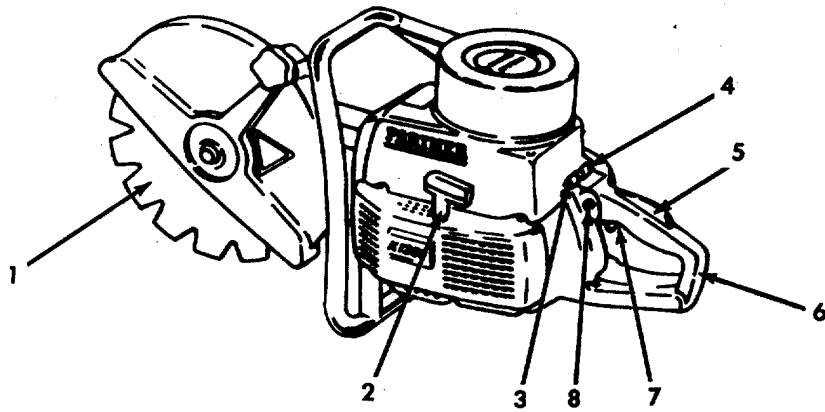
Key	Control or Indicator	Function
1	AC Voltmeter	<p>The AC Voltmeter registers the amount of AC voltage.</p> <p>The Voltage should stay between 110 and 120 volts.</p> 
2	Start Switch	<p>The Start Switch is used to engage the inverter when the truck is running. To operate, push the start switch in.</p> 
3-4	Commutation Fuse	<p>The Communication Fuse is used as a safety feature for the alternator circuit</p> 
5	Output Fuse	<p>The Output Fuse is a safety fuse for the 115 VAC output receptacle.</p> 
6	Output Receptacles	<p>The Output Receptacles serve as receptacles for 120 VAC when the inverter is engaged</p> 
7	Output Fuse	<p>The Output Fuse is a safety fuse for the 115 VAC output receptacle.</p> 

Table 2-6. Inverter Controls (Continued).  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-6)

Key	Control or Indicator	Function
8	Voltage Regulator	The Voltage Regulator regulates AC output voltage. Voltage is regulated BY an adjustment screw located behind the protective cover 
9-10	Commutation Fuse	The Communication Fuse is used as a safety feature for the alternator circuit. 
11	Control Fuse	The Communication Fuse is used as a safety feature for the auto throttle circuit. 
12	Test Module	The Test Module serves as a optional inverter test unit. 
13	Stop Switch	The Stop Switch is used to disengage the inverter when the truck is running. To discontinue the operation , push the stop switch in. 
14	Remote Control Head	The remote Control Head is a receptacle that allows for the installation of a remote control device. 



- 1. Cutter Wheel
- 2. Starter Grip Control
- 3. Stop Control
- 4. Choke Control
- 5. Safety Throttle Lock

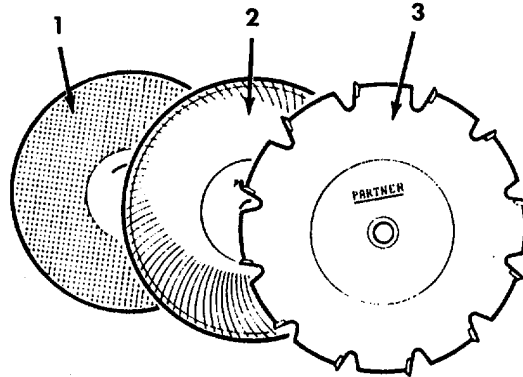
- 6. Handle
- 7. Throttle Control
- 8. Starting Throttle Control
- 9. Belt Tension Adjustment Screw
- 10. Guard Control Knob

FIGURE 2-7. POWER SAW CONTROLS

Table 2-7. Power Saw Controls  
 Twin Agent 44x4 Firefighting Truck  
 (Refer to Figure 2-7)

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

1	Cutter Wheel	<p>The Cutter Wheel is used for high speed cutting operations. Three types of cutter wheels are furnished with the power saw:</p> <ol style="list-style-type: none"> <li>1. Abrasive Blade</li> <li>2. Diamond Blade</li> <li>3. Carbide-Tipped Blade</li> </ol>
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2	Starter Grip Control	The Starter Grip Control is used to pull start the power saw engine.
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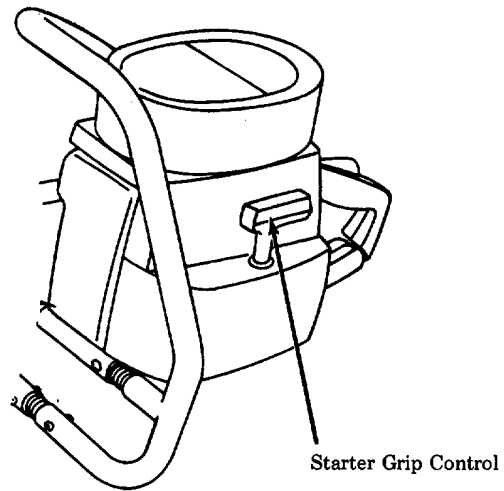
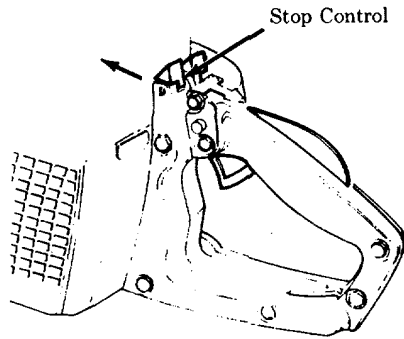


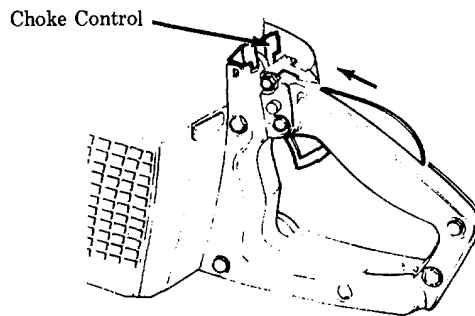
Table 2-7. Power Saw Controls (Continued).  
 Twin Agent 44x4 Firefighting Truck  
 (Refer to Figure 2-7)

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

3	Stop Control	The Stop Control is used to cease engine operation. Press button backwards to stop the engine. The button will remain in this position and must be returned to its original position before the engine is started again.
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4	Choke Control	The Choke Control is used to start a cold engine.  To start the cold engine with the choke control press the button backwards.
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5	Safety Throttle Lock	The Safety Throttle Lock prevents the throttle from opening accidentally and when the engine is at idling speed.  When working with the saw the throttle lock is released BY the hand holding the rear handle.
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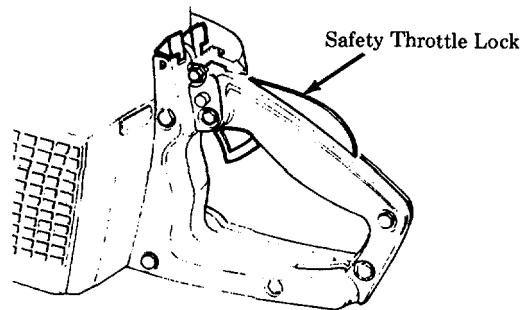
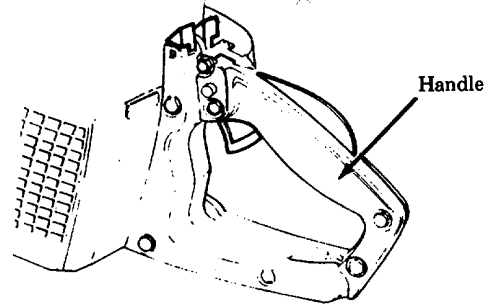


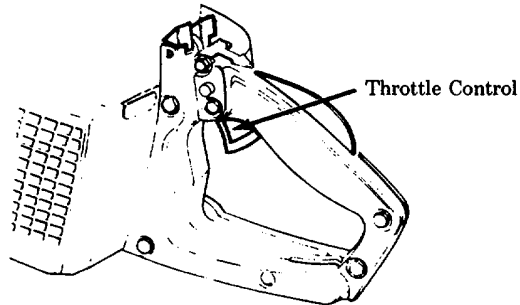
Table 2-7. Power Saw Controls (Continued).  
 Twin Agent 44x4 Firefighting Truck  
 (Refer to Figure 2-7)

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

6	Handle	The Handle acts as a support for the right hand. It incorporates the throttle trigger and safety throttle lock.
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7	Throttle Control	The Throttle Control is used to regulate engine and cutter wheel speed. Depress throttle control to accelerate engine rpm. Release throttle control to decrease engine rpm.
---	------------------	---



8	Starting Throttle Control	The Starting Throttle Control is used when Starting a cold engine. To activate the starting throttle control, press the throttle control and engage the starting throttle control. The control is released when the throttle control is pressed down to accelerate the engine rpm.
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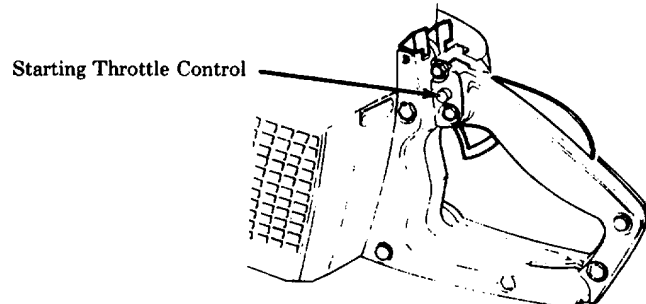
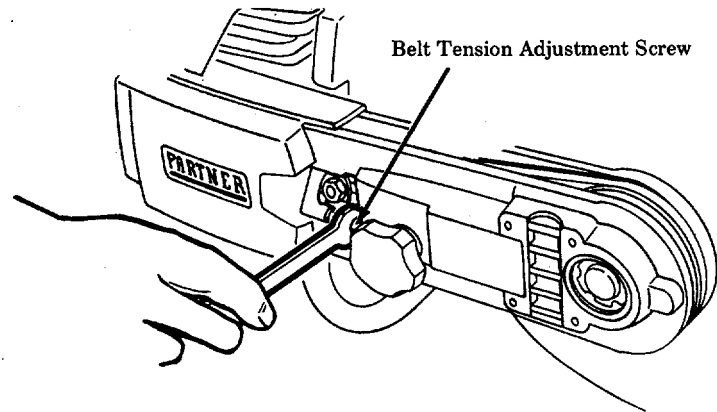


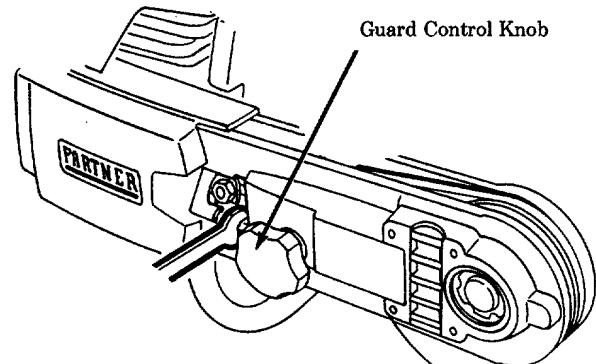
Table 2-7. Power Saw Controls (Continued).  
 Twin Agent 44x4 Firefighting Truck  
 (Refer to Figure 2-7)

Key	Control or Indicator	Function
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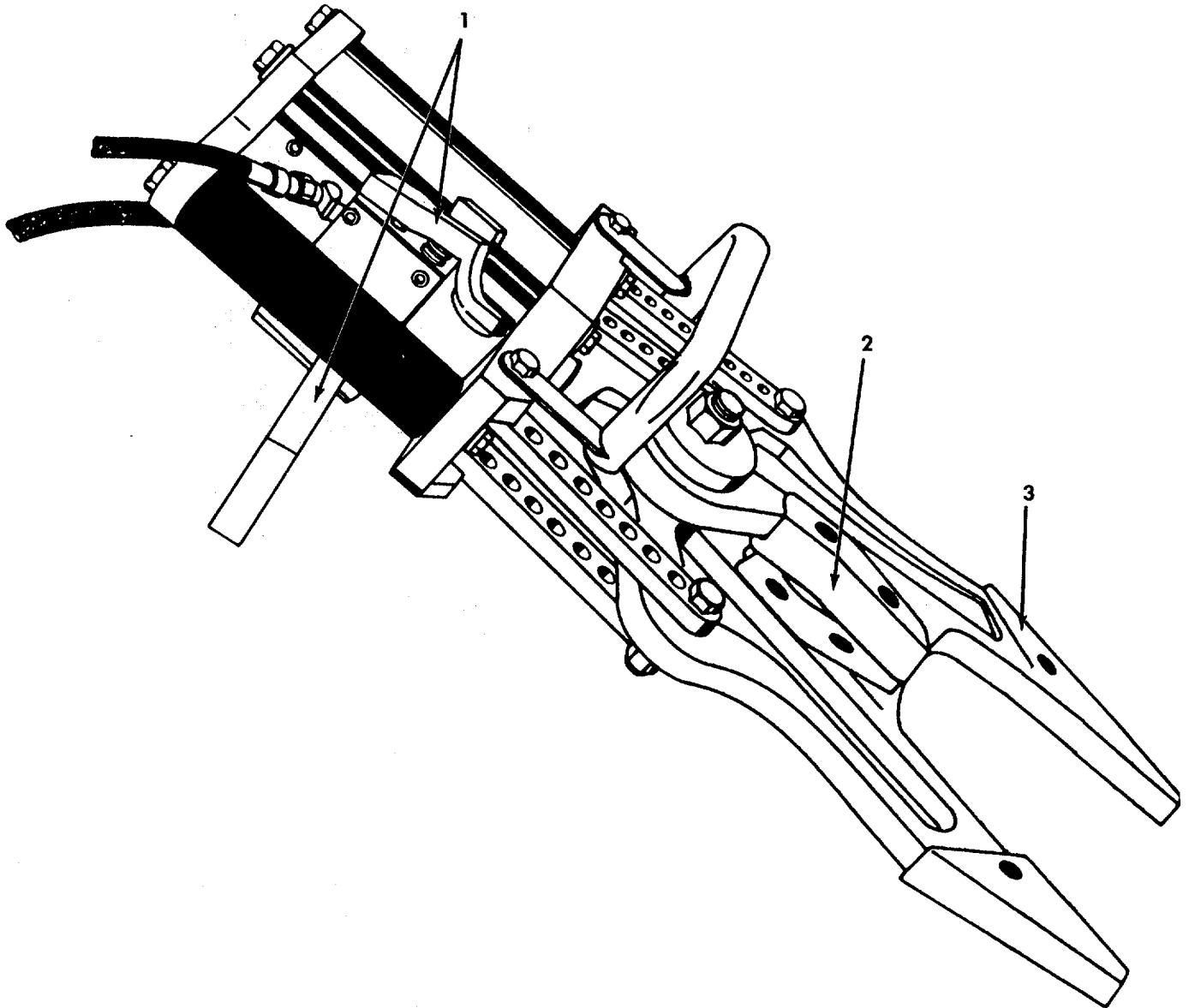
9	Belt Tension Adjustment Screw	The belt Tension Adjustment Screw is used to adjust the drive belt to the proper tension.
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10	Guard Control Knob	The Guard Control Knob is used to adjust and lock the belt guard in position.
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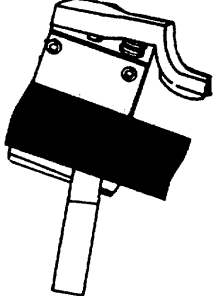
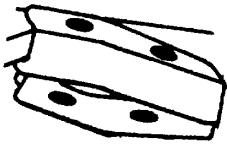
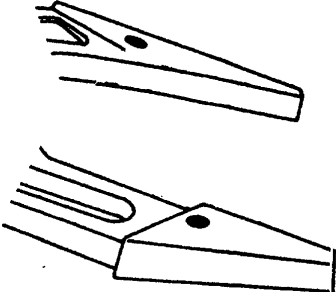


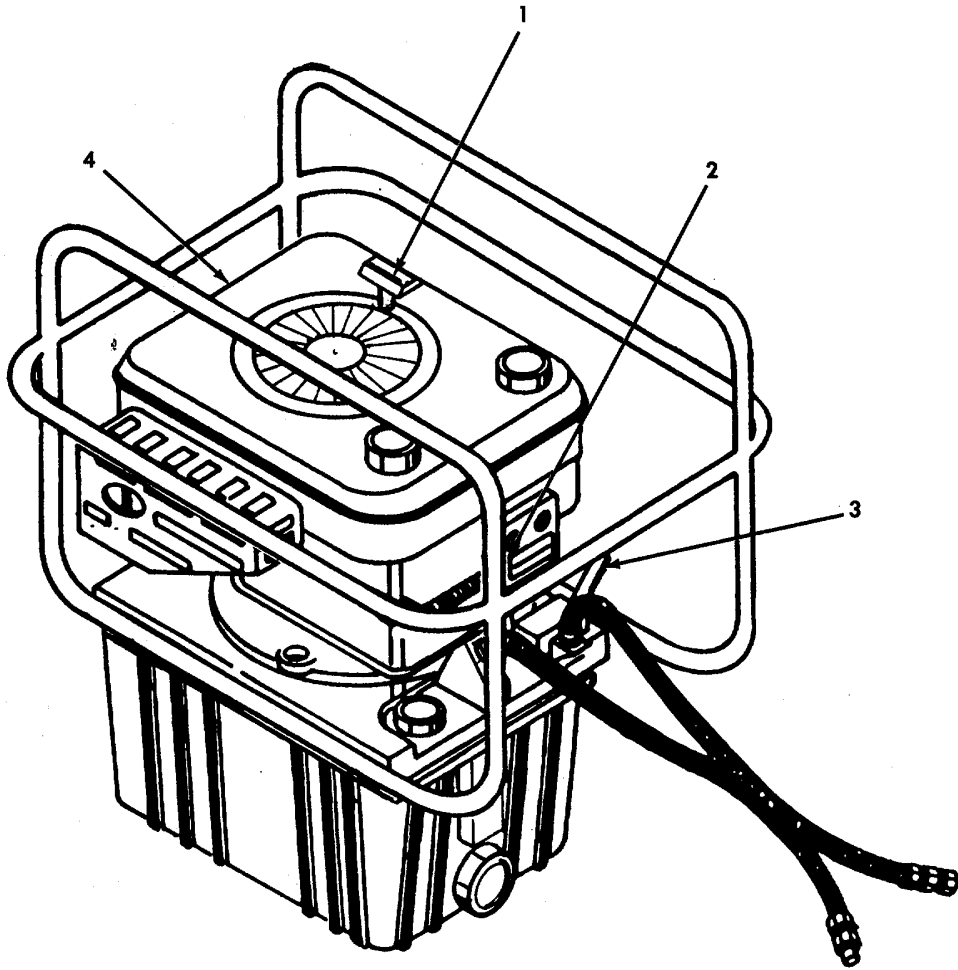


- 1. Operating Levers
- 2. Cutter Blades
- 3. Jaws

FIGURE 2-8. HYDRAULIC RESCUE TOOL CONTROLS

Table 2-8. Hydraulic Rescue Tool Controls  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-8)

Key	Control or Indicator	Function
1	Operating Levers	<p>The Operating Levers control the jaws and cutter blades of the hydraulic rescue tool.</p> <p>With the valve located on the right side of the tool housing, push operating lever to close rescue tool arms.</p> <p>Pull operating lever to open rescue tool arms.</p> 
2	Cutter Blades	<p>The Cutter Blades located on the tool arms are used for cutting door pillars, windows, roof rails and roofs.</p> 
3	Jaws	<p>The Jaws located on the tool arms are used for spreading and pulling debris to free victims trapped in an accident situation.</p> 



1. Starter Pull Handle
2. Throttle Control
3. Dump Valve Lever
4. Fuel Shut-Off Control

FIGURE 2-9. HYDRAULIC RESCUE TOOL POWER UNIT CONTROLS.

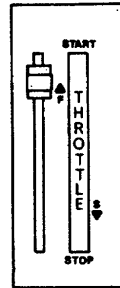
Table 2-9. Hydraulic Rescue Tool Power Unit Controls  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-9)

Key	Control or Indicator	Function
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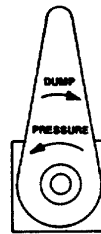
- |    |                     |  |
|----|---------------------|--|
| 1. | Starter Pull Handle | The Starter Pull Handle is used to start the rescue tool power unit. |
|----|---------------------|--|



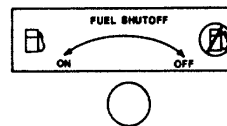
- |    |                  |  |
|----|------------------|--|
| 2. | Throttle Control | The Throttle Control is a three position control used to regulate engine speed and for starting and stopping the rescue tool power unit. |
|----|------------------|--|

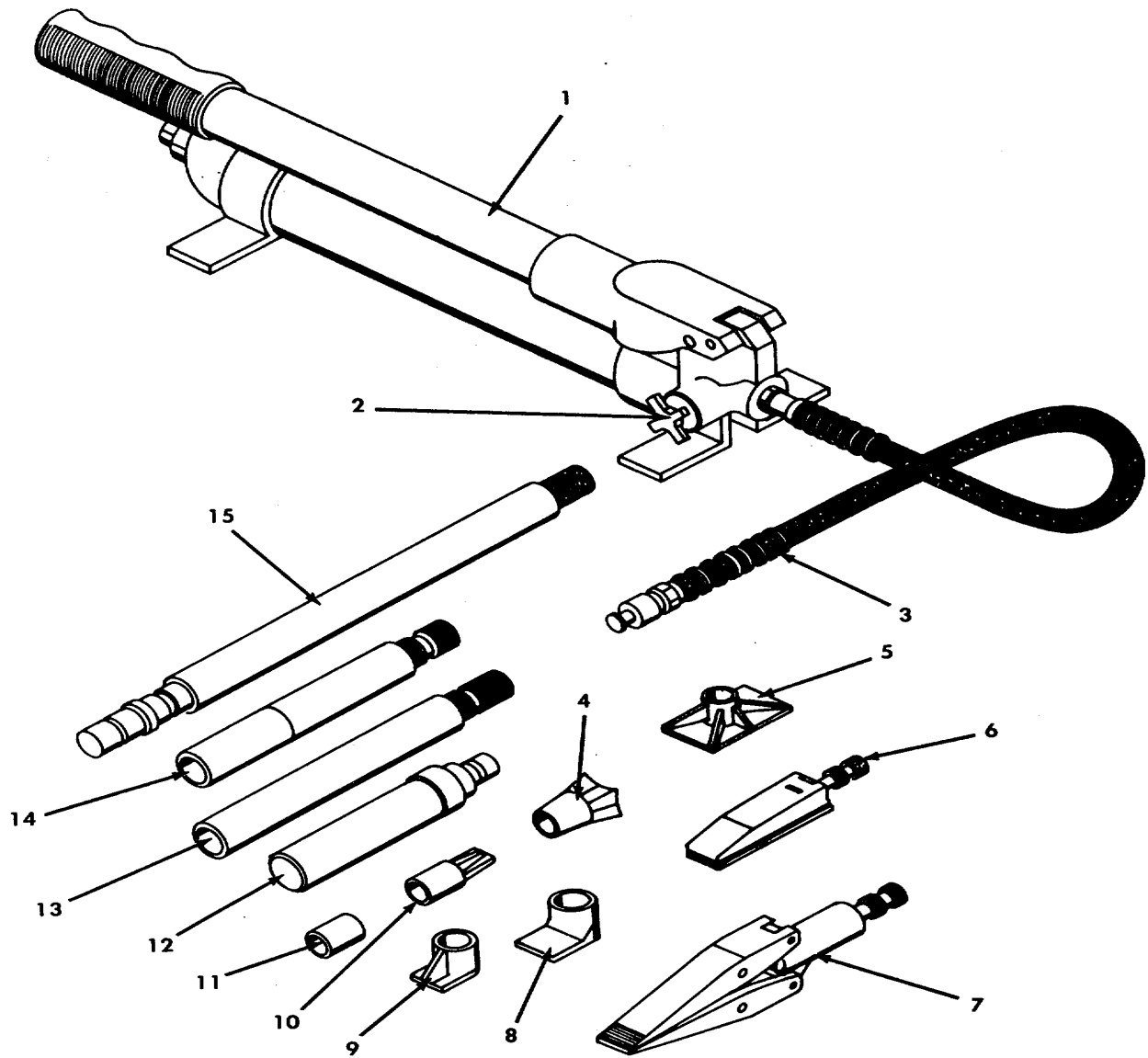


- |    |                    |   |
|----|--------------------|---|
| 3. | Dump Control Lever | The Dump Control Lever is a two position control used to relieve pressure through the entire rescue tool system.<br>The Handle of the dump control lever points in the direction of the flow. The handle in the forward position indicates flow through the hose. The handle in the rear position indicates the flow back into the reservoir. |
|----|--------------------|---|



- |    |                       |  |
|----|-----------------------|--|
| 4. | Fuel Shut-Off Control | The Fuel Shut-Off Control is a two position control used to control fuel flow to the engine. |
|----|-----------------------|--|





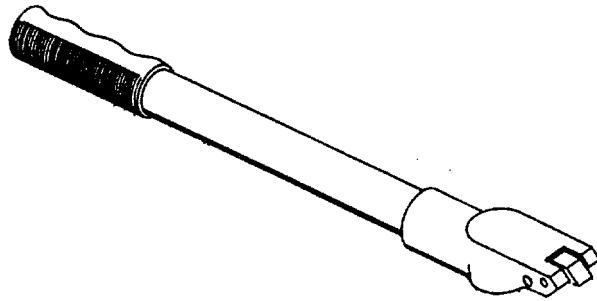
- |                               |                            |
|-------------------------------|----------------------------|
| 1. Pump Handle                | 9. Ram Toe                 |
| 2. Release Valve Control Knob | 10. Wedge Head             |
| 3. Hydraulic Hose             | 11. Seratted Saddle        |
| 4. 90° V-Base                 | 12. SS-Ram                 |
| 5. Flat Base                  | 13. 18 Inch Tube Extension |
| 6. Wedgie Ram                 | 14. 10 Inch Tube Extension |
| 7. Spread Ram                 | 15. 28 Inch Tube Extension |
| 8. Plunger Toe                |                            |

FIGURE 2-10. 10 TON HYDRAULIC RESCUE KIT CONTROLS

Table 2-10. 10 Ton Hydraulic Rescue Kit Controls  
Twin Agent 4x4 Firefighting Truck  
(Refer to Figure 2-10)

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

- |    |             |   |
|----|-------------|---|
| 1. | Pump Handle | The Pump Handle controls hydraulic pressure to the various components of the hydraulic rescue kit.<br><br>Move handle up and down to increase hydraulic pressure. |
|----|-------------|---|



- |    |                            |  |
|----|----------------------------|--|
| 2. | Release Valve Control Knob | The Release Valve controls hydraulic pressure in the pump reservoir.<br><br>To increase pump pressure, turn knob clockwise until fingertight.<br><br>To release pressure in the pump reservoir and the various components, turn knob counterclockwise. |
|----|----------------------------|--|



- |    |                |   |
|----|----------------|---|
| 3. | Hydraulic Hose | The Hydraulic Hose is the main connection between the hydraulic pump and ram components.<br><br>To connect hose to ram components, place the male end of the hose into the desired ram and tighten threaded collar coupler down completely by hand. |
|----|----------------|---|

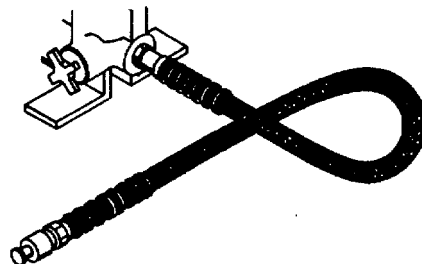
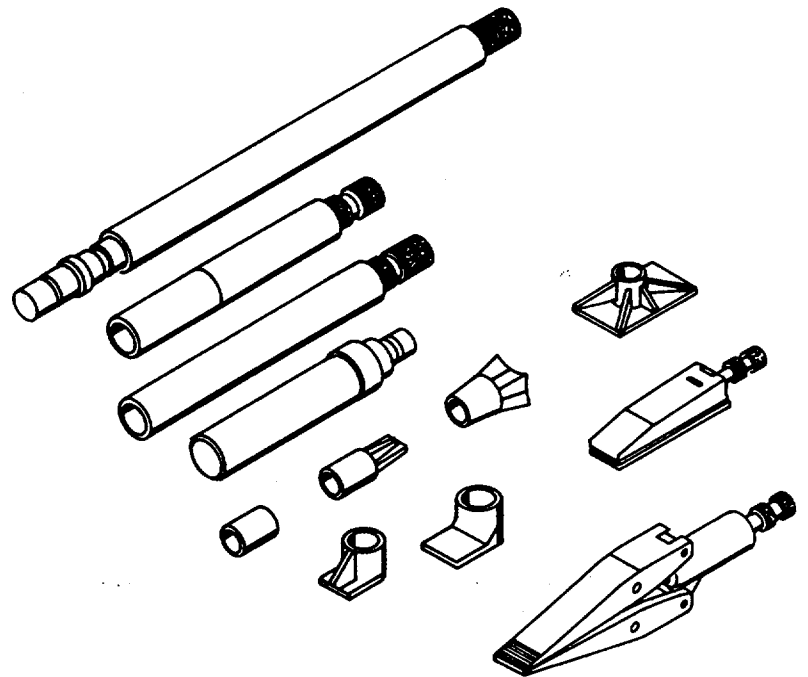


Table 2-10. 10 Ton Hydraulic Rescue Kit Controls  
 Twin Agent 4x4 Firefighting Truck  
 (Refer to Figure 2-10)

Key	Control or Indicator	Function
4-15	Hydraulic Rescue Kit Accessories	<p>The Hydraulic Rescue Kit Accessories are designed to perform countless combinations for pushing, pulling, spreading, clamping, and pressing.</p> <p>Refer to Section II for operating instructions on the basic set-up of each ram and accessories.</p>



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

General .....	Para. 2-3	Operator's PMCS Procedure.....	Para. 2-4
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**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 2-11. Intervals are nominal periods based on normal operating conditions. Intervals should be adjusted accordingly for extremes often 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 operations PMCS 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 54) 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.

**NOTE**

Equipment operation is allowable with minor leakage's (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.

**NOTE**

When operating with Class I or 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).

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Table 2-11. Operator/Crew Preventive Maintenance Checks and Services

D-Daily  
W-Weekly  
A-After  
M-Monthly

ITEM NO.	INTERVAL				ITEM TO BE INSPECTED	PROCEDURES Check for and have repaired or adjusted as necessary	EQUIPMENT IS NOT READY/ AVAILABLE IF
	D	A	W	M			
<b>ACCESSORIES</b>							
1		●	●		Aircraft Rescue Tool Kit	Visually inspect aircraft rescue tool kit for corrosion or damage. Inspect contents of the kit for missing tools. Refer to next higher level of maintenance if tools are missing or defective.	
<b>AUXILIARY FIREFIGHTING EQUIPMENT</b>							
2		●	●		Hydraulic Rescue Tool	Visually inspect hydraulic rescue tool for structural damage. Perform operational check. Refer to next higher level of maintenance if any defects are found.	Hydraulic rescue tool is damaged. Not operating.
3		●	●		Hydraulic Rescue Tool Power Unit	Visually inspect hydraulic rescue tool power unit for fluid leaks and structural damage. Perform operational check. Check engine oil level and hydraulic fluid level. Refer to next higher level of maintenance for service.	Hydraulic rescue tool power unit damaged. Not operating. Fluid levels low.
4		●	●		10 Ton Hydraulic Rescue Kit	Visually inspect 10 ton hydraulic rescue kit for fluid leaks and structural damage. Inspect contents of the kit for missing tools. Perform operational check. Check reservoir fluid level. Refer to next higher level of maintenance for service or replacement of missing or damaged tools.	
5		●	●		Rescue Saw	Visually inspect rescue saw for structural damage. Inspect cutter blade for damaged teeth. Perform operational check. Check reservoir and engine fluid levels. Refer to next higher level of maintenance for service or replacement.	Rescue saw damaged. Not operating.
6		●	●		Inverter	Visually inspect inverter for damage. Perform operational check. Refer to next higher level of maintenance for replacement if any defects are found.	
7		●	●		Nitrogen Cylinders	Visually inspect nitrogen cylinders for corrosion or structural damage. Check cylinder pressure gauge for minimum 1840 psig (12,686 kPa) working pressure. Refer to next higher level of maintenance if cylinders are damaged or below working minimum working pressure.	Cylinder pressure below minimum working pressure.

Table 2-11. Operator/Crew 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	A	W	M			
						<b>TWIN AGENT FIREFIGHTING SYSTEM</b>	
8			●		Controls and Gauges	Visually inspect all controls and gauges for damage.	Gauges or controls are damaged.
9		●	●		Piping, Valves, Fittings and Regulators	Visually inspect all piping, valves, fittings, and regulators for corrosion or structural damage. Refer to next higher level of maintenance if any defects are found.	Valves or regulators damaged.
10		●	●		P-K-P Agent Tank	Visually inspect agent tank for corrosion or structural damage. Refer to next higher level of maintenance for tank replacement.	
11		●	●		AFFF Agent Tank	Visually inspect agent tank for corrosion or structural damage. Refer to next higher level of maintenance for tank replacement.	
						<b>HOSE REEL ASSEMBLY</b>	
12			●		Hose Reel Assembly	Inspect hose reel assembly for proper operation and structural damage. Inspect all fittings for freedom of movement. Inspect hose and hose nozzles for cracks, corrosion, or other damage.	
						<b>REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY</b>	
13	●	●			Twin Agent Turret Assembly	Visually inspect remote manual twin agent turret assembly for corrosion and structural damage. Perform operational check. Refer to next higher level of maintenance if any defects are found.	Twin agent turret not operating.
						<b>FIRE BODY ASSEMBLY</b>	
14			●		Handrails and Mounting Brackets	Visually inspect handrails and mounting brackets for structural damage.	

Table 2-11. Operator/Crew 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	A	W	M			
15	●	●			Lights	Perform operational checks on clearance lights, deck lights, quartz 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.	Tail lights are defective.
16	●	●			Doors	Check operation and general condition of compartment doors.	
<b>ENGINE COOLING SYSTEM</b>							
17	●	●			Fan and Drive Belts	Visually inspect fan and drive belts for fraying, proper tension, and structural damage. Refer to next higher level of maintenance for adjustment or replacement.	Fan damaged. Drive belts worn. Not properly tightened.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <b>WARNING</b> </div> <p><b>Allow engine to cool 15 minutes before removing filler cap.</b></p>							
18	●	●			Coolant Level	Visually inspect coolant for rust or impurities. Appearance of rust indicates that the corrosion inhibitor has lost its effectiveness. Check coolant level. Refer to next higher level of maintenance for service.	Coolant level is low.
19	●	●			Radiator, De-aeration Tank, Hoses and Piping	Visually inspect radiator, deaeration tank, hoses and piping for corrosion and structural damage. Refer to next higher level of maintenance for replacement.	Radiator damaged.
20			●		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.
<b>ENGINE FUEL SYSTEM</b>							
21			●		Air Cleaner	Visually inspect air filter filament for dirt, corrosion, or damage.	
22			●		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.

Table 2-11. Operator/Crew 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	A	W	M			
23			●		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.
24			●		Fuel Line and Filters	Visually inspect fuel lines for damage or loose connections. Visually inspect filter elements and exterior of fuel filters for corrosion or structural damage.	
<b>DIESEL FUEL INJECTION SYSTEM</b>							
25			●		Injection Pump and Lines	Visually inspect injection pump and injection lines for corrosion or structural damage. Refer to next higher level of maintenance if any defects are found.	Injection pump is damaged.
<b>ENGINE ACCESSORIES</b>							
26			●		Batteries	Visually inspect battery terminals for corrosion. Clean as necessary. Visually inspect battery hold down for tightness and corrosion.	
27	●	●			Oil Pan	Visually inspect oil pan for corrosion or structural damage. Check for signs of leakage around drain plug.	
<b>ENGINE COMPARTMENT FLUID LEVELS</b>							
28			●		Windshield Washer Fluid	Check windshield washer fluid reservoir level. Replenish windshield washer fluid as necessary.	
29	●	●			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.
30	●	●			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.	
31			●		Transmission Fluid Level	Check the transmission fluid level. Refer to next higher level of maintenance for service.	Fluid level is low.

Table 2-11. Operator/Crew 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	A	W	M			
<b>CAB ASSEMBLY</b>							
32	●	●			Mirrors	Inspect mirrors for cracks, dents, or other damage. Inspect for loose or missing attaching hardware.	
33		●		●	Doors	Check operation and general condition of cab doors. Inspect door seals for tears, cracks or loose sealing gaskets.	
34	●	●			Glass	Inspect all cab glass for breaks or discoloration. Check operation of door windows in cab.	
35			●		Seats	Inspect seats for torn or ripped upholstery. Inspect seats for proper operation. Check seat and seat adjusting mechanisms for loose or missing attaching hardware.	
36			●		Seat Belts	Inspect seat belts for tears. Check operation and condition of seat belt mechanism.	
37	●	●			Cab	Inspect cab panels for rust, dents, or areas requiring touch-up painting. Refer to next higher level of maintenance for painting.	
38	●	●			Service Brakes	Check service brakes for proper operation. Drain condensation from air tank reservoir. Refer to next higher level of maintenance if any defects are found.	Service brake won't stop vehicle.
39	●	●			Parking Brake	Perform operational check on parking brake.	
40	●	●			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.	Does not go in or out of gear.
41	●	●			4-WD Selector	Perform operational check on 4-WD selector lever. Visually inspect lever for damage. Refer to next higher level of maintenance if any defects are found.	Does not go in or out of gear.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <b>WARNING</b> </div> <p>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>							

Table 2-11. Operator/Crew 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	A	W	M			
42	●	●			Controls, Indicators and Gauges	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.	Controls, indicators or gauges not operating. Defective.
43	●	●			Fuel Level	Perform operational check on fuel level gauge. Replenish fuel as necessary.	
44	●	●			Lights	Perform operational check on headlights, parking lights, turn signal lights, spotlights 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.
45				●	Windshield Wipers/Washer	Perform operational check on windshield wipers and washers. Inspect wiper blades for damage.	
46	●	●			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.
<b>CHASSIS</b>							
47				●	Exhaust	Inspect exhaust system and hardware for damage, wear and corrosion.	
48				●	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.
49				●	Differentials	Inspect for damage and oil leaks. Refer to next higher level of maintenance if defects are found.	Differentials are damaged.
50	●	●			Wheels, Rims and Tires	Check for proper tire pressure, 80 psi (551.6 kPa). Inspect tires for uneven wear, gouges, cuts and bruises. Check tightness of wheel mounting bolts, 88 ft-lb (119.3 N.m). Inspect rims for damage. Refer to next higher level of maintenance if defects are found.	Tires and rims are damaged. Tire is flat.



**Section III. OPERATION UNDER USUAL CONDITIONS**

	Para.		Para.
AFFF Vessel Recharge Procedures .....	2-24	Operation of Lighting and Vision Equipment .....	2-12
Driving the Vehicle .....	2-9	Operation of Rear Handline .....	2-21
Dry Chemical Vessel Recharge Procedures .....	2-25	Operation of Remote Turret .....	2-20
General .....	2-5	Operation of Rescue Saw .....	2-15
Mobile Operation of Twin Agent 4x4		Operation of Siren/Public Address System .....	2-13
Firefighting Truck .....	2-7	Post Operational Procedures .....	2-22
Nitrogen Cylinder Replacement Procedures .....	2-26	Scope .....	2-6
Operating Procedures .....	2-18	Shutdown .....	2-10
Operation of Accessory Firefighting		Stand-By Mode Procedures .....	2-19
Equipment .....	2-11	Starting the Engine .....	2-8
Operation of 10 Ton Hydraulic Rescue Tool .....	2-17	System Shut-Down After Operation	
Operation of Hydraulic Rescue Tool .....	2-16	Procedures .....	2-23
Operation of Inverter .....	2-14		

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**2-5. GENERAL.**

- a. The following instructions are for the information and guidance of personnel responsible for the proper operation of the Twin Agent 4x4 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 Twin Agent 4x4 Firefighting Truck.
- d. Post Operational Procedures. Basic checks and services of the firefighting truck immediately after a firefighting mission.

**2-7. MOBILE OPERATION OF TWIN AGENT 4x4 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 air brakes. An automatic 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 drivers normal seated position. These controls and indicators are illustrated and described in figures 2-2 through 2-5.

**2-8. STARTING THE ENGINE.**

- a. Perform daily inspections as required.
- b. Apply parking brake (22, figure 2-4).
- c. Place the battery selector switch (6, figure 2-3) in the BOTH position.
- d. Place the transmission gear selector (4, figure 2-3) to the neutral (N) position.
- e. Push engine stop control (34, figure 2-4) in toward the dash panel.

**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 Troubleshooting Chart, Chapter 3.**

- f. Turn ignition key to START and press down accelerator control pedal (8, figure 2-3) and hold. Release key and accelerator pedal when the engine starts.

**CAUTION**

**Do not increase engine speed until the oil pressure gauge (16, figure 2-4) indicates 30 psi (206.8 kPa). Shut engine down if oil pressure does not register on the gauge within 20 to 30 seconds after start.**

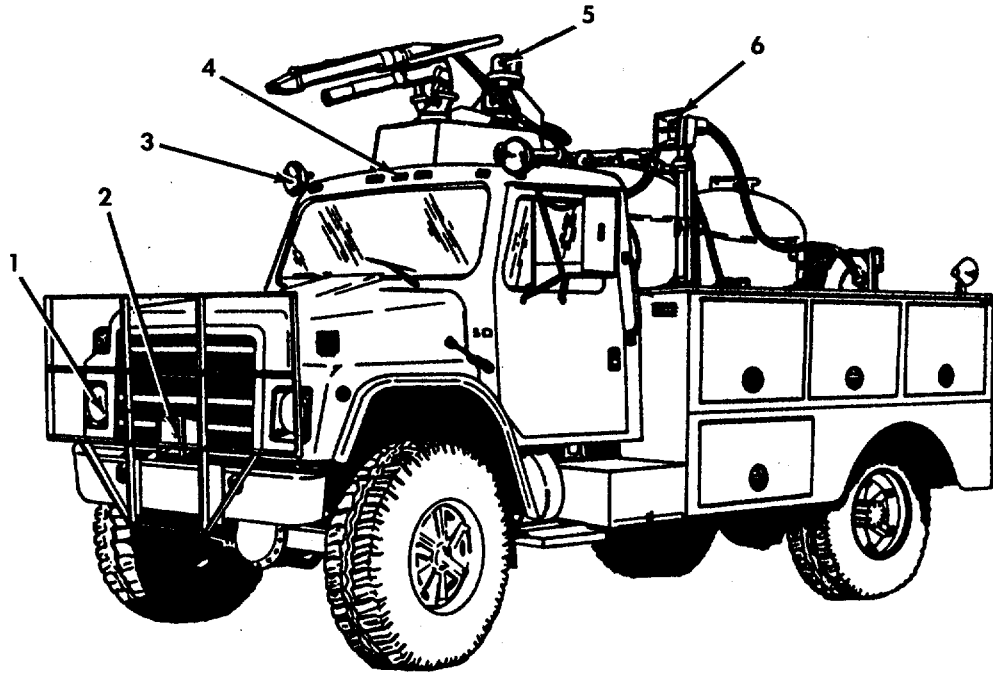
- g. With engine running, reduce engine speed. Allow engine to warm-up three to five minutes before applying vehicle load.

**2-9. DRIVING THE VEHICLE.**

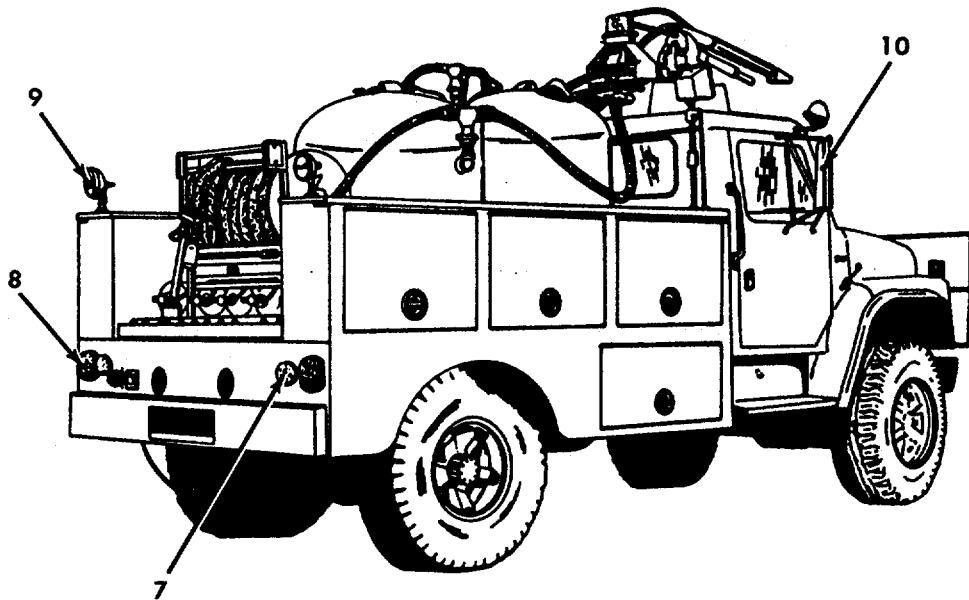
- a. Observe all gauges and indicators (figure 2-4) for normal operation.
- b. Depress brake pedal (9, figure 2-3). Release parking brake (22, figure 2-4) and shift transmission gear selector (4, figure 2-3) to desired gear.
- c. Release brake pedal (9, figure 2-3) and gradually depress accelerator pedal (8) to increase engine speed.

**NOTE**

**The accelerator pedal (8, figure 2-3) should be released while engaging the front axle to release torque on the drive train.**



STREET SIDE



CURB SIDE

- |                             |                       |
|-----------------------------|-----------------------|
| 1. Headlights               | 6. Quartz Lights      |
| 2. Front Quartz Flood Light | 7. Back-Up Lights     |
| 3. Spot Light               | 8. Brake Lights       |
| 4. Clearance Light          | 9. Pick-Up Lights     |
| 5. Roof Beacon Light        | 10. Rear View Mirrors |

FIGURE 2-11. LIGHTING AND VISION EQUIPMENT

**2-9 DRIVING THE VEHICLE (Continued).**

- d. To operate the vehicle in 4-wheel drive the front axle must be engaged. Push the front axle control (5, figure 2-3) to the IN position. Push the other axle control to either the HIGH or LOW range. When in the 4-wheel drive mode, the front axle engaged light (32, figure 2-4) will be illuminated.

**2-10. SHUTDOWN.**

Observe the following procedures when shutting down the firefighting truck:

- a. Depress brake pedal (9, figure 2-3) with steady downward pressure to stop truck.
- b. Place transmission gear selector (4, figure 2-3) in the neutral (N) position. Apply parking brake (22, figure 2-4).
- c. Shut-off all lights and accessory controls.
- d. Turn ignition key to OFF and pull engine stop control (34, figure 2-4) out.
- e. Turn battery selector switch to OFF.

**2-11. OPERATION OF ACCESSORY FIREFIGHTING EQUIPMENT.**

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

**2-12. OPERATION OF LIGHTING AND VISION EQUIPMENT.**

- a. *Rear View Mirror.* Rear view mirrors (10, figure 2-11) 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 (3, figure 2-11) is aimed with its control handle (3, figure 2-3) located inside the cab on both curb and street sides of the windshield. The ON/OFF switch is located on each handle.
- c. *Headlights, Back-Up Lights, Brake Lights, and Clearance Lights.* Headlights, (1, figure 2-11), back-up lights (7), brake lights (8) and clearance lights (4) are controlled BY the headlight control knob (19, figure 2-4).
- d. *Front Quartz Flood Light.* The front quartz flood light (2, figure 2-11) is controlled by the front quartz flood-light switch (27, figure 2-4).
- e. *Pick-Up Lights.* Each pick-up light (9, figure 2-11) is aimed BY the handle attached to the light body. The ON/OFF switch is also mounted on the light body.
- f. *Roof Beacon Light.* The roof beacon light (5, figure 2-11) is controlled by the roof beacon switch (23, figure 2-4).
- g. *Quartz Flood Lights.* The quartz flood lights (6, figure 2-11) are controlled by their respective quartz flood light switch (26 and 28, figure 2-4).
- h. *Compartment Lights.* Lights in all truck compartments are activated by the compartment lights switch (24, figure 2-4).

### 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:



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

- a. Rotate ON/OFF PA volume control knob (3, figure 2-5) 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.
- b. For siren operation, select desired tone on selector switch (2, figure 2-5). The selector switch has five positions:
  - (1) RADIO. In this position, incoming radio messages are amplified by the siren and rebroadcast over the external speakers. Siren tones (WAIL, YELP, HI-LO) do not operate in this position.
  - (2) STANDBY. In this position, it is possible to operate the siren by activating the manual pushbutton. A WAIL tone will be produced using the manual pushbutton.
  - (3) 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.
  - (4) YELP. In this position, a continuous rapid warbled tone is generated. Depressing the manual pushbutton will have no effect.
  - (5) HI-LO. In this position, a two-tone sound will be heard. Depressing the manual pushbutton will produce the YELP tone. The pushbutton has no effect when the selector switch (2) is in RADIO.
- c. The manual pushbutton (1, figure 2-5) operates the electronic siren in the manual operation mode. The push button has no effect when the selector switch (2) 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.

### 2-14. OPERATION OF THE INVERTER.

The inverter designed to provide 120 volt, 60 Hz AC power from the DC output of the 12 volt vehicle electrical system to operate all tools, lights, and receptacles as required in various firefighting operations. The inverter operating controls are located on the instrument panel (20, figure 2-4), and on the inverter.

**2-14. OPERATION OF THE INVERTER (Continued).****CAUTION**

The vehicle is equipped with an automatic throttle control which provides automatic increase in engine speed to 1,500 rpm when the inverter is energized. Do not energize the inverter while the vehicle is moving or damage to the engine or inverter could occur.

- a. To activate the inverter, depress the inverter START switch (2, figure 2-6) or remote START switch (20, figure 2-4).
- b. To cease inverter operation, depress the inverter STOP switch (13, figure 2-6) or remote STOP switch (20, figure 2-4).

**2-15. OPERATION OF RESCUE SAW.****WARNING**

Improper use of any power tool may cause serious or fatal injury. Read, understand and follow carefully the operating and safety instructions.

- a. Operator safety precautions.
  - (1) Never operate the machine when you are fatigued.
  - (2) Use safety footwear, snug-fitting clothing, safety goggles, and hearing and head protection devices and gloves.
  - (3) Always use caution when handling fuel. Move the cutting machine at least 10 feet (3.05 m) from the fueling point before starting engine.
  - (4) Do not allow other persons to be near the machine when starting or cutting. Keep by-standers and animals out of the work area.
  - (5) Never start cutting until you have a clear work area and secure footing.
  - (6) Always hold the unit firmly with both hands when the engine is running. Use a firm grip with thumbs and fingers encircling the handles.
  - (7) Keep all parts of your body away from the cutter disc when the engine is running.
  - (8) Never operate without the disc guard.
  - (9) Do not cock, wedge or jam the disc in the cut.
  - (10) Before starting the engine, make sure that the disc is not contacting anything.
  - (11) Always carry the machine with the engine stopped and the muffler away from your body.
  - (12) Never operate a cutting machine that is damaged, improperly adjusted, or not completely and securely assembled. Be sure that the disc stops moving when the throttle-control trigger is released.
  - (13) Always shut off the engine before setting the machine down.

**2-15. OPERATION OF RESCUE SAW (Continued)**

- (14) Keep the handles dry, clean, and free of oil or fuel.
- (15) Operate the machine only in well ventilated areas. Failure to use the power cutter in a well ventilated area can lead to serious injury or death.
- (16) The cutter disc should be removed from the cutting machine when it is transported or stored.

b. Preparation for use.

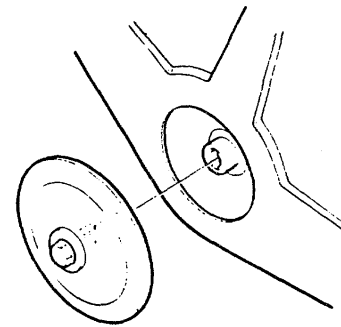
- (1) Attachments. Never modify a cut-off saw. Use only approved attachments.
- (2) Driveshafts and flanges.

- (a) Check that driveshaft threads are not damaged.
- (b) Check that contact surfaces on cutter wheel and flanges are flat, run true on the shaft and are free of foreign material.

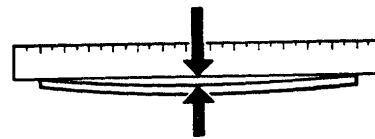
Do not use flanges that are different sizes, warped, nicked, sprung or dirty.

(3) Cutter wheel.

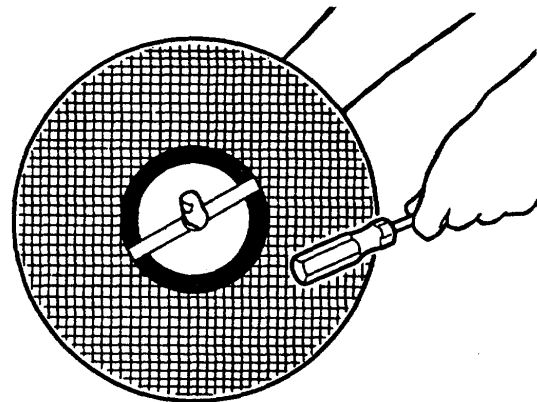
- (a) Check that wheel is approved for handheld portable, high speed, cut-off saws. Do not exceed the maximum operating speed marked on the wheel.
- (b) Inspect wheel for cracks or other damage.
- (c) Test abrasive wheels by striking lightly with a piece of wood; if the wheel does not make a full, ringing sound, it is damaged.
- (d) Do not use a wheel that has been dropped.
- (e) Do not use a diamond or carbide tipped blade with a tip missing.



CHECKING DRIVESHAFT



CHECKING WHEEL

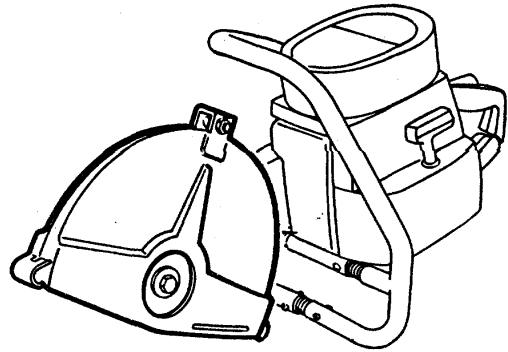


TESTING ABRASIVE WHEEL

**2-15. OPERATION OF RESCUE SAW (Continued).**

(4) Blade guard.

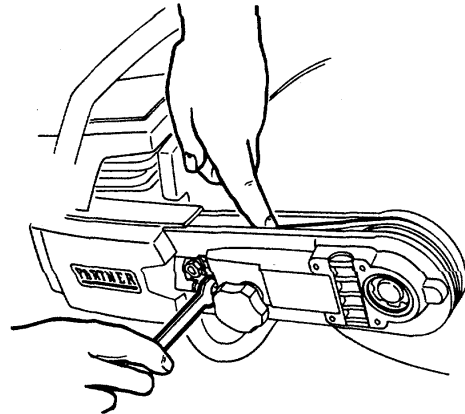
Check blade guard for cracks or other damage. Clean inside of guard before installing new wheel. Check that guard can be adjusted and locked.



CHECKING BLADE GUARD

(5) V belt and covers.

- (a) Check that belt has the right tension.
- (b) Check that covers are in place, tight, undamaged and that belt does not rub on them.



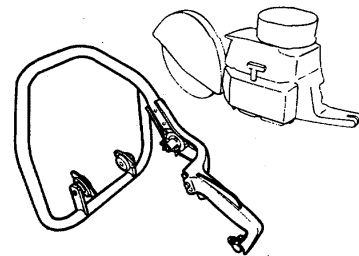
CHECKING V BELT

(6) Handles.

Check that handles are tight, undamaged, dry and clean.

(7) Vibration isolation elements.

Check that vibration elements are in place.



CHECKING VIBRATION ELEMENTS



**2-15. OPERATION OF RESCUE SAW (Continued).**

- (8) Air filter.

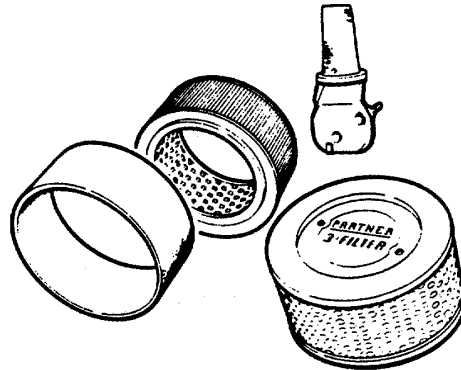
Clean prefilter every time you refuel.

- (9) Cooling passages.

Check that cooling passages and cylinder fins are clean.

- (10) General.

Check power head and cutter arm for wear or damage. Check that all components and fasteners are tight.



**CHECKING AIR FILTER**

c. *Starting.*

**WARNING**

Never drop start; you may lose control of saw.

Never start saw with wheel in cut. This could cause kickback and serious injury.

On cold starts, wheel will turn as soon as engine is started.

**NOTE**

Heavier blades may make saws slightly front heavy.

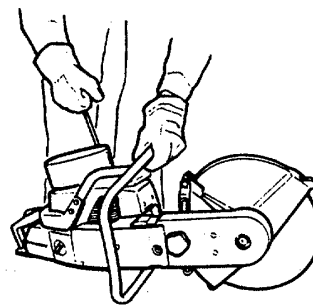
An aircraft rescue tool kit is supplied for additional aid in aircraft and vehicle rescue procedures.

- (1) Hold saw so that wheel does not touch anything including the ground

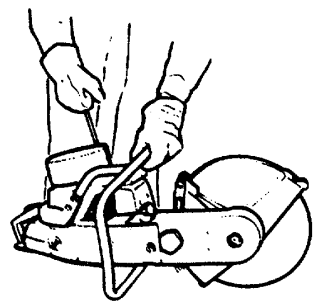
**WARNING**

Do not wrap starter rope around hand or let starter rope snap back, which could cause injury to yourself or damage to the starter.

- (2) Use starter grip (2, figure 2-7) and after pulling, let starter rewind fully.



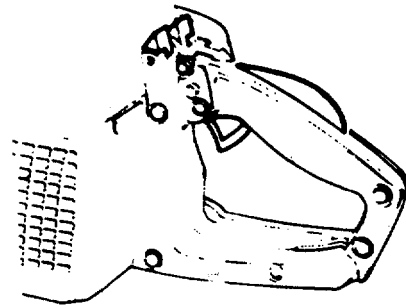
**STARTING POSITION**



**STARTING**

2-15. OPERATION OF RESCUE SAW (Continued)

- (3) Check controls.
  - (a) Check that when you release the throttle control (7, figure 2-7) engine rpm drops and returns to idle "by itself". Check that the wheel does not move when the engine is idling.
  - (b) Check that the stop control (3, figure 2-7) does stop the engine.

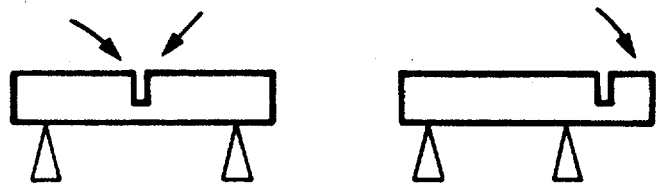


CHECKING CONTROLS

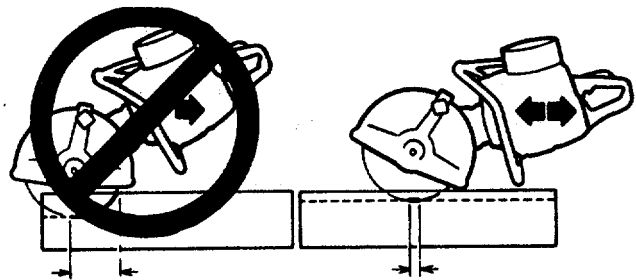
d. Operating.

The following techniques are general in nature. Check instructions for each type of wheel for individual cutting characteristics. (Diamond blades, for example, need less feed pressure than abrasive wheels.)

- (1) Support work piece so that you know what to expect while cutting so that it will not bind.
- (2) Always cut at wide open throttle.



SUPPORTING THE WORK PIECE



CUTTING TECHNIQUES



Absolutely never cut with the side of the wheel; it almost certainly will be damaged, break, and is likely to cause severe injury. Use cutting edge only.



- (3) Start cut gently, do not bump or jam wheel.
- (4) Use high wheel speed.
- (5) Move wheel slowly back and forth.
- (6) Use small portion of wheel's cutting edge.
- (7) Use only the cutting edge of the wheel for cutting.

2-15. OPERATION OF RESCUE SAW (Continued)

**WARNING**

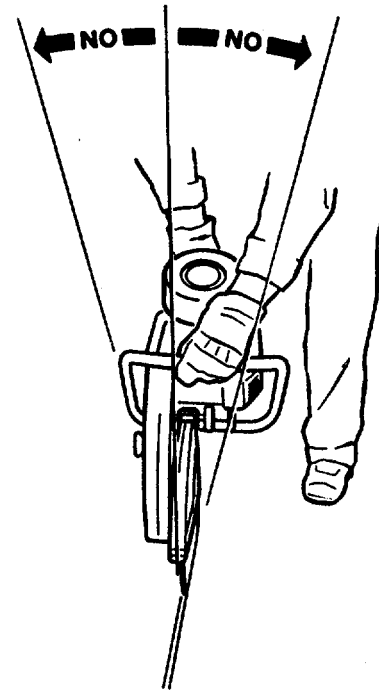
Do not bend saw to one side or wheel may bind or break causing human damage or injury.

(8) Cut with blade straight up and down (at right angle to work piece) .

**WARNING**

Kickback can happen extremely fast and with great force. Failure to comply with the following rules can result in a severe or even fatal injury.

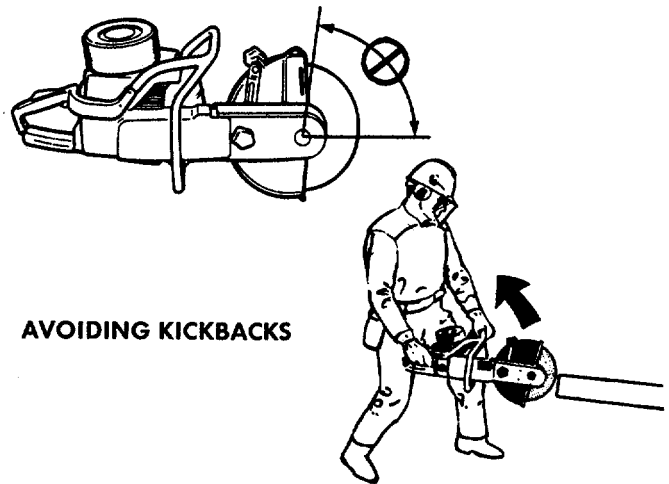
If the segment of the wheel is used for cutting, the wheel may start climbing in the cut and throw the saw up and back towards the operator with great force. Carbide tipped blades can kick more violently than other blades because of their tooth design.



BLADE POSITION

(9) To avoid kickback.

- (a) Keep good balance and footing.
- (b) Use both hands and keep a firm grip with the thumb and fingers encircling the handles.
- (c) Keep work piece at a comfortable distance.
- (d) Run saw at full throttle.
- (e) Be careful when re-entering a cut.
- (f) Never cut above shoulder height.
- (g) Be alert to shifting of work piece or anything that could cause the cut to close and pinch the wheel.



AVOIDING KICKBACKS

e. Stopping

- (1) Move stop control (3, figure 2-7) to the stop position.
- (2) Wait until cutting blade stops then set saw on ground.

**2-16. OPERATION OF HYDRAULIC RESCUE TOOL.****NOTE**

If the hoses are reversed, the tool will operate in reverse.

- a. Attach the 16 foot hose assembly to the power unit. The hose swivel end marked in red is the pressurized side and is connected to the dump valve (t3 figure 2-9) outlet also marked in red. Tighten with a 5/8 inch wrench.
- b. Connect the hydraulic rescue tool hoses to the hose assembly from the power unit. The locking collar must snap fully forward or the couplings are not locked and will disconnect under pressure.
- c. The handle of the reservoir mounted dump valve (3, figure 2-9) points in the direction of flow. The handle forward points the flow out through the hose, facing the rear points the flow back into the reservoir.
- d. To start the power unit, open the fuel shut-off control (4, figure 2-9). Position the dump valve lever (3) in the dump position. Put the throttle control (2) in the slow position, and pull the starter handle (1) with a short pull to start the engine.
- e. Turn the dump valve lever (3, figure 2-9) forward to point out in the direction of flow.
- f. Move the throttle control (2, figure 2-9) to accelerate power unit to desired operating speed.

**NOTE**

If the tool works in reverse, check the hose connections for proper installation.

- g. The operating levers (1, figure 2-9) are mounted on the hydraulic rescue tool. If valve is on the right side of the tool housing, pushing the lever (1) with the thumb will close the rescue tool. Pulling the lever (1) forward will open the rescue tool.
- h. Cycle the hydraulic rescue tool through at least two complete cycles. One cycle is defined as closed to fully open and back to the closed position.
- i. To stop the power unit, move the throttle control (2, figure 2-9) to the stop position.

**NOTE**

An aircraft rescue tool kit is supplied for additional aid in aircraft and vehicle rescue procedures.

- j. The following are basic set-ups using the hydraulic rescue tool and attachments.

*(1) Spreading procedures.*

- a. **Opening Door.** Insert the rescue tool into the window firmly seating the lower jaw on the top of the window opening. The upper jaw should be on the top of the window frame and the edge of the car roof. Opening the arms of the rescue tool will push the top of the door down and out away from the B pillar creating an opening between the door and the door frame. Close the rescue tool arms inserting the tips of the jaws into the opening between the door and door frame. Open the tool. Adjust the tool to get a firm grip and open the arms. Re-adjust the jaw location if the metal tears. Break the safety door latch and open the door.
- b. **Removing Door.**
  1. Swing door open and insert the jaws of the closed tool into the hinge side between the door and the frame. Make sure the jaws are firmly seated. Open the arms of the tool, break the hinges and remove the door. Break the top hinge first to be sure door rotates down and away from passengers and operator.

**2-16. OPERATION OF HYDRAULIC RESCUE TOOL (Continued).**

2. If there is no room available to work from the inside of the door, insert the jaws of the closed tool between the top of the door and the frame. Open the tool. The top hinge will fracture. Relocate the tool and break the low hinge and remove the door.
3. The hinges of the rear door are exposed when the front door is opened or removed. Insert the closed tool between the door frame and the door and open the tool until the hinges break. If the tool is opened to its full 32 inches. the safety door latch may break.
4. If the latch doesn't break. insert the tips of the jaws of the closed tool into the opening between the door' and the frame that was produced when the hinges were broken and the door pushed out. Spread the jaws and relocate the tool until the jaws are firmly seated. Open the tools' arms, break the latch and remove the door.

**c. Moving Seat.**

1. To push the seat to the rear, open the tool until one jaw is against the door frame and the other on the frame of the set. Open the tool and slide the set to the rear off the end of the seat track.
2. To raise the steering column from the inside of the passenger compartment, open the tool wide enough to place one jaw on the edge of the door frame and the other under the steering column. Make sure the jaw on the column has a firm seat on the column housing. Open the tool until the column has been pushed away from the patient.

**(2) Cutting procedures.****a. Cutting B Center Column.**

To cut B pillar, open the cutter wide enough to surround the column with the doors open or closed. Close the tool. The tool will close outward and not into the passenger space.

**b. Cutting A Windshield Column.**

1. To cut the A pillar, open the cutter wide enough to pass the cutter blade points over the pillar. The inside arm is positioned over the dashboard, the other outward of the windshield. Close the tools' arms. The inside arm will push outward against the glass as the tool closes. The cut is complete with the jaw tips 6 inches apart.
2. The cutter tips easily penetrate the windshield and the outward pressure of the inside arm pushes the glass out to make removal of the roof possible.

**c. Cutting Roof Rail.**

1. To cut the vehicle roof open the tool arms far. enough for. the tips of the cutter. blades to fit over the roof rail. Push the tool forward until the blades are fully engaged. The inside arm will be pulled against the vehicle roof as soon as the arms start to close.
2. The cutter' blades pierce the roof and cut the roof rail and roof when the tips of the blades are still open about 6 inches at the tips.

**WARNING**

**Tie roof securely to prevent the roof from falling  
on tool operator or victim.**

3. The arms are closed all the way. The roof is clamped between the jaws and creased for folding back.

**2-16. OPERATION OF HYDRAULIC RESCUE TOOL (Continued).**

(3) *Pulling procedures.*

a. Belts and Buckle Assemblies.

1. To pull a steering column, simply open the arms of the rescue tool to 32 inches and attach an adjuster buckle and 12 foot belt to each arm. Loop one 48 inch loop around the steering column and the other 48 inch loop around the axle or any anchor point on the front of the car. Position the tool and remove the slack by pulling on the loose ends of the 12 foot belts until taut.
2. Check that as much slack as possible has been taken up by pulling on the loose ends of the 12 foot belt, then close the arms.

**2-17. OPERATION OF 10 TON HYDRAULIC RESCUE TOOL.**

The 10 ton hydraulic rescue tool is designed to perform many functions. The pump, ram and attachments may be used to:



Do not overload ram. Overloading can cause cracked cylinders, blown caps, bent plungers and ruptured hoses. Do not over-extend the ram. This may push the plunger out of the top of the ram with violent results. When using a chain do not stand in line with the chain at any time. Do not cross twist, kink, knot or shorten any chain with a pin. Do not allow running loads to pass over chains. Do not use chains over sharp corners without protective padding. Do not form a loop by putting the point of a hook into a link. Do not use heat near or on a chain or any attachment. Do not use a chain whose links are twisted or bent, have nicks or gouges, shows excessive wear, stretch or spread in the links. Any such chain should be replaced immediately. Failure to heed these warning may result in damage to the equipment or failure resulting in personal injury or property damage.

High pressure hydraulic oil can cause personal injury. Do not hold hose or fittings in your hand while under pressure.

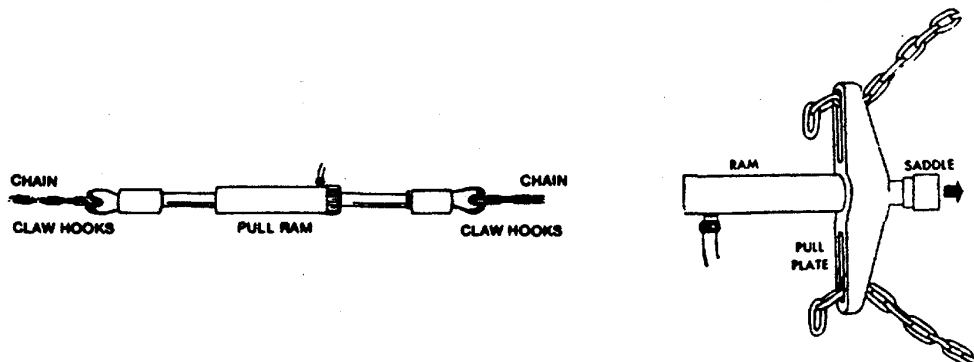
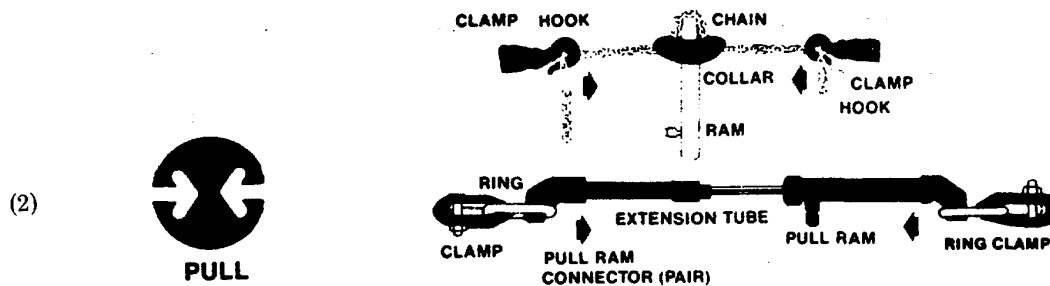
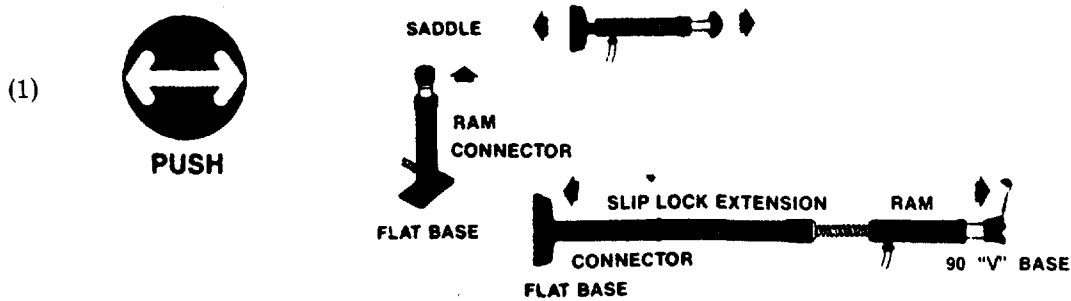
Do not drop heavy objects on hose. A sharp impact can damage wire braid of hose leading to possible failure or personal injury. Avoid sharp kinks and bends in hose. Periodically, inspect hoses for kinks, cuts and bulges. Remove hose from service immediately if the foregoing are observed. Do not carry the pump by the hose.

2-17. OPERATION OF 10 TON HYDRAULIC RESCUE TOOL (Continued).

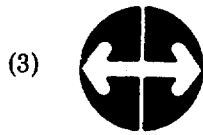
NOTE

An aircraft rescue tool kit is supplied for additional aid in aircraft and vehicle rescue procedures.

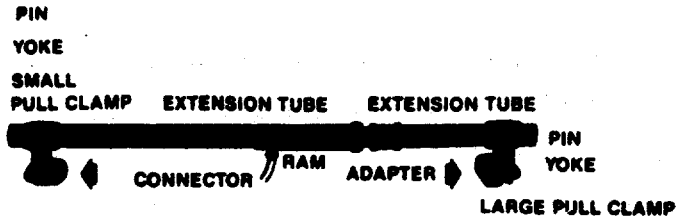
- a. Select best ram (6 or 7, figure 2-10) suited for the rescue operation and connect it to the pump and hose (3) by placing the male end of the coupler firmly into the ram selected.
- b. Push on the desired attachments to the ram.
- c. To extend the ram, close the release valve control knob (2, figure 2-10) by turning clockwise until finger-tight.
- d. To operate the pump, hold in a horizontal or vertical position and pump the handle (1, figure 2-10).
- e. To release the ram and load, turn release valve control knob (2, figure 2-10) slowly counterclockwise.
- f. Basic set-ups using the various rams and attachments:



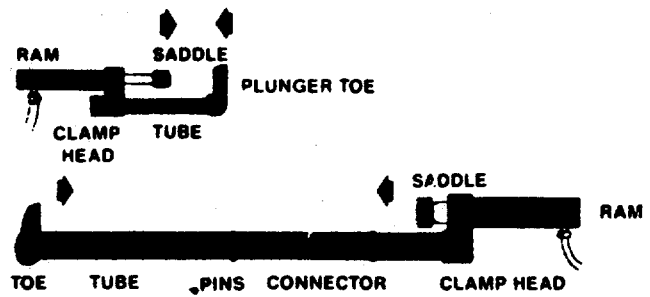
2-17. OPERATION OF 10 TON HYDRAULIC RESCUE TOOL (Continued).



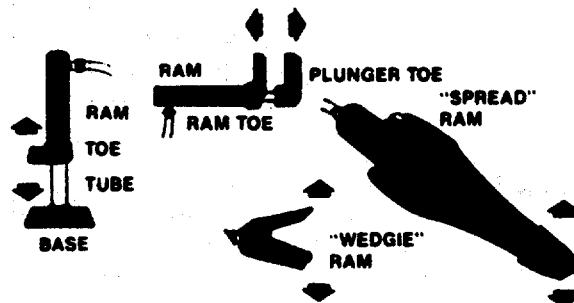
**STRETCH**



**CLAMP**



**SPREAD**





**2-18. OPERATING PROCEDURES.**

The following paragraphs will describe operating procedures necessary for all firefighting missions for which the following truck was designed. It is strongly recommended that all personnel required to operate the vehicle study the contents of these procedures thoroughly and practice the safety precautions specified.

**2-19. STAND-BY MODE PROCEDURES.**

The following valves and gauges must be checked prior to placing the Twin Agent 4x4 Firefighting Truck in the STAND-BY mode of operation.

- a. Master control valve (5, figure 2-1) CLOSED. Manual twin agent pressure activator handle (3) pushed fully towards panel.
- b. Test valves (7, figure 2-1) OPEN.
- c. Dry chemical tank drain cap (8, figure 2-1) and dry chemical tank fill cap (19) fully tightened.
- d. Purge valve (17, figure 2-1) and bleed valve (18) CLOSED.
- e. Dry chemical emergency shut-off valve (13, figure 2-1) OPEN.
- f. AFFF tank drain valve (10, figure 2-1) CLOSED.
- g. AFFF emergency shut-off valve (9, figure 2-1) OPEN.
- h. Purge valve (16, figure 2-1) and bleed valve (14) CLOSED.
- i. Dual agent handline control handles (22, figure 2-1) CLOSED.
- j. Turret valves (3 and 13, figure 2-2) CLOSED.
- k. Pressure gauges (1, figure 2-1) and (11, figure 2-2) should read ZERO.

**NOTE**

**1840 psi (12,686.8 kPa) is the minimum cylinder pressure for a working pressure of 230 psi (1,585.8 kPa). For intermediate working pressure, the minimum cylinder pressure should read 8 times the selected working pressure.**

- l. Open all nitrogen cylinder valves and check pressure gauges for cylinder pressure. Pressure gauge readings should be in excess of 1840 psi (12,686.8 kPa).
- m. The system is now ready for operation.

**2-20. OPERATION OF REMOTE TURRET.**

- a. Activate the system by using the remote turret pressure activator switch (9, figure 2-2).
- b. Activate turret solenoids by using the twin agent solenoid activator switch (7, figure 2-2).
- c. The regulator pressure gauge (6, figure 2-2) indicates regulated pressure in the dry chemical and AFFF tanks.
- d. Remove control handle retaining pin (5, figure 2-2) and pull twin agent control handle (4) down. Nozzle spray pattern is controlled by the AFFF turret nozzle shaper (12, figure 2-2). Placing the control fully forward emits a dispersed pattern, while placing the control all the way back emits a straight stream.
- e. To operate the turret, select the agent required by using the AFFF/Dry Chemical selector switch (10, figure 2-2) and press the twin agent activating button (2) on the end of the twin agent control handle (4). The discharge of the selected agent will continue as long as the twin agent activating button (2) is pushed in. Releasing the switch will stop the discharge agent. To control the shape of the AFFF agent discharge, place shaper control handle (12, figure 2-2) fully forward for a dispersed pattern or all the way back for a straight flow.
- f. If an agent change is required, all turret discharge should be halted before the AFFF/Dry Chemical selector switch (10) is used.

**2-21. OPERATION OF REAR HANDLINE.**

- a. Activate the system by using the twin agent pressure activator switch (2, figure 2-1) or manual twin agent pressure activator handline (3).
- b. Release hand brake and unwind hose from the hose reel.
- c. The regulator pressure gauge (4, figure 2-1) and test gauges (6) indicate the regulated pressure in the dry chemical and AFFF tanks.
- d. Open either or both dual agent handline control handles (22, figure 2-1).

**2-22. POST OPERATIONAL PROCEDURES.**

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

**2-23. SYSTEM SHUT-DOWN AFTER OPERATION PROCEDURES.****NOTE**

**If all cylinder pressure has been spent it is necessary to manually close the turret operating valves using the manual override control levers (8, figure 2-2).**

- a. CLOSE the AFFF emergency shut-off valve (9, figure 2-1) and the dry chemical emergency shut-off valve (13).
- b. OPEN the purge valves (16 and 17, figure 2-1).
- c. OPEN dual agent handline control valves (22, figure 2-1) until only nitrogen discharges.

**2-23. SYSTEM SHUT-DOWN AFTER OPERATION PROCEDURES (Continued).**

- d. Select AFFF mode in remote turret using AFFF/DC selector switch (10, figure 2-2) and press twin agent activating button (2) until only nitrogen discharges from the turret foam nozzle.
- e. Select Dry Chemical mode in remote turret using AFFF/DC selector switch (10, figure 2-2) and press twin agent activating button (2) until only nitrogen discharges from the turret dry chemical nozzle.
- f. CLOSE test valves (7, figure 2-1).
- g. CLOSE master control valve (5, figure 2 -1) by using either manual twin agent pressure activator handline (3) or remote turret pressure activator switch (9, figure 2-2).
- h. OPEN the bleed valves (14 and 18, figure 2-1).
- i. CLOSE all nitrogen cylinder valves if nitrogen pressure in the cylinders has dropped below 1840 psi (12, 686.8 kPa), so that the cylinders may be changed.

**NOTE**

**If use has only been minimal and cylinder pressure is in excess of 1840 psi (12,686.8 kPa), then omit step i above. The system is ready for the next operation.**

- j. CLOSE the purge valves (16 and 17, figure 2-1).
- k. OPEN the AFFF emergency shut-off valve (9, figure 2-1) and the dry chemical emergency shut-off valve (13).
- l. CLOSE the bleed valves (14 and 18, figure 2-1).
- m. The system is now shut-down and ready for nitrogen cylinder change.

**2-24. AFFF VESSEL RECHARGE PROCEDURES.**

- a. CLOSE all nitrogen cylinder valves.
- b. CLOSE test valves (7, figure 2-1).
- c. Check that the master control valve (5, figure 2-1) is CLOSED.
- d. OPEN purge valve (16, figure 2-1) and bleed valve (14) to bleed any trapped pressure out of the vessel.
- e. OPEN AFFF handline slowly and leave OPEN.

**WARNING**

**If there is any trapped pressure in the vessel its presence will be apparent from hissing gas escaping from the safety hole in the AFFF Tank fill cap (15, figure 2-1). Do not loosen cap until there is no further gas escaping.**

**2-24. AFFF VESSEL RECHARGE PROCEDURES (Continued).**

- f. When no discharge emits from either the purge valve (16, figure 2-1) or AFFF handline nozzle, slowly loosen AFFF tank fill cap (15).
- g. CLOSE the AFFF emergency shut-off valve (9, figure 2-1).
- h. Close the AFFF handline valve.
- i. Using the following table, determine the amount of AFFF concentrate that must be added.

*Table 2-12. AFFF Vessel Fill Readings*

DIPSTICK READING	1	2	3	4	5	6	7	8
AMOUNT OF 6% AFFF CONCENTRATE TO BE ADDED *	15.15	14.65	13.9	13.0	12.1	11.2	10.3	9.4
DIPSTICK READING	9	10	11	12	13	14	15	16
AMOUNT OF 6% AFFF CONCENTRATE TO BE ADDED	8.5	7.6	6.7	5.8	4.9	4.0	3.1	2.2
DIPSTICK READING	17	18	19	20				
AMOUNT OF 6% AFFF CONCENTRATE TO BE ADDED	1.35	0.6	0.2	0				

*\*Quantity to be added can be rounded off to the next higher gallon.*

- j. Add the AFFF agent slowly.
- k. Top up the vessel with water SLOWLY with the fill nozzle submerged to minimize foaming.
- l. When the vessel is full, replace AFFF tank fill cap (15, figure 2-1) and tighten firmly.
- m. OPEN the AFFF emergency shut-off valve (9, figure 2-1).
- n. CLOSE purge valve (16, figure 2-1) and bleed valve (14).
- o. OPEN all nitrogen cylinder valves.
- p. Check that all valves and gauges are in the STAND-BY mode of operation (paragraph 2-19).

**2-25. DRY CHEMICAL VESSEL RECHARGE PROCEDURES.**

- a. CLOSE all nitrogen cylinder valves.
- b. CLOSE test valves (7, figure 2-1).
- c. Check that the master control valve (5, figure 2-1) is CLOSED.
- d. OPEN purge valve (17, figure 2-1) and bleed valve (18) to bleed any trapped pressure out of the vessel.
- e. OPEN dry chemical handline slowly and leave OPEN.

**2-25. DRY CHEMICAL VESSEL RECHARGE PROCEDURES (Continued).****WARNING**

**If there is any trapped pressure in the vessel its presence will be apparent from hissing gas escaping from the safety hole in the Dry Chemical Tank fill cap (19, figure 2-1). Do not loosen cap until there is no further gas escaping.**

- g. CLOSE the dry chemical emergency shut-off valve (13, figure 2-1).
- h. CLOSE the dry chemical handline valve.
- i. Add dry chemical as required to fill the vessel.
- j. When the vessel is full, replace dry chemical tank fill cap (19, figure 2-1) and tighten firmly.
- k. OPEN the dry chemical emergency shut-off valve (13, figure 2-1).
- l. CLOSE purge valve (17, figure 2-1) and bleed valve (18).
- m. OPEN all nitrogen cylinder valves.
- n. Check that all valves and gauges are in the STAND-BY mode of operation (paragraph 2-19).

**2-26. NITROGEN CYLINDER REPLACEMENT PROCEDURES.**

- a. CLOSE all nitrogen cylinder valves.
- b. SLOWLY loosen swivel connection at each nitrogen cylinder.
- c. Unfasten cylinder clamps.
- d. Replace used cylinders with full cylinders.
- e. Fasten cylinder clamps.
- f. Check that the master control valve (5, figure 2-1) is CLOSED.
- g. Connect swivel connections to new cylinders.
- h. OPEN all nitrogen cylinder valves.
- i. Check that all valves and gauges are in the STAND-BY mode of operation (paragraph 2-19).

**Section IV. OPERATION UNDER UNUSUAL CONDITIONS**

	Para.		Para.
Operation at High Altitudes .....	2-35	Operation in Mud .....	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

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**2-27. SCOPE.**

This section covers the necessary operating instructions, in addition to those previously covered that are necessary for the components of the Twin Agent 4x4 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).**



**The truck is not designed for firefighting operations below 32°F (0°C). If the vehicle is left in temperatures below freezing, it is recommended that the AFFF agent be drained (paragraph 2-23).**

When operating in an intermediate cold climate, take the necessary precautions to prevent the truck from freezing.

**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.

**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 filters.

**2-31. OPERATION UNDER RAINY OR HUMID CONDITIONS.**

When operating under rainy or humid conditions, the high humidity causes rusting or 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.**

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.

**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 cab, equipment compartments, and twin agent firefighting system.

**2-34. OPERATION IN MUD.**

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

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

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.

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**CHAPTER 3  
OPERATOR MAINTENANCE INSTRUCTIONS**

**Section I OPERATOR TROUBLESHOOTING PROCEDURES  
Section II MAINTENANCE OF TIRE RIM ASSEMBLY**

**Section I. OPERATOR TROUBLESHOOTING PROCEDURES**

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

**3-1. GENERAL.**

- a. The table in this section lists the common malfunctions which may occur during the operation or maintenance of the Twin Agent 4x4 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.

**3-2. SYMPTOM INDEX.**

<b>SYMPTOM</b>	<b>Page</b>
<b>TWIN AGENT FIREFIGHTING SYSTEM</b>	
Pressure Gauges Show Loss of Pressure.....	3-2
<b>ENGINE COOLING SYSTEM</b>	
Engine Overheating .....	3-2
<b>ENGINE FUEL SYSTEM</b>	
Engine Will Not Start .....	3-2
Uneven running And /Or Frequent Stalling.....	3-2
<b>ENGINE AND ACCESSORIES</b>	
No Battery Voltage .....	3-2
<b>CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS</b>	
Windshield Washer Doesn't Work.....	3-2
<b>TRANSMISSION ASSEMBLY</b>	
No Drive In Any Gear .....	3-2
<b>AIR BRAKE SYSTEM</b>	
Brakes "Grab"; Truck Pulls To One Side On Brake Application .....	3-3
Erratic, Uneven Braking.....	3-3
<b>STEERING ASSEMBLY</b>	
Wheel Steering Hard In One Or Both Directions .....	3-3
Erratic Steering.....	3-3



**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*

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**MALFUNCTION**

**TEST OR INSPECTION**

**CORRECTIVE ACTION**

---

**TWIN AGENT FIREFIGHTING SYSTEM**

1. PRESSURE GAUGES SHOW LOSS OF PRESSURE.  
 Check for defective regulator or low/empty cylinders.  
 Refer to next higher level of maintenance for replacement.

**ENGINE COOLING SYSTEM**

2. 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**

3. ENGINE WILL NOT START.  
 Check for low fuel supply.  
 Replenish fuel supply as necessary.
4. UNEVEN RUNNING AND/OR FREQUENT STALLING.  
 Check for low fuel supply.  
 Replenish fuel supply as necessary.

**ENGINE AND ACCESSORIES**

5. NO BATTERY VOLTAGE.  
 Inspect battery cables for cracks, fraying and looseness.  
 Refer to next higher level of maintenance for replacement.

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

6. WINDSHIELD WASHER DOESN'T WORK.  
 Check fluid level reservoir.  
 Refer to next higher level of maintenance.

**TRANSMISSION ASSEMBLY**

7. NO DRIVE IN ANY GEAR.  
 Check fluid level.  
 Refer to next higher level of maintenance.

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

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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**AIR BRAKE SYSTEM**

- 8. BRAKES "GRAB": Truck Pulls To One Side on Brake Application.  
Improperly inflated tires.  
Inflate to correct pressure (paragraph 3-4).
- 9. ERRATIC, UNEVEN BRAKING.  
Soft tire.  
Inflate to proper pressure (paragraph 3-4).

**STEERING ASSEMBLY**

- 10. WHEEL FLUID LEVEL IN RESERVOIR.  
Check fluid level in reservoir.  
Refer to next higher level of maintenance.
- 11. ERRATIC STEERING.  
Check fluid level in reservoir.  
Refer to next higher level of maintenance.

**Section II. MAINTENANCE OF TIRE RIM ASSEMBLY**

General.....	Para. 3-3	Tire Service .....	Para. 3-4
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**3-3. GENERAL.**

This section contains information on maintenance at the Crew/Operator level.

**3-4. TIRE SERVICE.**

This task covers: Service

**INITIAL SET-UP**

Tools  
Tire Pressure Gauge

General Safety Instructions

Engine OFF.  
Transmission in neutral.  
Parking brake set.

**SERVICE**

- a. Check air pressure in tires.
- b. Front tire pressure should be 80 psi (551.6 kPa). Add air as needed.
- c. Rear tire pressure should be 80 psi (551.6 kPa). Add air as needed.

**CHAPTER 4  
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS**

<b>Section I</b>	<b>REPAIR PARTS, SPECIAL TOOLS, TIDE, AND SUPPORT EQUIPMENT</b>
<b>Section II</b>	<b>SERVICE UPON RECEIPT</b>
<b>Section III</b>	<b>ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)</b>
<b>Section IV</b>	<b>LUBRICATION INSTRUCTIONS</b>
<b>Section V</b>	<b>ORGANIZATIONAL TROUBLESHOOTING PROCEDURES</b>
<b>Section VI</b>	<b>MAINTENANCE OF ACCESSORIES</b>
<b>Section VII</b>	<b>MAINTENANCE OF AUXILIARY FIREFIGHTING EQUIPMENT</b>
<b>Section VIII</b>	<b>MAINTENANCE OF TWIN AGENT FIREFIGHTING SYSTEM</b>
<b>Section IX</b>	<b>MAINTENANCE OF REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY</b>
<b>Section X</b>	<b>MAINTENANCE OF HOSE REEL ASSEMBLY</b>
<b>Section XI</b>	<b>MAINTENANCE OF FIRE BODY ASSEMBLY</b>
<b>Section XII</b>	<b>MAINTENANCE OF ENGINE COOLING SYSTEM</b>
<b>Section XIII</b>	<b>MAINTENANCE OF ENGINE FUEL SYSTEM</b>
<b>Section XIV</b>	<b>MAINTENANCE OF DIESEL FUEL INJECTION SYSTEM</b>
<b>Section XV</b>	<b>MAINTENANCE OF ENGINE EXHAUST SYSTEM</b>
<b>Section XVI</b>	<b>MAINTENANCE OF ENGINE AND ACCESSORIES</b>
<b>Section XVII</b>	<b>MAINTENANCE OF CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS</b>
<b>Section XVIII</b>	<b>MAINTENANCE OF ELECTRICAL SYSTEM</b>
<b>Section XIX</b>	<b>MAINTENANCE OF PROPELLER SHAFT ASSEMBLY</b>
<b>Section XX</b>	<b>MAINTENANCE OF TRANSMISSION ASSEMBLY</b>
<b>Section XXI</b>	<b>MAINTENANCE OF TRANSFER CASE ASSEMBLY</b>
<b>Section XXII</b>	<b>MAINTENANCE OF TIRE RIM ASSEMBLY</b>
<b>Section XXIII</b>	<b>MAINTENANCE OF AIR BRAKE SYSTEM</b>
<b>Section XXIV</b>	<b>MAINTENANCE OF STEERING ASSEMBLY</b>
<b>Section XXV</b>	<b>MAINTENANCE OF POWER STEERING SYSTEM</b>
<b>Section XXVI</b>	<b>MAINTENANCE OF FRONT SUSPENSION ASSEMBLY</b>
<b>Section XXVII</b>	<b>MAINTENANCE OF REAR SUSPENSION ASSEMBLY</b>
<b>Section XXVIII</b>	<b>MAINTENANCE OF REAR AXLE ASSEMBLY</b>
<b>Section XXIX</b>	<b>MAINTENANCE OF FRONT AXLE ASSEMBLY</b>
<b>Section XXX</b>	<b>MAINTENANCE OF FRAME ASSEMBLY</b>
<b>Section XXXI</b>	<b>PREPARATION FOR SHIPMENT OR STORAGE</b>

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**Section I. REPAIR PARTS, SPECIAL TOOLS, TIDE, AND SUPPORT EQUIPMENT**

	Para.		Para.
Repair Parts .....	4-1	Special Tools, TIDE, and Support Equipment .....	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 general support maintenance for the Twin Agent 4x4 Firefighting Truck.

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

Special tools, TMDE, and support equipment required to maintain the Twin Agent 4x4 Firefighting Truck are listed in Appendix B, Section III.

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**Section II. SERVICE UPON RECEIPT**

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

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**4-3. INTRODUCTION.**

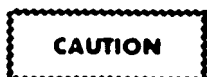
This section provides instructions for readying the Twin Agent 4x4 Firefighting Truck for use after initial receipt by the using facility.

**4-4. LUBRICATION.**

Each truck has been completely serviced prior to shipment, with lubricants 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.



**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.**

Table 4-1. Inspection Prior To Use.

DESCRIPTION	INSPECTION TO BE PERFORMED
Truck Body	<ul style="list-style-type: none"> <li>a. Inspect body for evidence of damage during shipment.</li> <li>b. Check to see that all compartment doors, latches, and hinges operate properly.</li> <li>c. Check mounting hardware and tighten if necessary.</li> </ul>
Truck Cab	<ul style="list-style-type: none"> <li>a. Inspect cab for evidence of damage during shipment.</li> <li>b. Check door latches, hinges and windows for proper operation.</li> <li>c. Check seats and belts to see that they are properly installed, and that the streetside seat is adjustable.</li> </ul>
Controls and Instruments	<ul style="list-style-type: none"> <li>a. Check all controls for freedom of operation.</li> <li>b. Refer to operation instructions and check all instruments for normal readings and proper operation (Chapter 2, Section III).</li> </ul>
Firefighting System and Accessories	<ul style="list-style-type: none"> <li>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.</li> <li>b. Check that the Pressure Vessel Caps are fully tightened.</li> <li>c. Check that no AFFF is dripping from the AFFF Pressure Vessel drain valve.</li> <li>d. Inspect all auxiliary firefighting equipment for evidence of damage during shipment.</li> </ul>
Engine	<ul style="list-style-type: none"> <li>a. Check crankcase oil level and inspect oil on dipstick for cleanliness.</li> <li>b. Examine air cleaner element for dirty or restricted condition.</li> <li>c. Examine mounting hardware and tighten as necessary.</li> <li>d. Inspect engine and piping connections for evidence of leakage. Repair leaks and replenish lost fluid.</li> <li>e. Clean away any obstruction to cooling air flow to radiator.</li> <li>f. Check cooling system level and antifreeze protection as required.</li> <li>g. Check engine, starter and instrumentation wiring for proper connections and condition of wiring insulation.</li> <li>h. Check tension of fan and alternator drive belts. Belts should be tight enough to allow 1/2 inch deflection midway between the pulleys.</li> </ul>
Transmission and Transfer Case	<ul style="list-style-type: none"> <li>a. Check fluid levels, adding fluid as required.</li> <li>b. Check external hydraulic lines for evidence of leakage. Tighten or replace loose or defective fittings.</li> <li>c. Check operation of shift selectors.</li> </ul>

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

DESCRIPTION	INSPECTION TO BE PERFORMED
Electrical System	<ul style="list-style-type: none"> <li>a. Check battery electrolyte level and state of charge.</li> <li>b. Check battery cable connections. Tighten and clean.</li> <li>c. Check the siren/speaker system for proper operation.</li> <li>d. Check the emergency beacon for proper operation.</li> <li>e. Check all lights for burned out bulbs, loose connections, and dirty or broken lenses.</li> <li>f. Check to insure all circuits function properly.</li> </ul>
Steering System	<ul style="list-style-type: none"> <li>a. Check steering reservoir for proper fluid level.</li> <li>b. Examine steering hose connections for evidence of leakage. Tighten as required.</li> <li>c. Check steering stop adjustment. Adjust if required.</li> <li>d. Check steering system for proper operation during road test.</li> </ul>
Chassis and Running Gear	<ul style="list-style-type: none"> <li>a. Check all lubricant levels</li> <li>b. Check tire inflation.</li> <li>c. Inspect tires for serious cuts or bruises. Remove foreign objects lodged in the tread.</li> <li>d. Check all wheel mounting nuts for proper torque.</li> <li>e. Check front and rear suspension for proper mounting.</li> </ul>
Fuel System	<ul style="list-style-type: none"> <li>a. Check fuel level and replenish if necessary.</li> <li>b. Check condition of fuel filter.</li> <li>c. Inspect fuel line connections for evidence of leakage. Tighten as required.</li> <li>d. During cold weather, drain moisture accumulation from fuel tank before operation of vehicle</li> </ul>
Brake System	<ul style="list-style-type: none"> <li>a. Check for proper air pressure 70 psi (483 kPa).</li> <li>b. Inspect brake lines for evidence of leakage. Tighten or replace loose or defective fittings.</li> <li>c. Check operation of brakes.</li> <li>d. Bleed condensation from air brake reservoirs.</li> </ul>

**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 Twin Agent 4x4 Firefighting Truck 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 M-Monthly Q-Quarterly S-Semi-Annually A-Annually

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
<b>ACCESSORIES</b>							
1	●					Polyethylene Funnel	Visually inspect polyethylene funnel for corrosion or damage. Replace if damaged.
2	●					Filler Tube	Visually inspect filler tube for corrosion or damage. Replace if damaged.
3	●					Steel Funnel	Visually inspect steel funnel for corrosion or damage. Replace if damaged.
<b>AUXILIARY FIREFIGHTING EQUIPMENT</b>							
4	●		●			Hydraulic Rescue Tool	Visually inspect hydraulic rescue tool for structural damage. Perform operational check.
5	●		●			Hydraulic Rescue Tool Power Unit	Visually inspect hydraulic rescue tool power unit for fluid leaks and structural damage. Perform operational check. Check engine oil level and hydraulic fluid level. Add fluid if necessary. Refer to next higher level of maintenance for repair.
6	●		●			10 Ton Hydraulic Rescue Kit	Visually inspect 10 ton hydraulic rescue kit for fluid leaks and structural damage. Inspect contents of the kit for missing tools. Perform operational check. Check reservoir fluid level. Add fluid if necessary.
7	●		●			Rescue Saw	Visually inspect rescue saw for structural damage. Inspect cutter blade for damaged teeth. Perform operational check. Check reservoir and engine fluid levels. Add fluid if necessary. Refer to next higher level of maintenance for repair.
8	●		●			Inverter	Visually inspect inverter for damage. Perform operational check. Replace inverter if defective or damaged.
<b>TWIN AGENT FIREFIGHTING SYSTEM</b>							
9	●		●			Nitrogen Cylinders	Visually inspect nitrogen cylinders for corrosion or structural damage. Check cylinder pressure gauge for minimum 1840 psi (12,686 kPa) working pressure. Replace damaged cylinders.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><b>WARNING</b></div> <p>Ensure all pressure is expelled from the dry chemical or AFFF tanks before removing fill plugs. If pressure venting sound is audible, stop immediately and wait until there is no further gas escaping. Avoid breathing dry chemical dust when filling tank. The dry chemical may create hazards to personnel.</p>							



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

W-Weekly M-Monthly Q-Quarterly S-Semi-Annually A-Annually

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
10		●	●			Agent Tanks	Visually inspect agent tanks for corrosion or structural damage. Replace tanks if damaged or corroded. Check firefighting agent levels. Add agents as necessary.
11	●		●			Piping, Valves, Fittings and Regulators	Visually inspect all piping, valves, fittings, and regulators for corrosion or structural damage. Replace any damaged or defective piping, valves, or regulators.
12	●		●			Controls and Gauges	Visually inspect all controls and gauges for damage. Perform operational check. Replace any damaged or defective gauges or controls.
13	●		●			Twin Agent Turret Assembly	<p>REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY</p> <p>Visually inspect remote manual twin agent turret assembly for corrosion and structural damage. Perform operational check. Replace agent turret if damaged or defective.</p>
14		●				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 nozzles for cracks, corrosion, or other damage. Repair or replace damaged parts.</p>
15		●				Lights	<p>FIRE BODY ASSEMBLY</p> <p>Perform operational checks on clearance lights, deck lights, quartz lights, tail lights and compartment lights. Inspect lights for defective lamps, bulbs, or damaged lenses. Replace defective parts.</p> <p>ENGINE COOLING SYSTEM</p> <div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;"> <p><b>WARNING</b></p> </div> <p>Allow engine to cool 15 minutes before removing filler cap.</p>
16	●					Coolant Level	Visually inspect coolant for rust or impurities. Check coolant level. Add coolant as necessary.
17	●					Fan Belt	Visually inspect fan belt for signs of cracks, breaks, or wear. Replace belt if any signs of wear are evident.
18			●			Thermostat Housing	Visually inspect thermostat housing for corrosion or structural damage. Inspect the sealing surface for corrosion build up. Replace any damaged or defective parts.
19			●			Water Pump	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.
20				●		Radiator	Visually inspect radiator for signs of leakage, corrosion, or other structural damage. Replace radiator if defective.
21				●		Radiator Piping	Visually inspect radiator piping for signs of leakage or corrosion. Inspect piping for loose or missing clamps. Replace any defective parts.

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

W-Weekly M-Monthly Q-Quarterly S-Semi-Annually A-Annually

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
<b>ENGINE FUEL SYSTEM</b>							
22			●			Air Cleaner Filter	Visually inspect air cleaner for free air flow. Replace air cleaner filter if clogged or dirty.
23			●			Fuel Filters	Visually inspect the fuel filters for clogged or dirty passages. Replace fuel filter if clogged or dirty.
24			●			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.
<b>ENGINE AND ACCESSORIES</b>							
25		●				Engine Assembly	Visually inspect engine for signs of rust, pitting, or structural damage. Perform operational check. Refer to next higher level of maintenance for replacement.
26		●				Batteries	Visually inspect batteries and cables for rust or corrosion. Check water level. Replenish water as necessary. Replace batteries if damaged or corroded.
27		●				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.
28		●				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.
29				●		Turbocharger	Visually inspect turbocharger for signs of corrosion or other structural damage. Inspect for loose, damaged or missing attaching hardware. Replace turbocharger if damaged. Replace missing or damaged attaching hardware.
30				●		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.
31				●		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.
32				●		Rocker Arm Cover	Visually inspect rocker arm cover for signs of corrosion or other structural damage. Inspect for loose, damaged or missing attaching hardware. Replace rocker arm cover if damaged. Replace missing or damaged attaching hardware.

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

W-Weekly M-Monthly Q-Quarterly S-Semi-Annually A-Annually

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
33			●			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.
34					●	Engine Mountings	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>CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p><b>WARNING</b></p> </div> <p><b>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.</b></p>							
35		●				Controls, Indicators and Gauges	With engine running and parking brake secure, perform operational check of electrical controls, indicators, and gauges. Repair or replace any defective controls, indicators, or gauges.
36		●				Lights	Perform operational check on headlights, parking lights, turn signal lights, spot lights, and roof beacon light. Visually inspect lights for defective lamps or bulbs, or damaged lenses. Replace or repair defective lamps, bulbs, or lenses.
37	●					Siren/Public Address System	Perform operational check on siren/public address system. Visually inspect siren and external speaker for damage. Replace siren/public address system or external speaker if defective.
38			●			Heater/Defroster	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.
39		●				Cab Panels	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>ELECTRICAL SYSTEM</p>							
40					●	Cab/Body Wiring Harness	Visually inspect respective cab or body harness for breaks, 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.

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

W-Weekly M-Monthly Q-Quarterly S-Semi-Annually A-Annually

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
41			●			Propeller Shafts	<p style="text-align: center;"><b>PROPELLER SHAFT ASSEMBLY</b></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) continue, replace defective parts. Replace any damaged parts that are found.</p>
42			●			Transmission	<p style="text-align: center;"><b>TRANSMISSION ASSEMBLY</b></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>
43			●			Transfer Case	<p style="text-align: center;"><b>TRANSFER CASE ASSEMBLY</b></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>
44		●				Wheels and Tires	<p style="text-align: center;"><b>TIRE RIM ASSEMBLY</b></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>
45		●				Brake System	<p style="text-align: center;"><b>BRAKE SYSTEM</b></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. Replace any defective or missing parts.</p>
46		●				Parking Brake Control	<p>Perform operational check on parking brake control. Visually 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)

W-Weekly M-Monthly Q-Quarterly S-Semi-Annually A-Annually

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
47		●				Front Brakes	Visually inspect front brakes for cracks, scores, spotting, or other structural damage to the caliper's. Inspect condition of brake lining. Replace front brakes or brake lining if defective or worn parts are found.
48		●				Rear Brakes	Visually inspect rear 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.
<b>STEERING ASSEMBLY</b>							
49			●			Steering System	Visually inspect pitman arm, tie rods, drag link and steering shock absorber for corrosion, cracks, bends, dents, or other structural damage. Replace any damaged parts.
<b>POWER STEERING SYSTEM</b>							
50			●			Power Steering System	Visually inspect power steering gear, pump, and piping 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.
<b>FRONT SUSPENSION ASSEMBLY</b>							
51				●		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.
52				●		Wheel Hub	Visually inspect dust cap, brake drum and hub for corrosion, cracks, pitting, looseness, or other structural damage. Inspect screws and studs for distortion, damaged heads or screws. Replace any damaged or defective parts.
<b>REAR SUSPENSION ASSEMBLY</b>							
53				●		Rear Suspension	Visually inspect U-bolts, 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.

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

W-Weekly M-Monthly Q-Quarterly S-Semi-Annually A-Annually

ITEM NO.	INTERVAL					ITEM TO BE INSPECTED	PROCEDURE
	W	M	Q	S	A		
<b>REAR AXLE ASSEMBLY</b>							
54				●		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.
55			●			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.
56			●			Axle Shaft	Visually inspect axle shaft for signs of torsional fractures or other indications of impending failure. Replace shaft if damaged.
57				●		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 trunnions 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.
<b>FRONT AXLE ASSEMBLY</b>							
58				●		Axle Shaft	Visually inspect axle shaft for signs of torsional fractures or other indications of impending failure. Replace shaft if damaged.
59				●		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 trunnions 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.
<b>FRAME ASSEMBLY</b>							
60			●			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.
61					●	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
--------------------------------	-----------	---------------	-----------

**4-8. GENERAL.**

The lubrication section illustrates and lists items of the Twin Agent 4x4 Firefighting Truck which require lubrication checks and services. Detailed lubrication instructions for the transmission, transfer case, brake system and power steering system assemblies can also be found, under the appropriate, organizational maintenance paragraphs.

**4-9. CHASSIS LUBRICATION INSTRUCTIONS**

**NOTE**

Park truck on the most level ground possible to check oil levels.

Clean fittings before and after lubricating with a dry, lint-free cloth (Appendix D, Item 14).

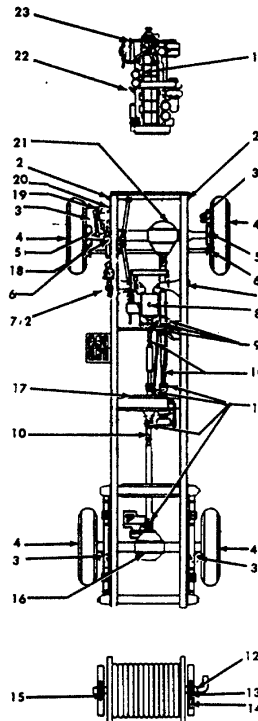
Keep all external parts that do not require lubrication free of lubricants. Before lubricating, clean lint, dust, or grease from the lubrication points.

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 all moving parts.

**THESE LUBRICATION INSTRUCTIONS ARE MANDATORY.**



- |   |                                |   |
|---|--------------------------------|---|
| 1. Throttle                                 | 10. Propeller Shaft Slip Joint | 18. Steering Column U-Joints, Slip Joints |
| 2. Spring Pin                               | 11. Propeller Shaft U-Joint    | 19. Drag Link                             |
| 3. Brake Camshaft and Slack Adjuster        | 12. Hose Reel Swing Joint      | 20. Power Steering Gear                   |
| 4. Wheel Bearing                            | 13. Hose Reel Gears            | 21. Front Differential                    |
| 5. Axle Shaft U-Joint and Trunnion Bearings | 14. Hose Reel Brake Assembly   | 22. Engine                                |
| 6. Tie Rod End                              | 15. Hose Reel Bearing          | 23. Power Steering Pump                   |
| 7. Shackle Pin                              | 16. Rear Differential          |   |
| 8. Transmission                             | 17. Transfer Case              |   |
| 9. Transfer Case Shift Linkage              |                                |   |

*FIGURE 4-1. CHASSIS LUBRICATION SCHEMATIC*

**4-9. CHASSIS LUBRICATION INSTRUCTIONS (Continued).***a. Chassis Lubrication*

- (1) *Throttle Linkage.* Lubricate with light engine oil (SAE 10 W 30W) (Appendix D, Item 37) as required, not to exceed 100 hours of operation.
- (2) *Spring Pin.* Lubricate with grease (Appendix D, Item 20) every 100 hours of operation. Pressure gun should be held on fitting until new grease appears.
- (3) *Brake Camshaft and Slack Adjuster.* Lubricate with grease (Appendix D, Item 20) every 250 hours of operation.
- (4) *Wheel Bearing.* Lubricate with grease (Appendix D, Item 20) every 500 hours of operation. Pack bearings with grease by hand.
- (5) *Axle Shaft U Joint, and Trunnion Bearings.* Lubricate with grease (Appendix D, Item 20). Lubricate axle shaft U-joint whenever axle shafts are removed. Lubricate trunnion bearings when bearing caps are removed for service. No periodic lubrication is required.
- (6) *Tie Rod Ends.* Lubricate with grease (Appendix D, Item 20) every 250 hours of operation. Pressure gun should be held on fitting until new grease appears.
- (7) *Shackle Pin.* Lubricate with grease (Appendix D, Item 20) every 100 hours of operation. Pressure gun should be held on fitting until new grease appears.
- (8) *Transmission.* Check transmission fluid weekly. Change transmission fluid every 250 hours of operation. Use DEXRON II type oil (Appendix D, Item 38).
- (9) *Transfer Case Shift Linkage.* Lubricate by hand using grease (Appendix D, Item 21) every 100 hours of operation.
- (10) *Propeller Shaft Slip Joint.* Lubricate with grease (Appendix D, Item 20) every 100 hours of operation. Pressure gun should be held on fitting until new grease appears.
- (11) *Propeller Shaft U Joint.* Lubricate with grease (Appendix D, Item 20) every 100 hours of operation, pressure gun should be held on fitting until new grease appears.
- (12) *Hose Reel Swing Joint.* Lubricate with grease (Appendix D, Item 21) every 250 hours of operation.
- (13) *Hose Reel Gears.* Lubricate by hand using grease (Appendix D, Item 21) every 250 hours of operation.
- (14) *Hose Reel Brake Assembly.* Lubricate with grease (Appendix D, Item 20) every 250 hours of operation. Pressure gun should be held on fitting until new grease appears.
- (15) *Hose Reel Bearing.* Lubricate with grease (Appendix D, Item 20) every 250 hours of operation.
- (16) *Rear Differential.* Remove fill plug, add SAE 80W-90 gear oil (Appendix D, Item 36) to the level of the fill plug hole every 250 hours of operation. Change initial fill lubricant after first 50 hours of operation.
- (17) *Transfer Case.* Check level and fill using SAE 80W-90 gear oil (Appendix D, Item 36).
- (18) *Steering Column U Joints, Slip Joints.* Lubricate with grease (Appendix D, Item 20) every 250 hours of operation. Pressure gun should be held on fitting until new grease appears.
- (19) *Drag Link.* Lubricate with grease (Appendix D, Item 20) every 100 hours of operation. Pressure gun should be held on fitting until new grease appears.
- (20) *Power Steering Gear.* Lubricate with grease (Appendix D, Item 20) every 100 hours of operation. Lubricate using low pressure.



4-9. CHASSIS LUBRICATION INSTRUCTIONS (Continued).

- (21) *Front Differential.* Remove fill plug, add SAE 80W-90 gear oil (Appendix D, Item 36) to the level of the fill plug hole every 250 hours of operation. Change initial fill lubricant after first 50 hours of operation.
- (22) *Engine Crankcase.* Check oil level every 10 hours of operation, fill to FULL marking on dipstick using SAE 10W-40 oil (Appendix D, Item 37). Change oil and oil filters every 200 hours of operation.

**RECOMMENDED SAE VISCOSITY GRADE ENGINE OILS**  
**SELECT THE SAE GRADE OIL BASED ON THE EXPECTED TEMPERATURE RANGE BEFORE NEXT OIL CHANGE**

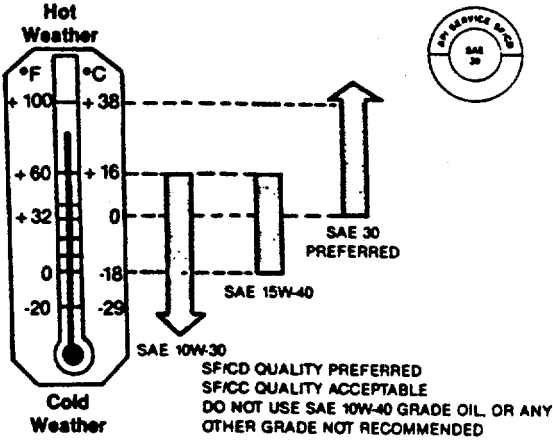
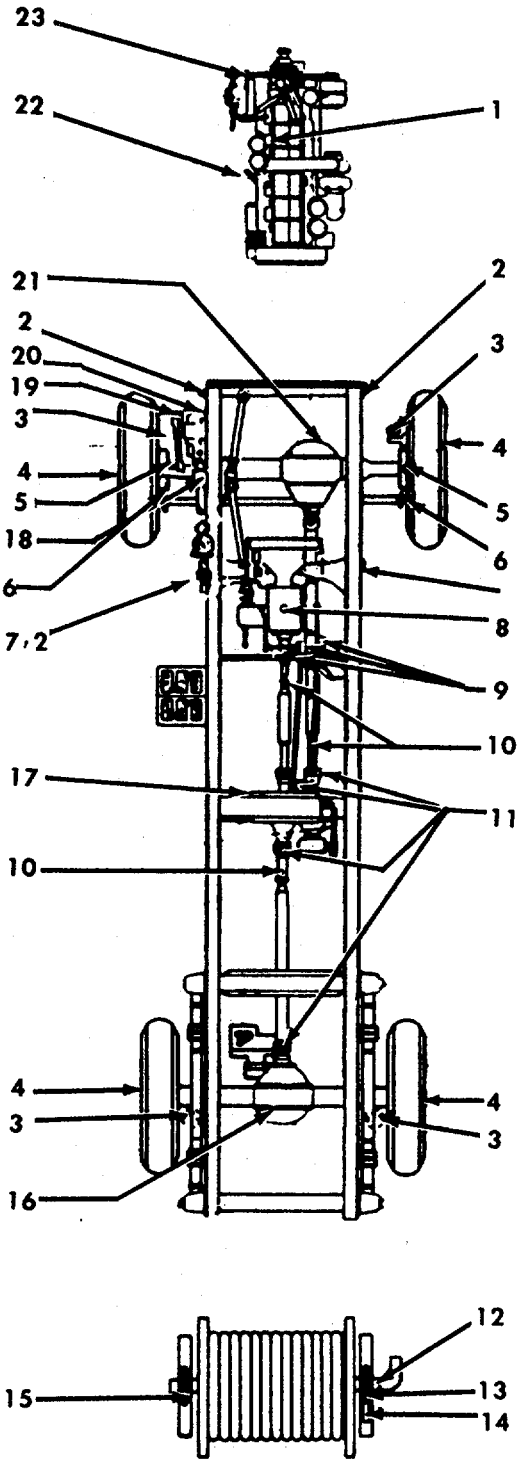


Table 4-3. SAE Oil Viscosity Recommendations

- (23) *Power Steering Pump.* Check oil level every 100 hours of operation, fill to FULL mark on dipstick using SAE 10W-40 oil (Appendix D, Item 37). Change oil and filters every 250 hours of operation.



**Section V. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES**

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

**4-10. GENERAL.**

- a. The table in this section lists the common malfunctions which may occur during the operation or maintenance of the Twin Agent 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.

**4-11. SYMPTOM INDEX.**

Symptom	Page
<b>AUXILIARY FIREFIGHTING EQUIPMENT</b>	
Hydraulic Rescue Tool Operates Erratically .....	4-19
Hydraulic Rescue Tool Has Loss of Power .....	4-19
Hydraulic Rescue Tool Fails to Operate .....	4-19
Hydraulic Rescue Tool Operates in Reverse .....	4-19
Power Unit Will Not Start .....	4-19
Power Unit Misses Under Load .....	4-19
Power Unit Lacks Power .....	4-19
Power Unit Does Not Run Tool .....	4-19
<b>TWIN AGENT FIREFIGHTING SYSTEM</b>	
High Pressure Gauge Indicates Loss of Pressure .....	4-19
Handline Valves Do Not Operate Freely .....	4-20
Dry Chemical Handline Valve Does Not Close Properly .....	4-20
Marked Decrease in Flow From Discharge Nozzles .....	4-20
<b>HOSE REEL ASSEMBLY</b>	
Hose Nozzle Leaks .....	4-20
Hose Reel Rewind Inoperative .....	4-20
<b>FIRE BODY ASSEMBLY</b>	
Back-Up Lights Inoperative .....	4-20
Stop Lights Inoperative .....	4-20
<b>ENGINE COOLING SYSTEM</b>	
Engine Coolant Overheating .....	4-21
Engine Coolant Loss .....	4-21
<b>ENGINE EXHAUST SYSTEM</b>	
Vibrating Or Rattling From Exhaust System .....	4-21
Restricted Exhaust System .....	4-21
Exhaust Leakage And/Or Noise .....	4-21

4-11. SYMPTOM INDEX (Continued).

Symptom	Page
<b>ENGINE AND ACCESSORIES</b>	
Engine Will Not Crank .....	4-22
Engine Cranks Slowly-Will Not Start .....	4-22
Engine Cranks Normally-Will Not Start .....	4-22
Engine Starts But Will Not Continue To Run At Idle Speed .....	4-22
Engine Will Not Return To Idle Speed.....	4-22
Noticeable Loss Of Power .....	4-22
Engine Overheats .....	4-23
<b>CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS</b>	
Headlights Inoperative .....	4-23
Front Side Marker Lights Inoperative .....	4-23
Turn Signals Inoperative .....	4-23
Hazard Warning Lights Inoperative .....	4-23
Roof Warning Light Operates But Fails To Rotate.....	4-24
Roof Warning Light Operates Intermittently While Rotating .....	4-24
Windshield Wipers Inoperative .....	4-24
Windshield Washer Pump Inoperative .....	4-24
Noise From Speedometer .....	4-24
Inadequate Defrosting.....	4-24
Erratic Heater Operation .....	4-24
<b>PROPELLER SHAFT ASSEMBLY</b>	
Noisy Propeller Shaft .....	4-24
Propeller Shaft Vibration.....	4-25
<b>TRANSMISSION ASSEMBLY</b>	
Lubricant Leaks.....	4-25
Noisy Shifting.....	4-25
Slips Out Of Gear .....	4-25
<b>TRANSFER CASE ASSEMBLY</b>	
Excessive Noise .....	4-25
Shift Lever Difficult To Move.....	4-25
Lubricant Leaking.....	4-25
<b>TIRE RIM ASSEMBLY</b>	
Excessive Tire Wear.....	4-26
<b>BRAKE SYSTEM</b>	
Excessive Brake Pedal Travel .....	4-26
Excessive Brake Pedal Effort.....	4-26
Brakes Slow To Respond.....	4-26
Uneven Braking Action-Side To Side .....	4-26
Brakes Squeak During Application .....	4-27
<b>STEERING ASSEMBLY</b>	
Excessive Play Or Looseness .....	4-27
Hard Steering.....	4-27

4-11. SYMPTOM INDEX (Continued).

Symptom	Page
<b>POWER STEERING SYSTEM</b>	
Belt Squeal .....	4-27
Excessive Steering Wheel Kick-Back Or Loose Steering .....	4-27
Hard Steering.....	4-27
<b>FRONT AND REAR SUSPENSION ASSEMBLIES</b>	
Poor Directional Stability.....	4-28
Front/Rear Shimmy.....	4-28
Vehicle Pulls To One Side .....	4-28
Front/Rear End Noise .....	4-28
<b>REAR/FRONT AXLE ASSEMBLY</b>	
Wheels Do Not Drive (Propeller Shaft Rotating).....	4-28
Lubricant Leaks Through Axle Shaft.....	4-29
Lubricant Leaks At Pinion Shaft .....	4-29
Constant Noise From Front Axle .....	4-29

**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**

---

**AUXILIARY FIREFIGHTING EQUIPMENT**

1. HYDRAULIC RESCUE TOOL OPERATES ERRATICALLY.  
*Step 1.* Check if hydraulic fluid is low.  
 Add fluid (paragraph 4-19).  
*Step 2.* Check for air in hydraulic system.  
 Cycle tool full open to full closed several times (paragraph 2-16).
2. HYDRAULIC RESCUE TOOL HAS LOSS OF POWER.  
*Step 1.* Check for leak in valve seals.  
 Refer to next higher level of maintenance for repair.  
*Step 2.* Check for piston failure.  
 Refer to next higher level of maintenance for repair.
3. HYDRAULIC RESCUE TOOL FAILS TO OPERATE.  
 Check for coupling failure.  
 Replace coupling (paragraph 4-19).
4. HYDRAULIC RESCUE TOOL OPERATES IN REVERSE.  
 Check for reversed hoses on power supply.  
 Reverse hoses (paragraph 2-16).
5. POWER UNIT WILL NOT START.  
*Step 1.* Check if fuel is low.  
 Add fuel paragraph 4-19).  
*Step 2.* Check if throttle is not in the choke position.  
 Move throttle to choke position.
6. POWER UNIT MISSES UNDER LOAD.  
 Check for fouled or cracked spark plug.  
 Replace spark plug (paragraph 4-19).
7. POWER UNIT LACKS POWER.  
 Check for partially closed choke.  
 Adjust throttle control.
8. POWER UNIT DOES NOT RUN TOOL.  
 Check for dump valve in DUMP position.  
 Switch lever to PRESSURE position.

**TWIN AGENT FIREFIGHTING SYSTEM**

9. HIGH PRESSURE GAUGE INDICATES LOSS OF PRESSURE.  
 Check for manifold leak.  
 Tighten connections as required.

Table 4-4. Organizational Troubleshooting Chart

<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
10. HANDLINE VALVES DO NOT OPERATE FREELY.	Check handline valves for corrosion.	Replace affected valves (paragraph 4-39).
11. DRY CHEMICAL HANDLINE VALVE DOES NOT CLOSE PROPERLY.	Check for dry chemical build up inside the valve.	Replace valve (paragraph 4-39).
12. MARKED DECREASE IN FLOW FROM DISCHARGE NOZZLES.	Check for low cylinder pressure.	Replace cylinders (paragraph 2-26).
<b>HOSE REEL ASSEMBLY</b>		
13. HOSE NOZZLE LEAKS.	<i>Step 1.</i> Check for defective o-ring in coupling. Replace o-ring (paragraph 4-39). <i>Step 2.</i> Check for defective nozzle assembly. Replace nozzle (paragraph 4-39).	
14. HOSE REEL REWIND INOPERATIVE.	Perform operational check on rewind motor.	Replace rewind motor (paragraph 4-41).
<b>FIRE BODY ASSEMBLY</b>		
15. BACK-UP LIGHTS INOPERATIVE.	<i>Step 1.</i> Inspect for loose or burnt out bulbs. Secure or replace bulbs (paragraph 4-52). <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 from fuse through gear selector or back-up light switch.	
16. STOP LIGHTS INOPERATIVE.	<i>Step 1.</i> Inspect for loose or burnt out bulbs. Secure or replace bulbs (paragraph 4-53). <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

---

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

**ENGINE COOLING SYSTEM**

## 17. ENGINE COOLANT OVERHEATING.

*Step 1.* Check pressure cap for proper seal.

Replace pressure cap (paragraph 4-58).

*Step 2.* Check coolant level.

Fill cooling system to proper level (paragraph 4-58).

*Step 3.* Check for loose or worn fan belt.

Replace worn fan belt (paragraph 4-62). Tighten fan belt.

*Step 4.* Check for damaged coolant hoses.

Replace coolant hoses (paragraph 4-63).

*Step 5.* Check for damaged or inoperative thermostat.

Replace thermostat (paragraph 4-65).

*Step 6.* Check for scale or deposits in cooling system.

Clean and flush cooling system (paragraph 4-58).

*Step 7.* Check for damaged radiator.

Replace radiator (paragraph 4-66).

## 18. 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**

## 19. VIBRATING OR RATTLING FROM EXHAUST SYSTEM.

Visually inspect for loose or misaligned components.

Align and tighten connections. Replace damaged hanger brackets or clamps (paragraph 4-79).

## 20. RESTRICTED EXHAUST SYSTEM.

*Step 1.* Inspect for damaged or kinked tubing exhaust.

Replace the damaged condition (paragraph 4-79).

*Step 2.* Inspect tail pipe end for obstructions.

Remove obstruction, or if end is crimped, straighten outlet.

## 21. EXHAUST LEAKAGE AND/OR NOISE.

*Step 1.* 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 4-89).

*Step 4.* Inspect for burned or rusted out exhaust pipe.

Replace exhaust pipe (paragraph 4-79).

Table 4-4. Organizational Troubleshooting Chart

---

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


---

**ENGINE AND ACCESSORIES**

## 22. ENGINE WILL NOT CRANK.

*Step 1.* Inspect for loose or corroded battery cables.

Tighten or replace battery cables (paragraph 4-83).

*Step 2.* Check voltage to starter and starter solenoid.

Replace starter if defective (paragraph 4-86).

*Step 3.* Check generator output and generator belt tension.

Replace generator or tighten belt (paragraph 4-85).

## 23. 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 4-83).

## 24. 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 4-70).

*Step 2.* Inspect for incorrect contaminated fuel.

Replace fuel.

## 25. 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.

## 26. ENGINE WILL NOT RETURN TO IDLE SPEED.

Inspect linkage for proper alignment or binding.

Adjust or replace linkage (paragraph 4-71).

## 27. NOTICEABLE LOSS OF POWER.

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

Replace air cleaner element (paragraph 4-68).

*Step 2.* Inspect for blocked fuel filters.

Replace fuel filters (paragraph 4-69).

*Step 3.* Remove fuel tank and check filter.

Replace fuel tank filter (paragraph 4-69).



Table 4-4. Organizational Troubleshooting Chart

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

## 28. ENGINE OVERHEATS.

*Step 1.* Check coolant system for leaks.

Fill cooling system as necessary (paragraph 4-58).

*Step 2.* Inspect for loose or worn fan belt.

Replace worn fan belt (paragraph 4-62). Tighten fan belt.

*Step 3.* Check if thermostat is stuck closed.

Replace thermostat (paragraph 4-65).

*Step 4.* Inspect for leaks at head gasket.

Replace head gasket (paragraph 4-65).

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

## 29. 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 4-94).

## 30. FRONT SIDE MARKER LIGHTS INOPERATIVE.

*Step 1.* Inspect for loose or burnt out bulbs.

Secure or replace bulbs (paragraph 4-95).

*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 4-108).

## 31. TURN SIGNALS INOPERATIVE.

*Step 1.* Inspect for loose or burnt out bulbs.

Secure or replace bulbs (paragraph 4-96).

*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.* Check for defective turn signal flasher.

Replace flasher (paragraph 4-96).

## 32. HAZARD WARNING LIGHTS INOPERATIVE.

*Step 1.* Inspect for loose or burnt out bulbs.

Secure or replace bulbs (paragraph 4-96).

*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.* Check for defective warning light flasher.

Replace flasher (paragraph 4-96).

Table 4-4. Organizational Troubleshooting Chart

---

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

---

## 33. ROOF WARNING LIGHT OPERATES BUT FAILS TO ROTATE.

*Step 1.* Check for defective internal motor.

Replace motor (paragraph 4-100).

*Step 2.* Check for binding mechanism.

Disassemble, clean and reassemble as required.

## 34. ROOF WARNING LIGHT OPERATES INTERMITTENTLY WHILE ROTATING.

Check if internal brush is worn or corroded.

Clean or replace brush (paragraph 4-100).

## 35. WINDSHIELD WIPERS INOPERATIVE.

*Step 1.* Check for blown fuse.

Replace fuse.

*Step 2.* Inspect for damaged motor.

Replace motor (paragraph-4-100).

## 36. WINDSHIELD WASHER INOPERATIVE.

*Step 1.* 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 4-105).

*Step 2.* 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 4-107).

## 38. INADEQUATE DEFROSTING.

*Step 1.* Check that defrost lever is operating.

Adjust as necessary.

*Step 2.* Inspect for obstructions in defroster ducts.

Remove any obstructions.

## 39. ERRATIC HEATER OPERATION.

*Step 1.* Check coolant level.

Fill to proper level (paragraph 4-58).

*Step 2.* Check for kinked heater hoses.

Relieve kinks or replace hoses.

*Step 3.* Test blower motor.

Replace if defective (paragraph 4-112).

### PROPELLER SHAFT ASSEMBLY

## 40. NOISY PROPELLER SHAFT.

Inspect for bent or dented drive shafts.

Replace drive shafts (paragraph 4-150).

Table 4-4. Organizational Troubleshooting Chart

---

<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

---

## 41. PROPELLER SHAFT VIBRATION.

*Step 1.* Check for loose or damaged universal joints.

Replace universal joints (paragraph 4-151).

*Step 2.* Check to see if drive shaft tubes are out of balance.

Replace drive shaft tubes (paragraph 4-152).

**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 4-156).

*Step 2.* Inspect side cover and gasket for damage or looseness.

Tighten or replace cover or gasket (paragraph 4-156).

*Step 3.* Inspect rear extension seal for damage.

Replace seal (paragraph 4-156).

## 43. NOISY SHIFTING.

*Step 1.* Inspect shift linkage for damage.

Replace linkage (paragraph 4-157).

## 44. SLIPS OUT OF GEAR.

*Step 1.* Inspect shift linkage for binding.

Adjust or replace linkage.

*Step 2.* Inspect for proper alignment.

Align and tighten as necessary.

**TRANSFER CASE ASSEMBLY**

## 45. 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.

## 46. SHIFT LEVER DIFFICULT TO MOVE.

Perform operational check on shift lever.

Refer to next higher level of maintenance.

## 47. 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.

Table 4-4. Organizational Troubleshooting Chart

---

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

---

**TIRE RIM ASSEMBLY**

48. EXCESSIVE TIRE WEAR.

*Step 1.* Check tires for proper inflation.

Inflate to recommended pressure 80 psi (551.6 kPa).

*Step 2.* Inspect shock absorbers for damage.

Replace shock absorbers (paragraph 4-185).

*Step 3.* Check front end for proper alignment.

Align the front end.

*Step 4.* Check tires for proper balance.

Balance rims/tires.

**BRAKE SYSTEM**

49. 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 4-169).

50. EXCESSIVE BRAKE PEDAL EFFORT.

Inspect for worn brake lining.

Replace lining (paragraph 4-169).

51. BRAKES SLOW TO RESPOND.

*Step 1.* Inspect wheel cylinders for damage.

Replace as necessary (paragraph 4-199).

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

Adjust or replace as necessary.

52. UNEVEN BRAKING ACTION-SIDE TO SIDE.

*Step 1.* Inspect wheel cylinders for damage.

Replace as necessary (paragraph 4-199).

*Step 2.* Inspect for worn brake lining.

Replace brake lining (paragraph 4-169).

*Step 3.* Inspect brake drums or rotors for heat spots or scores.

Replace drums or rotors (paragraph 4-199).

Table 4-4. Organizational Troubleshooting Chart

---

**MALFUNCTION**

**TEST OR INSPECTION**

**CORRECTIVE ACTION**

---

53. BRAKES SQUEAK DURING APPLICATION.

- Step 1.* Inspect for uneven brake lining wear.  
Replace brake lining (paragraph 4-169).
- Step 2.* Check brake drums for out-of-round.  
Replace brake drums (paragraph 4-190).

**STEERING ASSEMBLY**

54. EXCESSIVE PLAY OR LOOSENESS.

- Step 1.* Inspect for worn steering shaft couplings.  
Replace couplings (paragraph 4-189).
- Step 2.* Inspect for worn upper ball joints.  
Replace ball joints (paragraph 4-189).
- Step 3.* Inspect for loose pitman arm, tie rods or steering arms.  
Tighten as necessary.

55. HARD STEERING.

- Step 1.* Check tires for proper inflation.  
Inflate to recommended pressure.
- Step 2.* Inspect steering linkage for proper lubrication.  
Lubricate as necessary (paragraph 4-9).
- Step 3.* Check front end for proper alignment.  
Align front end.

**POWER STEERING SYSTEM**

56. BELT SQUEAL

- Inspect for loose belt.  
Adjust belt tension (paragraph 4-62).

57. 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.

58. 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.

Table 4-4. Organizational Troubleshooting Chart

---

<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

---

**FRONT AND REAR SUSPENSION ASSEMBLY**

## 59. POOR DIRECTIONAL STABILITY.

*Step 1.* Inspect ball joint lubrication.

Lubricate as necessary (paragraph 4-9).

*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 4-190).

## 60. FRONT/REAR SHIMMY.

*Step 1.* Check tires for proper balance.

Balance wheel/tires.

*Step 2.* Inspect for loose or worn steel bearings.

Replace wheel bearings (paragraph 4-187).

*Step 3.* Inspect for malfunctioning shock absorber.

Replace shock absorber (paragraph 4-185).

## 61. 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 4-193).

## 62. FRONT/REAR END NOISE.

*Step 1.* Inspect ball joints and steering linkage for proper lubrication.

Lubricate as necessary (paragraph 4-9).

*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**

## 63. WHEELS DO NOT DRIVE (PROPELLER SHAFT ROTATING).

Broken axle shaft.

Replace axle shaft (paragraph 4-198).

Table 4-4. Organizational Troubleshooting Chart

---

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

---

## 64. 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.

## 65. 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).

*Step 3.* Restricted axle housing breather valve.

Inspect and replace.

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

Remove restriction.

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

Tighten companion flange to specified torque.

## 66. CONSTANT NOISE FROM FRONT AXLE.

Improperly lubricated wheel bearings.

Repack wheel bearings (paragraph 4-187).

---

**Section VI. MAINTENANCE OF ACCESSORIES**

	Para.		Para.
Aircraft Crash Rescue Tool Kit Replacement.....	4-15	General .....	4-12
Filler Tube Replacement .....	4-14	Polyethylene Funnel Replacement .....	4-13
		Steel Funnel Replacement .....	4-16

**4-1 2. GENERAL.**

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

**4-1 3. POLYETHYLENE FUNNEL REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

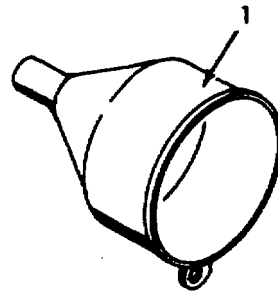
Materials/Parts

Polyethylene Funnel (DUN-3009)

**REMOVAL**

**NOTE**

**If the polyethylene funnel (1) is not found in the truck, the funnel may be stored at the AFFF storage site.**



Remove the polyethylene funnel (1) from the cab.

**INSTALLATION**

Insert new polyethylene funnel (1) into the cab.



**4-14. FILLER TUBE REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

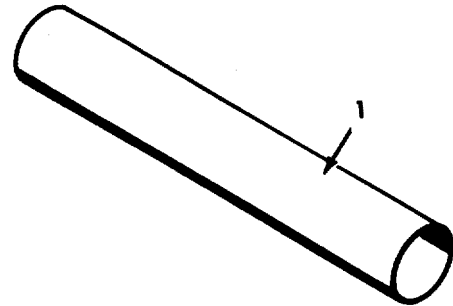
Materials/Parts  
 Filler Tube (603426B001)

**REMOVAL**

**NOTE**

If the filler tube (1) is not found in the truck, it may be stored at the dry chemical storage site.

Remove the filler tube (1) from the cab of the truck.



**INSTALLATION**

Insert new filler tube (1) into cab of the truck.

**4-15. AIRCRAFT CRASH RESCUE TOOL KIT REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

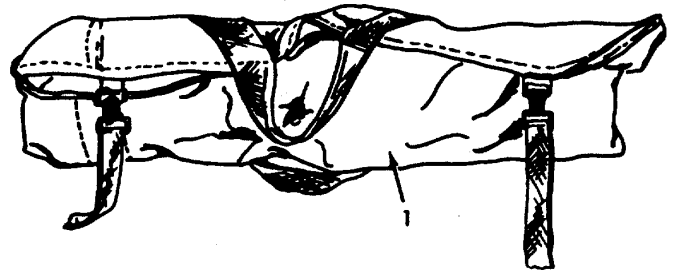
Materials/Parts  
 Aircraft Crash Rescue Tool Kit (CRK5)

**REMOVAL**

Remove the Aircraft Crash Rescue Tool Kit (1) from the top rear streetside compartment.

**INSTALLATION**

Insert new Aircraft Crash Rescue Tool Kit (1) into top rear streetside compartment.



**4-16. STEEL FUNNEL REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

Materials/Parts

Steel Funnel (101511D001)

**REMOVAL**

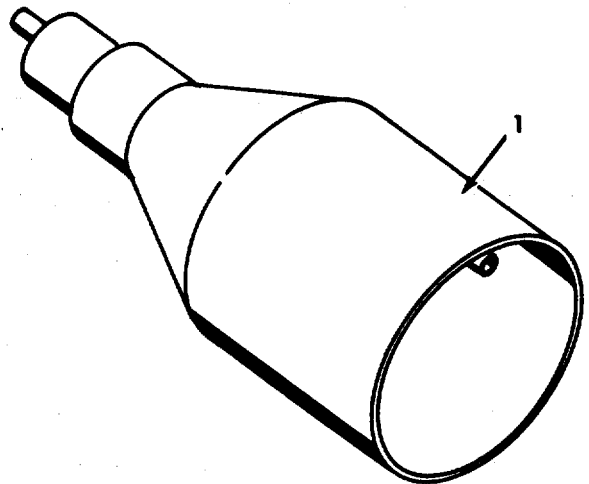
**NOTE**

If the steel funnel (1) is not found in the truck, the funnel may be stored at the dry chemical storage site.

Remove steel funnel (1) from the cab.

**INSTALLATION**

Insert new steel funnel (1) into the cab.



**Section VII. MAINTENANCE OF AUXILIARY FIREFIGHTING EQUIPMENT**

	Para.		Para.
10 Ton Hydraulic Rescue Kit Maintenance .....	4-20	Hydraulic Rescue Tool Replacement .....	4-18
General .....	4-17	Inverter Maintenance .....	4-22
Hydraulic Rescue Tool Power		Rescue Saw Maintenance .....	4-21
Unit Maintenance .....	4-19		

**4-17. GENERAL.**

This section contains information on the maintenance of the auxiliary firefighting equipment that are maintainable at the Organizational level.

**4-18. HYDRAULIC RESCUE TOOL REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

Materials/Parts

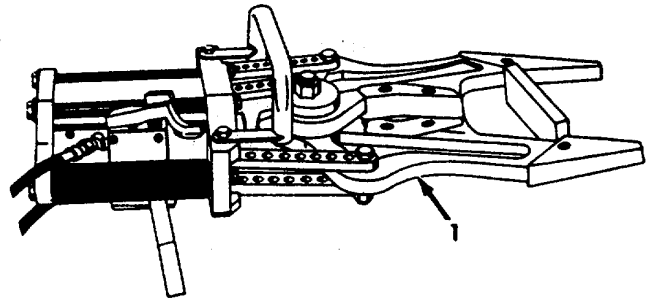
Hydraulic Rescue Tool (9999-0017)

**REMOVAL**

Remove the hydraulic rescue tool (1) from the bottom streetside compartment.

**INSTALLATION**

Insert new hydraulic rescue tool (1) into the bottom streetside compartment.



**4-19. HYDRAULIC RESCUE TOOL POWER UNIT MAINTENANCE.**

This task covers: a. Removal                      b. Service                      c. Installation

**INITIAL SET-UP**

Materials/Parts

Hydraulic Rescue Tool Power Unit (9999-0003)

Gasoline (Appendix D, Item 19A)

Oil (Appendix D, Item 37)

Cloth (Appendix D, Item 14)

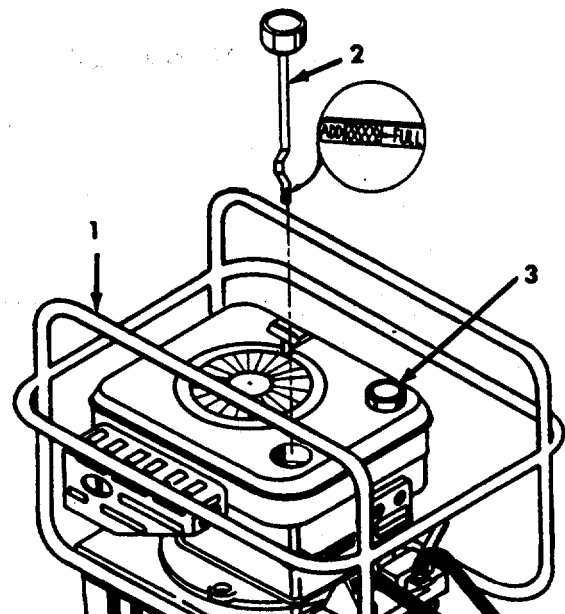
**REMOVAL**

Remove hydraulic rescue tool power unit (1) from the top rear curb side compartment.

**SERVICE**

a. *Oil check.*

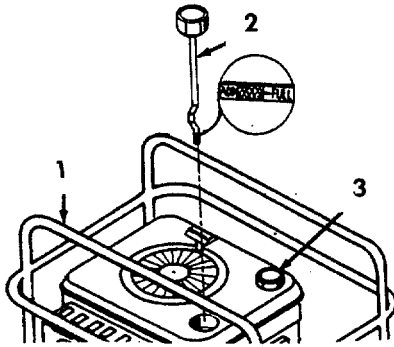
- (1) Place power unit (1) on a level surface. Clean area around oil fill on engine before removing oil dipstick (2).
- (2) Remove oil dipstick (2).
- (3) Remove oil from dipstick (2) with a clean cloth (Appendix D, Item 14).
- (4) Screw dipstick (2) firmly in place until it bottoms. Remove dipstick (2) to check oil level.



4-19. HYDRAULIC RESCUE TOOL POWER UNIT MAINTENANCE (Continued).

**CAUTION**

Do not overfill. Dipstick (2) must be securely assembled into tube at all times when engine is running.



- (5) Fill to FULL mark on dipstick (2). Pour slowly. Capacity is approximately 1-1/4 pints (0.6 liters).

**NOTE**

If overfilled, engine may smoke excessively or appear to be seized. To correct, drain excess oil and remove spark plug to clear oil trapped above piston.

- b. Fuel check.

**CAUTION**

Do not fill fuel tank to point of overflowing. Allow tank space for fuel expansion.

Open fuel fill (3) and fill with gasoline (Appendix D, Item 19A).

**INSTALLATION**

Insert new hydraulic rescue power unit (1) into top rear curb side compartment.

4-20. 10 TON HYDRAULIC RESCUE KIT MAINTENANCE.

This task covers: a. Removal      b. Service      c. Installation

**INITIAL SET-UP**

Materials/Parts

- 10 Ton Hydraulic Rescue Kit (65066)
- Hydraulic Fluid (Appendix D, Item 6)
- Cloth (Appendix D, Item 14)

Personnel Required: 2

**REMOVAL**

Remove case containing 10 ton hydraulic rescue kit from top middle curb side compartment.

**SERVICE**

- a. Unlatch case and remove hydraulic pump (1).
- b. Remove dipstick (2) and wipe clean with cloth (Appendix D, Item 14).
- c. Replace dipstick (2) and remove to check oil level.

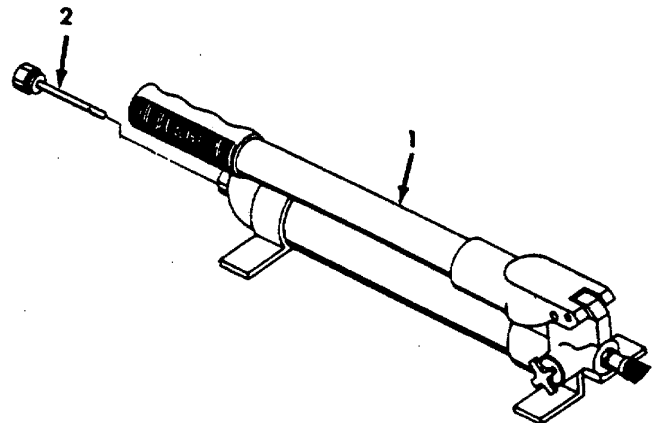
**CAUTION**

Fill to mark on dipstick (2). Do not overfill.

- d. Add hydraulic fluid (Appendix D, Item 6) as needed.

**INSTALLATION**

Replace any tools in the 10 ton hydraulic rescue kit as necessary. Insert case into top middle curb side compartment.



**4-21. RESCUE SAW MAINTENANCE.**

This task covers: a. Removal                      b. Service                      c. Installation

**INITIAL SET-UP**

Materials/Parts  
Rescue Saw (K1200)

Personnel Required: 2

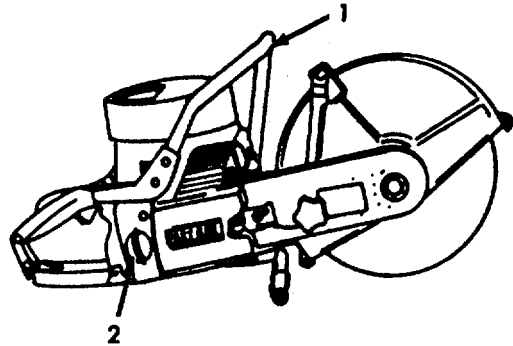
**REMOVAL**

Remove the rescue saw (1) from the bottom curb side compartment.

**SERVICE**

**NOTE**

Use a mixture ratio of 1:25 gasoline (Appendix D, Item 19A) to oil (Appendix D, Item 37). The gasoline and oil must be thoroughly mixed before being put into the fuel tank.



Open fuel cap (2) and fill tank with gasoline/oil mixture.

**INSTALLATION**

Insert new rescue saw (1) into bottom curbside compartment.

**4-22. INVERTER MAINTENANCE**

**INITIAL SET-UP**

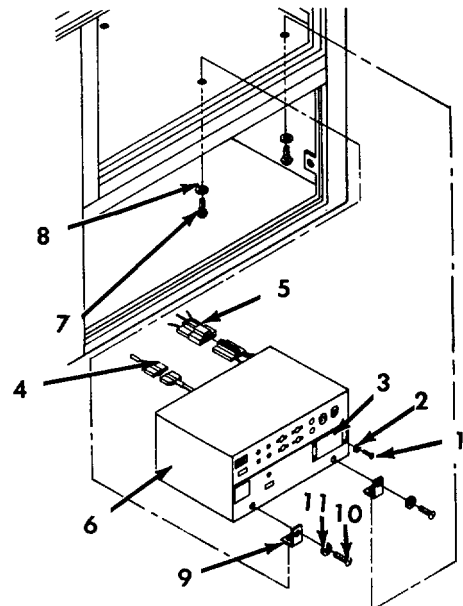
Tools  
General Mechanics Tool Kit

General Safety Instructions  
Battery selector switch OFF.  
Batteries disconnected.

Materials/Parts  
Inverter (A40-120)

**REMOVAL**

- a. Disconnect remote control plug.
- b. Remove four screws (1) and lockwashers (2) from control box (3).
- c. Remove control box (3).
- d. Disconnect control (4) and harness (5) on rear of inverter.
- e. Tag and disconnect two circuit breaker wires from inverter (6).
- f. Remove four mounting screws (7) and washers (8).
- g. Lift inverter (6) with brackets (9) and remove from compartment.
- h. If necessary, remove brackets (9) from inverter (6) by removing four bolts (10) and washers (11).



## 4-22. INVERTER MAINTENANCE (Continued).

**NOTE**

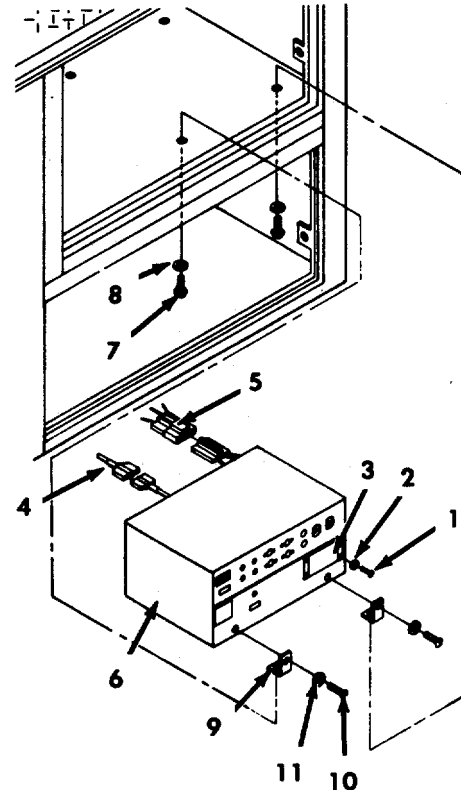
To allow twin agent 4x4 firefighting truck to be operational while inverter is out, continue as follows.

- i. Attach adapter harness located on the small control harness (4) to printed circuit board connector located in the control box (3).
- j. Mount the control box (3) to the inverter bracket using the control box mounting hardware. Ground green ground wire on the mounting hardware.
- k. Separate the red and black power harness connectors (5) and plug them into each other to connect the alternator to the batteries.
- l. The voltage regulator in the control box (3) controls the vehicle alternator while inverter is not operational or not installed.
- m. Connect positive and negative terminals to batteries.

**INSTALLATION****NOTE**

If firefighting truck was wired to operate without inverter, begin installation procedures as follows. If not, begin installation procedures at step d.

- a. Disconnect the alternator from the batteries by unplugging the red and black power harness connectors.
- b. Remove the control box (3) from the inverter bracket by removing the control box mounting hardware. Remove the green ground wire from the mounting hardware.
- c. Disconnect adapter harness located on the small control harness from the printed circuit board connector located in the control box (3).
- d. If removed, attach brackets (9) to inverter (6) using four washers (11) and bolts (10).
- e. Position inverter (6) into compartment and secure with four washers (8) and mounting screws (7).
- f. Remove tags and connect two circuit breaker wires to inverter (6).
- g. Connect control (4) and power harness (5) on rear of inverter.



- h. Install control box (3).
- i. Install four lockwashers (2) and screws (1) to control box (3).
- j. Connect remote control plug.
- k. Connect positive and negative terminals to batteries.

**TEST**

- a. Run engine at approximately 1500 rpm with inverter operating at 120 VAC output.
- b. Apply normal AC load. If not available, simulate load with equivalent wattage and type of load.
- c. If AC load does not operate properly, inverter output voltage drops more than 10 volts, or inverter shuts off, remove AC load.
- d. If unable to achieve stable operation, refer to paragraph 4-11.

**Section VIII. MAINTENANCE OF TWIN AGENT FIREFIGHTING SYSTEM**

	Para.		Para.
AFFF Agent Tank Replacement .....	4-30	Piping, Valves, Fittings, and Regulator	
Controls and Gauges Replacement .....	4-27	Replacement .....	4-28
General .....	4-23	P-K-P Agent Tank Replacement .....	4-29
Handrail Replacement .....	4-25	Twin Agent Firefighting System Maintenance .....	4-24
Nitrogen Cylinder Replacement .....	4-26		

**4-23. GENERAL.**

This section contains information on the maintenance of the twin agent firefighting system that are maintainable at the Organizational level.

**4-24. TWIN AGENT FIREFIGHTING SYSTEM MAINTENANCE.**

This task covers: a. Removal                      b. Installation                      c. Service

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Hoist and Sling

Materials/Parts

Twin Agent Firefighting System (A44012003)

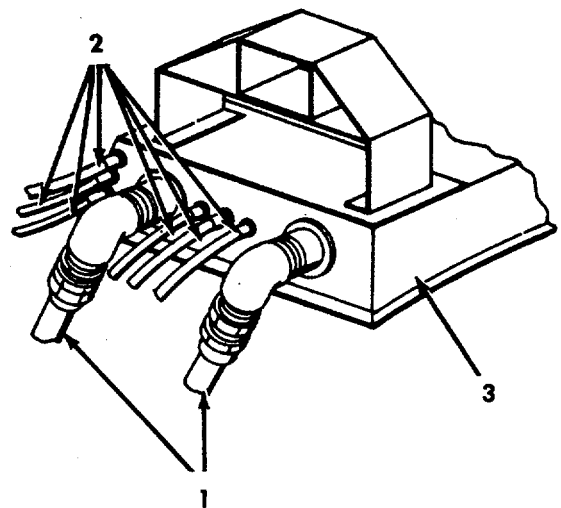
Personnel Required: 4

Equipment Condition

Para.	Condition Description
2-23	Pressure Relieved in System

**REMOVAL**

- a. Disconnect two hoses (1) and control lines (2) from back of turret (3).



**4-24. TWIN AGENT FIREFIGHTING SYSTEM MAINTENANCE (Continued).**

- b. Remove four bolts (4), washers (5), lockwashers (6) and nuts (7) from corners of skid (8).



**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.**

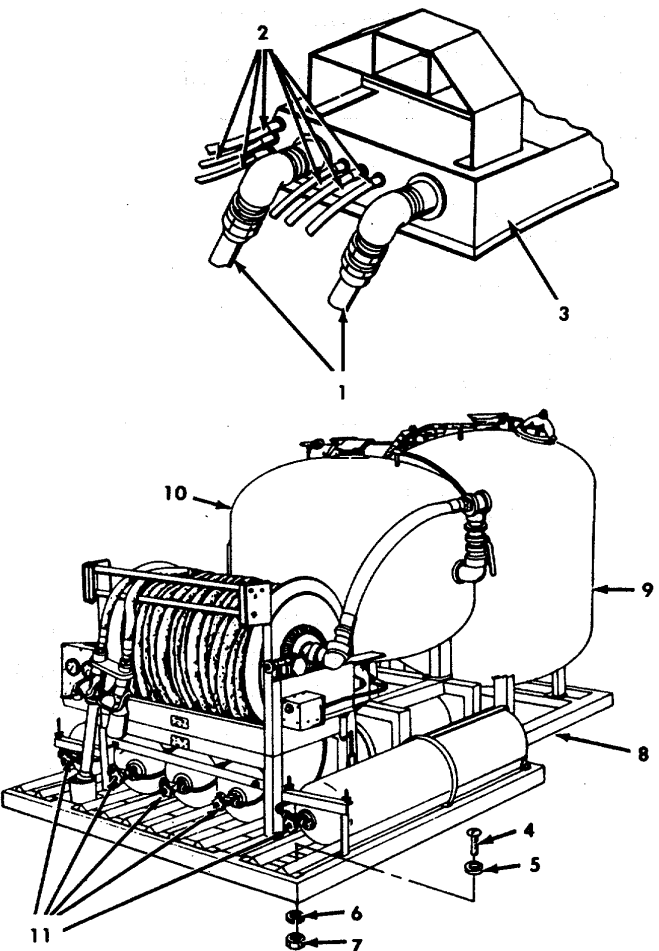
- c. Using hoist and sling attached to skid (8), carefully lift twin agent firefighting system off truck body.

**INSTALLATION**



**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. Using a hoist and sling attached to skid (8), carefully lift and position twin agent firefighting system onto truck body.
- b. Secure skid (8) at each corner using bolts (4), lockwashers (5), flat washers (6), and nuts (7).
- c. Attach two hoses (1) and control lines (2) to turret (3).
- d. Pressurize the system (paragraph 2-24 or 2-25).



**SERVICE**

- a. Check and fill AFFF agent tank (9) (paragraph 2-24).
- b. Check and fill P-K-P agent tank (10) (paragraph 2-25).
- c. Replace nitrogen cylinders (11) (paragraph 2-26).



## 4-25. HANDRAIL REPLACEMENT.

---

This task covers: a. Removal                      b. Installation

---

### INITIAL SET-UP

#### Tools

General Mechanics Tool Kit

#### Materials/Parts

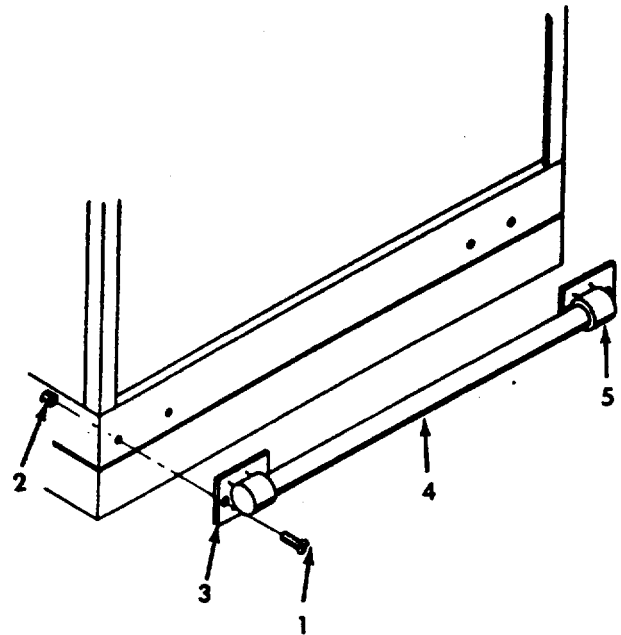
Handrail (117-00001-D)

Handrail Bracket (117-00001-E)

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### REMOVAL

- a. Remove two screws (1) and locknuts (2) from one handrail bracket (3).
- b. Remove handrail bracket (3) and handrail (4).
- c. If necessary, remove second handrail bracket (5) by removing two screws (1) and locknuts (2).



### INSTALLATION

- a. If removed, install handrail bracket (5) and secure with two screws (1) and locknuts (2).
- b. Insert handrail (4) into bracket (5) and install handrail bracket (3).
- c. Secure handrail bracket (3) with two screws (1) and locknuts (2).

**4-26. NITROGEN CYLINDER REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Nitrogen Cylinder (C46300001)

Personnel Required: 2

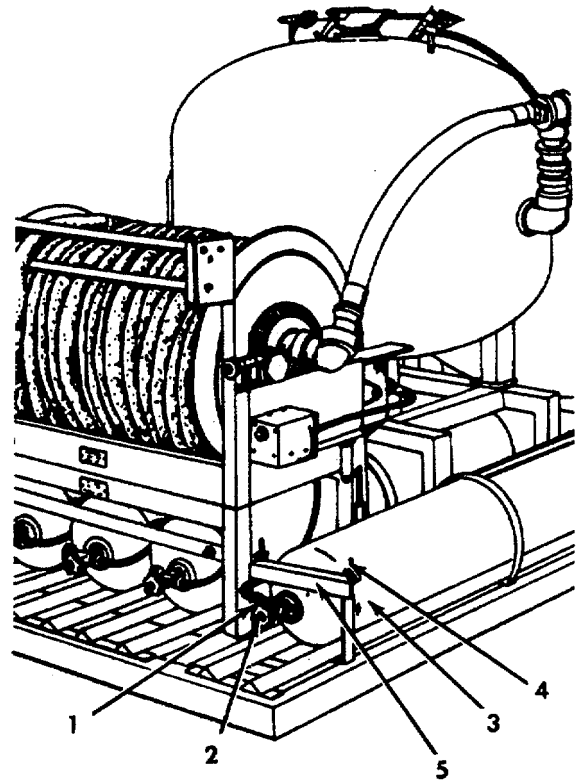
Equipment Condition

Para.    Condition Description

2-23    Pressure Relieved in System

**REMOVAL**

- a. Close knob (1) and unscrew hose fitting (2) from top of nitrogen cylinder (3).
- b. Remove two wing nuts (4) and retaining bar (5).
- c. Slide nitrogen cylinder (3) off of truck.
- d. Repeat procedure for four remaining tanks as necessary.

**INSTALLATION**

- a. Slide new nitrogen cylinder (3) into truck.
- b. Place retaining bar (5) in place and secure with two wing nuts (4).
- c. Attach hose fitting (2) to top of nitrogen cylinder (3).
- d. Pressurize the system (paragraph 2-24 or 2-25).

**4-27. CONTROLS AND GAUGES REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Gauges and Controls as required (Appendix E, Figure E-9)

Equipment Condition

Para. Condition Description  
2-23 Pressure Relieved in System

**REMOVAL**

a. Pressure gauge removal.

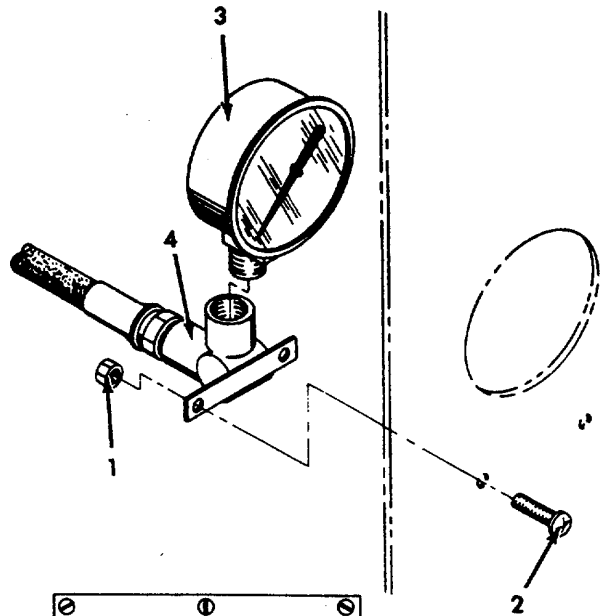
**NOTE**

**This procedure is typical for all pressure gauges.**

- (1) Remove two nuts (1) and bolts (2).
- (2) Unscrew gauge (3) from fitting (4).

b. Rear control handle removal

- (1) Turn control handle (5) counterclockwise and remove.
- (2) Remove nut (6) and remove control rod (7) from valve (8).



**INSTALLATION**

a. Pressure gauge installation.

**NOTE**

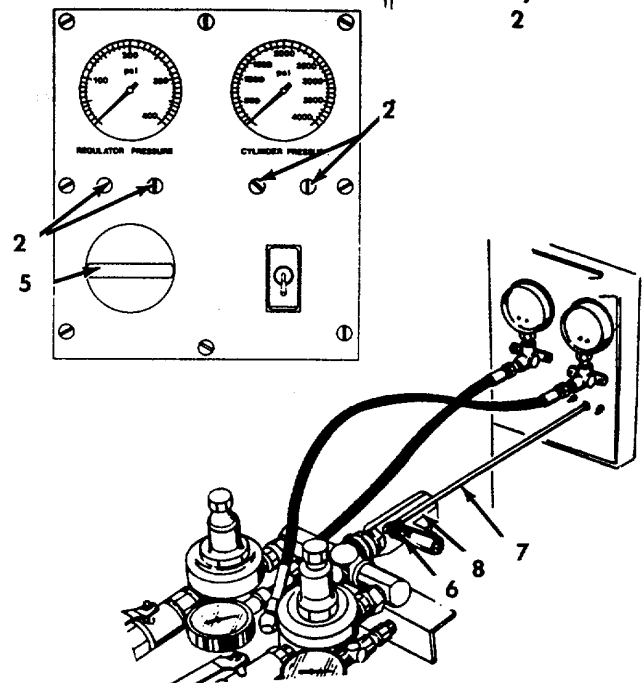
**This procedure is typical for all pressure gauges.**

- (1) Screw gauge (3) into fitting (4).
- (2) Position gauge onto control panel and secure with bolts (2) and nuts (1).

(3) Pressurize the system (paragraph 2-24 or 2-25).

b. Rear control handle installation.

- (1) Insert control rod (7) through panel and secure other end to valve (8) with nut (6).
- (2) Position control handle (5) on control rod (3) and secure by turning clockwise.



**4-28. PIPING, VALVES, FITTINGS, AND REGULATOR REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Various Pipes, Fittings and Regulators (Appendix E, Figure E-9)

Equipment Condition

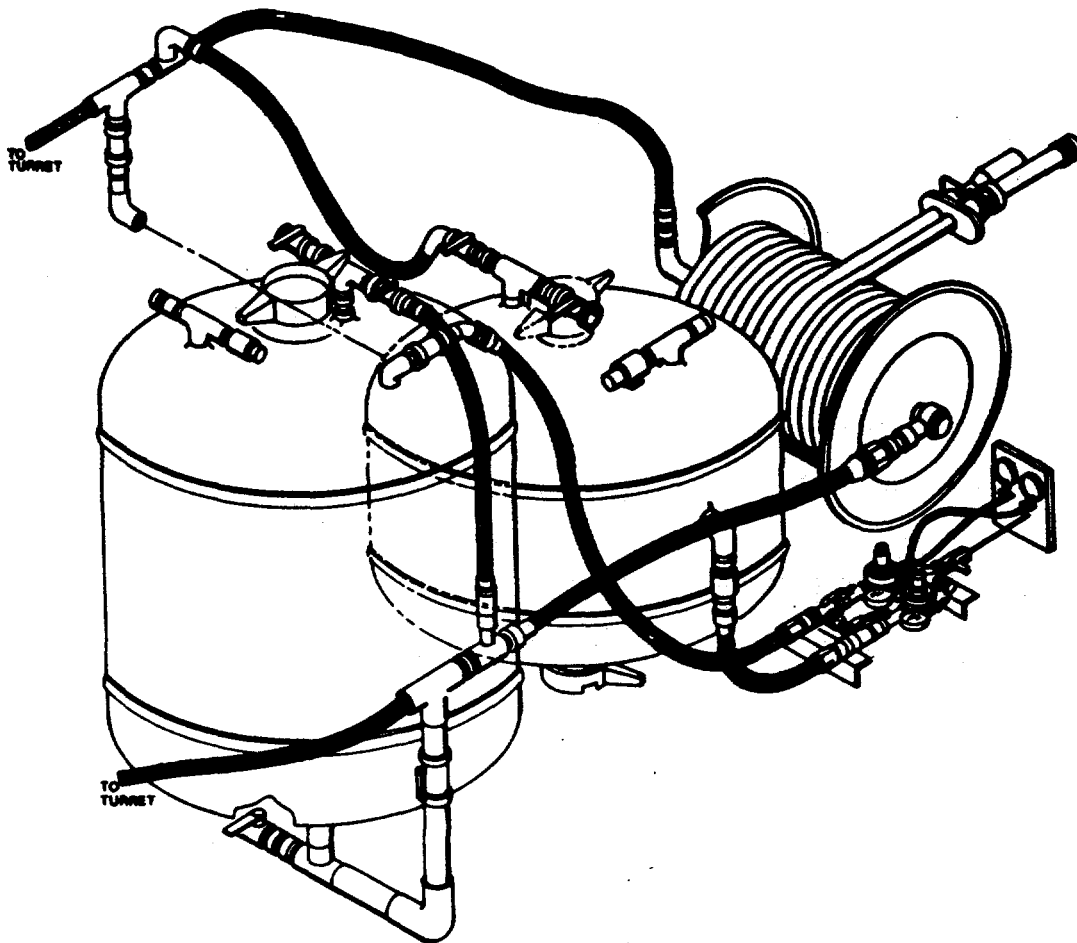
Para.	Condition Description
2-23	Pressure Relieved in System

**REMOVAL**

Disconnect piping, valves, fittings, and regulators as necessary and remove from firefighting assembly.-

**INSTALLATION**

- a. Position piping, valves, fittings and regulators and install on the firefighting assembly.
- b. Pressurize the system (paragraphs 2-24 or 2-25).



**4-29. P-K-P AGENT TANK REPLACEMENT.**

---

This task covers: a. Removal b. Installation

---

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Hoist and Sling

Materials/Parts

P-K-P Agent Tank (101460D001)

Personnel Required: 2

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

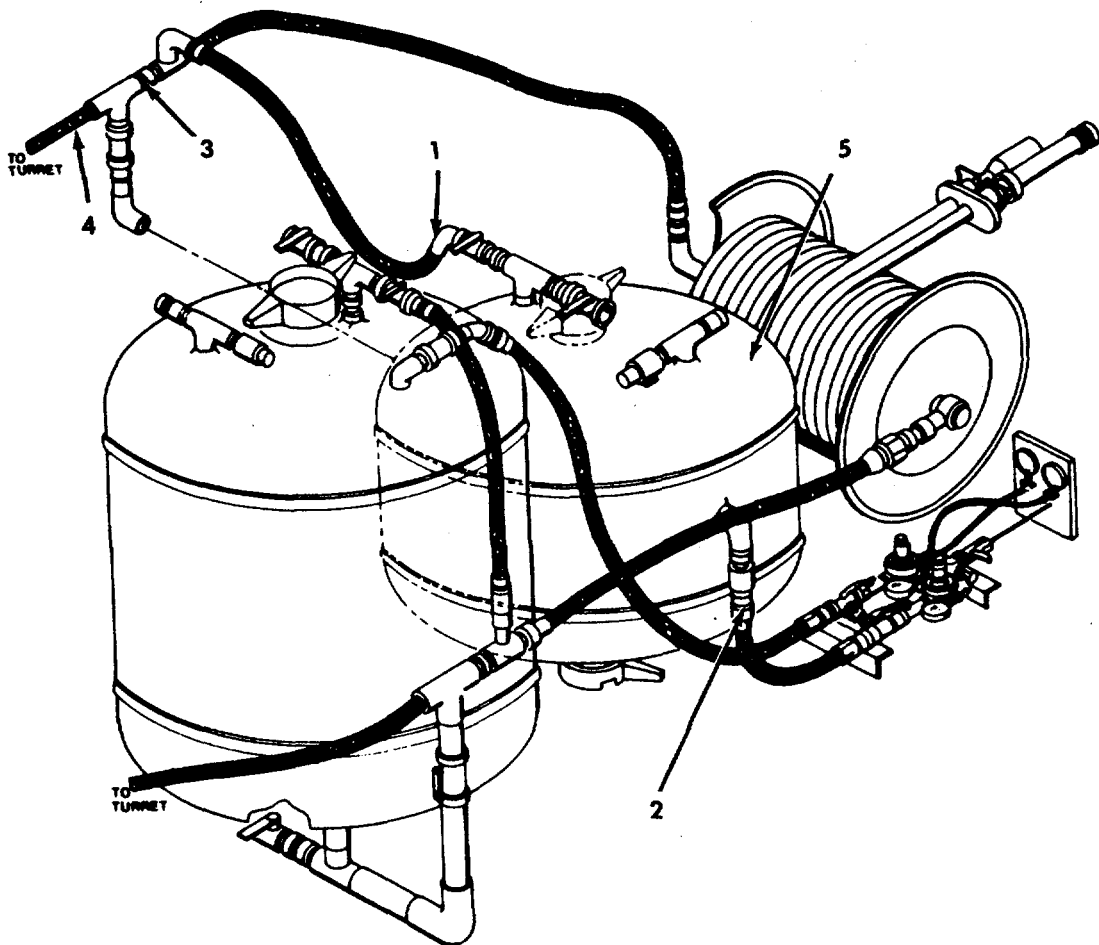
Equipment Condition

Para.	Condition Description
2-23	Pressure Relieved in System

---

**REMOVAL**

- a. Disconnect hoses (1 through 4) from tank (5).



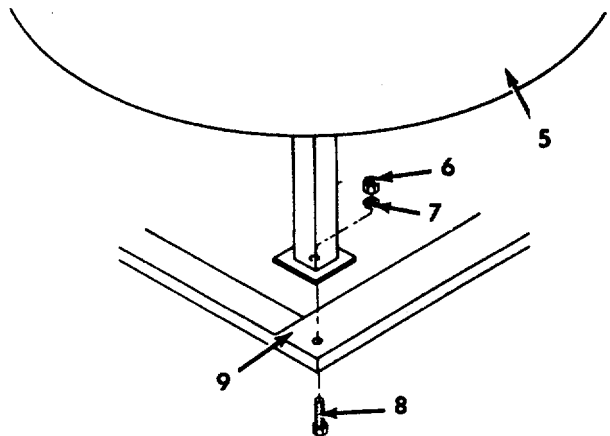
4-29. P-K-P AGENT TANK REPLACEMENT (Continued).

- b. Remove four nuts (6), washers (7) and bolts (8).

**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. Using a hoist and sling attached to the tank (5), carefully lift tank from mounting base (9).

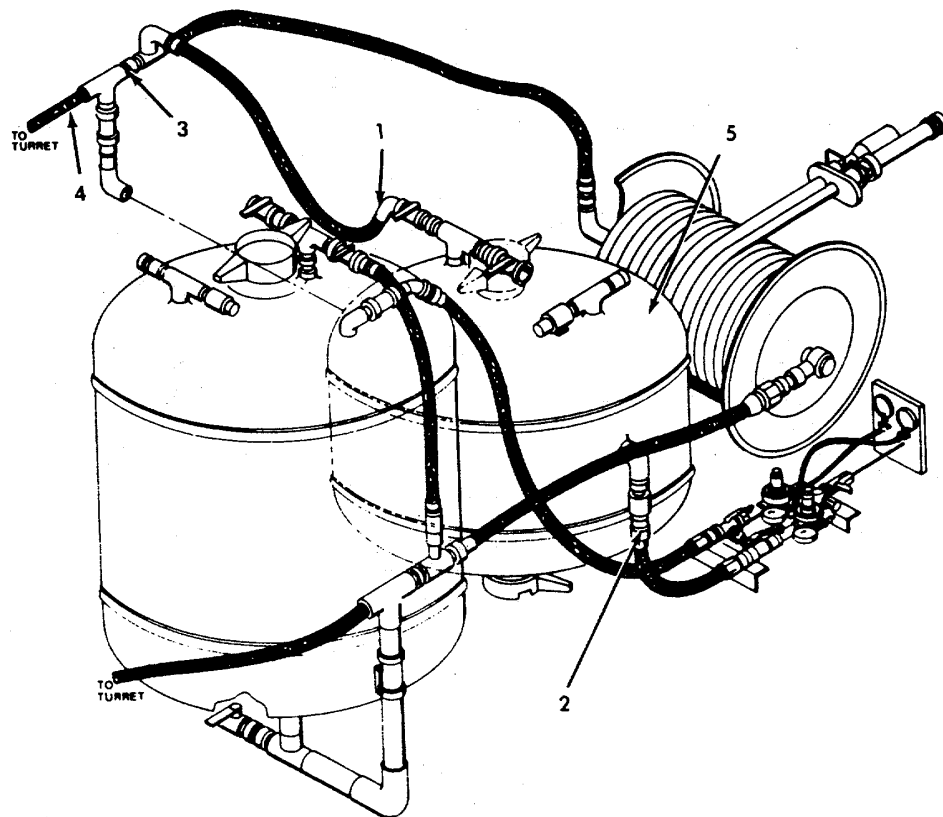


INSTALLATION

**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. Using a hoist and sling attached to the tank (5), carefully lift and position tank onto the mounting base (9).
- b. Secure tank using four bolts (8), washers (7), and nuts (6).
- c. Connect hoses (1 through 4) to tank (5).
- d. Pressurize the system (paragraph 2-25).



**4-30. AFFF AGENT TANK REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Hoist and Sling

Personnel Required: 2

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Materials/Parts

AFFF Agent Tank (101460D002)

Equipment Condition

Para. Condition Description  
2-23 Pressure Relieved in System

**REMOVAL**

- a. Disconnect hoses 1 through 3) from tank (4).
- b. Remove four nuts (5), washers (6), and bolts (7).



**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.**

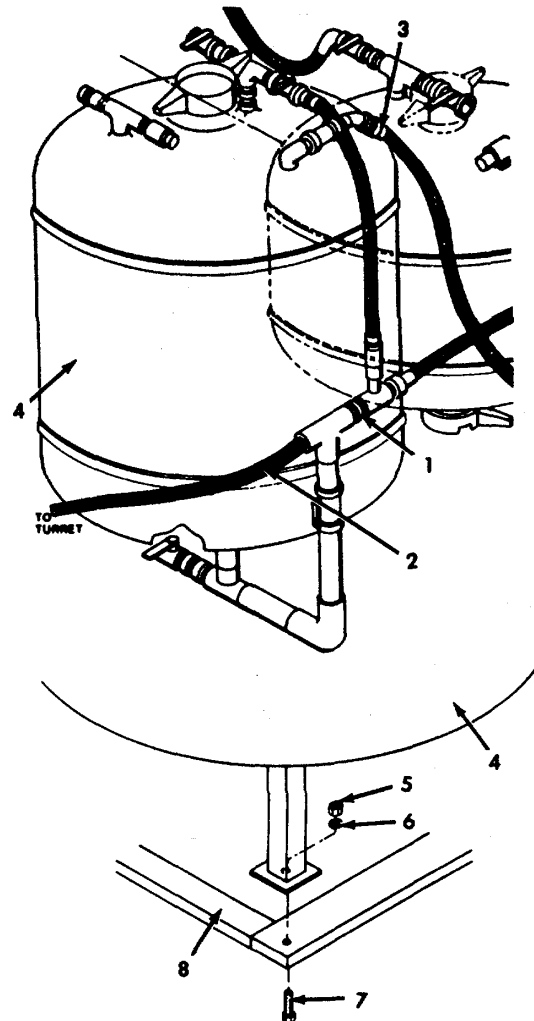
- c. Using a hoist and sling attached to the tank (4), carefully lift tank from mounting base (8).

**INSTALLATION**



**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. Using a hoist and sling attached to the tank (4), carefully lift and position tank onto the mounting base (8).
- b. Secure tank using four bolts (7), washers (6), and nuts (5).
- c. Connect hoses (1 through 3) to tank (4).
- d. Pressurize the system (paragraph 2-24).



**Section IX. MAINTENANCE OF REMOTE MANUAL  
TWIN AGENT TURRET ASSEMBLY**

	Para.		Para.
Controls and Gauges Replacement .....	4-35	General .....	4-31
Dry Chemical Nozzle Assembly Replacement ...	4-34	Remote Manual Twin Agent Turret	
Foam Nozzle Assembly Replacement .....	4-33	Assembly Replacement .....	4-32

**4-31. GENERAL.**

This section contains information on the maintenance of the remote manual twin agent turret assembly that are maintainable at the Organizational level.

**4-32. REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY REPLACEMENT.**

This task covers:    a. Removal                    b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Hoist and Sling

Materials/Parts

Remote Manual Twin Agent Turret Assembly  
(101508D002)

Equipment Condition

Para.	Condition Description
2-23	Pressure Relieved in System
4-28	Hoses Removed
4-100	Roof Warning Light Control Wire Disconnected

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Battery selector switch OFF.



4-32. REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY REPLACEMENT (Continued).

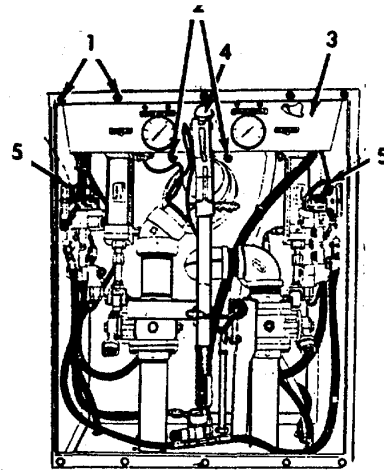
REMOVAL

- a. Remove five screws (1) and two nuts (2) securing turret control panel (3) to turret assembly.
- b. Tag and disconnect control wires to the panel light (4) and solenoids (5).
- c. Remove four nuts (6), washers (7) and bolts (8) securing rear plate (9) to roof.



**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.**

- d. Secure hoist and sling to turret assembly.
- e. Remove twelve nuts (10), lockwashers (11), washers (12), and bolts (13) securing turret assembly to the cab roof.
- f. Remove turret, assembly retaining bars (1 4) and remove turret.



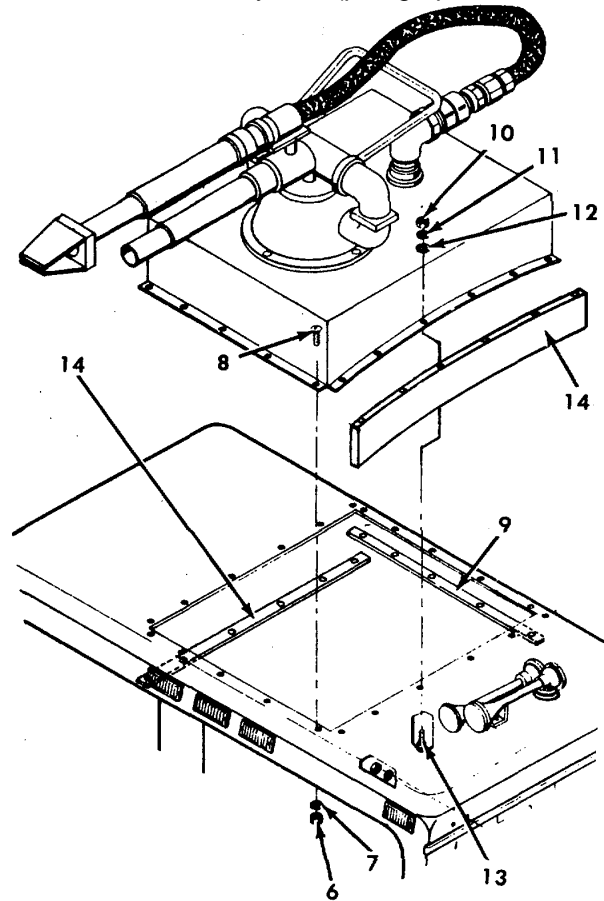
- g. Reconnect hoses (paragraph 4-28).
- h. Pressurize the system (paragraphs 2-24 or 2-25).

INSTALLATION



**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 turret assembly on cab roof and secure with retaining bars (14), twelve bolts (13), washers (12), lockwashers (11), and nuts (10).
- b. Remove hoist and sling.
- c. Position rear plate (9) on roof and secure with four bolts (8), washers (7) and nuts (6).
- d. Reconnect control wires to the panel light (4) and solenoids (5).
- e. Position turret control panel (3) to turret assembly and secure with five screws (1) and two nuts (2).
- f. Reconnect roof warning light control wire (paragraph 4-100)..



**4-33. FOAM NOZZLE ASSEMBLY REPLACEMENT.**


---

This task covers: a. Removal            b. Installation

---

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Foam Nozzle (100145D002)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Battery selector switch OFF.

Equipment Condition

Para.    Condition Description

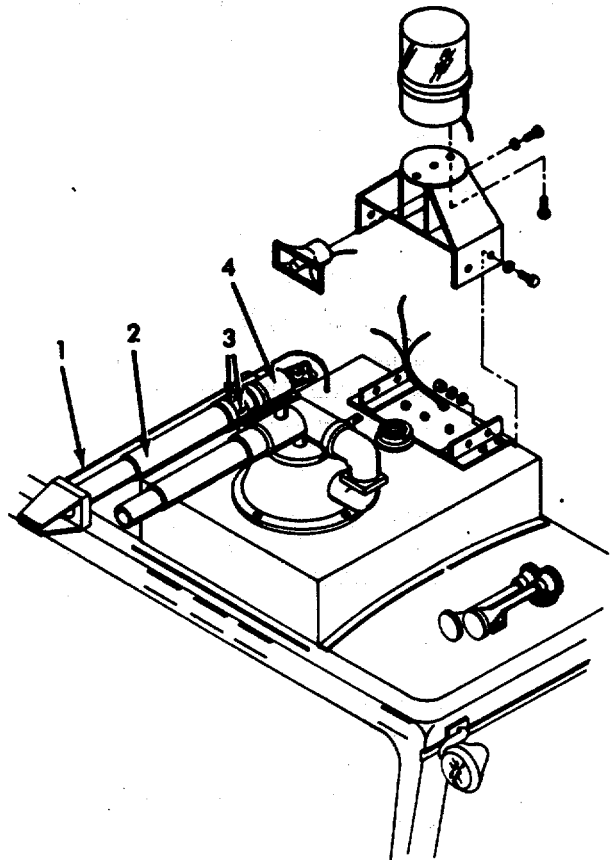
2-23    Pressure Relieved in System

**REMOVAL**

- a. Disconnect shaper control cable (1) from nozzle (2).
- b. Loosen two set screws (3) and remove nozzle assembly (2) from turret assembly (4) by turning counterclockwise.

**INSTALLATION**

- a. Connect nozzle assembly (2) to turret assembly (4) by turning clockwise.
- b. Secure nozzle assembly (2) to turret assembly (4) with two set screws.
- c. Connect shaper control cable (1) to nozzle (2).
- d. Pressurize the system (paragraphs 2-24 or 2-25).



**4-34. DRY CHEMICAL NOZZLE ASSEMBLY REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Dry Chemical Nozzle (100156B007)

Equipment Condition

Para. Condition Description

2-23 Pressure Relieved in System

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

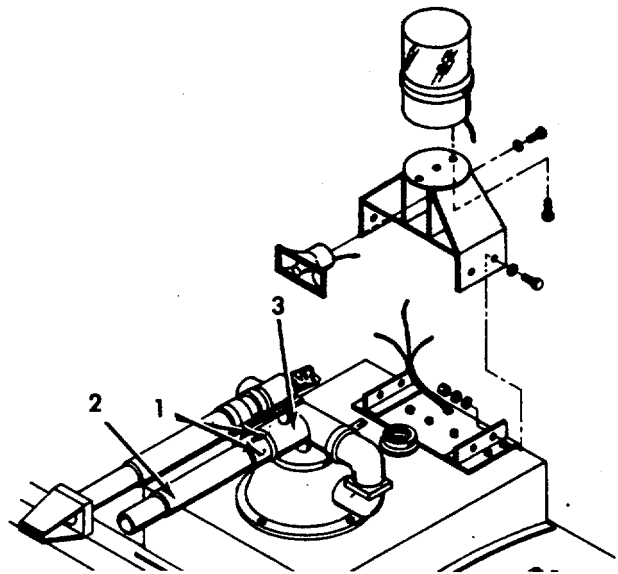
Battery selector switch OFF.

**REMOVAL**

Loosen two set screws (1) and remove nozzle assembly (2) from turret assembly (3) by turning counterclockwise.

**INSTALLATION**

- a. Connect nozzle assembly (2) to turret assembly (3) by turning clockwise.
- b. Secure nozzle assembly (2) to turret assembly (3) with two set screws (1).
- c. Pressurize the system (paragraphs 2-24 or 2-25).



**4-35- CONTROLS AND GAUGES REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Gauges and Controls as required (Appendix E, Figure E-15)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Battery selector switch OFF.

Equipment Condition

Para. Condition Description

2-23 Pressure Relieved in System

4-35. CONTROLS AND GAUGES REPLACEMENT (Continued).

REMOVAL

a. Pressure gauge removal.

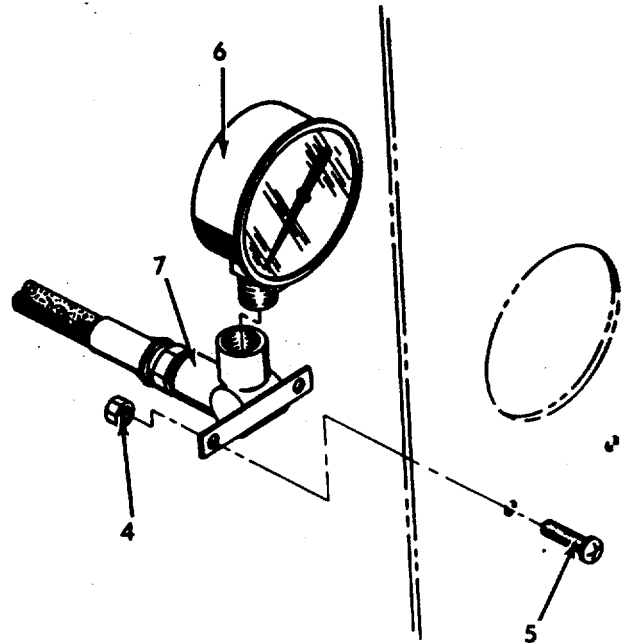
NOTE

This procedure is typical for all pressure gauges.

- (1) Remove five screws (1) and two nuts (2) securing control panel (3) to roof turret assembly. Remove panel.
- (2) Remove two nuts (4) and bolts (5).
- (3) Unscrew gauge (6) from fitting (7).

b. Cab control handle removal.

- (1) Remove two retaining pins (1).
- (2) Remove handle (2) from control assembly (3).



INSTALLATION

a. Pressure gauge installation.

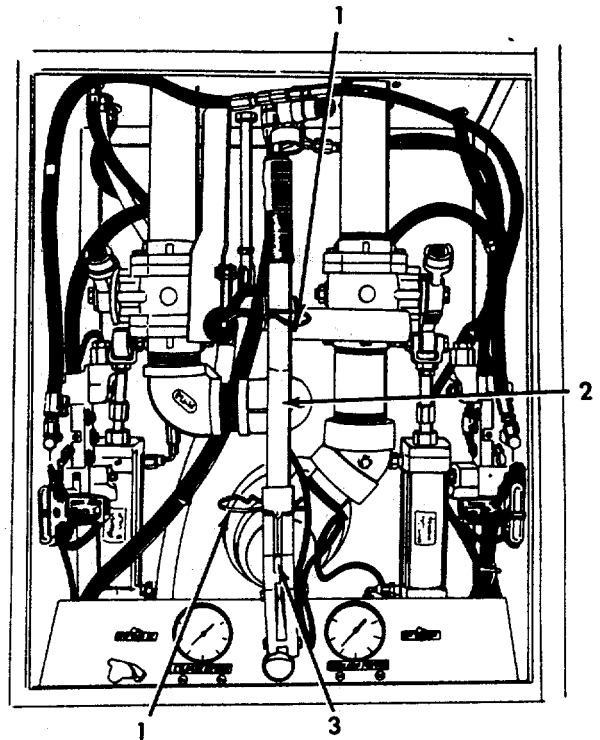
NOTE

This procedure is typical for all pressure gauges.

- (1) Screw gauge (6) into fitting (7).
- (2) Position gauge onto control panel and secure with two bolts (5) and nuts (4).
- (3) Position control panel (3) on roof turret assembly and secure with five screws (1) and two nuts (2).
- (4) Pressurize the system (paragraphs 2-24 or 2-5).

b. Cab control handle installation.

- (1) Position handle (2) into the control assembly (3).
- (2) Secure using the two retaining pins (1).



**Section X. MAINTENANCE OF HOSE REEL ASSEMBLY**

	Para.		Para.
Dual Agent Handline Maintenance .....	4-39	Hose Rollers Replacement .....	4-38
General .....	4-36	Motor Replacement .....	4-41
Hose Reel Assembly Maintenance .....	4-37	Rewind Switch Replacement .....	4-43
Hose Replacement .....	4-40	Swivel Joint/Elbow Replacement .....	4-42

**4-36. GENERAL.**

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

**4-37. HOSE REEL ASSEMBLY MAINTENANCE.**

This task covers:    a. Removal                    b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
 Pressure Gun  
 Hoist and Sling

Materials/Parts

Hose Reel (93231130-10BR)  
 Grease, Lubricating (Appendix D, Item 21)

Equipment Condition

Para.	Condition Description
4-26	Nitrogen Cylinders Removed
4-40	Hose Removed

Personnel Required: 2

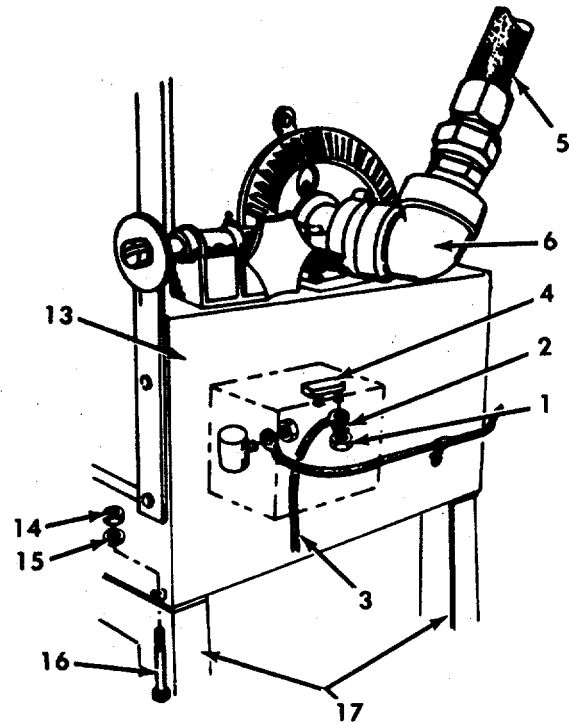
General Safety Instructions

Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.

4-37. HOSE REEL ASSEMBLY MAINTENANCE (Continued).

REMOVAL

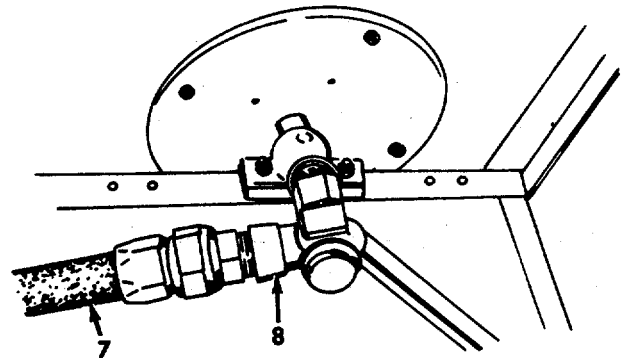
- a. Remove nuts (1) and lockwashers (2) securing control wiring (3) to solenoid (4).
- b. Remove curbside hose (5) from inlet elbow (6).
- c. Disconnect streetside hose (7) from swivel joint (8).
- d. Remove three nuts (9), lockwashers (10), and bolts (11) securing rear control panel (12) to hose reel (13).
- e. Remove four nuts (14), lockwashers (15) and bolts (16) securing hose reel assembly to fire-fighting system frame (17).



**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.

- f. Using the hoist and sling, remove the hose reel assembly (13).

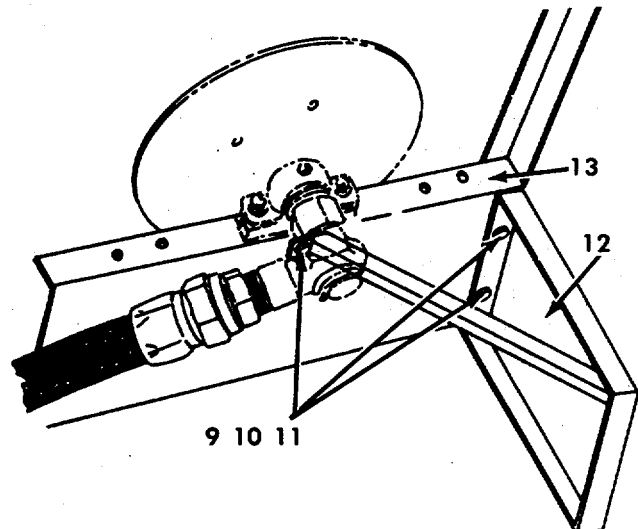


INSTALLATION

**WARNING**

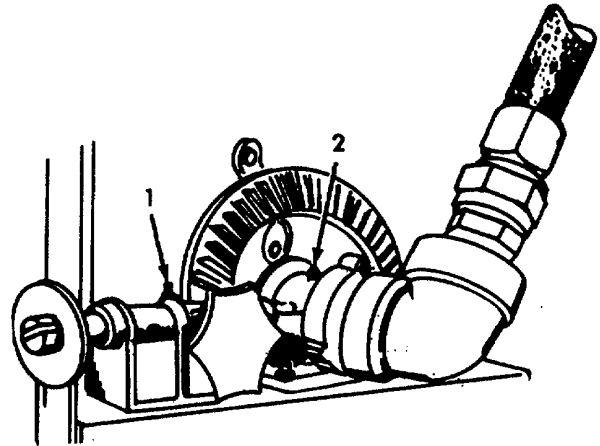
When lifting an object, make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

- a. Using the hoist and sling, lift the hose reel (13) and position on the fire-fighting system frame (17).



**4-37. HOSE REEL ASSEMBLY MAINTENANCE (Continued).**

- b. Secure hose reel to frame with four bolts (16), lockwashers (15) and nuts (14).
- c. Position rear control panel (12) to hose reel (13) and secure with three bolts (11), lockwashers (10), and nuts (9).
- d. Connect streetside hose (7) to swivel joint (8).
- e. Connect curbside hose (5) to inlet elbow (6).
- f. Attach control wiring (3) to solenoid (4) and secure with lockwashers (2) and nuts (1).
- g. Attach dual agent handline hoses (paragraph 4-40).
- h. Install nitrogen cylinders paragraph 4-16) and pressurize system (paragraphs 2-24 or 2-25).



**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 five times for proper servicing.

**4-38. HOSE ROLLERS REPLACEMENT.**

---

This task covers:    a. Removal                    b. Installation

---

**INITIAL SET-UP**

Tools  
General Mechanics Tool Kit

Materials/Parts  
Hose Rollers (R-281)

Equipment Condition  
Para.    Condition Description  
2-23    Pressure Relieved in System

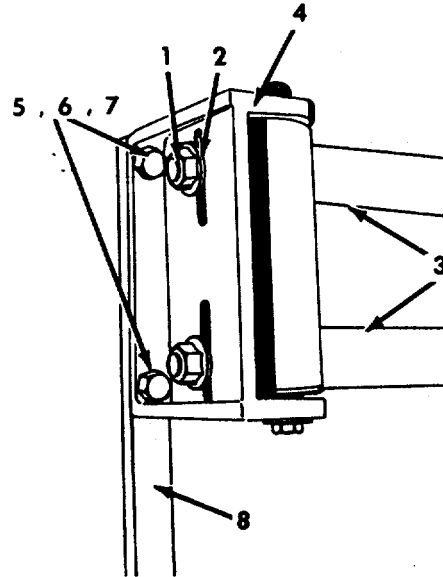
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General Safety Instructions  
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**4-38. HOSE ROLLERS REPLACEMENT (Continued)**

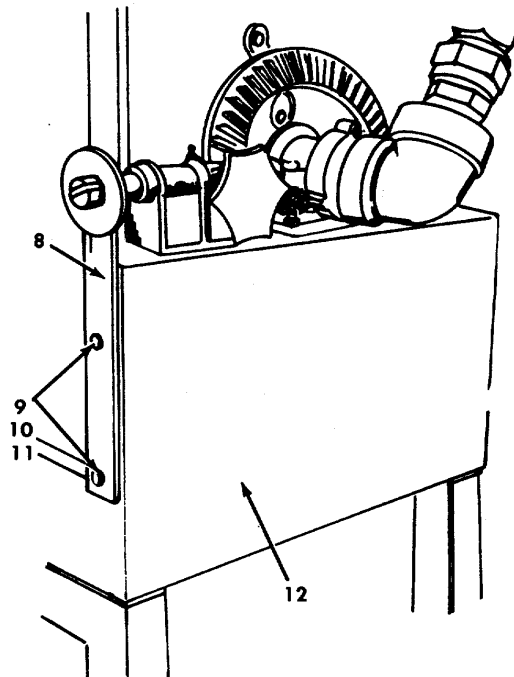
**REMOVAL**

- a. Remove four nuts (1) and washers (2) securing upper and lower hose rollers (3) to brackets (4). Remove hose rollers.
- b. Remove four nuts (5), lockwashers (6) and bolts (7) securing brackets (4) to hose roller support angle (8). Remove brackets.
- c. Remove four nuts (9), lockwashers (10) and bolts (11) securing hose roller support angle (8) to hose reel assembly (12). Remove support angle.



**INSTALLATION**

- a. Position hose roller support angle (8) to hose reel assembly (12) and secure with four bolts (11), lockwashers (10) and nuts (9).
- b. Position brackets (4) to hose roller support angle (8) and secure with four bolts (7), lock-washers (6) and nuts (5).
- c. Position upper and lower hose rollers (3) to brackets (4) and secure with four washers (2) and nuts (1).
- d. Pressurize the system (paragraphs 2-24 or 2-25).





**4-39. DUAL AGENT HANDLINE MAINTENANCE.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

P-K-P Nozzle (H75002007)

AFFF Nozzle (75002008)

Equipment Condition

Para. Condition Description

2-23 Pressure Relieved in System

**REMOVAL**

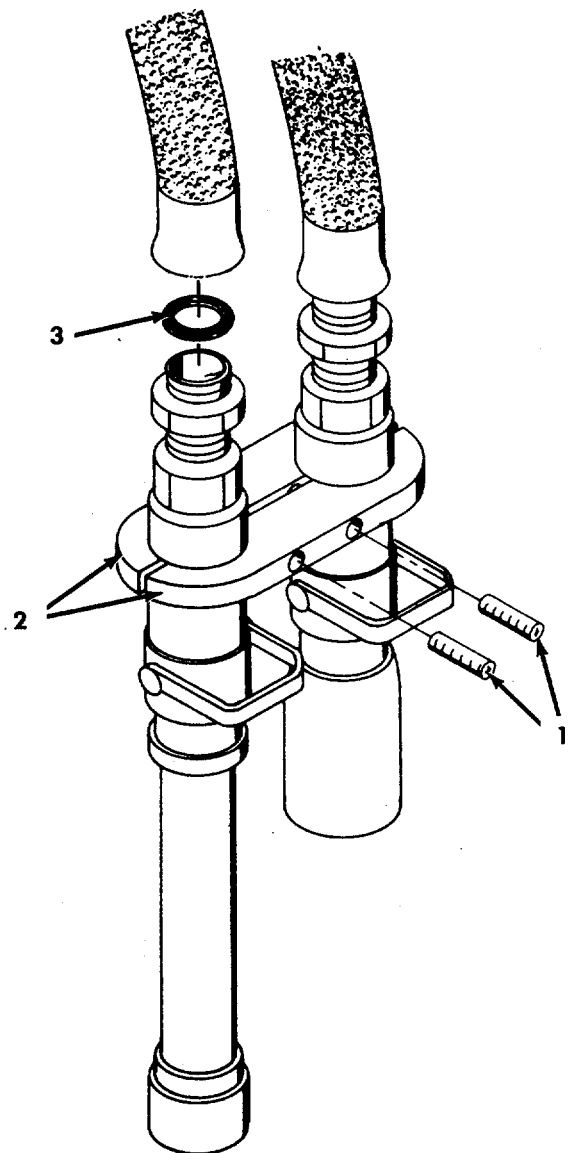
- a. Remove two set screws (1) from collar (2).
- b. Using an adjustable wrench remove desired nozzle from hose.

**REPAIR**

- a. Unscrew connection base (1) from nozzle base (2). Remove gasket (3).
- b. Place new gasket (3) in connection base (1). Screw connection base (1) onto nozzle base (2).

**INSTALLATION**

- a. Install nozzle by turning clockwise onto hose end.
- b. Position collar (2) onto nozzles and secure with two set screws (1).
- c. Pressurize the system (paragraphs 2-24 or 2-25).



**4-40. HOSE REPLACEMENT.**

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This task covers: a. Removal b. Installation

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**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Hose (A44212101)

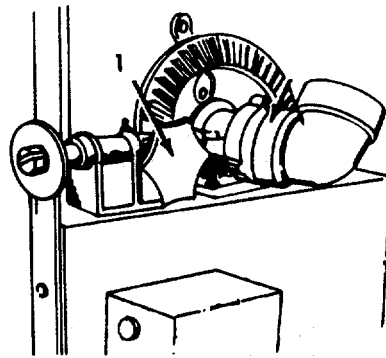
Equipment Condition

Para.	Condition Description
2-23	Pressure Relieved in System
4-39	Agent Handline Removed

---

**REMOVAL**

- a. Loosen handbrake (1) and fully unwind hose from hose reel assembly.
- b. Disconnect hoses from outlet elbows



**INSTALLATION**

- a. Connect hoses to outlet elbows and rewind hoses onto hose reel assembly.
- b. Tighten handbrake (1).
- c. Install agent handline (paragraph 4-39).
- d. Pressurize the system (paragraph 2-24 or 2-25).

**4-41. MOTOR 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 set.  
 Battery selector switch OFF.

Materials/Parts

Motor (370023)

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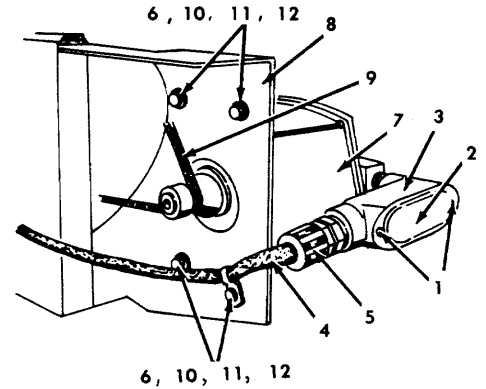
**REMOVAL**

- a. Remove two screws (1) securing cover plate (2) to junction box (3).
- b. Disconnect control wiring cable (4) located behind cover plate (2).
- c. Loosen nut (5) securing control wiring (4) to junction box (3) and remove control wire.
- d. Loosen four nuts (6) securing motor (7) to mounting bracket (8).
- e. Slide motor upward to remove from drive chain (9).
- f. Remove four nuts (6), lockwashers (10), washers (11), and bolts (12).
- g. Remove motor (7).

**4-41. MOTOR REPLACEMENT (Continued).**

**INSTALLATION**

- a. Position motor (7) to mounting bracket (8) and secure with four bolts (12), washers (11), lockwashers (10) and nuts (6).
- b. Slide motor (7) onto drive chain (9) and tighten nuts (6) and bolts (12).
- c. Install control wiring (4) into junction box (3) and secure with nut (5).
- d. Connect control wiring cable (4).
- e. Position cover plate (2) to junction box (3) and secure with two screws (1).



**4-42. SWIVEL JOINT/ELBOW REPLACEMENT.**

This task covers: a. Removal      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Pipe Wrench

Materials/Parts

Swivel Joint (327078)  
Elbow (327075)

Equipment Condition

Para.	Condition Description
2-23	Pressure Relieved in System
4-40	Hoses Removed

General Safety Instructions

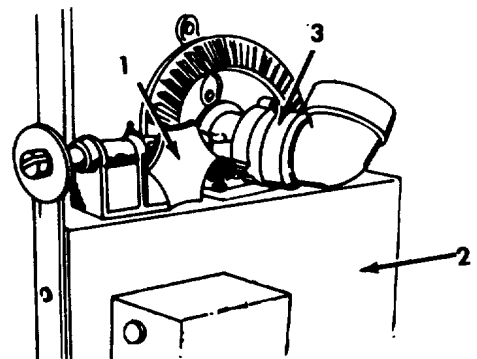
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Battery selector switch OFF.

**REMOVAL**

**NOTE**

**This procedure is typical for both hose reel outlet assemblies.**

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



**INSTALLATION**

**NOTE**

**This procedure is typical for both hose reel outlet assemblies.**

- a. Install swivel (3) to hose reel (2) assembly and secure using a pipe wrench.
- b. Reconnect hoses (paragraph 4-40).
- c. Pressurize the system (paragraphs 2-24 or 2-25).

**4-43. REWIND SWITCH REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Rewind Switch (101516C001)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

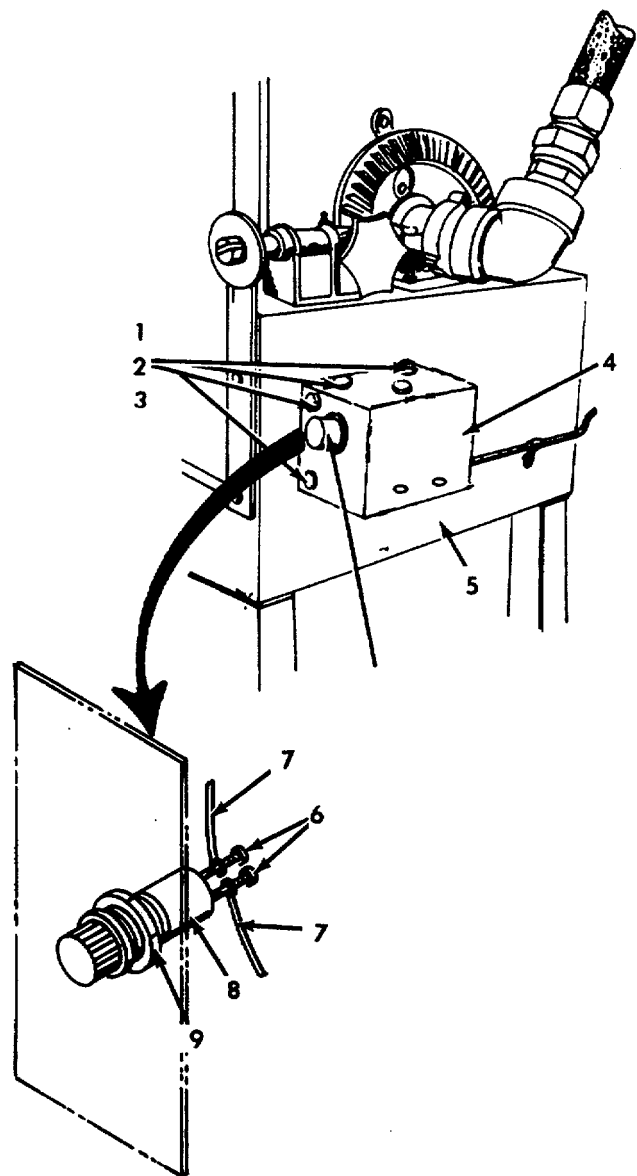
Battery selector switch OFF.

**REMOVAL**

- a. Remove four nuts (1), lockwashers (2) and bolts (3) securing cover (4) to hose reel assembly (5).
- b. Remove two screws (6) securing control wiring (7) to rewind switch (8).
- c. Remove retaining nut (9) and remove rewind switch (8).

**INSTALLATION**

- a. Install new rewind switch (8) and secure with retaining nut (9).
- b. Connect control wiring (7) to switch and secure with two screws (6).
- c. Install cover (4) to hose reel assembly (5) and secure with four bolts (3), lockwashers (2) and nuts (1).



**Section XI MAINTENANCE OF FIRE BODY ASSEMBLY**

	Para.		Para.
Back-Up Alarm Replacement .....	4-54	Fire Body Replacement .....	4-45
Back-Up Light Maintenance .....	4-52	General .....	4-44
Clearance Light Maintenance .....	4-47	Inverter Receptacles Replacement .....	4-51
Compartment Door Assembly Maintenance .....	4-56	Rear Quartz Flood Light Maintenance .....	4-48
Compartment Light Maintenance.....	4-55	Rear Slave Receptacle Replacement .....	4-50
Deck Light Maintenance .....	4-46	Rear Station Chargers Replacement .....	4-49
		Turn and Stop Light Maintenance .....	4-53

**4-44. GENERAL.**

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

**4-45. FIRE BODY REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Fire Body (KFT-001)

Equipment Condition

Para.	Condition Description
4-13 thru 4-16	Accessories Removed
4-18 thru 4-22	Auxiliary Firefighting Equipment Removed
4-24	Twin Agent Firefighting System Removed
4-46 thru 4-56	Fire Body Electrical Components Removed
4-148	Chassis Electrical System Disconnected

Personnel Required: 4

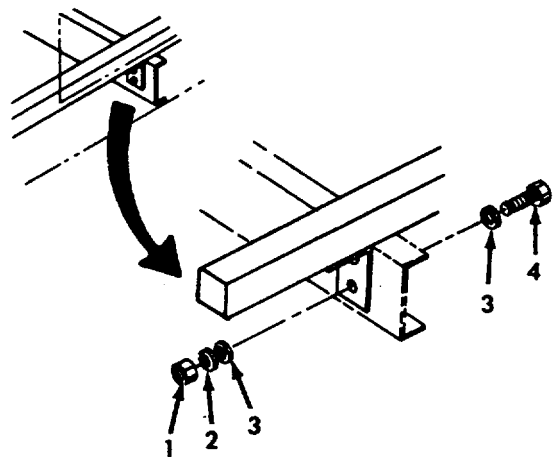
**REMOVAL**

- a. Remove twelve nuts (1), lockwashers (2), washers (3) and bolts (4).



**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 a hoist and sling, lift the fire body off the chassis.



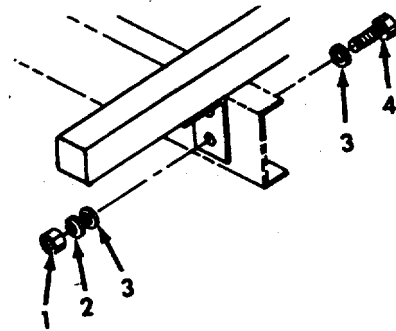
4-45. FIRE BODY REPLACEMENT (Continued).

INSTALLATION



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. Using a hoist and sling, carefully lower fire body onto chassis.
- b. Secure fire body (5) to chassis using twelve bolts (4), washers (3), lockwashers (2) and nuts (1).
- c. Connect chassis electrical system (paragraph 4-148).



- d. Install fire body electrical components (paragraph 4-46 thru 4-56).
- e. Install twin agent firefighting system (paragraph 4-24).
- f. Install auxiliary firefighting equipment (paragraph 4-18 thru 4-22).
- g. Install accessories (paragraph 4-13 thru 4-16).

4-46. DECK LIGHT MAINTENANCE.

This task covers: a. Removal      b. Repair      c. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

General Safety Instructions

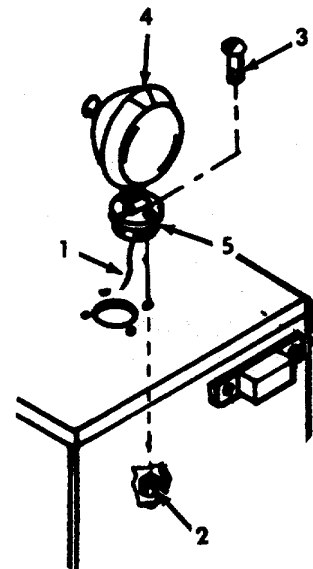
Battery Selector Switch OFF.  
Battery Cables Disconnected.

Materials/Parts

Deck Light (AG-R-4413)  
Bulb (4413)

REMOVAL

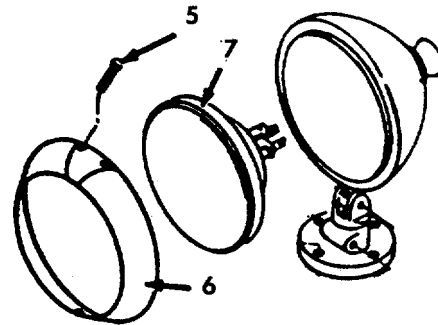
- a. Disconnect control wiring (1).
- b. Remove four locknuts (2) and screws (3) securing deck light (4) to fire body.
- c. Remove deck light (4).



**4-46. DECK LIGHT MAINTENANCE (Continued).**

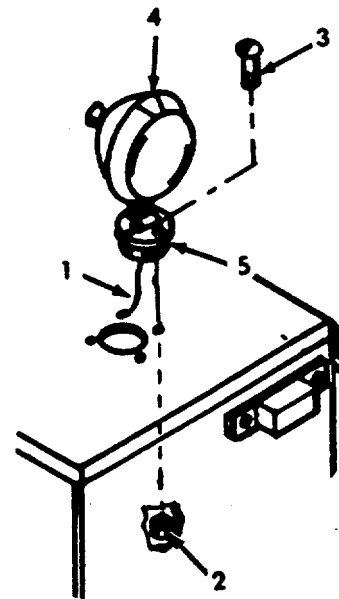
**REPAIR**

- a. Remove two screws (5) from top of lens retaining ring (6)
- b. Remove retaining ring (6).
- c. Disconnect and remove bulb (7).
- d. Connect bulb wiring and position new bulb (7) in socket.
- e. Position retaining ring (6) and install screws (5).
- f. Connect battery cables.



**INSTALLATION**

- a. Position deck light (4) on fire body.
- b. Secure deck light (4) with four screws (3) and locknuts (2).
- c. Connect control wiring (1).
- d. Connect battery cables.



**4-47. CLEARANCE LIGHT MAINTENANCE.**

---

This task covers:    a. Removal            b. Repair            c. Installation

---

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Bulb (194)

Materials/Parts

Clearance Light (1522A or 1522R)

General Safety Instructions

Battery Selector Switch OFF.  
Battery Cables Disconnected.

---

**4-47. CLEARANCE LIGHT MAINTENANCE (Continued).**

**REMOVAL**

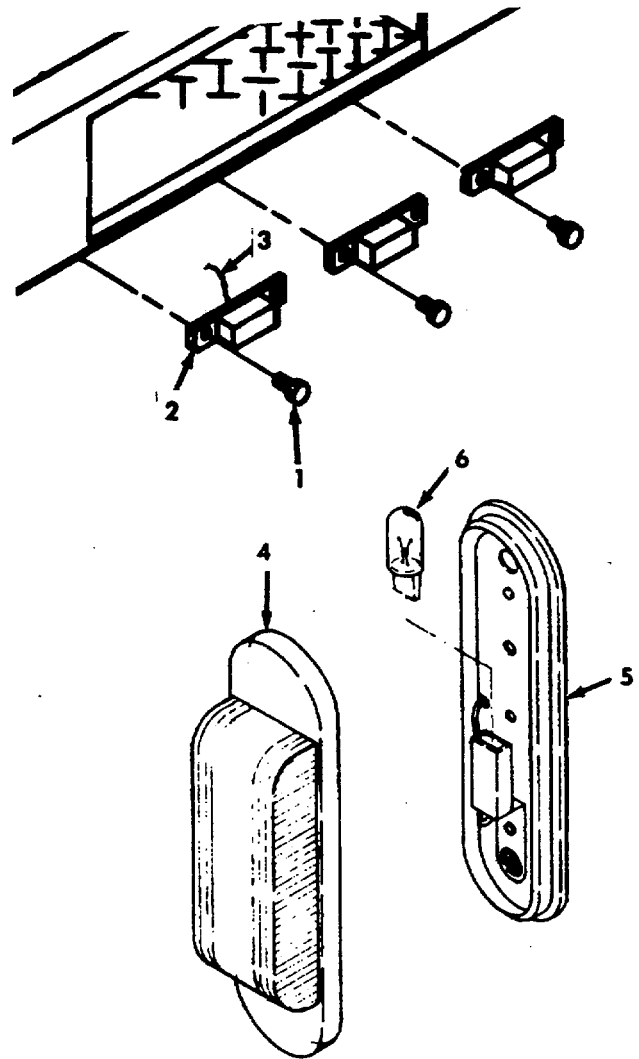
- a. Remove two screws (1) securing clearance light (2) to fire body.
- b. Cut control wiring (3) and remove clearance light (2).

**REPAIR**

- a. Using screwdriver unclip lens cover (4) from body (5).
- b. Remove bulb (6) from body (5).
- c. Insert new bulb (6) and snap lens cover (4) into place.
- d. Connect battery cables.

**INSTALLATION**

- a. Reconnect control wiring (3) and install new clearance light (2).
- b. Secure clearance light (2) with two screws (1).
- c. Connect battery cables.



**4-48. REAR QUARTZ FLOOD LIGHT MAINTENANCE**

This task covers: a. Removal      b. Repair      c. Installation

**INITIAL SET-UP**

Tools  
General Mechanics Tool Kit

General Safety Instructions  
Battery Selector Switch OFF.  
Batteries Disconnected.

Materials/Parts  
Quartz Flood Light (305-500)

Equipment Condition  
Para.    Condition Description  
4-51    Inverter Receptacles Removed



**4-48. REAR QUARTZ FLOOD LIGHT MAINTENANCE (Continued).**

**REMOVAL**

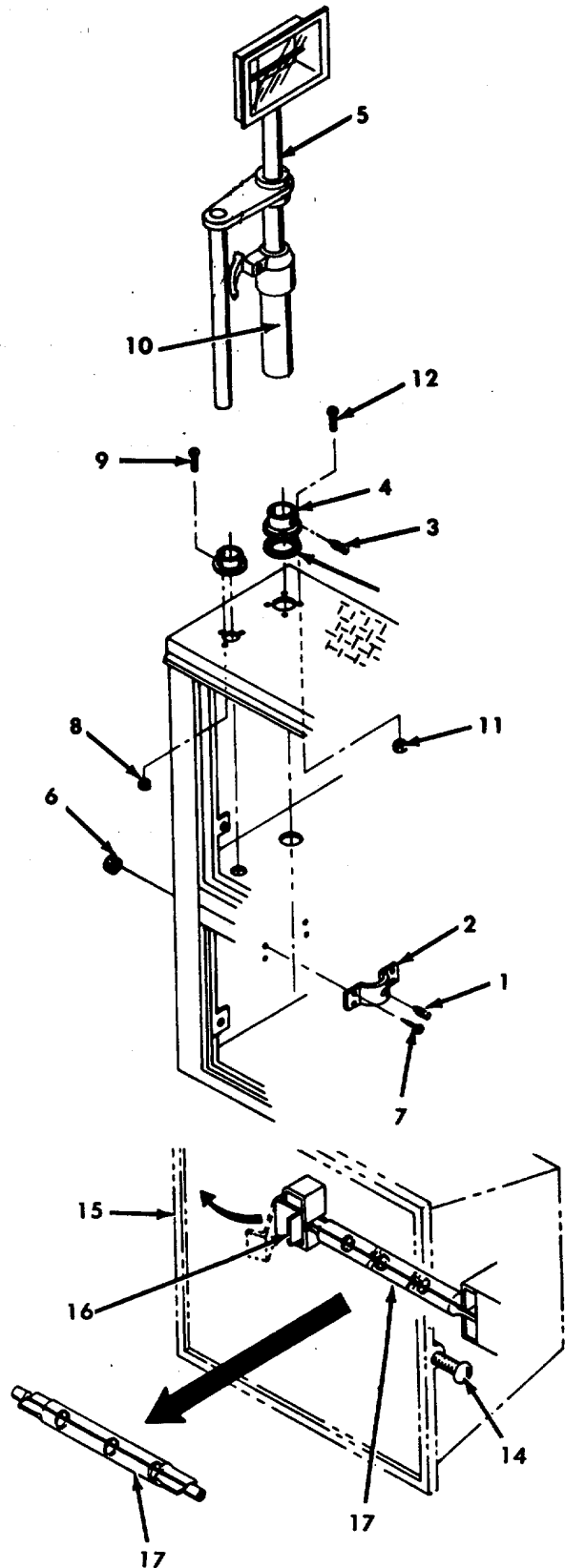
- a. Remove two setscrews (1) on clamp (2).
- b. Remove three setscrews (3) on collar (4).
- c. Lift quartz light assembly (5) out of fire body.
- d. Remove four locknuts (6) and screws (7) along with the clamp (2).
- e. Remove three locknuts (8) and screws (9) and remove tube assembly (10) from fire body.
- f. Remove four locknuts (11) and screws (12).
- g. Remove collar (4) and gasket (13) from fire body.

**REPAIR**

- a. Remove two screws (14) and hinge open lens cover (15).
- b. Open clip (16) and remove bulb (17).
- c. Insert new bulb (17) and close clip (16).
- d. Close lens cover (15) and secure with screws (14).
- e. Connect battery cables.

**INSTALLATION**

- a. Install collar (4) and gasket (13) onto fire body and secure with four screws (12) and locknuts (11).
- b. Insert tube assembly (10) into body and secure with three screws (9) and locknuts (8).
- c. Position clamp (2) onto body and secure with four screws (7) and locknuts (6).
- d. Insert quartz light assembly (5) into fire body.
- e. Insert three setscrews (3) into collar (4).
- f. Insert two setscrews (1) into clamp (2).
- g. Install inverter receptacles (paragraph 4-51).
- h. Connect battery cables.



**4-49. REAR STATION CHARGER REPLACEMENT.**

This task covers: a. Removal b. Repair c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Instructions

Battery Selector Switch OFF.  
Battery Cables Disconnected.

Materials/Parts

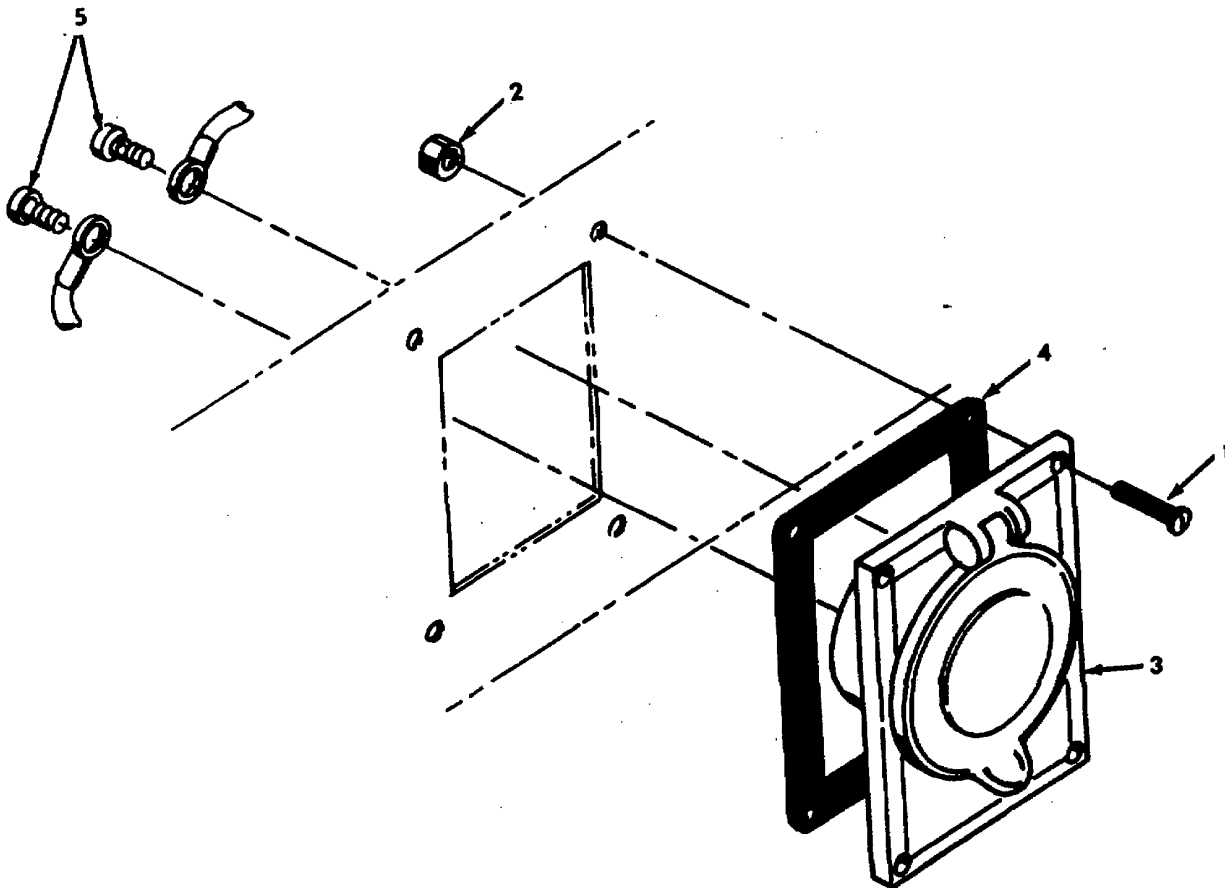
Station Charger (5369C)  
Gasket (COML)

**REMOVAL**

- a. Remove four screws (1) and nuts (2). Pull out rear station charger (3) and remove gasket (4).
- b. Loosen two terminal screws (5) and remove electrical connections.
- c. Remove rear station charger (3).

**INSTALLATION**

- a. Insert new rear station charger (3) into fire body and attach electrical connections to two terminal screws (5).
- b. Install new gasket (4).
- c. Secure rear station charger (3) with four screws (1) and nuts (2).
- d. Connect battery cables.



**4-50. REAR SLAVE RECEPTACLE REPLACEMENT**


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 This task covers: a. Removal b. Installation
 

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**INITIAL SETUP**Tools

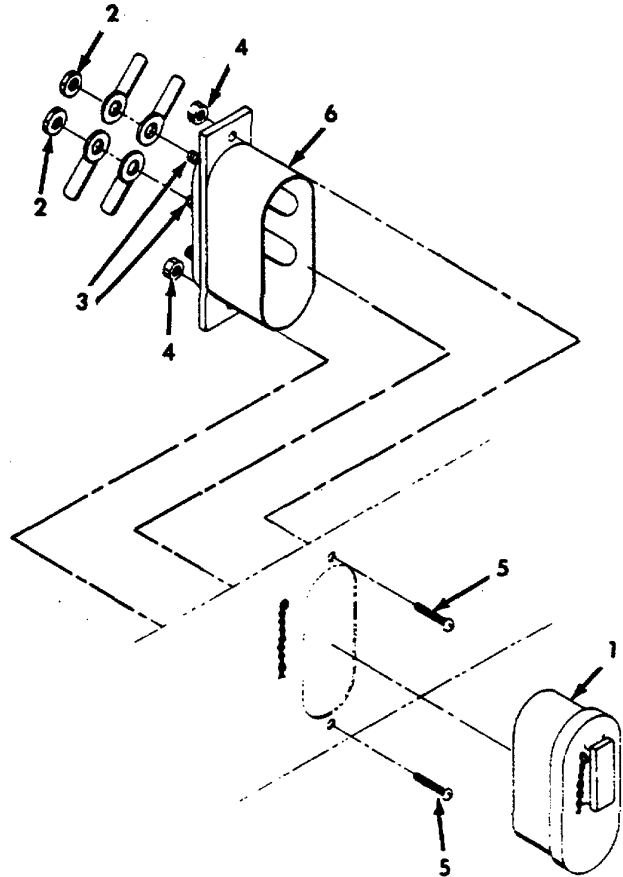
General Mechanics Tool Kit

General Safety Instructions
 Battery Selector Switch OFF.  
 Battery Cables Disconnected.
Materials/Parts

Slave Receptacle (4622)

**REMOVAL**

- a. Remove cover (1).
- b. Remove nuts (2) securing wires to plug (3).
- c. Remove two locknuts (4) and screws (5) securing receptacle (6) to fire body.
- d. Remove receptacle (6).

**INSTALLATION**

- a. Insert new receptacle (6) into fire body and secure with two screws (5) and locknuts (4).
- b. Install wires onto plug (3) and secure with nuts (2).
- c. Install cover (1).
- d. Connect battery cables.

**4-51. INVERTER RECEPTACLES REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Instructions

Battery Selector Switch OFF.  
Battery Cables Disconnected.

Materials/Parts

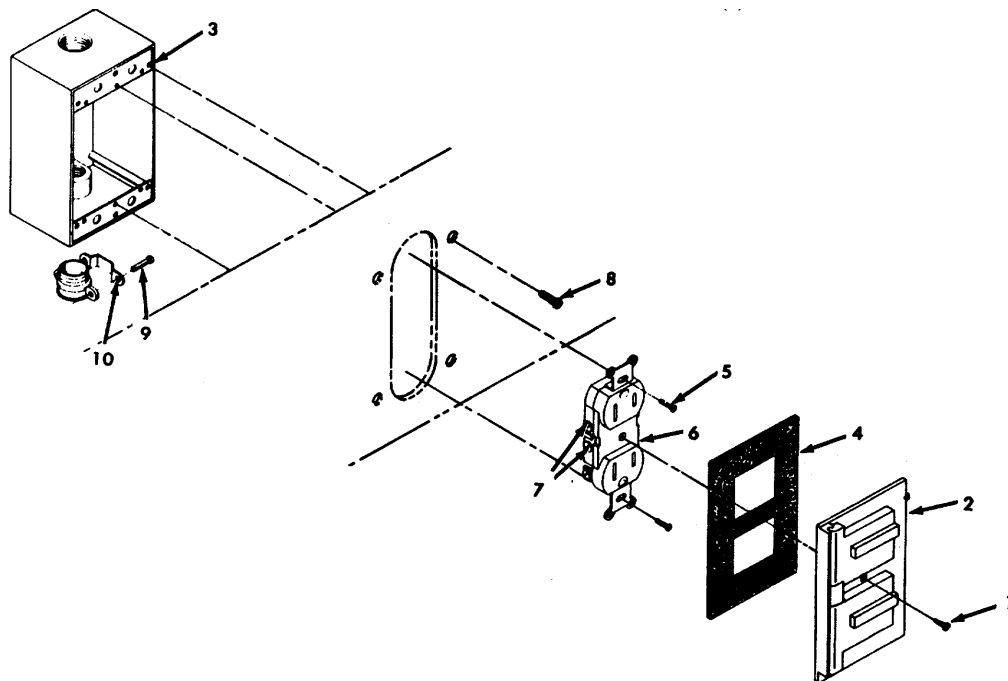
Inverter Receptacle (5800)  
Gasket (NSS)

**REMOVAL**

- a. Remove screw (1) securing cover (2) to receptacle box (3). Remove cover (2) and gasket (4).
- b. Remove two screws (5) securing receptacle (6) to box (3).
- c. Carefully remove receptacle (6) from box (3) and loosen three screws (7) securing wiring to receptacle (6).
- d. Remove four screws (8) securing receptacle box (3) to body and lower box (3).
- e. Disconnect wiring.
- f. Loosen two screws (9) on clamp (10) and remove wire from box (3).

**INSTALLATION**

- a. Insert wire into box (3) and secure clamp (10) over wire using two screws (9).
- b. Connect wiring.
- c. Secure box (3) to body using four screws (8).
- d. Attach wires to receptacle (6) and secure with three screws (7).
- e. Secure receptacle (6) to box (3) using two screws (5).
- f. Install new gasket (4) and cover (2) and secure with screw (1).
- g. Connect battery cables.



**4-52. BACK-UP LIGHT MAINTENANCE**

This task covers: a. Removal b. Repair c. Installation

**INITIAL SET-UP**

Tools  
General Mechanics Tool Kit

General Safety Instructions  
Battery Selector Switch OFF.  
Battery Cables Disconnected.

Materials/Parts  
Back-Up Light (2693W)

**REMOVAL**

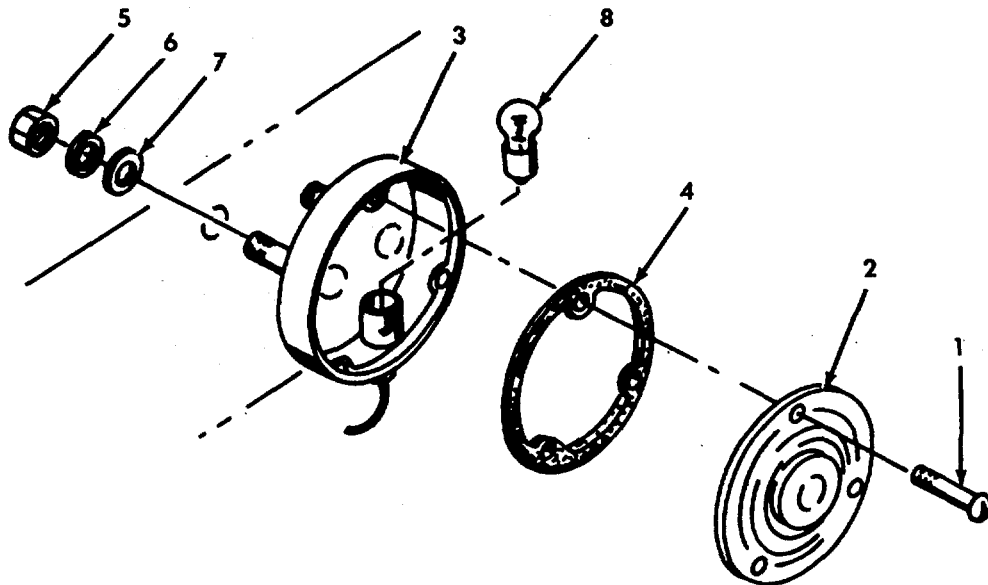
- a. Remove three screws (1) securing lens cover (2) to mounting plate (3).
- b. Remove lens cover (2) and gasket (4).
- c. Remove two nuts (5), lockwashers (6), and washers (7).
- d. Disconnect control wiring.

**INSTALLATION**

- a. Connect control wiring.
- b. Install washers (7), lockwashers (6), and nuts (5).
- c. Install gasket (4) and lens cover (2) and secure to mounting plate (3) using three screws (1).
- d. Connect battery cables.

**REPAIR**

Repair consists of replacement of damaged parts or burnt out bulb (8).



**4-53. TURN AND STOP LIGHT MAINTENANCE.**

This task covers: a. Removal b. Repair c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Instructions

Battery Selector Switch OFF.  
Batteries Disconnected.

Materials/Parts

Turn and Stop Light (CE-650-ST)

**REMOVAL**

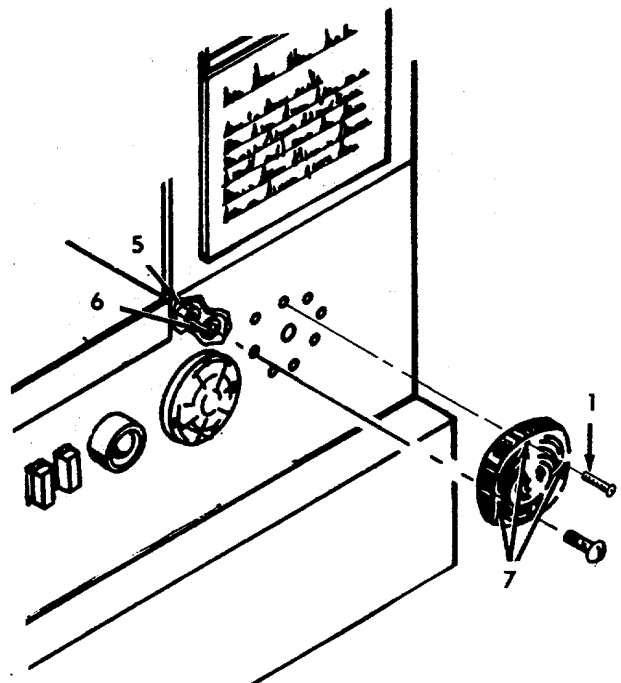
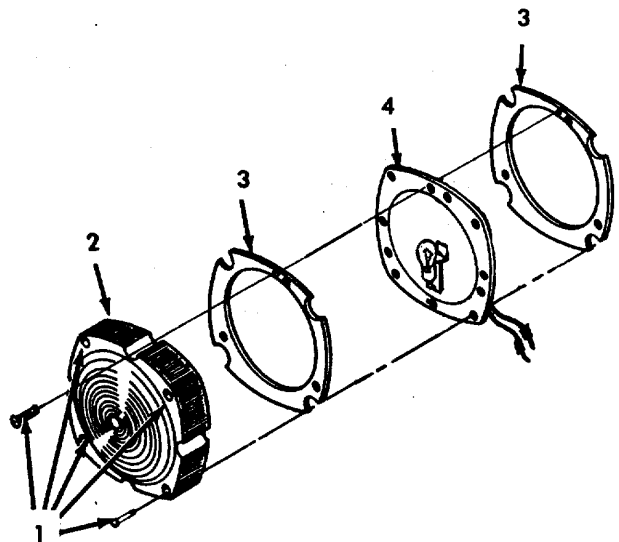
- a. Remove five screws (1) retaining lens cover (2) and gasket (3) to mounting base (4).
- b. Remove three nuts (5), starwashers (6), and screws (7) retaining mounting base (4) to fire body.
- c. Disconnect two plugs.

**REPAIR**

Repair consists of replacement of damaged parts or burnt out sealed beam lamp.

**INSTALLATION**

- a. Connect two plugs.
- b. Install mounting base (4) to fire body and secure with screws (7), starwashers (6) and nuts (5).
- c. Install gasket (3) and lens cover (2) onto mounting base (4) and secure with five screws (1).
- d. Connect battery cables.



**4-54. BACK-UP ALARM REPLACEMENT**


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This task covers: a. Removal b. Installation

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**INITIAL SET-UP**Tools

General Mechanics Tool Kit

General Safety Instructions

Battery Selector Switch OFF.

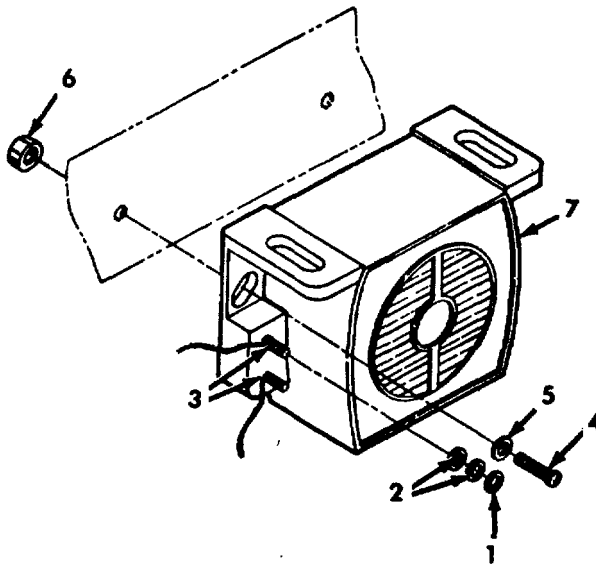
Batteries Disconnected.

Materials/Parts

Back-Up Alarm (322)

**REMOVAL**

- a. Disconnect nut (1) and washers (2) and remove wiring from the back-up alarm terminals (3).
- b. Remove screws (4), washers (5), nuts (6), back-up alarm (7) from the vehicle.

**INSTALLATION**

- a. Install the back-up alarm (7) on the vehicle and secure with screws (4), washers (5), and nuts (6).
- b. Install wiring on back-up alarm terminals (3) and secure with washers (2) and nut (1).
- c. Connect battery cables.

**4-54. BACK-UP ALARM REPLACEMENT**

This task covers: a. Removal b. Repair c. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

General Safety Instructions

Battery Selector Switch OFF.  
Batteries Disconnected.

Materials/Parts

Compartment Light (M393)

**REMOVAL**

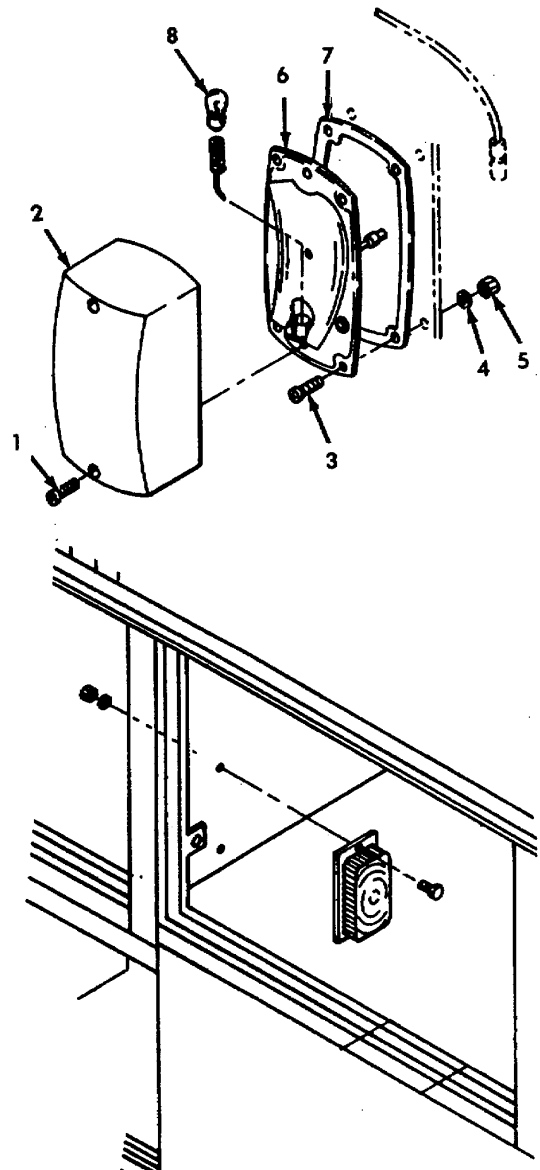
- a. Remove two screws (1) securing lens (2) to light assembly.
- b. Remove lens (2).
- c. Remove two screws (3), washers (4), and nuts (5) securing light assembly to vehicle compartment.
- d. Disconnect wiring to light assembly.
- e. Remove housing (6) and gasket (7).

**REPAIR**

- a. Remove old bulb (8) by pressing inward and rotating counterclockwise 90 degrees.
- b. Install new bulb (8) by pressing inward and rotating clockwise 90 degrees.

**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. COMPARTMENT DOOR ASSEMBLY REPLACEMENT.**

This task covers: a. Removal            b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Upper Door Assembly (KFT-004A)

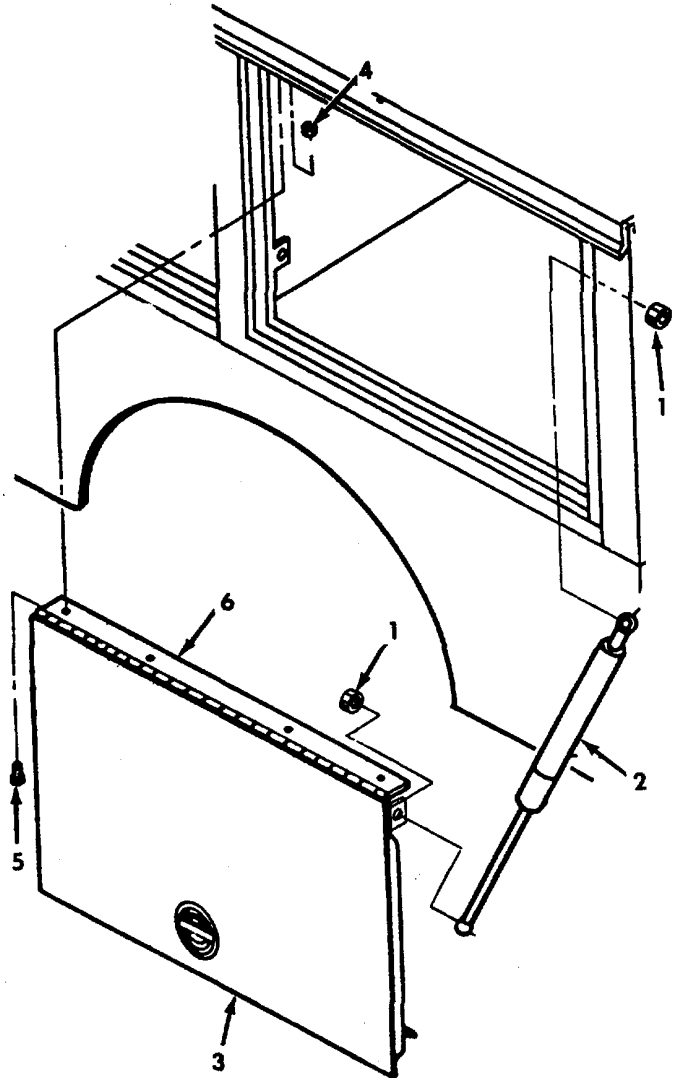
Lower Door Assembly (KFT-004B)

**REMOVAL**

- a. Remove nuts (1) from gas cylinder (2) and disconnect gas cylinder (2) from door assembly (3).
- b. Remove locknuts (4) and screws (5) from hinge (6).
- c. Remove door assembly (3) from fire body.

**INSTALLATION**

- a. Install new door assembly (3) onto fire body and secure with screws (5) and locknuts (4) through hinge (6).
- b. Install gas cylinder (2) through door assembly (3) and secure with nut (1).



**Section XII. MAINTENANCE OF ENGINE COOLING SYSTEM**

	Para.		Para.
Deaeration Tank Replacement .....	4-59	General .....	4-57
Drive Belt Replacement .....	4-62	Hoses and Piping Replacement.....	4-63
Engine Cooling System Service .....	4-58	Radiator Replacement.....	4-66
Fan and Clutch Replacement .....	4-61	Thermostat and Housing Replacement .....	4-65
Fan Shroud Replacement .....	4-60	Water Pump Replacement .....	4-64

**4-57. GENERAL.**

This section contains information on the maintenance of the engine cooling system that are maintainable at the Organizational level.

**4-58. ENGINE COOLING SYSTEM SERVICE.**

This task covers: Service

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Engine Coolant (Appendix D, Item 15)

General Safety Instructions

Be certain the engine is cool before attempting any work on the cooling system.

Engine OFF.

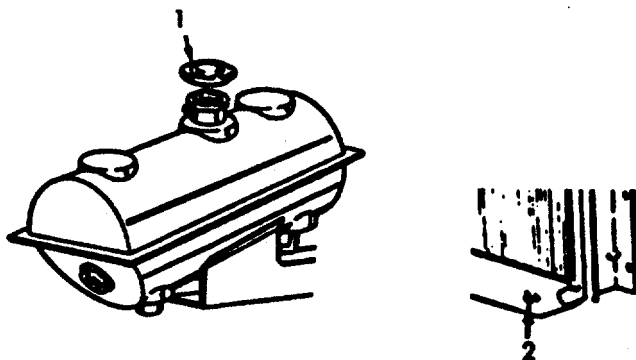
Transmission in (N) neutral.

Parking brake set.

**SERVICE**



**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 deaeration tank 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.
- 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 15) 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 (Appendix D, Item 15) until level reaches bottom of filler neck and install cap.
- j. Install deaeration tank cap.

**4-59. DEAERATION TANK REPLACEMENT.**

This task covers: a. Removal b. Installation

Tools

General Mechanics Tool Kit

Materials/Parts

Deaeration Tank (586531C2)

General Safety Instructions

Be certain that engine is cool before attempting any work on the cooling system.

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Equipment Condition

Para. Condition Description

4-58 Cooling System Drained

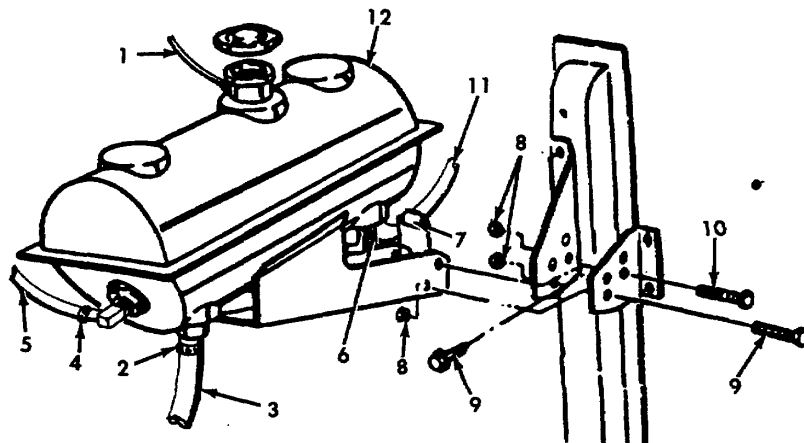
4-105 Washer Solvent Bottle Removed

**REMOVAL**

- a. Pull hose (1) off deaeration tank fill tower.
- b. Loosen clamp (2) and remove hose (3).
- c. Loosen clamp (4) and remove hose (5).
- d. Loosen clamp (6) and remove hose (7).
- e. Remove three locknuts (8), two bolts (9), bolt (10), and spacer (11).
- f. Remove deaeration tank (12).

**INSTALLATION**

- a. Install deaeration tank (12) and spacer (11).
- b. Secure with bolt (10), two bolts (9), and three locknuts (8).
- c. Install hoses (7, 5, and 3) and secure with clamps (6, 4, and 2) respectively.
- d. Insert hose (1) onto deaeration tank fill tower.
- e. Install washer solvent bottle (paragraph 4-105).
- f. Fill cooling system (paragraph 4-58).



**4-60. FAN SHROUD 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 set.

Materials/Parts

Fan Shroud (485200C3)

Equipment Condition

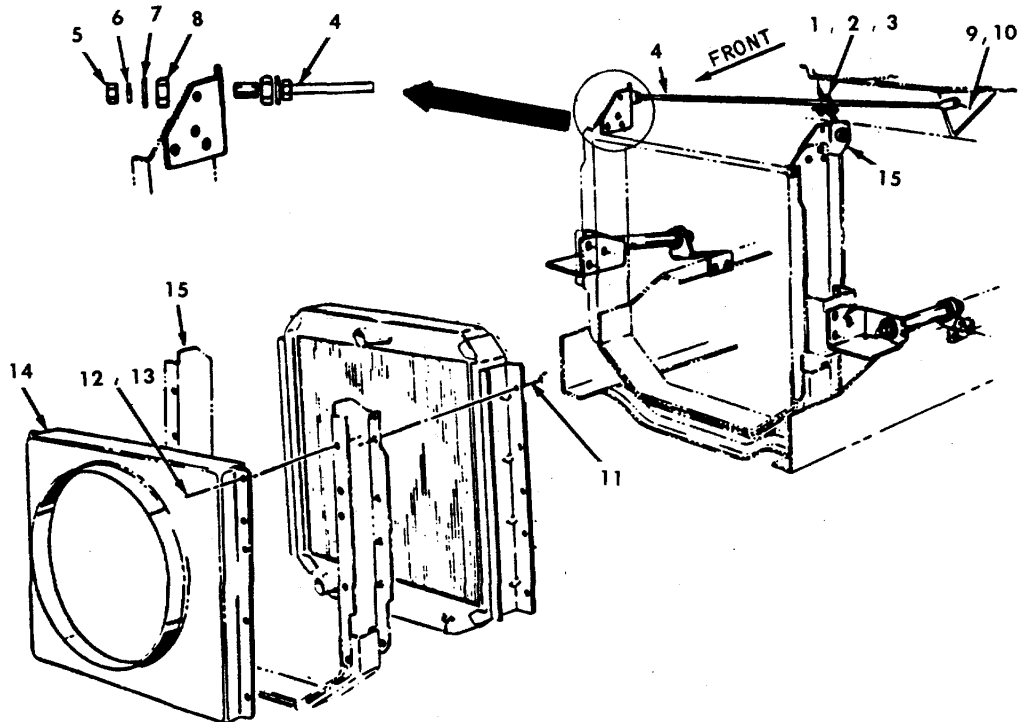
Para.	Condition Description
4-58	Cooling System Drained
4-61	Fan and Clutch Removed
4-63	Top Radiator Hoses Disconnected

**REMOVAL**

- a. Remove U-bolts (1), nuts (2), and lockwashers (3) which secure upper radiator cross braces (4).
- b. Remove two upper radiator cross braces (4) by removing nut (5), lockwasher (6), flat washer (7) and insulator (8) from front end of each cross brace (4).

**NOTE**

- Street side brace bolt (9) also secured horn to vehicle.**
- c. Remove bolt (9) and washer (10) from back end of each cross brace (4).



**4-60. FAN SHROUD REPLACEMENT (Continued).**

- d. Cut nylon ties on cross braces (4) and remove two cross braces (4).
- e. Remove ten nuts (11), bolts (12), and washers (13) securing fan shroud (14) to radiator support (15).
- f. Remove fan shroud (14).

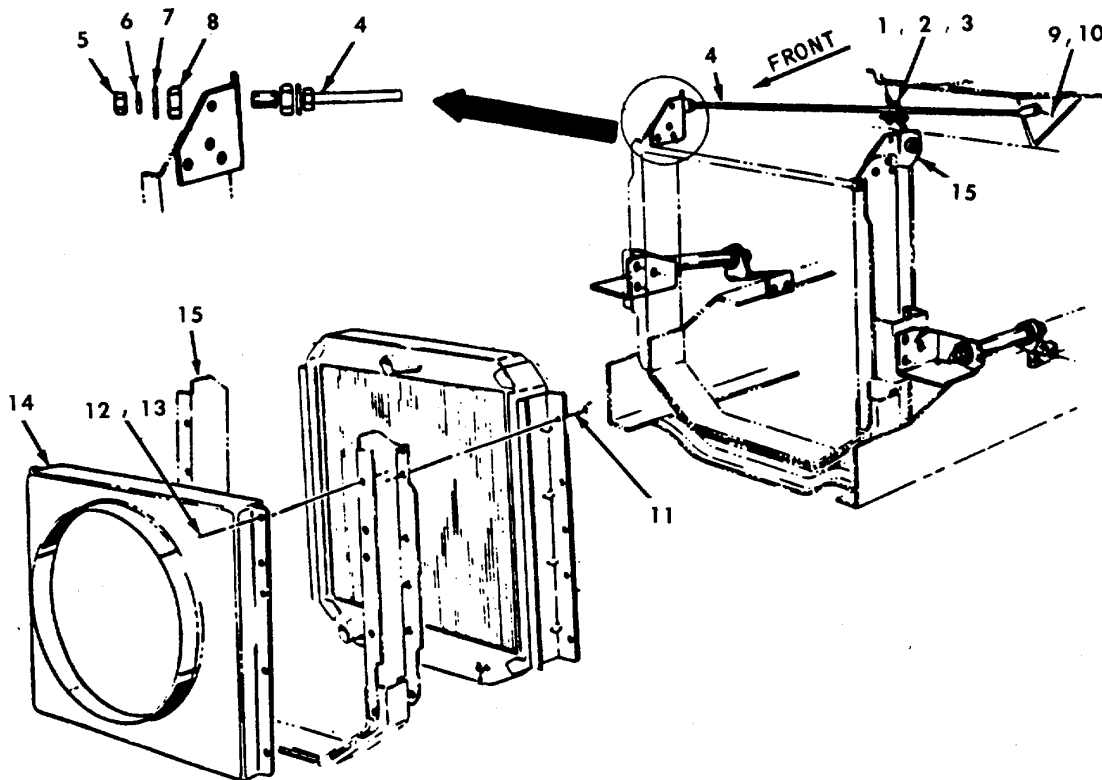
**INSTALLATION**

- a. Install fan shroud (14) and secure to radiator support (15) using ten washers (13), bolts (12), and nuts (11).

**NOTE**

**Remember to secure horn to vehicle with street side brace bolt (9).**

- b. Secure back end of two cross braces (4) using washers (10) and bolts (9).
- c. Secure front end of each cross brace (4) using insulator (8), flat washer (7), lockwasher (6) and nut (5).
- d. Secure hose to cross braces (4) using nylon ties.
- e. Secure cross braces (4) using U-bolt (1), nuts (2), and washers (3).
- f. Connect top radiator hoses (paragraph 4-63).
- g. Install fan and clutch (paragraph 4-61).
- h. Fill cooling system (paragraph 4-58).



**4-61. FAN AND CLUTCH REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools  
 General Mechanics Tool Kit

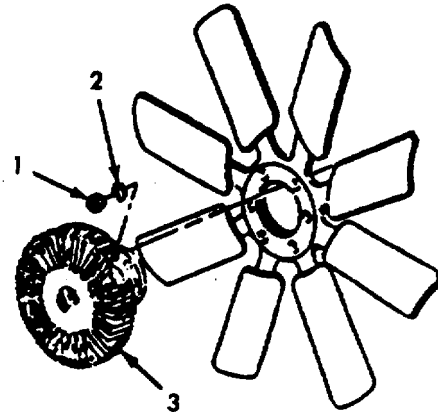
General Safety Instructions  
 Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.

Materials/Parts  
 Fan (587656C1)  
 Fan Clutch (492146C1)

Equipment Condition  
 Para. Condition Description  
 4-58 Cooling System Drained  
 4-63 Top Radiator Hoses Disconnected

**REMOVAL**

- a. Remove six nuts (1) and lockwashers (2).
- b. Slide fan and clutch assembly (3) forward off studs and remove fan and clutch assembly (3).



**INSTALLATION**

- a. Slide fan and clutch assembly (3) onto studs and secure with six lockwashers (2) and nuts (1).
- b. Connect top radiator hoses (paragraph 4-63).
- c. Fill cooling system (paragraph 4-58).

**4-62. DRIVE BELTS REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools  
 General Mechanics Tool Kit  
 Tension Gauge

General Safety instructions  
 Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.

Materials/Parts  
 Alternator Belt (686617C91)  
 Power Steering Belts (358328C91)  
 Air Compressor Belt (673950C1)

**4-62. DRIVE BELTS REPLACEMENT (Continued).**

**REMOVAL**

Loosen slack adjustment bolts as necessary on air compressor, steering pump and/or alternator and remove belt from pulley.

**INSTALLATION**

Install belt on pulley and tighten slack adjustment bolts on air compressor, steering pump and/or alternator as necessary.

**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. Overtightening belts can lead to bearing damage and early belt failure.**

**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. Run the engine at idle for a minimum of 15 minutes, allowing the belt(s) to reseal itself in the pulleys.
- e. Allow the drive belt to cool, then check the belt tension with the tension gauge.
- f. Belt tension with either belt should be 67 lb (300 N).
- g. Adjust to proper tension as necessary. Remove band clamps and nylon ties as necessary to remove radiator hoses and piping.

**4-63. HOSE AND PIPING REPLACEMENT**

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This task covers:    a. Removal                    b. Installation

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**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Materials/Parts

Upper Radiator Hose (571967C1)  
Lower Radiator Hose (486129C91)

Equipment Condition

Para	Condition Description
4-58	Cooling System Drained

---

**REMOVAL**

Remove band clamps and nylon ties as necessary to remove radiator hoses and piping.

**INSTALLATION**

- a. Install radiator hoses and piping and secure with band clamps and nylon ties as necessary.
- b. Fill cooling system (paragraph 4-58).

**4-64. WATER PUMP 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 set.

Materials/Parts

Water Pump (685155C92)

Gasket (675808C1)

Equipment Condition

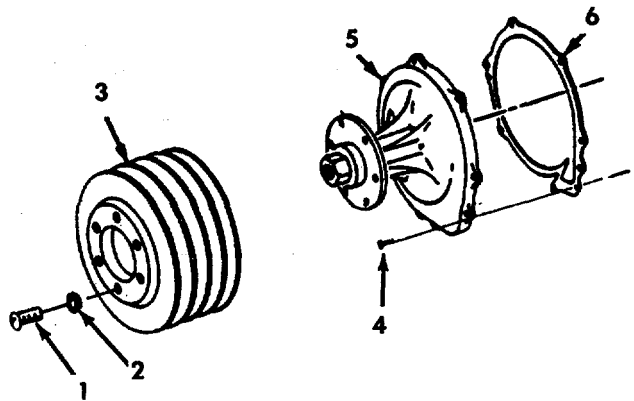
Para.	Condition Description
4-58	Cooling System Drained
4-60	Fan Shroud Removed
4-61	Fan and Clutch Removed
4-62	Drive Belts Removed
4-63	Radiator Hoses Removed

**REMOVAL**

- a. Remove six bolts (1) and lockwashers (2).
- b. Remove the pulley (3) from the water pump hub.
- c. Remove all stud nuts and bolts (4).
- d. Remove the water pump (5) and gasket (6) from the front cover.

**INSTALLATION**

- a. Install gasket (6) and water pump (5).
- b. Install all stud nuts and bolts (4).
- c. Install pulley (3) onto water pump hub.
- d. Secure with six washers (2) and nuts (1).
- e. Install fan shroud (paragraph 4-60).
- f. Install fan and clutch (paragraph 4-61).
- g. Install drive belts (paragraph 4-62).
- h. Install radiator hoses (paragraph 4-63).
- i. Fill cooling system (paragraph 4-58).





**4-65. THERMOSTAT AND HOUSING REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Thermostat (1801191C91)  
Housing (686757C2)

General Safety Instructions

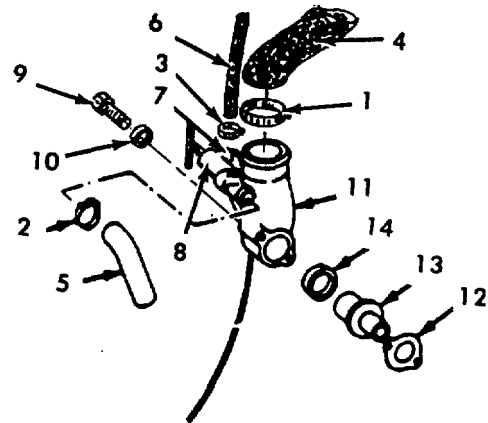
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Equipment condition

Para. Condition Description  
4-58 Cooling System Drained

**REMOVAL**

- a. Loosen hose clamps (1, 2, and 3) and disconnect hoses (4, 5, and 6).
- b. Remove line nut (7) from pet cock valve (8).
- c. Remove mounting bolts (9) and washers (10).
- d. Remove housing (11) away from engine block.
- e. Remove gasket (12), thermostat (13) and seal (14) from the thermostat housing (11).



**INSTALLATION**

- a. Install new seal (14) and thermostat (13) into housing (11).
- b. Position gasket (12) and install housing (11) to engine block with mounting bolts (9) and washers (10).
- c. Install line nut (7) to pet cock valve (8).
- d. Install hoses (4, 5, and 6) and tighten hose clamps (1, 2, and 3).
- e. Fill cooling system (paragraph 4-58).

**4-66. RADIATOR REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Radiator (493367C3)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Equipment condition

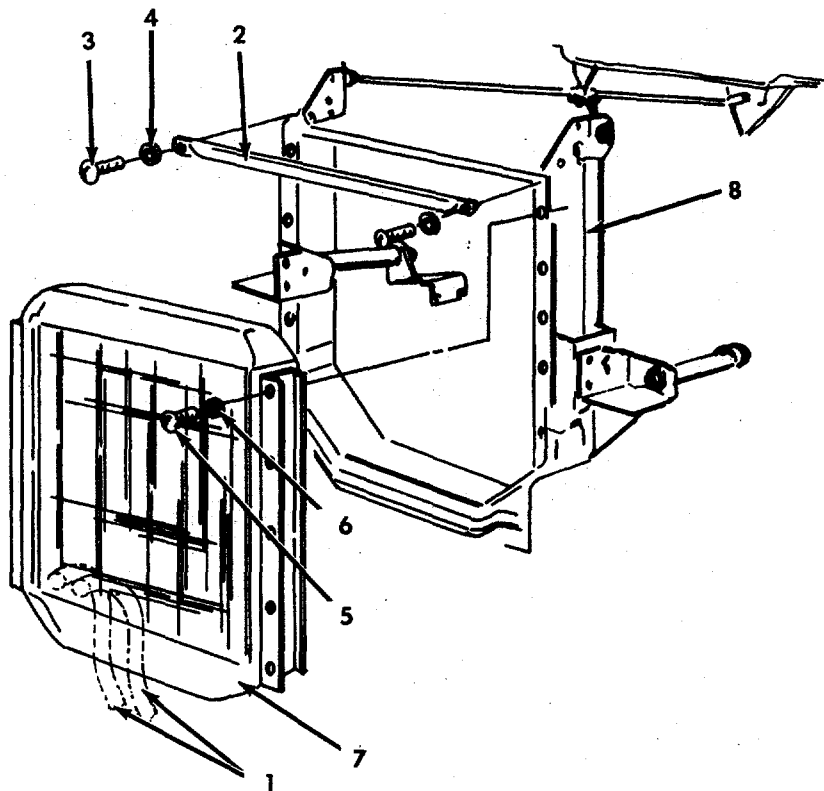
Para. Condition Description  
4-58 Cooling System Drained  
4-60 Fan Shroud Removed  
4-63 Hoses Removed

**4-66. RADIATOR REPLACEMENT (Continued).****REMOVAL**

- a. Insert catch basin under radiator and disconnect two transmission cooling lines (1) from bottom of radiator.
- b. Remove front support rod (2) by removing two bolts (3) and washers (4).
- c. Remove ten bolts (5) and flat washers (6) securing radiator (7) to radiator support (8).
- d. Remove radiator (7).

**INSTALLATION**

- a. Install radiator (7) and secure to radiator support (8) using ten bolts (5) and flat washers (6).
- b. Install four support rods (2) and secure with bolts (3) and washers (4).
- c. Connect two transmission cooling lines (1) to bottom of radiator.
- d. Install hoses (paragraph 4-63).
- e. Install fan shroud (paragraph 4-60).
- f. Fill cooling system (paragraph 4-58).
- g. Check transmission fluid level (paragraph 4-156).



**Section XIII. MAINTENANCE OF ENGINE FUEL SYSTEM**

Accelerator Pedal Replacement .....	Para. 4-73	Fuel Pump Replacement .....	Para. 4-70
Air Cleaner Replacement .....	4-68	Fuel Tank Replacement .....	4-72
Fuel Filter Replacement .....	4-69	General .....	4-67
Fuel Lines Replacement .....	4-71		

**4-67. GENERAL.**

This section contains information on the maintenance of the engine fuel system that are maintainable at the Organizational level.

**4-68. AIR CLEANER REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Instructions

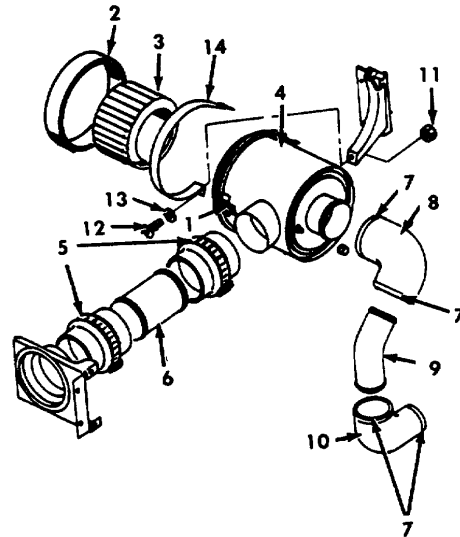
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Materials/Parts

Air Cleaner (492919C91)  
Element (476741C1)

**REMOVAL**

- a. Unhook three latches (1) and remove lid (2).
- b. Remove filter element (3) from housing (4).
- c. Remove two band clamps (5) and flexible duct (6).
- d. Remove four band clamps (7), flexible elbow (8), pipe (9) and flexible elbow (10).
- e. Remove two nuts (11), bolts (12), and flat washers (13) from straps (14).
- f. Remove straps (14) and air cleaner housing (4).



**INSTALLATION**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>a. Install air cleaner housing (4) and straps (14).</li> <li>b. Secure straps (14) with washers (13), bolts (12), and nuts (11).</li> <li>c. Install flexible elbow (10), pipe (9) and flexible elbow (8) and secure with four band clamps (7).</li> </ol> | <ol style="list-style-type: none"> <li>d. Install flexible duct (6) and secure with two band clamps (5).</li> <li>e. Install filter element (3) into housing (4).</li> <li>f. Install lid (2) and hook three latches (1).</li> </ol> |
|---|--|

**4-69. FUEL FILTER REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Oil/Fuel Filter Wrench

General Safety Instructions

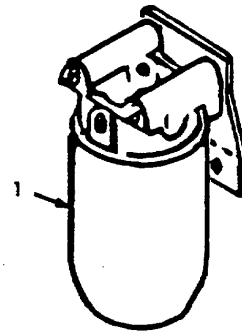
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Materials/Parts

Fuel Filter (702255C1)  
Vegetable Oil (Appendix D, Item 39)

**REMOVAL**

- a. Place catch basin under fuel filter (1).
- b. Unscrew fuel filter (1) using oil/fuel filter wrench if necessary.



**INSTALLATION**

- a. Put a light coating of vegetable oil (Appendix D, Item 39) on rubber gasket of new fuel filter (1) before installing.
- b. Screw new fuel filter (1) into place.

**4-70. FUEL PUMP 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 set.

Materials/Parts

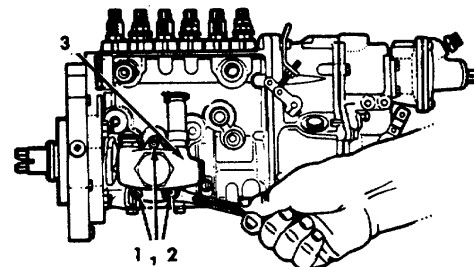
Fuel Supply Pump (684492C93)

Equipment condition

Para. Condition Description  
4-58 Cooling System Drained

**REMOVAL**

- a. Remove fuel supply pump mounting nuts (1) and washers (2).
- b. Remove supply pump (3) and drain lubricating oil into a container.



**INSTALLATION**

- a. Install fuel supply pump (3) and secure with mounting washers (2) and nuts (1).
- b. Torque mounting nuts to 3-5 ft-lb (4-7 N.m).

**4-69. FUEL FILTER REPLACEMENT**

This task covers: a. Removal      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Instructions

Disconnect batteries.  
 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.

Materials/Parts

Fuel Lines (As Required, Appendix E, Figure E-35)

**REMOVAL**

**NOTE**

**Fuel lines are attached with threaded fittings.**

Unscrew threaded fittings as necessary to remove fuel lines.

**INSTALLATION**

- a. Connect all fuel lines that were removed.
- b. Fill fuel system and check for signs of leaking.
- c. Connect batteries.

**4-72. FUEL TANK REPLACEMENT.**

This task covers: a. Removal      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Instructions

Disconnect batteries.  
 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.

Materials/Parts

Fuel Tank (464762C91)

Personnel Required: 2

Equipment Condition

Para.    Condition Description  
 4-71    Fuel Lines Disconnected.

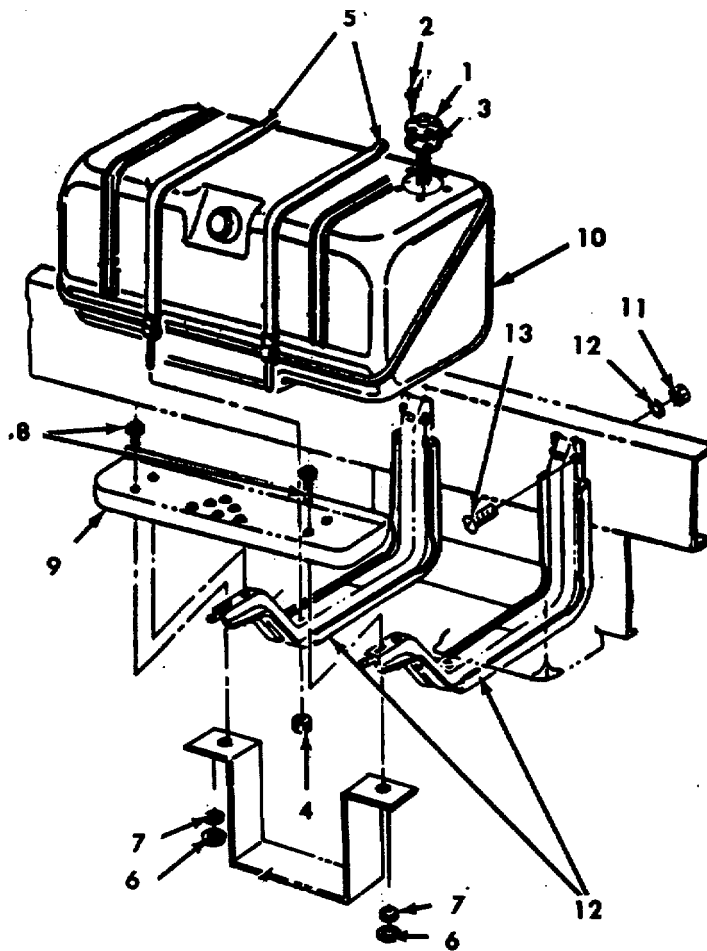
**4-72. FUEL TANK REPLACEMENT (Continued).**

**REMOVAL**

- a. Disconnect two electrical contacts at fuel level indicator sending unit (1).
- b. Remove five bolts (2) from the sending unit (1) and remove the gasket (3) and sending unit (1).
- c. Remove nut (4) from each retainer strap (5).
- d. Remove four nuts (6), washers (7) and bolts (8) and remove step (9).
- e. Place a jack or other suitable support under tank (10) and remove four nuts (11), washers (12), and bolts (13) from each bracket (14).
- f. Remove brackets (14). Lower tank (10) and remove.

**INSTALLATION**

- a. Slide tank (10) into place and install brackets (14).
- b. Secure each bracket (14) using four bolts (13), washers (12), and nuts (11).
- c. Install step (9), and secure with four bolts (8), washers (7), and nuts (6).
- d. Install retainer straps (5) and secure with nuts (4).
- e. Position gasket (3) and sending unit (1) and install the five bolts (2) that secure the sending unit (1) to the tank (10).
- f. Connect two electrical contacts at fuel level indicator sending unit (1).
- g. Install fuel lines (paragraph 4-71).
- h. Connect batteries.



**4-73. ACCELERATOR PEDAL 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 set.

Materials/Parts

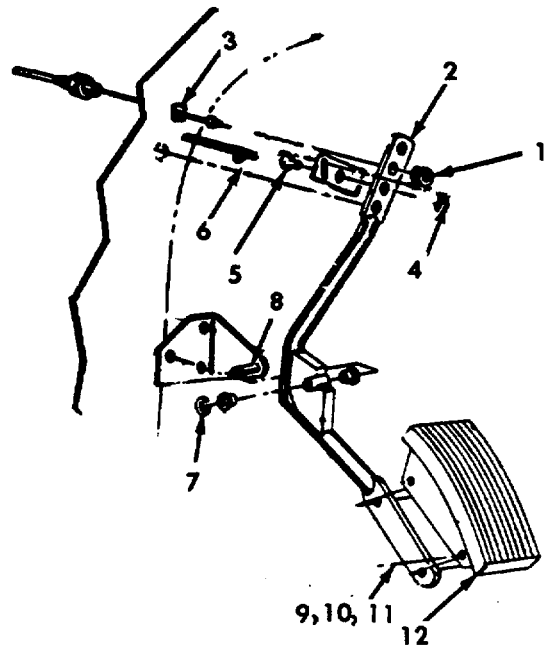
Accelerator Pedal (482606C1)

**REMOVAL**

- a. Squeeze grommet (1) together with pliers. Remove grommet (1) from accelerator pedal rod (2).
- b. Slide cable (3) through hole in accelerator pedal rod (2).
- c. Remove nut (4) from sleeve (5) on lower cable (6) and slide lower cable (6) out of rod (2).
- d. Remove snap ring (7) and slide accelerator pedal assembly off pivot shaft (8).
- e. Remove two nuts (9), lockwashers (10), and bolts (11) and remove accelerator pedal (12) from rod.

**INSTALLATION**

- a. Install accelerator pedal (12) onto rod (2) and secure with two bolts (11), lockwashers (10), and nuts (9).
- b. Slide accelerator pedal assembly onto pivot shaft (8) and install snap ring (7).
- c. Install lower cable (6) through sleeve (5) and rod (2) and secure with nut (4).
- d. Slide cable (3) through hole in accelerator pedal rod (2).
- e. Install grommet (1).



**Section XIV. MAINTENANCE OF DIESEL FUEL INJECTION SYSTEM**

	Para.		Para.
General .....	4-74	Injection Nozzles Replacement.....	4-77
Injection Lines Replacement .....	4-75	Injection Pump Replacement .....	4-76

**4-74. GENERAL.**

This section contains information on the maintenance of the diesel fuel injection system that are maintainable at the Organizational level.

**4-75. INJECTION LINES REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Fuel Line Nut Wrenches

General Safety Instructions  
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Materials/Parts

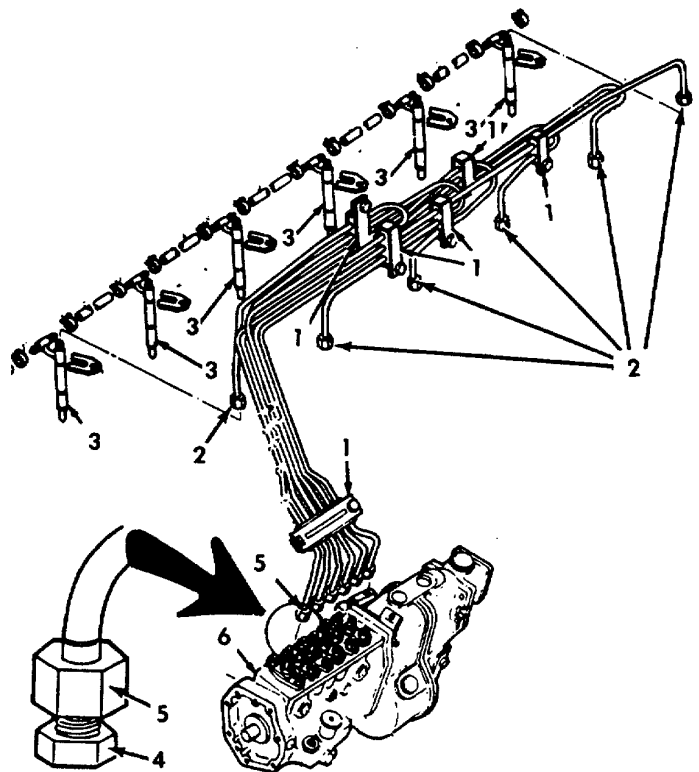
Injection Lines (1802 951C1 through 1802 956C1)

**REMOVAL**

- a. Remove line clamps (1) to remove single lines as necessary. It is not necessary to remove the clamps (1) to remove all six lines, the lines can be removed as an assembly.
- b. Loosen line nuts (2) at the nozzles and remove the lines from the nozzles (3), capping the nozzles immediately.

**CAUTION**

The injection pump delivery valve holder (4) must be held with a wrench to prevent movement when the lines are being removed or installed in the injection pump. Failure to do this may result in fuel leakage.



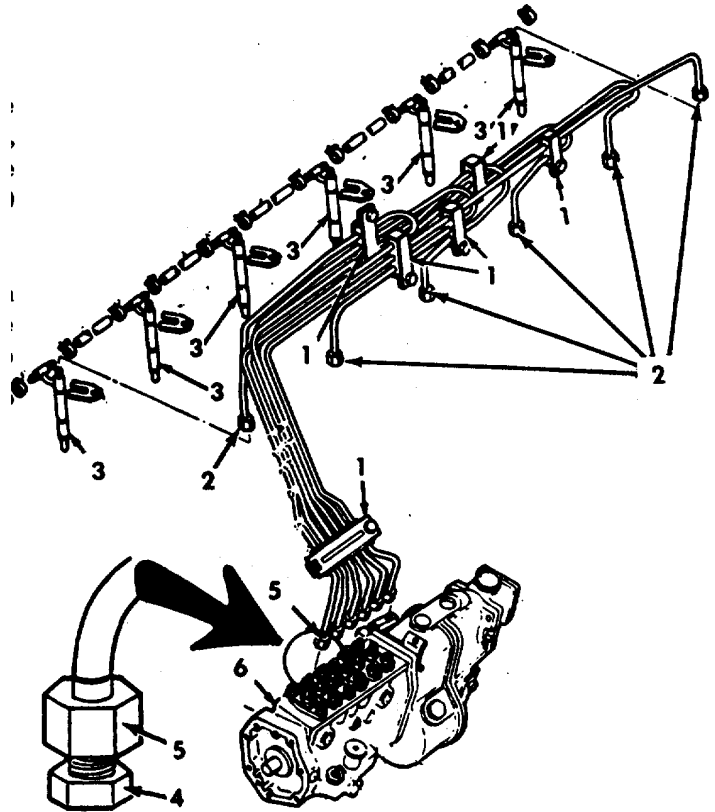


**4-75. INJECTION LINES REPLACEMENT (Continued).**

- c. Hold the injection pump delivery valve holder (4) with a wrench to prevent movement and loosen line nuts (5) at the injection pump (6).
- d. Remove the lines from the pump.

**INSTALLATION**

- a. Holding the injection pump delivery valve holder (4) with a wrench to prevent movement, install the injection lines and torque the line nuts (5) to the pump (6). Torque line nuts to 30 ft-lb (41 N.m).
- b. Remove the protective caps from the injection nozzles and install the lines and nuts (2) to the nozzles (3). Torque line nuts to 30 ft-lb (41 N.m).
- c. Install the line clamps (1) if removed.



**4-76. FUEL INJECTION PUMP REPLACEMENT.**

This task covers: a. Removal      b. Installation

Tools

General Mechanics Tool Kit

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

Materials/Parts

Injection Pump (1802604C92)  
Gasket (675 609 C1)

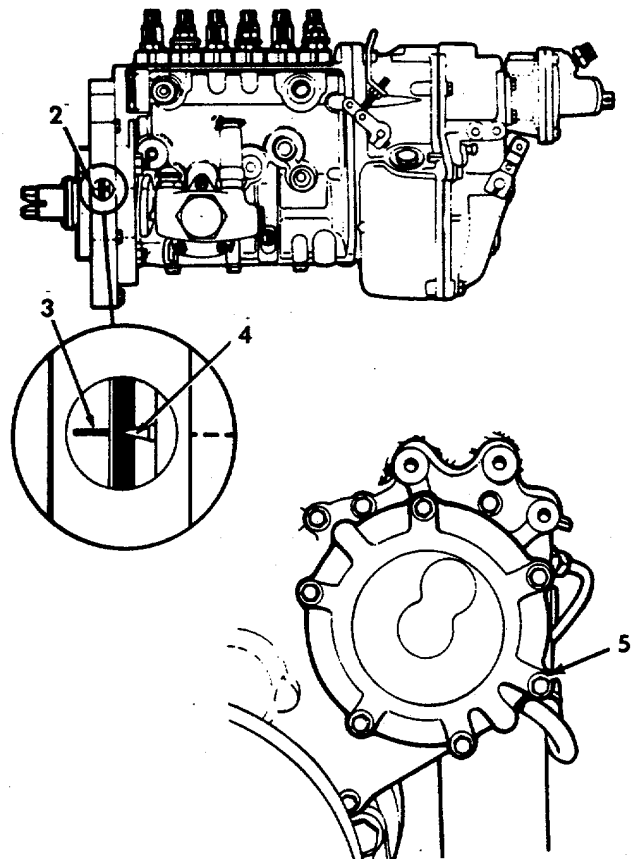
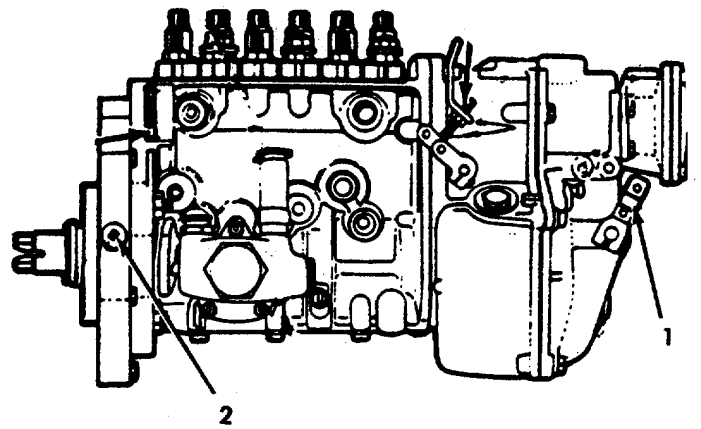
Equipment Condition

Para. Condition Description  
4-75 Injection Lines Removed

## 4-76. FUEL INJECTION PUMP REPLACEMENT (Continued).

## REMOVAL

- a. Disconnect accelerator cable or linkage from outer injection pump control lever (1).
- b. Remove injection pump timing pointer plug (2) and gasket from left side of pump mounting adapter.
- c. Rotate engine in normal operating direction until engine front cover timing pointer is approximately 90 degrees from top dead center dot on crankshaft pulley. (The injection pump is driven at one-half engine speed. Therefore, each time the injection pump hub mark (3) is aligned with injection pump timing pointer (4), engine should be on number one cylinder compression stroke.
- d. Turn engine slowly in normal direction of rotation until timing mark (3) on hub is aligned with injection pump timing pointer (4) (observe through mounting adapter timing plug hole (2)). If engine is turned past timing mark, rotate engine counterclockwise at least 90 degrees to remove gear train backlash. Rotate engine until timing mark (3) and pump timing pointer (4) are aligned.
- e. Observe engine front cover timing pointer and crankshaft pulley degree alignment. To ensure an accurate reading, view pointer straight on the engine should now be positioned at specified static pump to engine timing. If timing is not within specifications, rotate engine to correct crankshaft position (specified degrees before top dead center) before removing injection pump. If necessary to rotate engine in opposite direction of normal rotation to achieve specified timing, rotate engine to 90 degrees before top dead center and then rotate engine to specified timing. This procedure takes up gear backlash.
- f. Remove high pressure injection lines as an assembly of six lines from injection nozzles and pump. Cap all openings to keep dirt out of fuel system.
- g. Remove or disconnect all other necessary lines, hoses, and wires from pump.
- h. Cap all openings to keep dirt out of fuel system.
- i. Remove injection pump drive gear access cover capscrews and washers (5).

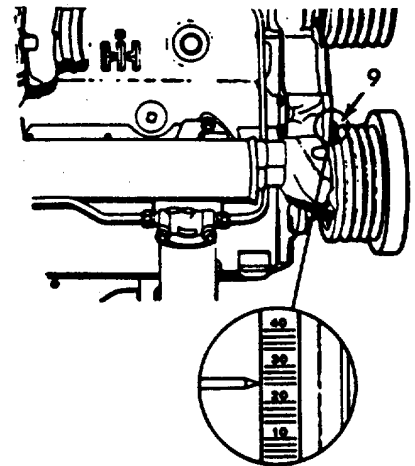
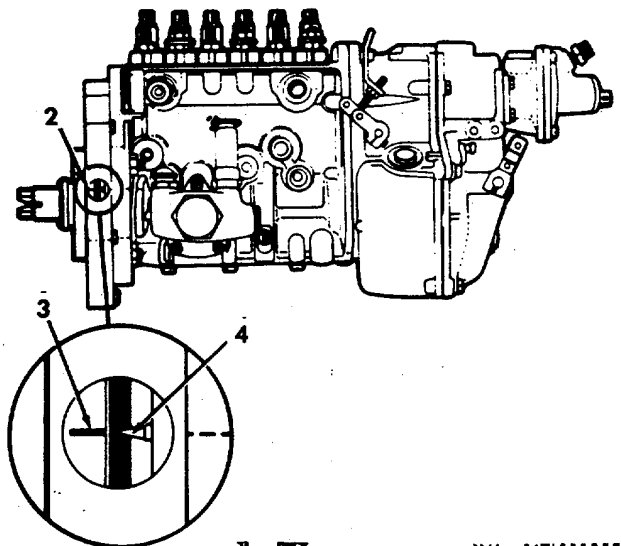
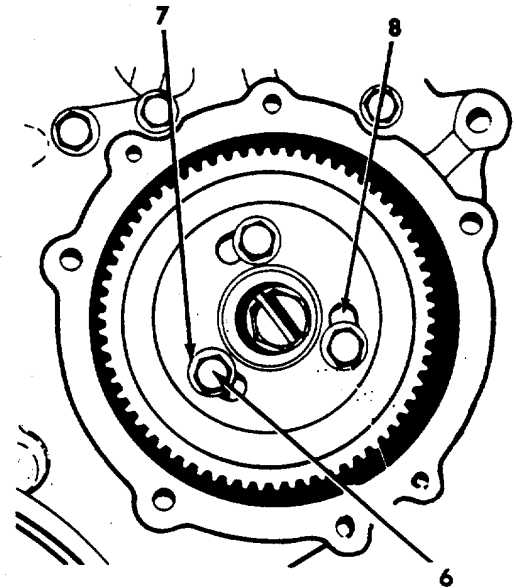


**4-76. FUEL INJECTION PUMP REPLACEMENT (Continued).**

- j. Remove injection pump drive gear bolts (6) and washers (7) from injection pump hub and remove pump from engine.

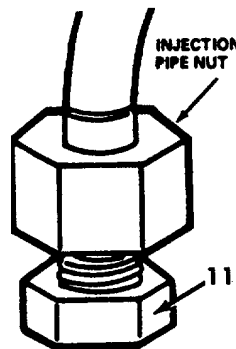
**INSTALLATION**

- a. Install injection pump drive gear loosely to injection pump using drive gear bolts (5) and washers (7).
- b. Rotate pump clockwise (as viewed from drive gear end) until timing mark (3) on pump drive hub is aligned with timing pointer (4) in adapter hole (2).
- c. Rotate loosened pump drive gear counterclockwise (as viewed from drive gear end) to 3/4 of full extent of drive gear bolt slots (8).
- d. Install final filter to injection pump hose and rubber coated clamp. If the clamp is omitted, the hose may rub on adjacent parts and leak.
- e. Install final filter to pump housing hose to inlet connector on pump housing.
- f. Clean front cover plate and install new gasket and injection pump assembly.
- g. With injection pump in position on engine, secure pump adapter to front plate with bolts, nuts, and washers. Torque bolts and nuts to 24 ft-lb (33 N.m).
- h. Verify alignment of pump timing pointer (4) to hub mark (3) through mounting adapter opening (2). Rotate pump drive hub as required for proper alignment. Torque pump drive gear bolts to 35 ft-lb (47 N.m). Observe engine to injection pump timing on pulley (9).
- i. Install drive gear access cover (10) with applicable capscrews and washers (5).
- j. Install lubricating oil line to injection pump.



**CAUTION**

Injection pump delivery valve holder (11) must be held with a wrench to prevent movement when high pressure piping is being installed.



**4-76. FUEL INJECTION PUMP REPLACEMENT (Continued).**

k. Install fuel supply, fuel return and high pressure injection lines with all clamps and brackets. Clean inside of each injection line with filtered air before assembling to injection pump and nozzles. Torque line nuts to 30 ft-lb (41 N.m).

l. Remove all protective caps and install and connect all other applicable lines, hoses and wires to the pump.

m. Add minimum of one pint of engine oil to governor through the upper governor housing plug (12). Because injection plug is splash lubricated, engine oil must be added to a replacement pump.

n. Install throttle cable or linkage to outer control lever (1). Adjust throttle cable or linkage so tang in outer control lever is in override position. At override lever tang will be approximately half way from center of control lever to end of slot.

o. After installation of fuel injection pump, prime fuel system using these procedures.

(1) Loosen all six high pressure fuel lines at nozzle end.

(2) Loosen hand priming pump handle.

(3) Operate priming pump until pump action becomes solid (harder to pump).

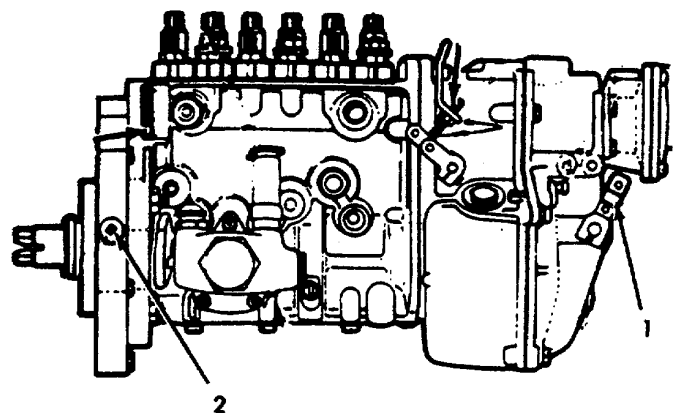
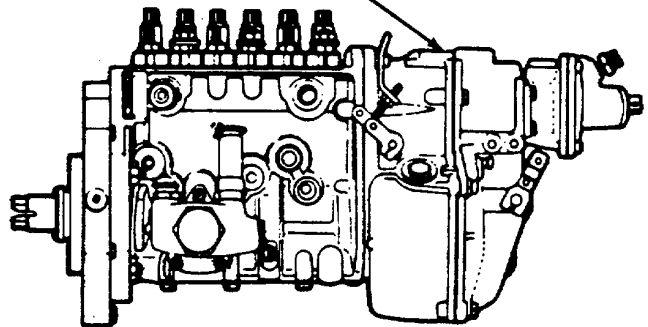
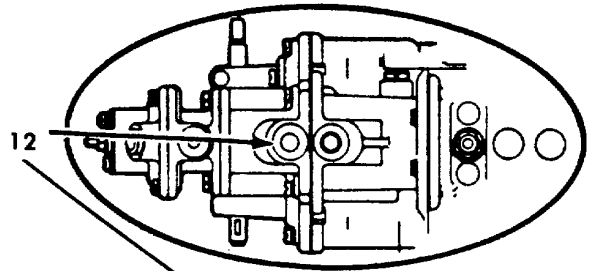
(4) Position injection pump shutoff lever in run position with electric shutoff or mechanical cable.

(5) Crank engine for fifteen seconds.

(6) Operate priming pump until pump action becomes solid. Tighten priming pump handle securely.

(7) Crank engine for fifteen seconds and observe fuel/air leakage at each nozzle/fuel pipe connector. When fuel flows from each nozzle connector, tighten connector.

(8) Start engine and operate until engine runs smoothly.



**4-77. INJECTION NOZZLES REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
 Fuel Line Nut Wrenches

Materials/Parts

Injection Nozzles (6688840C91)

General Safety Instructions

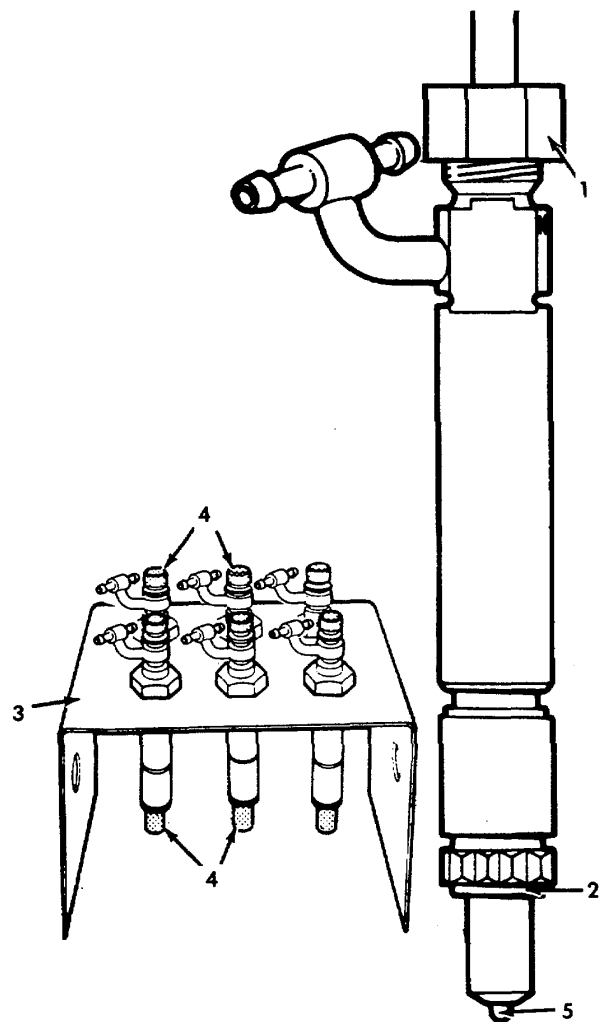
Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.  
 Batteries disconnected.

**REMOVAL**

**WARNING**

**Cleaning solvent (Appendix D, Item 54) 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.**

- a. Before removing nozzle assemblies, clean exterior of each nozzle assembly and the surrounding area with solvent (Appendix D, Item 54) to prevent entry of dirt into engine when nozzle assemblies are removed. Also, clean all fuel line connections.
- b. Loosen connector nut (1) with a fuel line nut wrench and remove fuel lines.
- c. Cap open ends of nozzles and fuel injection lines to prevent entry of dirt.
- d. With all fuel lines removed, remove injection nozzles by turning counterclockwise. Pull nozzle assembly with seal washer (2) from the engine. If seal washer remains in nozzle bore, remove with a suitable tool and discard.
- e. Place nozzle assemblies in a holding rack (3) to prevent damage to tips as they are removed from the heads. The fixture is stamped with numbers corresponding to the cylinder numbering of the engine. Use of this fixture permits replacing nozzles in their respective ports in the cylinder heads. Assure tips and line connections are capped (4).
- f. With nozzle removed, cover the nozzle bore in the cylinder head with protective caps.



## 4-77. INJECTION NOZZLES REPLACEMENT (Continued).

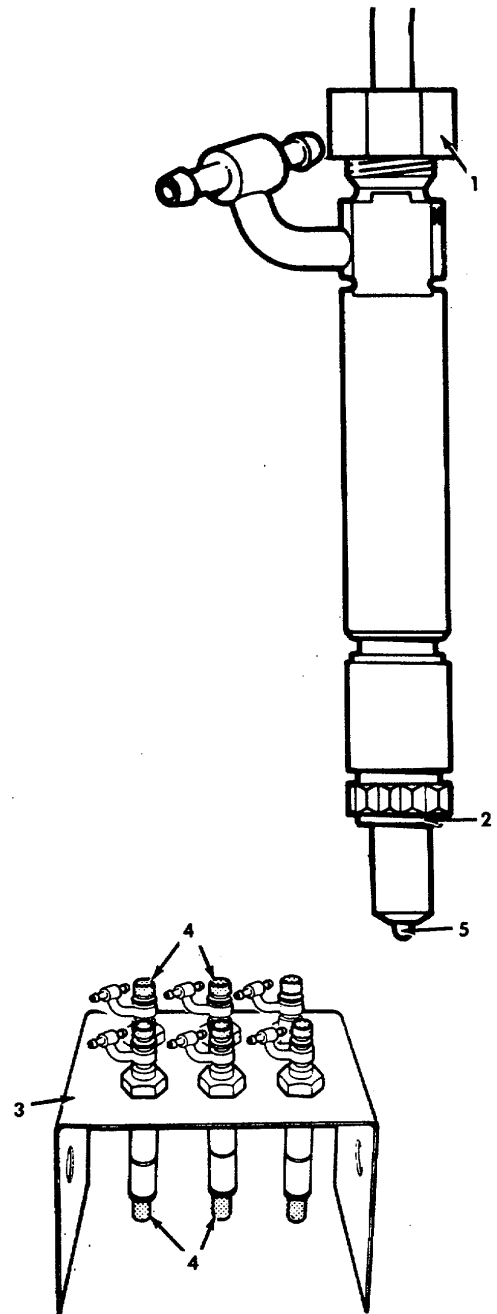
## INSTALLATION

- a. Thoroughly clean nozzle bore in cylinder head before reinserting nozzle holder assembly. Pay particular attention to seating surfaces, in order that no small particles or carbon will cause assembly to be cocked or permit blow-by of combustion gases.
- b. Clean injection nozzle seats in cylinder head, removing any carbon buildup from the seat. Failure to clean the seat can cause combustion gas leakage.

<b>CAUTION</b>
----------------

**Be careful not to strike nozzle tips (5) during installation.**

- c. Remove protective cap from nozzle tip (5) and install nozzle and holder assembly with new seal washer (2) into cylinder head nozzle bore, from which it was removed.
- d. Torque nozzle and holder assembly to 20 ft-lb (27 N.m).
- e. Remove protective covers from the fuel inlet end of the nozzle and from the fuel lines.
- f. Connect all fuel lines. Torque the fuel line connector nuts (1) to 30 ft-lb (41 N.m).
- g. Purge fuel lines of air by loosening connector (1) and cranking engine until solid fuel, free from air, flows from the connection. Re-torque connector (1) to 30 ft-lb (41 N.m).
- h. Start engine and check for fuel leakage at connections and lines.



**Section XV. MAINTENANCE OF ENGINE EXHAUST SYSTEM**

	Para	Para.
Exhaust Pipes Replacement .....	4-79	Muffler Replacement.....4-81
General.....	4-78	Tail Pipe Replacement .....
		4-80

**4-78. GENERAL**

This section contains information on the maintenance of the engine exhaust system that are maintainable at the Organizational level.

**4-79 ST PIPES NOZZLES REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Exhaust Pipe (683076C1)

Exhaust Pipe (683520C1)

Flex Pipe (767738C1)

General Safety Instructions

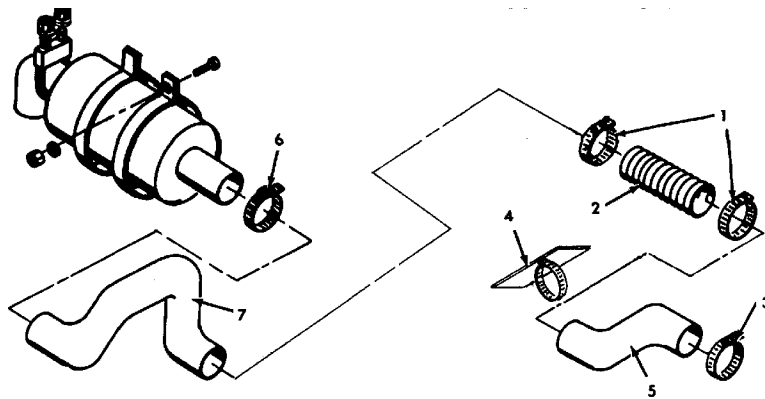
Since the exhaust system can reach extremely high temperatures, be sure the exhaust system is cooled before tempting any disassembly.

**REMOVAL**

- a. Remove clamps (1) and remove flex pipe (2).
- b. Remove band clamp (3), clamp (4) and pipe (5).
- c. Remove clamp (6) and remove crossover pipe (7).

**INSTALLATION**

- a. Install crossover pipe (7) and secure with clamp (6).
- b. Install pipe (5) and secure clamp (4) and band clamp (3).
- c. Install flex pipe (2) and clamps (1).



**4-80. TAIL PIPE REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

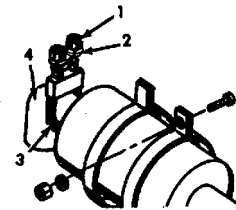
Tail Pipe (258387C2)

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. Remove two nuts (1), lockwashers (2), and U-bolt (3).
- b. Remove tailpipe (4).



**INSTALLATION**

- a. Install tail pipe (4).
- b. Install U-bolt (3), lockwashers (2), and nuts (1).

**4-81. MUFFLER REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Muffler (482167C1)

General Safety Instructions

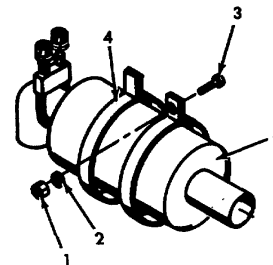
Since the exhaust system can reach extremely high temperatures, be sure the exhaust system is cooled before attempting any disassembly.

Equipment Condition

Para	Condition Description
4-80	Tail Pipe Removed
4-79	Exhaust Pipes Disconnected At Muffler

**REMOVAL**

- a. Remove two nuts (1), lockwashers (2), and bolts (3).
- b. Remove straps (4) and muffler (5).



**INSTALLATION**

- a. Install straps (4) on muffler (5).
- b. Secure straps (4) using two bolts (3), lockwashers (2) and nuts (1).
- c. Install tail pipe (paragraph 4-80).
- d. Connect exhaust pipes at muffler (paragraph 4-79).



**Section XVI. MAINTENANCE OF ENGINE AND ACCESSORIES**

	Para.		Para.
Alternator Replacement .....	4-85	Intake Manifold Replacement.....	4-88
Battery Cable Replacement .....	4-84	Oil Pan Replacement .....	4-92
Battery Replacement .....	4-83	Starter Replacement .....	4-86
Dipstick and Tube Replacement .....	4-91	Turbocharger Replacement .....	4-87
Exhaust Manifold Replacement .....	4-89	Valve Cover Replacement . .....	4-90
General .....	4-82		

**4-82. GENERAL**

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

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Battery (COM 8D)

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.

Engine OFF.

Transmission in (N) neutral.

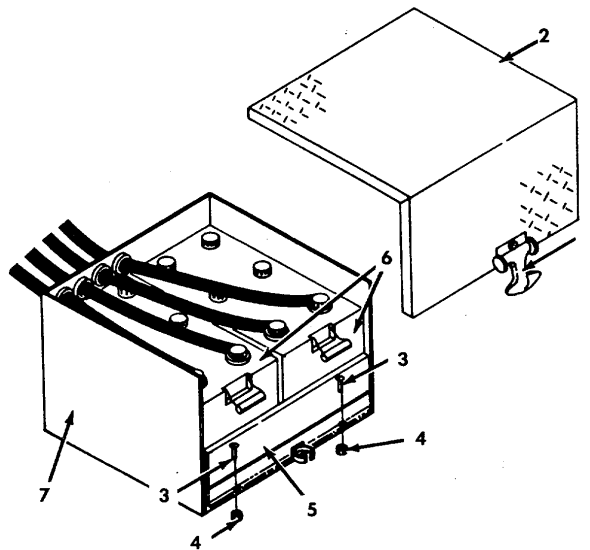
Parking brake set.

**REMOVAL**

- a. Release retainer (1) and remove cover (2)
- b. Disconnect cables from battery terminals
- c. Disconnect bolts (3) and locknuts (4) and remove battery hold-down retainer (5).
- d. Remove the battery (6)

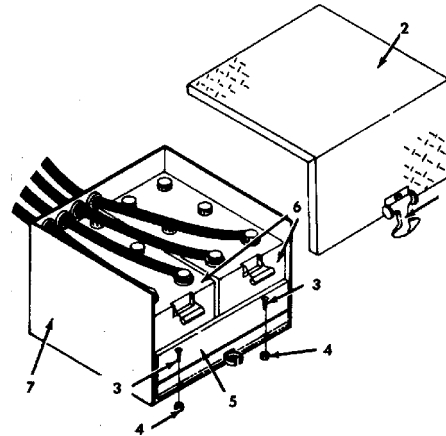
**NOTE**

Check the battery box (7) for damage or foreign objects. If damage is noted, repair or replace. Clean the box before installing battery.



**4-83. BATTERY REPLACEMENT (continued)**

- a. Install the battery (6) into the battery box (7)
- b. Install the battery hold-down retainer (5), bolts (3), and locknuts (4).
- c. Connect the positive cables to the positive terminals.
- d. Connect the negative cables to the negative terminals.
- e. Torque the terminals to 120 ft-lb (13 N.m).
- f. Install cover (2) and connect retainer (1).



**4-84. BATTERY CABLE REPLACEMENT**

This task covers:      a. Removal                      b. Installation                      c. Service

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Battery Cables (123-00045)

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.

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

**REMOVAL**

- a. Disconnect the negative cables from the negative battery terminals.
- b. Disconnect the positive cables.
- c. Remove four screws from mounting on battery selector switch.
- d. Tip battery selector switch front and disconnect positive cables from selector switch.
- e. Disconnect negative cables from frame.
- f. Remove battery cables.

**INSTALLATION**

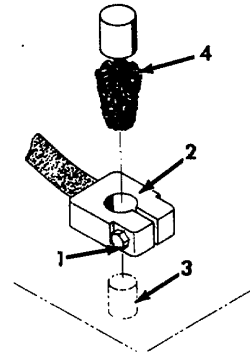
- a. Install negative battery cables and attach to frame.
- b. Attach positive cables to battery selector switch.
- c. Position selector switch and secure with four screws.
- d. Connect positive and negative cables to proper battery terminals.

**4-84. BATTERY CABLE REPLACEMENT**

This task covers:      a. Removal                      b. Installation                      c. Service

**SERVICE**

- a. Loosen bolt (1) and carefully remove battery cable (2) from battery terminal (3).
- b. Clean battery cable (2) and battery terminal (3) with wire battery brush (4).
- c. Install battery cable (2) onto battery terminal and tighten bolt (1).
- d. Check batteries for water level and specific gravity.
- e. Add water, charge or replace as necessary.



**4-85 ALTERNATOR REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Alternator (A0018050AB)

Equipment Condition

Para.    Condition Description

4-62    Alternator Drive Belt Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

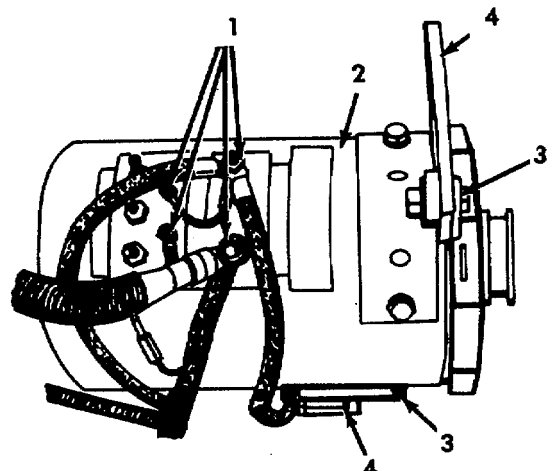
Batteries disconnected.

**REMOVAL**

- a. Disconnect the terminal and battery leads (1) from the top of the alternator (2).
- b. Remove bolts (3) which retain alternator (2) to the mounting brackets (4).
- c. Remove alternator (2) from the vehicle.

**INSTALLATION**

- a. Install alternator (2) on mounting brackets (4) with thru bolts (3). Do not tighten at this time.
- b. Install and adjust the alternator drive belt (paragraph 4-62).
- c. Tighten bolts and torque to 68 ft-lb (92 N.m).
- d. Connect the terminal and battery leads (1) at the top of the alternator (2)..



- e. Connect battery cables at the batteries

**4-86. STARTER REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SETUP**Tools

General Mechanics Tool Kit

Materials/Parts

Starter (1990405)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

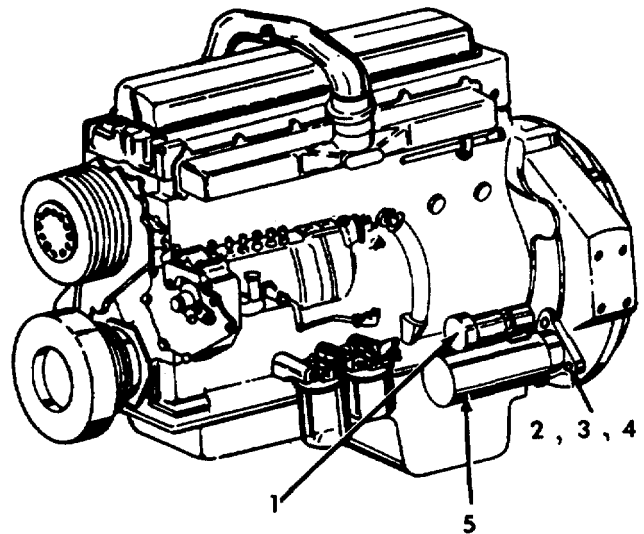
**REMOVAL****NOTE**

**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 (5) to engine.
- c. Pull starter (5) away from engine to remove.

**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-lb (38 N.m).
- d. Torque starter nuts to 7.4 ft-lb (10 N.m).
- e. Torque starter (short) bolts to 24 ft-lb (32 N.m).
- f. Connect all wires to terminals on starter solenoid (1).
- g. Tighten all terminal nuts firmly. Torque the terminal nuts no more than 6 ft-lb (8 N.m).
- h. Reconnect battery cables.



## 4-87. TURBOCHARGER REPLACEMENT

This task covers:      a. Removal                      b. Installation

### Tools

General Mechanics Tool Kit

### Materials/Parts

Turbocharger (1806078C91)

Oil (Appendix D, Item 37)

### General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

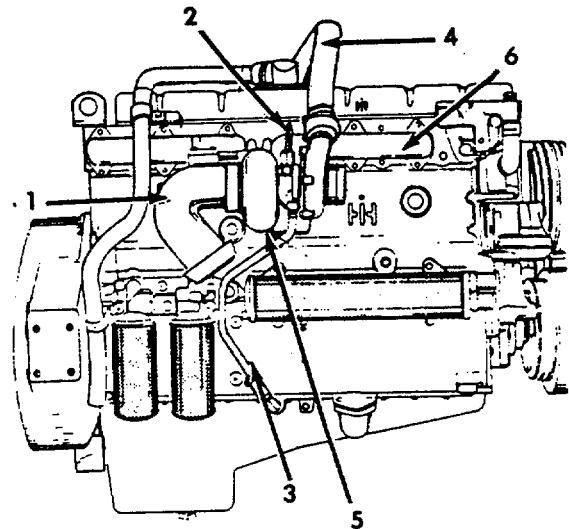
### REMOVAL

- a. Remove the exhaust elbow (1) by removing hex head cap screws, nuts and lockwashers.

### NOTE

**The exhaust sleeve is loosely held and must be supported when removed.**

- c. Disconnect the oil inlet tube (2) and drain tube (3) from the center housing. Remove and discard all tube gaskets.
- d. Loosen the clamps and remove the air cleaner hose (pipe) from the compressor housing.
- e. Loosen the clamps on the air crossover tube hose (4) at the air compressor housing. Position these parts away from the turbocharger (5).
- f. Remove all four turbocharger mounting bolts and lift the turbocharger (5) from the exhaust manifold (6).
- g. Remove the turbocharger gasket from the exhaust manifold.
- h. Cover or plug the exhaust manifold (6) and air tubes.



- a. Be sure all elbows and hoses are clean before installing them. Check the air cleaner, air induction system and engine exhaust manifolds for foreign material.
- b. Inspect turbocharger mounting pad on the manifold for presence of foreign material.
- c. Using a new gasket, place the turbocharger (5) on the exhaust manifold (6) and install the four bolts and nuts. Do not tighten at this time.

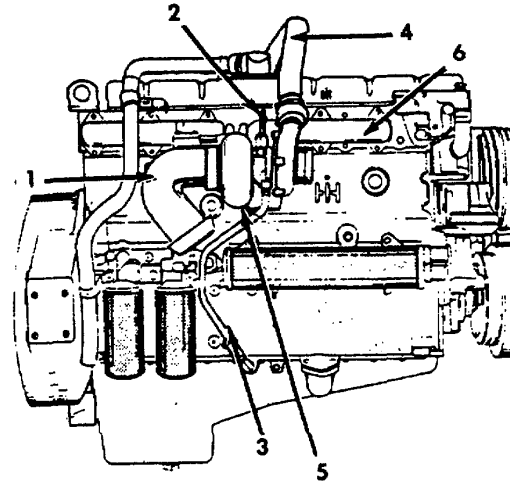
### INSTALLATION

#### NOTE

**Prevent the entrance of foreign material by covering or plugging all openings into the turbocharger. Covers must remain in place until the turbocharger is installed and all connections are secured.**

**4-87. TURBOCHARGER REPLACEMENT (Continued).**

- d. Make certain that the oil inlet (2) and oil drain lines (3) are clean. If hoses are used, make certain that they have not hardened and that the inner lining has not deteriorated or started to flake off. If metal tubing is used, make certain that it is not restricted or collapsed.
- e. Install the oil inlet (2) and drain lines (3) to the crankcase and turbocharger center housing rotating the turbocharger center housing to align the oil lines.
- f. When alignment has been accomplished scribe a mark on the center and turbine housings for reference.
- g. Rotate the compressor housing to align the air crossover tube (4) and hoses to the intake manifold.
- h. Scribe a reference mark on the center and compressor housing.
- i. Remove turbocharger from the engine and with scribe marks in alignment, tighten the clamp and torque bolts to 100-130 ft-lb (11.3-14.7 N.m) and bend the lock tabs on the lock-plates to secure bolts.
- j. Spin the wheels of the turbocharger (5). The shaft must rotate with no interference at either end of the turbocharger (5).
- k. Install the four mounting bolts and nuts on exhaust manifold (6). Torque the bolts and nuts to 35 ft-lb (47 N.m).
- l. Install the exhaust outlet system.
- m. Remove the covers or plugs from the oil inlet and outlet parts. Using a new gasket, connect the oil outlet tube (2).
- n. With a squirt can, put four or five ounces of clean oil (Appendix D, Item 37) into the oil inlet opening of the turbocharger (5). This will provide sufficient lubrication for the turbocharger bearings until normal engine lubrication is established.



- o. Connect the oil inlet tube (2) to the turbocharger (5) using a new gasket.
- p. Connect the air crossover tube (4) and hoses to the compressor housing outlet and tighten the clamps.
- q. Connect the air cleaner turbocharger connecting hardware.

**NOTE**

**Maximum allowable inlet restriction measured under full load varies according to the application but is always less than 30 in. H<sub>2</sub>O.**

- r. Intake restriction should be measured with the engine under full load (maximum turbocharger air flow) after turbocharger replacement.
- s. Connect battery cables.

**4-88. INTAKE MANIFOLD REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Intake Manifold (675633C91)

Gasket (682199C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

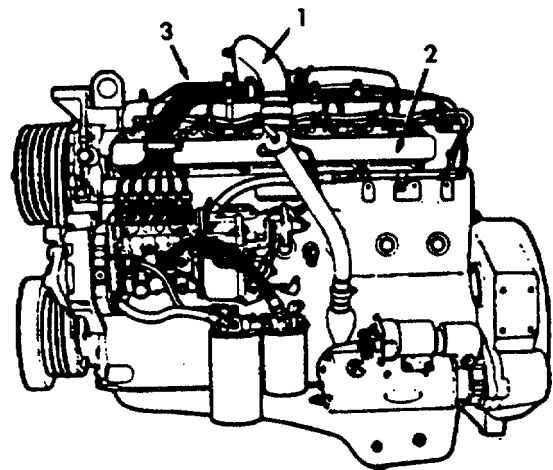
**REMOVAL**

- a. Disconnect turbocharger crossover tube (1) from intake manifold (2).
- b. Disconnect fuel lines (3) (as an assembly) at injection nozzles and pump.
- c. After removing fuel lines, cap all injection nozzle openings, pump and line openings to prevent dirt from entering.

**NOTE**

Index bolts during removal to aid in the installation.

- d. Remove bolts securing intake manifold (2) to cylinder head. Remove manifold and manifold gasket.

**INSTALLATION**

- a. Install intake manifold (2) with new gasket.

**CAUTION**

**Be sure manifold bolts are properly indexed with each gasket bolt hole. Failure to follow this procedure can result in gasket misalignment.**

- b. Secure intake manifold bolts with a torque of 20 ft-lb (27 N.m).
- c. Remove caps from all openings and install fuel lines (3).
- d. Connect turbocharger crossover tube (1) to intake manifold (2).
- e. Connect battery cables.

**4-89. EXHAUST MANIFOLD REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Front Exhaust Manifold (683564C91)

Gasket (688928C1)

Rear Exhaust Manifold (675779C3)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Equipment Condition

Para. Condition Description

4-87 Turbocharger Removed

**REMOVAL**

- a. Remove stud and washers (1) securing the exhaust manifold (2) to the cylinder head.
- b. Remove manifold (2) and manifold gaskets (3)

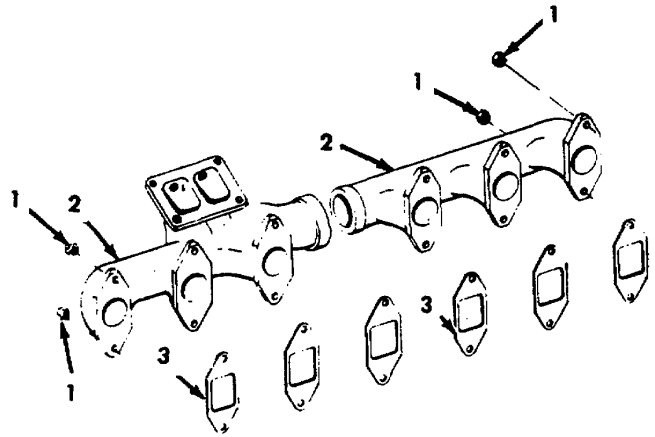
**INSTALLATION**

- a. Install exhaust manifold (2) with new gaskets (3).

**NOTE**

**Manifolds may loosen if non-specified washers are used.**

- b. Install specially hardened washers between manifold studs and nuts (1). Torque manifold stud nuts (1) to 57 ft-lb (77 N.m).
- c. Install turbocharger (paragraph 4-87).





## 4-90. VALVE COVER REPLACEMENT

This task covers:      a. Removal                      b. Installation

### INITIAL SET-UP

#### Tools

General Mechanics Tool Kit

#### Materials/Parts

Solvent (Appendix D, Item 54)

Valve Cover (690339C1)

#### General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

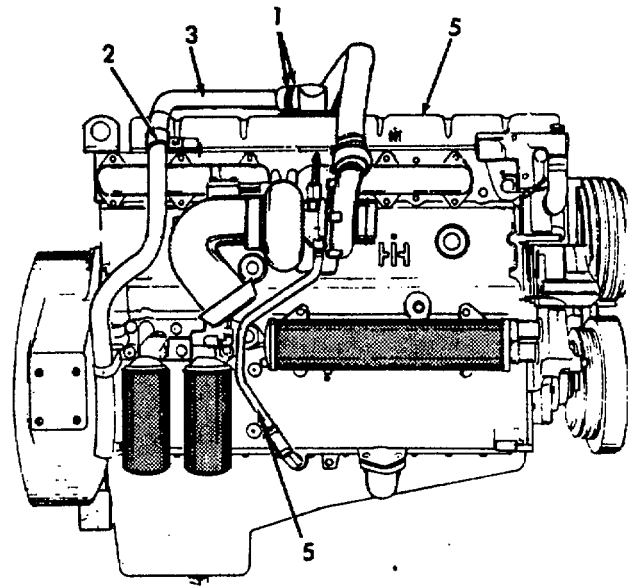
### REMOVAL

- a. Loosen the two clamps (1) and bracket/clamp (2) and remove the upper half of the valve cover breather tube (3).
- b. Remove six bolts and/or nuts (4) securing valve cover (5) to the cylinder head.
- c. Remove valve cover (5) and gasket (6).

**WARNING**

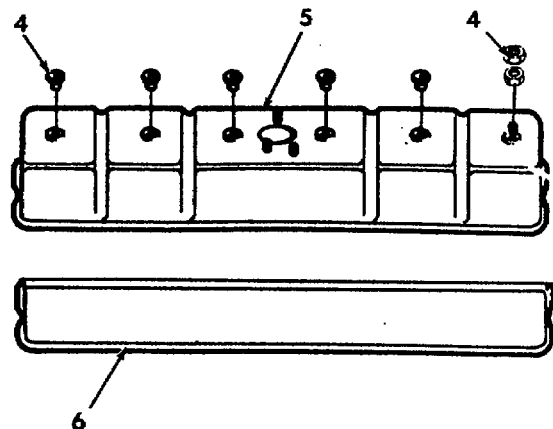
Cleaning solvent, (Appendix D, Item 54) is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flames.

- d. Remove old gasket material, oil and grease from the valve cover (5) and cylinder head using solvent (Appendix D, Item 54).



### INSTALLATION

- a. Replace old packing rings with new under valve cover bolt washers to avoid oil leaks.
- b. Replace oil valve cover gasket with a new oil gasket to assure an oil tight seal.
- c. Position valve cover (5) over gasket (6) and install the six bolts and/or nuts (4) and torque to 26 ft-lb (3 N.m).
- d. Position the valve cover breather tube (3) and tighten the bracket/clamp (2) where the two breather tubes connect.
- e. Tighten breather tube clamps (1).



**4-91. DIPSTICK AND DIPSTICK TUBE REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Dipstick (691796C1)

Tube (691848C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

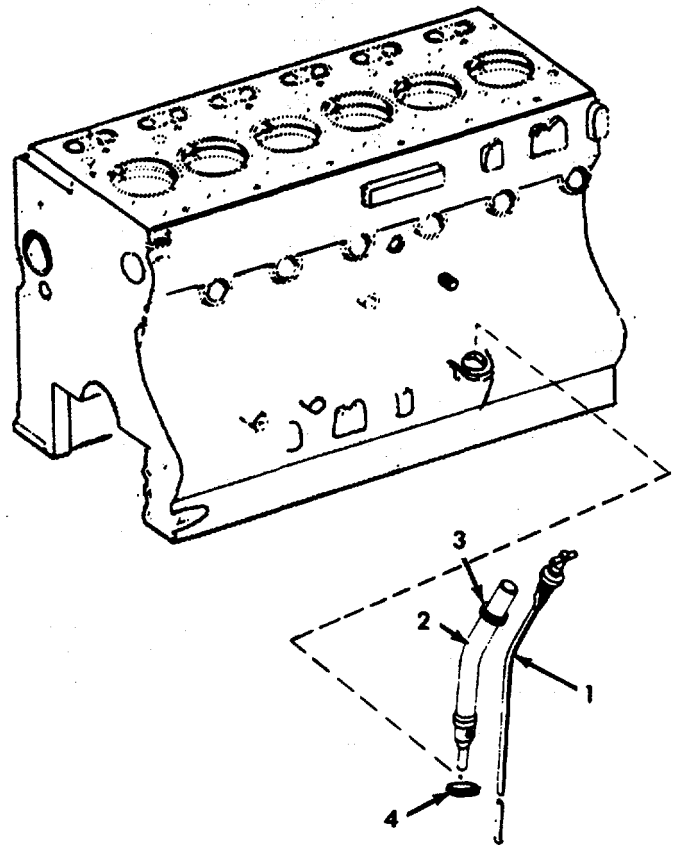
Parking brake set.

**REMOVAL**

- a. Remove dipstick (1) from tube (2).
- b. Remove the dipstick tube bracket (3).
- c. Remove the dipstick tube (2).
- d. Remove O-ring seal (4) from the dipstick tube (2).

**INSTALLATION**

- a. Install a new O-ring seal (4) to the dipstick tube (2).
- b. Install dipstick tube (2) in the engine and install the bracket (3).
- c. Install the dipstick (1) into tube (2).



**4-91. DIPSTICK AND DIPSTICK TUBE REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

- Oil Pan (1801398C91)
- RTV Sealant (Appendix D, Item 45)
- Gasket (671827C1)
- Plug Gasket (59658D)
- Oil (Appendix D, Item 37)
- Solvent (Appendix D, Item 54)

General Safety Instructions

- Engine OFF.
- Transmission in N) neutral.
- Parking brake set.
- Batteries disconnected.

**REMOVAL**

- a. Remove drain plug (1) and gasket (2) and drain oil into catch basin.
- b. Remove bolts (3) securing oil pan (4) to crank case.
- c. Remove oil pan (4) and gasket (5).



Cleaning solvent (Appendix D, Item 54) 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.

- d. Remove all old gasket and RTV sealant from the oil pan and engine block with cleaning solvent (Appendix D, Item 54).

**INSTALLATION**

**NOTE**

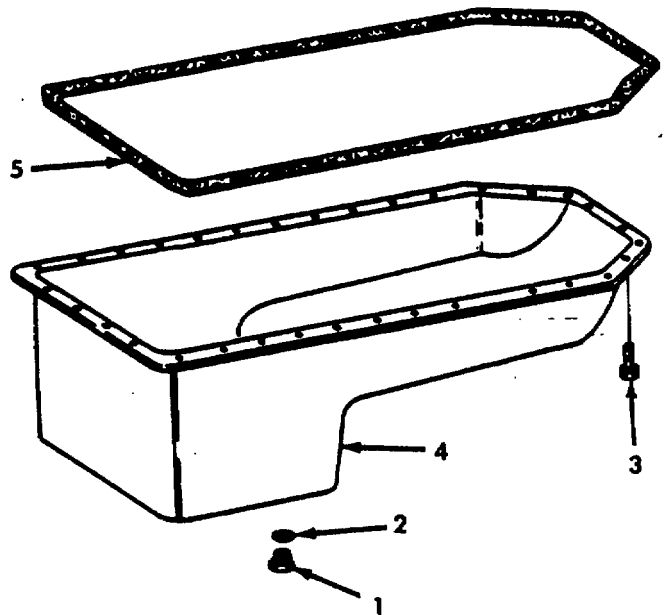
Only a small amount of sealant is required. Excessive amounts of sealant may prevent proper sealing of the oil pan.

- a. Apply a 3/16 inch (5 mm) bead of RTV sealant (Appendix D, Item 45) to the oil pan sealing surface 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 gasket (5).
- c. Install the oil pan (4) to the engine with the oil pan bolts (3).



- d. Install new drain plug gasket (2) and install drain plug (1).
- e. Fill engine with oil (Appendix D, Item 37).
- f. Connect battery cables.

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

	Para.		Para.
Air Horn Replacement .....	4-101	Heater/Defroster Resistor Replacement .....	4-117
Back Window Replacement .....	4-140	Heater Core Maintenance .....	4-114
Blower Motor Replacement .....	4-112	Heater Hoses Maintenance .....	4-113
Brush Guard Replacement .....	4-122	Hood Assembly Replacement .....	4-124
Cab Spotlight Maintenance .....	4-97	Hood Hinge Replacement .....	4-125
Control Knobs and Indicator Lights .....		Hood Latch Replacement .....	4-126
Replacement .....	4-109	Inside Door Handle Replacement .....	4-135
Control Switches and Gauges Replacement .....	4-108	Mirror Replacement .....	4-129
Door Glass Regulator Replacement .....	4-142	Outside Door Handle Replacement .....	4-134
Door Glass Replacement .....	4-145	Quartz Flood Light Maintenance .....	4-98
Door Glass Seal Replacement .....	4-143	Radiator Support Replacement .....	4-128
Door Hinge Replacement .....	4-131	Roof Warning Light Maintenance .....	4-100
Door Lock Cylinder Replacement .....	4-133	Seat Belt Replacement .....	4-138
Door Lock Replacement .....	4-132	Seat Replacement .....	4-137
Door Replacement .....	4-130	Siren/Public Address System Maintenance .....	4-110
Door Run Channel Replacement .....	4-144	Speedometer Cable Core Replacement .....	4-107
Door Weatherstrip Replacement .....	4-136	Speedometer Replacement .....	4-106
Engine Compartment Light Maintenance .....	4-99	Splash Guard/Mud Flap Replacement .....	4-127
External Speaker Replacement .....	4-111	Steering Column Replacement .....	4-119
Flexible Coupling Replacement .....	4-120	Steering Wheel Replacement .....	4-118
Front Clearance Light Maintenance .....	4-95	Turn Signal Switch Replacement .....	4-121
Front Turn Signal Light Maintenance .....	4-96	Vent Glass Replacement .....	4-141
General .....	4-93	Washer Replacement .....	4-105
Grille Replacement .....	4-123	Windshield Replacement .....	4-139
Headlights Replacement .....	4-94	Windshield Washer/Wiper Assembly Service .....	4-102
Heater/Defroster Blower Switch .....		Wiper Motor Replacement .....	4-104
Replacement .....	4-116	Wipers Replacement .....	4-103
Heater/Defroster Control Assembly .....			
Replacement .....	4-115		

**4-93. 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.

**4-94. HEAD LIGHT MAINTENANCE**

This task covers:      a. adjustment                      b. Removal                      c. Repair                      d. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

General Safety Summary

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

Materials/Parts

Lamp (5962548)

**4-94. HEADLIGHTS MAINTENANCE (Continued)**

**ADJUSTMENT**

**NOTE**

Place the vehicle 25 feet (7.6 meters) from a vertical wall or structure with the front of the vehicle at a 90 degree angle to the wall or structure.

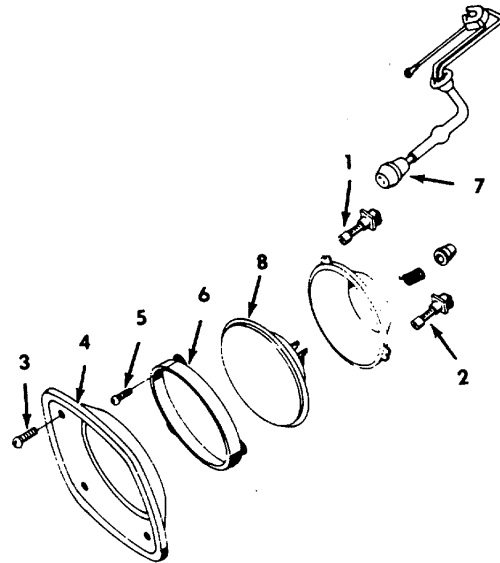
- a. Measure the height from the ground to the center of the headlight.
- b. Measure the distance from the center of one headlight to the other.
- c. Transfer these measurements to the wall or structure and mark them accordingly with two cross-marks, directly in front of the headlights.
- d. Turn on the headlights and switch to high beam.
- e. The focal hot spot of each headlight should be centered 2 inches (51 mm) below the junction of the vertical and horizontal marks.
- f. To raise the light, turn the vertical adjusting screw (1) clockwise. To lower the light, turn the vertical adjusting screw (1) counterclockwise.
- g. To turn the headlight to the left or vertical, turn the horizontal adjusting screw (2) clockwise. To turn the headlight to the right of vertical, turn the horizontal adjusting screw (2) counterclockwise.

**REMOVAL**

- a. Remove four retaining screws (3) and remove headlight bezel (4).
- b. Remove three retaining screws (5) and remove sealed beam unit retaining ring (6).
- c. Pull sealed beam unit from headlight assembly. Disconnect three-way wiring connector (7) from rear of sealed beam unit (8) and remove sealed beam unit (8).

**REPAIR**

Repair consists of replacing defective sealed beam unit (8) or bezel (4).



**INSTALLATION**

- a. Connect three-way wiring connector (7) to new sealed beam unit (8).
- b. Position sealed beam unit (8) in mounting ring. Install retaining ring (6) and secure with screws (5).

**CAUTION**

**Do not overtighten bezel retaining screws. Overtightening could cause damage (stripping) of threads in hood fender.**

- c. Install headlight bezel (4) and secure with screws (3).
- d. Connect battery cables.
- e. Check light operation.

**4-95. FRONT CLEARANCE LIGHT MAINTENANCE**


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This task covers:      a. Removal                      b. Repair                      c. Installation

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**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Bulb (26617R1)

Clearance Light Assembly (451677C92)

General Safety Instructions

Engine OFF.

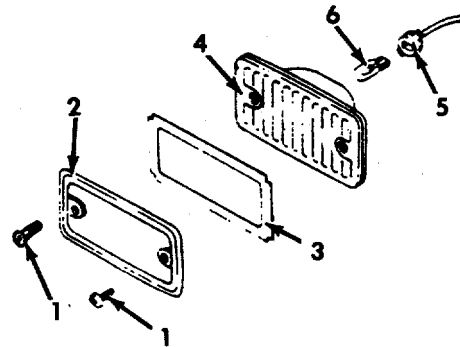
Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

**REMOVAL**

- a. Remove two light mounting screws (1). Remove trim bezel (2) and seal (3).
- b. Pry light assembly (4) from mounting recess in cab.
- c. Turn bulb socket (5) about one-eighth turn counterclockwise and remove socket (5) (with bulb) from light assembly (4).

**REPAIR**

- a. Grasp bulb (6) and pull straight out to remove plug-in type bulb from socket (5).
- b. Inspect light assembly (4) and gasket (3) and replace if damaged.
- c. Push new bulb (6) into socket(5).

**INSTALLATION**

- a. Position socket (5) (with bulb) into light assembly (4) and turn socket one-eighth turn clockwise to secure.
- b. Position light assembly (4), seal (3) and trim bezel (2) into mounting recess in cab. Secure with two mounting screws (1).
- c. Connect battery cables.
- d. Check light operation.

**4-96. FRONT TURN SIGNAL LIGHT MAINTENANCE**

This task covers:      a. Removal                      b. Repair                      c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Bulb (9417866)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

**REMOVAL**

- a. Disconnect wiring cable (1) from base of light assembly (2).
- b. Remove two nuts (3) and washers (4) from light mounting studs (5).
- c. Remove light assembly (2) from fender.
- d. Inspect light mounting pad (6) and replace if damaged or deteriorated.

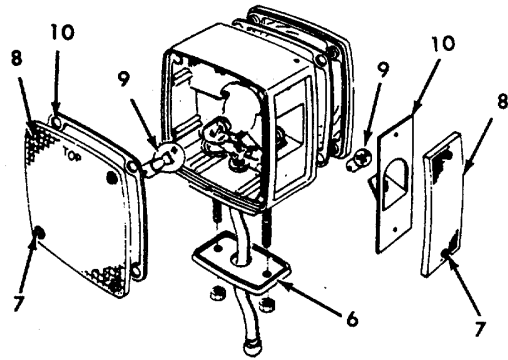
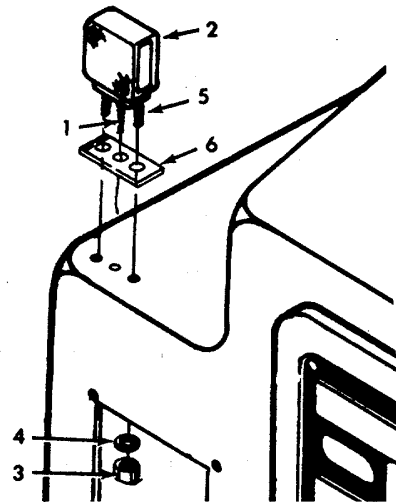
**REPAIR**

- a. Remove lens mounting screws (7) and remove lens (8).
- b. Press bulb (9) inward and turn counterclockwise to remove bulb (9) from socket.
- c. Inspect bulb socket. If rusty or corroded, replace light assembly (2). Inspect lens gasket (10) and replace if damaged.
- d. Insert new bulb (9) in socket, press inward and turn clockwise to lock in place.
- e. Position lens (8) and gasket (10) on light body and install lens mounting screws (7).

**INSTALLATION**

- a. Position mounting pad (6) and light assembly (2) on fender.
- b. Install two washers (4) and nuts (3) on light mounting studs (5).
- c. Plug wiring cable connector (1) into light assembly (2).

- d. Tighten light mounting nuts (3).
- e. Connect battery cables.
- f. Check light operation.



**4-97. CAB SPOTLIGHT MAINTENANCE**

This task covers:      a. Removal                      b. Repair                      c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Spotlight (S-6-225)

General Safety Instructions

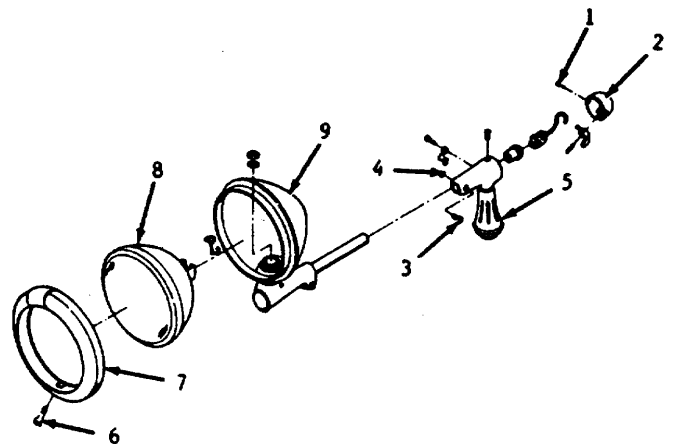
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

**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
- g. Remove spotlight assembly.
- h. Remove screw (6) from bottom ring (7).
- i. Remove retaining ring (7).
- j. Remove lamp (8) from housing (9)

**INSTALLATION**

- a. Insert lamp (8) and wiring into housing (9).
- b. Install retaining ring (7) on housing (9) and secure with screw (6).
- 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.



**REPAIR**

Repair consists of replacing defective lamp (8) or retaining ring (7).

- f. Connect wiring to handle.
- g. Install end cap (2) and secure with two screws (1).
- h. Reconnect battery cables.



**4-98. QUARTZ FLOOD LIGHT MAINTENANCE**

This task covers:      a. Removal                      b. Repair                      c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

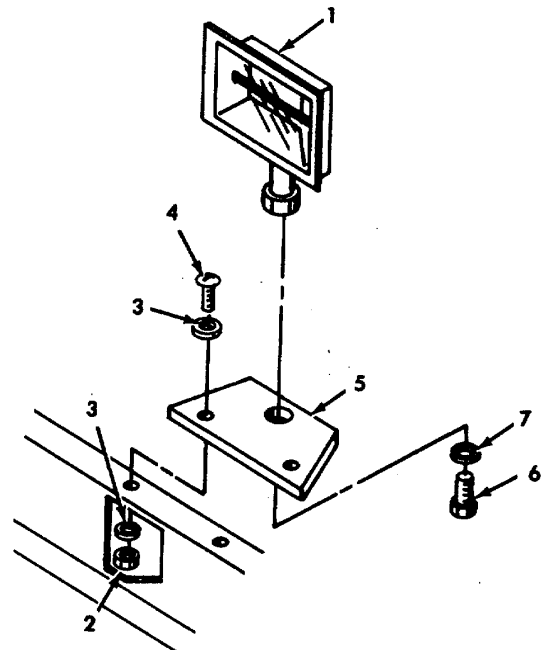
Quartz Flood Light (305)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

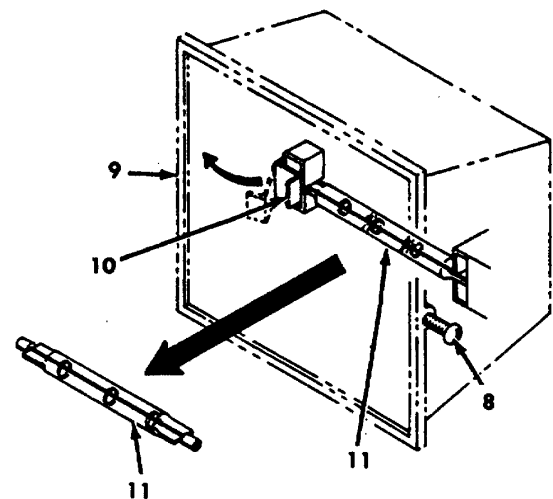
**REMOVAL**

- a. Disconnect two electrical plugs to quartz flood light (1).
- b. Remove two nuts (2), washers (3), and bolts (4).
- c. Remove quartz flood light (1) and bracket (5).
- d. Remove bolt (6) and washer (7) and remove quartz flood light (1) from bracket (5).



**REPAIR**

- a. Remove two screws (8) and hinge open lens cover (9).
- b. Open clip (10) and remove bulb (11).
- c. Insert new bulb (11) and close clip (10).
- d. Close lens cover (9) and secure with screws (8).
- e. Connect battery cables.



**INSTALLATION**

- a. Install quartz flood light (1) onto bracket (5). Secure with washer (7) and bolt (6).
- b. Install quartz light (1) and bracket (5) onto truck.
- c. Secure bracket (5) with two bolts (4), washers (3), and nuts (2).
- d. Connect two electrical plugs to quartz flood light (1).
- e. Connect battery cables.

**4-99. ENGINE COMPARTMENT LIGHT MAINTENANCE**

This task covers:      a. Removal                      b. Repair                      c. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Lights (391)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

**REMOVAL**

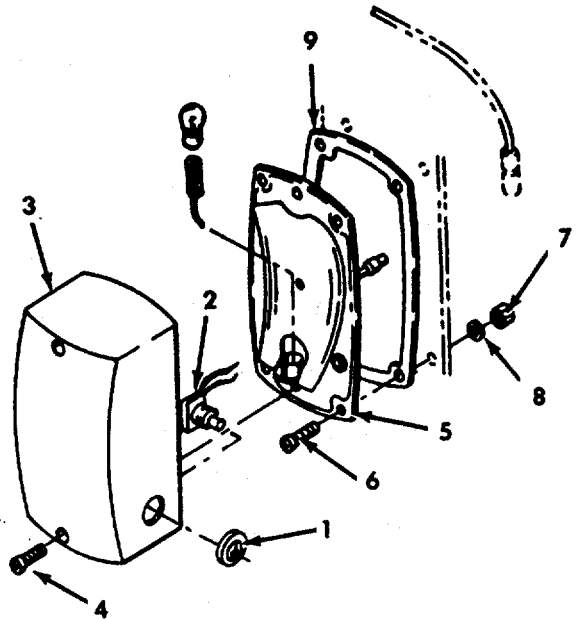
- a. Lift hood and disconnect wiring assembly.
- b. Remove switch nut (1) to loosen switch (2) from lens (3).
- c. Remove two screws (4) securing lens (3) to light assembly (5).
- d. Remove lens (3).
- e. Remove two screws (6), nuts (7), and washers (8) securing light assembly (5) to mounting bracket.
- f. Remove light assembly (5) and gasket (9).

**REPAIR**

Repair consists of replacing defective bulb (10) or lens (3).

**INSTALLATION**

- a. Install light assembly (5) and gasket (9) to mounting bracket with two screws (6), washers (8) and nuts (7).
- b. Install lens (3) to light assembly (5) with two screws (4).
- c. Install switch nut (1) to secure switch (2) to lens (3).
- d. Connect wiring assembly.
- e. Reconnect battery cables.



**4-100. ROOF WARNING LIGHT MAINTENANCE**

This task covers:      a. Removal                      b. Repair                      c. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Roof Warning Light (SW2-RC)

Lamp (21-9)

General Safety Instructions

Engine OFF.

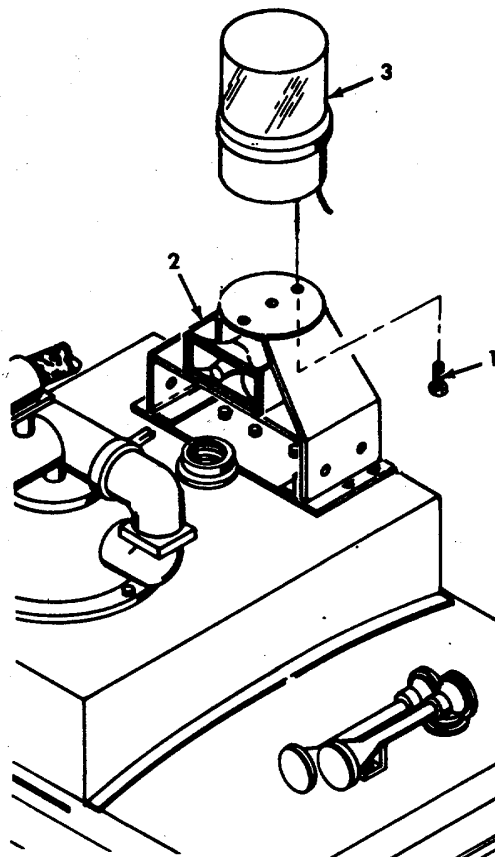
Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

**REMOVAL**

- a. Cut nylon tie at tie retaining clip and remove wires from protective covering.
- b. Unplug positive wire and remove ground wire at rear of speaker.
- c. Remove two screws (1) from speaker bracket (2) and remove roof warning light (3).



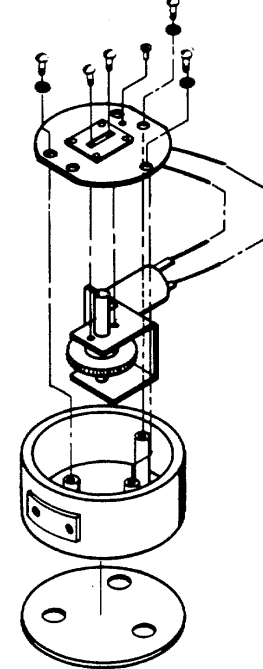
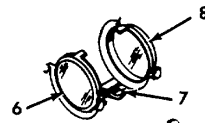
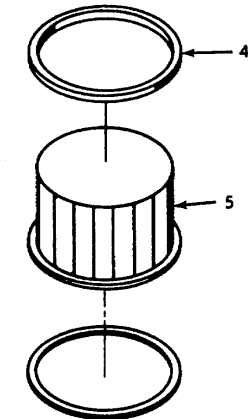
**4-100. ROOF WARNING LIGHT MAINTENANCE (Continued)**

**REPAIR**

a. *Lamp replacement.*

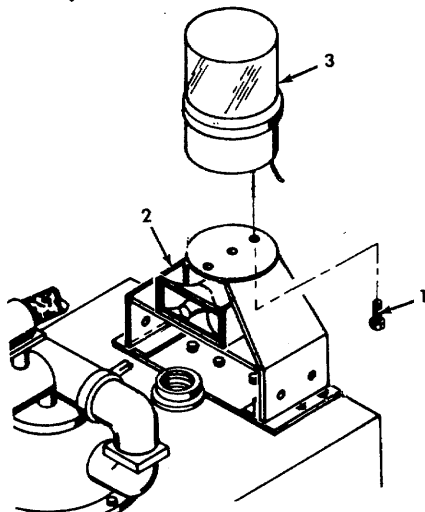
- (1) Slide locking ring (4) counterclockwise and remove ring (4) and red lens cover (5).
- (2) Remove two lamp retaining clips (6).
- (3) Remove control wiring connectors (7).
- (4) Replace two lamps (8).
- (5) Install control wiring connectors (7).
- (6) Install two lamp retaining clips (6).
- (7) Install red lens cover (5) and locking ring (4) and turn clockwise to lock.

b. Replace any other parts which are defective.



**INSTALLATION**

- a. Place roof warning light (3) onto speaker bracket (2) and secure with two screws (1).
- b. Plug in positive wire and attach ground wire at rear of speaker.
- c. Install wires into protective covering and secure with new nylon tie.



**4-101. AIR HORN REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Kit

Materials/Parts

Air Horn (244283R91)

General Safety Instructions

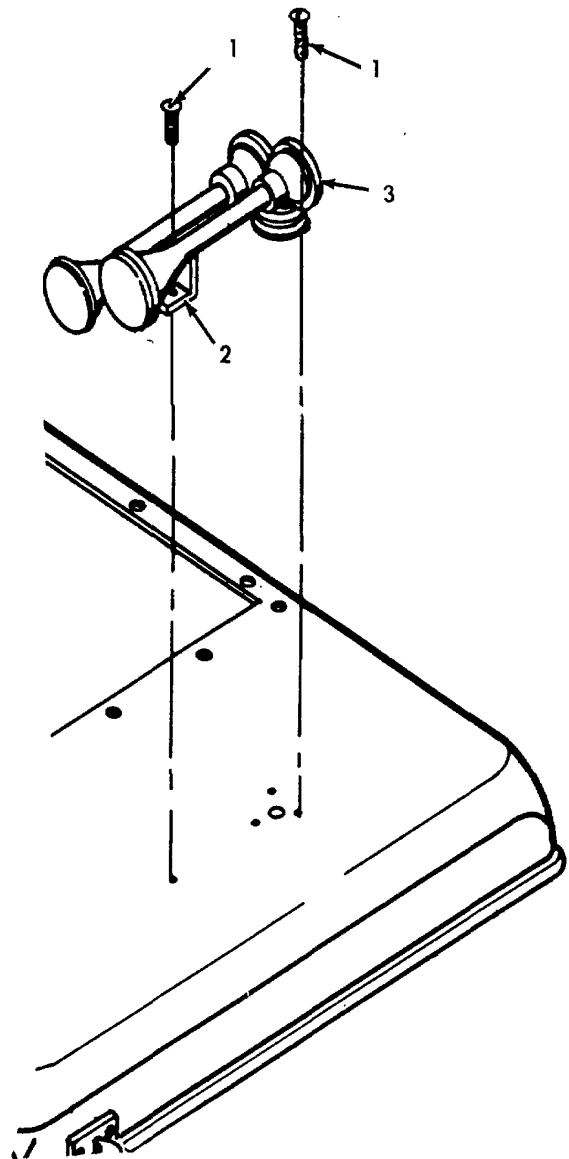
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

Equipment Condition

Para.	Condition Description
4-173	System Bled

**REMOVAL**

- a. Remove screws (1) securing horn bracket (2) to cab.
- b. Lift air horn (3) off cab and disconnect air line to air horn.
- c. Remove air horn (3).



**INSTALLATION**

- a. Connect air line to air horn (3).
- b. Fasten horn (3) to cab using screws (1).
- c. Secure air horns (4) to cab using screws (1).

**4-102. WINDSHIELD WASHER/WIPER ASSEMBLY SERVICE.**

This task covers: Service

**INITIAL SETUP**

Materials/Parts

Windshield Washer Fluid (Appendix D, Item 56)

**SERVICE**

- a. Check level of fluid in reservoir and inspect reservoir for signs of dirt. Flush with clean water and refill reservoir if dirt is present.
- b. Refill with windshield washer fluid (Appendix D, Item 56).

**4-103. WIPERS REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

General Mechanics

Materials/Parts

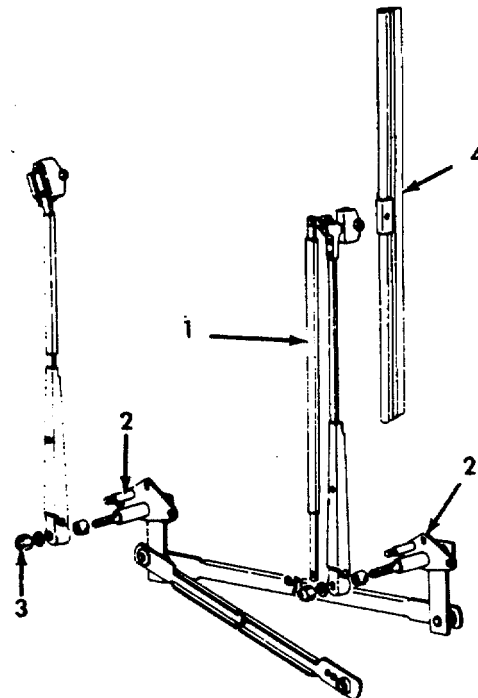
Wiper Blade (475925C1)

Wiper Arm, Streetside (508915C1)

Wiper Arm, Curbside (475924C91)

**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.

**4-104. WIPER MOTOR REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description  
4-103 System Bled

Materials/Parts

Wiper Motor (471496C12)

General Safety Instructions

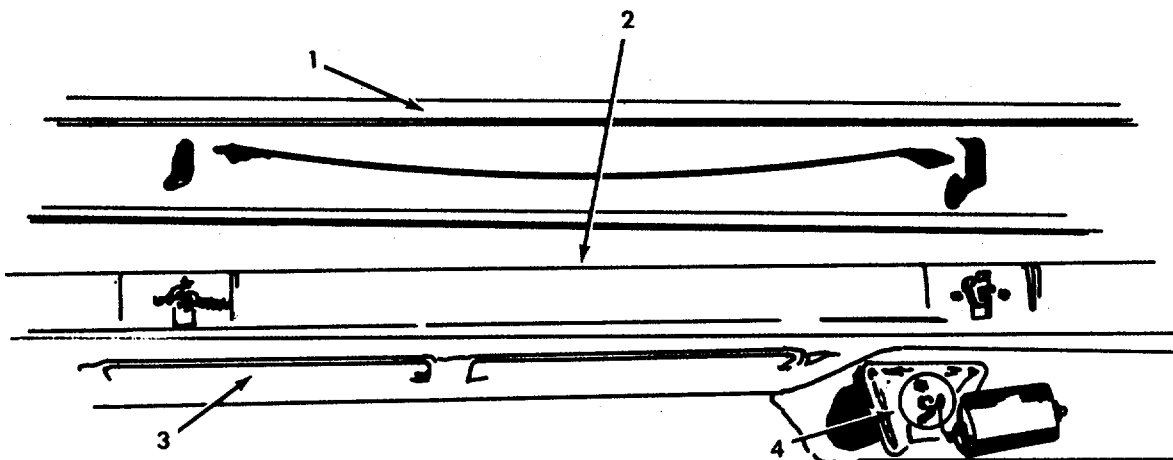
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

**REMOVAL**

- a. Remove seven mounting screws and detach cowl cover panel (1) from top of cowl (2).
- b. Disconnect washer hose from fitting on bottom of cowl cover panel (1).
- c. Reaching into cowl air intake chamber (3), unfasten retainer clip from wiper motor drive lever pin and detach linkage rod from drive lever.
- d. Remove three mounting bolts from each pivot bracket and lift out complete pivot brackets and wiper linkage assembly from inside air intake chamber (3).
- e. Disconnect wiring harness from wiper motor (4).
- f. Remove wiper motor bracket mounting bolts and detach motor assembly (4).

**INSTALLATION**

- a. Attach motor assembly (4) to wiper motor bracket and secure with mounting bolts.
- b. Connect wiring harness to wiper motor (4).
- c. Install wiper linkage assembly along with pivot bracket inside air intake chamber (3) and secure with three mounting bolts on each pivot bracket.
- d. Attach linkage rod to drive lever and fasten retainer clip to wiper motor (4) drive lever pin.
- e. Connect washer hose to fitting on bottom of cowl cover panel (1).
- f. Attach cowl cover panel (1) to top of cowl (2) with seven mounting screws.
- g. Install wipers (paragraph 4-103).
- h. Connect battery cables.



**4-105. WASHER REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SETUP**Tools

General Mechanics Tool Kit

Materials/Parts

Washer (394120C91)

General Safety Instructions

Engine OFF.

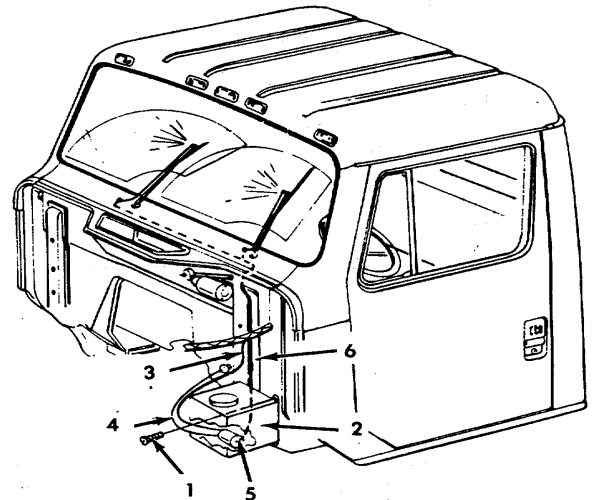
Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

**REMOVAL**

- a. Remove four reservoir-to-cowl mounting bolts (1) and remove washer assembly (2) from cowl.
- b. Separate wiring connector for instrument panel switch-to-motor wire (3) and motor-to-ground wire (4) from pump motor (5).
- c. Disconnect pump-to-wiper nozzle hose (6) from pump outlet fitting.
- d. Remove washer assembly (2).

**INSTALLATION**

- a. Install **washer assembly** (2).
- b. Connect pump-to-wiper nozzle hose (6) to pump outlet fitting.
- c. Connect wiring connector for instrument panel switch-to-motor wire (3) and motor-to-ground wire (4) to pump motor (5).
- d. Install washer assembly to cowl and secure with reservoir-to-cowl mounting bolts (1).
- e. Connect battery cables.



**4-106. SPEEDOMETER REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SETUP**Tools

General Mechanics Tool Kit

Materials/Parts

Washer (571227C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

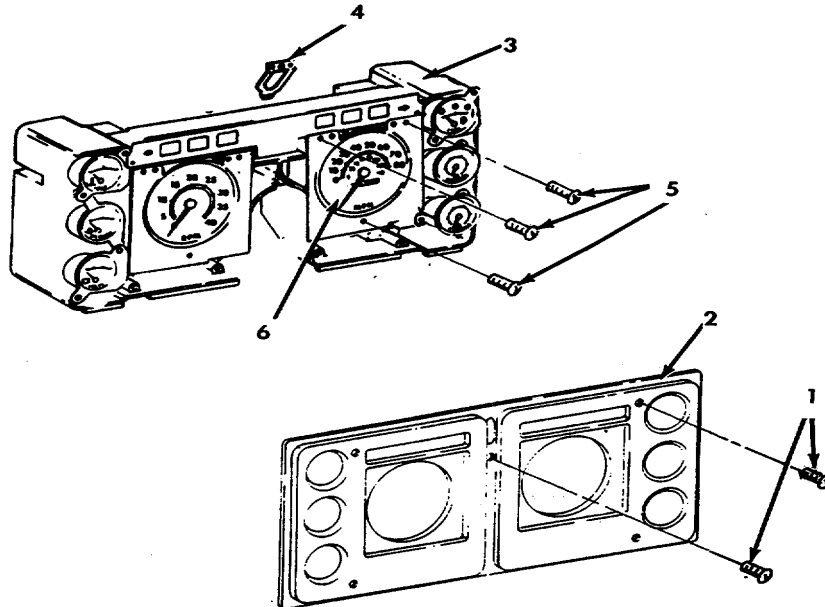
Parking brake set.

**REMOVAL**

- a. Unscrew the five cluster mounting screws (1) and remove cover (2).
- b. Tilt out cluster assembly (3) from instrument panel.
- c. Disconnect flexible cable from back of speedometer by pressing down on quick-connect spring clasp (4).
- d. Remove speedometer mounting screws (5). Remove speedometer (6).

**INSTALLATION**

- a. Install speedometer (6) and secure with mounting screws (5).
- b. Attach flexible cable into back of speedometer (6).
- c. Tilt cluster assembly (3) back into instrument panel.
- d. Position cover (2) on cluster assembly and secure with five mounting screws (1).



**4-107. SPEEDOMETER CABLE CORE REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Cable (577729C91)

Equipment Condition

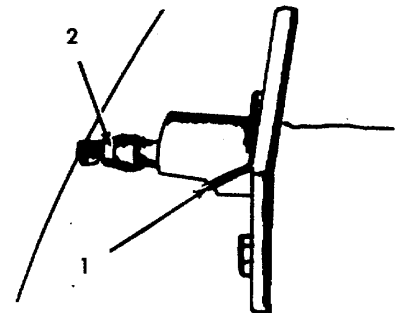
Para. Equipment Condition  
4-106 Cluster Assembly Removed

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**REMOVAL**

- a. Depress spring clasp (1) on back of speedometer and release cable (2).
- b. Unscrew cable lower or drive end from adapter at transmission.
- c. Unfasten cable from any ties or clips and remove complete cable assembly from chassis.



**INSTALLATION**

**CAUTION**

**When replacing core, be sure core is not too long. A long core will cause a damaging thrust to head of speedometer when installed.**

- a. Lubricate core and install through casing.

**NOTE**

**Keep last four inches of cable free of lube to prevent lube from entering the instrument head.**

**Avoid sharp bends when installing speedometer cable. Under no circumstances should a casing have less than a six inch radius bend.**

- b. Install cable assembly into chassis and secure with ties or clips.
- c. Screw cable drive end to adapter at transmission.
- d. Depress spring clasp (1) on back of speedometer and insert cable (2). Release spring clasp (1).
- e. Install cluster assembly (paragraph 4-106).

**4-108. CONTROL SWITCHES AND GAUGES REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Switches and Gauges as required  
(Appendix E, Figure 75)

Equipment Condition

Para. Equipment Description  
4-106 Cluster Assembly Removed

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**REMOVAL**

a. *Air gauge removal.*

**NOTE**

**Air gauges are mounted to a common bracket and are removed as an assembly from the cluster assembly.**

- (1) Disconnect air lines (1) from fittings on rear of air gauges (2).
- (2) Remove two air gauge mounting assembly screws (3) and remove gauge assembly.

b. *Control switches removal.*

- (1) Remove four mounting screws (4) and remove panel (5) from dash panel.
- (2) Remove two screws (6) and remove circuit board from the panel (5).
- (3) Tag and remove wires from switches.
- (4) Depress switch retainers and remove switches.

c. *Gauge removal.*

**NOTE**

**This procedure is typical for the following gauges: WATER TEMPERATURE GAUGE, (7), OIL PRESSURE GAUGE (8), VOLTMETER (9), TACHOMETER (10), and FUEL GAUGE (11).**

- (1) Remove two mounting screws (12).
- (2) Remove gauge (13).

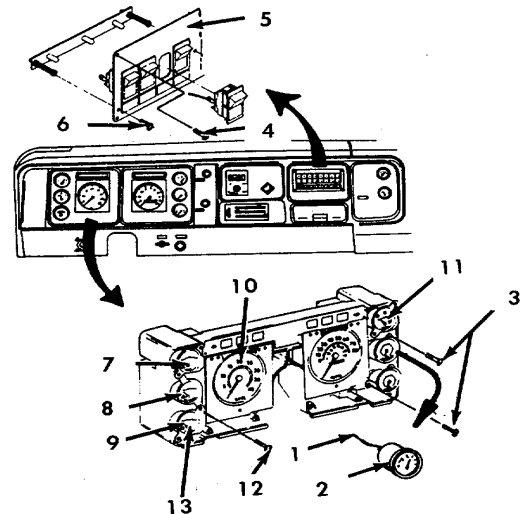
**INSTALLATION**

a. *Air gauge installation.*

**NOTE**

**Air gauges are mounted to a common bracket and are removed as an assembly from the cluster assembly. Use non-hardening sealant (Appendix D, Item 45) on fitting threads.**

- (1) Position air gauge assembly to cluster assembly and secure with mounting screws (3).
- (2) Reconnect air lines (1) to fittings on rear of air gauges (2).
- (3) Install cluster assembly (paragraph 4-106).



b. *Control switches installation.*

- (1) Insert switch into circuit board and install control wires.
- (2) Position circuit board on panel (5) and secure with two screws (6).
- (3) Position panel (5) onto dash and secure with four mounting screws (4).

c. *Gauge installation.*

**NOTE**

**This procedure is typical for the following gauges: WATER TEMPERATURE GAUGE (7), OIL PRESSURE GAUGE (8), VOLTMETER (9), TACHOMETER (10), and FUEL GAUGE (11).**

- (1) Position gauge (13) to cluster assembly.
- (2) Secure with mounting screws (12).
- (3) Install cluster assembly (paragraph 4-106).

**4-109. CONTROL KNOBS AND INDICATOR LIGHTS REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Control Knobs and Lights as required  
(Appendix E. Figure 75)

Equipment Condition

Para. Equipment Description  
4-106 Cluster Assembly Removed

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**REMOVAL**

a. *Control knob removal.*

Remove set screw or retaining ring and remove control knob.

b. *Indicator light removal.*

Pull and remove light bulbs as necessary.

**INSTALLATION**

a. *Control knob installation.*

Position control knob on shaft and secure using either a set screw or retaining ring.

b. *Indicator light installation.*

(1) Install replacement light.

(2) Install cluster assembly (paragraph 4-106).

**4-110. SIREN/PUBLIC ADDRESS SYSTEM REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

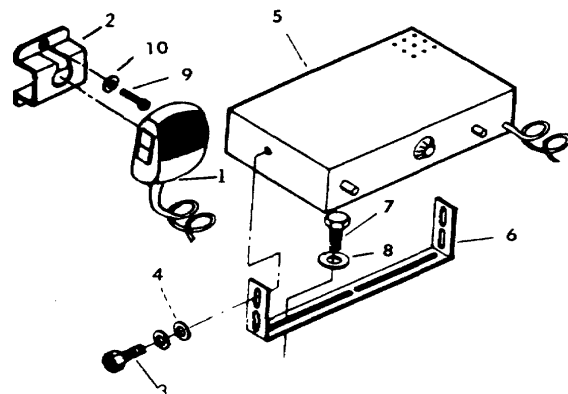
Siren (3691)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

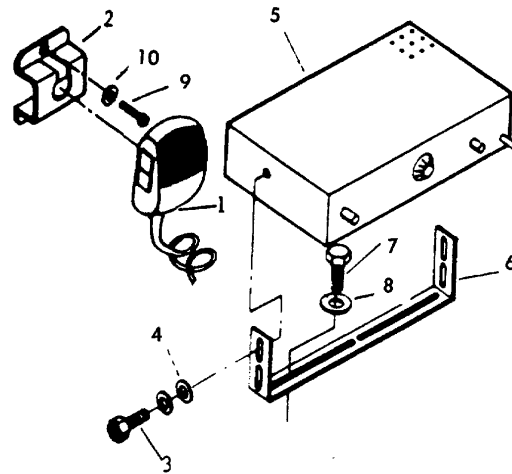
**REMOVAL**

- a. Lift microphone (1) out of microphone' bracket (2).
- b. Remove two screws (3) and flat washer (4).
- c. Lift siren and PA control unit (5) off mounting bracket (6).
- d. Disconnect electrical connection from back of siren/PA system (5).
- e. Remove two screws (7), flat washer (8), and mounting bracket (6).



**4-110. SIREN/PUBLIC ADDRESS SYSTEM REPLACEMENT.**

- f. Remove two screws (9) and lockwasher (10).  
Remove microphone bracket (2).
- g. Remove siren and PA system from truck.



**INSTALLATION**

- a. Install microphone bracket (2) with two lockwashers (10) and screws (9).
- b. Install mounting bracket (6) with two flatwashers (8) and screws (7).
- c. Connect electrical connection to back of siren/PA unit (5).
- d. Position siren and PA system control unit (5) to mounting bracket (6) and secure with flat washers (4) and two screws (3).

- e. Position microphone (1) into microphone bracket (2).

**4-111. EXTERNAL SPEAKER REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Speaker (PSE-58)

General Safety Instructions

Engine OFF.

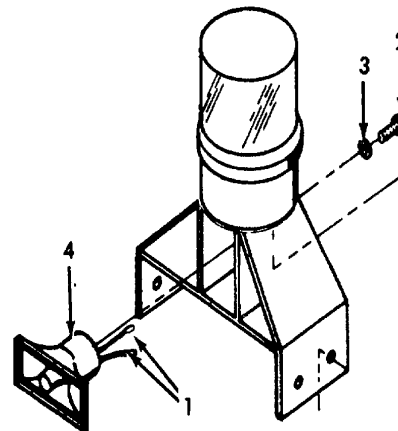
Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

**REMOVAL**

- a. Cut nylon tie and remove wires from protective covering.
- b. Disconnect two plugs (1).
- c. Remove bolt (2) and lockwasher (3) from rear of speaker (4).
- d. Slide speaker (4) forward and remove speaker (4).



**INSTALLATION**

- a. Slide speaker (4) into bracket and secure with lockwasher (3) and bolt (2).
- b. Connect two plugs (1).

- c. Insert wires into protective covering and fasten with nylon tie.
- d. Connect battery cables.

**4-112. BLOWER MOTOR REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Blower Motor (469455C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

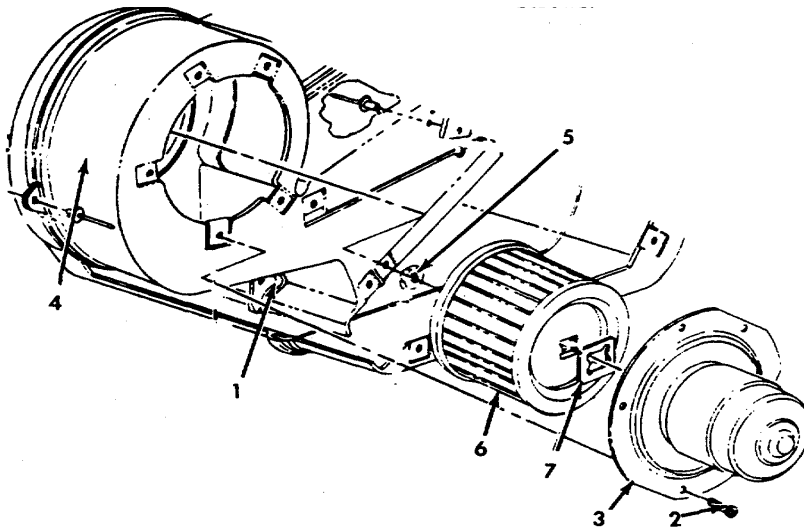
Batteries disconnected.

**REMOVAL**

- a. Remove five screws securing dash panel to cab.
- b. Disconnect blower motor wiring connector (1).
- c. Remove five screws (2) and remove blower motor assembly (3) from blower housing (4).
- d. Remove locknut (5) and lift fan (6) and spacer (7) from motor shaft.

**INSTALLATION**

- a. Position spacer (7) and fan (6) on motor shaft and secure with locknut (5). Torque locknut to 12 ft-lb (1.4 N.m).
- b. Install blower motor assembly (3) in blower housing (4) and secure with five screws (2).
- c. Connect blower motor wiring connector (1).
- d. Reconnect battery and perform operational check.
- e. Position dash panel and secure with five screws.



**4-113. HEATER HOSES MAINTENANCE.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Hose As required (COML)

Equipment Description

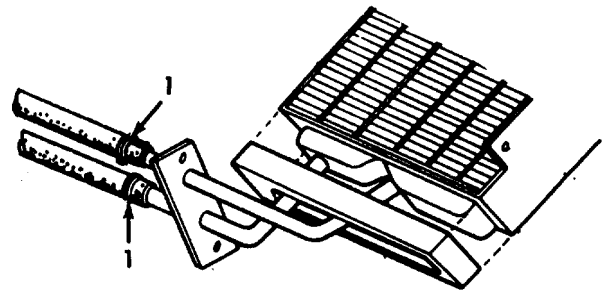
Para. Condition Description  
4-72 Cooling System Drained

General Safety Instructions

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

**REMOVAL**

Remove band clamps (1) and nylon ties as necessary to remove heater hoses.



**INSTALLATION**

Install heater hoses and secure with band clamps (1) and nylon ties.

**4-114. HEATER CORE MAINTENANCE.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description  
4-58 Engine Cooling System Drained  
4-113 Hoses Removed

General Safety Instructions

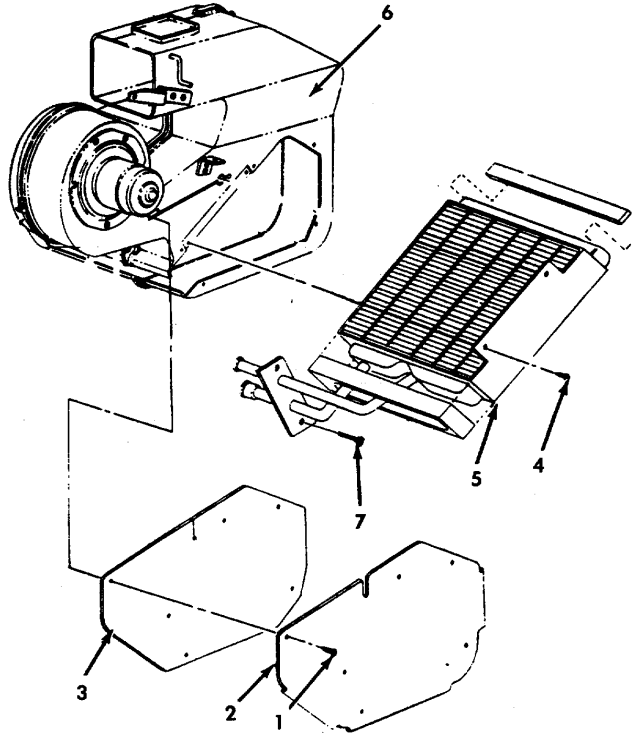
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Materials/Parts

Core (581702C1)

**4-114. HEATER CORE MAINTENANCE (Continued).****REMOVAL**

- a. Remove six screws (1) attaching cover (2) to heater housing and remove cover (2). Remove gasket (3).
- b. Remove two screws (4) attaching heater core (5) to heater housing (6).
- c. Remove two screws (7) attaching heater core pipes to floor panel and remove heater core (5).

**INSTALLATION**

- a. Position heater core (5) in heater housing (6) making sure front, top and bottom seals are in position.
- b. Install two screws (4) attaching heater core (5) to heater housing (6).
- c. Install two screws (7) attaching heater core
- d. Install heater hoses on heater core pipes and tighten hose clamps (paragraph 4-113).
- e. Install gasket (3) and cover (2) and secure with six screws (1).



**4-115. HEATER/DEFROSTER CONTROL ASSEMBLY REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Control Assembly (150-90002-0)

General Safety Instructions

Engine OFF.

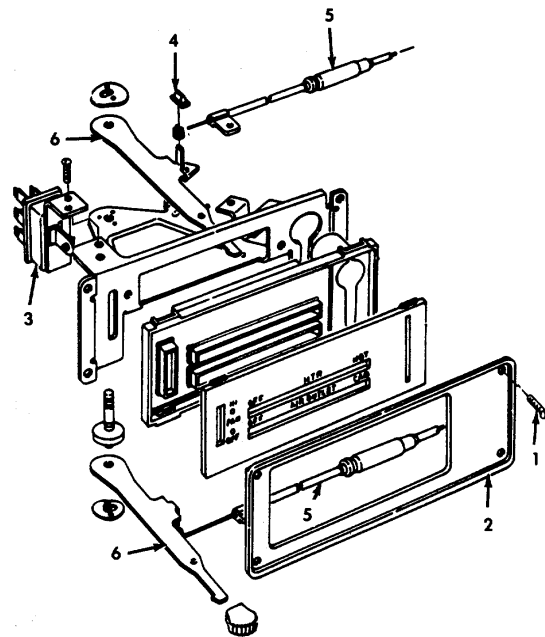
Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

**REMOVAL**

- a. Remove four control assembly mounting screws (1). Remove control assembly trim plate (2). Pull control assembly outward.
- b. Disconnect wiring harness connector from blower switch (3).
- c. Disconnect instrument panel lamp socket from control assembly.
- d. Remove retaining nuts (4) from the cable assemblies (5).
- e. Remove cable assemblies (5) from control levers (6).
- f. Remove control assembly.

**INSTALLATION**

- a. Connect control cables (5) to control assembly levers (6).
  - (1) Cable with white mounting tab upper (HTR) lever.
  - (2) Cable with black mounting tab to lower (AIR OUTLET) lever.
  - (3) Install control cables (5) and cable retaining nuts (4).
- b. Connect instrument panel lamp socket to control assembly.
- c. Connect wiring harness connector to blower switch (3).
- d. Position control assembly in instrument panel and install trim plate (2) and mounting screws (1).
- e. Connect battery cables.
- f. Check operation and adjustment of control cables.

**4-116. HEATER/DEFROSTER BLOWER SWITCH REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Blower Switch (472253C1)

Equipment Condition

Para. Condition Description

4-115 Heater/Defroster Control Assembly Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

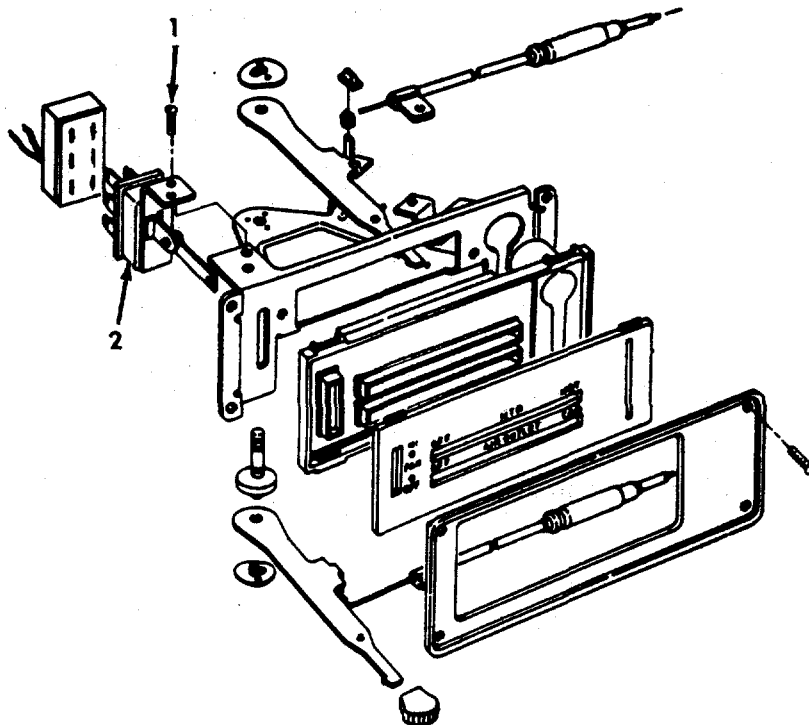
Batteries disconnected.

**REMOVAL**

- a. Remove blower switch mounting screws (1).
- b. Remove blower switch (2).

**INSTALLATION**

- a. Position blower switch (2) in control assembly and secure with mounting screws (1).
- b. Install heater/defroster control assembly (paragraph 4-115).
- c. Connect battery cables.



**4-117. HEATER/DEFROSTER CONTROL ASSEMBLY REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

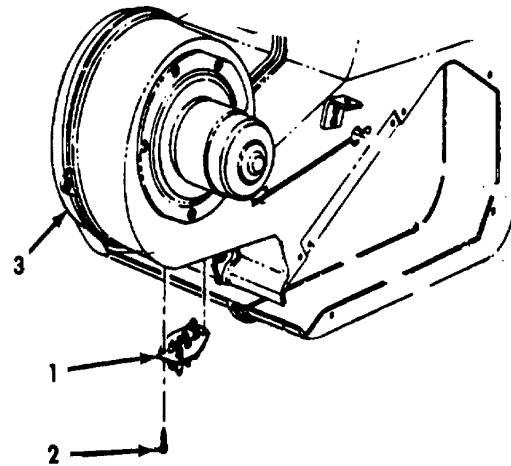
Resistor (469458C1)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

**REMOVAL**

- a. Disconnect wiring harness connectors from blower resistor (1).
- b. Remove resistor mounting screws (2) and remove resistor (1) from blower housing (3).



**INSTALLATION**

- a. Position resistor (1) in blower housing (3). Make sure resistor terminal locations correspond with wiring harness terminals. Install mounting screws (2).
- b. Connect wiring harness connector to resistor (1).
- c. Perform operational check.
- d. Connect battery cables.

**4-118. STEERING WHEEL REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Steering Wheel Puller

Materials/Parts

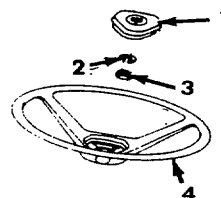
Steering Wheel (469902C3)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Batteries disconnected.

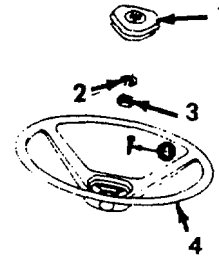
**REMOVAL**

- a. Pry up horn button cap (1) evenly, disconnect horn wire, and remove the horn button.
- b. Remove the retainer ring (2).



**4-118. STEERING WHEEL REPLACEMENT (Continued).**

- c. Remove the steering wheel mounting nut (3).
- d. Remove steering wheel (4) using steering wheel puller.



**INSTALLATION**

- a. Install the steering wheel (4) with the narrow spoke (with the word TOP) at the 12 o'clock position. Install the steering wheel mounting nut (3) and torque to 75-80 ft-lb (102- 108 N.m).
- b. Install the retainer ring (2).

- c. Connect the horn wire to the horn button (I) and install the horn button.
- d. Connect battery cables.

**4-119. STEERING COLUMN REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Steering Column (489574C91)

Equipment Condition

Para. Condition Description

4-118 Steering Wheel Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

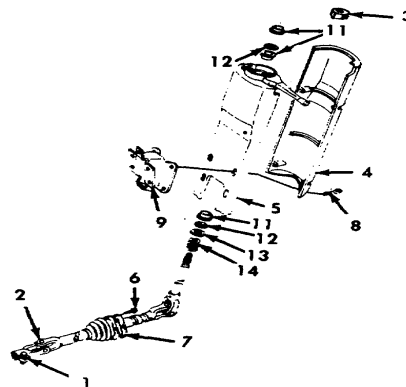
**REMOVAL**

**NOTE**

**Install the steering wheel mounting nut (3) to prevent the steering column from sliding out of the steering column housing.**

- a. Remove the pinch bolt (1) from the yoke (2) at the steering gear.
- b. Remove five screws and steering column trim cover (4).
- c. Remove the electrical connectors and wiring from the steering column housing (5).
- d. Remove the three screws (6) attaching the steering column rubber seal (7) to the floor panel.

- e. Remove the four bolts, washers and nuts (8) attaching the steering column housing (5) to the steering column support bracket (9). Tilt the steering column assembly to the side and remove it from the vehicle.

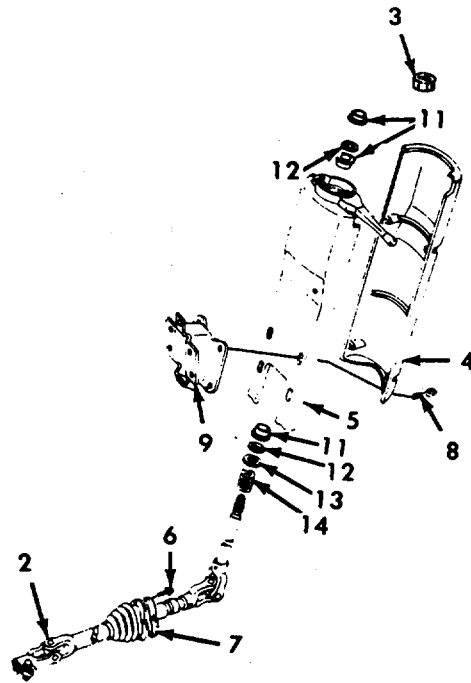


**4-119. STEERING COLUMN REPLACEMENT(Continued).**

- f. Remove the steering wheel mounting nut (3) and remove the steering shaft assembly (10) bushing (11), washer (12), flatwasher (13), and spring (14).

**INSTALLATION**

- a. Assemble the steering shaft assembly (10), spring (14), flatwasher (13), washer (12), and bushing (11) and install the steering column housing (5). Install the steering wheel mounting nut (3) temporarily.
- b. Guide the lower portion of the steering column assembly through the opening in the floor panel. Position the shaft assembly on the steering gear.
- c. Install the four bolts, nuts, and washers (8) attaching the steering column housing (5) to the steering column support bracket (9) and torque to 23-27 ft-lb (31-36 N.m).
- d. Install the three screws (6) attaching the steering column rubber seal (7) to the floor panel.
- e. Install the electrical connectors and wiring in the steering column housing (5).
- f.. Install the steering column trim cover (4).
- g. Install the steering wheel (paragraph 4-118).



- h. Install the nut and bolt (1) in the yoke assembly (2). Torque to 35-40 ft-lb (47-54 N.m).

**4-120. FLEXIBLE COUPLING REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Equipment Description

Para. Condition Description  
4-119 Steering Column Removed

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

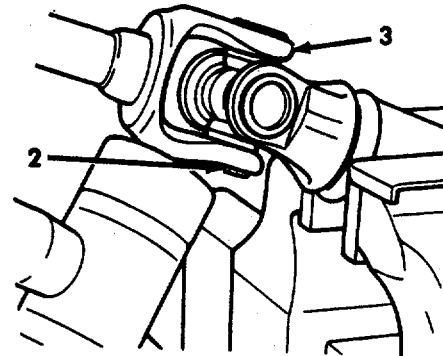
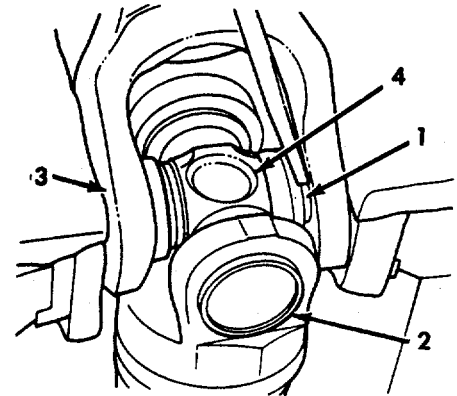
Materials/Parts

Coupling (252577C91)

**4-120. FLEXIBLE COUPLING REPLACEMENT (Continued).**

**REMOVAL**

- a. Place the universal joint in a vise. Remove the snap rings (1), retaining the bearings (2) in the yoke (3).
- b. Place the shaft assembly in a vise. Tap the yoke (3) with a soft hammer beside the bearing (2) that is being removed. The bearing should come out. If the bearing does not come out, place the bearing in a vise. Use copper jaw covers on vise. Tap the yoke away from the bearing.
- c. Remove the spider (4) after the bearings (2) have been removed.

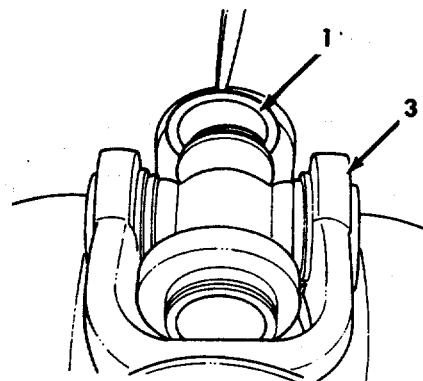
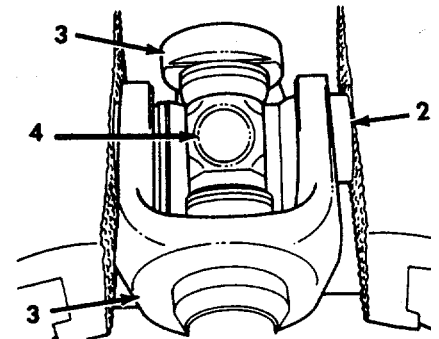


**INSTALLATION**

**NOTE**

**Make certain parts are clean before assembly.**

- a. Rest yoke (3) on hard surface. Tap one bearing (2) part way into yoke with a soft hammer. Be certain bearings (2) are straight in yoke (3).
- b. Insert spider (4) through the opposite hole, without bearing, and swing it into place and down into the partially installed bearing (2).
- c. Turn assembly over and tap the opposite bearing part way into the yoke. Be certain to start bearing straight in yoke (3).
- d. Place yoke in vise with bearings against jaws of vise. Tighten vise slowly and the bearings will be pressed into the yoke.
- e. After pressing bearing into yoke (3), the spider may be off center in yoke. This is desirable because it permits installation of snap ring (1) on the side with the most clearance. Install snap ring (1).
- f. After the first snapping (1) is in place, turn assembly over. The bearing with snapping installed should be on the bottom. Rest yoke on vise and strike bearing which is on top. This will seat both bearings. Snaprings should rest against inside milled surface of yoke. Install remaining snapping (1).



g- Bearings (2) must move freely. If tight, tap yoke until free.

h. Install steering column (paragraph 4-119).

**4-121. TURN SIGNAL SWITCH REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Switch (471302C93)

Equipment Condition

Para. Condition Description

4-118 Steering Wheel Removed

General Safety Instructions

Engine OFF.

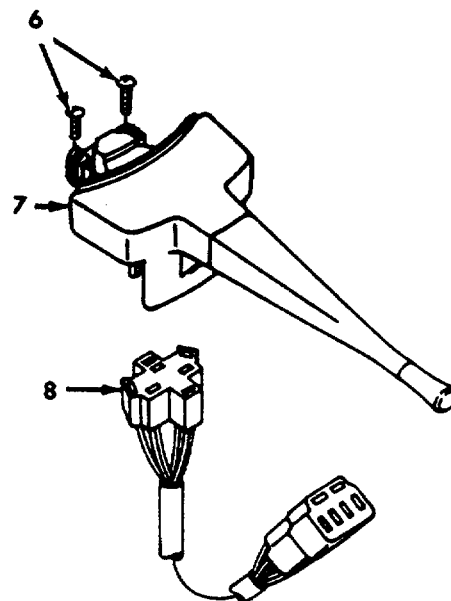
Transmission in (N) neutral.

Parking brake set.

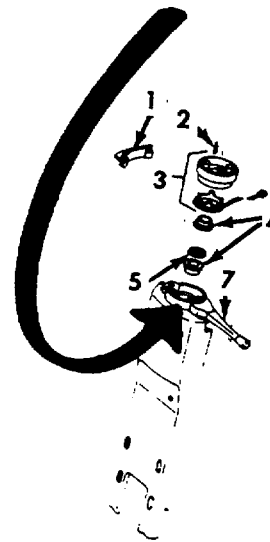
Batteries disconnected.

**REMOVAL**

- a. Remove steering column housing cover (1).
- b. Remove cancelling pin (2) and retainer and slip ring assembly (3).
- c. Remove two bushings (4) and washer (5).
- d. Remove two screws (6) from turn signal switch (7).
- e. Disconnect electrical plug (8) from turn signal switch (7). Remove turn signal switch.

**INSTALLATION**

- a. Position turn signal switch (7) on steering column and secure with two screws (6).
- b. Connect electrical plug (8) to turn signal switch (7).
- c. Install two bushings (4) and washer (5).
- d. Install retainer and slip ring assembly (3) and cancelling pin (2).
- e. Install steering column housing cover (1).
- f. Install steering wheel (paragraph 4-118).
- g. Connect battery cables.



**4-122. BRUSH GUARD REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Brush Guard (KFT-003)

Personnel Required: 2

General Safety Instructions

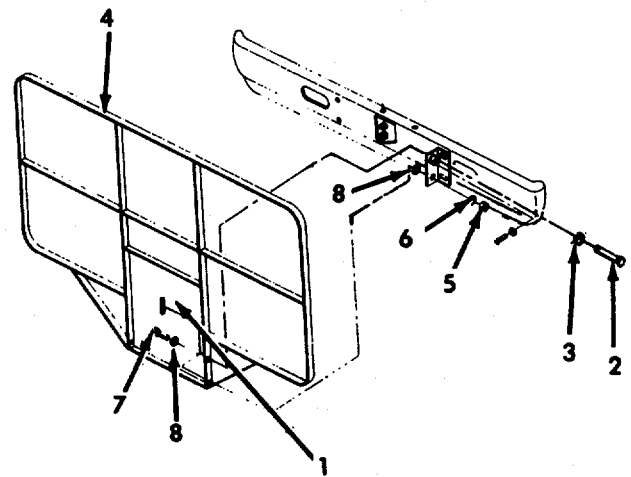
Engine OFF.

Transmission in (N) neutral.

Parking brake set.

**REMOVAL**

- a. Disconnect two clips (1), pins (2) and washers (3).
- b. Tilt brush guard (4) forward.
- c. Remove two nuts (5) and washers (6).
- d. With second person holding brush guard (4), remove two bolts (7) and washers (8).
- e. Carefully remove brush guard (4).

**INSTALLATION**

- a. Position brush guard on truck and install washers (8) and bolts (7).
- b. Install washers (6) and nuts (5).
- c. Tilt brush guard (4) against truck and install two washers (3), pins (2) and clips (1).



**4-123. GRILLE REPLACEMENT.**

This task covers:      a. Removal      b. Installation

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**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Grille (KFT-011)

Equipment Condition

Para. Condition Description  
4-122 Brush Guard Removed

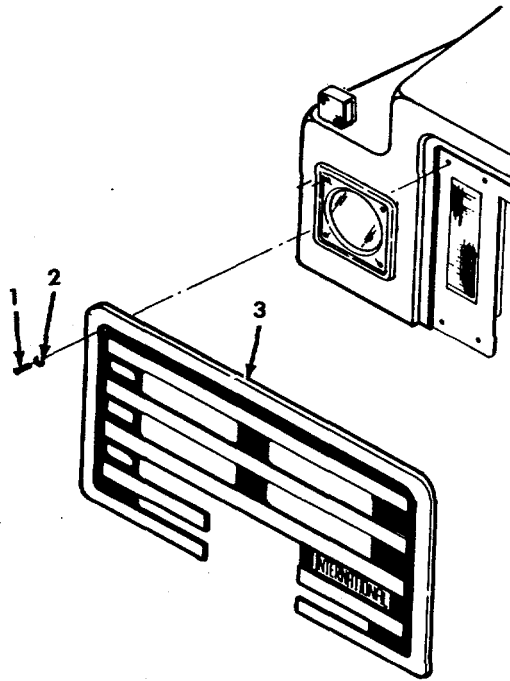
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General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**REMOVAL**

- a. Remove eight screws (1) and washers (2).
- b. Remove grille (3).

**INSTALLATION**

- a. Position grille (3) on truck and secure with eight washers (2) and screws (1).
- b. Install brush guard (paragraph 4-122).

**4-124. HOOD ASSEMBLY REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Hood (487787C3)

Equipment Condition

Para. Condition Description

4-122 Brush Guard Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

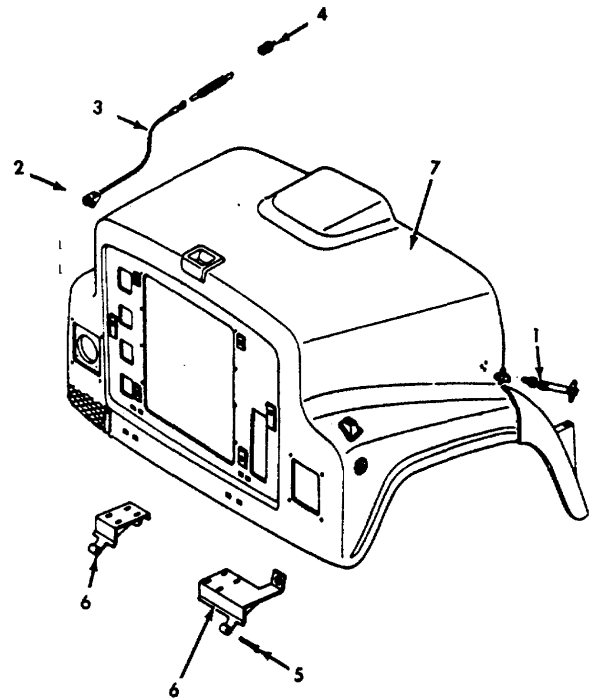
Parking brake set.

Personnel Required: 2

**REMOVAL**

- a. Release hood latches (1) on each side of cowl and tilt hood assembly forward.
- b. Remove cable end pins (2) and detach stop cables (3) from hood stop brackets (4) at top of radiator.
- c. Disconnect headlight wiring harness from hood assembly.
- d. Remove cotter pin and hinge pin (5) from the two hood hinge assemblies (6) and detach hood (7) from chassis.
- e. Remove spring type pin and hinge pin (5) from the two hood hinge assemblies (6) and detach hood (7) from chassis.

- d. Close hood assembly and connect hood latches (1) on each side of cowl.
- e. Install brush guard (paragraph 4-122).



**INSTALLATION**

- a. Position hood (7) onto chassis and secure with spring type pin and hinge pin (5) to two hood hinge assemblies (6).
- b. Connect headlight wiring harness to connector on underside of hood.
- c. Attach stop cables (3) to hood stop brackets (4) at top of radiator using cable end pins (2).

**4-125. HOOD HINGE REPLACEMENT.**


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This task covers:      a.      Removal      b.      Installation

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**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Hinge (483996C3)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set

Equipment Condition

Para.    Condition Description

4-122    Brush Guard Removed

4-123    Grille Removed

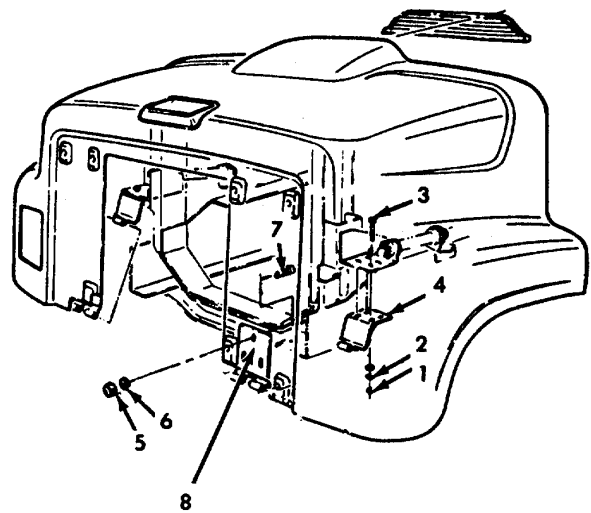
4-124    Hood Assembly Removed

**REMOVAL**

- a. Remove four nuts (1), washers (2), lockwashers (3) and bolts (4) from each of the two leaf brackets (5).
- b. Remove two leaf brackets (5).
- c. Remove three nuts (6), lockwashers (7), and bolts (8) from each of two brackets (9).
- d. Remove two brackets (9).

**INSTALLATION**

- a. Install bracket (9) and secure each with three bolts (8), lockwashers (7), and nuts (6).
- b. Install leaf brackets (5) and secure each with four bolts (4), lockwashers (3), washers (2) and nuts (1).
- c. Install hood assembly (paragraph 4-124).
- d. Install grille (paragraph 4-123).
- e. Install brush guard (paragraph 4-122).



**4-126. HOOD LATCH REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Latch (500269C1)

General Safety Instructions

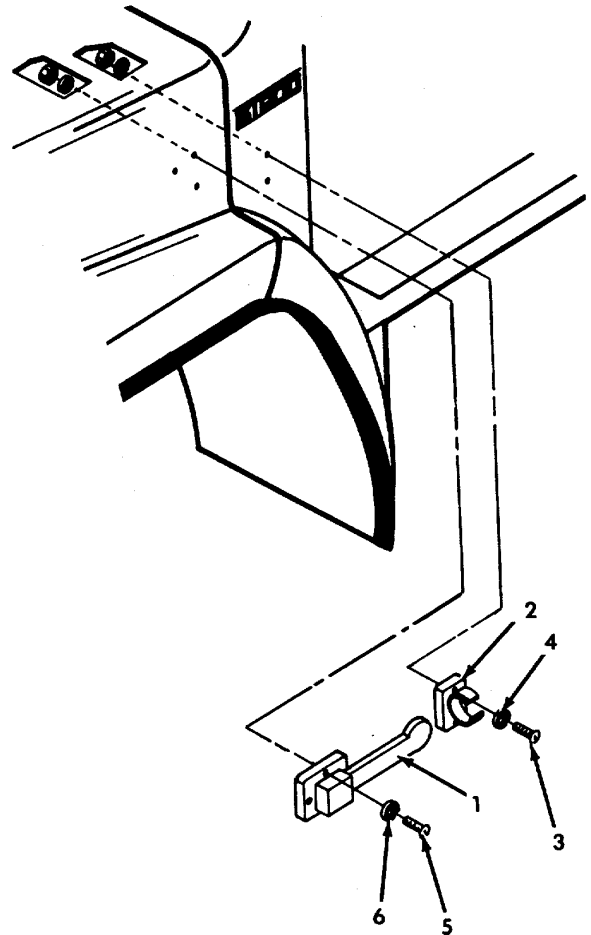
Engine OFF.

Transmission in (N) neutral

Parking brake set.

**REMOVAL**

- a. Release latch (1) from bracket (2).
- b. Remove two screws (3) and lockwashers (4).
- c. Remove bracket (2).
- d. Remove three screws (5) and lockwashers (6).
- e. Remove latch (1).

**INSTALLATION**

- a. Install latch (1) and secure with three lock-washers (6) and screws (5).
- b. Install bracket (2) and secure with two lockwashers (4) and screws (3).
- c. Insert latch (1) into bracket (2).

**4-127. SPLASH GUARD/MUD FLAP REPLACEMENT.**

This task covers:      a.      Removal      b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Splash Guard/Mud Flap Right (583960C1)

Splash Guard/Mud Flap Left (583959C1)

General Safety Instructions

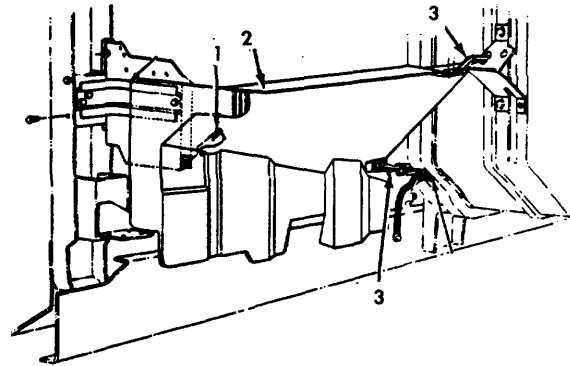
Engine OFF.

Transmission in (N) neutral

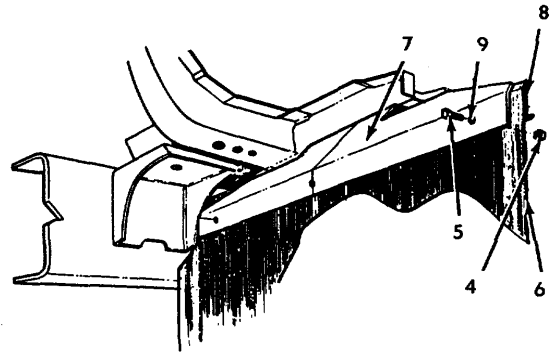
Parking brake set.

**REMOVAL**

- a. Remove pin (1) and lift up front end of splash guard/mud flap (2).
- b. Slide ends (3) of flap (2) out of brackets.
- c. Remove splash guard/mud flap (2).
- d. Remove the three nuts (4) from the bolts (5) that hold the rubber mud deflector flap (6) between the bracket (7) and the reinforcement plate (8).
- e. Remove the reinforcement plate (8) off the bolts (5).
- f. Remove mud flap (6) and bolts (5).

**INSTALLATION**

- a. Slide ends (3) of flap (2) into brackets.
- b. Lower front end of splash guard/mud flap (2) and install pin (1).
- c. Position mud flap (6) and align bolt holes (9) on the bracket (7).
- d. Position the reinforcement plate (8) and install the three bolts through the bracket (7), mud flap (6) and reinforcement plate (8).
- e. Install nuts (4) on the reinforcement plate side (8) and torque nuts (4) to 8 ft-lb (10.8 N.m).



**4-128. RADIATOR SUPPORT REPLACEMENT.**

This task covers:      a.      Removal      b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Radiator Support (15522682)

Equipment Condition

Para.    Condition Description

4-66    Radiator Removed

4-124   Hood Assembly Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral

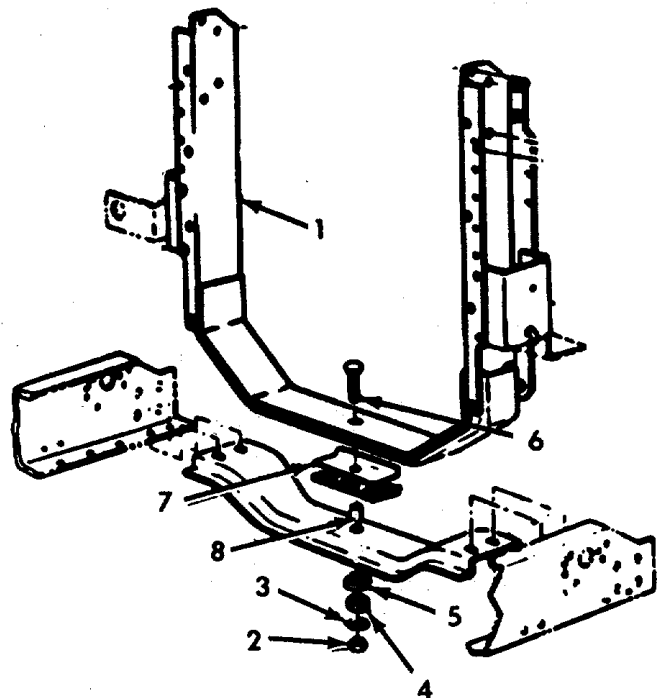
Parking brake set.

**REMOVAL**

- a. Hold radiator support (1) and remove nuts (2), lockwasher (3), insulator (4), and retainer (5).
- b. Remove bolt (6) and radiator support (1).
- c. Remove insulator (7) and spacer (8).

**INSTALLATION**

- a. Position spacer (8) and insulator (7).
- b. Install radiator support (1) and secure with bolt (6), retainer (5), insulator (4), lockwasher (3) and nut (2).
- c. Install hood assembly (paragraph 4-124).
- d. Install radiator (paragraph 4-66).



**4-129. MIRROR REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**

Tools  
General Mechanics Tool Kit

Materials/Parts  
Mirrors (482238C91)

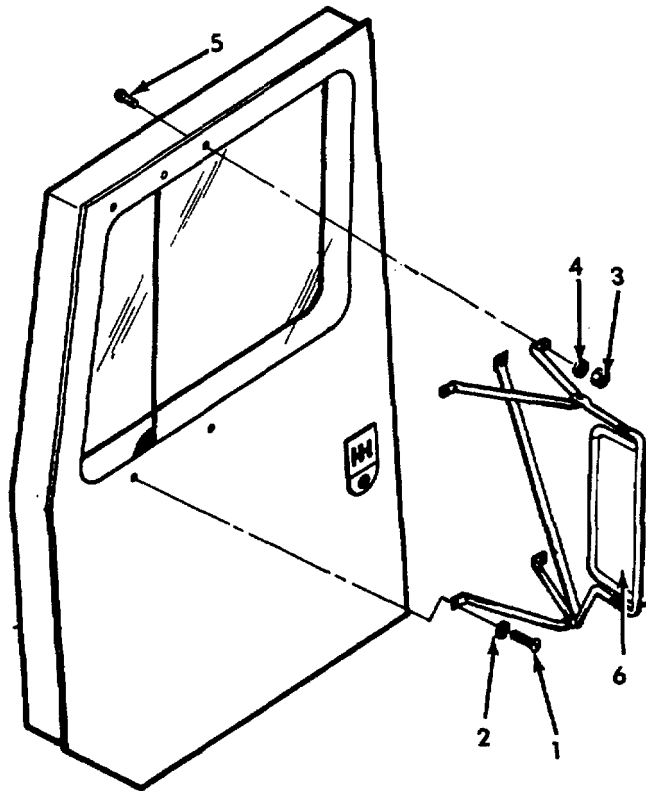
General Safety Instructions  
Engine OFF.  
Transmission in (N) neutral  
Parking brake set.

**REMOVAL**

- a. Remove two bolts (1) and lockwashers (2).
- b. Remove three nuts (3), lockwashers (4), and bolts (5).
- c. Remove mirror assembly (6).

**INSTALLATION**

- a. Position mirror assembly (6) and install three bolts (5), lockwashers (4), and nuts (3).
- b. Install two lockwashers (2) and bolts (1).



**4-130. DOOR REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Curbside Door (488000C91)  
Streetside Door (487999C91)

Equipment Condition

Para. Condition Description  
4-129 Mirrors Removed

General Safety Instructions

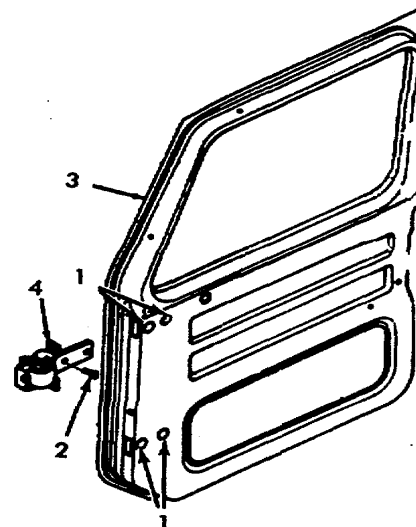
Engine OFF.  
Transmission in (N) neutral  
Parking brake set.

**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. Using a rope sling through window opening, attach sling to overhead lift and support door.
- b. Remove four button plugs (1) for access to hinge bolts.
- c. Remove the four flange head hinge bolts (2) and lift door assembly (3) from hinges (4).
- d. Remove door assembly and protect paint from scratches.



**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. Using sling, lift door (3) into position and install four flange head hinge bolts (2) to hinges (4).
- b. Install four button plugs (1).
- c. Install mirrors (paragraph 4-129).

**ADJUST**

- a. Door striker pin or stud is mounted in an enlarged hole in lock pillar. Loosen pin to move pin up or down and in or out as required.
- b. Fore and aft adjustment is by spacer shim between striker pin and pillar.
- c. Make final adjustment of striker pin and torque to 45-60 ft-lb (60-80 N.m).

**NOTE**

**When adjusted, door weatherseal should contact door frame all around with slight pressure but without damage to seal, door should latch, lock and release without undue effort, and door should be rattle free when vehicle is in motion.**



**4-131. DOOR HINGE REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

- Curbside Hinge Upper (475341C91)
- Streetside Hinge Upper (475340C91)
- Curbside Hinge Lower (475343C91)
- Streetside Hinge Lower (475342C91)

Equipment Condition

Para. Condition Description  
4-130 Door Removed

General Safety Instructions

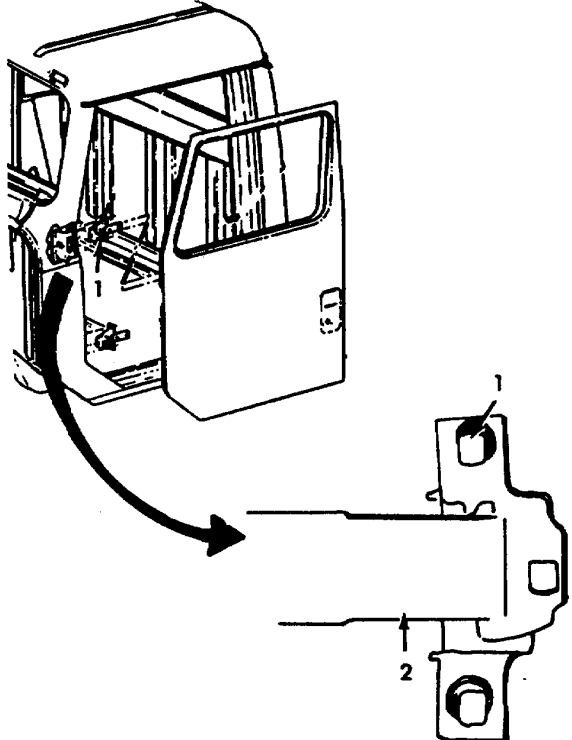
- Engine OFF.
- Transmission in (N) neutral
- Parking brake set.

**REMOVAL**

- a. To simplify door adjustment on reassembly, mark hinge position on hinge pillar with scratch awl before loosening hinges.

**CAUTION**

**Flange head bolt inside pillar can best be removed with a flex socket. Also be careful when extracting bolt so as to avoid its loss inside pillar.**



- b. Remove the three flange head bolts (1) and detach door hinge (2) from hinge pillar.

**INSTALLATION**

- a. Install hinge (2) to hinge pillar and secure with three flange head bolts (1).
- b. Install door (paragraph 4-130).

**4-132. DOOR LOCK REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Curbside Lock (477258C94)

Streetside Lock (477257C94)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral

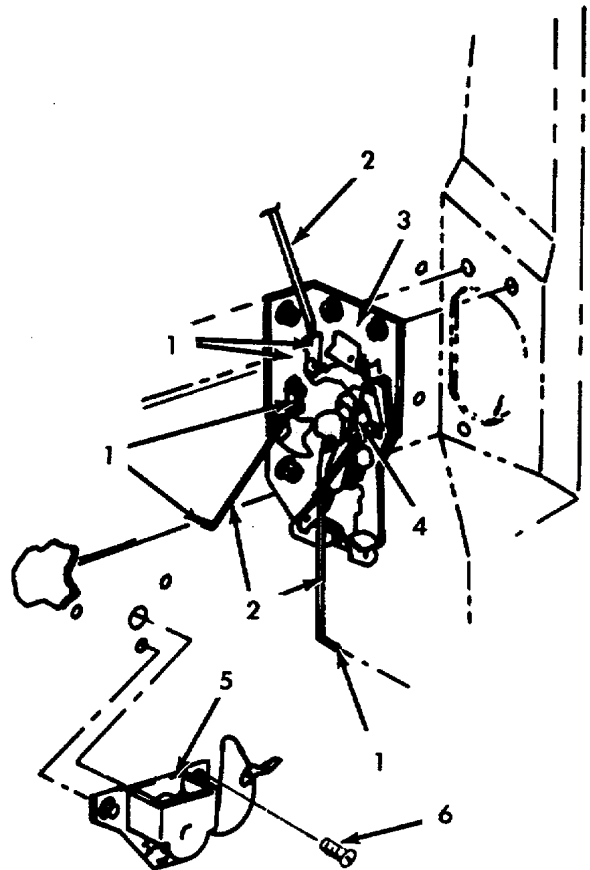
Parking brake set.

**REMOVAL**

- a. Unfasten rod end clips (1) and remove relay control rods (2) from remote control assembly (3) and from lock cylinder assembly (4). Opposite ends of the three relay control rods can remain attached to latch assembly (5).
  
- b. Remove three socket head screws (6) and detach remote control (3) from inside of door.

**INSTALLATION**

- a. Install remote control (3) to inside of door and secure with three socket head screws (6).
  
- b. Attach control rods (2) to remote control assembly (3) and lock cylinder assembly (4) using rod end clips (1).
  
- c. Install control rods and trim panel (paragraph 4-145).



**4-133. DOOR LOCK CYLINDER REPLACEMENT.**

---

This task covers:      a.      Removal      b.      Installation

---

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Lock Cylinder (474621C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral

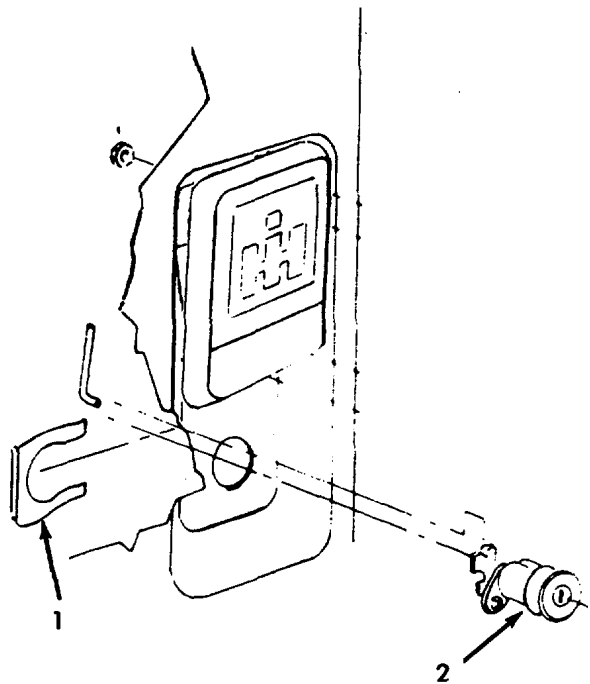
Parking brake set.

**REMOVAL**

- a. Working through door access opening pry lock retainer (1) from lock cylinder assembly (2) with a small pry bar or screwdriver.
- b. Rotate lock cylinder assembly (2) slightly and remove from door.

**INSTALLATION**

- a. Install lock cylinder assembly (2) into door and install lock retainer (1).
- b. Install door lock (paragraph 4-132).



**4-134. OUTSIDE DOOR HANDLE REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

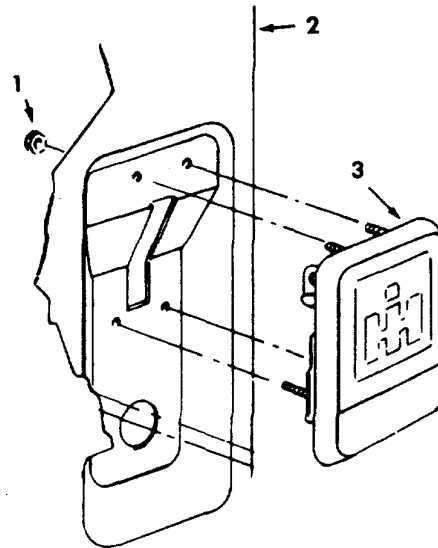
Tools  
General Mechanics Tool Kit

Materials/Parts  
Handle (475930C92)

General Safety Instructions  
Engine OFF.  
Transmission in (N) neutral  
Parking brake set.

**REMOVAL**

- a. Remove three hex nuts (1) from studs through door (2) from rear of handle (3).
- b. Remove door outer handle (3) from door (2).



**INSTALLATION**

- a. Install door outer handle (3) onto door (2).
- b. Attach three hex nuts (1) to studs on door handle (3).

**4-135. INSIDE DOOR HANDLE REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools  
General Mechanics Tool Kit

Materials/Parts  
Handle (454252C1)

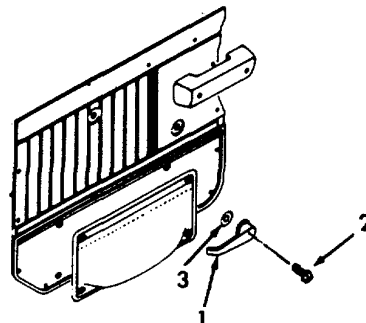
General Safety Instructions  
Engine OFF.  
Transmission in (N) neutral  
Parking brake set.

**REMOVAL**

Remove inside door handle (1) by removing socket head screw (2). Remove washer (3).

**INSTALLATION**

Install washer (3) and inside door handle (t) and secure with socket head screw (2).



**4-136. DOOR WEATHERSTRIP REPLACEMENT.**

This task covers:      a.      Removal      b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Weatherstrip (444058C1)

General Safety Instructions

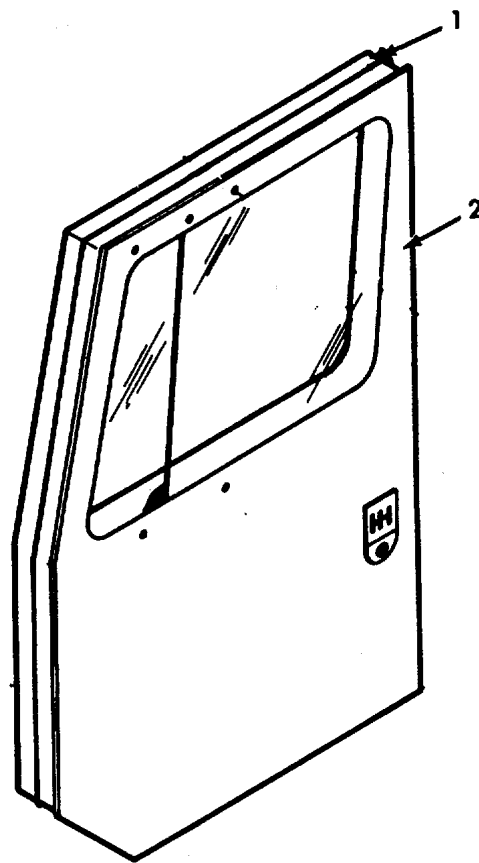
Engine OFF.

Transmission in (N) neutral

Parking brake set.

**REMOVAL**

Pry up old Weatherstrip (1) at fastener locations and remove Weatherstrip from cab door (2).

**INSTALLATION**

- a. Obtain new Weatherstrip.
- b. Be sure all old fasteners have been removed and door flange is free of dirt.
- c. Place new Weatherstrip (1) into place on door (2) and align fasteners over mounting holes.
- d. Apply pressure to each fastener to secure Weatherstrip (1).

**4-137. SEAT REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Drivers Seat (489905C91)

Passengers Seat (489907C91)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral

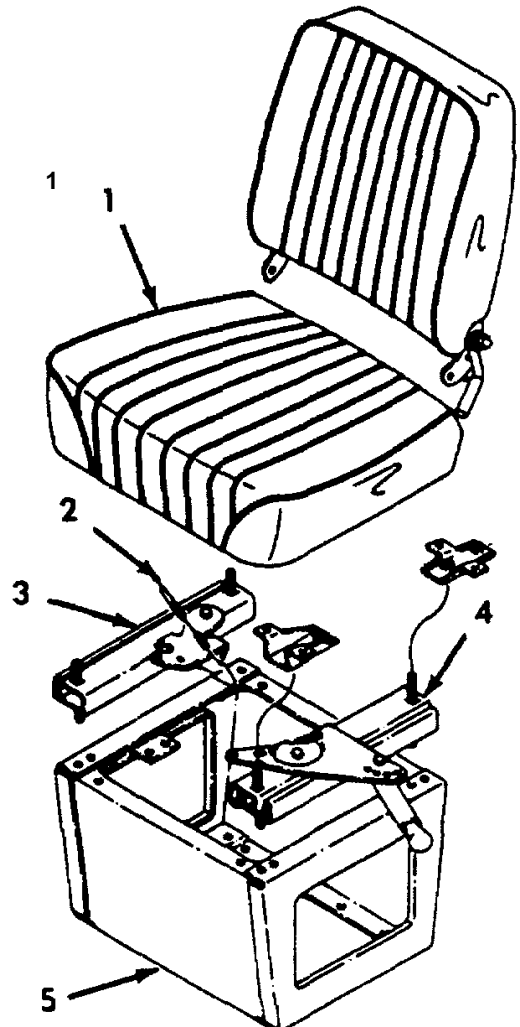
Parking brake set.

**REMOVAL**

- a. Remove the four bolts which secure the upper adjuster rails to seat bottom on right and left side and detach seat and back assembly (1). Slide seat fore and aft as necessary for access to mounting bolts.
- b. Unlock seat adjuster wire (2) between the two rails (3) and (4).
- c. Remove two bolts which secure lower half of each seat adjuster to seat riser (5) and remove right (3) and left seat adjuster (4).
- d. Clean seat adjusters as required. Apply a light coat of multi-purpose lube (Appendix D, Item 37) to rails to assure a smooth operation reassembly. Wipe away excess lube.

**INSTALLATION**

- a. Install seat adjusters (3) and (4) to seat riser (5) and secure with bolts. Torque bolts to 20-22 ft-lb (27-30 N.m).
- b. Lock seat adjuster wire (2) between the two rails.
- c. Attach seat and back assembly (1) to rails (3) and (4) using four bolts.



**4-138. SEAT BELTS REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Seat Belts (1647775C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral

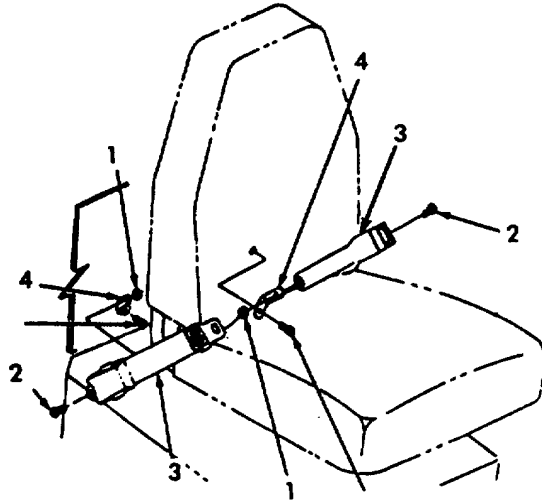
Parking brake set.

**REMOVAL**

Remove nuts (1) and bolts (2) securing seat belts (3) to brackets (4). Remove seat belts (3).

**INSTALLATION**

- a. Position seat belts (3) on brackets (4) and secure with bolts (2) and nuts (1).
- b. Torque bolts (2) to 70-85 ft-lb (95-115 N.m).



**4-139. WINDSHIELD REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Sealtool (SE-2442)

Materials/Parts

Windshield (4645T)  
Weatherseal (476222C1)

Personnel Required: 2

Equipment Condition

Para. Condition Description  
4-103 Wiper Arms 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 set

Special Environmental Conditions

The higher the temperature of the work area, the more pliable the Weatherstrip will be. The more pliable the Weatherstrip, the more easily the windshield can be removed.

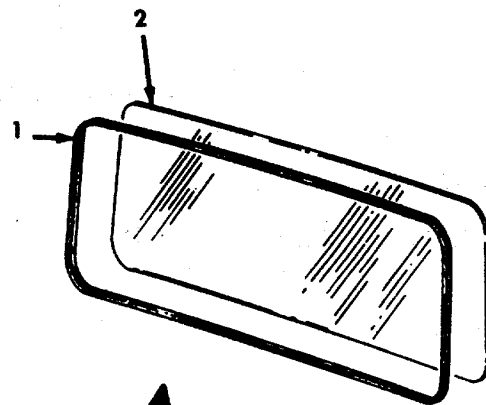
**4-139. WINDSHIELD REPLACEMENT (Continued).**

**REMOVAL**

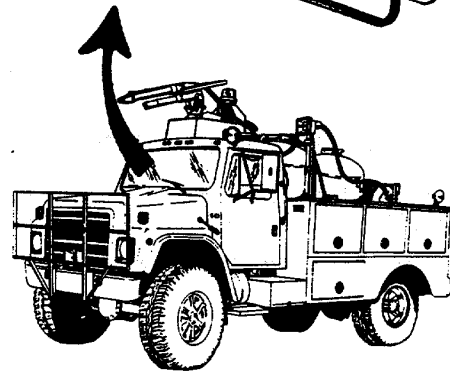
- a. Pry integral or detached insert from weather- seal (1) with a thin blade screwdriver or sealtool around entire glass.
- b. Working with one man outside cab and an assistant inside apply light pressure on windshield (2) from inside of cab to push glass from seal.

**WARNING**

Be careful during this operation since heavy pressure at any one point can lead to glass breakage.



- c. Lift glass (2) from opening and peel Weatherseal (1) from fence (weld flange).



**INSTALLATION**

- a. Coat Weatherseal (1) with a soapy solution or rubber lubricant for ease of assembly.
- b. Install Weatherseal (1) carefully around edge of windshield opening flange. Position splice joint of seal ends at centerline of cab and on lower flange.
- c. Working from outside the cab, place windshield (2) in channel of Weatherseal (1) starting at lower edge of opening.
- d. Install wiper arms (paragraph 4-103).



**4-140. BACK WINDOW REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit  
(SE-2442)

Materials/Parts

Window (1156T)  
Personnel Required: 2

General Safety Instructions

CAUTION: Always wear heavy gloves when Seal tool handling glass to minimize risk of injury.

Special Environmental Conditions

The higher the temperature of the work area, the more pliable the Weatherstrip will be. The more pliable the Weatherstrip, the more easily the windshield can be removed.

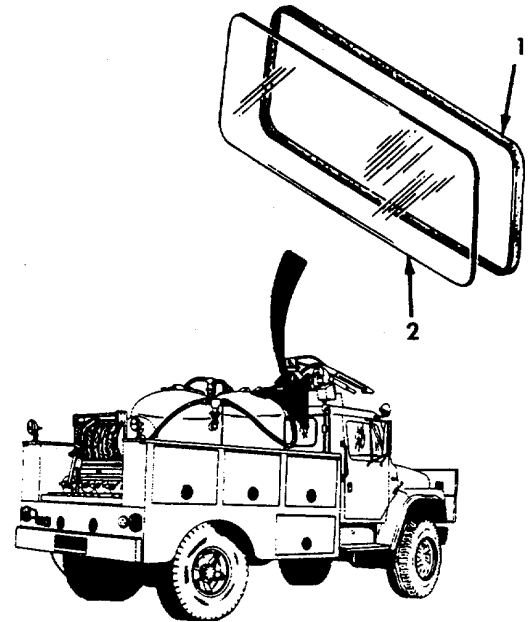
**REMOVAL**

- a. Pry out integral insert of Weatherseal (1) with seal tool or a thin blade screwdriver around entire perimeter of glass (2).
- b. Working with an assistant, one man inside cab and one man outside, gently push glass from inside out.
- c. Lift glass (2) from opening.

**INSTALLATION****NOTE**

**Before installing new weatherseal or window glass, body flange and glass must be cleaned free of dirt, old sealing compound, wax, etc.**

- a. Coat Weatherseal (1) with a soapy solution or rubber lubricant for ease of assembly.
- b. Position Weatherseal carefully around edge of rear window glass (2) opening flange.
- c. Working from outside the cab place rear window glass (2) in channel of Weatherseal (1) starting at lower edge of opening.
- d. With glass completely seated in Weatherseal channel start working Weatherseal insert down into groove provided with seal tool or dull screwdriver. A second coat of rubber lubricant will expedite this step.



**4-141. HOOD LATCH REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Sandpaper, Fine (Appendix D, Item 46)  
 Rubber Lubricant (Appendix D, Item 24)  
 Curbside Glass (20264743)  
 Streetside Glass (20264744)

General Safety Instructions

CAUTION: Always wear heavy gloves when handling glass to minimize the risk of injury.

Equipment Condition

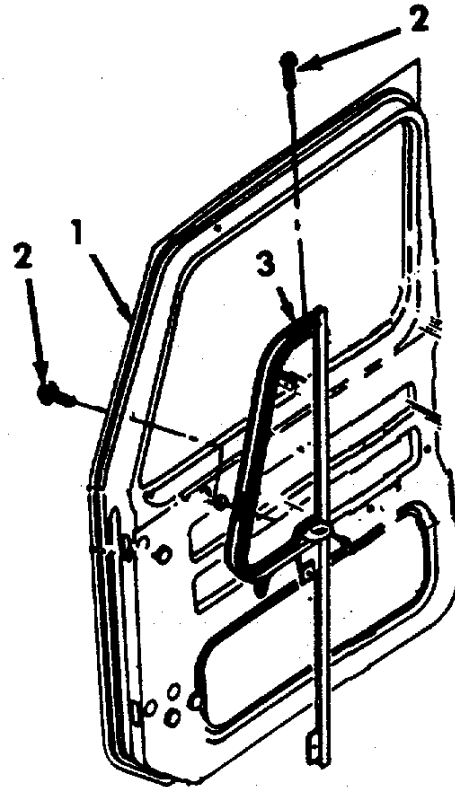
Para. Condition Description

4-145 Door Glass Removed

4-143 Door Glass Seal Removed

**REMOVAL**

- a. At the outside of door (1) remove two pan head mounting screws (2) one from top and one from front edge.
- b. From inside of door (1) remove two hex head bolts (2) and detach vent glass (3) and front run channel from door (1).
- c. Lift out vent glass (3) and front run channel as an assembly through window frame.

**INSTALLATION**

- a. Install vent glass (3) and front run channel as an assembly.
- b. Install two bolts (2) on inside of door into vent glass (3).
- c. At the outside edge of the door (1), install two pan head screws (2).
- d. Install door glass seal (paragraph 4-143).
- e. Install door glass (paragraph 4-145).

**4-142. DOOR GLASS REGULATOR REPLACEMENT.**

This task covers:      a.      Removal      b.      Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

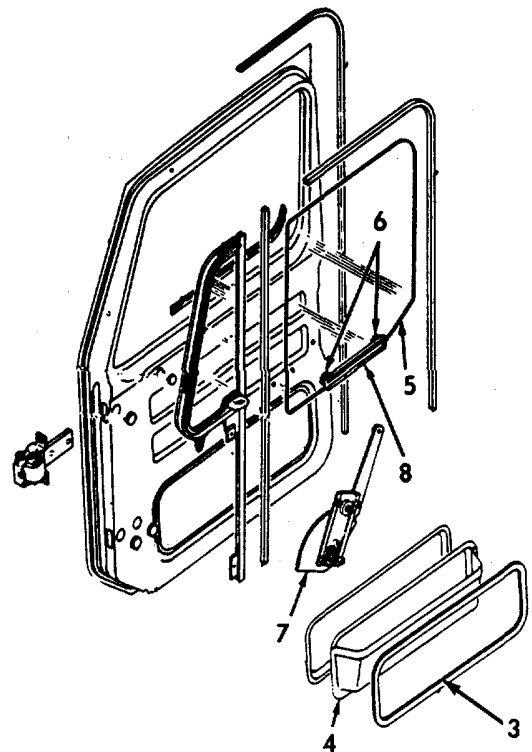
Lubriplate (Appendix D, Item 28)  
 Door Glass Regulator Curbside (449767C93)  
 Door Glass Regulator Streetside (449766C93)

General Safety Instructions

Engine OFF.  
 Transmission in (N) neutral  
 Parking brake set.

**REMOVAL**

- a. Remove window regulator handle (1) and door remote control handle (2) by removing socket head screws from handles.
- b. Remove gasket (3) and door trim panel (4).
- c. Lower glass (5) to bottom of door and remove the two glass fastener screws (6) and regulator lever (7) from window guide (8).
- d. Remove window guide (8) by sliding it from regulator lever (7).
- e. Push door glass (5) up in window frame and secure glass to top of door with tape.
- f. Remove the four retaining screws which hold regulator assembly (7) in door.
- g. Push regulator shaft through hole in door inner panel and remove regulator assembly (7) through access opening.



**INSTALLATION**

- a. Install regulator assembly (7) and secure with four retaining screws.
- b. Install window guide (8) by sliding it into regulator lever (7)
- c. Untape glass (5) and lower glass (5) to bottom of door and attach two glass fastener screws(6) and regulator lever (7) to window guide (8).
- d. Install door trim panel (4) and gasket (3).
- e. Install remote control handle (2) and window regulator handle (1) using socket head screws.

**4-143. DOOR GLASS SEAL REPLACEMENT.**

This task covers:      a.      Removal      b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Seal, Curbside (449682C2)  
Seal, Streetside (449681C2)

Equipment Condition

Para. Condition Description  
4-145 Door Glass Removed

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral  
Parking brake set.

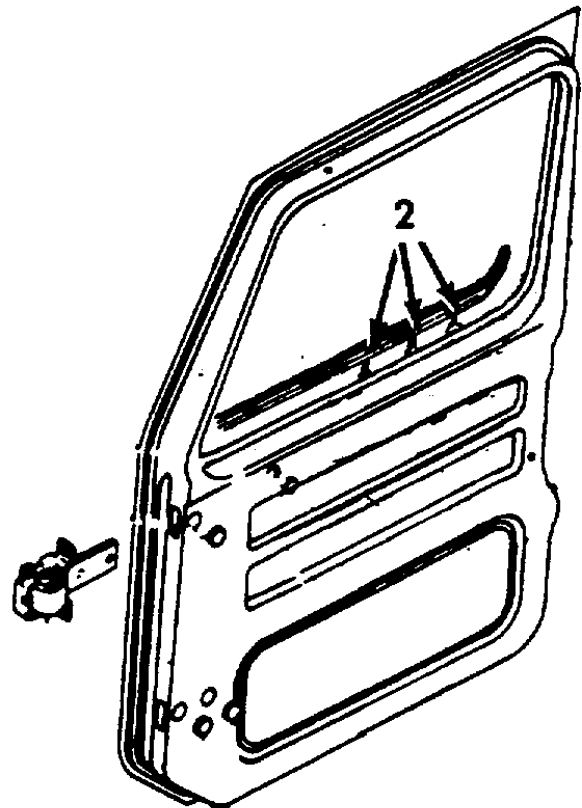
**REMOVAL****NOTE**

**Door glass may be left in bottom of door or removed through access opening as desired.**

Carefully pryout inner and outer seals (1) from window frame. Apply pressure at clips (2) to avoid damage. If clips (2) are broken during removal, a replacement seal will be necessary.

**INSTALLATION**

- a. To install door glass inner and outer seals (1) simply align seals in place and press clip (2) into openings provided. Avoid damage to seal by applying pressure at clip locations only.
- b. Install door glass (paragraph 4-145).



**4-144. DOOR RUN CHANNEL REPLACEMENT.**

This task covers:      a.      Removal      b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Curbside Channel (466754C1)

Streetside Channel (466753C1)

Equipment Condition

Para. Condition Description

4-145 Door Glass Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral

Parking brake set.

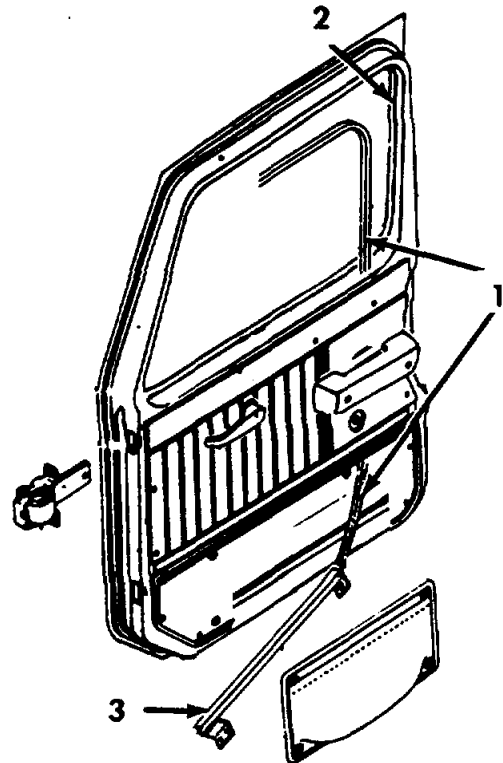
**REMOVAL****NOTE**

**Glass may be left in bottom of door or removed through access opening as desired.**

- a. Pry out channel seal (1) from door window frame (2).
- b. Remove channel (3) and seal through door access opening.

**INSTALLATION**

- a. Insert the channel seal (1) lower end in the rear run channel (3).
- b. Place channel and seal assembly inside door and press upper end of seal into window frame (2).
- c. Install door glass (paragraph 4-145).



**4-145. DOOR GLASS REPLACEMENT.**

This task covers:      a.      Removal              b.      Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

General Safety Instructions

CAUTION: Always wear heavy gloves when handling glass to minimize the risk of injury.

Materials/Parts

Door Glass (46477)

Equipment Condition

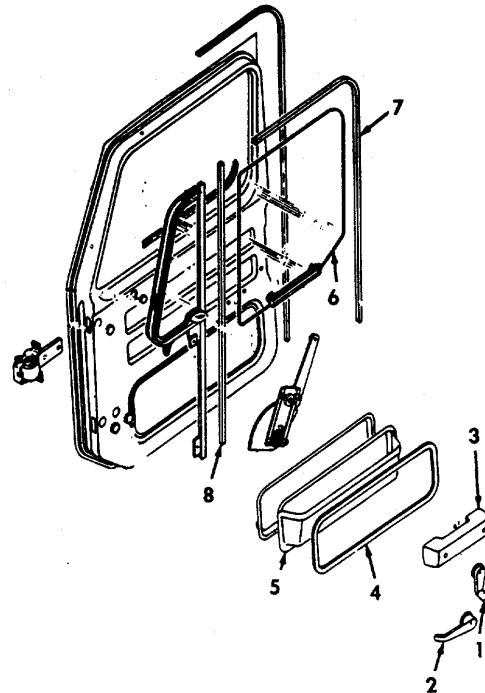
Para. Condition Description

4-173 Door Vent, Window Run Channel Removed

4-176 Door Trim Panel Removed

**REMOVAL**

- a. Remove window regulator handle (1) and door remote control handle (2) by removing socket head screws from handles.
- b. Remove two screws and detach arm rest (3).
- c. Remove rubber insert (4) from around door access cover (5) using blunt nose screwdriver or seal tool. Lift out cover (5) and remove seal (4) from access opening.
- d. Lower window glass (6) to bottom of its channel.
- e. Remove glass regulator (paragraph 4-142).
- f. Remove button plug from side of door for access to rear glass run channel (7) upper retaining bolt. Remove bolt.
- g. Remove two retaining bolts from lower end of glass rear run channel (7). Remove channel and channel seal from glass.
- h. Remove glass (6) from front run channel (8).
- i. Pull glass (6) out bottom of access opening.

**INSTALLATION**

- a. Insert window glass (6) through access opening.
- b. Enter glass (6) into front run channel (8).

**4-145. DOOR GLASS REPLACEMENT (Continued).**

- c. Slide rear run channel (7) and channel seal onto rear edge of glass (6).
  - d. Secure rear run channel (7) retainer to upper and lower mounting brackets with bolts and washers.
  - e. When assured that glass will slide easily from top to bottom in window channels, move window to lowered position.
  - f. Install glass regulator (paragraph 4-142).
  - g. Operate regulator handle to make sure all components have been assembled correctly.
  - h. Reinstall access door (5) and rubber insert (4).
  - i. Attach arm rest (3) using two screws.
  - j. Install remote control handle (2) and window regulator handle (1) using socket head screws.
-

**Section XVIII. MAINTENANCE OF ELECTRICAL SYSTEM**

Cab Electrical System Replacement .....	Para. 4-147	General.....	Para. 4-146
Chassis Electrical System Replacement .....	4-148		

**4.146. GENERAL.**

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

**4-147. CAB ELECTRICAL SYSTEM REPLACEMENT.**

This task covers:      a.      Removal      b.      Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

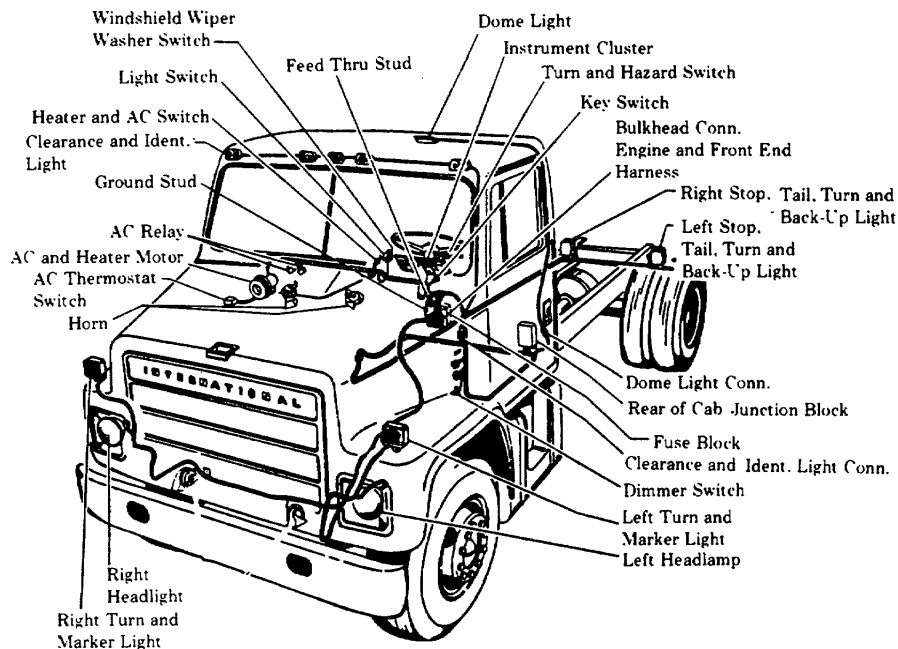
Cab Harness as required  
(Appendix E, Figure 97)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral  
Parking brake 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.





**4-147. CAB ELECTRICAL SYSTEM REPLACEMENT (Continued).**

**INSTALLATION**

- a. Position new wiring harness in vehicle and re-connect 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 batteries.

**4-148. CHASSIS ELECTRICAL SYSTEM 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 set.  
Batteries disconnected

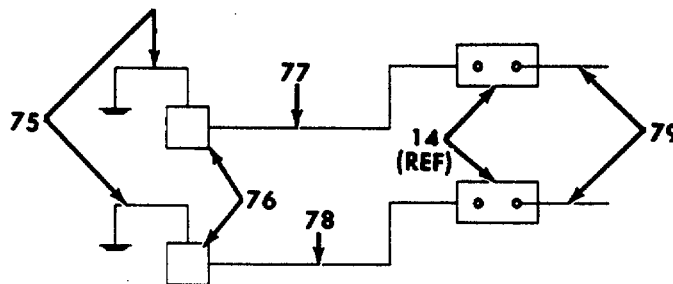
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**REMOVAL**

- 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.
- a. Battery Charging System

**INSTALLATION**

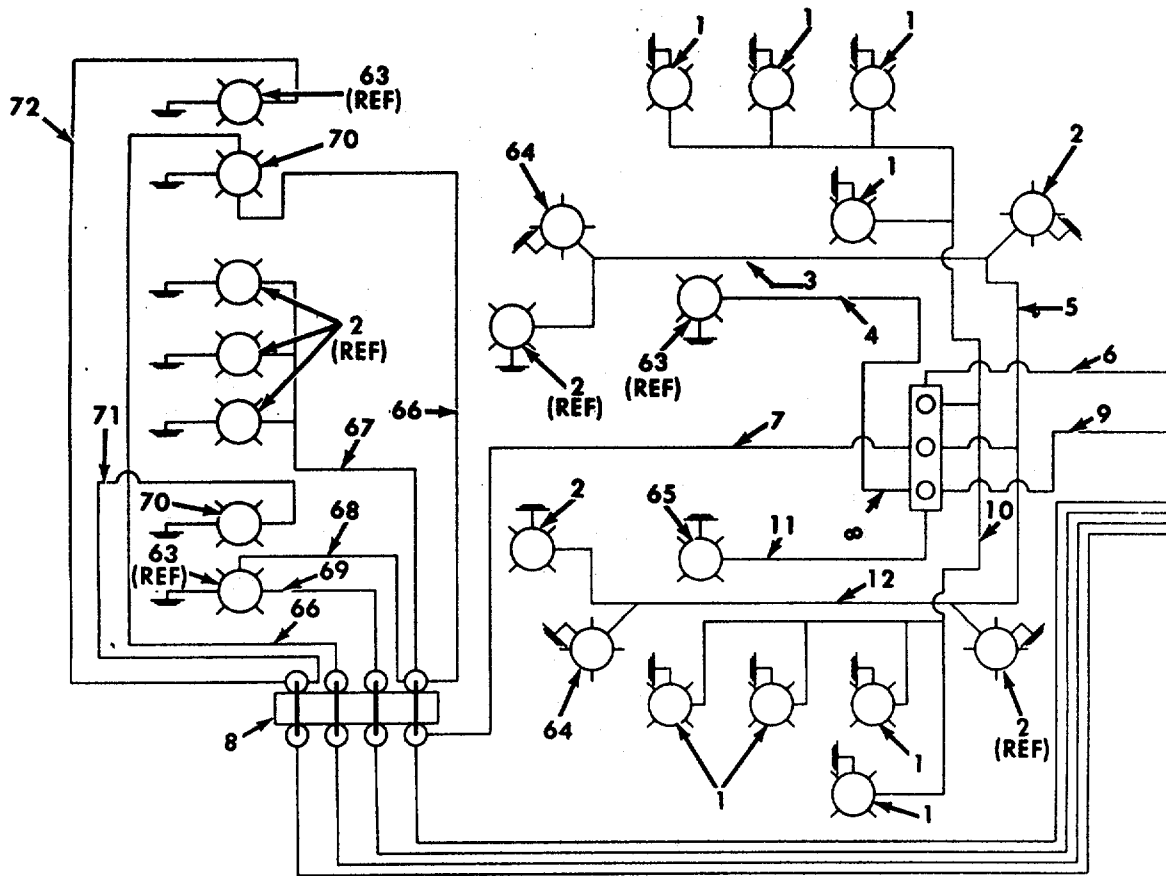
- a. Position new wiring harness in vehicle and re-connect the various branch circuits and sockets.
- b. Insert harness in retaining clips and secure by bending or securing clips back into position.
- c. Reconnect the batteries.



- 14. Battery
- 75. wire, 12, Harness "G"
- 76. Plug, Charging
- 77. wire, 10, Harness "F"
- 78. wire, 11, Harness "F"
- 79. Cable Ground, 21, Harness "P"

4-148. CHASSIS ELECTRICAL SYSTEM REPLACEMENT (Continued).

b. DC Body Wiring Schematic

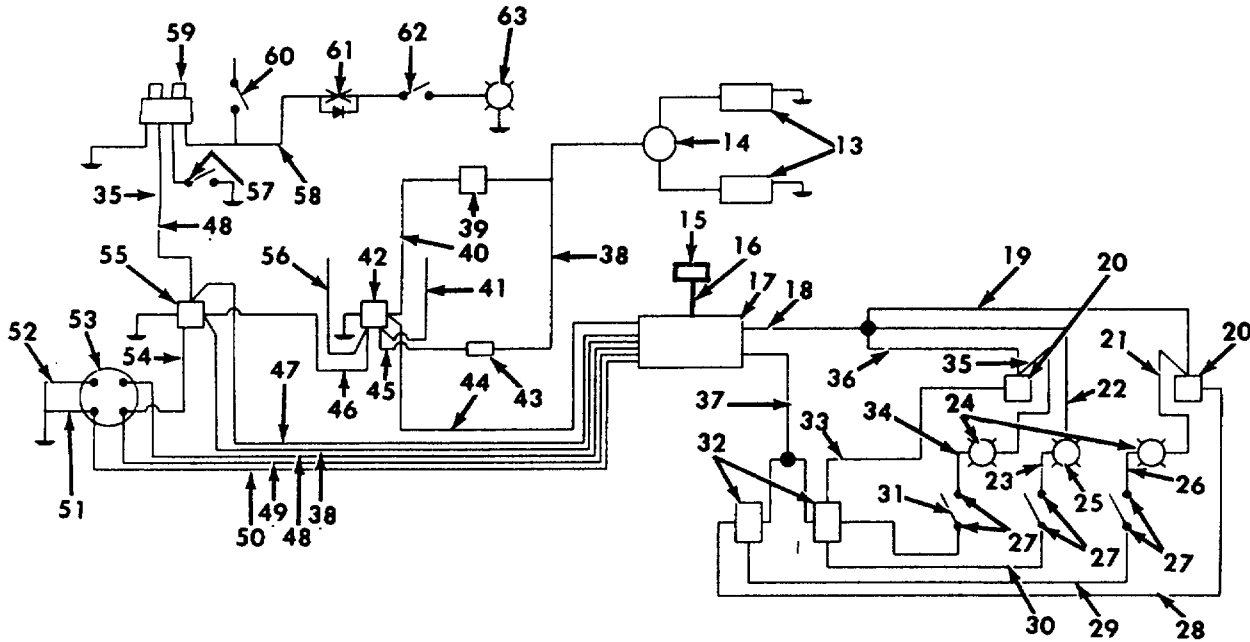


- 1. Compartment Light Assembly
- 2. Light, Clearance
- 3. Wire, 01L, Harness "L"
- 4. Wire, 06L, Harness "L"
- 5. Wire, 05L, Harness "L"
- 6. Wire, 05C, Harness "C"
- 7. Wire, 01D, Harness "D"
- 8. Block Terminal
- 9. Wire, 06C, Harness "C"
- 10. Wire, 05M, Harness "M"
- 11. Wire, 06M, Harness "M"

- 12. Wire, 01M, Harness "M"
- 63. Light, Stop, Turn, Tail
- 64. Light, Clearance, Red
- 65. Spotlight, Rear
- 66. Wire, 04, Harness "H"
- 67. Wire, 01S, Harness "S"
- 68. Wire, 01H, Harness "H"
- 69. Wire, 02H, Harness "H"
- 70. Light, Back-Up
- 71. Wire, 021, Harness "I"
- 72. Wire, 02H, Harness "H"

4-148. CHASSIS ELECTRICAL SYSTEM REPLACEMENT (Continued).

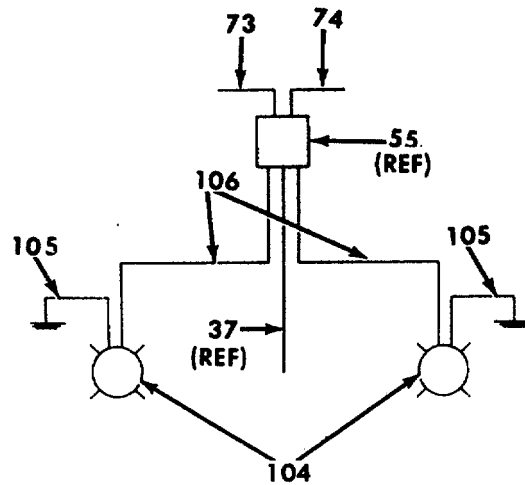
c. AC Wiring Schematic



- |   |   |
|---|---|
| 13. Battery Disconnect Switch           | 39. Switch, Ignition                        |
| 14. Battery                             | 40. Wire, 020                               |
| 15. Remote                              | 41. Wire, 17                                |
| 16. Cable, Remote to Inverter           | 42. Reverse Polarity Protection Solenoid    |
| 17. Inverter                            | 43. Ammeter, Shunt, Kit w/Ammeter           |
| 18. Wire, White                         | 44. Wire, Orange, Harness "T"               |
| 19. Wire, 012, Harness "R"              | 45. Wire, 019                               |
| 20. Receptacle Assembly, 1 10 VAC       | 46. Wire, 018                               |
| 21. Wire, 014, Harness "R"              | 47. Wire, Brown, Harness "T"                |
| 22. Wire, 016, Harness "R"              | 48. Wire, Blue, Harness "T"                 |
| 23. Wire, 017, Harness "R"              | 49. Wire, Red/Black, 4 Gauge, Harness "T"   |
| 24. Flood Light, Quartz, Rear, 110 VAC  | 50. Wire, Green/Black, 4 Gauge, Harness "T" |
| 25. Flood Light, Quartz, Front, 110 VAC | 51. Wire, 021                               |
| 26. Wire, 009 Harness "R"               | 52. Wire, 022                               |
| 27. Switch, Rocker Control Panel        | 53. Alternator                              |
| 28. Wire, 010 Harness "R"               | 54. Wire, 017, Harness "U"                  |
| 29. Wire, 008 Harness "R"               | 55. Relay, High Amperage By-Pass            |
| 30. Wire, 006 Harness "R"               | 56. Wire, 16, Harness "U"                   |
| 31. Wire, 004 Harness "R"               | 57. Switch, Safety Neutral                  |
| 32. Breaker, Circuit, 30 AMP            | 58. Wire, White/Red                         |
| 33. Wire, 015 Harness "R"               | 59. Inverter Throttle                       |
| 34. Wire, 005 Harness "R"               | 60. Switch, Brake                           |
| 35. Wire, 011 Harness "R"               | 61. Blocking Diode                          |
| 36. Wire, 013 Harness "R"               | 62. Switch, Turn Signal                     |
| 37. Wire, Black                         | 63. Light, Stop, Turn, Tail                 |
| 37A. Wire, Black, 4 Gauge, Harness "T"  |   |
| 38. Chassis Wiring                      |   |

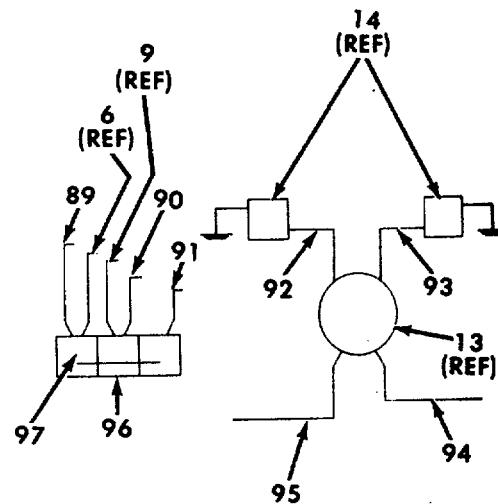
4-148. CHASSIS ELECTRICAL SYSTEM REPLACEMENT (Continued).

d. Engine Compartment Lights



- 37. Wire, Black
- 55. Relay, High Amperage By-Pass
- 73. Wire, 017, Red
- 74. Wire, 018, Black
- 104. Light, Compartment, Engine
- 105. Wire, 24
- 106. Wire, 18, Harness "A"

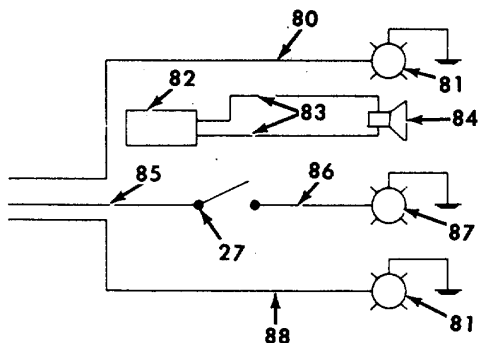
e. Quick-Disconnect Wiring



- 6. Wire, 05C, Harness "C"
- 9. Wire, 06C, Harness "C"
- 13. Battery Disconnect Switch
- 14. Battery
- 89. Wire, 08, Harness "B"
- 90. Wire, 07, Harness "B"
- 91. Wire, 25
- 92. Wire, 19, Harness "N"
- 93. Wire, 20, Harness "O"
- 94. Wire, Starter
- 95. Wire, 14, Harness "J"
- 96. Board, Circuit Breaker
- 97. Circuit Breaker, 20 AMP

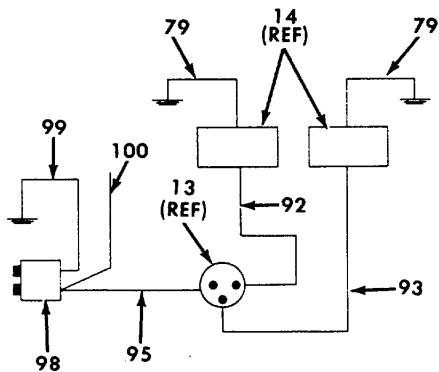
4-148. CHASSIS ELECTRICAL SYSTEM REPLACEMENT (Continued).

f. Truck Cab Wiring



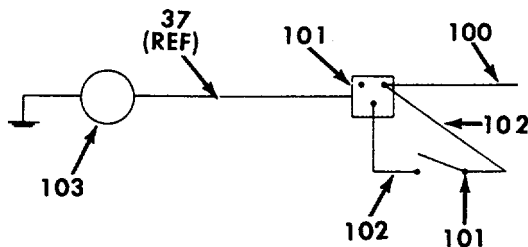
- |                                  |                                 |
|----------------------------------|---------------------------------|
| 27. Switch, Rocker Control Panel | 84. Speaker, External           |
| 80. Wire, 09B, Harness "B"       | 85. Wire, 07, Harness "B"       |
| 81. Spotlight Assembly           | 86. Wire, 08, Harness "B"       |
| 82. Siren/PA Control             | 87. Roof Warning light Assembly |
| 83. Wire, 09A, Harness "B"       | 88. Wire, 09C, Harness "B"      |

g. Jump Seat Wiring



- |                                    |                            |
|------------------------------------|----------------------------|
| 13. Battery Disconnect Switch      | 95. Wire, 14, Harness "J"  |
| 14. Battery                        | 98. Plug, Jumper           |
| 79. Cable, Ground, 21, Harness "P" | 99. Wire, 13, Harness "K"  |
| 92. Wire, 19, Harness "N"          | 100. Wire, 15, Harness "E" |
| 93. Wire, 20, Harness "O"          |                            |

h. Hose Reel Wiring



- |                                |                       |
|--------------------------------|-----------------------|
| 37. Wire, Black                | 102. Wire             |
| 100. Wire, 15, Harness "E"     | 103. Motor, Hose Reel |
| 101. Switch and Relay Assembly |                       |

**Section XIX. MAINTENANCE OF PROPELLOR SHAFT ASSEMBLY**

	Para		Para.
Front Propellor Shaft Replacement .....	4-154	Rear Propellor Shaft Replacement .....	4-152
General .....	4-149	Rear Slip Yoke Replacement .....	4-153
Propellor Shaft Assembly Service .....	4-150	Universal Joints Replacement .....	4-151

**4-149. GENERAL**

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

**4-150. PROPELLOR SHAFT ASSEMBLY SERVICE.**

This task covers : Service

**INITIAL SET-UP**

Tools

Grease Gun

Materials/Parts

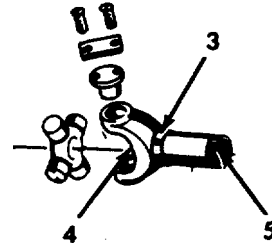
Grease (Appendix D, Item 20)

**SERVICE**

- a. Lubricate all universal joints by applying grease (Appendix D, Item 20) to grease fitting (1) at center of journal cross until it appears at all four journal cross bearing seals (2).



- b. Lubricate slip joint spline by applying grease (Appendix D, Item 20) to grease fitting (3). Apply grease gun pressure until lubricant appears at relief hole (4). Cover relief hole with finger and continue to apply pressure until grease appears at sleeve yoke seal (5).



4-151. UNIVERSAL JOINT REPLACEMENT

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit  
Drift

Materials/Parts

U-Joint (Appendix E, Figure 99)

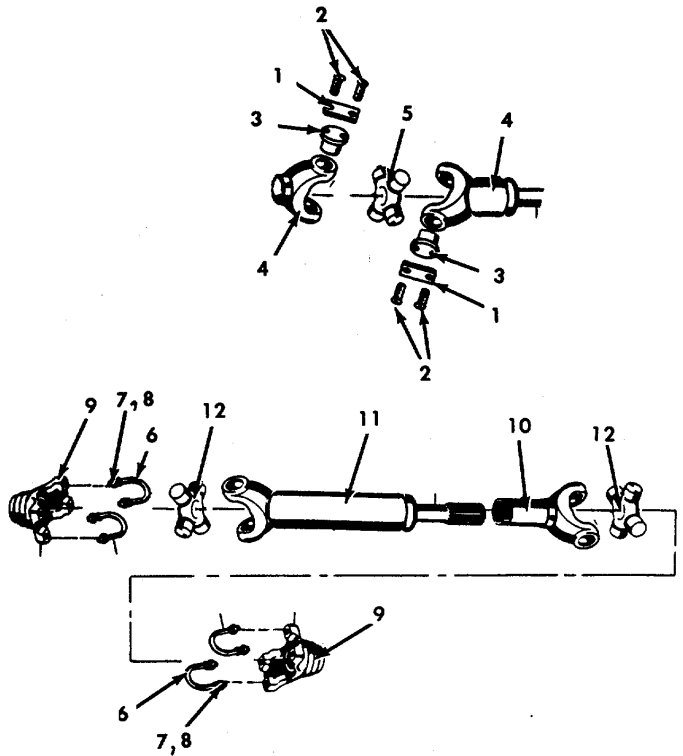
REMOVAL

- a. To remove rear U Joints, bend tabs of lockstrip (1) down and remove two capscrews (2) and bearing cap (3) from yoke (4).
- b. Remove bearing caps (3) by using a large pair of pliers on cap edges, turn retaining caps and bearing subassembly at the same time lifting upward to remove from the yoke (4)

**CAUTION**

Use soft round drift with flat face to prevent damage to bearing while tapping.

- c. Turn the joint over and tap the exposed end of the journal cross (5) until the opposite needle bearing is free.
- d. To remove front U-joints, remove the U-bolts (6), nuts (7) and lockwashers (8) from the end yokes (9).
- e. Slide the sleeve yoke (10) toward the shaft (11) to free the bearings (12) from their seats between the shoulders in the end yokes (9).



INSTALLATION

- a. To install rear U-joints, position journal cross in yoke (4) and carefully insert bearing cap assemblies (3) over end of cross (5).
- b. Install lockstrap (1) and two capscrews (2) at each bearing cap assembly (3).

- c. Bend tabs of lockstrap (1) to prevent loosening of capscrews (2).
- d. To install front U-joints, position the bearings (12) in their slots between the shoulders in the end yokes (9).
- e. Install U-bolts (6), lockwashers (8) and nuts (7).
- f. Torque nuts to 20-24 ft-lb (27.1 to 32.5 N.m).

**4-152. REAR PROPELLOR SHAFT REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

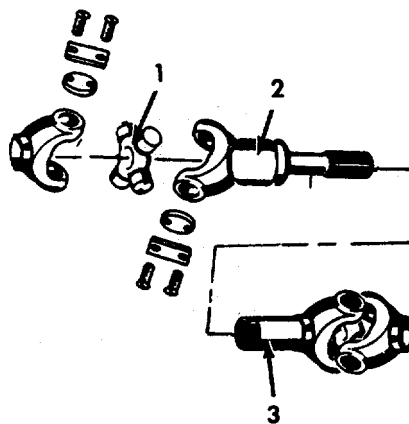
Rear Propeller Shaft (Appendix E, Figure 99)

Equipment Condition

Para. Condition Description  
4-151 Rear Universal Joints Removed

**REMOVAL**

- a. Remove universal joints (1) at rear axle (paragraph 4-151).
- b. Remove rear propellor shaft (2) by sliding from rear slip yoke (3).



**INSTALLATION**

Position propellor shaft (2) on slip yoke (3) and install rear universal joint (1) at rear axle (paragraph 4-151).

**4-153. REAR SLIP YOKE REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

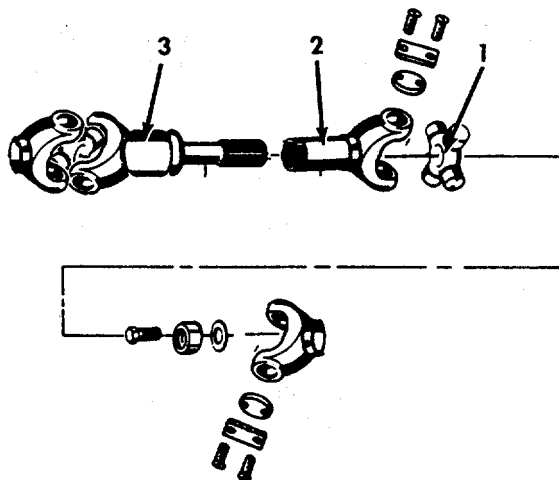
Rear Slip Yoke

Equipment Condition

Para. Condition Description  
4-151 Front Universal Joints Removed

**REMOVAL**

- a. Remove universal joint (1) at rear of transfer case (paragraph 4-151).
- b. Remove rear slip yoke (2) by sliding from rear propeller shaft (3).



**INSTALLATION**

Position slip yoke (2) on rear propeller shaft (3) and install front universal joint (1) at rear of transfer case (paragraph 4-151).



**4-154. FRONT PROPELLOR SHAFT REPLACEMENT**

This task covers: a.. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

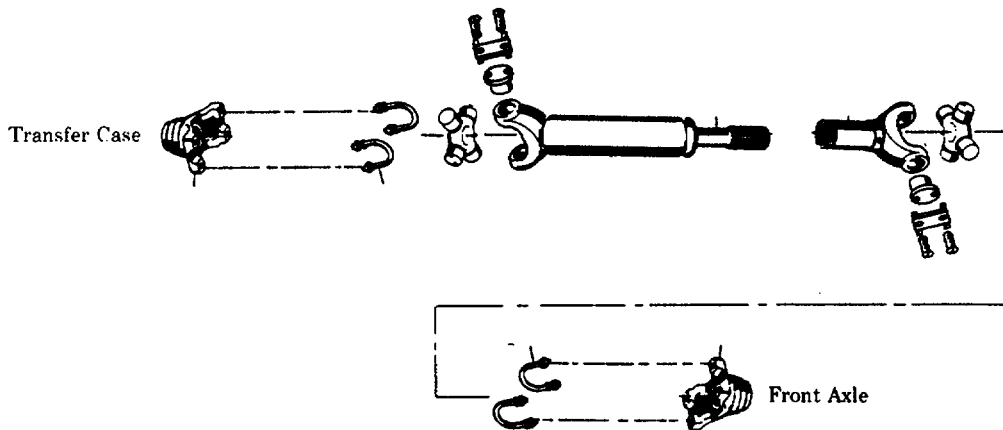
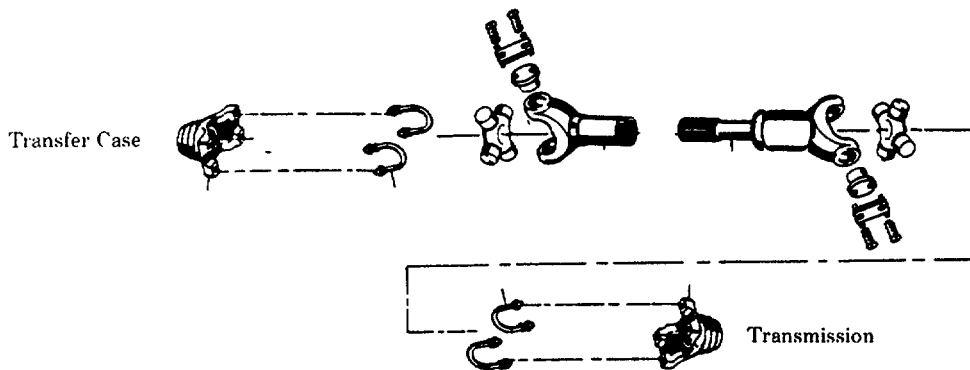
Front Propellor Shaft (Appendix E, Figure 99)

**REMOVAL**

- a. Removal of both transmission-to-transfer case propellor shaft and front axle-to-transfer case propellor shaft can be accomplished by following the procedures in paragraph 4-152.
- b. Removal of both transmission-to-transfer case slip yoke and front axle-to-transfer case slip yoke can be accomplished by following the procedures in paragraph 4-153.

**INSTALLATION**

- a. Installation of both transmission-to-transfer case slip yoke and front axle-to-transfer case slip yoke can be accomplished by following the procedures in paragraph 4-153.
- b. Installation of both transmission-to-transfer case propellor shaft and front axle-to-transfer case propellor shaft can be accomplished by following the procedures in paragraph 4-152.



Section XX. MAINTENANCE OF Transmission Assembly

General	Para. 4-155	Transmission Shift Control Lever	Para.
Transmission Assembly Maintenance .....	4-156	Replacement .....	4-157

**4-155. GENERAL.**

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

**4-156. TRANSMISSION ASSEMBLY MAINTENANCE.**

This task covers: a. Removal                      b. Replacement                      c. Service

Tools

- General Mechanics Tool Kit
- Hoist
- Sling

General Safety Instructions

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

Materials/Parts

- Transmission (23014313)
- Transmission Oil (Appendix D, Item 38)

**REMOVAL**

- a. Drain the oil from the transmission before removal from the vehicle. For better drainage, the transmission should be warm.
- b. Make sure all linkages, controls, cooler lines, modulator actuator cable, temperature connection, input and output couplings, oil filler tube, parking brake linkage, mounting bolts, etc., are disconnected before transmission removal. Oil lines should be carefully placed out of the way of damage and all openings covered to keep out dirt.
- d. The torque converter is free to move forward when the transmission is disconnected from the engine.



**Be sure the torque converter is not allowed to separate from the transmission while the transmission is being removed.**



**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. Position hoist sling relative to transmission center of gravity.

- e. Install a retaining strap to hold the converter in place as soon as the transmission is clear of its mountings.

**4-156. TRANSMISSION ASSEMBLY MAINTENANCE (Continued).**

- f. Remove mounting bolts (1) and clear transmission of its mountings.
- g. Remove transmission.
- h. Clean the exterior of the transmission.

**INSTALLATION**

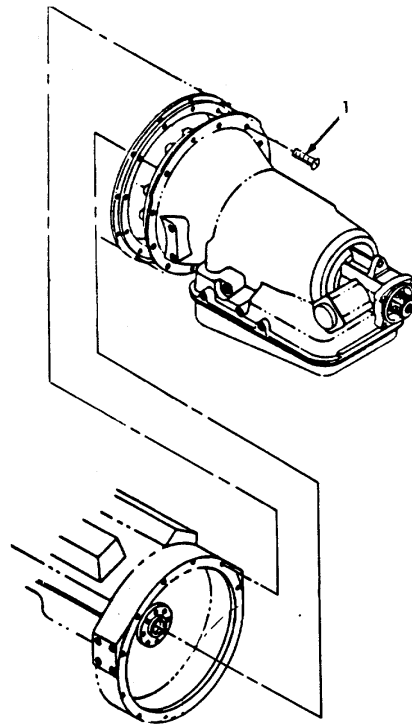
**WARNING**

**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. Position transmission and remove retaining strap from torque converter.
- b. Connect transmission to engine and frame.
- c. Connect linkages, controls, cooler lines, modulator actuator cable, temperature connection, input and output couplings, oil filler tube, parking brake linkage, etc.
- d. Fill transmission with oil. See service for oil check.

**SERVICE**

- a. When the transmission oil temperature is 60-120°F (16-50° C), a cold oil level check should be made. This check is required to ensure that there is a sufficient quantity of oil in the transmission to operate the vehicle until normal operating temperature is reached. A hot check must be made when the transmission oil reaches normal operating temperature (160-200° F; 71-93° C). This check is required to ensure that the oil level is at the proper operating level.
- b. Park the vehicle on a level surface. Apply the parking brake and operate the engine at 1000-1500 rpm for approximately one minute to purge air from the system. To fill clutch cavities and circuits, shift the transmission into drive (D) and then to reverse (R). Allow the engine to idle and shift to neutral (N).



**4-156. TRANSMISSION ASSEMBLY MAINTENANCE (Continued).***c. Cold check.*

- (1) Be sure the oil temperature is between 60-120° F (16-50° C). With the engine idling and the transmission in neutral (N), wipe the dipstick clean and check the oil level. If the oil level registers in the REF FILL band, the quantity of oil in the transmission is sufficient to operate the vehicle until normal operating temperature (160-200° F; 71-93° C) is reached. If the oil level registers on or below the bottom line of the REF FILL band, add oil to bring the level within the band. If the oil level registers above the REF FILL band, drain oil to bring the level within the band. Then operate the vehicle and make a hot check when normal operating temperature is reached.

<b>CAUTION</b>
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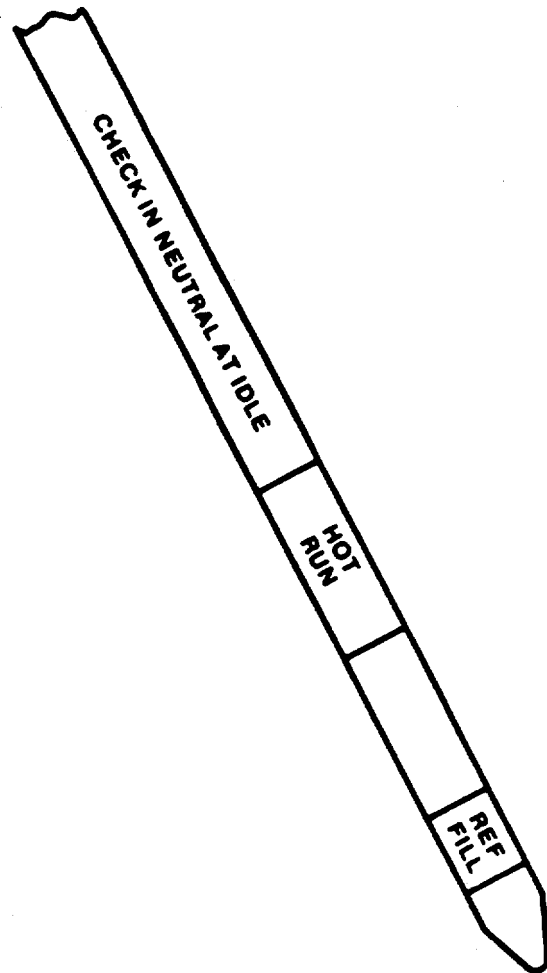
The oil level rises as oil temperature increases. Do not fill above the REF FILL band before the transmission reaches normal operating temperature.

*d. Hot check.*

- (1) Be sure the oil temperature is between 160-200° F (71-93° C). With the engine idling and the transmission in neutral (N), wipe the dipstick clean and check the oil level. If the oil level registers in the HOT RUN band or between ADD and FULL, the oil level is satisfactory to continue operation of the vehicle. If the oil level registers on or below the bottom line of the HOT RUN band or below the ADD line, add oil to bring the oil level to the middle of the band.

*e. Adjusting oil level.*

- (1) About one U.S. quart (0.946 liter) of transmission oil (Appendix D, Item 38) is required to raise the oil level from the bottom of the band to the top of the band. If a hot check shown the oil level is above the HOT RUN line, drain oil until it is level with the top of the REF FILL band in a cold oil check. Drain oil to bring the oil level within the band.



**4-157. TRANSMISSION SHIFT CONTROL LEVER REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Shift Control Lever (505641C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

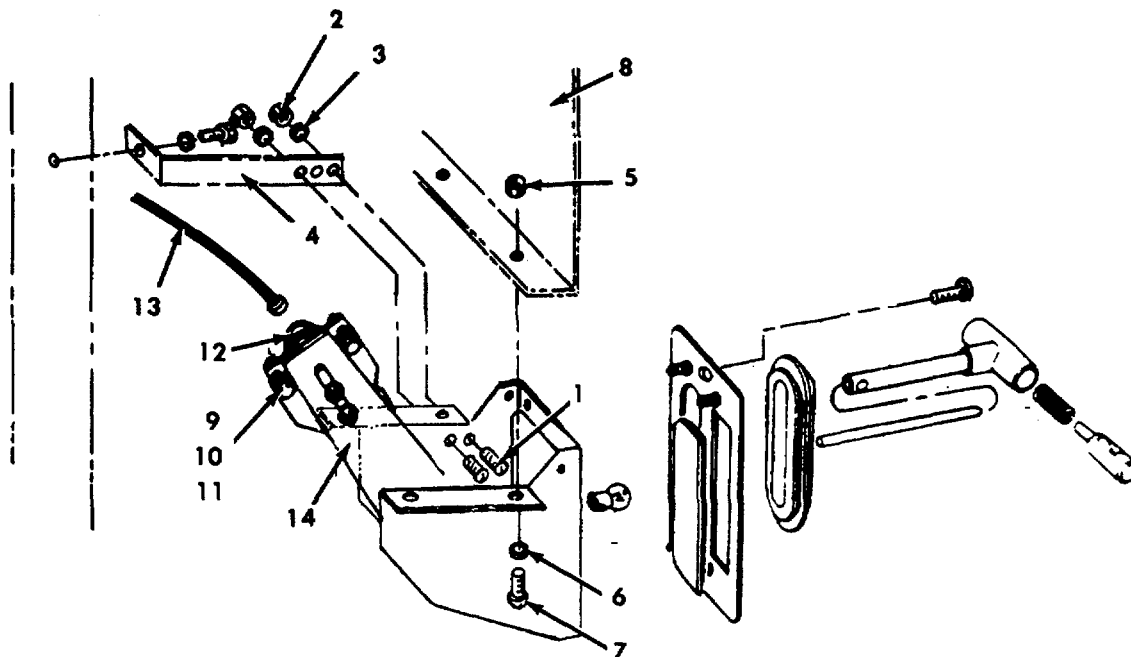
Parking brake set.

**REMOVAL**

- a. Remove two bolts (1) nuts (2) and lockwashers (3) which secure shift lever assembly to support angle (4).
- b. Remove two nuts (5), lockwashers (6) and bolts (7) which secure shift lever assembly to dash panel (8).
- c. Lower shift lever assembly from dash and remove two nuts (9), lockwashers (10), bolts (11) and one u-clamp (12).
- d. Move shift lever slowly up and down until barrel on cable end (13), is positioned in access notch, remove cable end from shift lever assembly.

**INSTALLATION**

- a. Move shift lever slowly up and down until barrel on cable end (13) can be positioned in access notch.
- b. Position cable along bracket (14) as required for proper shifting and secure by installing U-clamp (12), two bolts (11), lockwashers (10) and nuts (9).
- c. Position shift lever assembly at dash panel (8) and secure by installing two bolts (7), lockwashers (6) and nuts (5).
- d. Attach support angle (4) using two bolts (1), nuts (2), and lockwashers (3).



**Section XXI. MAINTENANCE OF TRANSFER CASE ASSEMBLY**

	Para.		Para.
General .....	4-158	Transfer Case Shift Lever Replacement .....	4-160
Transfer Case Assembly Maintenance .....	4-159		

**4-158. GENERAL.**

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

**4-159. TRANSFER CASE ASSEMBLY MAINTENANCE.**

This task covers: a. Removal      b. Installation      c. Service

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Transfer Case Assembly (872165005)

Gear Oil (Appendix D, Item 36)

Equipment Condition

Para. Condition Description

4-152 Propellor Shaft Removed

4-154 Propellor Shaft Removed

General Safety Instructions

Engine OFF.

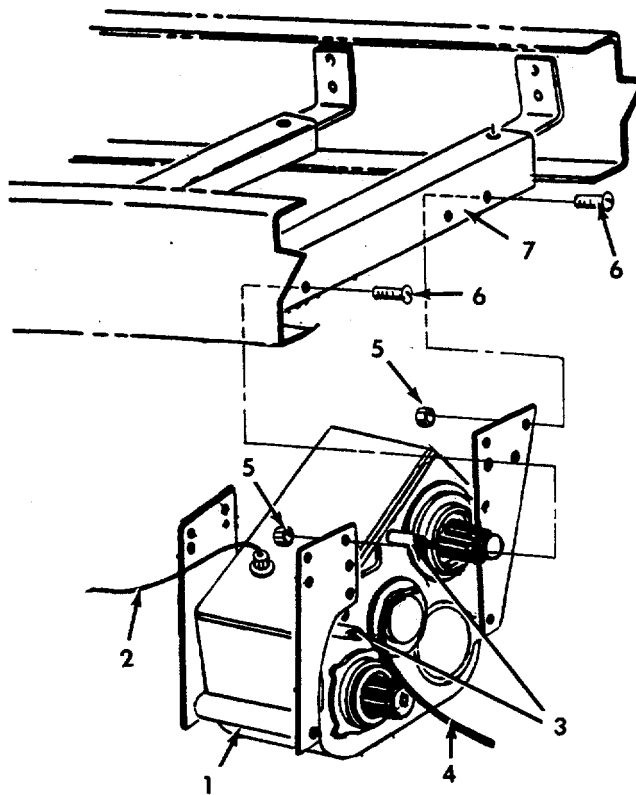
Transmission in (N) neutral.

Parking brake set.

Batteries disconnected.

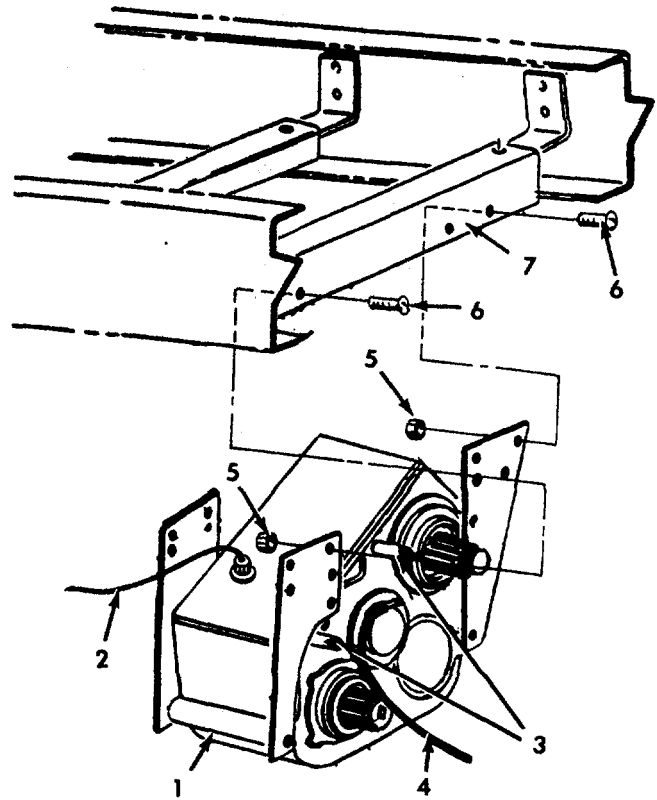
**REMOVAL**

- a. Remove drain plug (1) and drain oil from transfer case.
- b. Unplug wire (2) from transfer case.
- c. Disconnect mechanical linkage (3) and tag for future identification.
- d. Disconnect the speedometer cable (4).
- e. Position a transmission jack of minimum 500 lb (227 kg) capacity beneath the transfer case. Be sure that the transfer case is seated safely on the jack.
- f. Remove four locknuts (5) and bolts (6) from each mounting angle (7).
- g. Check to ensure that all mountings and connections to the transfer case have been disconnected. Slide transfer case forward. Lower the transfer case to the floor and remove from under the vehicle.



**4-159. TRANSFER CASE ASSEMBLY MAINTENANCE (Continued).****INSTALLATION**

- a. Place transfer case on transmission jack and position jack and transfer case under the vehicle.
- b. Raise transmission jack and position transfer case.
- c. Install four bolts (6) and locknuts (5) in both mounting angles (7).
- d. Connect mechanical shift linkages to shift shafts (3).
- e. Connect wire (2) to terminal.
- f. Replace drain plug (1). Remove fill plug and fill transfer case housing with oil (Appendix D, Item 36) to the correct level and install fill plug.
- g. Connect speedometer cable (4).
- h. Install propellor shafts (paragraph 4-152 and 4-154).
- i. Road test the vehicle by driving slowly with no load for the first few moments, then test at a higher speed listening for any problems.
- j. Check transfer case for leaks around gaskets and seals.
- k. Connect batteries.

**SERVICE**

- a. Remove oil drain plug (1) and drain lubricant from transfer case.
- b. Install drain plug (1) and remove oil fill plug (8).
- c. Fill transfer case with oil (Appendix D, Item 36) until level with oil fill plug opening.
- d. Replace oil fill plug (8).

**4-160. TRANSFER CASE SHIFT LEVER REPLACEMENT**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Transfer Case Shift Lever (039-00022-1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

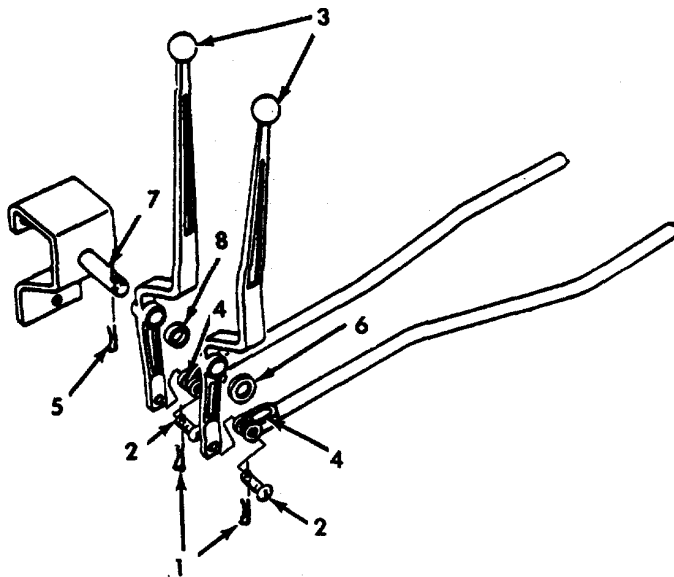
Batteries disconnected.

**REMOVAL**

- a. Remove cotter pin (1) and pin (2) which connects each shift lever (3) to control lever clevis (4).
- b. Remove cotter pin (5) and washer (6) from pivot bracket pin (7).
- c. Slide shift levers (3) and spacer (8) off pivot bracket pin(7) and feed through rubber boot at cab floor.

**INSTALLATION**

- a. Position two shift levers (3) and spacer (8) on pivot bracket pin.
- b. Install washer (6) and insert cotter pin (5) through hole in end of pivot bracket pin (7).
- c. Connect each shift lever (3) to control lever clevis (4) by inserting pin (2) and securing pin with cotter pin (1).
- d. Connect batteries.





**Section XXII. MAINTENANCE OF TIRE RIM ASSEMBLY**

General.....	Para. 4-161	Tire Rim Assembly Replacement .....	Para. 4-162
Tire Replacement .....	4-163		

**4-161. GENERAL.**

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

**4-162. TIRE RIM ASSEMBLY REPLACEMENT.**

This task covers: a. Removal      b. Install      c. Alignment

**INITIAL SET-UP**

Tools

- Jack
- Lug Wrench
- General Mechanics Tool Kit

General Safety Instructions

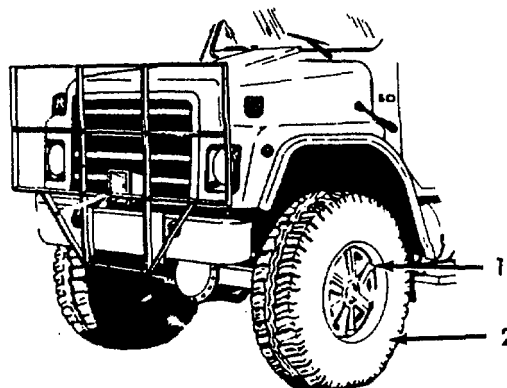
- Engine OFF.
- Transmission in (N) neutral.
- Parking brake set.

Materials/Parts

- Rim (494376C1)
- Tire (LT215/85R16M+S)

**REMOVAL**

- a. Raise vehicle so that tire rim assembly (2) is clear of ground.
- b. Remove the lugs (1) from the tire rim assembly (2).
- c. Remove the tire rim assembly (2) from the vehicle.



**INSTALLATION**

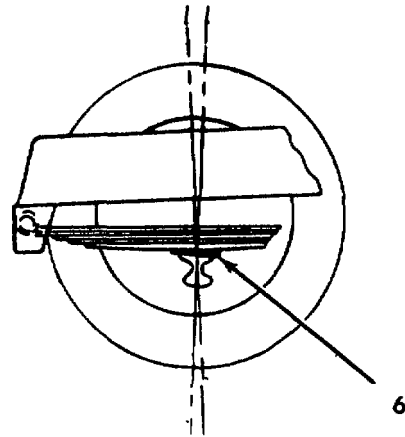
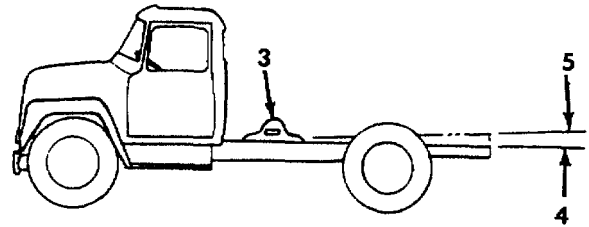
- a. Install tire rim assembly in position on the hub and install lug nuts loosely.
- b. Turn the wheel until one nut (1) is at the top of the bolt circle.
- c. Tighten the nut (1) just snug.
- d. Snug-up the remaining nuts in a criss-cross pattern.
- e. Lower vehicle.
- f. Torque lugs (1) to 190-210 ft-lb (258-285 N.m) evenly and alternately to avoid excessive runout.

4-162. TIRE RIM ASSEMBLY REPLACEMENT (Continued).

**ALIGNMENT**

a. Check caster angle.

- (1) With the vehicle on a smooth, level surface, frame angle should be measured with a bubble protractor (3) placed on the frame rail. The degree of tilt from the level frame position (4) is the angle that must be used in determining a correcting caster setting. Positive frame angle (5) is defined as forward tilt (front end down) and negative angle as tilt to rear (front end high).
- (2) The measured frame angle should be added or subtracted, as required, from the specified level frame caster setting to obtain the caster that should actually be measured on vehicle.
  - (a) Positive frame angle should be subtracted from specified setting.
  - (b) Negative frame angle should be added to specified setting.



**NOTE**

**As an example, if the specified caster setting is a positive 1° / and it is found that the vehicle has a positive 1° / frame angle, then the measured caster should be 0±1/2°. This would result in the desired 1° /±1/2° caster angle when the chassis settled to level frame under load.**

- (3) Caster adjustment is made by inserting a wedge (6) between the spring and axle.
  - (a) To increase caster, insert the wedge so the thick parts face the rear of the truck.
  - (b) To decrease caster, place the wedge so that the thick end is toward the front of the truck.

**CAUTION**

**If an excessively thick wedge is required for a truck that has high mileage, check the contour of the springs and replace springs if necessary.**

b. Check camber angle (7).

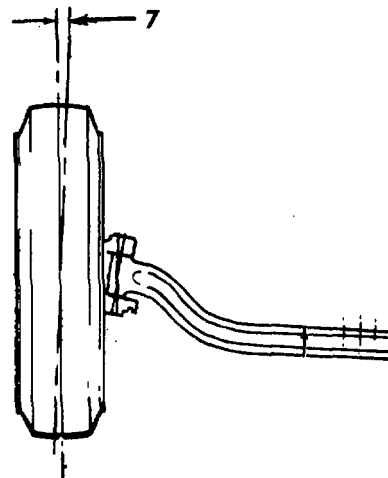
- (1) Camber is the amount in degrees that the wheel inclines away from the vertical at the top, as viewed from the front of the truck.
  - (a) Positive camber is an outward tilt or inclination of the wheel at the top.
  - (b) Negative or reverse camber is an inward tilt of the wheel at the top.
- (2) An incorrect camber angle causes the side of the tread to wear, resulting in abnormal tire wear.
- (3) Unequal camber in *the* front wheels will cause the truck to lead to the right or left. The truck will lead to the side which has the most positive camber.

**4-162. TIRE RIM ASSEMBLY REPLACEMENT (Continued).**

c. Check toe-in.

**NOTE**

When setting toe-in adjustment, the front suspension must be neutralized; that is all component parts must be in the same relative position when making the adjustment as they will be in operation. To neutralize the suspension, the vehicle must be rolled forward 12-15 feet (3.65-4.57 m). By rolling the vehicle forward, all tolerances in the front suspension are taken up and the suspension is then in normal operating position. Neutralizing the front suspension is extremely important, especially if the vehicle has been jacked up in order to scribe the tires; otherwise, the front wheels will not return to the normal operating position due to the tires gripping the floor surface when the vehicle is lowered.



- (1) Actual toe-in measurements should be taken at hub height between the two points on the center of the tread at the rear of the tires.
- (2) Mark the point and roll the truck ahead so that the points are in the front at hub height and measure the distance between the same two points on the tire treads.

**NOTE**

The difference in the two measurements is the actual toe-in or toe-out.

- (3) To adjust the toe-in, turn the steering wheel so that the gear is in the mid-position.
- (4) Loosen the clamping bolts on the tie rod.
- (5) Turn the tie rod in the direction necessary to bring toe-in within the specified limits.
- (6) Tighten the clamping bolts on the tie rod.

**FRONT ALIGNMENT SPECIFICATIONS**

Caster		Toe In		Camber	
Degree Minutes		Inch	mm	Degree Minutes	
2	30	00-.19	.00-4.8	0	45

**4-163. TIRE REPLACEMENT.**

This task covers: a. Removal      b. Installation

**INITIAL SET-UP**

Tools

- Jack
- Lug Wrench
- Tire Changing Machine
- Wire Brush
- Tire Gauge

Materials/Parts

- Rubber Lubricant (Appendix D, Item 25)
- Tire (LT215/85R16M+S)

**REMOVAL**

- a. Raise the vehicle.
- b. Using a lug wrench, remove the lug nuts (1 from the studs.
- c. Remove the tire and rim from the vehicle.



Use a tire changing machine to demont tires. Do not use hand tools or tire irons alone to remove the tire from the rim. 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 (Appendix D, Item 25).

**NOTE**

Do not use silicone base lubricants as this could cause the tire to slip on the rim.

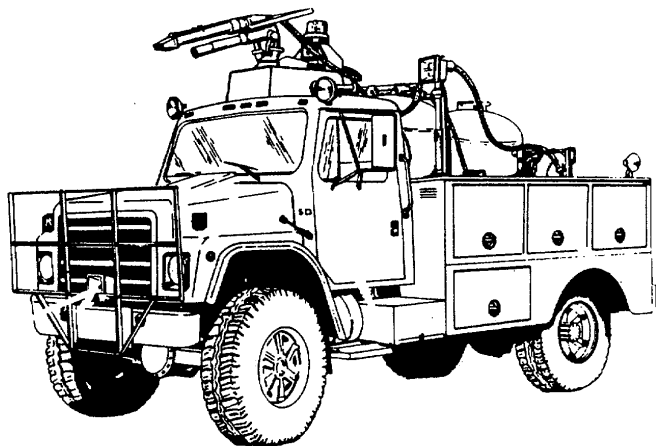
Due to the construction of radial truck tires, particularly in the lower sidewall and bead area, it may be difficult to get the tire to take air. An inflation aid may be necessary to help seat the bead of tubeless radial tires.

- c. Install the tire and rim to the the wheel.



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.

Do not stand over tire when inflating. Bead may break when beads snap over safety hump and cause serious personal injury.



## 4-163. TIRE REPLACEMENT (Continued).

**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 vibratin and non-retreadable 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.

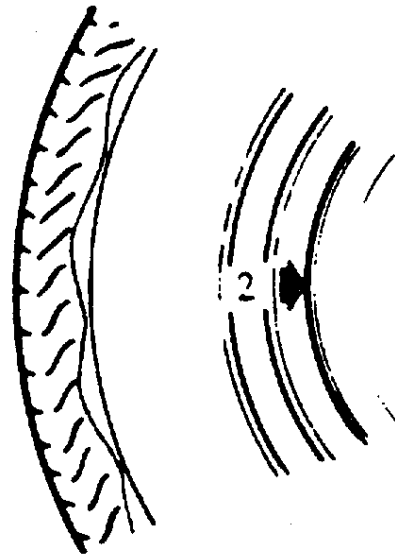
**CAUTION**

Before re-installing the rims, remove any build up of corrosion on the rim mounting surface and disc mounting surface by scraping and wire brushing. Installing rims without good metal-to-metal contact at the mounting surfaces can cause lug nuts to loosen. This can lead to a rim coming off while the vehicle is moving, causing loss of control.

- f. Place the tire rim assembly in position on the hub and install the lug nuts snugly in a criss-cross pattern to minimize runout.

**NOTE**

Lateral runout should not exceed 0.125 inch (3.18 mm) on the front wheels and 0.187 inch (4.76 mm) on the rear wheels.



- g. Turn the wheel until one nut is at the top of the bolt circle, then tighten evenly and alternately according to a torque of 190-210 ft-lb (258-285 N.m).
- h. Inflate tire(s) to 80 psi (551.6 kPa).
- i. Lower vehicle.

**Section XXIII. MAINTENANCE OF AIR BRAKE SYSTEM**

	Para.		Para.
Air Dryer Replacement .....	4-168	General .....	4-164
Air Lines and Piping Replacement .....	4-171	Maxi-Chamber Replacement .....	4-166
Air Tank Replacement .....	4-173	Service Brakes Maintenance .....	4-169
Brake Drum Maintenance .....	4-170	Slack Adjuster Replacement .....	4-165
Brake Pedal Replacement .....	4-174	Valves and Switches Replacement .....	4-172
Compressor Replacement.....	4-167		

**4-164. GENERAL.**

This section contains information on the maintenance of the air brake system that are maintainable at the Organizational level.

**4-165. SLACK ADJUSTER REPLACEMENT.**

This task covers: a. Removal                      b. Installation

**INITIAL SET-UP**

Tools  
General Mechanics Tool Kit

Materials/Parts  
Slack Adjuster (501294C91)

General Safety Instructions  
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Battery selector switch OFF.  
Tires blocked.

**REMOVAL**

- a. Remove cotter pin (1) and rod (2) from clevis (3) from maxi-brake (4).
- b. Remove snapping (5), washer (6), and bushing (7).
- c. Slide slack adjuster (8) from end of brake camshaft (9).

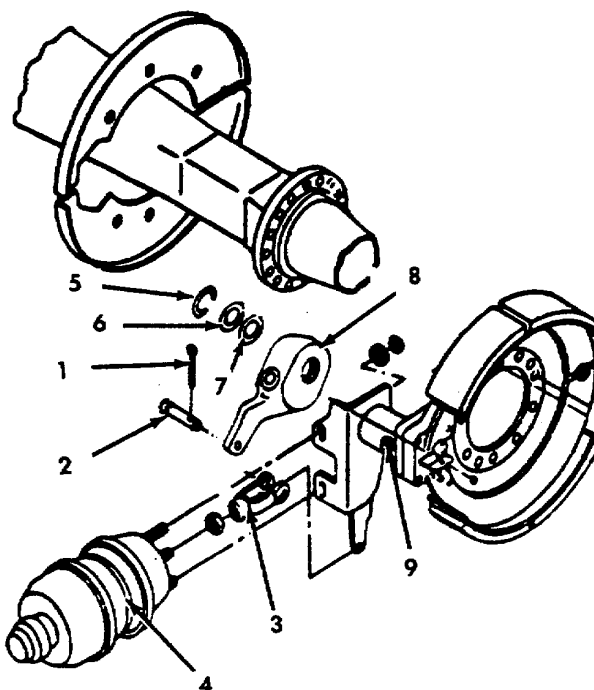
**INSTALLATION**

- a. With soft faced hammer tap slack adjuster (8) onto end of brake camshaft (9).

**NOTE**

**Ensure that washer (6) and bushing (7) are installed to provide a maximum end play of 0.62 in. (1 59 mm) with snapping (5) install-ed.**

- b. Install bushing (7), washer (6), and snapping (5).
- c. Position end of slack adjuster (5) to clevis (3) from maxi-brake (4) and secure with rod (2) and cotter pin (1).



- d. Remove tire blocks.

**4-166. MAXI-CHAMBER REPLACEMENT.**


---

 This task covers: a. Removal                      b. Installation
 

---

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Maxi-Chamber Streetside (596003C91)

Maxi-Chamber Curbside (596004C91)

Equipment Condition

Para. Condition Description

4-165 Slack Adjuster Disconnected

4-173 System Bled

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

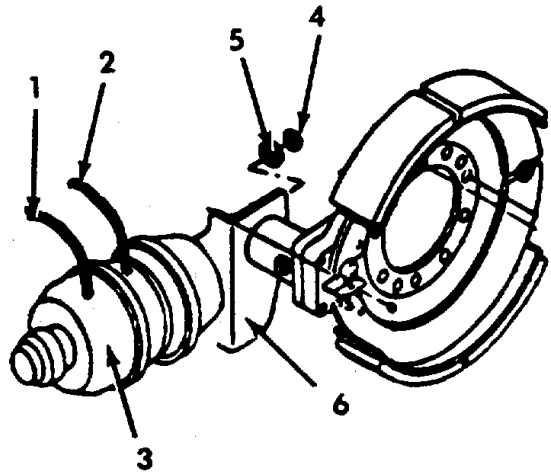
Parking brake set.

Battery selector switch OFF.

Tires blocked

**REMOVAL**

- a. Tag and remove hoses (1) and (2) from maxi-brake chamber (3).
- b. Remove two nuts (4) and washers (5) securing maxi-brake chamber (3) to axle bracket (6).
- c. Remove maxi-brake chamber.

**INSTALLATION**

- a. Position maxi-brake chamber (3) on axle bracket (6) and secure with two washers (5) and nuts (4).
- b. Remove tags and install hoses (1) and (2).
- c. Reconnect slack adjuster (paragraph 4-165).
- d. Recharge the system (paragraph 4-173).
- e. Remove tire blocks.

**4-167. COMPRESSOR REPLACEMENT.**


---

 This task covers: a. Removal                      b. Installation
 

---

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Compressor (N-7602-A)

Equipment Condition

Para.    Condition Description

4-173   System Bled

4-58    Cooling System Drained

4-62    Drive Belt Removed

4-171   Hoses and Piping Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Battery selector switch OFF.

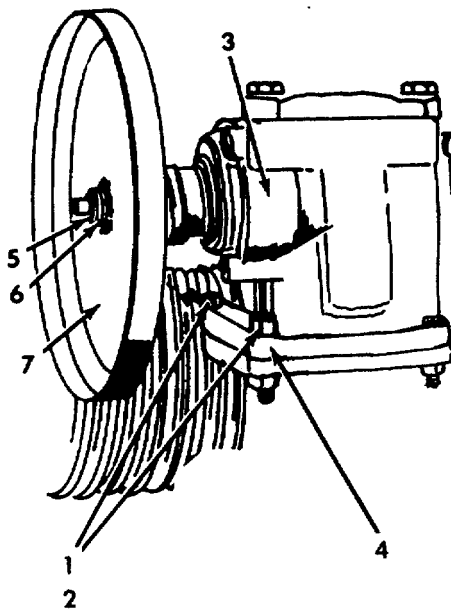
Tires blocked.

**REMOVAL**

- a. Loosen and remove four nuts (1) and bolts (2) and remove compressor (3) from engine mounting (4).
- b. Remove cotter pin (5) from nut (6) and remove drive belt pulley (7) from compressor (3).

**INSTALLATION**

- a. Install drive belt pulley (7) on compressor (3) and secure with nut (6). Torque nut to 75 ft-lb (101.7 N.m). Install cotter pin (5).
- b. Position compressor (3) to engine mounting (4) and secure with four bolts (2) and nuts (1). Torque nuts to 34 ft-lb (46.10 N.m).
- c. Reconnect all hoses and piping (paragraph 4-171).
- d. Install drive belts (paragraph 4-62).
- e. Refill cooling system (paragraph 4-58).
- f. Recharge air brake system (paragraph 4-173).
- g. Remove tire blocks.





**4-168. AIR DRYER REPLACEMENT.**


---

 This task covers: a. Removal      b. Installation
 

---

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Air Dryer (531602C92)

Equipment Condition

Para. Condition Description

4-83 Batteries Removed

4-173 System Bled

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

Battery selector switch OFF.

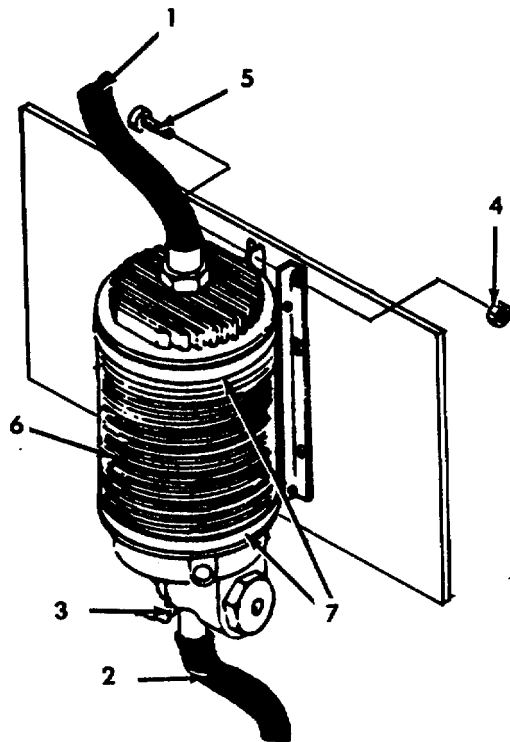
Tires blocked.

**REMOVAL**

- a. Remove hoses (1) and (2).
- b. Unplug heater electrical control wire (3).
- c. Remove two nuts (4) and bolts (5), and remove air dryer (6) and two mounting brackets (7).

**INSTALLATION**

- a. Position air dryer (6) and two mounting brackets (7) to frame and secure with two nuts (4) and bolts (5).
- b. Reconnect heater electrical control wire (3).
- c. Reconnect hoses (1) and (2).
- d. Install and reconnect batteries (paragraph 4-83).
- e. Recharge the system (paragraph 4-173).
- f. Remove tire blocks.



**4-169. SERVICE BRAKES MAINTENANCE.**

This task covers: a. Removal      b. Service      c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Front Brake Shoes (482433C91)  
 Rear Brake Shoe Curbside (580990C92)  
 Rear Brake Shoe Streetside (580989C92)  
 Lubricant (Appendix D, Item 22)

Equipment Condition

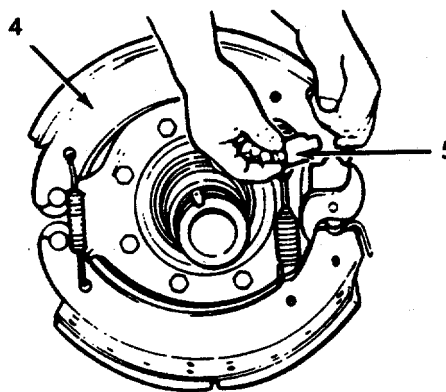
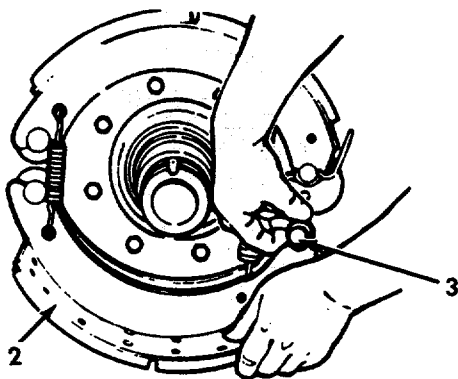
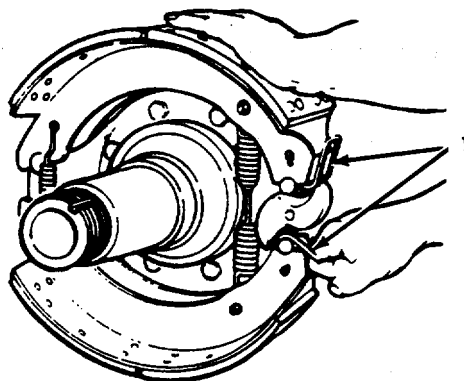
Para. Condition Description  
 4-162 Tire Rim Assembly Removed  
 4-198 Hub and Drum Removed

General Safety Instructions

Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.  
 Battery selector switch OFF.  
 Tires Blocked

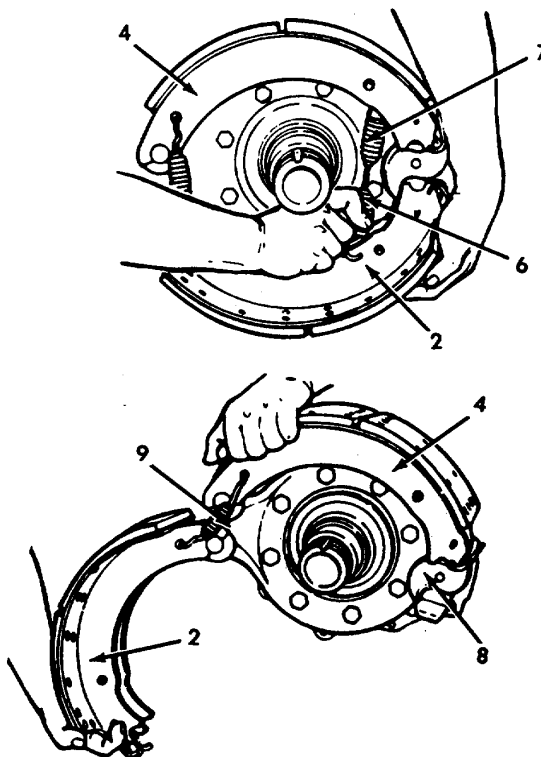
**REMOVAL**

- a. Push the roller retainers (1) out of the way.
- b. Push down on the lower shoe (2) and remove the bottom roller (3).
- c. Pull up on upper shoe (4) and remove the top roller (5).



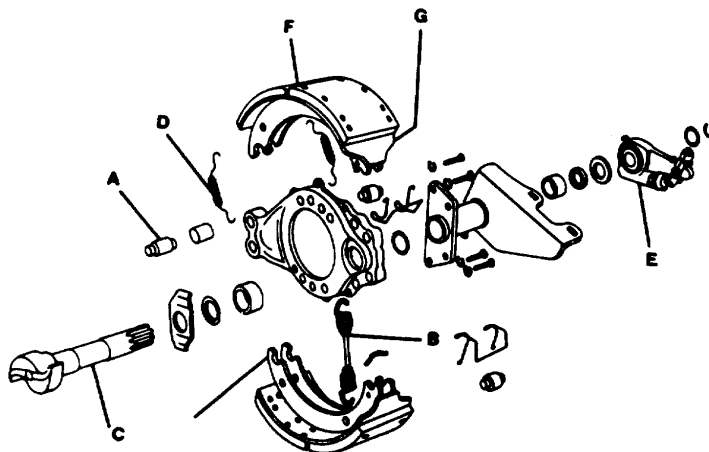
**4-169. SERVICE BRAKES MAINTENANCE (Continued).**

- d. Pull up on lower shoe (2) and disconnect return spring (6). Disconnect return spring (7) from upper shoe (4) and discard.
- e. Swing the lower shoe (2) away from the cam (8) to relieve the tension on the shoe retainer springs.
- f. Remove the two shoe retainer springs (9) and discard.
- g. Remove the upper (4) and lower shoe (2) assemblies.



**SERVICE**

Good maintenance requires lubrication of all brake linkages, anchor pins, camshafts, slack adjusters, and other moving parts calling for grease. Sluggishness follows neglected lubrication. A high temperature resistant lubricant should be used (Appendix D, Item 22).

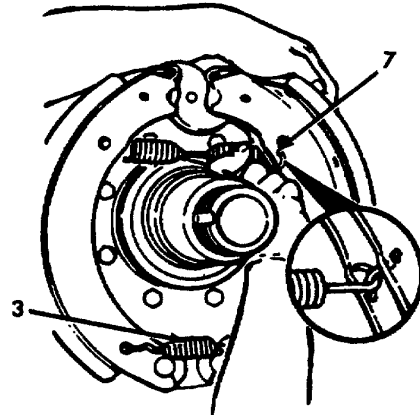
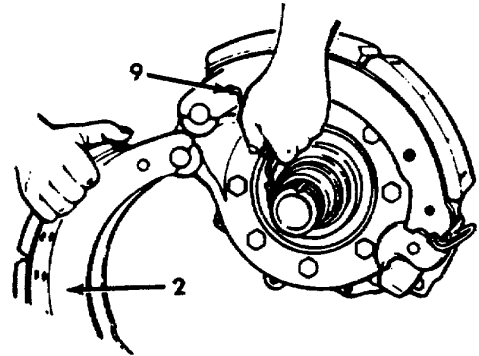


- A. Anchor Pin
- B. Return Spring
- C. Camshaft
- D. Retaining Spring
- E. Slack Adjuster
- F. Brake Lining
- G. Brake Shoe

**4-169. SERVICE BRAKES MAINTENANCE (Continued).**

**INSTALLATION**

- a. Install the upper shoe and lining assembly (4).
- b. While holding the lower shoe and lining assembly (2) in position over the anchor pin, install two new retaining springs (9).
- c. Swing the lower shoe and lining assembly (2) into place. Check to make sure the retaining springs (9) are in position.
- d. Swing the upper shoe (4) and lining assembly into place. Check to make sure the retaining springs (9) are in position.
- e. Hook the return spring (7) into the upper shoe assembly (4) and hook the return spring in position.
- f. Pull the upper shoe assembly (4) up and insert the new cam roller in place (5).
- g. Push the lower shoe assembly (2) down and insert the new cam (3) roller in place.
- h. Pull the roller retainers (1) into place.
- i. Install hub and drum (paragraph 4-169).
- j. Install tire rim assembly (paragraph 4-162).
- k. Remove tire blocks.



**4-170. BRAKE DRUM MAINTENANCE.**

This task covers: a. Removal		b. Service	c. Installation
<b>INITIAL SET-UP</b>		<u>Equipment Condition</u>	
<u>Tools</u>		Para.	Condition Description
General Mechanics Tool Kit		4-162	Tire Rim Assembly Removed
Steam Cleaner			
Lathe			
Rubber Mallet			
<u>Materials/Parts</u>		<u>General Safety Instructions</u>	
Emery Cloth (Appendix D, Item 13)		Engine OFF.	
		Transmission in (N) neutral.	
		Parking brake set.	
		Battery selector switch OFF.	

**4-170. BRAKE DRUM MAINTENANCE (Continued).**

**REMOVAL**

- a. Remove eight nuts (1), grease cap (2) and gasket (3).
- b. Remove two bearing adjustment nuts (4) along with washer (5).
- c. Tap on cast wheel hub (6) using a rubber mallet until wheel works loose and outer cone bearing (7) and bearing outer cap (8) can be slid off spindle (9).
- d. Remove wheel hub (6) and drum (10).

- d. Grind the finished surface if grinder is available or use emery cloth (Appendix D, Item 13) on a straight piece of wood and polish the drum friction surface.
- e. Brake drums should be cleaned thoroughly with a steam cleaner or hot water.

**INSTALLATION**

- a. Pack bearing (7) with grease (Appendix D, Item 20).
- b. Carefully slide drum (10) and hub (6) onto spindle (9).
- c. Slide bearing outer cap (8) and bringing outer cone (7) onto spindle and push into position in wheel hub (6).
- d. Install one bearing adjusting nut (4) and tighten by hand, rotate wheel hub (6) and take up slack by torquing adjusting nut (4) to 50 ft-lb (67.8 N.m).
- e. Back off nut approximately one quarter to one-third turn and install washer (5) and second nut (4).

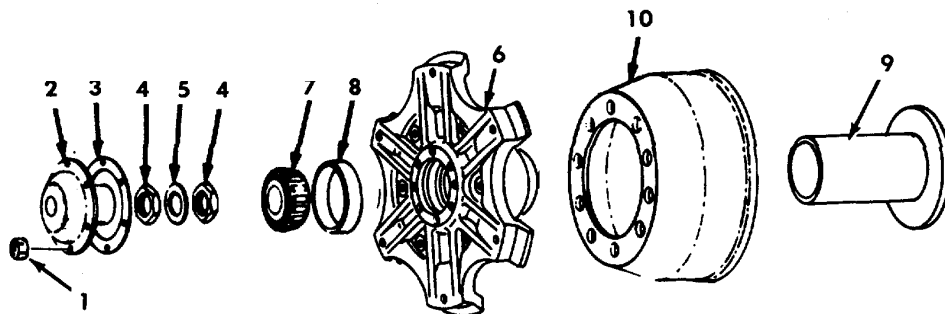
**SERVICE**

**NOTE**

The brake drum is removed with the hub. Brake drums that are otherwise in good condition can be turned in a lathe. However, it must be remembered that the recommended remachining or rebores limit for brake drums with a diameter over 14 inches (355 mm) may not be increased more than .080 inch (2.03 mm) diameter (total cut) and discarded at .120 inch (3.05 mm) over normal diameter.

The dimension located on the drum is discarded dimension. Never remachine drums to maximum wear or discard diameter.

To recondition a brake drum in a lathe, the drum must be remounted so that it is centered.



- a. Install brake drum on lathe.
- b. Use proper size cone to provide accurate centering.
- c. Turn drum, taking only light cuts and remove just enough material to clean up drum.
- f. While securely holding inner nut (4) with a wrench, torque outer nut (4) with another wrench to 150 ft-lb (203 N.m). Check for free movement.
- g. Install gasket (3) and grease cap (2) with eight nuts (1) and torque nuts to 15 ft-lb (20.1 N.m).
- h. Install tire rim assembly (paragraph 4-162).

**4-171. AIR LINES AND PIPING REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

Tools

General Mechanics Tool Kit

Materials/Parts

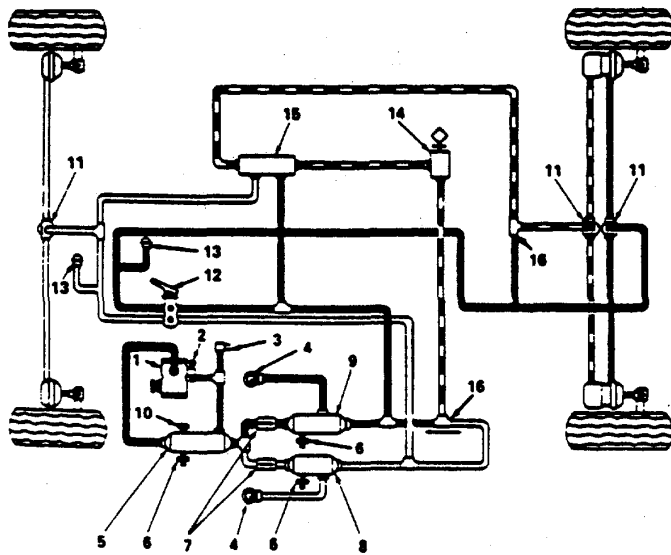
Air Lines and Piping as required (Appendix E (COML)  
Pipe Sealant (Appendix D, Item 47)

Equipment Condition

Para. Condition Description  
4-173 System Bled

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Battery selector switch OFF.  
Tires blocked



ITEM                      DESCRIPTION

- 1 Air Compressor
- 2 Air Compressor Governor
- 3 Low Pressure switch
- 4 Air gauge
- 5 Supply Reservoir
- 6 Drain Cock
- 7 Check Valve
- 8 Secondary Reservoir
- 9 Primary reservoir
- 10 Safety Valve
- 11 Quick Release Valve
- 12 Brake Valve
- 13 Stoplight Switch
- 14 Spring Brake Control Valve
- 15 Inversion Valve
- 16 Two-Way Check Valve

LEGEND

- PRIMARY ;SERVICCE SYSTEM
- SECONDARY SERVICE SYSTEM
- PARKING ;BRAKE SYSTEM

**REMOVAL**

**NOTE**

**use a wrench to remove.**

- a. Disconnect connections to air tanks and valves.
- b. Disconnect any other connections to air tanks and valves.
- c. Remove air lines from truck.

**INSTALLATION**

- a. Apply pipe sealant (Appendix D, Item 47) to all exterior threads on the hose and fittings.
- b. Install air lines into truck and connect all hoses and fittings.
- c. Check system for leaks or loose connections.
- d. Charge air brake system (paragraph 4-173).

**4-172. VALUES AND SWITCHES REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Equipment Condition ,  
Para. Condition Description  
4-173 System Bled

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Battery selector switch OFF.  
Tires blocked.

**REMOVAL**

*a. Brake pedal switch removal.*

(1) Disconnect the electrical connectors at the brake pedal (2) mounting bracket (3).

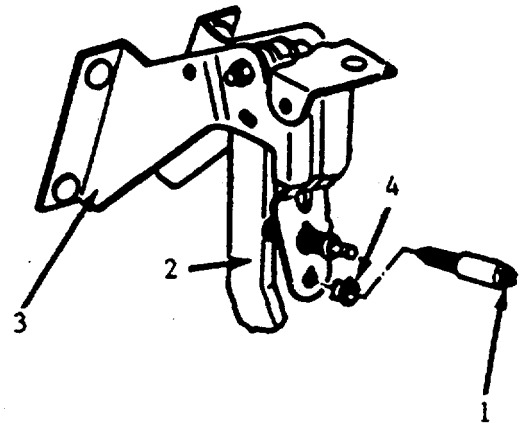
(2) Remove the switch (1).

*b. Brake valve removal.*

(1) Tag and disconnect air lines from valve.

(2) Remove hardware securing valve to frame.

(3) Remove valve from truck.



**INSTALLATION**

*a. Brake pedal switch installation.*

(1) Install the switch (1).

(2) Connect the electrical connector.

(3) 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.**

(4) Pull the brake pedal (2) fully rearward against the pedal stop until the audible clicks can no longer be heard.

(5) Release the brake pedal (2), then repeat step c to assure that the switch is properly seated and no audible click can be heard.

(6) Electrical contact should now be made when the brake pedal is depressed to 1-1.24 inches (25-31 mm) and the brake lights should go on.

(7) Check the operation of the switch.

*b. Brake valve installation.*

(1) Position valve on frame and secure with attaching hardware.

(2) Connect all air lines to valve and remove tags.

(3) Check conditions for leaks or loose fittings.

(4) Charge air brake system (paragraph 4-173).

**4-173. AIR TANK REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Air Tank (483116C1)

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

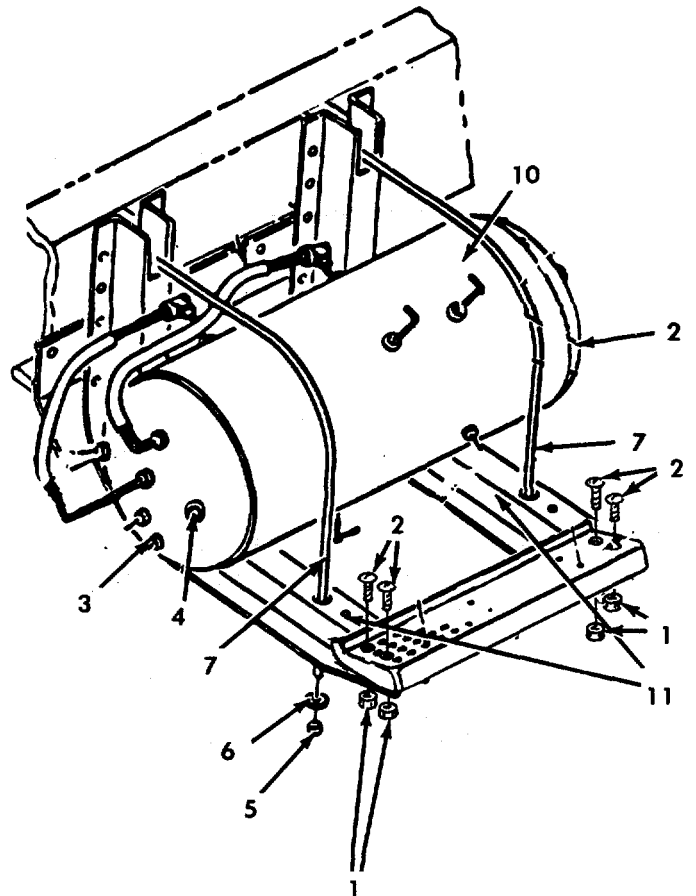
Parking brake set.

Battery selector switch OFF.

Tires blocked.

**REMOVAL**

- a. Remove four nuts (1) and bolts (2) to remove step (3).
- b. Open drain cocks (4, 5, and 6) and bleed system.
- c. Remove two nuts (7) and washers (8) and remove retaining bands (9) securing air tank (10) to mounting brackets (11).
- d. Tag and remove all air hoses.
- e. Remove air tank (10).



**INSTALLATION**

- a. Position air tank (10) on mounting brackets (11). Remove tags and reconnect all hoses.
- b. Position retaining bands (9) over air tank (10) and through mounting brackets (11) and secure with two washers (8) and nuts (7).
- c. Close drain cocks (4, 5, and 6).
- d. Position step (3) and install mounting bolts (2) and nuts (1).
- e. Start engine and recharge the air brake system.
- f. Remove tire blocks.



**4-174. BRAKE PEDAL REPLACEMENT.**

---

This task covers:      a. Removal                      b. Installation

---

**INITIAL SETUP**Tools

General Mechanics Tool Kit

Materials/Parts

Brake Pedal (4874321C1)

General Safety Instructions

Engine Off.

Transmission in (N) neutral.

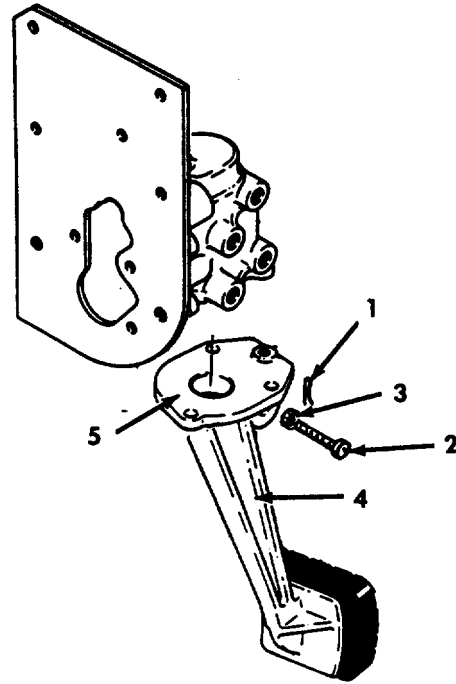
Parking brake set.

Battery selector switch OFF.

Tires blocked.

**REMOVAL**

- a. Remove cotter pin (1) and retaining pin (2).
- b. Remove two spacers (3) and brake pedal (4) from mounting bracket (5).

**INSTALLATION**

- a. Position brake pedal (4) and two spacers (3) to mounting brackets (5) and secure with retaining pin (2) and cotter pin (2).
- b. Remove tire blocks.

**Section XXIV. MAINTENANCE OF STEERING ASSEMBLY**

	Para.		Para.
Drag Link Replacement.....	4-178	Pitman Arm Replacement.....	4-176
General.....	4-175	The Rod Replacement.....	4-177

**4-175. GENERAL.**

This section contains information the maintenance of the steering assembly components that are maintainable at the Organizational level.

**4-176. PITMAN ARM REPLACEMENT.**

---

This task covers:      a. Removal                      b. Installation

---

**Initial SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

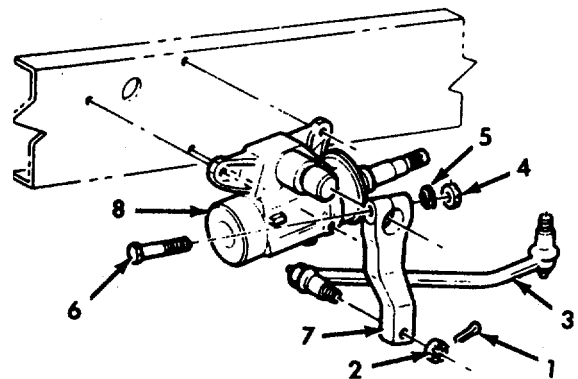
Pitman Arm (488704C1)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Battery selector switch OFF.

**REMOVAL**

- a. Remove cotter pin (1) from the attaching nut (2).
- b. Remove nut (2).
- c. Remove the drag link (3) from the pitman arm.
- d. Remove the nut (4) and lockwasher (5) from the pinch bolt (6) that secures the pitman arm (7) to the steering gear (8) sector shaft.
- e. Drive wedge into slot in pitman arm (7). Remove pitman arm (7).



**INSTALLATION**

- a. Position the pitman arm (7) on the sector shaft, aligning the timing mark on the sector shaft to the timing mark on the pitman arm. Use the pinch bolt (6) to align the groove on the sector shaft and the bolt hole in the pitman arm (7).
- b. Remove the wedge, making certain that the pitman arm (7) stays aligned to the sector shaft.
- c. Install lockwasher (5) and nut (4) and torque nut (4) to 330-370 ft-lb (447-502 N.m).

- d. Install ball stud of drag link (3) into the pitman arm (7).
- e. Install nut (2) and torque to 110-125 ft-lb (149-169 N.m).
- f. Install cotter pin (1).

**NOTE**

**If cotter pin cannot be installed after obtaining minimum torque, do not back off nut. Tighten to next castellation.**

**4-177. TIE ROD REPLACEMENT.**


---

 This task covers:      a. Removal                      b. Installation
 

---

**INITIAL SETUP**Tools

General Mechanics Tool Kit

Materials/Parts

Tie Rod (574877C1)

General Safety Instructions

Engine OFF.

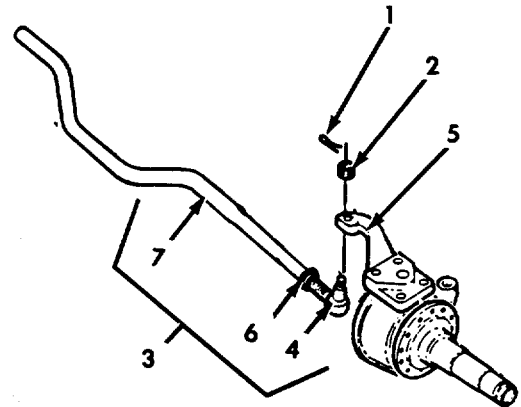
Transmission in (N) neutral.

Parking brake set.

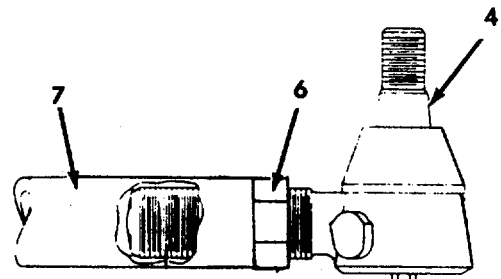
Battery selector switch OFF

**REMOVAL**

- a. Remove two cotter pins (1) from castellated nuts (2) from rod assembly (3).
- b. Remove tie rod end (4) from steering arm (5).
- c. Remove tie rod ends (4) by loosening locknuts (6) and unscrewing end (4) from tie rod (7).

**INSTALLATION**

- a. Thread tie rod end (4) into tie rod (7) and secure with locknut (6).
- b. Insert tie rod end (4) into steering arm (5) and secure with castellated nut (2).
- c. Torque nut (2) to minimum 90 ft-lb (122 N.m) and insert cotter pin (1) through hole in tie rod end (4).

**NOTE**

If cotter pin cannot be installed after obtaining minimum torque, do not back off nut. Tighten to next castellation.

**4-178. DRAG LINK REPLACEMENT.**


---

 This task covers:      a. Removal                      b. Installation
 

---

**INITIAL SETUP**Tools

General Mechanics Tool Kit

Press

Materials/Parts

Drag Link (488703C91)

General Safety Instructions

Engine OFF.

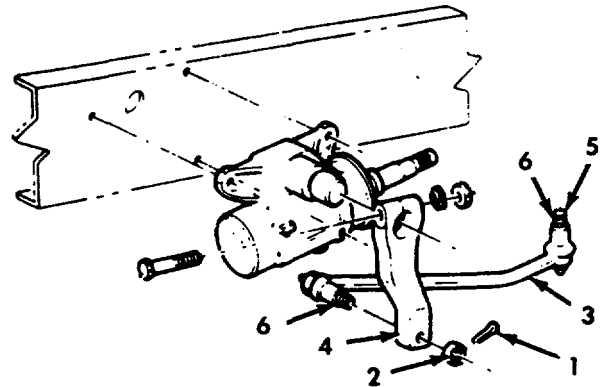
Transmission in (N) neutral.

Parking brake set.

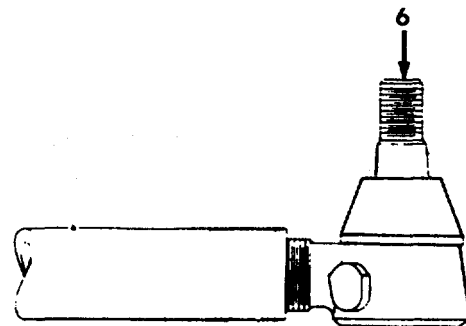
Battery selector switch OFF.

**REMOVAL**

- a. Disconnect drag link from pitman arm (paragraph 4-176).
- b. Remove cotter pin (1) from the attaching nut (2).
- c. Remove nut (2).
- d. Remove the drag link (3) from the pitman arm (4) and steering knuckle end (5).
- e. Remove two drag link ends (6) by using a press.

**INSTALLATION**

- a. Press drag link ends (6) into drag link rod (3).
- b. Connect drag link ends (6) to pitman arm (4) and to steering knuckle (5) and secure with castellated nut (2).
- c. Torque nut (2) to minimum 90 ft-lb (122 N.m) and insert cotter pin (1).



**Section XXV. MAINTENANCE OF POWER STEERING SYSTEM**

	Para		Para.
General.....	4-179	Power Steering Pump Replacement .....	4-183
Pitman Shaft Seal Replacement .....	4-182	Power Steering System Service .....	4-180
Power Steering Gear Replacement .....	4-181		

**4-179. GENERAL**

This section contains information on the maintenance of the power steering system that are maintainable at the Organizational level.

**4-180. POWER STEERING SYSTEM SERVICE.**

This task covers: Service

**INITIAL SET-UP**

Tools

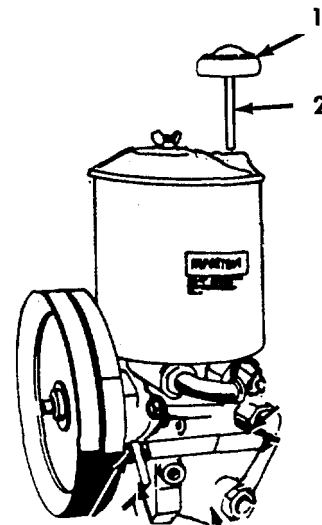
General Mechanics Tool Kit

Materials/Parts

Power Steering Fluid (Appendix D, Item 19)

**SERVICE**

- a. Run engine until power steering fluid reaches normal operating temperature, approximately 170° F (80° C), then shut engine off. Remove reservoir filler cap (1) and check oil level on dipstick (2).
- b. If oil level is low, add power steering fluid (Appendix D, Item 19) to proper level and replace filler cap (1).
- c. When checking fluid level after the steering system has been serviced, air must be bled from the system.
  - (1) With wheels turned all the way to the left add power steering fluid (Appendix D, Item 19) to level indicated on dipstick (2).
  - (2) Start engine, and running at idle, recheck fluid level. Add fluid if necessary.
  - (3) Bleed system by turning wheels from side to side without hitting stops. Maintain fluid level so it is just visible in the reservoir. Fluid with air in it will have a light tan or milky appearance. This air must be eliminated from fluid before normal steering action can be obtained.



- (4) Return wheels to center position and continue to run engine for two or three minutes, then shut engine off.
- (5) Road-test vehicle to make sure steering functions normally and is free from noise.
- (6) Recheck fluid level as described in steps a and b.

**4-181. POWER STEERING GEAR REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Kit

Materials/Parts

Power Steering Gear (491010C92)

Equipment Condition

Para. Condition Description  
 4-178 Drag Link Removed  
 4-119 Steering Shaft Disconnected

General Safety Instructions

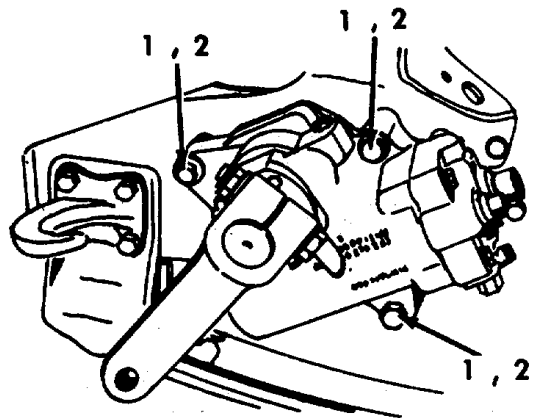
Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.  
 Battery selector switch OFF.

**REMOVAL**

- a. Thoroughly clean off all outside dirt, especially from around fittings and line connections, before you remove the gear.
- b. Drain the steering gear assembly by removing bottom drain plug on gear.
- c. Remove all fluid lines.
- d. Plug all port holes and fluid lines.

**CAUTION**

**This steering gear weighs approximately 80 lb (36 kg) dry. Exercise caution when you remove, lift, or carry it. Do not pound the universal joint or input shaft coupling on or off the input shaft. Internal damage to the steering gear can result.**



- e. Remove the steering gear from the vehicle by removing three locknuts (1) and bolts (2).
- f. Clean and dry the gear before repair.

**INSTALLATION**

- a. Position steering gear on the vehicle and install using three bolts (2) and locknuts (1).
- b. Torque nuts to 135 ft-lb (183 N.m).

- c. Install drain plug.
- d. Unplug port holes and fluid lines.
- e. Connect all fluid lines.
- f. Connect steering shaft (paragraph 4-119).
- g. Connect drag link (paragraph 4-178).
- h. Fill steering fluid reservoir (paragraph 4-180).

**4-182. PITMAN SHAFT SEALREPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Kit  
Drift

Equipment Condition

Para. Condition Description  
4-176 Pitman Arm Removed

Materials/Parts

Power Steering Fluid (Appendix D, Item 19)  
Seal Kit (As Required, Appendix E, Figure E-136)  
Crocus Cloth (Appendix D, Item 12)  
Solvent (Appendix D, Item 54)  
Grease (Appendix D, Item 22)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**REMOVAL**

- a. Position a drain pan under the steering gear.
- b. Remove protector boot (1), grease fitting (2) and dirt and water seal (3). Discard protector boot and dirt and water seal.
- c. Clean the sector shaft (4) with a crocus cloth (Appendix D, Item 12). Be sure to remove any paint.
- d. Remove the four trunnion cover bolts (5) and trunnion cover (6). Then remove and discard the sector shaft seal package consisting of the two-piece sector shaft seal (7), the Teflon back-up washer (8) and the trunnion cover seal ring (9).



**Cleaning solvent (Appendix D, Item 54) 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.**

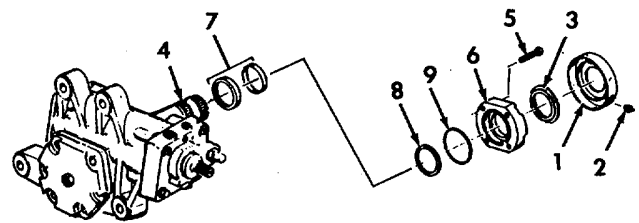
- e. Clean the trunnion cover (6) with solvent (Appendix D, Item 54) and inspect the seal cavity and sealing face for nicks or corrosion. Replace the trunnion cover (6) with a new one if these conditions exist.

**INSTALLATION**

- a. Place the trunnion cover (6) on a bench to install the new seal package. Start with the Teflon backup washer (8).



**The words OIL SIDE must be visible on the seal after it is in place. The seal will not function if the seal is reversed and a loss of power steering assist may occur.**



- b. Install the two-piece sector shaft seal (7) so that the words OIL SIDE are visible after seal is in place.
- c. Grease the new trunnion cover seal ring (9) and install it into the cover groove.
- d. Cover the serrations of the sector shaft (4) with only one layer of tape to avoid damaging the seals during installation.
- e. Install the trunnion cover (6) and four trunnion bolts (5). Torque bolts to 15-22 ft-lb (20- 30 N.m) if dry or 11-16 ft-lb (15-22 N.m) if lubricated.
- f. Pack clean high temperature grease (Appendix D, Item 22) around seal area of sector shaft (4). Install a new dirt and water seal (3) using a suitable blunt end drift.
- g. Apply a generous amount of the same grease (Appendix D, Item 22) to the protector boot (1) in the area inside of the small diameter ring. Assemble protector boot onto sector shaft (4) and trunnion cover (6) locating the grease fitting hole toward the input shaft end of gear assembly. Insert grease fitting (2) into protector boot. Remove tape from sector shaft serrations.
- h. Install the pitman arm (paragraph 4-176).
- i. Fill the steering fluid system (Appendix D, Item 19) (paragraph 4-180) and bleed system as needed.

**4-183. POWER STEERING PUMP REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Kit

Suction Pump

Materials/Parts

Power Steering Pump (491159C92)

Power Steering Fluid (Appendix D, Item 19)

Equipment Condition

Para. Condition Description

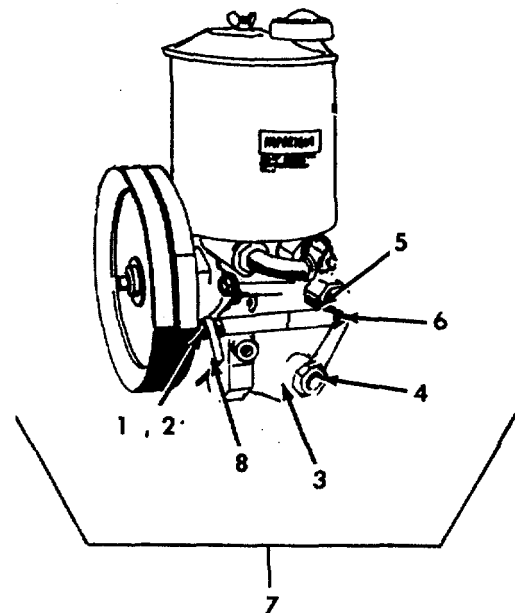
4-62 Belts Removed

**REMOVAL**

- a. Remove filler cap.
- b. Remove fluid from reservoir with a suction pump.
- c. Disconnect all lines from pump.
- d. Remove three nuts (1) and lockwashers (2).
- e. Remove rear bracket (3) by removing two nuts (4).
- f. Remove spacer (5) and washer (6).
- g. Slide pump (7) toward rear of truck and remove from front bracket (8).

**INSTALLATION**

- a. Position pump (7) at front bracket (8) and install loosely, two nuts (1) and lockwashers (2).
- b. Install spacer (5) and washer (6).
- c. Install rear bracket (3) using two nuts (4).
- d. Install third nut (1) and lockwasher (2) loosely.
- e. Install belts (paragraph 4-62) and slide pump to take up slack on belts.
- f. While keeping tension on belts, tighten three nuts (1).



- g. Connect all fluid lines to pump.
- h. Refill steering reservoir with power steering fluid (Appendix D, Item 19) (paragraph 4- 180).



**Section XXVI. MAINTENANCE OF FRONT SUSPENSION ASSEMBLY**

	Para		Para.
Front Shock Absorber Replacement .....	4-185	General .....	4-184
Front Suspension Leaf Spring and Bushing Replacement .....	4-190	Spindle Replacement .....	4-188
Front Wheel Hub/Drum Replacement .....	4-186	Steering Knuckle and Arm Replacement .....	4-189
		Wheel Bearing Replacement .....	4-187

**4-184. GENERAL**

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

**4-185. FRONT SHOCK ABSORBER REPLACEMENT.**

This task covers:      a. Removal                              b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Hoist

Materials/Parts

Shock Absorbers (472367C91)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**REMOVAL**

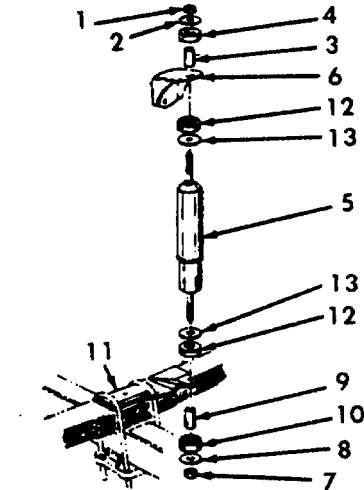


**When lifting an object, make sure the hoist and sling are fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.**

- Raise the vehicle on a hoist.
- Remove nut (1), washer (2), bushing (3), and spacer (4) attaching the shock absorber (5) to the frame bracket (6).
- Remove nut (7), washer (8), bushing (9) and spacer (10) attaching the shock absorber (5) to the spring bracket (11).
- Remove the shock absorber (5), two spacers (12) and washers (13).

**INSTALLATION**

- Install the shock absorber (5), two spacers (12) and washers (13) to frame bracket (6) and spring bracket (11).



- Secure shock absorber (5) to spring bracket (11) using spacer (10), bushing (9), washer (8), and nut (7). Torque to 65 ft-lb (88 N.m).
- Secure shock absorber (5) to frame bracket (6) using spacer (4), bushing (3), washer (2), and nut (1). Torque to 65 ft-lb (88 N.m).
- Lower the vehicle to the floor.

**4-186. FRONT WHEEL HUB/DRUM REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Kit  
Rubber Mallet

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Materials/Parts

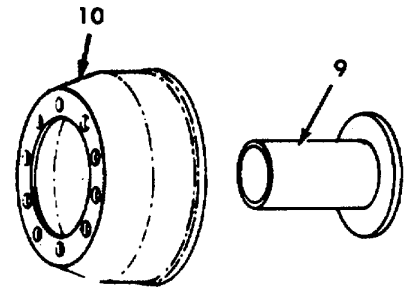
Wheel Drum (472278C1)  
Grease (Appendix D, Item 20)

Equipment Condition

Para. Condition Description  
4-162 Tire Rim Assembly Removed

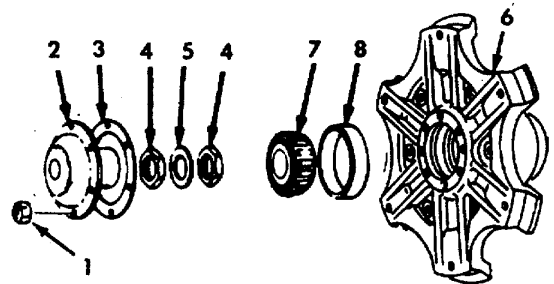
**REMOVAL**

- a. Remove eight locknuts (1), axle cap (2) and gasket (3).
- b. Remove two bearing adjustment nuts (4) along with washer (5).
- c. Tap on wheel hub (6) using a rubber mallet until wheel (6) works loose and bearing outer cone (7) and bearing outer cup (8) can be slid off spindle (9).
- d. Remove wheel hub (6) and drum (10).



**INSTALLATION**

- a. Coat spindle (9) and pack bearing (7) with grease (Appendix D, Item 20).
- b. Carefully slide drum (10) and wheel hub (6) onto spindle (9).
- c. Slide bearing outer cup (8) and bearing outer cone (7) onto spindle (9) and push into position in wheel hub (6).
- d. Install inner bearing adjustment nut (4) and torque to 50 ft-lb (67.8 N.m). Rotate wheel hub (6) in both directions.
- e. Back off nut (4) approximately one-fourth to one-third turn and check to assure free wheel movement.



- f. Install washer (5) and outer nut (4).
- g. While securely holding inner nut (4) with wrench, jam outer nut (4) by torquing out nut to 100-150 ft-lb (136-203 N.m).
- h. Install gasket (3) and axle cap (2) and secure with eight locknuts (1). Torque nuts to 45-50 ft-lb (61-67.8 N.m).
- i. Install tire rim assembly (paragraph 4-162).

**4-187. WHEEL BEARING REPLACEMENT**


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 This task covers:      a. Removal                      b. Installation
 

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**INITIAL SETUP**Tools

General Mechanics Tool Kit

Rubber Mallet

Materials/Parts

Front Bearing Inner Cone (13277DC)

Rear Bearing Inner Cone (ST2112)

Grease (Appendix D, Item 20)

Equipment Condition

Para. Condition Description

4-186 Hub/Drum Removed

4-162 Tire Rim Assembly Removed

General Safety Instructions

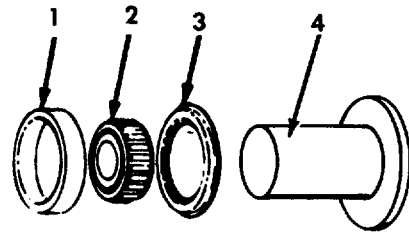
Engine OFF.

Transmission in (N) neutral.

Parking brake set.

**REMOVAL**

- a. Remove bearing inner cup (1), bearing inner cone (2).
- b. Remove grease seal (3) from spindle (4).

**INSTALLATION**

- a. Pack bearing (2) with grease (Appendix D, Item 20).
- b. Install oil seal (3) on spindle (4).
- c. Install bearing inner cone (2) into inner cup (1) and slide onto spindle.
- d. Install front wheel hub/drum (paragraph 4-186).
- e. Install tire rim assembly (paragraph 4-162).

**4-188. SPINDLE REPLACEMENT.**


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This task covers:      a. Removal                      b. Installation

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**INITIAL SETUP**Tools

General Mechanics Tool Kit

Materials/Parts

Spindle (503086C91)

Equipment Condition

Para. Condition Description

4-162 Tire Rim Assembly Removed

4-169 Service Brakes Removed

4-186 Hub/Drum Removed

4-187 Wheel Bearings Removed

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General Safety Instructions

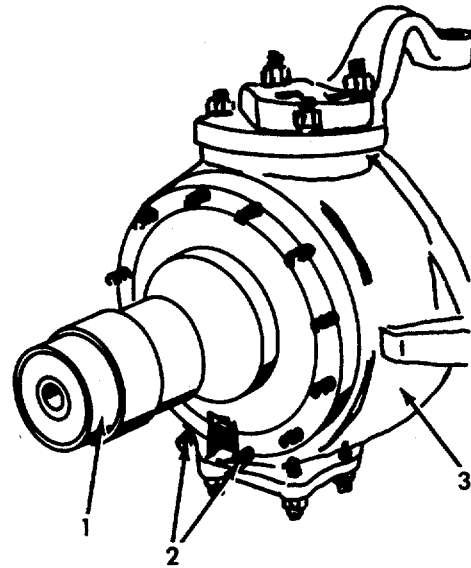
Engine OFF.

Transmission in (N) neutral.

Parking brake set.

**REMOVAL**

Slide spindle (1) off trunnion housing studs (2) on trunnion housing (3).

**INSTALLATION**

- a. Slide spindle (1) onto trunnion housing studs (2).
- b. Install service brakes (paragraph 4-169).
- c. Install wheel bearings (paragraph 4-187).
- d. Install hub/drum assembly (paragraph 4-186).
- e. Install tire rim assembly (paragraph 4-162).

**4-189. STEERING KNUCKLE AND ARM REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Kit

Materials/Parts

- Steering Knuckle Curbside (503090C1)
- Steering Knuckle Streetside (503089C1)
- Steering Arm Curbside (504868C1)
- Steering Arm Streetside (503096C1)

General Safety Instructions

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

Equipment Condition

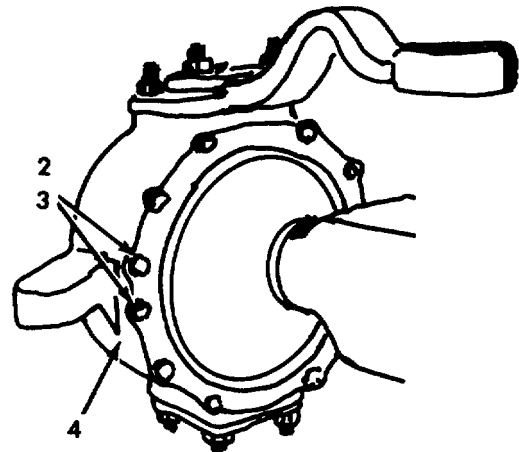
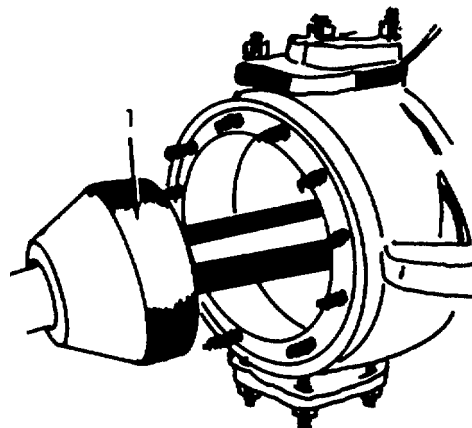
Para.	Condition Description
4-162	Tire Rim Association Removed
4-169	Service Brakes Removed
4-186	Hub/Drum Removed
4-187	Wheel Bearings Removed
4-188	Spindle Removed

**REMOVAL**



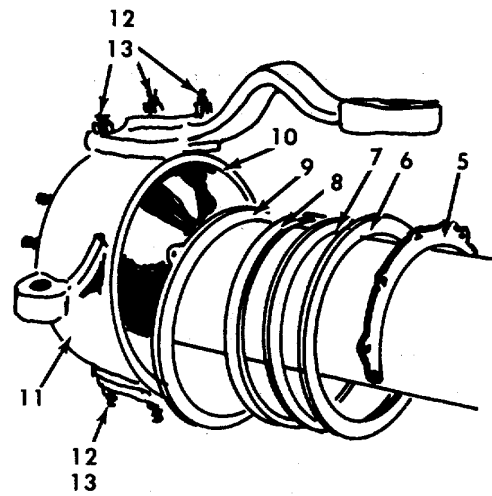
Care should be taken not to damage axle shaft oil seal in end of axle housing when removing axle shaft.

- a. Remove axle shaft and universal joint assembly (1) from axle housing.
- b. Remove retaining ring mounting bolts (2) and lockwashers (3) from back side of trunnion housing (4).



**4-189. STEERING KNUCKLE AND ARM REPLACEMENT (CONTINUED)**

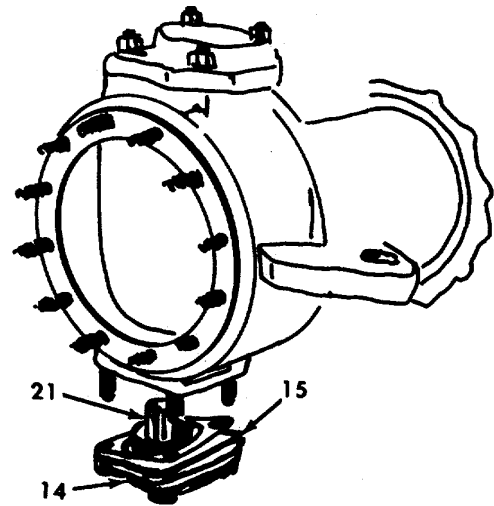
- c. Remove retaining ring halves (5), split ring retainer (6), seal with spring (7), steering ball felt (8), flange (9) and gasket (10) from back side of trunnion housing (11).
- d. Loosen both upper and lower trunnion cap retaining nuts (12). Remove bottom cap mounting nuts and lockwashers (13) only at this time.
- e. Remove lower trunnion cap (14) and shim pack (15). Retain and mark shim pack for reassembly.



**NOTE**

The lower trunnion bearing will lay loose on bottom of trunnion housing when lower trunnion cap (14) is removed. Remove lower trunnion bearing by pulling trunnion housing (11) away from axle housing to provide access to bearing.

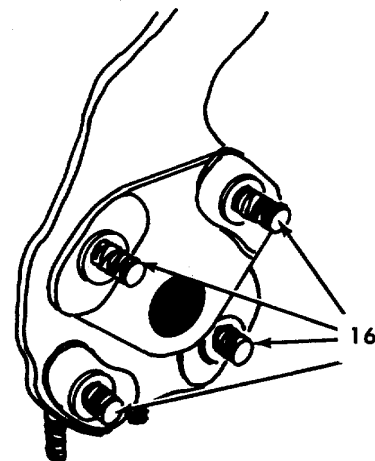
- f. Remove trunnion housing (11) from axle housing by tilting bottom of trunnion housing out and pulling housing upward.



**NOTE**

The upper trunnion housing bearing will lay loose on upper bearing race of axle housing end when trunnion housing is removed. Remove upper trunnion bearing.

- g. Place trunnion housing on workbench and remove upper trunnion cap retaining nuts (previously loosened), lockwashers, trunnion cap and shim pack.
- h. Remove steering arm retaining nuts (12) and washers (13) exposing tapered dowels (16).
- i. To remove tapered dowels (16), work the steering arm (17) back and forth until enough of the dowels (16) are exposed to allow dowels to be gripped with a pliers or other suitable tool.
- j. With tapered dowels (16) removed, pull steering arm (17) off of mounting studs and upper trunnion pin (18).
- k. Remove upper trunnion cap shim pack (19). Retain and mark shim pack for reassembly.



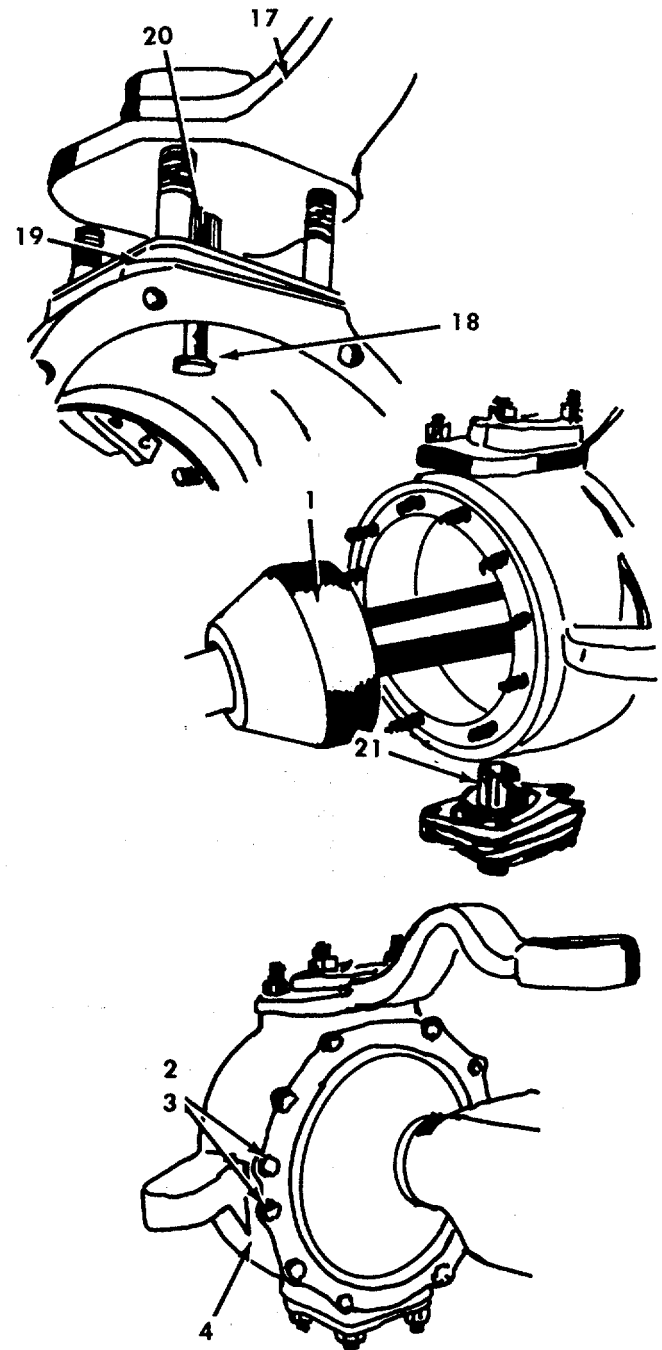
4-189. STEERING KNUCKLE AND ARM REPLACEMENT (CONTINUED)

NOTE

It is not necessary to remove the upper trunnion pin upon trunnion housing disassembly.

INSTALLATION

- a. Using original shim pack (19) install upper trunnion cap (17). Torque retaining nuts to 60-70 ft-lb (81-95 N.m). Install tapered dowels (16) before installing lockwasher (13) and retaining nuts (12). Torque retaining nuts to 60-70 ft-lb (81-95 N.m).
- b. Lubricate trunnion bearings thoroughly using grease (Appendix D, Item 20). Place a trunnion bearing on upper trunnion bearing cup of axle housing end. Lower trunnion housing (11) into place on axle housing end indexing upper trunnion pin (18) with upper trunnion bearing (20).
- c. Place lower trunnion bearing (21) in bottom of trunnion housing (11) and align with lower bearing cap. Using original shim pack (15) install lower trunnion cap (14). Torque retaining nuts to 60-70 ft-lb (81-95 N.m).
- d. Check trunnion bearing adjustment by placing a torque wrench on trunnion cap (11) or steering arm retaining nut (12) and swinging trunnion housing (11). Torque should be 8-15 ft-lb (11-20 N.m). To increase torque, remove shims (15) or (19) to decrease torque, add shims.
- e. Install gasket (10), flange (9), steering ball felt (8), seal with spring (7), split retainer ring (6) and retaining ring halves (5) on rear of trunnion housing (1).
- f. Install retaining half lockwashers (.3) and mounting bolts (2). Torque mounting bolts to 10-15 ft-lb (14-20 N.m).
- g. Install axle shaft and universal joint assembly (1) in axle housing indexing splined end of axle shaft with side gear of center unit.



- h. Slide spindle over universal joint shaft and on trunnion housing studs (paragraph 4-188).
- i. Install wheel bearings (paragraph 4-187.).
- j. Install hub/drum assembly (paragraph 4-186).
- k. Install service brakes (paragraph 4-169).
- l. Install tire rim assembly (paragraph 4-162).

**CAUTION**

When installing axle shaft and universal joint assembly, care should be taken not to damage axle shaft oil seal.

**4-190. FRONT SUSPENSION LEAF SPRING AND BUSHING REPLACEMENT.**

This task covers:      a. Removal                      b. Installation

**INITIAL SETUP**

Topic

General Mechanics Tool Kit  
Drift  
Jack  
Floor Stands

Equipment Condition

Para. Condition Description  
4-185 Front Shock Absorbers Removed

Materials/Parts

Front Leaf Spring (572359C91)  
(Grease (Appendix D, Item 20))

General Safety Instructions

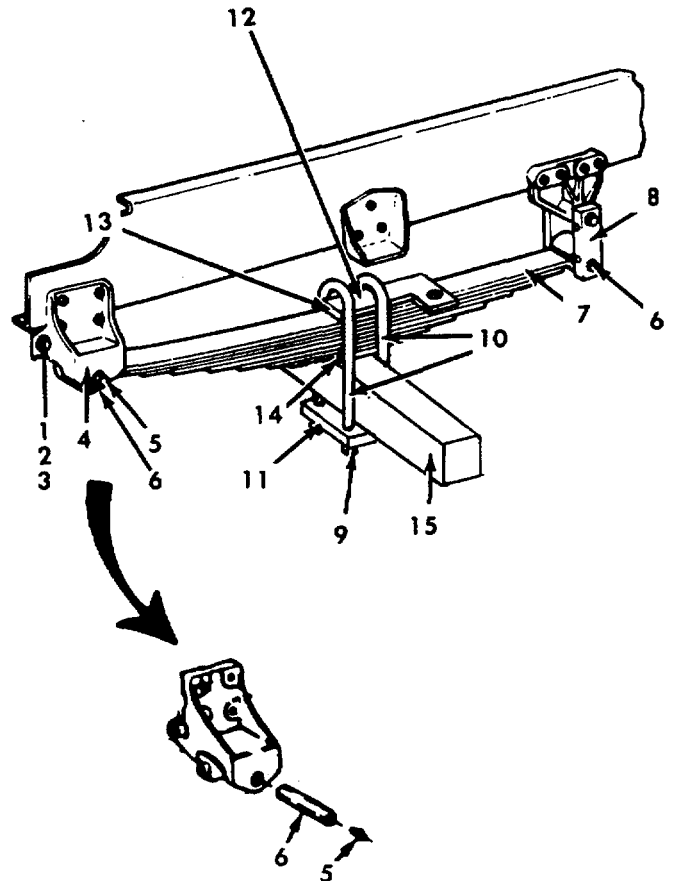
Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

**REMOVAL**



**A jack should never be used alone to support vehicle while under-chassis service is being performed. The jack may lower and serious personal injury could result. Always support vehicle with floor stands.**

- a. Raise the vehicle sufficiently to remove weight on front spring. Support the spring with a suitable lifting device. Support the vehicle with floor stands.
- b. Remove nut (1), lockwasher (2) and retaining bolt (3) from front spring hanger (4).
- c. Remove grease fittings (5) in spring pin end (6).
- d. Pound spring pin (6) out through hanger (4) and eye of spring (7) using a drift.
- e. Repeat steps b, c, and d to remove spring (7) from shackle (8) at rear of spring.
- f. Remove four U-bolt nuts (9), U-bolts (10), and U-bolt plate (11). Remove front spring U-bolt seat (12) and shock absorber bracket (13).
- g. Lift spring (7) along with two shims (14) from axle (15).



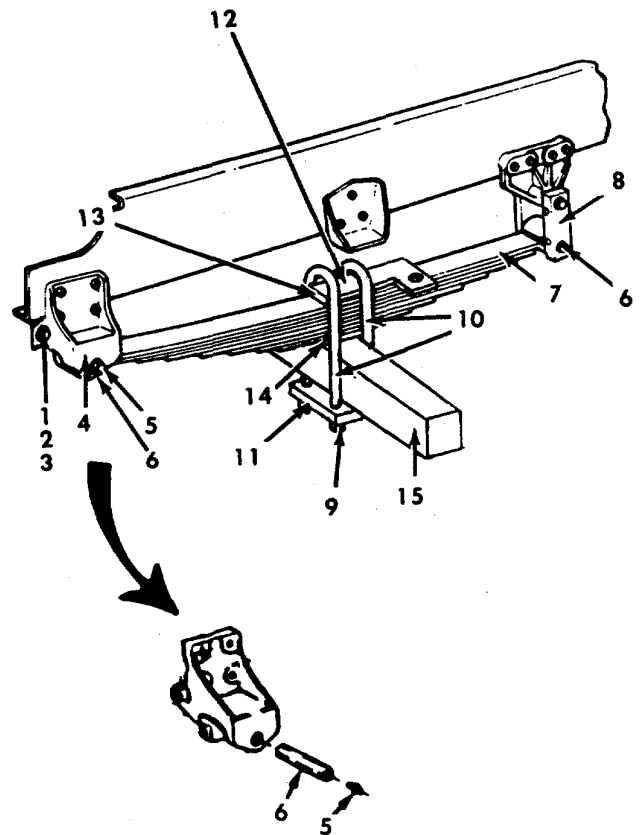
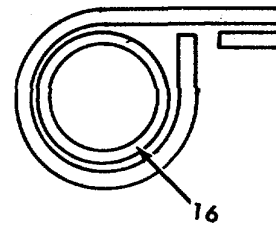


**4-190. FRONT SUSPENSION LEAF SPRING AND BUSHING REPLACEMENT (Continued).**

- h. Remove two spring eye bushings (16) by pounding through spring eye using a soft drift.

**INSTALLATION**

- a. Install two new bushings (16) in spring eyes by pounding or pressing into spring eye.
- b. Position two shims (14) on axle (15) and lower new spring (7) into position.
- c. Position shock absorber bracket (13) and U-bolt seat (12) on spring (7) and install two U-bolts (10), U-bolt plate (11) and U-bolt nuts (9). Torque nuts (9) to 145-165 ft-lb (197-224 N.m).
- d. Insert spring pin (6) through hangers (8 and 4) and bushings (16) until groove in spring pin (6) aligns with hole for bolt (3) in hanger (4). (Install with pointed end of pin toward center of truck.)
- e. Install bolt (3), lockwasher (2) and nut (1) in hanger (4). Torque nuts to 45-50 ft-lb (61-67.8 N.m).
- f. Install grease fitting (5) in pin end (6).
- g. Repeat steps d and e to secure spring (7) to shackle (8).
- h. Lubricate bushings (16) by applying grease (Appendix D, Item 20) to grease fitting (5) until fresh grease is visible at each end of bushing.
- i. Remove floor stands and lower vehicle.
- j. Install front shock absorbers (paragraph 4-185).



**Section XXVII. MAINTENANCE OF REAR SUSPENSION ASSEMBLY**

General .....	Para 4-191	Rear Suspension Leaf Spring and Bushing Replacement .....	Para. 4-192
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**4-191. GENERAL**

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

**4-192. REAR SUSPENSION LEAF SPRING AND BUSHING REPLACEMENT**

This task covers:      a. Removal                      b. Installation

**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- Floor Jack
- Floor Stands
- Press

General Safety Instructions

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

Materials/Parts

- Leaf Springs (471287C91)
- Bushing Spacer (471569C2)

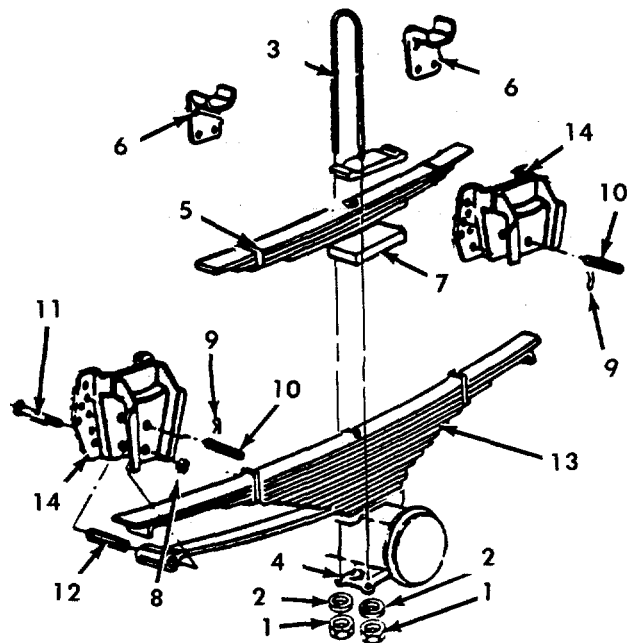
Personnel Required: 2

**REMOVAL**



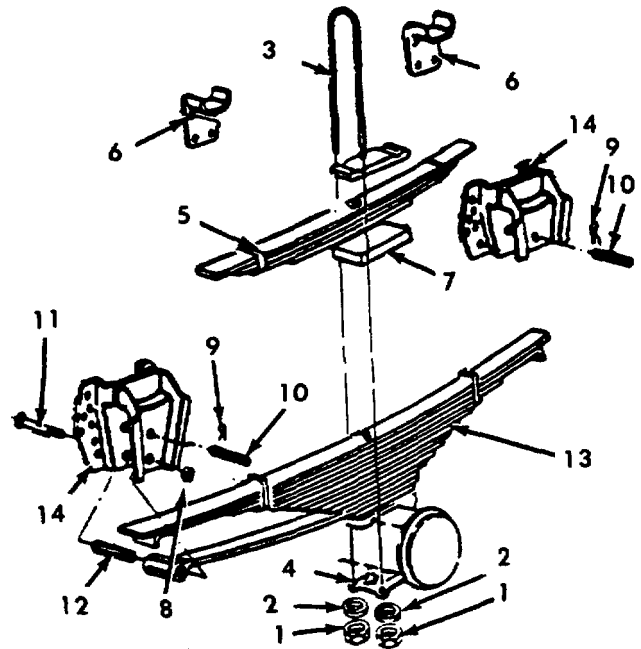
A jack should never be used alone to support vehicle while under-chassis service is being performed. The jack may lower and serious personal injury could result. Always support vehicle with floor stands.

- a. Place a floor jack under truck frame and raise truck sufficiently to relieve weight from spring being removed. Support vehicle with floor stands.
- b. Remove four U-bolt nuts (1) and washers (2) and then remove U-bolt (3) and U-bolt plate (4).
- c. Slide auxiliary spring (5) from brackets (6) and remove spring spacer (7).



**4-192. REAR SUSPENSION LEAF SPRING AND BUSHING REPLACEMENT (Continued).**

- d. Remove nut (8) and cotter pins (9) from spring bracket pins (10) and bolt (11).
- e. Remove spring bushing spacer (12). (Spacer may need to be pressed out.)
- f. Slide spring (13) off of brackets (14).



**INSTALLATION**

- a. All bolts should be cleaned and lubricated with oil (Appendix D, Item 37).
- b. Install new bushing spacer (12) in spring (13) utilizing a press if needed.
- c. Position spring (13) on brackets (14).
- d. Install nut (8) and cotter pins (9) on spring bracket pins (10) and bolt (11).
- e. Install spring spacer (7) and position auxiliary spring (5) on brackets (6).
- f. Install U-bolt plate (4), U-bolt (3) and U-bolt nuts (1) and washers (2).
- g. Torque U-bolt nuts (1) to 145-165 ft-lb (197-224 N.m).
- h. Remove floor stands and lower vehicle to the ground.

**SECTION XXVIII. MAINTENANCE OF REAR AXLE ASSEMBLY**

	Para.		Para.
Differential Side Gear and Pinion Replacement .....	4-196	Rear Axle Assembly Replacement .....	4-197
General .....	4-193	Rear Wheel Bearing Replacement .....	4-195
Hub and Drum Assembly Replacement .....	4-198		

**4-193. GENERAL**

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

**4-194. REAR AXLE ASSEMBLY REPLACEMENT.**

---

This task covers:      a. Removal                      b. Installation

---

**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- Jack
- Hoist

Materials/Parts

- Rear Axle Assembly (RA-42)
- Gear Oil (Appendix D, Item 36)

Equipment Condition

- Para. Condition Description
- 4-152 Propellor Shaft Removed
- 4-162 Tire Rim Assembly Removed
- 4-171 Air Brake Lines Removed
- 4-173 Air System Bled
- 4-198 Hub and Drum Assembly Removed

General Safety Instructions

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

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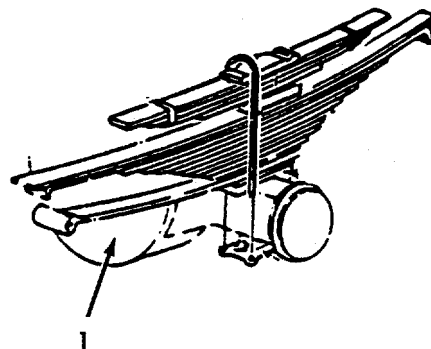
**REMOVAL**

- a. Drain lubricant from axle housing (1).



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. Support the axle with a suitable lifting device.

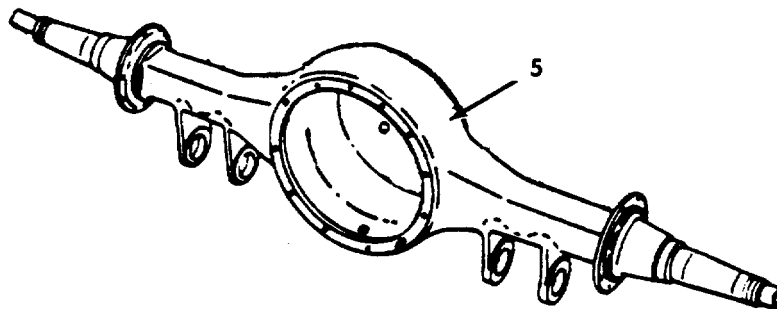
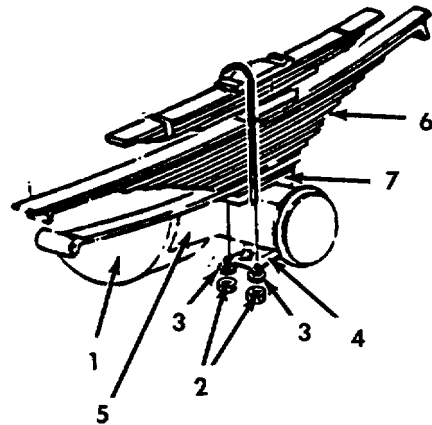


**4-194. REAR AXLE ASSEMBLY REPLACEMENT Continued)**

- c. Remove leaf spring U-bolt nuts (2), washers (3) and U-bolt plate (4) from the axle assembly (5).
- d. Lower lifting device and axle assembly (5).

**INSTALLATION**

- a. Position the rear axle under the vehicle and align the axle assembly (5) with the leaf springs (6).
- b. Install axle leaf spring spacers (7) and raise the axle assembly (5) into place.
- c. Install leaf spring U-bolt plate (4), washers (3) and nuts (2).
- d. Install the propellor shaft (paragraph 4-152).
- e. Connect air brake lines (paragraph 4-171).
- f. Recharge air brake system (paragraph 4-173).
- g. Fill axle housing with lubricant (Appendix D, Item 36).
- h. Install the hub and drum assembly (paragraph 4-198).
- i. Install tire rim assembly (paragraph 4-162).
- j. Remove the floor stands and lower the vehicle.



**4-195. REAR WHEEL BEARING REPLACEMENT.**


---

This task covers:      a. Removal                      b. Installation

---

**INITIAL SETUP**Tools

General Mechanics Tool Kit

Materials/Parts

Wheel Bearings (ST2016A)

Grease (Appendix D, Item 20)

Equipment Condition

Para. Condition Description

4-162 Tire Rim Assembly Removed

4-197 Rear Axle Shaft Removed

4-198 Hub and Drum Assembly Removed

---

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

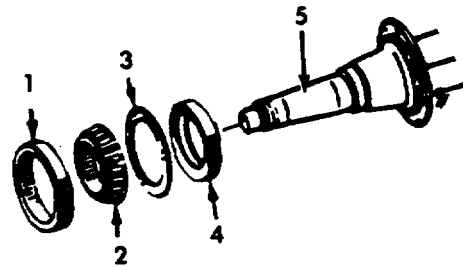
Parking brake set.

**REMOVAL**

Remove inner bearing cup (1), inner bearing (2), grease seal washer (3) and grease seal (4) from the axle housing spindle (5).

**INSTALLATION**

- a. Coat the axle housing spindle (5) with grease (Appendix D, Item 20).
- b. Pack bearing (2) in grease (Appendix D, Item 20).
- c. Install grease seal (4), grease seal washer (3), inner bearing (2), and inner bearing cup (1) onto axle housing spindle.
- d. Install hub and drum assembly (paragraph 4-198).
- e. Install rear axle shaft (paragraph 4-197).
- f. Install tire rim assembly (paragraph 4-162).
- g. Remove the floor stands and lower the vehicle.



**4-196. DIFFERENTIAL SIDE GEAR AND PINION REPLACEMENT**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit  
Jack, roller type

Materials/Parts

Differential Carrier Assembly (161019R93)  
Sealant (Appendix D, Item 49)

Equipment Condition

Para.	Condition Description
4-162	Tire Rim Assembly Removed
4-197	Axle Shafts Removed
4-152	Propeller Shaft Removed

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.

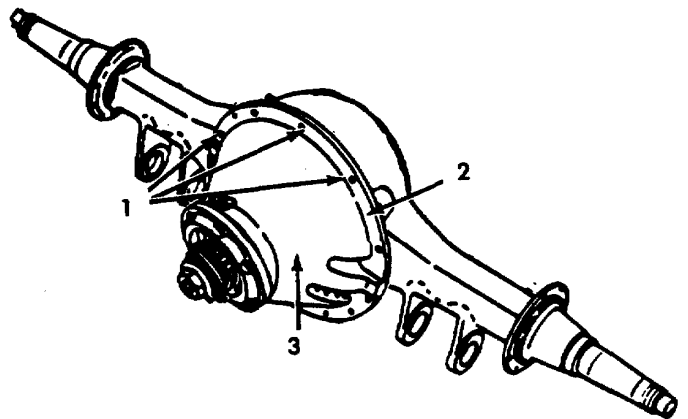
Parking brake set.

**REMOVAL**

- Remove mounting bolts (1) from carrier to axle housing flange (2).
- Support the weight of carrier (3) safely on a roller type floor jack.
- Use puller screws in carrier mounting flange to start carrier away from housing.
- Pull carrier (3) away from housing with the use of the roll jack and remove from under the vehicle.

**INSTALLATION**

- Position the carrier (3) on a rollerjack and position in place under the axle housing.
- Form a gasket on the housing flange using sealant (Appendix D, Item 49) and place carrier onto axle housing flange.
- Install the carrier to axle housing flange mounting bolts (1). Torque bolts (1) to 160-175 ft-lb (220-240 N.m).
- Install propeller shaft (paragraph 4-152).
- Install axle shafts (paragraph 4-197).
- Install tire rim assembly (paragraph 4-162).
- Remove the floor stands and lower the vehicle.



**4-197. REAR AXLE SHAFTS REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Hammer/Sledge, 5-6 lb (2.3-2.7kg)

Materials/Parts

Axle Shafts (571348C1)  
Solvent, Cleaning (Appendix D, Item 54).

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.

Equipment Condition

Para.	Condition Description
4-162	Tire Rim Assembly Removed

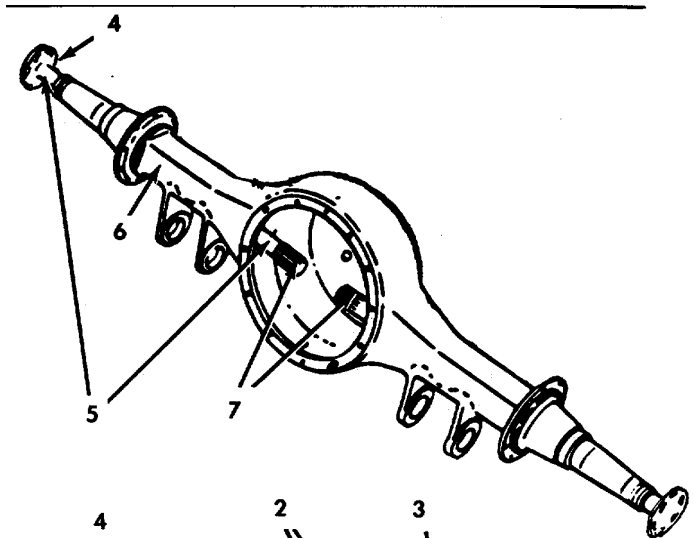
**REMOVAL**

- a. Remove eight nuts (1) from studs (2) around rear wheel hub (3), all that attach the axle shaft flange (4) to the wheel hubs (3).

**CAUTION**

**Do not use chisels or wedges to loosen shaft. Damage to shaft flange may result.**

- b. To loosen shaft (5) from the hub, strike the center of the axle shaft flange (4) with a 5-6 lb (2.3-2.7 kg) hammer or sledge. A pulling, twisting action will aid in the shaft removal.
- c. Remove the shaft (5) from the axle housing tube (6)

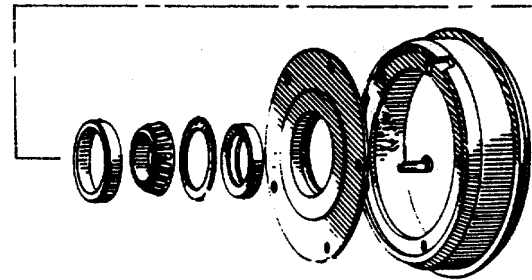
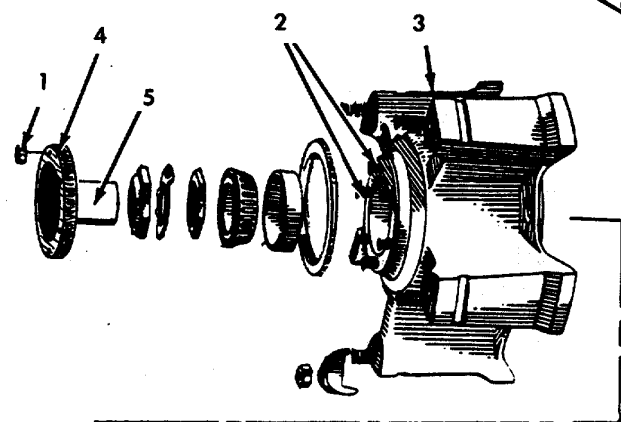


**INSTALLATION**

**WARNING**

**Cleaning solvent (Appendix D, Item 54) 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.**

- a. Thoroughly clean the axle shaft with solvent (Appendix D, Item 54).
- b. Position the axle shaft (5) in the axle housing tube (6) so that the shaft splines (7) enter the differential gearing.
- c. Attach the axle shaft flange (4) to the wheel hub with nuts (1). Torque nuts to 95-115 ft-lb (130-155 N.m).
- d. Install tire rim assembly (paragraph 4-162).
- e. Remove the floor stands and lower the vehicle.





**4-198. HUB AND DRUM ASSEMBLY.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Rubber Mallet

Materials/Parts

Hub and Drum (1648515C1)

Equipment Condition

Para.	Condition Description
4-162	Tire Rim Assembly Removed
4-197	Rear Axle Shaft Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

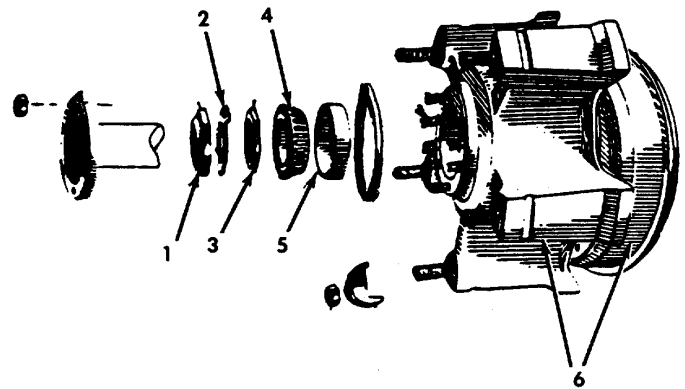
**REMOVAL**

a. Remove outer adjustment nut (1), bearing adjustment lockwasher (2), and inner adjustment nut (3).

b. After the adjustment nuts and lockwashers are removed, the outer bearing (4), and outer bearing 'cup (5) should be removed.

c. Once bearing assembly is removed, strike the hub and drum assembly (6) with a rubber mallet to aid in the removal.

d. Remove hub and drum assembly (6) from axle housing spindle (7).



e. Torque outer adjustment nut (1) to 100-150 ft-lb (135.6-203.4 N.m).

**INSTALLATION**

a. Install hub and drum assembly (6) onto axle housing spindle (7).

b. Install outer bearing cup (5) and outer bearing (4). Install the inner adjustment nut (3) and torque it to 50 ft-lb (67.8 N.m).

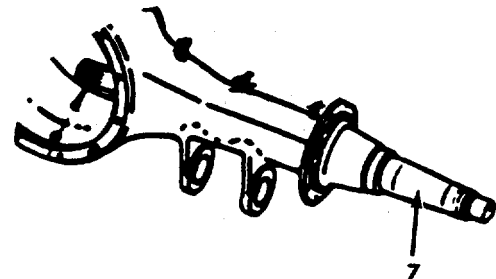
c. Rotate hub and drum assembly forward and backward, then back off adjustment nut (3) 1/4 to 1/3 turn.

d. Install bearing lockwasher (2) and the outer adjustment nut (1).

f. Install rear axle shaft (paragraph 4-197).

g. Install tire rim assembly (paragraph 4-162).

h. Remove floor stands and lower vehicle.



**Section XXIX. MAINTENANCE OF FRONT AXLE ASSEMBLY**

Front Axle Replacement.....	Para. 4-200	Front Axle Shaft Replacement.....	Para. 4-201
		General .....	4-199

**4-199. GENERAL**

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

**4-200. FRONT AXLE REPLACEMENT.**

This task covers:      a. Removal      b. Installation

**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- Jack
- Jack Stands

General Safety Instructions

- Engine OFF.
- Transmission in (N) neutral.
- Parking brake set.
- Battery selector switch OFF.

Materials/Parts

- Front Axle Assembly (FA-64)
- Solvent (Appendix D, Item 54)
- Gear Oil (Appendix D, Item 36)

Equipment Condition

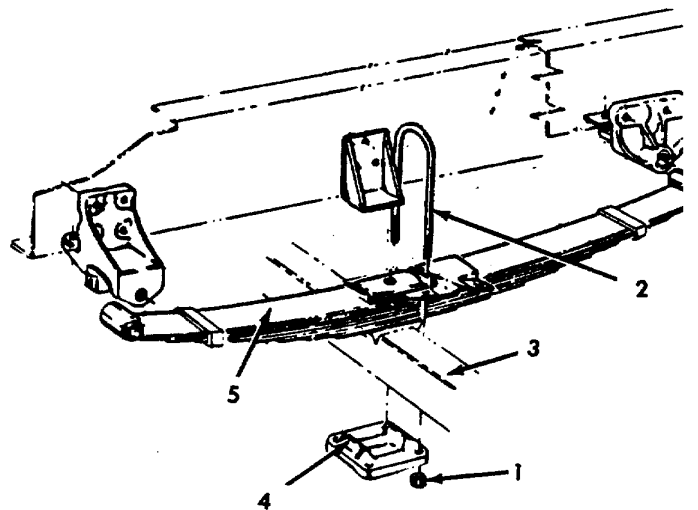
Para.	Condition Description
4-154	Front Propeller Shaft Removed
4-173	System Bled
4-169	Brakes Disconnected
4-176	Drag Link Disconnected
4-9	Lubricant Drained
4-162	Tire Rim Assembly Removed

**REMOVAL**

**WARNING**

A jack should never be used alone to support vehicle while under-chassis service is being performed. The jack may lower and serious personal injury could result. Always support vehicle with floor stands.

- a. Jack up truck until load is removed from the springs and place jack stand under frame to safely secure truck weight off axle assembly.
- b. Support axle on jack stands and remove four U-bolt nuts (1) and two spring U-bolts (2) from axle assembly (3).



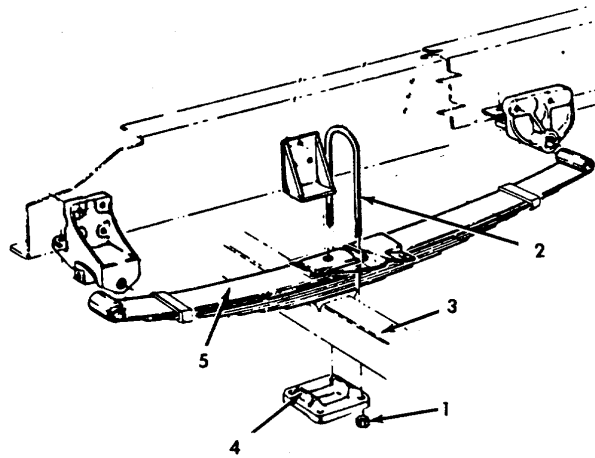
**4-200. FRONT AXLE REPLACEMENT (Continued).**

- c. Remove plate (4) and slide axle assembly out from under the vehicle.

**WARNING**

Cleaning solvent (Appendix D, Item 54) 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.

- d. Clean the axle assembly using solvent (Appendix D, Item 54).

**INSTALLATION**

- a. Position the axle assembly under the vehicle.
- b. Secure axle assembly (3) to spring assembly (5) with two spring U-bolts (2), plate (4) and four U-bolt nuts (1).
- c. Fill housing with gear oil (Appendix D, Item 36).
- d. Reconnect drag link (paragraph 4-176).
- e. Reconnect brakes (paragraph 4-169).
- f. Recharge air brake system (paragraph 4-173).
- g. Reconnect front propeller shaft (paragraph 4-154).
- h. Install tire rim assembly (paragraph 4-162).
- i. Remove jack stands and lower vehicle.

**4-201. FRONT AXLE SHAFT AND JOINT ASSEMBLY REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Vise

Materials/Parts

Axle Shaft Streetside (587413C91)

Axle Shaft Curbside (587414C91)

Joint Assembly (503092C1)

Equipment Condition

Para.	Condition Description
4-189	Steering Knuckle and Arm Removed

General Safety Instructions

Engine OFF.

Transmission in (N) neutral.

Parking brake set.

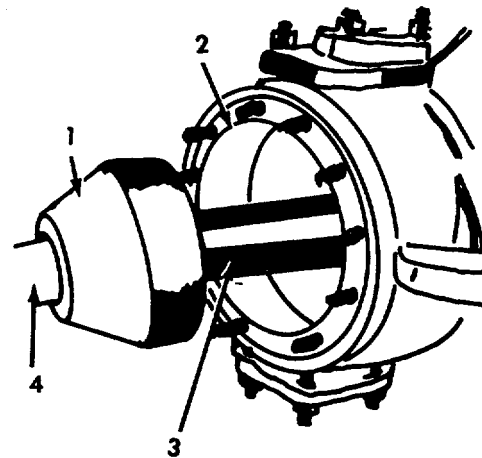
Battery selector switch OFF.

**REMOVAL**



Care should be taken not to damage axle shaft oil seal in the end of axle housing when removing axle shaft.

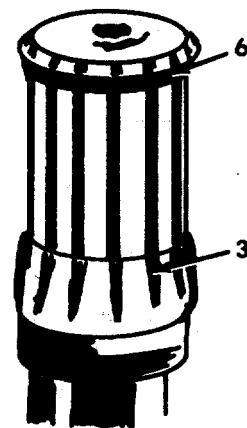
- a. Remove axle shaft and universal joint assembly (1) from axle housing (2).
- b. Place axle shaft (3) in a vise equipped with soft jaws. Grasp shaft end (4) of universal joint (1) and pull while rapping back side of joint with a soft faced hammer.
- c. Remove axle joint assembly.



**NOTE**

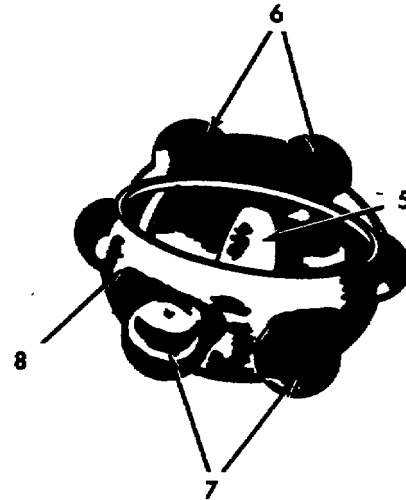
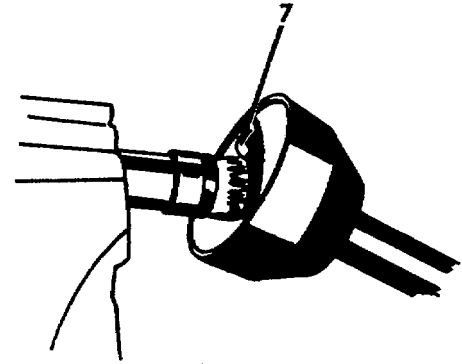
A new lock ring should always be used on installation.

- d. Remove lock ring (6) from axle shaft end (3) and discard.
- e. Place universal joint in a vise equipped with soft jaws with outer race bell upward.



4-201. FRONT AXLE SHAFT AND JOINT ASSEMBLY REPLACEMENT (Continued).

- f. Tilt inner race (5) in outer race (6) until one ball (7) can be removed, continue this procedure until all balls (7) are removed. A soft faced hammer may be used to aid inner race (5) movement.
- g. Roll universal joint cage (8) at a right angle to universal joint outer race bell (6) with the two elongated openings in cage (8) aligned with opposite teeth of outer race bell (6). Lift cage (8) and inner race (5) from outer race bell (6).
- h. Inspect axle shaft and universal joint assembly for seizure, broken or chipped balls, broken splines or other damage.
- i. Inspect spindle bushing for out of round condition caused by wear or corrosion, scoring or roughness in spots.
- j. Inspect axle shaft oil seal for evidence of wear or damage.
- k. Inspect for evidence of wear due to improper drive flange shim size. Wear on the interior surface of ball end of axle housing and on edge of ball joint bell housing indicates the use of too thin a shim, allowing contact between the two. If shim is too thick, the spindle bushing will show excessive wear.



- e. Place universal joint (1) on top of axle shaft index end (4) of axle shaft in splined inner race. Tap end of universal joint shaft with a soft faced hammer to collapse lock ring, securing assembly.
- f. Pack universal joint bell with lubricant (Appendix D, Item 21).

**INSTALLATION**

- a. Assemble inner race and cage by indexing notched tooth of inner race with elongated opening in cage and rolling inner race into cage.
- b. Align elongated openings of cage with opposite teeth of outer race bell and lower inner race and cage assembly into outer race bell.
- c. Tilt-inner race in outer race until one ball can be inserted, continue this procedure until all balls are inserted. Pre-lubrication of components and a soft faced hammer may be used to aid inner race movement.
- d. Install new lock ring (6) on axle shaft end and place axle shaft (3) in a vise equipped with soft jaws.

**CAUTION**

**When installing axle shaft and universal joint assembly, care should be taken not to damage axle shaft oil seal.**

**Install axle shaft (3) and universal joint assembly (1) in axle housing indexing splined end of axle shaft with side gear of center unit (2).**

- g. Install steering knuckle and arm.

**Section XXX> MAINTENANCE OF FRAME ASSEMBLY**

	Para.		Para.
Front Bumper Replacement .....	4-203	Rear Bumper Replacement .....	4-204
General .....	4-202	Tow Hooks Replacement.....	4-205

**4-202. GENERAL**

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

**4-203. FRONT BUMPER REPLACEMENT.**

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Front Bumper (KFT-010)

Equipment Condition

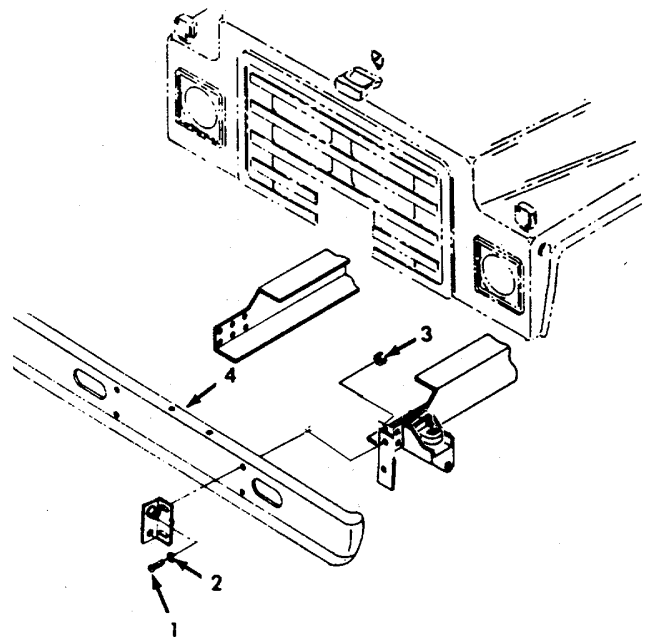
Para.	Condition Description
4-98	Quartz Flood Light
4-122	Brush Guard Removed

**REMOVAL**

- a. Remove four bolts (1), washers (2), and nuts (3).
- b. Remove front bumper (4).

**INSTALLATION**

- a. Install front bumper (4) and secure with four bolts (1), washers (2), and nuts (3).
- b. Install brush guard (paragraph 4-122).
- c. Install quartz flood light (paragraph 4-98).



**4-204. REAR BUMPER REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Materials/Parts

Rear Bumper (KFT-002)

Equipment Condition

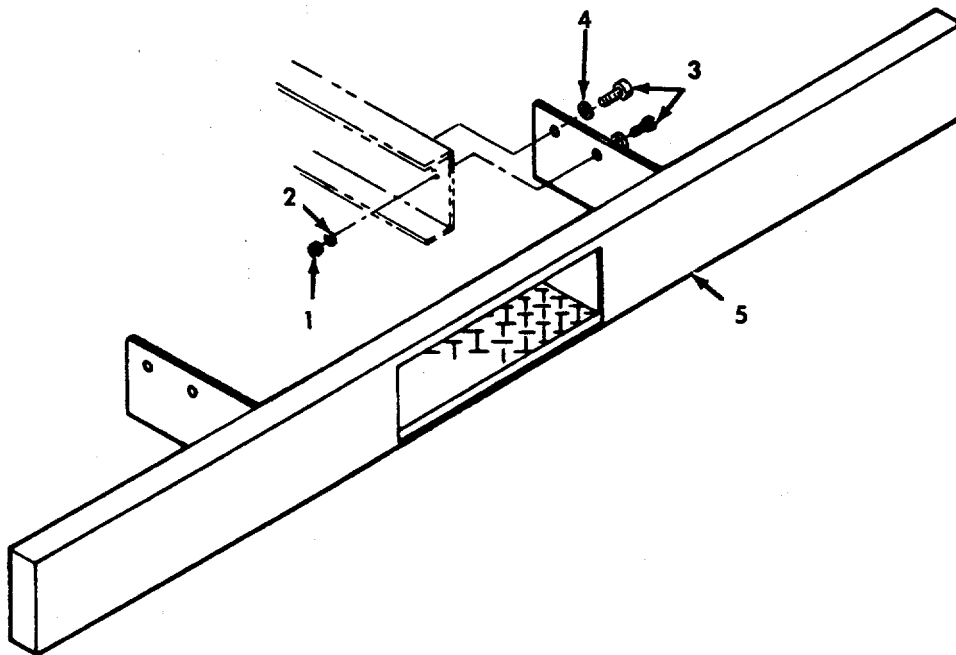
Para.	Condition Description
4-47	Clearance Lights Removed

**REMOVAL**

- a. Remove four nuts (1), lockwashers (2), bolts (3) and washers (4).
- b. Remove rear bumper (5).

**INSTALLATION**

- a. Install rear bumper (5) and secure with four washers (4), bolts (3), lockwashers (2), and nuts (1).
- b. Install clearance lights (paragraph 4-47).



4-205. TOW HOOKS REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Front Tow Hook Streetside (473210C1)  
 Front Tow Hook Curbside (492825C1)  
 Rear Tow Hook (003-00007)

REMOVAL

a. Front tow hooks removal.

- (1) Remove four nuts (1).

**NOTE**

Do not remove four bolts (2).

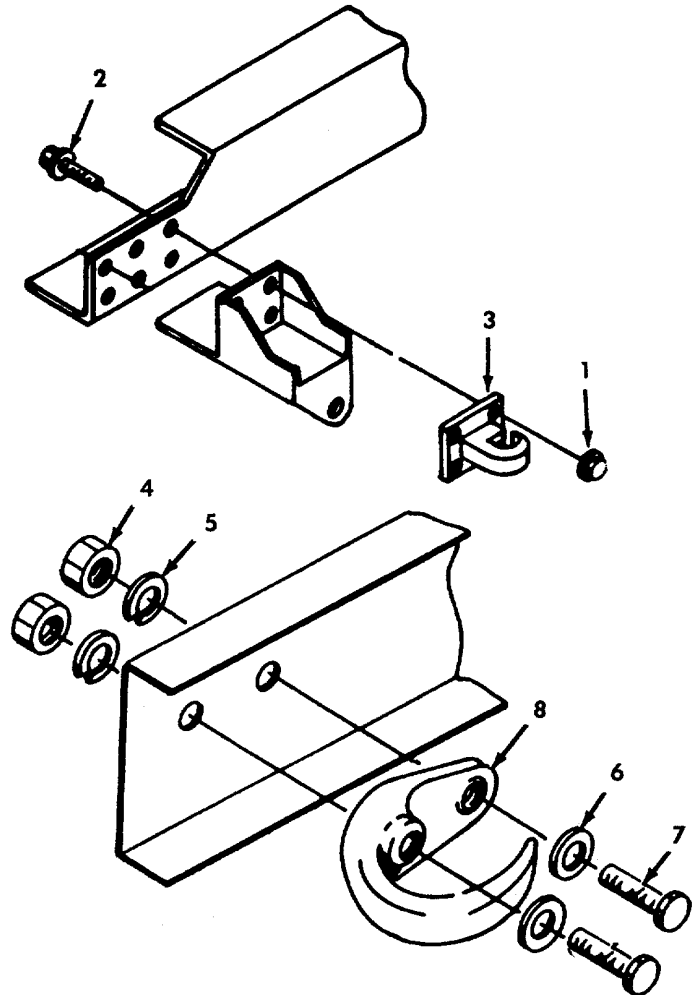
- (2) Remove tow hook (3).
- (3) Repeat procedure for opposite side.



To operate truck without front tow hooks (3), install nuts (1) back onto bolt (2).

b. Rear tow hooks removal.

- (1) Remove two nuts (4), lockwashers (5), flat washers (6), and bolts (7). (Rear streetside tow hook may require the removal of a ground wire from the nut side).
- (2) Remove tow hook (8).
- (3) Repeat procedure for opposite side.



INSTALLATION

a. Front tow hooks installation

- (1) Install tow hook (3) onto four bolts (2).
- (2) Install four nuts (1).
- (3) Repeat procedure for opposite side.

b. Rear tow hooks installation.

- (1) Install tow hook (8).
- (2) Secure with two bolts (7), flat washers (6), lockwashers (5) and nuts (4).
- (3) Repeat procedure for opposite side.



**Section XXXI. PREPARATION FOR SHIPMENT OR STORAGE**

General.....	Para. 4-206	Servicing Vehicle While in Storage.....	Para. 4-208
Preparing Vehicle for Shipment or Storage .....	4-207		

**4-206. GENERAL**

The purpose of this section is to assist organizational personnel in the preparation of the Twin Agent 4x4 Firefighting Truck for shipment or storage.

**4-207. PREPARING VEHICLE FOR SHIPMENT OR STORAGE**

- a. Cleaning.
  - (1) Remove all debris from cab, fire 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 4-58).
- (2) Fill cooling system with a conditioned water/anti-freeze solution suitable for the lowest temperature anticipated.
- c. Fuel system.
  - (1) Clean or replace air cleaner (paragraph 4-68).
  - (2) Drain the fuel tank (paragraph 4-72).
  - (3) Remove, empty, and reinstall fuel filter (paragraph 4-69).
  - (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 lube oil from engine crankcase (paragraph 4-9).

**4-207. PREPARING VEHICLE FOR SHIPMENT OR STORAGE (Continued).**

- (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 and storage.**

Remove batteries and store in a cool dry place 32 ° to 50° F (0° to 10° C) to minimize discharge.

## f. Drive belts.

- (1) Loosen tension on all drive belts (paragraph 4-62).
- (2) Coat unpainted surfaces of pulley grooves with primer (Appendix D, Item 41).
- (3) A warning tag bearing the information TENSION RELEASED ON ALL DRIVE BELTS, ADJUST BEFORE USE shall be attached to the steering wheel.

## 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 4-103) and store inside cab compartment.
- (4) Remove mirrors (paragraph 4-129) 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 3-4).

**4-208. SERVICING VEHICLE WHILE IN STORAGE.**

## a. Every month.

Check batteries for water level and specific gravity. Add water and charge 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 4-58).
- (4) Drain the fuel tank (paragraph 4-72).
- (5) Remove, empty, and reinstall fuel filter (paragraph 4-69).
- (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 4-62).
- (8) Start the engine and run at idle speed for approximately 4 minutes 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 AUXILIARY FIREFIGHTING EQUIPMENT
Section IV	MAINTENANCE OF DIESEL FUEL INJECTION SYSTEM
Section V	MAINTENANCE OF ENGINE AND ACCESSORIES
Section VI	MAINTENANCE OF CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS
Section VII	MAINTENANCE OF AIR BRAKE SYSTEM
Section VIII	MAINTENANCE OF POWER STEERING SYSTEM
Section IX	MAINTENANCE OF FRAME ASSEMBLY

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

Repair Parts.....	Para. 5-1	Special Tools, TMDE, and Support Equipment.....	Para. 5-2
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**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 Twin Agent 4x4 Firefighting Truck.

**5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.**

Special tools, TMDE, and support equipment required to maintain the Twin Agent 4x4 Firefighting Truck are listed in Appendix B, Section III.

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**Section II. DIRECT SUPPORT TROUBLESHOOTING PROCEDURES**

General.....	Para. 5-3	Symptom Index .....	Para. 5-4
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**5-3. GENERAL.**

- a. The table in this section lists the common malfunctions which may occur during the operation or maintenance of the Twin Agent 4x4 Firefighting Truck or components. The troubleshooting should be performed in the order given in each malfunction.
- b. This manual can not 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.**

<b>SYMPTOM</b>	<b>Page</b>
<b>AUXILIARY EQUIPMENT</b>	
Hydraulic Rescue Tool Power Unit Fails To Start Or Starts With Difficulty .....	5-3
Hydraulic Rescue Tool Power Unit Misses Under Load .....	5-3
Hydraulic Rescue Tool Power Unit Lacks Power .....	5-3
Hydraulic Rescue Tool Power Unit Surges Or Runs Unevenly.....	5-4
Hydraulic Rescue Tool Power Unit Overheats.....	5-4
Hydraulic Rescue Tool Power Unit Uses Excess Amount Of Oil.....	5-4
Hydraulic Rescue Tool Power Unit Fails To Operate The Tool At All.....	5-5
Rescue Saw Engine Fails To Start Or Starts With Difficulty .....	5-5
Rescue Saw Engine Runs But Without Power And Races When It Is Off Load.....	5-5
Rescue Saw Engine Does Not Accelerate From Idling Speed.....	5-5
Rescue Saw Engine Does Not Accelerate From Idling Speed And Is Smokey .....	5-5
Rescue Saw Engine Stops When Saw Is Turned.....	5-5
Rescue Saw Engine Runs Roughly Or Misfires .....	5-5
Rescue Saw Engine Overheats.....	5-5
<b>ENGINE COOLING SYSTEM</b>	
Engine Coolant Overheating .....	5-6
Engine Coolant Loss .....	5-6
<b>ENGINE AND ACCESSORIES</b>	
Engine Will Not Crank .....	5-6
Engine Cranks Slowly-Will Not Start .....	5-6
Engine Cranks Normally-Will Not Start.....	5-6
Engine Starts But Will Not Continue To Run At Idle Speed .....	5-7
<b>TRANSFER CASE ASSEMBLY</b>	
Excessive Noise.....	5-7
Shift Lever Difficult To Move.....	5-7

**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 5-1. Direct Support Troubleshooting Chart.

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

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**AUXILIARY EQUIPMENT**

1. HYDRAULIC RESCUE TOOL POWER UNIT FAILS TO START OR STARTS WITH DIFFICULTY
  - Step 1. Check for closed fuel shutoff valve  
Open valve by turning 1/4 turn counterclockwise.
  - Step 2. Check for fuel in tank.  
Fill tank with clean, fresh fuel.
  - Step 3. Check if throttle lever not in choke position.  
Position throttle lever to the left, past the detent position.
  - Step 4. Check for obstructed fuel line.  
Clean fuel screen and line. If necessary, remove and clean carburetor (paragraph 5-6).
  - Step 5. Check for obstructed tank cap vent.  
Open vent in fuel tank cap.
  - Step 6. Check for water in fuel.  
Dry tank. Clean carburetor and fuel lines. Dry spark plug points. Fill tank with clean, fresh fuel.
  - Step 7. Check if engine is overchoked.  
Close fuel shut-off and pull starter until engine starts. Reopen fuel shut-off for normal fuel flow.
  - Step 8. Check for improper carburetor adjustment.  
Adjust carburetor (paragraph 5-6).
  - Step 9. Check for loose or defective magneto wiring.  
Check magneto wiring for shorts or grounds; repair if necessary (paragraph 5-6).
  - Step 10. Check if spark plug is fouled.  
Clean and regap spark plug (paragraph 5-6).
  - Step 11. Check for cracked spark plug porcelain.  
Replace spark plug (paragraph 5-6).
  - Step 12. Check for no spark at plug.  
Disconnect ignition cut off wire at the engine. Crank engine. If spark at spark plug, ignition switch, safety switch or interlock switch is inoperative. If no spark, check magneto. Check wires for poor connections, cuts or breaks (paragraph 5-6).
  
2. HYDRAULIC RESCUE TOOL POWER UNIT MISSES UNDER LOAD
  - Step 1. Check for fouled spark plug.  
Clean and regap spark plug.
  - Step 2. Check for cracked spark plug porcelain.  
Replace spark plug.
  - Step 3. Check for improper spark plug gap.  
Regap spark plug (paragraph 5-6)
  - Step 4. Check for improper carburetor adjustment.  
Adjust carburetor (paragraph 5-6).
  
3. HYDRAULIC RESCUE TOOL POWER UNIT LACKS POWER
  - Step 1. Partially closed choke.  
Open choke.
  - Step 2. Improper carburetor adjustment.  
Adjust carburetor (paragraph 5-6).
  - Step 3. Lack of lubrication.  
Fill crankcase to the proper level.

Table 5-1. Direct Support Troubleshooting Chart (Continued).

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

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3. HYDRAULIC RESCUE TOOL POWER UNIT LACKS POWER (Continued)
- Step 4.* Fouled air cleaner.  
Clean air cleaner (paragraph 5-6).
- Step 5.* Check if air power unit is primed.  
Tip power unit at a 45° angle and pull the recoil starter several times without starting it.
- Step 6.* Check if sequence valve is out of adjustment.  
Adjust sequencing valve( paragraph 5-6).
4. HYDRAULIC RESCUE POWER TOOL UNIT SURGES OR RUNS UNEVENLY
- Step 1.* Check for clogged fuel tank cap vent hole.  
Open vent hole.
- Step 2.* Check for sticking or binding governor parts.  
Clean and deburr governor parts.
- Step 3.* Check for binding or sticking of carburetor throttle linkage, throttle shaft, or butterfly.  
Clean, lubricate, or adjust linkage and deburr throttle shaft or butterfly.
- Step 4.* Check for intermittent spark at spark plug.  
Disconnect ignition cut-off wire at the engine. If no spark, check wires for poor connections, cuts, or breaks.
- Step 5.* Check for improper carburetor adjustment.  
Adjust carburetor (paragraph 5-6).
- Step 6.* Check for dirty carburetor.  
Clean carburetor (paragraph 5-6).
5. HYDRAULIC RESCUE TOOL POWER UNIT OVERHEATS
- Step 1.* Check for improper carburetor adjustment.  
Adjust carburetor (paragraph 5-6).
- Step 2.* Check for obstructed air flow.  
Remove any obstructions from air passages in shrouds.
- Step 3.* Check for clogged cooling fins.  
Clean cooling fins.
- Step 4.* Check for excessive load on engine.  
Check operation of associated equipment.
- Step 5.* Check for lack of lubrication.  
Fill crankcase to proper level.
6. HYDRAULIC RESCUE TOOL POWER UNIT USES EXCESSIVE AMOUNT OF OIL
- Step 1.* Check if oil level is too high.  
To check level, turn dipstick cap tightly into receptacle for accurate level reading.
- Step 2.* Check if oil filler cap is loose, or if gasket is damaged.  
Replace ring gasket under cap and tighten cap securely.
7. HYDRAULIC RESCUE TOOL POWER UNIT FAILS TO OPERATE THE TOOL AT ALL
- Step 1.* Check if dump valve is in dump position.  
Switch dump valve to PRESSURE position. (The valve handle will point toward the hose.)
- Step 2.* Check for lack of hydraulic fluid in the unit.  
Fill the unit with 1-1/2 gallons (5.7 liter) of hydraulic fluid (Appendix D, item 19) and then prime with the unit by tipping the power unit at a 45° angle and pull the recoil starter several times without starting it.

Table 5-1. Direct Support Troubleshooting Chart (Continued).

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

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8. RESCUE SAW ENGINE FAILS TO START OR STARTS WITH DIFFICULTY  
*Step 1.* Check for empty fuel tank.  
 Fill fuel tank.  
*Step 2.* Check for not enough choke.  
 Pull starter cord repeatedly with full choke.  
*Step 3.* Check for too much choke.  
 Open choke flap and pull cord again.  
*Step 4.* Check for wet spark plug.  
 Remove plug, wash, blow dry.  
*Step 5.* Check if choke flap has not opened after engine fired for the first time.  
 Open choke flap and pull cord again. If this does not help, remove and clean spark plug.
9. RESCUE SAW ENGINE RUNS BUT WITHOUT POWER AND RACES WHEN IT IS OFF LOAD  
 Check if fuel mixture is too lean.  
 Turn fuel mixture adjuster screw slightly in counterclockwise direction.
10. RESCUE SAW ENGINE DOES NOT ACCELERATE FROM IDLING SPEED  
*Step 1.* Check if engine is not warmed up.  
 Run engine until warm and then adjust fuel mixture adjuster screw if required.  
*Step 2.* Check if low speed mixture is too lean.  
 Turn fuel mixture adjuster screw slightly in counterclockwise direction.
11. RESCUE SAW ENGINE DOES NOT ACCELERATE FROM IDLING SPEED AND IS SMOKEY  
*Step 1.* Check if air cleaner is blocked.  
 Clean air cleaner and then adjust fuel mixture adjuster screw if required.  
*Step 2.* Check if low speed fuel mixture is too lean.  
 Turn fuel mixture adjuster screw slightly in counterclockwise direction.
12. RESCUE SAW ENGINE STOPS WHEN SAW IS TURNED  
 Check if low speed mixture is too rich.  
 Turn fuel mixture adjuster screw slightly in the clockwise direction.
13. RESCUE SAW ENGINE RUNS ROUGHLY OR MISFIRES  
*Step 1.* Check if air cleaner is blocked.  
 Clean air cleaner.  
*Step 2.* Check if spark plug is oily or sooty.  
 Clean and adjust spark plug.  
*Step 3.* Check for loose ignition cable.  
 Attach cable properly.  
*Step 4.* Check for proper carburetor adjustment.  
 Adjust carburetor (paragraph 5-7).  
*Step 5.* Check for water or dirt in the fuel.  
 Clean tank and fuel lines.
14. RESCUE SAW ENGINE OVERHEATS  
 Check for blocked cylinder cooling vanes.  
 Clean cooling air passages.



Table 5-1. Direct Support Troubleshooting Chart (Continued).

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<b>MALFUNCTION</b>
<b>TEST OR INSPECTION</b>
<b>CORRECTIVE ACTION</b>

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**ENGINE COOLING SYSTEM**

15. **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 4-58).  
*Step 3.* Check for loose or worn fan belt.  
 Replace worn fan belt. Tighten fan belt (paragraph 4-62).  
*Step 4.* Check for damaged coolant hoses.  
 Replace coolant hose (paragraph 4-63).  
*Step 5.* Check for damaged or inoperative thermostat.  
 Replace thermostat (paragraph 4-65).  
*Step 6.* Check for scale or deposits in cooling system.  
 Clean and flush cooling system (paragraph 4-58).  
*Step 7.* Check for damaged radiator.  
 Replace radiator (paragraph 4-66).
16. **ENGINE COOLANT LOSS**  
 Visually inspect hoses, radiator, clamps, water pump, thermostat housing, radiator drain, and engine soft plugs for leakage.  
 Tighten or replace as necessary.

**ENGINE AND ACCESSORIES**

17. **ENGINE WILL NOT CRANK**  
*Step 1.* Inspect for loose or corroded battery cables.  
 Tighten or replace battery cables (paragraph 4-83).  
*Step 2.* Check voltage to starter and starter solenoid.  
 Replace starter if defective (paragraph 4-86).  
*Step 3.* Check alternator output and generator belt tension.  
 Replace alternator or tighten belt (paragraph 4-84).
18. **ENGINE CRANKS SLOWLY-WILL NOT START**  
*Step 1.* Check for loose cable connections at batteries, engine block, and starter.  
 Tighten loose connections.  
*Step 2.* Check condition of batteries.  
 Replace defective batteries (paragraph 4-83).

Table 5-1. Direct Support Troubleshooting Chart (Continued).

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

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## 19. ENGINE CRANKS NORMALLY-WILL NOT START



**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 4-70).

*Step 2.* Inspect for incorrect or contaminated fuel.

Replace fuel.

## 20. 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 (paragraph 4-75).

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

Reset timing (paragraph 4-76).

### TRANSFER CASE ASSEMBLY

## 21. EXCESSIVE NOISE

*Step 1.* Check lubricant level.

Fill as required (paragraph 4-9).

*Step 2.* Inspect yoke bolts for looseness.

Tighten yoke bolts (paragraph 4-159).

*Step 3.* Inspect adapter bolts for looseness.

Tighten adapter bolts (paragraph 4-159).

## 22. SHIFT LEVER DIFFICULT TO MOVE

Perform operational check on shift lever.

Refer to next higher level of maintenance.

Section III. MAINTENANCE OF AUXILIARY EQUIPMENT

General.....	Para 5-5	Rescue Saw Repair.....	Para 5-7
Hydraulic Rescue Tool Power Unit Repair.....	5-6		

5-5. GENERAL.

This section contains information on the maintenance of the auxiliary equipment that is maintainable at the Direct Support level.

5-6. HYDRAULIC RESCUE TOOL POWER UNIT REPAIR.

This task covers:      a. Disassembly      b. Adjustment      c. Reassembly

INITIAL SET-UP

Tools

General Mechanics Tool Kit

Materials/Parts

Hydraulic Fluid (Appendix D, Item 19)  
Hydraulic Rescue Tool Power Unit (91708-0015)

Equipment Condition

Para.	Condition Description
4-19	Hydraulic Rescue Tool Removed

General Safety Instructions

Avoid flame or spark.

DISASSEMBLY



**Drain gasoline from power unit prior to disassembly to avoid fire hazard.**



**Drain hydraulic fluid into a clean container prior to disassembly to avoid contamination which may damage the hydraulic pump.**

- (6) Remove two locknuts (10) on the inside of the reservoir (4).
- (7) Remove liquid level gauge (11).
- 8. Remove the three engine bolts (12) and lockwashers (13).
- 9. Lift engine (14) from cover plate assembly (15) using care not to lose engine key (16).

ADJUSTMENT

- a. Hydraulic Rescue Tool Power Unit Disassembly
  - (1) Remove ten screws (1) and lockwashers (2).
  - (2) Lift power unit (3) from reservoir (4).
  - (3) Lay the power unit on its side.
  - (4) Unscrew the relief valve subassembly (5) and gasket (6).
  - (5) Remove relief valve fitting (7), spring (8) and ball (9).

- a. Adjustment of Sequencing Valve.
  - (1) Using a 3/16 inch allen wrench, screw the lockscrew (17) all the way in until snug.
  - (2) Back off lockscrew (17) approximately 1/2 to 3/4 of one turn.

5-6. HYDRAULIC RESCUE TOOL POWER UNIT REPAIR (Continued).

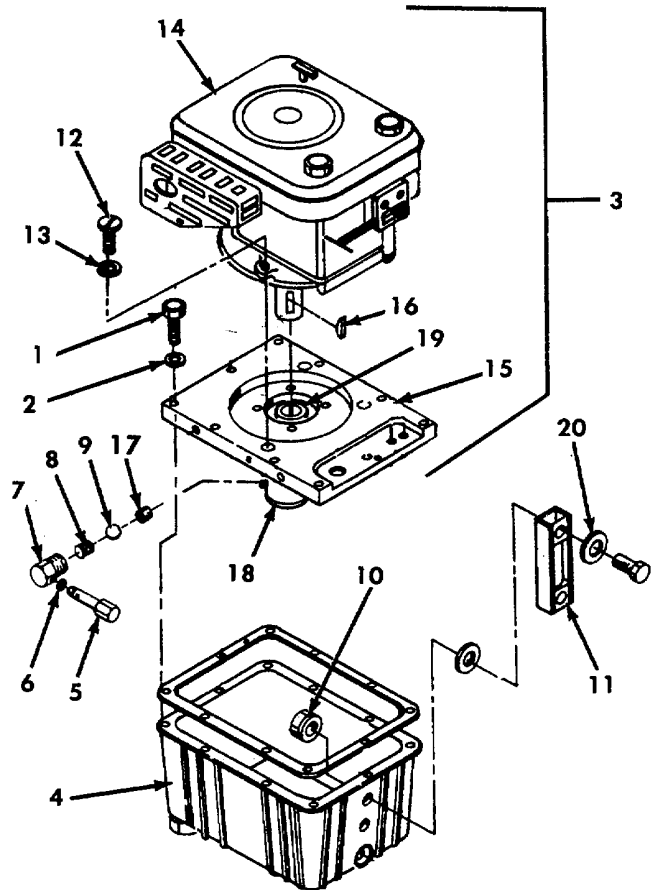
REASSEMBLY

a. Reassembly of Hydraulic Rescue Tool Power Unit.

- (1) Place ball (8) and spring (9) back into pump housing (18) making sure the spring seats properly.

properly.

- (2) Install the relief valve fitting (7) and tighten so that hole is at a 35° angle to the bottom of the pump housing.
- (3) Install gasket (6).
- (4) Torque relief valve subassembly (5) to approximately 25 ft-lb (34 N.m).
- (5) Install engine key (16) in proper position on engine shaft.
- (6) Align engine key (16) with slot in engine pump adapter (19) and carefully slide engine (14) into proper position on cover plate assembly (15).
- (7) Install three engine bolts (12) and lock-washers (13).



**NOTE**

**No seal rings should be located inside the reservoir.**

- (8) Position new liquid level gauge (11) on reservoir (4) making sure the red line is toward the bottom and that the six seat rings (20) are properly positioned.
- (9) Install two locknuts (10) and hand tighten.
- (10) Torque two bolt heads on liquid level gauge (11) to 10 ft-lb (13.6 N.m).
- (11) Set power unit (3) in reservoir (4) with level gauge facing same direction as dump valve .
- (12) Secure with ten screws (1) and lock-washers (2). Torque screws (1) to 10 ft-lb (13.6 N.m).

5-7. RESCUE SAW REPAIR

This task covers: a. Disassembly b. Inspection c. Assembly

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
 Plastic Hammer  
 Gear Puller  
 Tachometer  
 Ring Compressor

Materials/Parts

Grease (Appendix D, Item 22)  
 Adhesive (Appendix D, Item 48)  
 Oil (Appendix D, Item 37)  
 Rescue Saw (1200)

General Safety Instructions

Avoid flame or spark.



Drain gasoline from saw prior to disassembly to avoid fire hazard.

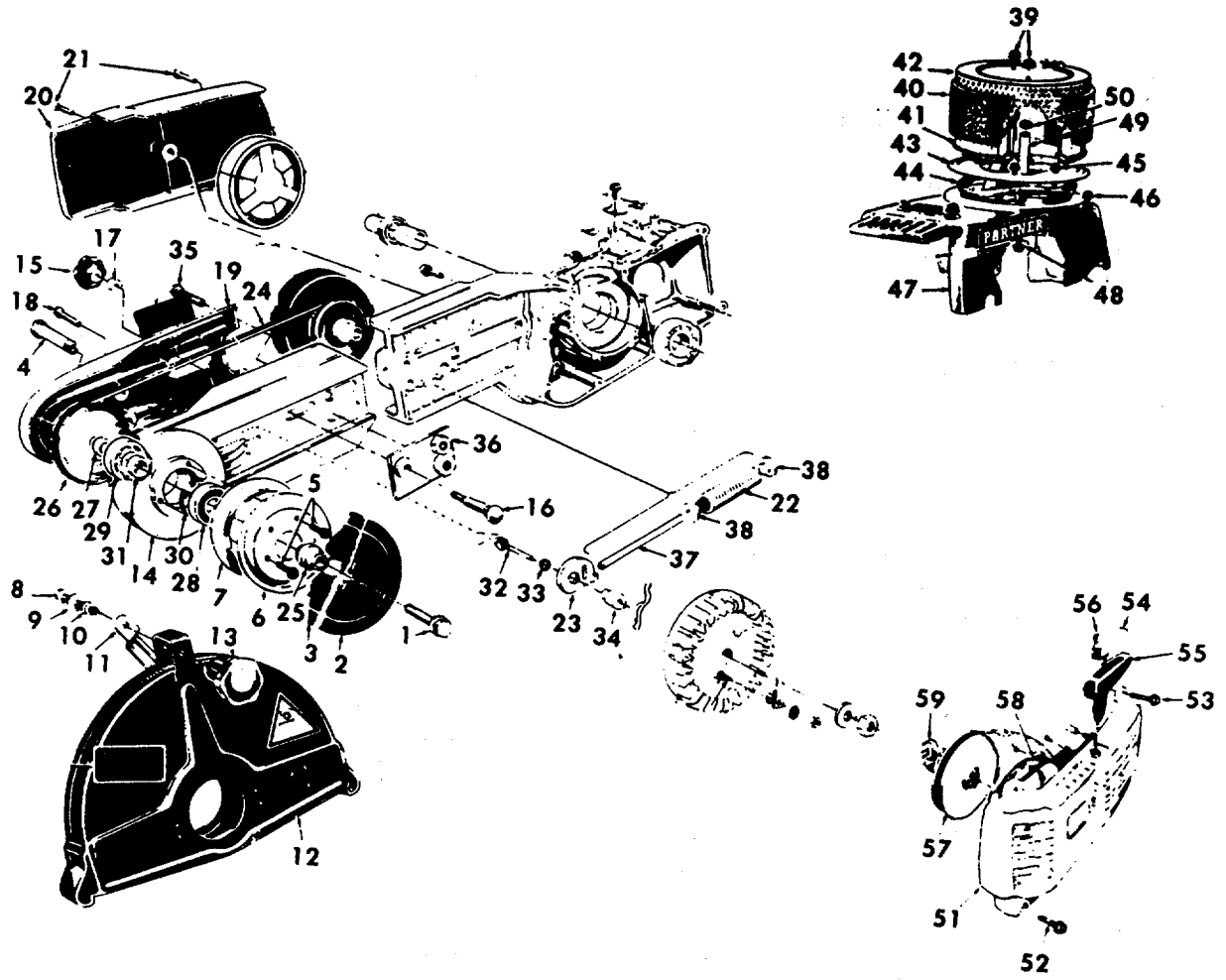
**DISASSEMBLY**

a. Rescue Saw Disassembly.

- (1) Drain gasoline and oil mixture from engine.
- (2) Remove screw (1), remove cutter disc with flange washers (2 and 3) from shaft (4).
- (3) Remove three screws (5) and remove flange support (6) and support (7).
- (4) Remove screw (8) with washer (9) and gasket (10) from cap rod (11), guard (12), and knob (13). Remove guard (12) from cutting arm (14).
- (5) Remove knob (15), screw (16), cap rod (11), and bushing (17). Remove two screws (18) and remove cutting arm guard (19).
- (6) Remove clutch cap (20) by removing two screws (21).
- (7) Relieve tension on spring (22) by turning eccentric (23) counterclockwise, press cutting arm back, and remove belt (24).
- (8) Remove nave case (25) from shaft (4).
- (9) Loosen shaft (4) by striking with a plastic hammer and remove shaft along with pulley (26) and spacer (27) from cutting arm.

- (10) Remove bearings (28 and 29), lock ring (30), and spacer (31) from cutting arm.
- (11) Remove screw (32), washer (33), eccentric (23) and spacer (34).
- (12) Remove cutting arm attaching screw (36), plate nut (36) and remove cutting arm (14).
- (13) Slide out and remove push rod (37) and remove spring (22) with two flanges (38).
- (14) Remove two nuts (39) and remove filter assembly. Remove pre-filter (40) from outside filter cap and separate main filter (41) from filter cap (42).
- (15) Remove filter holder (43) and seal (44) by removing attaching screws (45).
- (16) Remove three screws (46) and remove cylinder casing (47) with two screws (48) two spacers (49) and two washers (50).
- (17) Remove fan casing (51) with starter assembly by removing two screws (52) and three screws (53).
- (18) Pry housing (54) out of handle (55), untie knot in cable (56), and while holding pressure on cable drum (57), allow drum to turn slowly to relieve tension on spring (58).
- (19) Pry off lock spring (59) and remove cable drum (57) with starter cable (56). Separate cable from drum by unwinding cable and removing it.

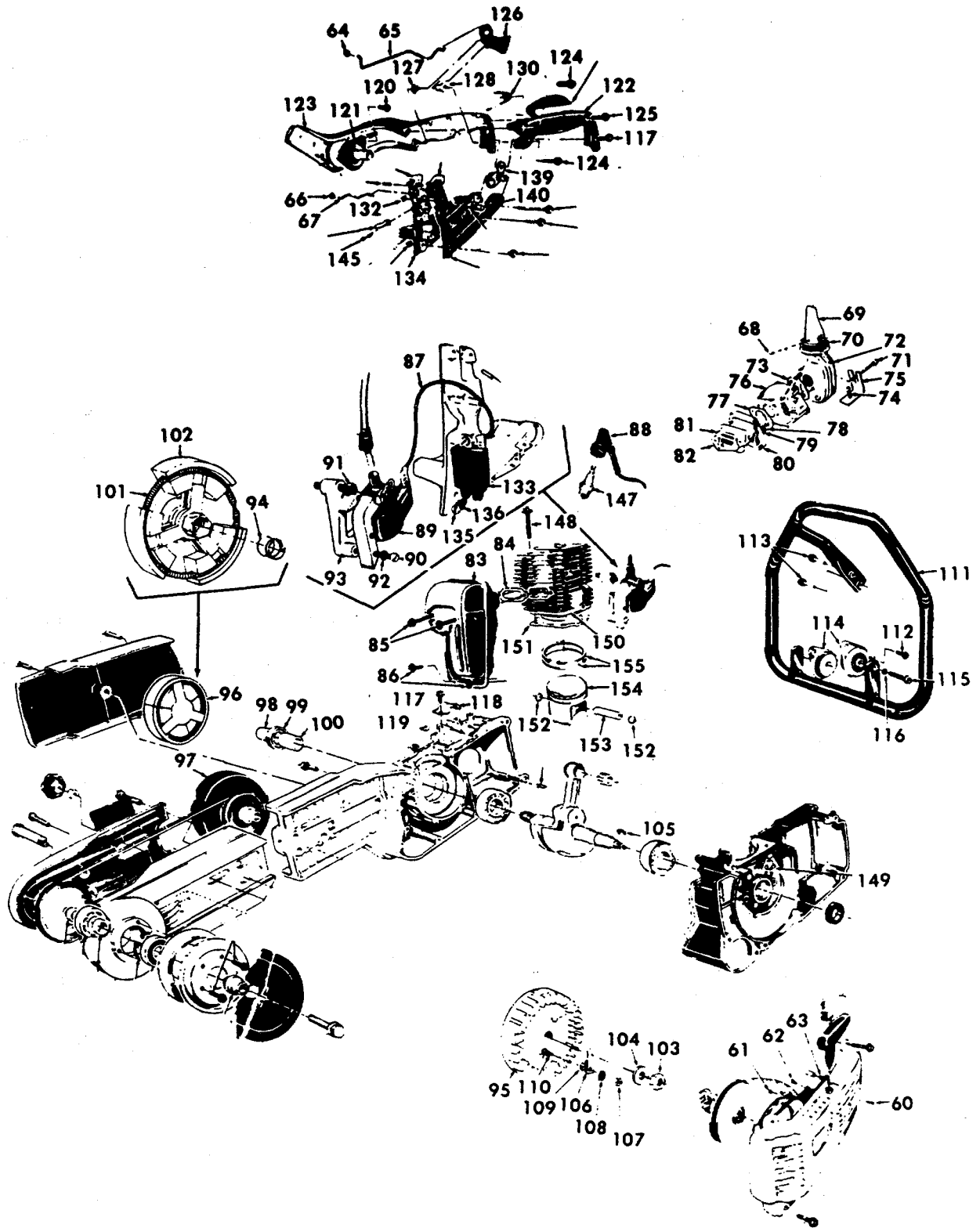
5-7. RESCUE SAW REPAIR (Continued).



**5-7. RESCUE SAW REPAIR (Continued).**

- (20) Remove screw (60) and nut (61) and remove starter spring cassette and spring (58). Separate spring from cassette.
- (21) Remove four screws (62) and remove plate (63).
- (22) Remove lockwasher (64) and disconnect throttle rod (65) from carburetor.
- (23) Remove lockwasher (66) and disconnect choke rod (67) from carburetor.
- (24) Remove two screws (68), and remove spill filter (69) with seal (70).
- (25) Remove two screws (71) and remove intake pipe (72) and gasket (73).
- (26) Remove screw (74) and remove angle (75).
- (27) Remove carburetor (76), gasket (77), two screws (78), two washers (79), seal (80), flange (81), and gasket (82).
- (28) Remove muffler (83) and gasket (84) by removing two screws (85) and two screws (86).
- (29) Disconnect primary cable (87) and ignition cable (88) and remove transistor coil (89), screws (90 and 91), washer (92), and armature plate (93).
- (30) Remove ring and holder (94). Hold flywheel (95) to prevent crankshaft from turning and unscrew clutch assembly (96) from crank-shaft. Remove clutch (96), drive wheel (97), bearing (98), seal (99), and hub (100) from crankshaft.
- (31) Remove spring (101) and centrifugal weights (102).
- (32) Hold the flywheel to prevent the crankshaft from turning and remove nut (103) and washer (104).
- (33) Using a suitable puller, pull flywheel until loose and remove flywheel (95) and woodruff key (105).
- (34) Remove two starter pawls (106) from flywheel by removing nuts (107), washers (108), springs (109) and bolts (110).
- (35) Remove front handle (111) by removing four screws (112) and two screws (113). Separate shock absorbers (114) from handle by removing two screws (115) and two washers (116).
- (36) Remove rear handle by removing three screws (117), plate (118), and two nuts (119). Remove two screws (120) and remove shock absorber (121) from right half of rear handle.
- (37) Separate left hand (122) from right half (123) by removing two screws (124) and one screw (125) and remove throttle control (126), throttle rod (65), washer (127), spacer (128), throttle catch (129) and spring (130).
- (38) Remove bracket assembly from crankcase by removing two screws (131) and two nuts (132).
- (39) Remove electronic ignition (133) from right bracket (134) by removing two screws (135) and two washers (136). Remove primary cable (87).
- (40) Separate right bracket (134) from left bracket (137) by removing screw (138) and remove shock absorber (139), hose (140) and pin (141).
- (41) Remove choke button (142) and stop button (143) by punching out pins (144). Remove choke rod (67).
- (42) Remove screw (145) and remove contact spring (146).
- (43) Remove spark plug (147). Remove four screws (148), four nuts (149), cylinder (150) and gasket (151).
- (44) Remove lock rings (152) and pin (153) and separate piston (154) from crankshaft connecting rod. Remove rings (155) from piston (154).

5-7. RESCUE SAW REPAIR (Continued).





**5-7. RESCUE SAW REPAIR (Continued).**

- (45) Remove fuel tank and disassemble by removing fuel cap (156), O-ring (157), filter (158), vent kit (159), strainer (160), hose (161), nipple (162), sleeve (163), and fuel hose (164) from tank (165).
- (46) Remove screws (150 and 166) and separate right and left hand crankcase halves. Remove crankshaft (167), bearing (168) and gasket (169).
- (47) Remove cylinder pin (170) and bearing (171) from right hand crankcase half (172) and seal (173) nut (174), and bearing (171) from left hand crankcase half (175).

**b. Rescue Saw Carburetor Disassembly.**

- (1) Remove four screws (176) and remove diaphragm cover (177) with diaphragm (178) and gasket (179).
- (2) Remove screw (180), lever (181), lever spindle (182) and spring (183).
- (3) Remove inlet needle valve (184), washer (185), and the valve (186).
- (4) Remove governor (187) and seal (188).
- (5) Remove four screws (189), fuel pump cover (190), gasket (191), pump diaphragm (192) and strainer (193).
- (6) Remove nipple (194), idle screw (195) with nylon ball (196), high speed adjust screw (197) with spring (198) and low speed adjust screw (199) with spring (200).
- (7) Remove screw (201) and throttle flap (202). Remove lockring (203), washer (204) and seal (205). Slide throttle shaft out and remove seal (206), two bushings (207), and spring (208) from shaft (209).
- (8) Remove screw (210), choke flap (211), choke shaft (212), and spring (213) with ball (214).

**INSPECTION****a. Rescue Saw, Ignition Inspection**

- (1) Remove cable (88) from spark plug (147). Hold wire by insulation with terminal end about 1/8 inch from metal body of spark plug.

- (2) Crank engine. If a bright hot spark jumps gap, magneto is operating correctly.
- (3) Remove spark plug (147) and reconnect cable (88).
- (4) Ground plug into cylinder body and crank engine. If hot spark jumps the spark gap, the ignition system is operating satisfactorily.

**b. Rescue Saw Spark Plug Inspection.**

- (1) Remove spark plug (147). Check for any cracks in porcelain and for points that are pitted or burned.
- (2) Check point gap with a wire feeler gauge.

**c. Rescue Saw Magneto Inspection.**

- (1) Inspect transistor coil (89) for cracked or burned insulation. Make sure lead wires are intact, especially where they enter the coil. Inspect for open circuits, shorts, and grounds. Inspect armature plate (93) for cracks, breaks or excessive wear.
- (2) Inspect electronic ignition (133) for damaged lead or dents or gouges in case.

**NOTE**

**Move blade to within 1 inch of magnet. The blade should be pulled against magnet if magnet is properly charged.**

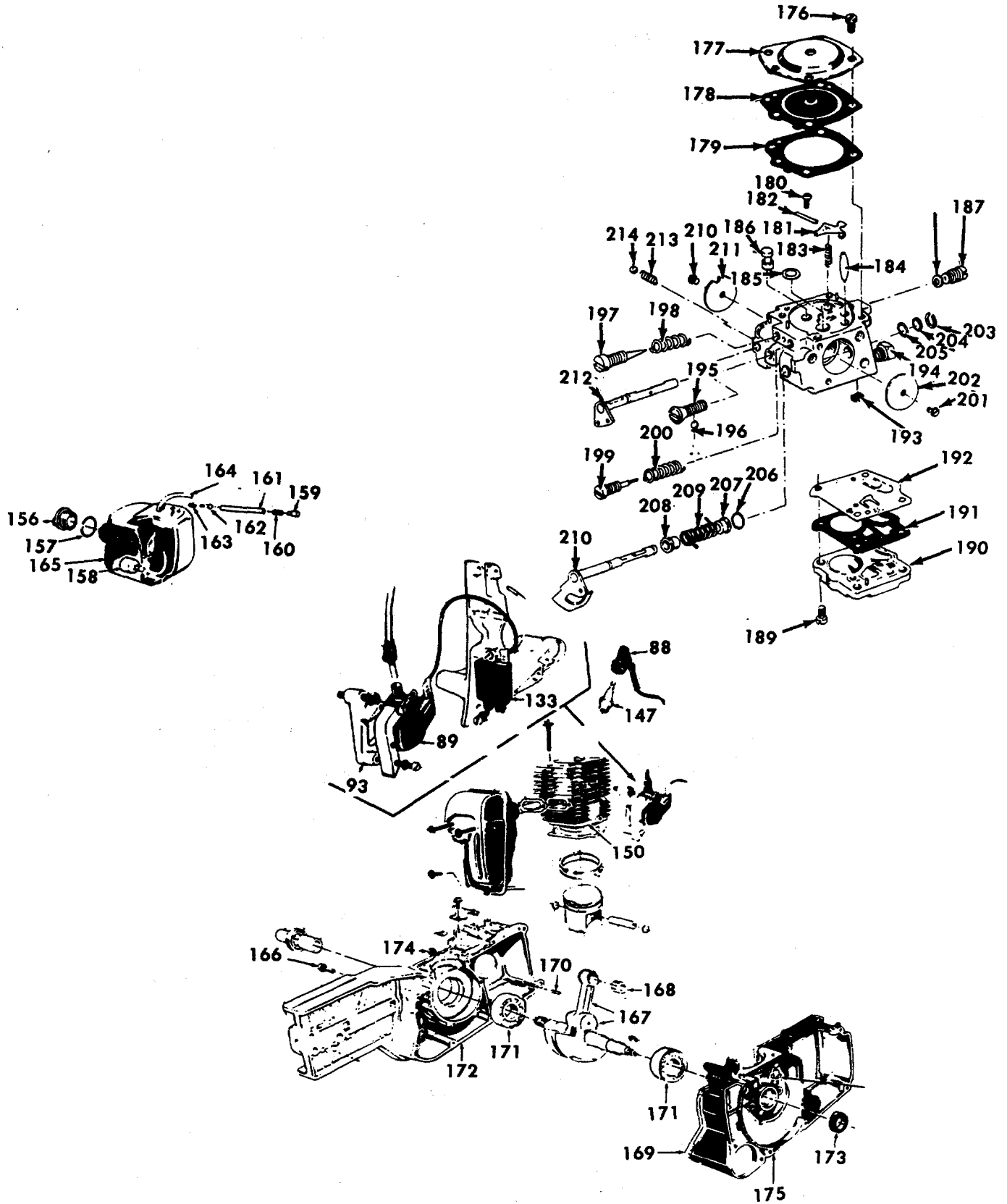
- (3) Check flywheel magnets by holding a screw driver on extreme end of handle with blade down.
- (4) Test magneto by actual engine operation.

**d. Rescue Saw Crankshaft and Piston Inspection.**

**CAUTION**

**Never attempt to straighten a bent crankshaft.**

5-7. RESCUE SAW REPAIR (Continued).



**5-7. RESCUE SAW REPAIR (Continued).**

- (1) Inspect crankshaft (167) for cracks, breaks and misalignment, and crankshaft threads and bearing surfaces for wear, scratches, gouges and flat areas.
- (2) Inspect needle bearing (168) for wear and damage.
- (3) Inspect piston (154) for cracks, uneven wear and damage to ring grooves, and piston pin (153) for wear and looseness of fit.

**e. Rescue Saw Cylinder, Crankcase and Muffler Inspection.**

- (1) Inspect cylinder (150) and crankcase (175) and 172) for broken or cracked pins, warped head mounting surfaces, worn or scored bearings, distorted or worn threads.
- (2) Inspect cylinder cooling fins for cracks or breaks.
- (3) Inspect clutch (96) for bearings and springs that are worn, scored, damaged, cracked or distorted.
- (4) Inspect muffler (83) for cracks, breaks, or excessive burning.

**f. Rescue Saw Filter Assembly, Cylinder Casing, Spill Filter and Intake Pipe Inspection.**

- (1) Inspect cylinder casing (47), filter cap (42), and filter holder (43) for cracks, dents, or other damage.
- (2) Inspect prefilter (40) for deterioration and clogging.
- (3) Inspect main filter (41) for cleanliness and overall condition.
- (4) Inspect spill filter (69) for cleanliness and general condition.
- (5) Inspect seal (70) for general condition and intake pipe (72) for dents, cracks, or other damage.

**g. Rescue Saw Cutter Blade Assembly Inspection**

- (1) Inspect shaft (4), pulley (26), bearings (28) and 29), spacer (31), flange washers (2 and 3), flange support (6), and support (7) for distortion, wear, and breaks.
- (2) Inspect cutting arm (14), guard (19), knob (13) and glade guard (12) for cracks, bends, burns, and worn threads.

**h. Rescue Saw V-Belt Tensioner Inspection.**

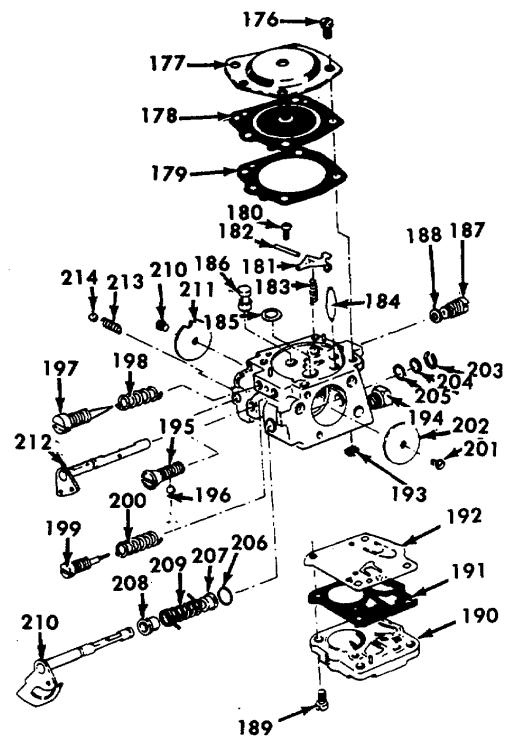
- (1) Inspect belt (24) for fraying, stretching and general good condition.
- (2) Inspect eccentric (23) and spacer (34) for wear and distortion.
- (3) Inspect push rod (37) and flanges (38) for wear, cracks, or distortion.
- (4) Inspect spring (22) for wear, distortion or breaks.

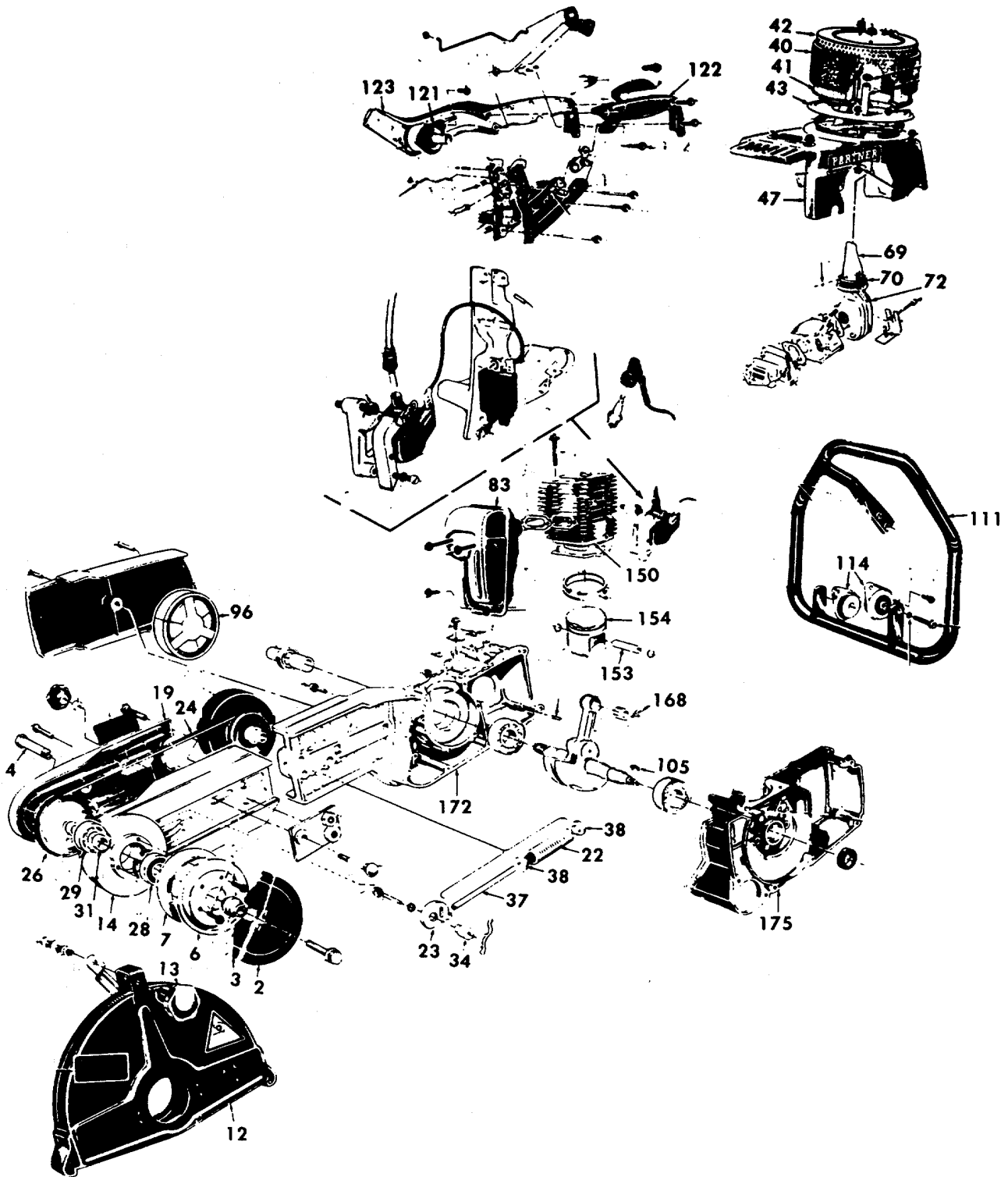
**i. Rescue Saw Handle and Controls Inspection**

- (1) Inspect tabular front handle (111) for cracks, dents, or gouges, and inspect shock absorbers (114 and 121) for deterioration and general condition.
- (2) Inspect rear handle (123 and 122) for cracks, breaks or distortion, and inspect all controls for general condition.

**j. Rescue Saw Carburetor Inspection.**

- (1) Check needle points on adjust screws (199) and 197) and idle screw (195) for wear. Inspect needle point for ridges, indentations, or flat spots.
- (2) Check all springs for distortion, crack or breaks.





**5-7. RESCUE SAW REPAIR (Continued).**

- (3) Check carburetor valves and seats for wear, scoring, or other damage.
- (4) Check carburetor body for cracks, clogged passage and worn bushings.
- (5) Check throttle shaft (210) and choke shaft (212) for wear on bearing surfaces, distortion or other damage.
- (6) Inspect fuel pump diaphragm (192) for damage on the flaps and for signs of leakage. Inspect main diaphragm (178) for leaks, looseness and wrinkles.
- (7) Using a tachometer, check that engine speed is 6500 rpm while throttle in full speed position and that clutch engages belt and blade at approximately 3200 rpm. Warm engine thoroughly and adjust full-throttle speed and idle speed which should be a little faster than necessary to rotate blade cutter.
- (7) Install washer (185), valve (186), and inlet needle valve (184).
- (8) Install spring (183), lever spindle (182), lever (181) and screw (180).
- (9) Install gasket (179), diaphragm (178), and cover (177) and secure with four screws (176).

**b. Rescue Saw Assembly.**

- (1) Warm both halves of the crankcase. Grease the main bearings (171) using grease (Appendix D, Item 22) and install on crankshaft assembly (167). Install seals (99 and 173) and hub (100). Install crankshaft (167) and cylinder pin (170) in left hand half crankcase. Apply adhesive (Appendix D, Item 48) to both sides of crankcase gasket (169) which is held in position by cylinder pin (170). Assemble the two crankcase halves (175 and 172) together and secure with screws (166 and 174). Install needle bearing (98) on clutch end of crankshaft and needle bearing (168) in connecting rod.
- (2) Assemble fuel hose (164), sleeve (163), nipple (162), hose (161), strainer (160), vent kit (159) and filter (158) onto tank (165).
- (3) Install tank into crankcase and complete assembly by installing O-ring (157) and cap (156).
- (4) Install piston (154) onto connecting rod with pin (153) and two lock rings (152). Install two rings (155) onto piston (154). Thoroughly oil piston (Appendix D, Item 37) and rings. Compress rings with a suitable ring compressor and install gasket (151) and cylinder (150) with four screws (148) and four nuts (149).
- (5) Install contact spring (146) with screw (145).
- (6) Install stop button (143) in left bracket (137) and choke button (142) in right bracket (134) and secure with pins (144). Connect choke rod (67) to choke button (142).

**ASSEMBLY****a. Rescue Saw Carburetor Assembly.**

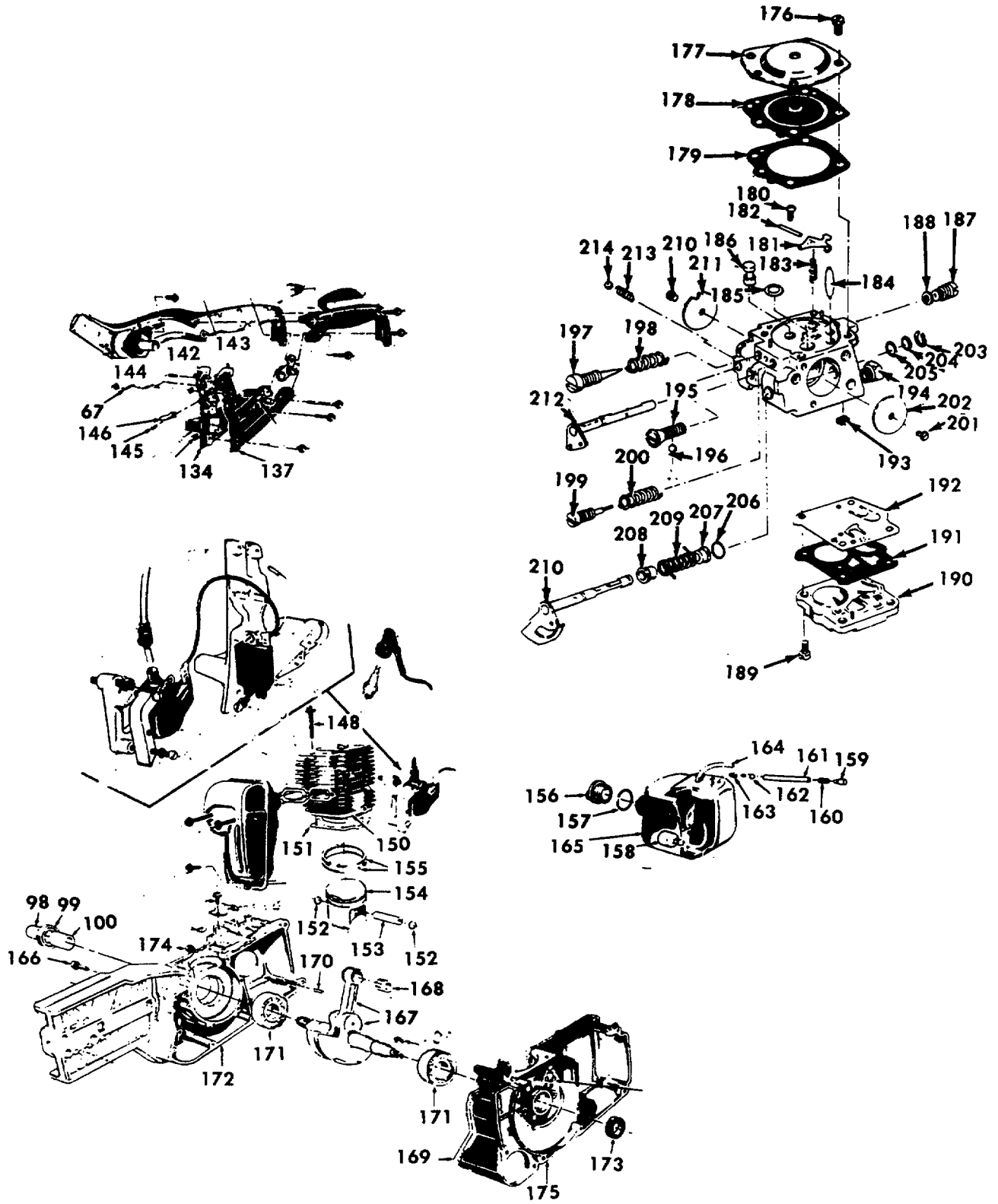
- (1) Insert spring (213) with ball (214) into carburetor body. Insert choke shaft (212) through carburetor body and attach choke flap (211) into shaft with screw (210).
- (2) Assemble spring (209) with two bushings (207) and seal (206) onto shaft (210). Install shaft (210) into carburetor body and secure with seal (205), washer (204) and lock ring (203). Install throttle flap (202) onto shaft (210) with screw (201).
- (3) Install nipple (194) and idle screw (195) with nylon ball (196).

**CAUTION**

**Do not screw down the jet adjustment screws hard since this can damage the seats.**

- (4) Install high speed adjust screw (197) with spring (198) and low speed adjust screw (199) with spring (200).
- (5) Install strainer (193), diaphragm (192), gasket (191), fuel pump cover (196) and secure with four screws (189).
- (6) Install seal (188) and governor (187).

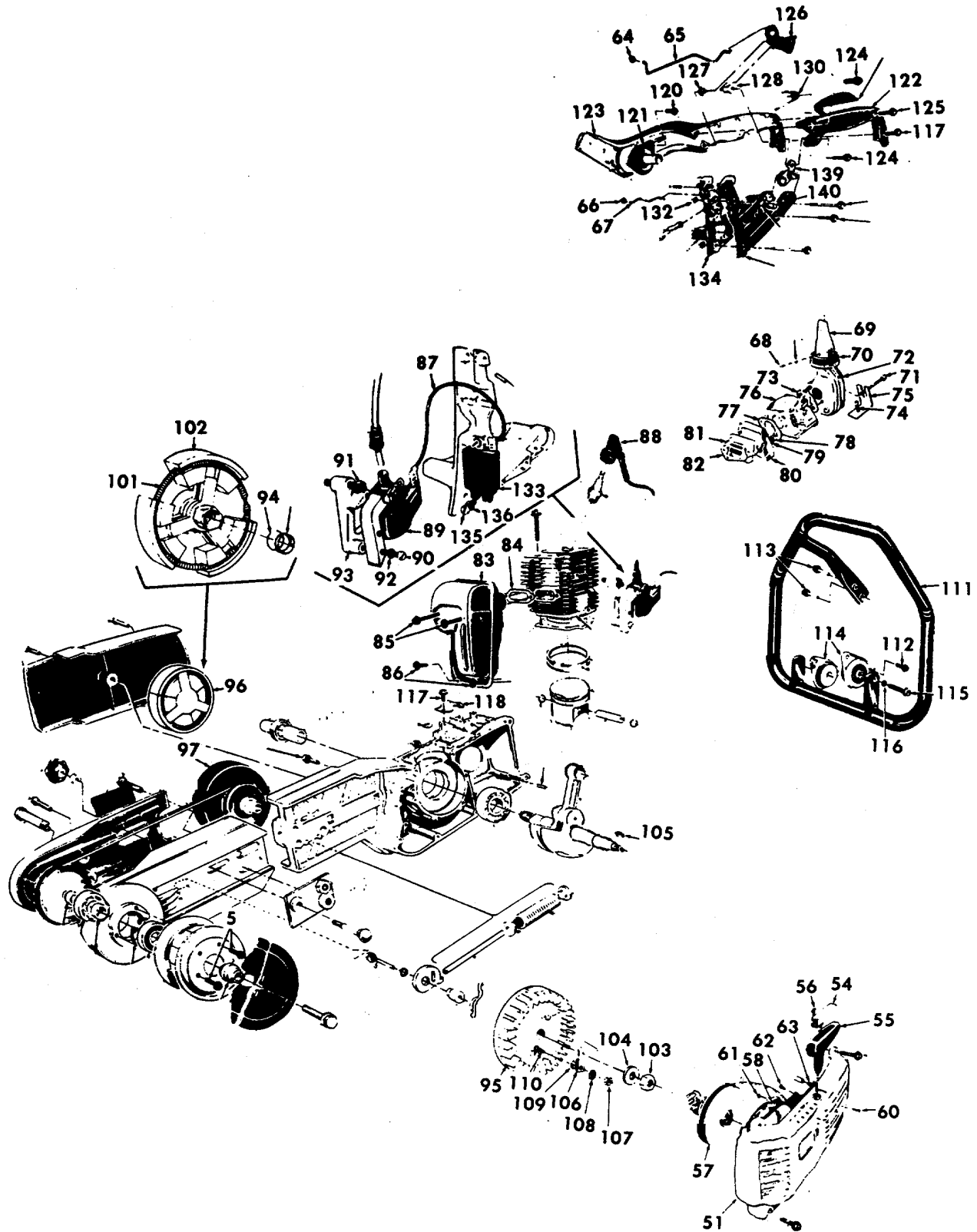
5-7. RESCUE SAW REPAIR (continued).



**5-7. RESCUE SAW REPAIR (Continued).**

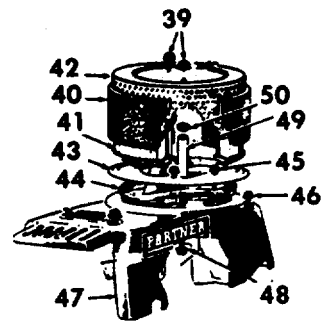
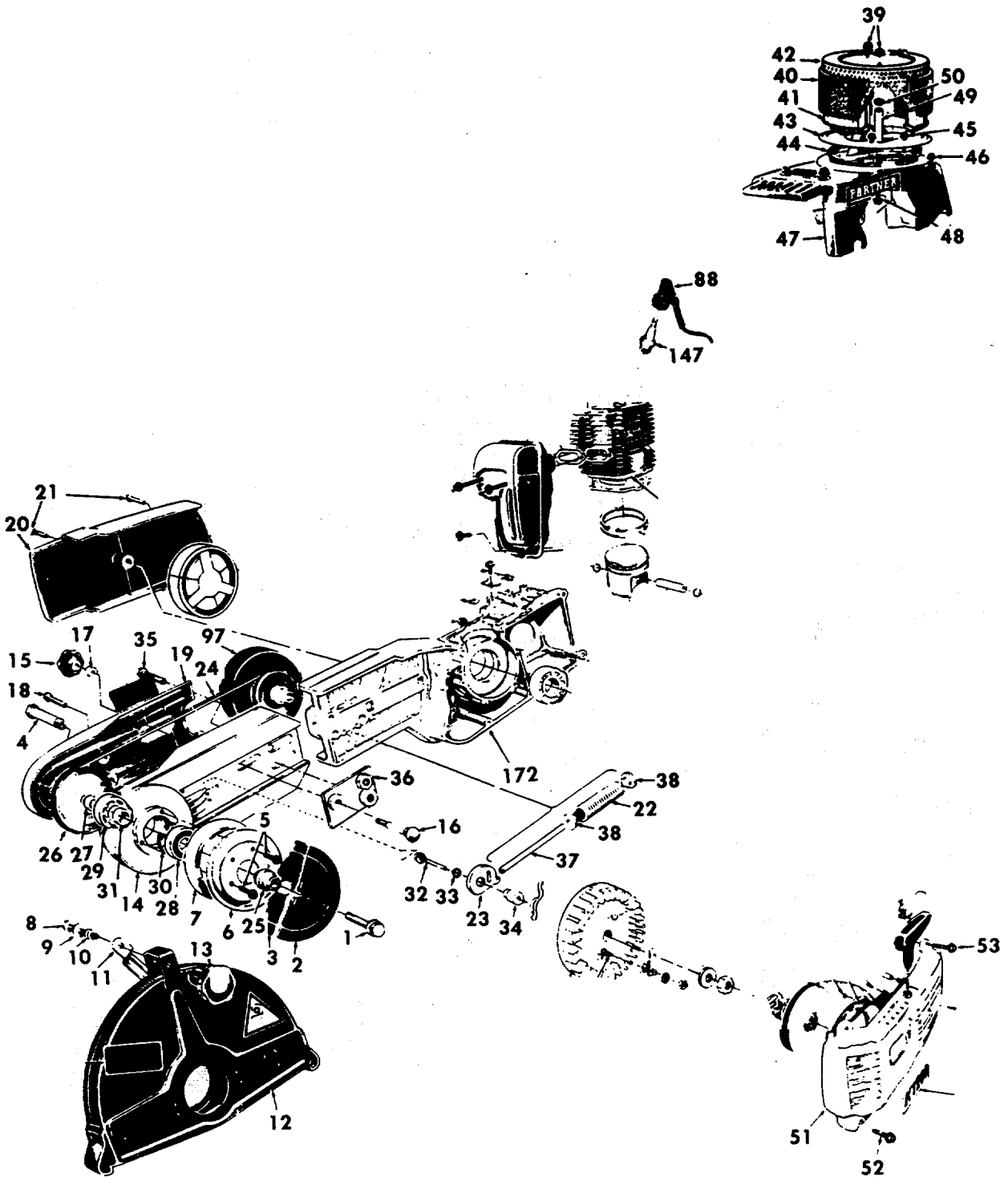
- (7) Assemble pin (141), hose (140), and shock absorber (139) into either left or right bracket and join left bracket (137) to right bracket (134) with screw (138).
- (8) Install electronic ignition (133) on right bracket and secure with two screws (135) and two washers (136). Connect primary cable (87) to ignition.
- (9) Attach bracket assembly to crankcase with two screws (131) and two nuts (132).
- (10) Assemble throttle catch (129), spring (130), spacer (128), washer (127), throttle control (126), with throttle rod (65), into rear handle assembly, and join the left half (122) to the right half (123) with two screws (124) and one screw (125).
- (11) Install shock absorber (121) with two screws (120).
- (12) Place shock absorber shaft on top of crankcase in place provided and secure with two screws (117) and plate (118).
- (13) Secure rear of handle assembly to shock absorber (139) with one screw (117).
- (14) Install two shock absorbers (114) on front handle (111) with two screws (115) and two washers (116). Install front handle assembly (111) and secure with four screws (112) and two screws (113).
- (15) Install two starter pawls (106) onto flywheel (95) with two bolts (110), two springs (109), two washers (108), and two nuts (107). Place woodruff key (105) in slot provided on crankshaft and slide flywheel (95) onto crankshaft making sure key remains in place. Install washer (104) and nut (103); and while holding flywheel to prevent crankshaft from turning, tighten nut (103).
- (16) Install drive wheel (97) onto crankshaft. Assemble centrifugal weight (102) with spring (101) onto hub and install clutch assembly (96) onto crankshaft with ring (179) and holder (94). Hold the flywheel to prevent the crankshaft from turning and tighten clutch (96) to a snug fit.
- (17) Install armature plate (93) with screws (90) and 91 and washers (92). Attach primary coil (89) and connect primary cable (87) and ignition cable (88).
- (18) Install muffler (83) and gasket (84) with two screws (85) and two screws (86).  
Install gasket (82), flange (81), seal (80), two washers (79), two screws (78), gasket (77), and carburetor (76).
- (19) Install angle (75) with screw (74).
- (20) Install gasket (73) and intake pipe (72) and secure with screws (71). Place seal (70) and spill filter (69) on intake pipe and secure with two screws (68) and two washers (180).
- (21) Connect choke rod (67) to choke shaft on carburetor and secure with lockwasher (66). Connect throttle rod (65) to throttle shaft on carburetor and secure with lockwasher (64).
- (22) Assemble starter assembly into fan casing (51).
- (23) Install plate (63) in fan casing with four screws (62).
- (24) Assemble starter spring (58) with starter cable drum (57) into spring cassette. Place eyelet of spring into cable drum then fit into place and secure with screw (60) and nut (61).
- (25) Lift up cable drum (57), pull starter cable through hole in cable drum, then through fan casing (51). Attach end of cable (56) to cable drum. Take up a few turns of the cable and secure cable drum with lock spring.
- (26) Pull end of starter cable (56) through handle (55) and housing (54). Tension spring (58) by turning cable drum clockwise one or two turns. Hold tension on spring and secure cable in housing (54) by tying a knot.

5-7. RESCUE SAW REPAIR (Continued).





5-7. RESCUE SAW REPAIR (Continued).



**5-7. RESCUE SAW REPAIR (Continued).**

- (27) Pull starter cable to make sure the starter unit functions before installing fan casing (51).
  - (28) Install fan casing (5 1) and secure with two screws (52) and three screws (53).
  - (29) Install seal (44) and filter holder (43) with two screws (45).
  - (30) Place main filter (41) inside filter cap (42) and prefilter (40) around outside of filter cap.
  - (31) Insert two screws (48) up through cylinder casing and install spacer (49) and washer (50) on each screw.
  - (32) Place filter assembly onto filter holder with screws (48) protruding through filter cap. Install two nuts (39) and tighten.
  - (33) Place cylinder casing (47) over crankcase and cylinder assembly and secure with three screws (46).
  - (34) Place spring (22) with two flanges (38) into slot provided in cutting arm portion of right crankcase (172). Insert push rod (37) into hole in forward end of crankcase.
  - (35) Install cutting arm (14) and secure with nut plate (36) and screw (35).
  - (36) Install eccentric (23) on cutting arm with spacer (34), screw (32) and washer (33).
  - (37) Install spacer (31), lock ring (30), and bearings (28 and 29) into cutting arm (14).
  - (38) Place pulley (26) and spacer (27) on shaft (4) and insert shaft through bearings in cutting arm. Install nave case (25) on shaft (4).
  - (39) Insert screw (16) through slot of cap rod (11), then through nut plate (36) and cutting arm. Place cutting disc guard (12) on cutting arm and install support (7), flange support (6), and three screws (5). Attach upper end of cap rod (11) to guard (12) with screw (8), washer (9), gasket (10), and knob (13).
  - (40) With cutting arm pushed to its full rearward position, install V-belt (24) on drive wheel (97) and pulley (26). Turn eccentric (23) clockwise to its full down position to tension belt. Tighten attaching screw (35) with socket wrench.
  - (41) Install clutch cap (20) and secure with two screws (2 1). Install cutting arm guard (19) and secure with two screws (18), then install bushing (17) and knob (15).
  - (42) Install spark plug (147) and connect ignition cable (88).
  - (43) Place desired cutting disc on shaft with flange washer (3) on inside and flange washer (2) on outside and secure with screw (1).
-

**Section IV. MAINTENANCE OF DIESEL FUEL INJECTION SYSTEM**

General.....	Para. 5-8
Injection Pump/Governor Repair .....	5-9

**5-8. GENERAL.**

This section contains information on the maintenance of the diesel fuel injection system that are maintainable at the Direct Support level.

**5-9. INJECTION PUMP REPAIR**

This task covers:            a. Disassembly            b. Inspection            c. Assembly

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description  
4-70 Fuel Transfer Pump Removed

Materials/Parts

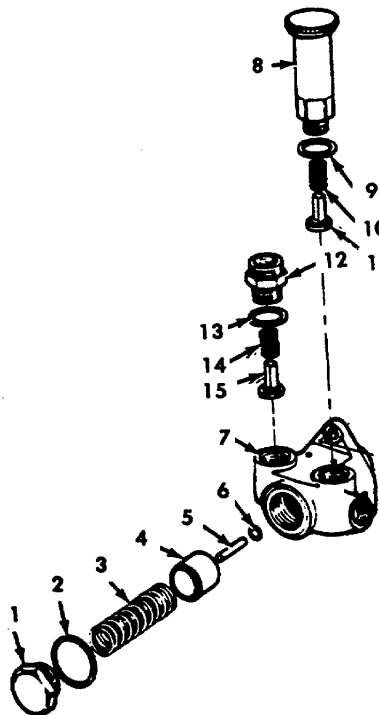
Gasket (625550C1)  
Diesel Fuel (Appendix D, Item 18)  
O-Ring (691272C1)  
Gasket (670882C1)

**DISASSEMBLY**

**NOTE**

**Return injection pump or governor to manufacturer's authorized service center when repairs are required.**

- a. Remove plug (1), gasket (2), spring (3), piston (4), spindle (5), and o-ring (6) from housing (7).
- b. Remove hand priming pump (8) and gasket (9). Use care not to lose or damage spring (10) or valve (11).
- c. Remove fitting (12) and gasket (13). Use care not to lose or damage spring (14) or valve (15).
- d. Clean parts in diesel fuel (Appendix D, Item 18).



**5-9. INJECTION PUMP/GOVERNOR REPAIR (Continued).**

**INSPECTION**

Inspect parts for cracks, wear or other damage.

**ASSEMBLY**

- a. Replace damaged or worn parts.
- b. Replace O-ring (6) and gasket (2, 9, and 13).

- c. Install valve (15), spring (14), gasket (13), and fitting (12) on housing (7).
- d. Install valve (11), spring (10), gasket (9), and hand pump (8).
- e. Install O-ring (6), spindle (5), piston (4), spring (3), gasket (2), and plug (1).
- f. Return injection pump/governor assembly to manufacturer's authorized service center if further repair is required.
- g. Install fuel supply pump (paragraph 4-70).

**Section V. MAINTENANCE OF ENGINE AND ACCESSORIES**

Alternator Repair.....	Para. 5-12
Engine Mounting Replacement.....	5-14
Engine Replacement.....	5-11
General.....	5-10
Starter Repair.....	5-13

**5-10. GENERAL.**

This section contains information on the maintenance of the engine and accessories that are maintainable at the Direct Support level.

**5-11. ENGINE REPLACEMENT**

This task covers:            a. Removal            b. Installation

**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- Hoist
- Lifting Chain
- Engine Stand

Personnel Required: 2

Materials/Parts

Engine (DT-466C)

Equipment Condition

Para.	Condition Description
4-59	Deaeration Tank Removed
4-60	Fan Shroud Removed
4-61	Fan Removed
4-66	Radiator Removed
4-68	Air Cleaner Removed
4-75	Injection Lines Removed
4-79	Exhaust Pipes Removed
4-84	Alternator Removed
4-86	Starter Removed
4-91	Dipstick and Tube Removed
4-124	Hood Removed
4-128	Radiator Support Removed
4-148	Engine Wiring Removed
4-156	Transmission Removed
4-183	Power Steering Pump Removed
5-14	Engine Mounting Bolts Removed

5-11. ENGINE REPLACEMENT (Continued).

REMOVAL

- a. Remove crankcase ventilation tube (1), oil cooler (2), pressure regulator valve (3), turbocharger oil return elbow (4) and oil filter base (5) with filters (6) from crankcase (7).

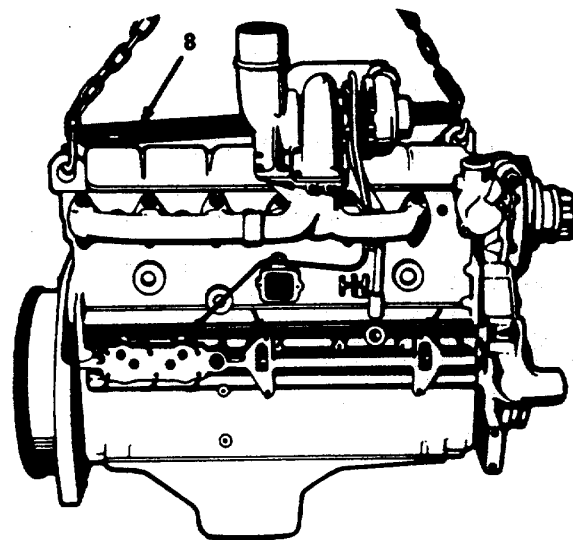
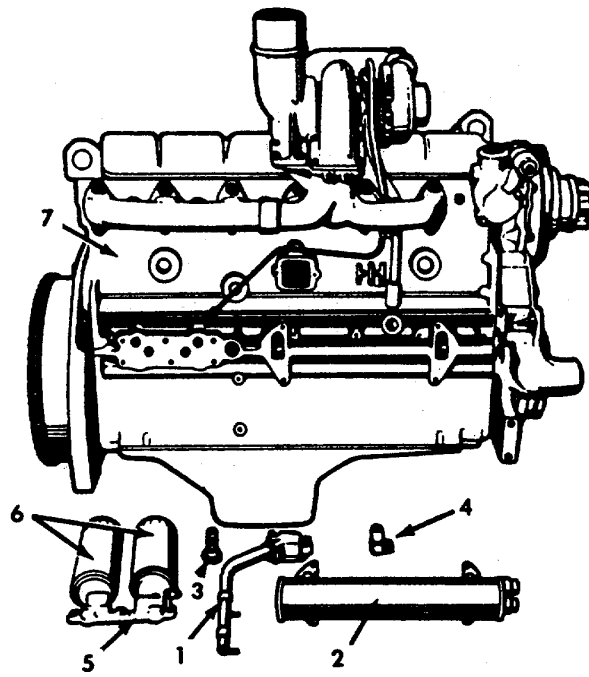
**WARNING**

Make sure safety catch on hoist hook functions properly.

**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.

- b. Position engine lifting device and carefully remove the engine from the vehicle.
- c. Hoist the engine to the engine stand. Insert a 2x4 inch board (Appendix D, Item 4) of appropriate length between the ends of the lifting chains as shown. This will prevent the possibility of the lifting eyes turning and damaging the rocker arm cover.



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 oil filters (6) with base (5) on crankcase (7).
- c. Install turbocharger oil return elbow (4), pressure regulator valve (3), oil cooler (2) and crankcase ventilation tube (1).
- d. Install engine mounting bolts (paragraph 5-14).
- e. Install power steering pump (paragraph 4-183).
- f. Install transmission (paragraph 4-156).
- g. Install engine wiring (paragraph 4-148).

**5-11. ENGINE REPLACEMENT (Continued).**

- h. Install radiator support (paragraph 4-128).
- i. Install hood (paragraph 4-124).
- j. Install dipstick and tube (paragraph 4-91).
- k. Install starter (paragraph 4-86).
- l. Install alternator (paragraph 4-84).
- m. Install exhaust pipes (paragraph 4-79).
- n. Install injection lines (paragraph 4-75).
- o. Install air cleaner (paragraph 4-68).
- p. Install radiator (paragraph 4-66).
- q. Install fan (paragraph 4-61).
- r. Install fan shroud (paragraph 4-60).
- s. Install deaeration tank (paragraph 4-59).

**5-12. ALTERNATOR REPAIR**

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This task covers:	a. Disassembly	b. Test	c. Assembly
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**INITIAL SET-UP**

Tools

- Lathe
- Voltmeter
- General Mechanics Tool Kit
- Heat Gun
- Bearing Puller (J-8433)
- Arbor Press
- Ammeter

Materials/Parts

- Solder (Appendix D, Item 53)
- Loctite (Appendix D, Item 27)
- Anerobic Sealant (Appendix D, Item 49)
- Alternator (A0018050AB)

Equipment Condition

Para.	Condition Description
4-84	Alternator Removed

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5-12. ALTERNATOR REPAIR (Continued).

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.

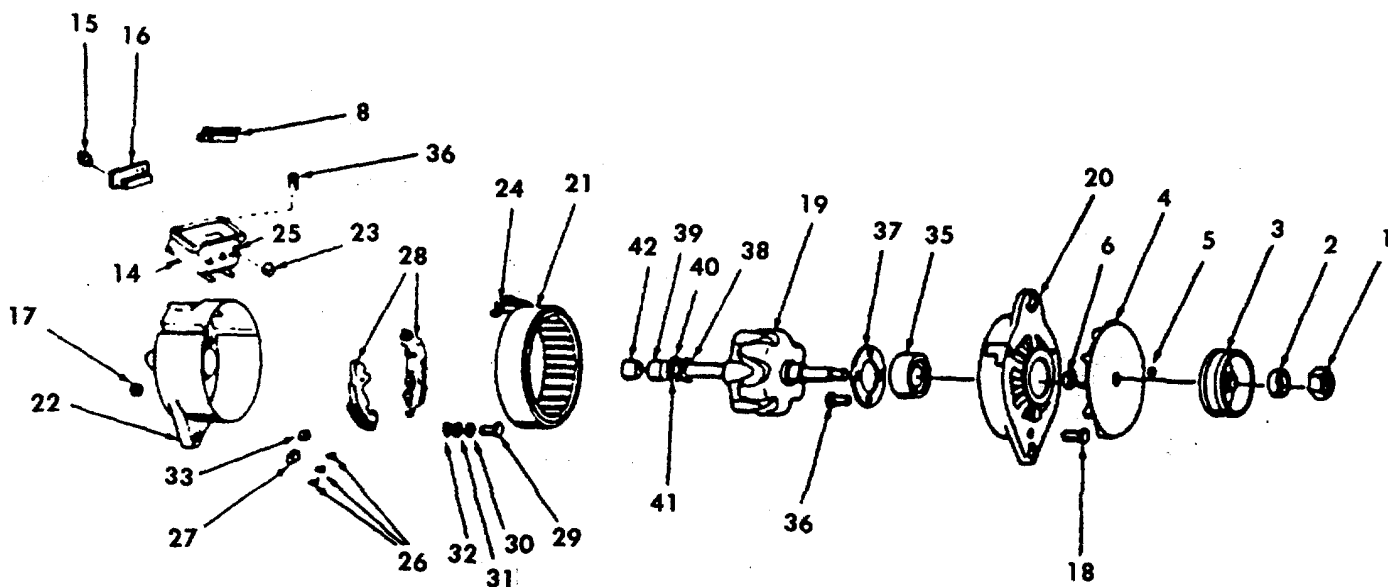
NOTE

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).

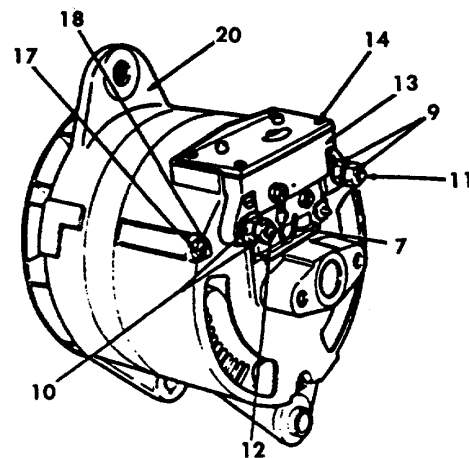
Ensure that drive end housing (20) separates from stator (21) and that the stator remains attached to the slip ring end housing (22) to avoid damage to the stator leads.

- g. Remove rotor (19) and drive end housing assembly (20) from stator (21) and slip ring end housing assembly (22).
- 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), guard washers (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).



**5-12. ALTERNATOR REPAIR (Continued).**

- 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).



**TEST**

**NOTE**

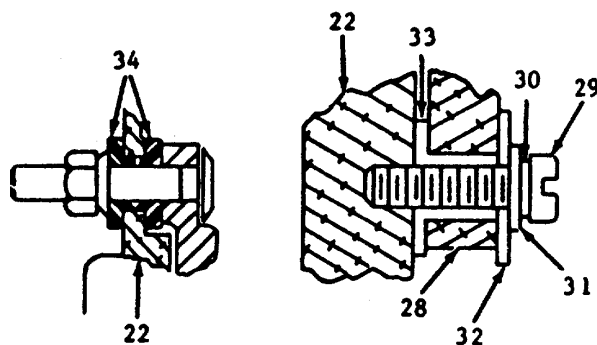
Before performing these tests, inspect all parts for wear, cracks, or other mechanical defects. Replace all damaged parts.

- 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 shortened 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.
- (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 shortened or open diode is detected, replace the entire heat sink assembly.



5-12. ALTERNATOR REPAIR (Continued).

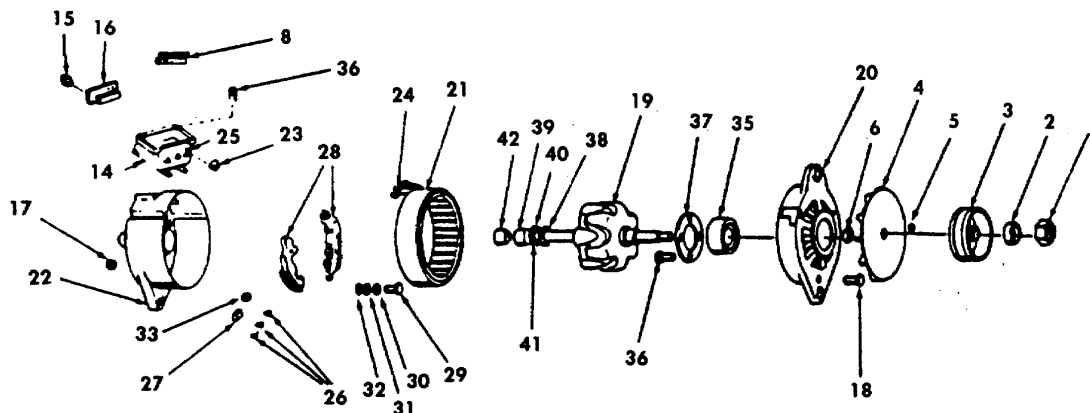
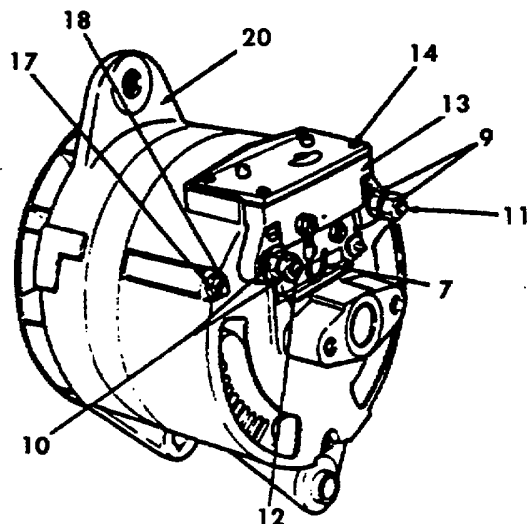
ASSEMBLY

- a. Install bearing (42) on the inner race of the bearing (19).
- b. Press on new slip ring assembly (39, 40, and 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 rotor coil leads (38) to slip ring assembly using a heat gun and solder (Appendix D, Item 53).
- 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).
- 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).
- i. Install the regulator (8) and brushes (36) in the housing (22).
- j. Install jumpers (24) using 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 27).
- m. Install nuts (9 and 10) 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).
- p. Install alternator (paragraph 4-84).

NOTE

Spray the terminal body assembly with sealant (Appendix D, Item 41).

- 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.



**5-13. STARTER REPAIR.**

This task covers:      a. Disassembly      b. Test      c. Assembly

**INITIAL SET-UP**

Tools

Ammeter  
 Voltmeter  
 General Mechanics Tool Kit  
 Test Light

Materials/Parts

Solvent (Appendix D, Item 54)  
 Lubricant (Appendix D, Item 32)  
 Starter (1990405)

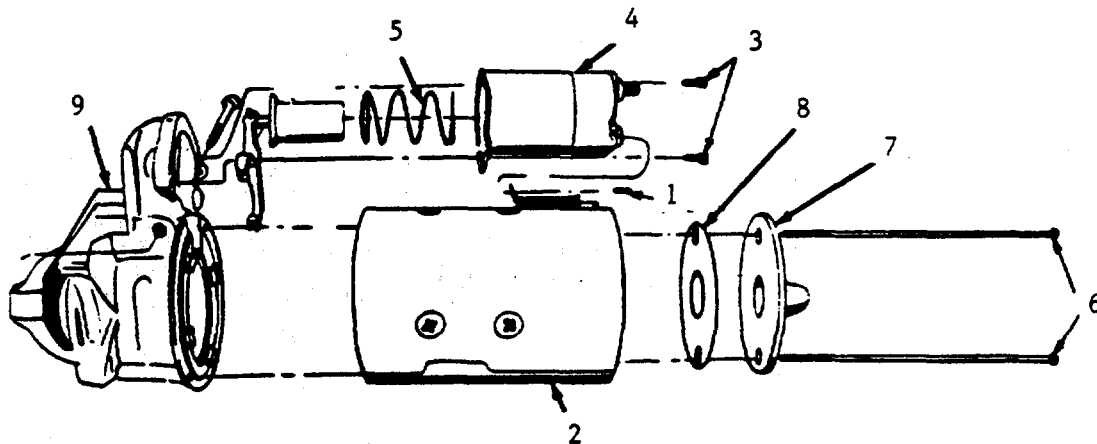
Equipment Condition

Para.	Condition Description
4-86	Starter Removed

**DISASSEMBLY**

a. Starter disassembly.

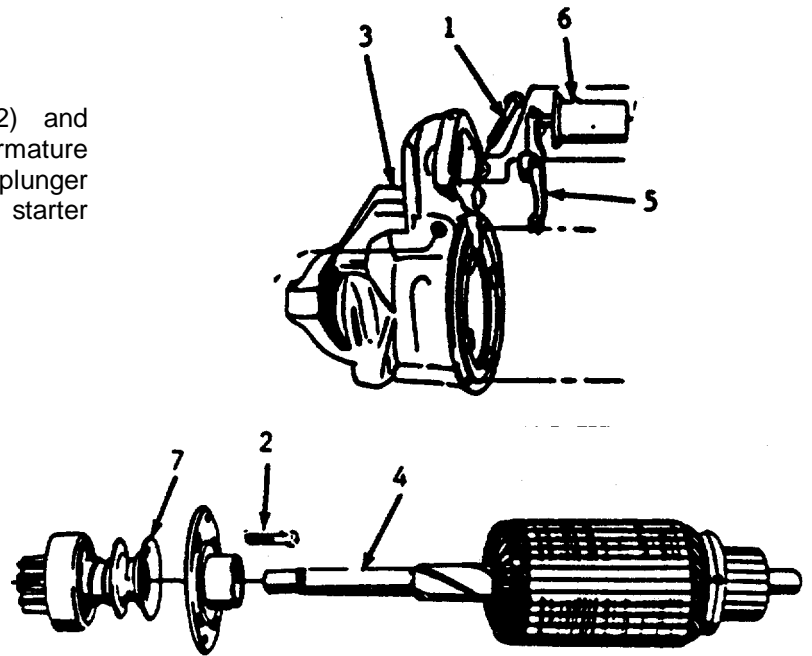
- (1) Remove screw (1) from field coil connector (2) and solenoid mounting screws (3). Rotate solenoid (4) 90 degrees and remove along with plunger return spring (5). Solenoid may now be serviced without further starter disassembly at this time.
- (2) Remove two through bolts (6), then remove commutator end frame (7), remove insulator (8). Remove field frame assembly (2) from drive gear housing.



**5-13. STARTER REPAIR. (Continued).**

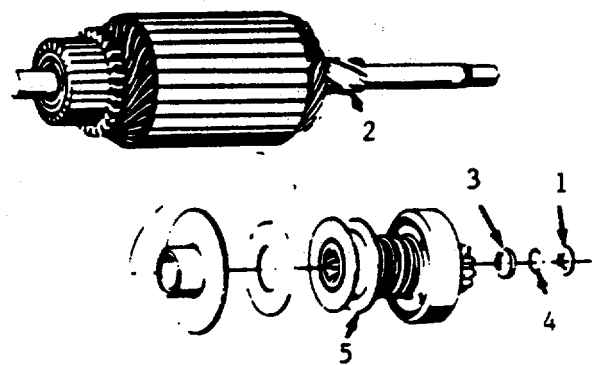
b. Shift lever and plunger removal.

- (1) Remove shift lever pilot 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 (7).



c. Remove drive assembly from shaft.

- (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 remove retainer off snapping (4).
- (3) Remove snapping (4) from groove in shaft.



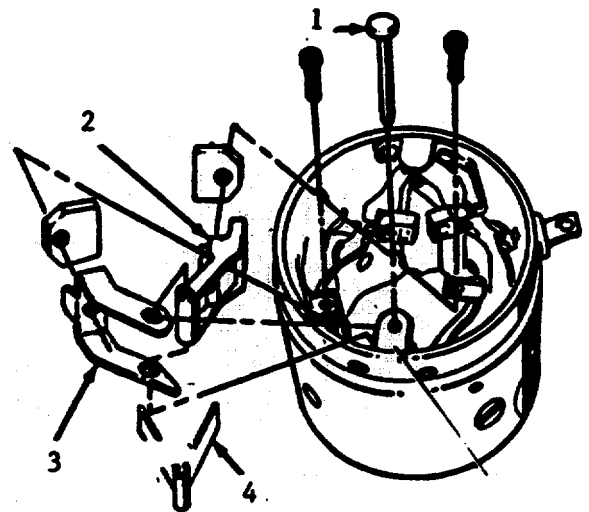
**NOTE**

**If snapping is distorted, it will be necessary to use a new one on reassembly.**

- (4) Remove retainer (3), clutch assembly (5), from armature shaft (2).

d. Replace brush holder.

- (1) Remove brush holder pivot pin (1) which positions one insulated (2) and one grounded bush (3).
- (2) Remove brush spring (4).
- (3) Replace brushes as necessary.



5-13. STARTER REPAIR. (Continued).

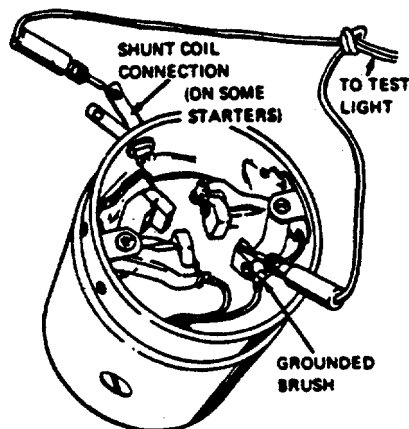
TEST

- a. Testing shunt coil for open.



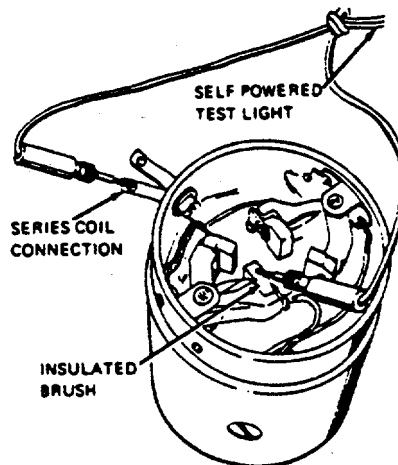
Cleaning solvent, Federal Specification P-D-680 is both toxic and flammable. Keep off skin. Use only in a well ventilated area and avoid prolonged breathing of vapors. Keep away from open flame.

- (1) Clean all starting motor parts with solvent (Appendix D, Item 54).
- (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) 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.

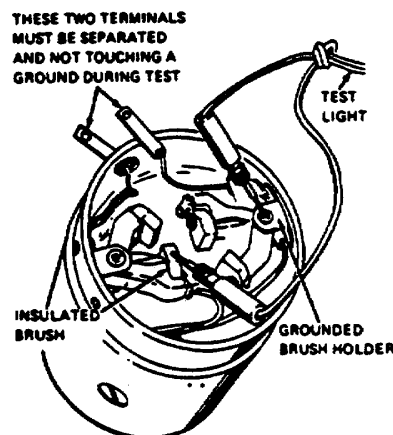
Using a test lamp, place one lead on the series coil terminal and the other lead on the insulated brush. If the lamp fails to light, the series coil is open and will require repair or replacement. This test should be made from each insulated brush to check brush and lead continuity.



**5-13. STARTER REPAIR. (Continued).**

- c. Test 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.

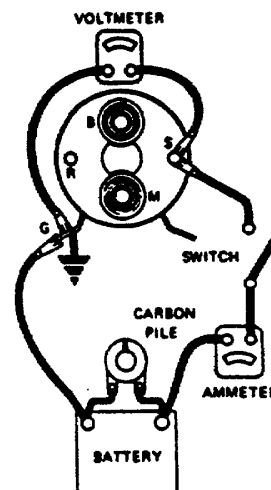


- d. Testing solenoid windings.

(1) If solenoid is not removed from starting 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 over heating 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**

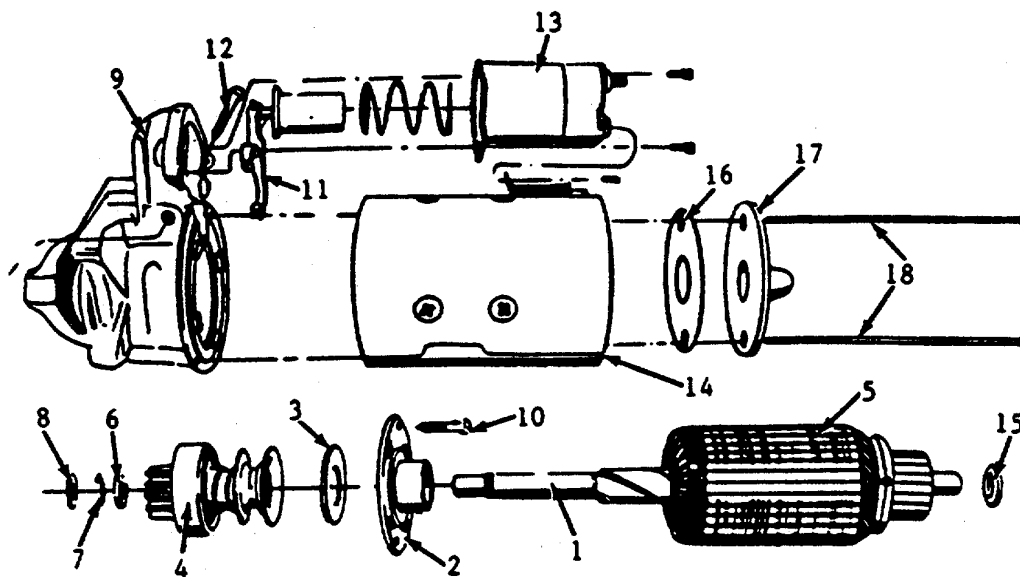
**Current will decrease as windings heat up.**

(4) 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**

- a. Lubricate drive end of armature shaft (1) with lubricant (Appendix D, Item 32).
- b. Install center bearing (2) with bearing toward the armature winding. Then install the fiber washer (3) on the armature shaft (1).
- c. Slide clutch assembly (4) onto armature shaft (1) with pinion away from armature (5).
- d. Slide retainer (6) onto shaft (1) with cupped side facing the end of shaft (1).

5-13. STARTER REPAIR. (Continued).



- e. Install snapping (7) into groove on armature shaft.
- f. Install thrust washer (8) on shaft (1).
- g. 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).
- h. Lubricate drive gear housing bushing with lubricant (Appendix D, Item 32).
- i. Engage shift lever yoke with clutch and slide complete assembly into drive gear housing (9).
- j. Install the center bearing screws (10) and the shift lever (11), and pivot bolt (12).
- k. Install solenoid assembly (13).
- l. Position field frame (14) against drive gear housing (9) on alignment pin using care to prevent damage to brushes.
- m. Lubricate commutator end frame bushing with lubricant (Appendix D, Item 32).
- n. 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).
- o. Connect the field coil connector (15) to the solenoid terminal with screw (20).

5-14. ENGINE MOUNTING REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

Jack  
General Safety Instructions

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

REMOVAL

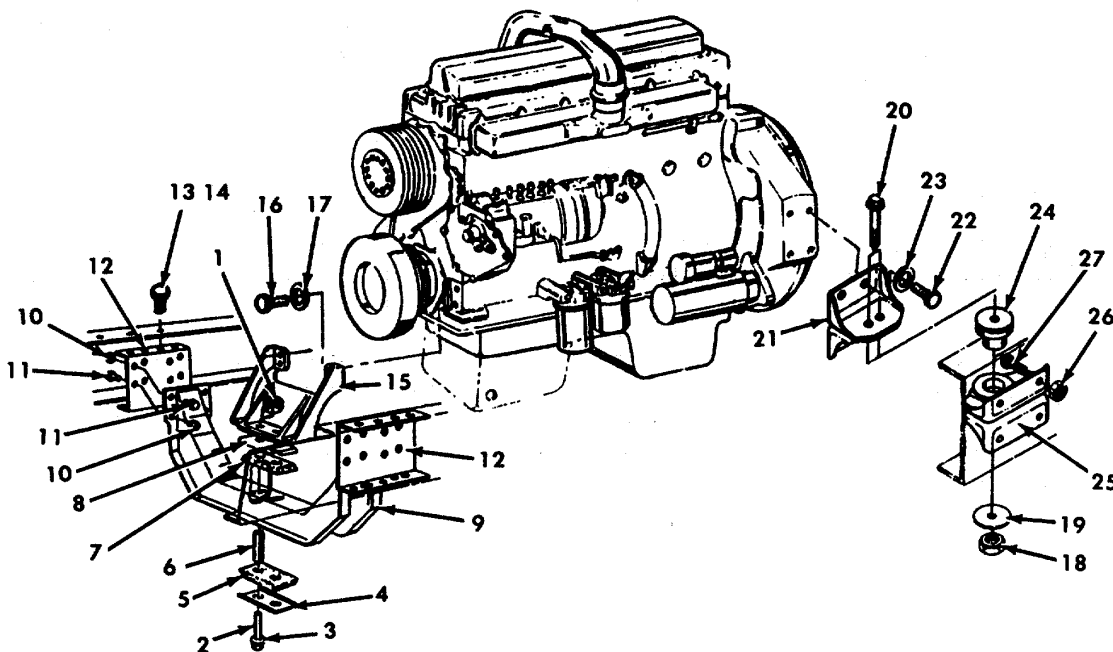
a. Front engine mounting assembly.



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 two flanged locknuts (1).
- (3) Remove two engine mounting bolts (2), washers (3), engine insulator retainer (4), engine insulator (5) and spacers (6).
- (4) Raise engine only enough to permit removal of the engine mounting.
- (5) Remove insulator (7) and retainer (8).
- (6) Remove front engine mounting crossmember (9) by removing eight flanged locknuts (10) and bolts (11).



**5-14. ENGINE MOUNTING REPLACEMENT.(Continued).**

(7) Remove crossmember mounting brackets (12) from frame rails by removing eight nuts (13) and bolts (14).

(8) Remove front engine mounting bracket (15) from engine by removing four bolts (16) and washers (17).

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 nuts (18), washers (19) and bolts (20).

(3) Remove each rear engine bracket (21) from engine by removing four bolts (22) and washers (23).

(4) Remove rear engine mounting insulators (24) by prying from rear engine mounting frame bracket (25).

(5) Remove rear engine mounting frame bracket (25) by removing four nuts (26) and bolts (27).

(3) Install front engine mounting crossmember (9) using light locknuts (10) and bolts (11). Torque locknuts (10) to 70 ft-lb (95 N.m).

(4) Position insulator (7) and retainer (8) and carefully lower engine until spacers (6) can be inserted.

(5) Install two spacers (6), engine insulator (5), retainer (4), two washers (3), bolts (2) and locknuts (1). Lower front of engine and remove front engine jack. Torque locknuts (1) to 38 ft-lb (48 N.m).

b. *Rear engine mounting assembly.*

(1) Install the mounting frame bracket (25) using four bolts (27) and nuts (26). Torque nuts (26) to 70 ft-lb (95 N.m).

(2) Insert insulator (24) in bracket (25).

(3) Install rear engine bracket (21) to engine using four bolts (22) and washers (23). Torque bolts (22) to 65 ft-lb (88 N.m).

(4) Carefully lower engine until bolts (20) can be inserted.

(5) Install washers (19) and nuts (18). Torque nuts (18) to 36 ft-lb (48 N.m).

**INSTALLATION**

a. *Front engine mounting assembly.*

(1) Install front engine mounting bracket (12) to engine using four bolts (16) and washers (17). Torque bolts (16) to 28 ft-lb (38 N.m).

(2) Install crossmember mounting brackets (12) to frame rails using eight nuts (13) and bolts (14). Torque nuts (13) to 70 ft-lb (95 N.m).



**Section VI. MAINTENANCE OF CAB ASSEMBLY, LIGHT, SWITCHES, GAUGES, CONTROLS AND INDICATORS**

	Para.
Cab Assembly, Lights, Switches, Gauges, Controls and Indicators Replacement .....	5-16
Cab Panels Replacement.....	5-17
Cab Panels Repair .....	5-18
General.....	5-15

**5-15. GENERAL**

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

**5-16. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS REPLACEMENT.**

This task covers:            a. Removal            b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
Hoist and Sling

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral.  
Parking brake set.  
Battery selector switch off.  
Batteries disconnected.

Equipment Condition

Para.	Condition Description
4-66	Radiator Drained
4-59	Deaeration Tank Removed
4-63	Heater Hoses Disconnected At Cab Connections
4-73	Accelerator Linkage Disconnected
4-83	Batteries Removed
4-106	Speedometer Cable Disconnected At Dash
4-123	Grille Removed
4-147	Cab Electrical Connections Disconnected
4-148	Chassis Electrical Connections Disconnected
4-157	Shift Control Lever Removed
4-160	Transfer Case Shift Lever Removed
4-189	Steering Coupling Disconnected

Personnel Required: 4

**REMOVAL**

- a. Remove the rear mounting hardware which hold the cab to the chassis.
- b. Remove the front mounting hardware holding the cab to the chassis.



**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.**

**5-16. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS REPLACEMENT.**  
**(Continued).**

- c. Engage hoist and sling to cab. Remove cab by raising slightly to clear support brackets.
- d. Remove lifting sling and hoist.
- g. Connect all electrical lines that run between the cab and chassis, including the cab-chassis ground strap, head light wires, horn wires, and brake light switch (paragraphs 4-147 and 4-148).

**INSTALLATION**



**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 4-160).
- f. Install transmission gear selector (paragraph 4-157).
- h. Connect speedometer cable (paragraph 4-106).
- i. Install deaeration tank (paragraph 4-59).
- j. Clip brake and clutch lines to cab (paragraph 4-174).
- k. Connect steering coupling (paragraph 4-189).
- l. Connect accelerator linkage (paragraph 4-73).
- m. Connect heater hoses at cab connections (paragraph 4-63).
- n. Service radiator (paragraph 4-66).
- o. Install and connect batteries (paragraph 4-83).
- p. Install grille (paragraph 4-123).

**5-17. CAB PANELS REPLACEMENT.**

---

This task covers:      a. Removal      b. Installation

---

**INITIAL SET-UP**

Tools

- Electric Drill
- Metal Drill Bits
- Pneumatic Chisel
- C-Clamps

General Safety Instructions

Batteries disconnected.

Materials/Parts

- Sealant (Appendix D, Item 51)
- Primer Paint (Appendix D, Item 41)
- Finish Paint (Appendix D, Item 40)
- Sheet Metal Parts as required (Appendix E, Figure 95).

## 5-17. CAB PANELS REPLACEMENT (Continued).

## REMOVAL

## NOTE

Before panels can be replaced on cab, some mechanical work may be required. This will vary depending on which panel is being replaced. Some or all of the following steps may be required.

1. Remove doors (paragraph 4-130).
2. Remove seat (paragraph 4-137).
3. Remove dash pad and instrument panel (paragraph 5-16).
4. Remove windshield (paragraph 4-139).
5. Remove rear window glass (paragraph 4-140).
6. Disconnect cab electrical connections (paragraph 4-147).
7. Remove fuel tanks (paragraph 4-72).
8. Remove air tanks (paragraph 4-173).


**CAUTION**

Care must be used to prevent damage to roof panel when removing side panels.

- a. Drill out spot welds which attach panel to be replaced to adjacent panels. Using electric drill with sheet metal drill bits.
- b. Open seams which have been clinched together using a pneumatic chisel.

## INSTALLATION


**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.

- a. Reweld any cracked or missing welds and repair as necessary any hidden damage found after removal of panel.
- b. Position and clamp new panel to cab.


**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.


**CAUTION**

Adjust welder so as not to damage or burn sheet metal while welding.

- c. Weld panels together by welding through holes previously drilled out. (Where drilled holes are inaccessible, use 1 inch (2.5 cm) seam welds spaced 3 inches (7.5 cm) apart or plug weld as applicable.
- d. Grind, sand or wire brush away any excess weld or weld ash from all newly welded areas.
- e. Apply body sealant (Appendix D, Item 51) to panel seams and drilled out holes.
- f. Apply primer paint (Appendix D, Item 41) to affected areas to assure good protection from rust.
- g. Finish paint as required (Appendix D, Item 40).
- h. Install all components removed prior to panel removal.
- i. Connect batteries.

**5-18. CAB PANELS REPAIR.**


---

This task covers:           a. Removal                   b. Installation

---

**INITIAL SET-UP**Tools

General Mechanics Tool Kit  
Heat Gun  
Rubber Mallet  
File  
Grinder

Materials/Parts

Sandpaper (Appendix D, Item 46)  
Filler (Appendix D, Item 17)  
Putty (Appendix D, Item 44)  
Paint (Appendix D, Item 40)

General Safety Instructions

Engine OFF.  
Transmission in (N) neutral  
Parking brake set.  
Batteries disconnected.  
Battery selector switch OFF.

---

**REPAIR**a. *Repair holes using metal insert.*

- (1) Using the appropriate tools, cut the rusted or damaged material from the panel.
- (2) Using a 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.

**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.**

- (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.

## c. Surface filling and finishing.

After repairing the damaged areas, apply filler (Appendix D, Item 17) and finish the surface as follows:

- (1) Following the manufacturer's instructions, mix enough body filler to re-establish the surface.

**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 17) into the repaired surface making sure to fill all voids and remove larger air bubbles.

**NOTE**

**Allow filler to extend above the original surface to allow for shrinkage.**

**5-18. CAB PANELS REPAIR (Continued).**

- (3) When the filler (Appendix D, Item 17) is firm to the touch file off the excess, still leaving the filler level slightly above that of the original surface.

**NOTE**

**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 120 ° F (49° C) is required for shrinkage.
- (5) Sand the filler with sandpaper (Appendix D, Item 46) until it is smooth and even with the original surface.
- (6) If the filler (Appendix D, Item 17) is slightly porous, apply a thin coat of glazing putty (Appendix D, Item 44).

**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 46).

**CAUTION**

**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 46). Complete the repair by painting (Appendix D, Item 40) the surface.

**Section VII. MAINTENANCE OF AIR BRAKE SYSTEM**

Air Dryer Repair .....	Para. 5-21	General .....	Para. 5-19
Compressor Repair .....	5-20		

**5-19. GENERAL.**

This section contains information on the maintenance of the air brake system that is maintainable at the Direct Support level.

**5-20. COMPRESSOR REPAIR.**

This task covers:      a. Disassembly                      b. Repair                      c. Assembly

**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- 3/4 Inch Allen Wrench
- Ring Expander

Materials/Parts

- Solvent (Appendix D, Item 54)
- Brush (Appendix D, Item 8)
- Oil (Appendix D, Item 37)

Equipment Condition

- Para. Condition Description
- 4-167 Compressor Removed

**DISASSEMBLY**

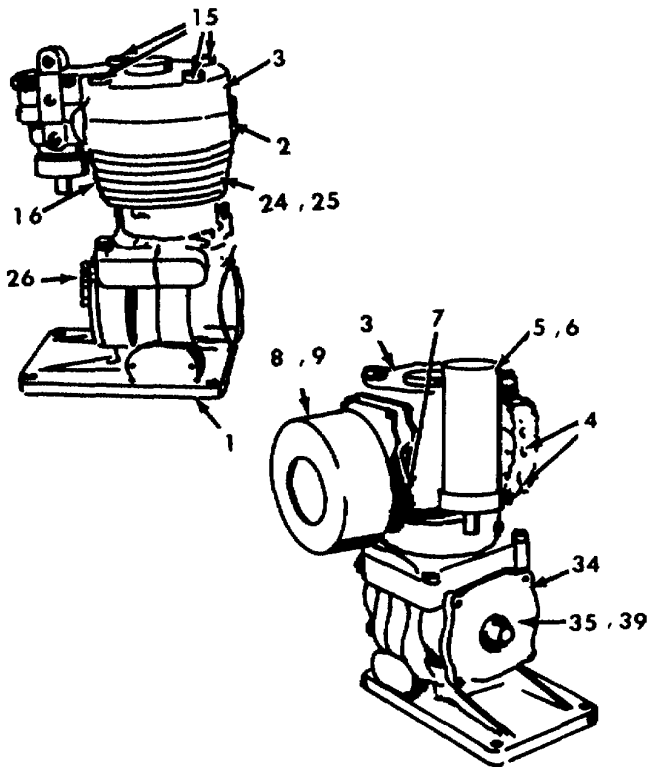


Cleaning solvent (Appendix D, Item 54) is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flames.



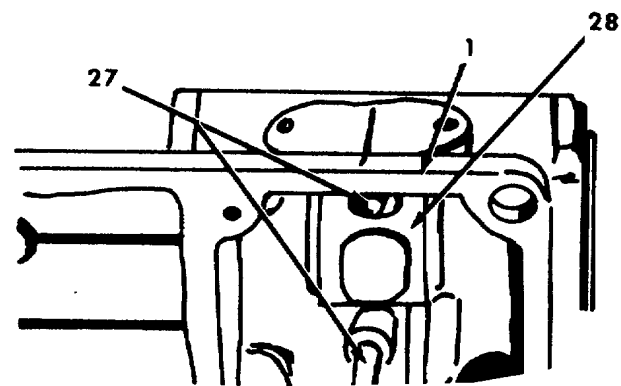
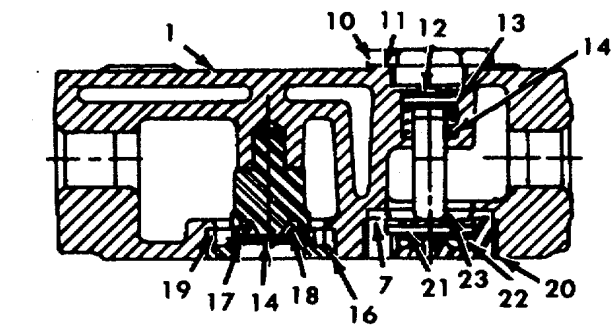
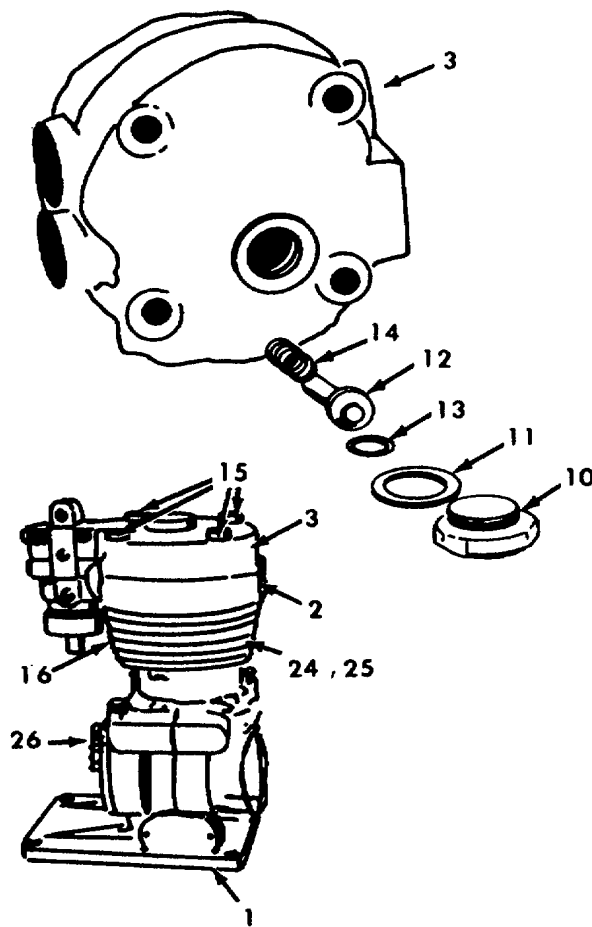
Avoid scratching machined surfaces.

- a. Clean exterior of compressor using solvent (Appendix D, Item 54) and a stiff brush (Appendix D, Item 8).
- b. Mark compressor crankcase (1), cylinder block (2) and cylinder head assembly (3) to assure proper positioning during assembly.
- c. Remove two screws (4), governor (5) and gasket (6).
- d. Remove two mounting screws (7), air cleaner assembly (8) and gasket (9).



**5-20. COMPRESSOR REPAIR (Continued).**

- e. Remove unloader cover (10) and washer seal (11).
- f. Remove unloader pin (12), O-ring (13) and spring (14).
- g. Remove four bolts (15) holding cylinder head assembly (3) to the cylinder block (2).
- h. Lift head (3) off block (2) and remove gasket (16).
- i. Place the cylinder head assembly (3) on a table and turn the assembly bottom sideways.
- j. Remove exhaust valve seat (16) using a 3/4 inch allen wrench.
- k. Remove valve (17), spring (18) and copper washer (19).
- l. Remove inlet valve cage (20) using a 3/4 inch allen wrench.
- m. Remove valve (21), spring (22) and copper washer (23).
- n. Remove four bolts (24) and lockwashers (25) holding cylinder block (2) to the crankcase (1).
- o. Lift the block off the crankcase (1) and remove gasket (26).
- p. Turn the crankcase (1) on its side to expose the connecting rod to crankshaft bolts (27).
- q. Slowly rotate the crankshaft so that the connecting rod cap (28) is at the bottom of its stroke. Remove the bolts (27), cap (28) and rod (29).
- r. Lift the piston (30) and connecting rod (28) through the top of the crankcase (1).
- s. Remove buttons (31) from piston wrist pin holes.



**NOTE**

**Do not remove the piston wrist pin from the piston since the piston and rod must be replaced as an assembly if either part is damaged.**

**5-20. COMPRESSOR REPAIR (Continued).**

- t. Remove piston rings (32 and 33) from the piston with a ring expander.
- u. Remove four bolts (34) securing the bearing cap (35) to the crankcase (1).

**CAUTION**

**Do not attempt to pry bearing cap from the crankcase.**

- v. Tap the cap (35) gently with a plastic mallet to loosen and remove cap.
- w. Remove bearing (36).

**WARNING**

Cleaning solvent (Appendix D, Item 54) 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.

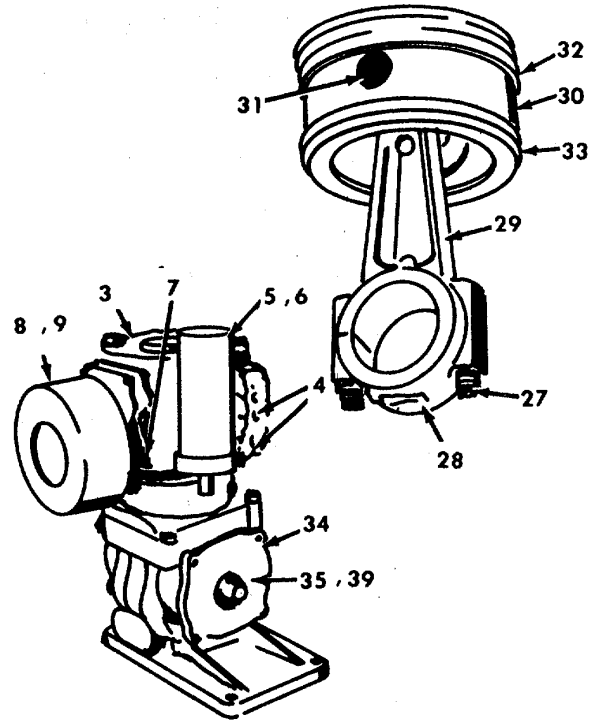
Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.

**CAUTION**

**Never use gasoline, fuel oil or kerosene as a cleaning solvent.**

**Be extremely careful to avoid scratching machined surfaces.**

- x. Wash all parts in cleaning solvent (Appendix D, Item 54). Blow dry with compressed air.
- y. Clean carbon deposits from the cylinder head's interior surfaces. Clean all interior air and water passageways.
- z. Remove carbon from piston crowns and ring grooves. Carbon in ring grooves can be removed by using a piece of a broken ring as a tool.



**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.

- aa. Blow out all drilled passageways with compressed air to insure they are open.
- bb. Remove old gasket material sealer from gasket surfaces.

**CAUTION**

**Removal of crankshaft may cause main bearing damage. Therefore, inspection while assembled is recommended.**

- cc. Examine components for wear, cracks, damaged threads, nicks, scoring and pitting.
- dd. Check piston to bore clearance. If clearance exceeds .008 inch, (.2 mm) the piston (30) and rod (28) assembly must be replaced.
- ee. Check tolerances of components in accordance with Table 5-2. If components do not measure within the limits listed, they must be replaced.



5-20. COMPRESSOR REPAIR (Continued)

Table 5-2. COMPRESSOR COMPONENT TOLERANCES

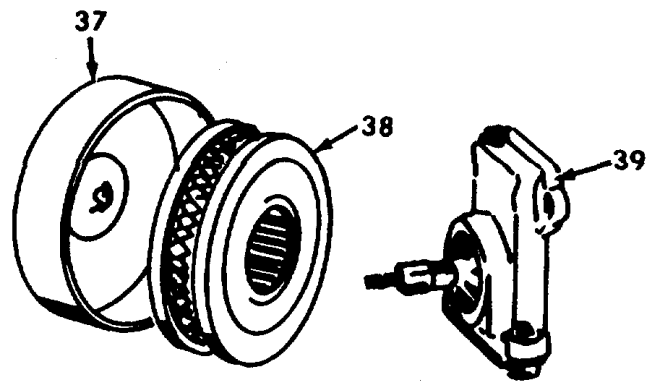
COMPONENTS:	TOLERANCE	
	MAX	MIN
<b>CYLINDER HEAD</b>		
Exhaust Valve Seat		
Valve Guide Diameter	1.010 in. (25.654 mm)	1.005 in. (25.53 mm)
Top of Valve Seat to Seating Surface	.162 in. (4.115 mm)	.158 in. (4.01 mm)
Inlet Valve Spring		
Load @ .20 inch (5.08 mm)	.75 lbs (.34 kg)	.60 lbs (.272 kg)
Unloader Spring		
Load @ .395 inch (10.03 mm)	4.18 lbs (1.90 kg)	3.38 lbs (1.53 kg)
Exhaust Valve Spring		
Load @ .20 inch (5.08 mm)	.75 lbs (.34 kg)	.60 lbs (.272 kg)
Exhaust Valve Stop		
Valve Stop Surface to Spring Seat Surface	.185 in. (4.7 mm)	.175 in. (4.445 mm)
Inlet Valve Cage		
Valve Guide Diameter	1.010 in. (25.654 mm)	1.005 in. (25.53 mm)
Top of Cage to Valve Stop	.149 in. (3.78 mm)	.143 in. (3.63 mm)
Inlet Valve Seat		
Valve Seating Surface to Valve Cage Contact Surface	.0265 in. (.673 mm)	.0235 in. (.597 mm)
Unloader Pin Length	1.603 in. (40.72 mm)	1.595 in. (40.51 mm)
<b>PISTON AND CONNECTING ROD</b>		
Piston Diameter Below Compression Rings	3.1450 in. (79.88 mm)	3.1440 in. (79.86 mm)
Piston Pin Hole	.5628 in. (14.295 mm)	.5626 in. (14.29 mm)
Rod Pin Diameter	.5620 in. (14.275 mm)	.5618 in. (14.27 mm)
Connecting Rod Pin Hole	.5631 in. (14.30 mm)	.5626 in. (14.29 mm)
Piston Rings		
Compression Ring Gap in 3.1501 inch (80.01 mm) Bore	.020 in. (.508 mm)	.008 in. (.20 mm)
Oil Ring Gap in 3.1501 inch (80.01 mm) Bore	.055 in. (1.4 mm)	.015 in. (.38 mm)
Groove Side Clearance		
Compression Rings	.0023 in. (.0584 mm)	.0004 in. (.01016 mm)
Oil Rings	.0005 in. (.0127 mm)	.0045 in. (.1143 mm)

5-20. COMPRESSOR REPAIR (Continued).

Table 5-2. COMPRESSOR COMPONENT TOLERANCES (Continued).

COMPONENTS:	TOLERANCE	
	MAX	MIN
<b>CYLINDER BLOCK</b>		
Cylinder Bore	3.1511 in. (80.038 mm)	3.1501 in. (80.01 mm)
<b>CRANKCASE, CRANKSHAFT AND BEARING CAP</b>		
Crankcase		
Bearing Bore Diameter	2.8338 in. (71.98 mm)	2.8331 in. (71.96 mm)
Front Seal Diameter	1.625 in. (41.224 mm)	1.623 in. (41.224 mm)
Ball Bearing		
Outside Diameter	2.8341 in. (71.99 mm)	2.8346 in. (72.0 mm)
Inside Diameter	1.3775 in. (34.99 mm)	1.3780 in. (35.00 mm)
Crankshaft		
Connecting Rod Journal Diameter	1.1855 in. (30.11 mm)	1.1850 in. (30.10 mm)
Connecting Rod Journal Width	1.267 in. (32.18 mm)	1.265 in. (32.13 mm)
Main Bearing Journal Diameter	1.3784 in. (35.01 mm)	1.3779 in. (35.00 mm)
Bearing Cap Seal Diameter	.636 in. (16.154 mm)	.635 in. (16.13 mm)
Crankshaft End Play	.032 in. (.8128 mm)	.001 in. (.0254 mm)
Seal Ring Outside Diameter	.633 in. (16.0078 mm)	.631 in. (16.027 mm)

- ff. Unscrew the air cleaner assembly cover (37) and remove air cleaner element (38) from base (39).
- gg. Inspect cover (37) and base (39) for bends, crushing or other damage.
- hh. Inspect element (38) for damage or crushing. Element (38) must also be replaced if dirty.



**REPAIR**

Repair consists of replacing damaged or defective components.

**NOTE**

Replace all gaskets and O-rings.

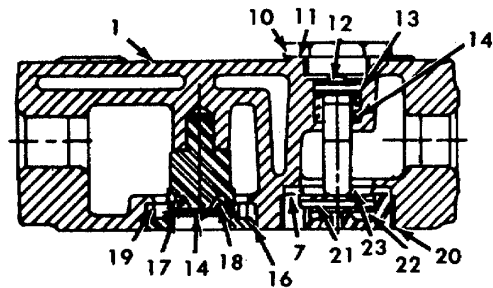
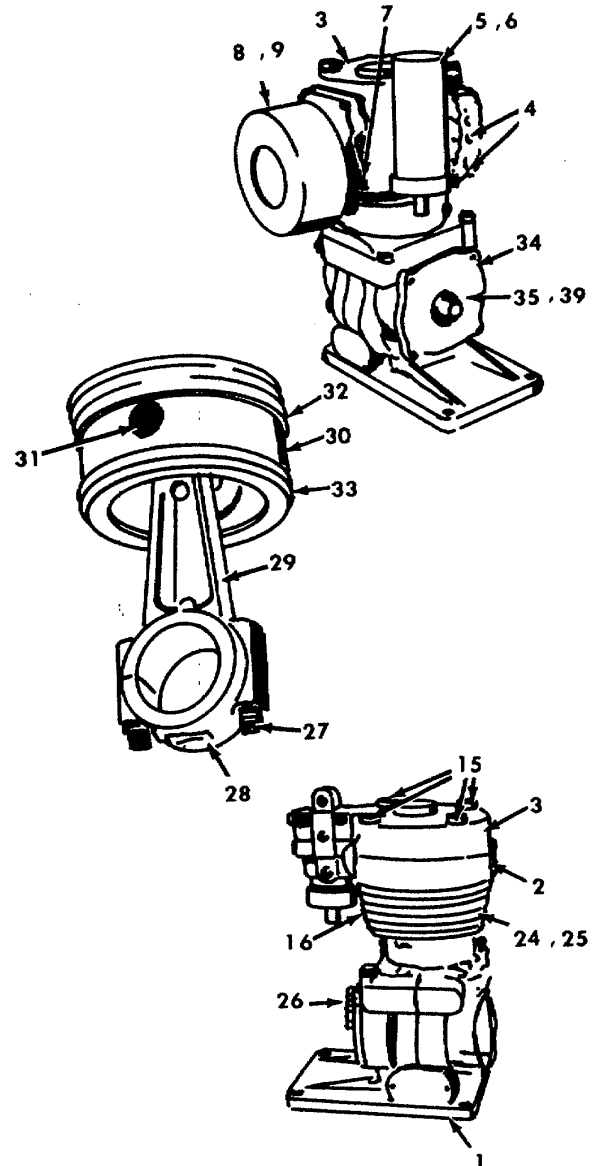
5-20. COMPRESSOR REPAIR (Continued).

ASSEMBLY

**CAUTION**

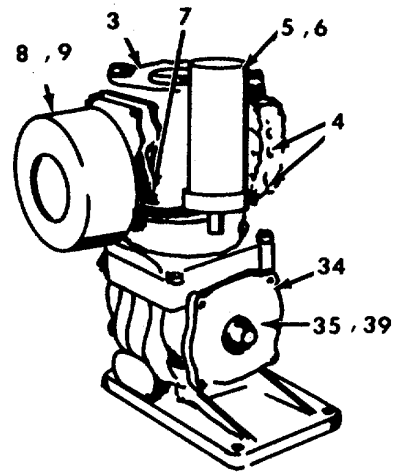
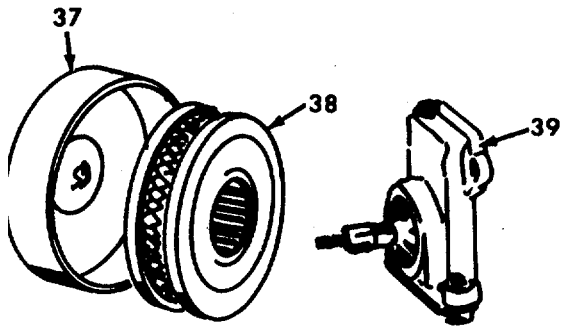
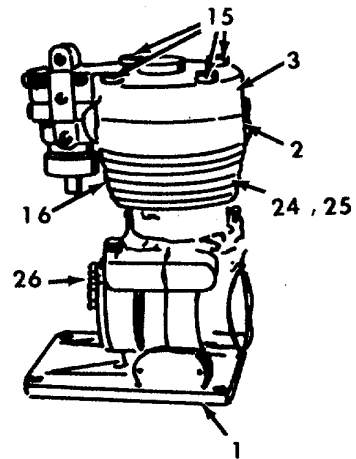
**Do not attempt to force any components during assembly. Investigate the problem if assembly is not smooth and force free.**

- a. Coat wear surfaces with engine oil (Appendix D, Item 37) before reassembling.
- b. Install bearing (36) and cap (35) by installing four bolts (34).
- c. Install piston rings (32 and 33) using a ring expander.
- d. Insert buttons (31) and carefully insert piston (30) and connecting rod (28) into the crankcase.
- e. With crankshaft positioned at the bottom of its stroke, install cap (28) to rod (29) using bolts (27).
- f. Install gasket (26) and cylinder block (2) onto the crankcase (1) using four bolts (24) and lock-washers (25).
- g. Install copper washer (23), spring (22), and valve (21).
- h. Install inlet valve cage (20) using a 3/4 inch allen wrench.
- i. Install copper washer (19), spring (18) and valve (17).



**5-20. COMPRESSOR REPAIR (Continued).**

- j. Install exhaust valve seat (16) using a 3/4 inch allen wrench.
- k. Install head (3) and gasket (16) to block (2) using four bolts (15).
- l. Install spring (14), O-ring (13), unloader pin (12), washer seal (11) and unloader cover (10).
- m. Install air cleaner base (39) and gasket (9) using mounting screws (7).
- n. Install filter element (38) and cover (37) onto base (39).
- o. Install gasket (6) and governor (5) on cylinder head assembly (3) using two screws (4).



5-21. AIR DRYER REPAIR

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

General Mechanics Tool Kit  
1/2 Inch Diameter Steel Rod

Materials/Parts

Solvent (Appendix D, Item 54)  
Lubricant (Appendix D, Item 37)

Equipment Condition

Para. Condition Description  
4-168 Air Dryer Removed

DISASSEMBLY



Use care in removing the nut (1) to prevent bodily injury since nut is spring loaded.

- a. Remove unloader nut (1) and O-ring (2).
- b. Remove piston (3), U-cup (4), sleeve (5) and spring (6).
- c. Remove retaining ring (7), spring (8), ring seat (9) and unloader spindle (10) as an assembly as they are not serviced separately.
- d. Remove the eight cap screws (12) retaining bottom cap (13) to body (14).
- e. Remove bottom cap (13) and deflector assembly (15).



Do not scratch or mar gasket surfaces.

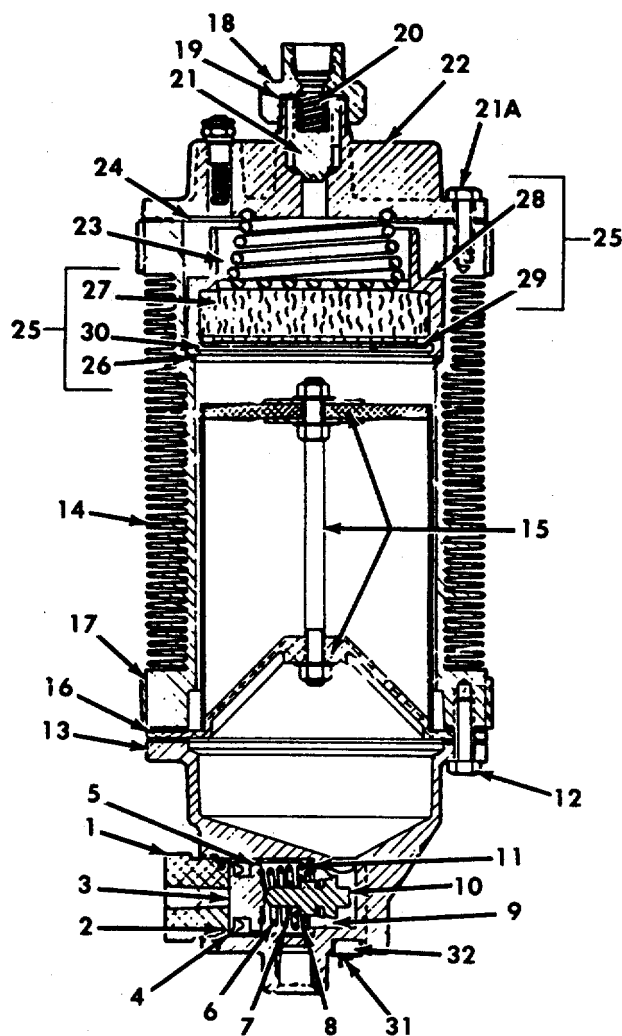
- f. Remove all traces of old gaskets (16 and 17) from gasket surfaces of bottom cap (13) and body (14). Discard old gaskets.



Cleaning solvent (Appendix D, Item 54) 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.

Use care in removing top cap bolts (21) to prevent bodily injury because the cap is spring loaded.

- g. Wash bottom cap (13) and inside of unit (14) with cleaning solvent (Appendix D, Item 54).
- h. Remove top nut (18). This nut is spring loaded.
- i. Remove copper gaskets (19), spring (20), and check valve spindle (21).



**5-21. AIR DRYER REPAIR (Continued).**

- j. Clean and dry entire check valve area and top nut (18).



Use care in removing top cap bolts (21) to pre-vent bodily injury because the cap is spring loaded.

- k. Remove eight cap screws (21A) holding top cap (22) to body (14) and remove spring (23).



Cleaning solvent (Appendix D, Item 54) 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.



**Do not mar or scratch gasket surfaces.**

- l. Remove all traces of gasket material from top cap and body gasket surfaces. Discard gasket (24). Wash top cap in cleaning solvent (Appendix D, Item 54).
- m. Remove complete filter assembly (25).
- n. Remove rubber packing ring (26).
- o. Remove stainless steel filter (27), filter cup (28), strainer (29) and V-spring (30).
- p. Remove thermostat (3 1) by removing two screws.
- q. Remove heater by loosening set screw.

**REPAIR**

Repair consists of replacing damaged or defective components.

**NOTE**

**Replace all gaskets and O-rings.**

**ASSEMBLY**

- a. Install new thermostat (31) by inserting it into the hole from which old thermostat was removed and attach by means of the two screws provided.
- b. Install new heater (32) by inserting it into hole from which old heater was removed and re-tighten set screw.
- c. Install new U-cup (4) in groove of unloader piston (3). Lips of U-cup (4) should face away from spring seat.
- d. Apply a light film of lubricant (Appendix D, Item 37) to O-ring (2) and position on unloader nut (1).
- e. Position the two copper gaskets (11) together and lightly coat exposed surfaces with lubricant (Appendix D, Item 37). Then position lubricated gaskets on shoulder of ring seat (9). Gaskets should be on face opposite the spring (8).
- f. Place gaskets (11) followed by seat ring assembly into bottom cap (13).

**5-21. AIR DRYER REPAIR (Continued).**

- g. Install unloader sleeve (5) in unloader port against the seat ring (9). Be sure the 1/2 inch (12.7 mm) diameter cross hole is next to the seat ring (9).
- h. Position large spring (6) in the sleeve (5) with large diameter coil against seat ring (9).
- i. Insert unloader piston (3) into unloader sleeve (5). Lips of U-cup (4) must face out with spring seat toward spring.

**NOTE**

The unloader spindle (1) and seat ring (9) is a mated assembly and should not be disassembled. The entire mated assembly must be replaced as an assembly.

- j. Insert a 1/2 inch (12.7 mm) diameter rod or equivalent through the exhaust port in the bottom cap (13) and into the cross hole of sleeve (5) to maintain alignment.

**NOTE**

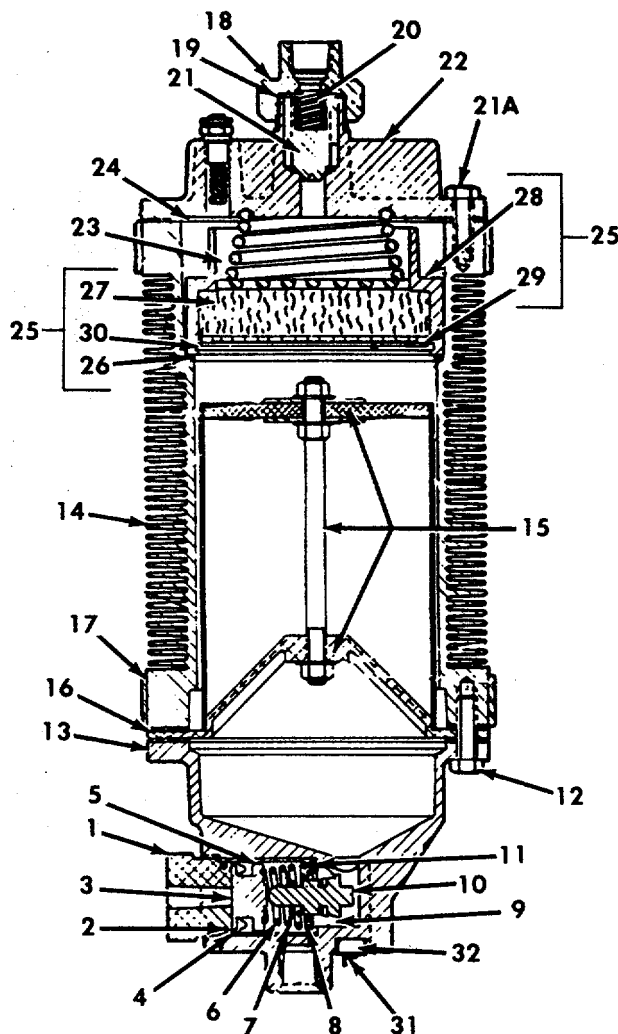
If the cross holes are not aligned, the unit will not operate.



Overtightening of the unloader nut will result in damage to the unloader assembly.

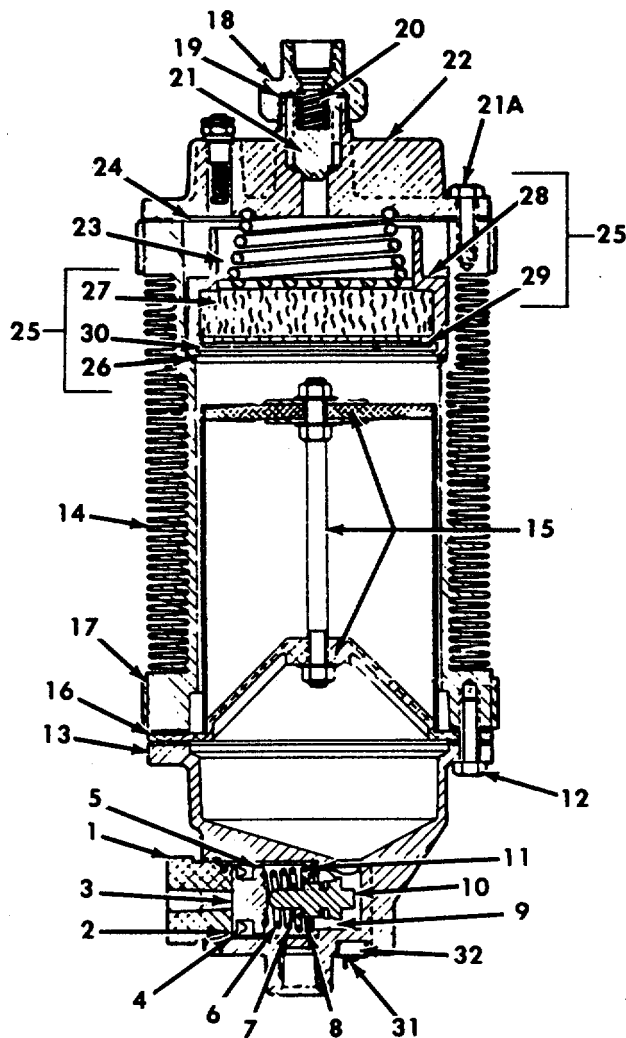
- k. Apply a sealing compound (Appendix D, Item 27) to thread of the unloader valve nut (1) and install the nut. Tighten nut to 60 ft-lb (81 N.m) maintaining the alignment of the cross holes of sleeve (5).
- l. Remove the alignment rod.
- m. Assemble stainless steel filter (27) in filter cup (28). Filter should be stretched slightly to fill the space in the filter cup.
- n. Reinstall strainer (29) with flat face of strainer towards stainless steel filter (27).

- o. Install V-spring (30) holding filter assembly together.
- p. Install new packing ring (26) on ledge of body (14).



**5-21. AIR DRYER REPAIR (Continued).**

- q. Position filter assembly into body (14) with large end down. The filter must set on packing ring (26).
- r. Install heavy spring (23) with larger diameter coil against top of filter assembly.
- s. Position new gasket (24) on body.
- t. Position top cap (22) and spring (39) so that the small diameter coil on spring fits groove in top cap.
- u. Compress spring (39) and install four 3/8 inch cap screws (21) into body (14). Each of these four screws should be engaged at least three full turns before load on cap is removed. Cap screws should be equally spaced. Then thread remaining screws into place.
- v. Tighten all top cap bolts (21) alternately and evenly to 15 ft-lb (20.4 N.m).
- w. Position new check valve spindle (21) in top cap (22) with tapered end down.
- x. Install spring (20) in check valve spindle (21).
- y. Position new copper gaskets (19) in nut (18) and rub a small quantity of grease (Appendix D, Item 21) on the gaskets to help them keep their position in the top nut (18).
- z. Thread nut (18) on top cap (22) and torque to 60 ft-lb (81 N.m). Top nut (18) is not included in check valve replacement kit.
- aa. Install new gaskets (16) and (17).
- bb. Align bolt holes and position assembly against bottom gasket surface of body (14).
- cc. Insert eight cap screws (12) to attach bottom cap (13) to body (14) and deflector assembly (15). Tighten alternately and evenly to 15 ft-lb (20.3 N.m).





**Section VIII. MAINTENANCE OF POWER STEERING SYSTEM**

	Para.		Para.
General .....	5-22	Power Steering Pump Repair .....	5-24
Power Steering Gear Repair .....	5-23		

**5-22. GENERAL.**

This section contains information on the maintenance of the power steering system that is maintainable at the Direct Support level.

**5-23. POWER STEERING GEAR REPAIR.**

This task covers:      a. Disassembly                      b. Repair                      c. Assembly

**INITIAL SET-UP**

Tools

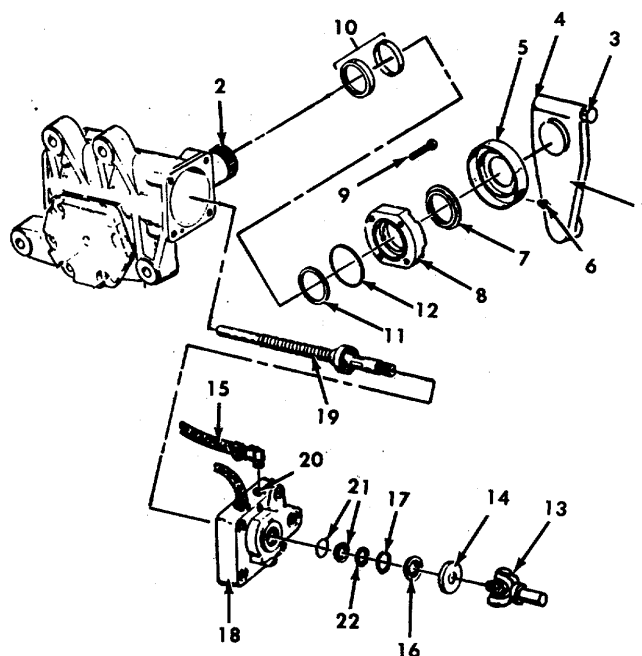
- General Mechanics Tool Kit
- Gear Puller
- Catch Basin
- Seal Driver

Materials/Parts

- Steering Gear (491010C92)
- Emery Paper (Appendix D, Item 54)
- Solvent (Appendix D, Item 54)
- Cloth (Appendix D, Item 14)
- Grease (Appendix D, Item 22)
- Power Steering Fluid (Appendix D, Item 19)

**DISASSEMBLY**

- a. Mark pitman arm (1) and sector shaft (2) to assure proper alignment during reassembly.
- b. Remove pitman arm nut (3), bolt (4), and pitman arm (1) from sector shaft (2) using a gear puller.
- c. Remove protector boot (5), grease fitting (6), and seal (7).



**NOTE**

**Discard protector boot (5) and seal (6).**

- d. Clean sector shaft (2) using fine emery paper (Appendix D, Item 13). Be sure all paint is removed.

**5-23. POWER STEERING GEAR REPAIR (Continued).**

- e. Position catch basin beneath gear to protect against fluid spill during removal of trunnion cover (8).
- f. Remove four trunnion cover bolts (9) and trunnion cover (8).
- g. Remove two-piece sector shaft seal (10), teflon backup washer (11) and trunnion cover sealing (12).

**WARNING**

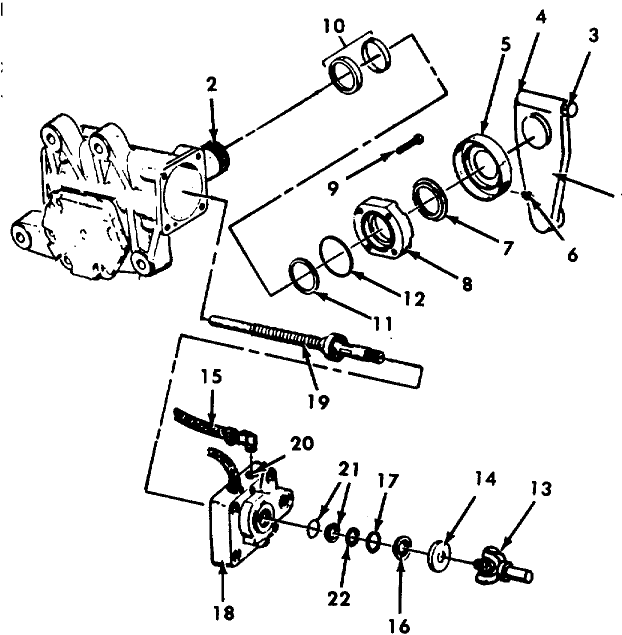
Cleaning solvent (Appendix D, Item 54) is both toxic and flammable. Keep off skin. Use only in a well-ventilated area and avoid prolonged breathing of vapors. Keep away from open flames.

- h. Clean trunnion cover (8) with solvent (Appendix D, Item 54).
- i. Mark to assure proper alignment during assembly remove input coupling (13) and seal protector (14). If coupling (13) is tight, insert screwdriver into slot to release.
- j. Clean the area around the input shaft using fine emery paper (Appendix D, Item 13).
- k. Remove and plug the return line (15).
- l. Remove and discard seal (16) and remove seal retaining ring (17) from the valve housing (18).

**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.

- m. Hold a piece of cloth (Appendix D, Item 14) over the worm shaft/input shaft (19) and apply air pressure to the valve housing return port (20). This will force the two piece input shaft seal (21) and steel backup washer (22) to pop out of the gear. Discard the two piece seal.

**REPAIR**

Repair consists of replacing damaged or defective components.

**ASSEMBLY**

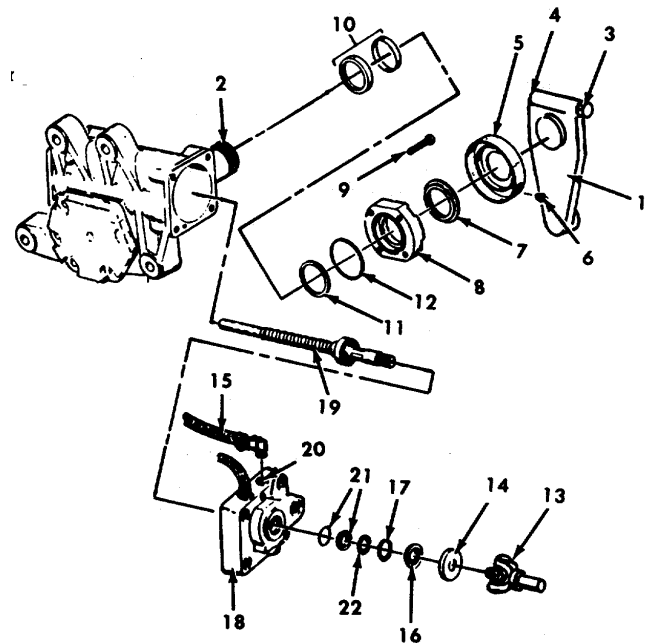
- a. Apply grease (Appendix D, Item 22) to the new input shaft seal (21) and steel backup washer (22) and to the input shaft (19).
- b. Install the two piece seal (21) flat side up and the steel backup washer (22) using seal driver.
- c. Install retaining ring (17).
- d. Pack the area around the input shaft with high temperature grease (Appendix D, Item 22).
- e. Install the new seal (16) using the seal driver.
- f. Add more grease (Appendix D, Item 22) and assemble seal protector (14) onto worm shaft/input shaft (19) seating it in the relief groove just beyond the input shaft serrations with cup side toward the gear.
- g. Remove plug in return line (15) and reconnect the return line to the steering gear.
- h. Reconnect input coupling (13) aligning marks properly.

**5-23. POWER STEERING GEAR REPAIR (Continued).**

- i. Place the trunnion cover (8) on work bench to install the new seal package.
- j. Install teflon backup washer (11).
- k. Install two piece seal (10) so that words OIL SIDE are visible after seal is in place.
- l. Lubricate the new trunnion cover seal ring (12) with grease (Appendix D, Item 22) and install it into the cover groove.
- m. Cover the serrations of the sector shaft (2) with tape to avoid damaging the seals during reassembly.

**NOTE**

**Use only one layer of tape.**



- n. Install the trunnion cover (8) and four bolts (9). Torque bolts (9) to 15-22 ft-lb (20-30 N.m) dry using 1/2 inch socket.
- o. Pack high temperature grease (Appendix D, Item 22) around seal area of sector shaft (2).
- p. Install seal (7) using seal driver.
- q. Apply generous amount of grease (Appendix D, Item 22) to protector boot (5) in the area inside of the smaller diameter ring.
- r. Assemble protector boot onto shaft (2) and trunnion cover (8) locating the grease fitting hole toward the input shaft end of the gear assembly.
- s. Insert grease fitting (6) into protector boot (5).
- t. Remove tape from sector shaft serrations.
- u. Reconnect the pitman arm (1) making sure alignment marks are in proper positions.
- v. Install bolt (4) and nut (3) using a 3/4-16 grade 8 bolt. Torque to 380-420 ft-lb (515-569 N.m) dry.

- w. Fill the steering system reservoir with power steering fluid (Appendix D, Item 19).
- x. Crank the engine for 10 seconds without allowing it to start. Check and refill the reservoir. Repeat at least 3 times, each time checking and refilling the reservoir.
- y. Start the engine and let it idle for 2 minutes. Shut the engine off and check the fluid level in the reservoir.
- z. Start the engine again. Steer the vehicle from full left to full right, turning several times. Add fluid as necessary to the fill line on the dipstick.

**5-24. POWER STEERING PUMP REPAIR.**

This task covers:      a. Disassembly                      b. Repair                      c. Assembly

**INITIAL SET-UP**

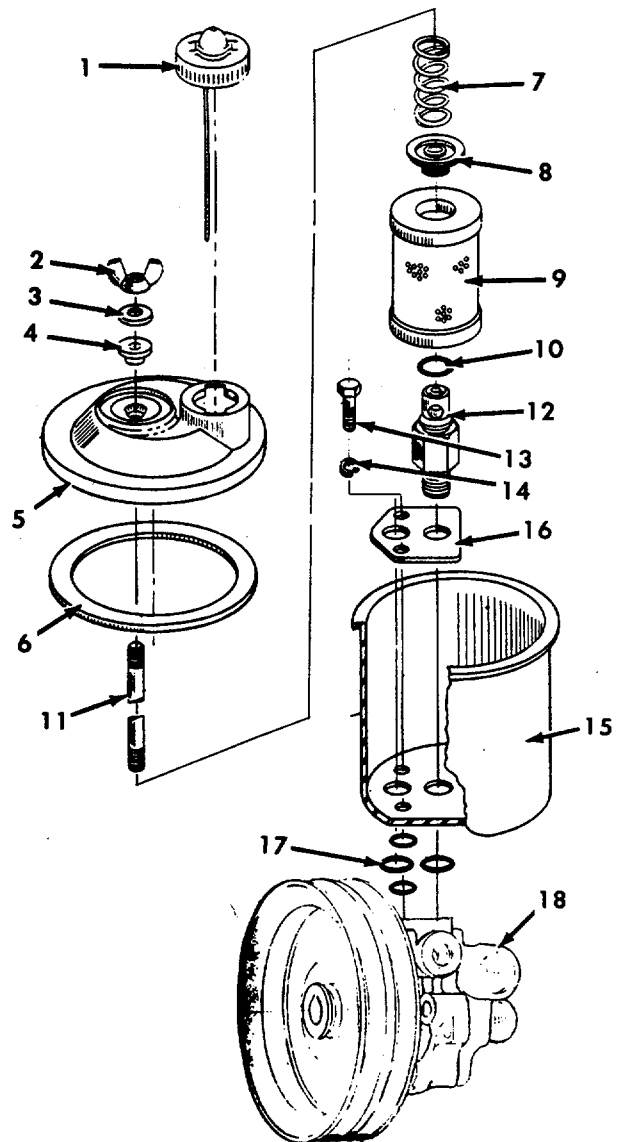
Tools

General Mechanics Tool Kit  
Suction Pump

Materials/Parts

Filter/Gasket Service Kit (ERS 28001)  
Reservoir Service Kit (ERS 27839)  
Power Steering Fluid (Appendix D, Item 19)

- a. Remove filler cap assembly (1).
- b. Remove wing nut (2), washer (3), stud gasket (4), cover (5) and gasket (6).
- c. Remove fluid from reservoir with a suction pump.
- d. Remove spring (7), filter cap (8), filter (9) and filter O-ring (10).
- e. Remove stud (11). Remove reservoir stud (12) using a 1-1/4 inch hex socket wrench.
- f. Remove two bolts (13) and lockwashers (14) using a 5/16 inch hex socket wrench.
- g. Remove the reservoir (15), reinforcement plate (16) and lift the four gaskets (17) from the grooves on the pump body.



**REPAIR**

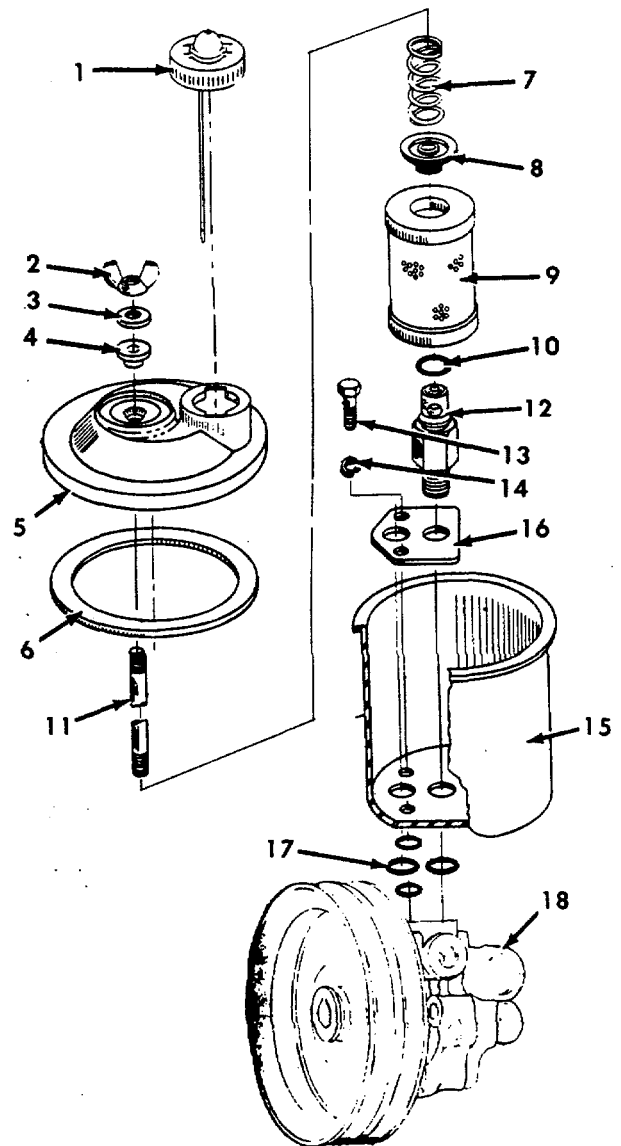
- a. Discard stud gasket (4), filter cap (8), filter O-ring (10), filter (9) and four gaskets (17).
- b. Replace all other components which are damaged or defective.

**ASSEMBLY**

- a. Install filter O-ring (10) on reservoir stud (11).
- b. Insert four gaskets (16) in grooves on the pump body (17).
- c. Align four holes in pump body (17), reservoir (14) and reinforcement plate (15) and secure with two lockwashers (13) and bolts (12). Torque to 5-10 ft-lb (7-14 N.m).

**5-24. POWER STEERING PUMP REPAIR (Continued).**

- d. Install reservoir stud (11) with O-ring (10) and torque to 30-40 ft-lb (40-54 N.m).
- e. Torque stud (11) into reservoir stud (12) to 1-5 ft-lb (1.4-7 N.m).
- f. Install new filter (9) over stud (11) and push down over O-ring (10).
- g. Carefully install new filter cap (8) on stud (11) and push into end of filter (9).
- h. Install spring (7), gasket (6) and reservoir cover (5).
- i. Install new stud gasket (4) and secure reservoir cover (5) to reservoir (15) with washer (3) and wing nut (2). Torque wing nut (2) to 10-25 in-lb (1.2-2.8 N.m).
- j. Refill reservoir to proper level with power steering fluid (Appendix D, Item 19).
- k. Replace filler cap assembly (1).



**Section IX. MAINTENANCE OF FRAME ASSEMBLY**

Crossmember Replacement .....	Para. 5-26	General .....	Para. 5-25
Frame Rail Replacement .....	5-27		

**5-25. GENERAL.**

This section contains information on the maintenance of the power steering system that is maintainable at the Direct Support level.

**5-26. CROSSMEMBER REPLACEMENT.**

This task covers:      a. Disassembly                      b. Repair                      c. Assembly

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Personnel Required :4

General Safety Instructions

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

Equipment Condition

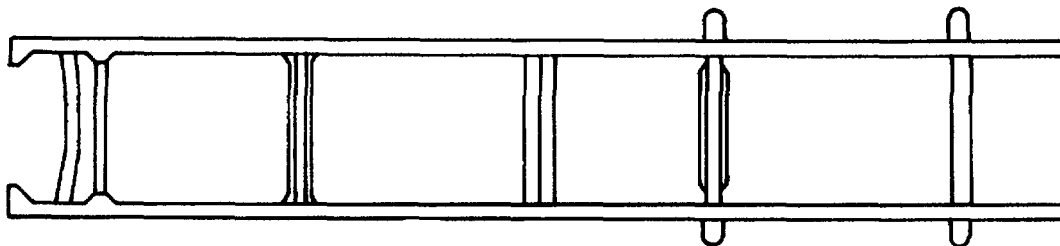
Para.	Condition Description
4-13 thru 4-16	Accessories Removed
4-18 thru 4-22	Auxiliary Equipment Removed
4-24	Twin Agent Firefighting System Removal
4-45	Body Assembly Removed
5-13	Engine Removed
5-18	Cab Assembly Removed

Materials/Parts

Crossmember (473369C2)

**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.

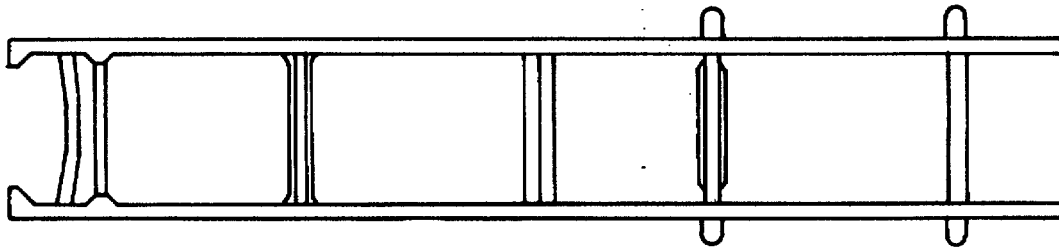


**5-26. CROSSMEMBER REPLACEMENT (Continued).**

- 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 crossmembers 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 5-18).
- f. Install engine (paragraph 5-13).
- g. Install hose body assembly (paragraph 4-45).
- h. Install twin agent firefighting system (paragraph 4-24).
- i. Install accessories (paragraphs 4-18).
- j. Reconnect the battery cables.

**5-27. FRAME RAIL REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit  
 Jack Stand  
 Hoist

Personnel Required: 4

Materials/Parts

Streetside Frame Rail (491922C4)  
 Curbside Frame Rail (491923C4)

Equipment Condition

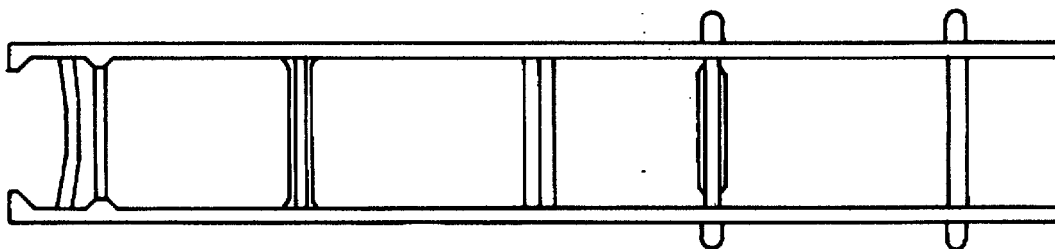
Para.	Condition Description
5-25	Crossmembers Removed
4-59 thru 4-66	Engine Cooling System Removed
4-68 thru 4-77	Engine Fuel System Removed
4-79 thru 4-81	Exhaust System Removed
4-147 thru 4-148	Electrical System Removed
4-150 thru 4-154	Propeller Assemblies Removed
4-156	Transmission Assembly Removed
4-159	Transfer Case Removed
4-171	Brake System Lines and Piping Removed
4-118 thru 4-120	Steering Assembly Removed
4-181 thru 4-183	Power Steering System Removed
4-185 thru 4-190	Front Suspension Removed
4-192 thru 4-193	Rear Suspension Removed
4-195	Rear Axle Assembly Removed
4-201	Front Axle Assembly Removed

**REMOVAL**



- a. Using hoist, remove frame rail from area.
- b. Remove jack stands from under frame rails.

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.





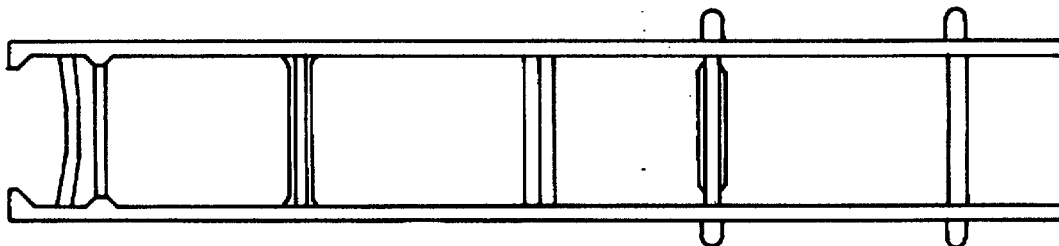
**5-27. FRAME RAIL REPLACEMENT (Continued).****INSTALLATION**

- a. Position frame rail to begin assembly.



**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 5-25).
- d. Install front axle assembly (paragraph 4-201).
- e. Install rear axle assembly (paragraph 4-195).
- f. Install rear suspension (paragraphs 4-192 thru 4-193).
- g. Install front suspension (paragraphs 4-185 thru 4-190).
- h. Install power steering system (paragraphs 4-181 thru 4-183).
- i. Install steering assembly (paragraphs 4-118 thru 4-120).
- j. Install brake system lines and piping (paragraph 4-171).
- k. Install transfer case (paragraph 4-159).
- l. Install transmission assembly (paragraph 4-156).
- m. Install propeller assemblies (paragraphs 4-150 thru 4-154).
- n. Install electrical system (paragraphs 4-147 and 4-148).
- o. Install exhaust system (paragraphs 4-79 thru 4-81).
- p. Install engine fuel system (paragraphs 4-68 thru 4-77).
- q. Install engine cooling system (paragraphs 4-59 thru 4-66).



- h. Install power steering system (paragraphs 4-181 thru 4-183).
- i. Install steering assembly (paragraphs 4-118 thru 4-120).
- j. Install brake system lines and piping (paragraph 4-171).
- k. Install transfer case (paragraph 4-159).

**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 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 Twin Agent 4x4 Firefighting Truck.

**6-2 SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.**

Special tools, TMDE and support equipment required to maintain the Twin Agent 4x4 Firefighting Truck are listed in Appendix B, Section m.

**Section II. MAINTENANCE OF ENGINE AND ACCESSORIES**

	Para.		Para.
Camshaft and Gear Maintenance .....	6-9	General. ....	6-3
Cylinder Head and Valve Maintenance .....	6-6	Oil Pump, Filters, and Cooler Maintenance .....	6-11
Engine and Accessories Repair .....	6-4	Piston and Connecting Rod Maintenance .....	6-12
Flywheel, Crankshaft, and Main		Rocker Arm, Shaft and Push Rod Maintenance .....	6-5
Bearing Maintenance .....	6-13	Timing and Gear Maintenance .....	6-10
Front Cover Maintenance .....	6-8	Vibration Damper 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.**


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 This task covers:      Repair
 

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**INITIAL SET-UP**Tools

General Mechanics Tool Kit

Equipment Condition

Para.    Condition Description

4-62    Drive Belts Removed

5-11    Engine Removed

Materials/Parts

Seals and Gaskets (as required)

**REPAIR****NOTE**

**Engine repair consists of disassembly, repair, or replacement of the following components:**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>a. Remove alternator (paragraph 4-85).</li> <li>b. Remove starter (paragraph 4-86).</li> <li>c. Disassemble, repair, or replace the intake manifold (paragraph 4-88).</li> <li>d. Disassemble, repair, or replace the exhaust manifold (paragraph 4-89).</li> <li>e. Disassemble, repair, or replace the valve cover (paragraph 4-90).</li> <li>f. Disassemble, repair or replace the rocker arm, shaft and pushrods (paragraph 6-5).</li> <li>g. Disassemble, repair or replace the cylinder head and valves (paragraph 6-6).</li> <li>h. Disassemble, repair or replace the front cover (paragraph 6-8).</li> <li>i. Disassemble, repair or replace the camshaft and gear (paragraph 6-9).</li> </ul> | <ul style="list-style-type: none"> <li>j. Disassemble, repair or replace the vibration damper, timing and gear train (paragraph 6-10).</li> <li>k. Disassemble, repair or replace the dipstick and tube (paragraph 4-91).</li> <li>l. Disassemble, repair or replace the oil pan (paragraph 4-92).</li> <li>m. Disassemble, repair or replace the oil pump, filters, and cooler (paragraph 6-11).</li> <li>n. Disassemble, repair or replace the pistons and connecting rods (paragraph 6-12).</li> <li>o. Disassemble, repair or replace the flywheel, crankshaft and main bearing (paragraph 6-13).</li> <li>p. Remove or replace the engine mountings (paragraph 5-14)</li> <li>q. Replace alternator (paragraph 4-85).</li> <li>r. Replace starter (paragraph 4-86).</li> </ul> |
|--|---|

**6-5. ROCKER ARM, SHAFT AND PUSH ROD MAINTENANCE**

This task covers:      a. Removal                      b. Inspection                      c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Equipment Condition

Para.	Condition Description
4-90	Valve Cover Removed
4-77	Injection Nozzles Removed
5-11	Engine Removed

Materials/Parts

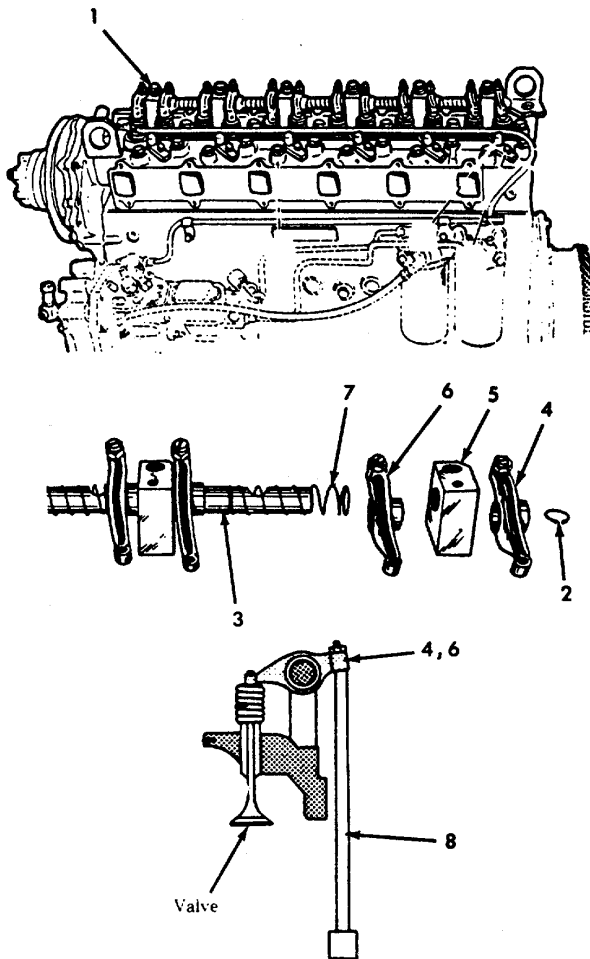
Rocker Arm (688999C91)  
 Shaft (675660C92)  
 Push Rod (675621C1)

General Safety Instructions

Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.

**REMOVAL**

- a. Remove bolts (1) securing rocker lever assembly to cylinder head. Remove rocker arms as an assembly.
- b. Remove snaprings (2) from the grooves at each end of the shaft (3).
- c. Slide rocker arm (4), support bracket (5), and another rocker arm (6) off shaft (3) from each end.
- d. Slide spring (7) off shaft (3).
- e. Repeat steps c and d working from each end of the shaft (3) until shaft (3) is bare.
- f. Remove push rods (8).



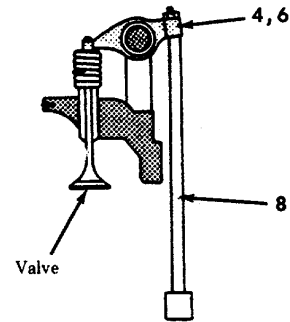
**INSPECTION**

- a. Check rocker arms for cracks or surface imperfections. Check for worn shaft bore diameter.
- b. Check shaft for pitting, scoring, nicking, chipping, looseness, or other damage.
- c. Check pushrods for cracks, damage, or distortion.
- d. Inspect all attaching hardware for cracked or damaged threads.

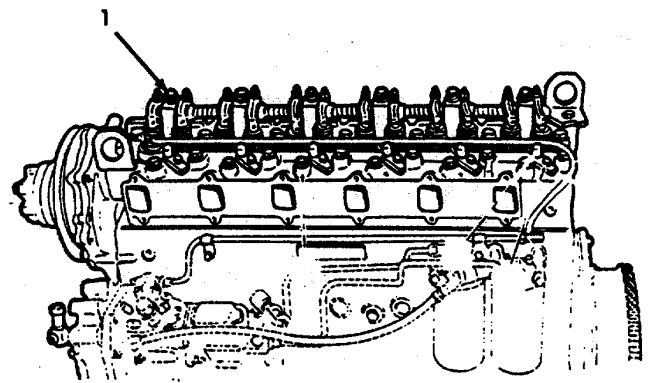
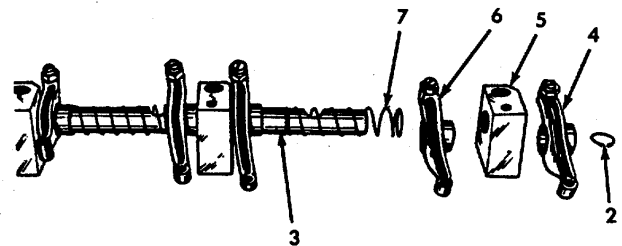
6-5. ROCKER ARM, SHAFT AND PUSH ROD MAINTENANCE (Continued).

INSTALLATION

- a. Install pushrods (8).
- b. If necessary, press replacement cap plugs into each end of the shaft (3).
- c. With side of shaft (3) marked top up and bolt grooves toward assembler, slide one spring (7) to the center of the shaft.
- d. Slide rocker arm (6) into the shaft on each side of the spring, with the adjusting screw towards the assembler.



- e. Slide a support bracket (5) onto the shaft from each end of the shaft to the rocker arm. The tapped hole in each bracket must be to the top and the through bolt holes must line up with the notched side of the shaft.
- f. Slide rocker arm (4) and all other remaining parts on the shaft, observing the order shown. Install the snaprings (2) into the grooves at each end of the shaft.
- g. Install rocker lever assembly to cylinder head and secure with bolts (1).



- h. Install valve cover (paragraph 4-90).
- i. Install injection nozzles (paragraph 4-77).
- j. Install engine (paragraph 5-11).

**6-6. CYLINDER HEAD AND VALVES MAINTENANCE**

This task covers:      a. Removal                      b. Inspection                      c. Installation

**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- Hoist and Sling
- Valve Guide Remover (SE-1722)
- Slide Hammer
- Nozzle Sleeve Puller Adapter (SE-2587)
- Nozzle Sleeve Installing Tool (SE-2534)
- Brass Hammer
- Valve Spring Compressor
- Dial Indicator
- Valve Guide Installer (SE-1943)
- Intake Pre-Cup Puller (PLT-509-5)
- Exhaust Pre-Cup Puller (PLT-509-6)

Materials/Parts

- Cleaning Solvent (Appendix D, Item 54)
- Brass Bristle Brush (Appendix D, Item 7)
- Loctite (Appendix D, Item 27)
- Wood Block (Appendix D, Item 4)
- Soft Bristle Brush (Appendix D, Item 9)
- Fine Emery Cloth (Appendix D, Item 13)
- Lubricating Oil (Appendix D, Item 36)
- Bluing Ink (Appendix D, Item 23)
- Cylinder Head (687199C92)
- Intake Valve (675046C2)
- Exhaust Valve (676865C2)

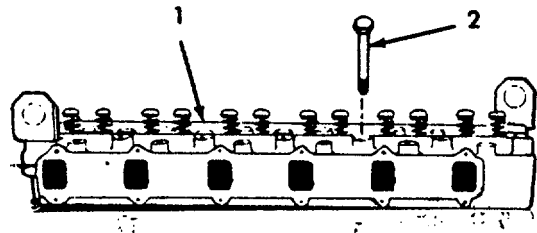
Equipment Condition

Para.	Condition Description
5-11	Engine Removed
4-77	Injection Nozzles Removed
4-90	Valve Cover Removed
6-5	Rocker Arm, Shaft and Push Rods Removed

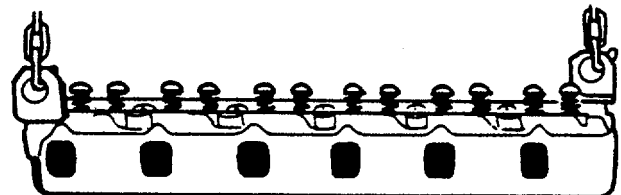
**REMOVAL**

a. *Cylinder removal.*

- (1) Remove cylinder head bolts (2).
- (2) Insert 15 inch pry bar at left front side of cylinder head, between indentation of cylinder head and crankcase. Break seal formed by head gasket sealant prior to hoisting.



**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.**



- (3) Connect hoist and sling to cylinder head lifting eyes and remove head from engine. Place head on wood blocks to protect valves and deck.

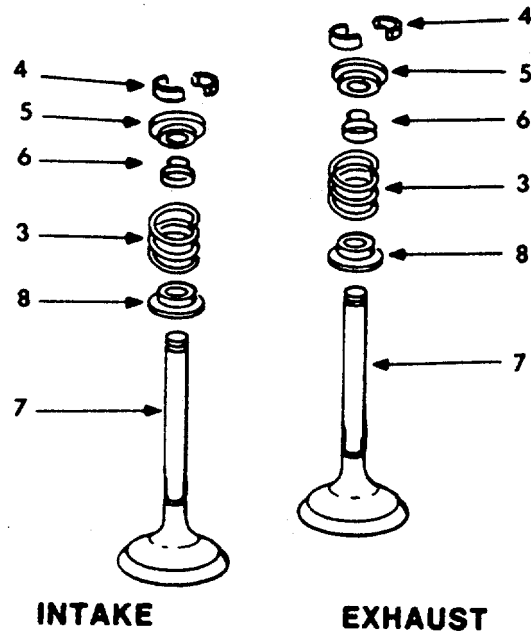
6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued)

b Valve removal.

**CAUTION**

Keep valves in order so reinstallation in original valve guide is assured.

- (1) Compress valve springs (3) using a spring compressor tool.
- (2) Remove spring retainer locks (4).
- (3) Remove rotators (5) and oil shields (6).
- (4) Allow valve (7) and valve seat (8) to drop out of guide.



**NOTE**

If valve does not dropout, inspect valve stem for burrs. If burr exists, remove with a hone to prevent valve guide damage.

**INSPECTION**

a. Cylinder head inspection.

- (1) Remove deposits from upper and lower deck of head. Pay special attention to exhaust valve ports, valve seats, injection nozzle sleeves and water directors.

**WARNING**

Cleaning solvent (Appendix D, Item 54) 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.

- (a) Use cleaning solvent (Appendix D, Item 54) and brass wire brush (Appendix D, Item 7) to clean bores.

**WARNING**

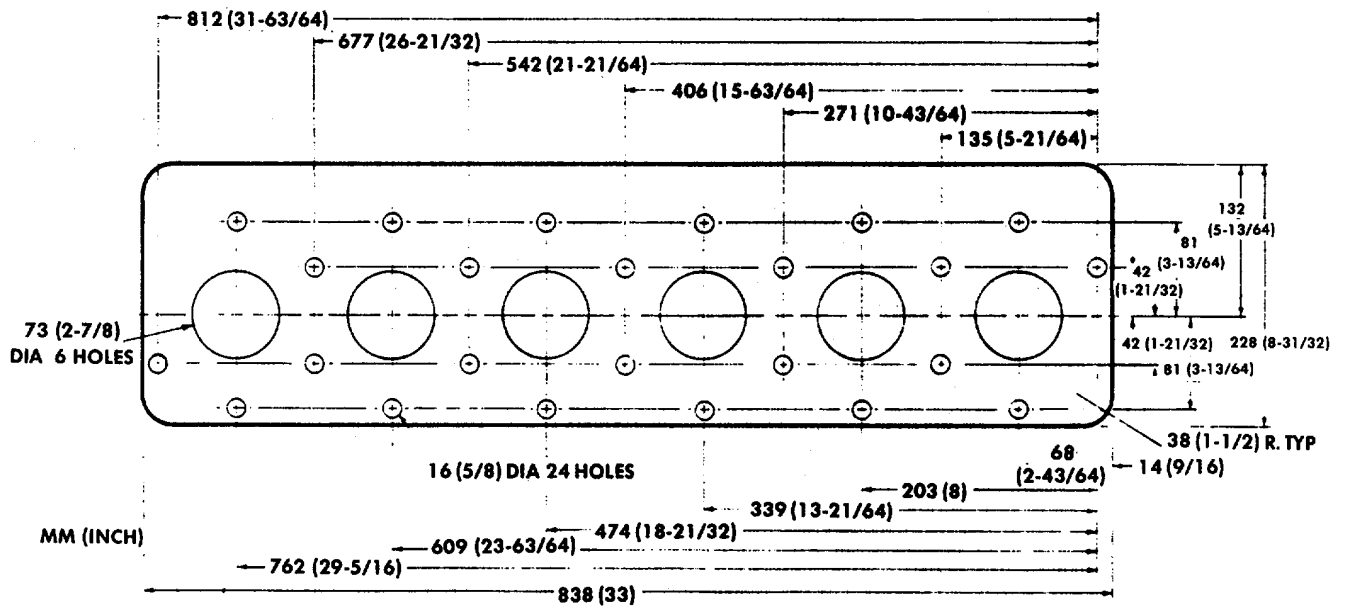
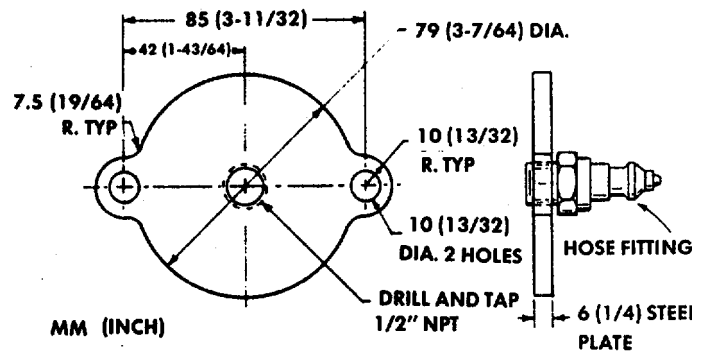
Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi 206 kPa). Wearing of goggles is required to avoid injury to personnel.

- (b) Blow out carbon deposits with compressed air after cleaning.
- (2) Visually inspect head for cracks using spraying methods. If cracks are found, replace cylinder head.

6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued)

(3) Test cylinder head pressure.

- (a) Fabricate gasket as shown. Use 1/8 inch 3 mm rubber.
- (b) Fabricate bottom pressure plate to cover water directors as shown. Use 1/2 inch (13 mm) aluminum for a permanent plate or plywood of the same dimension for a temporary plate.
- (c) Remove the valves and install injection nozzles.

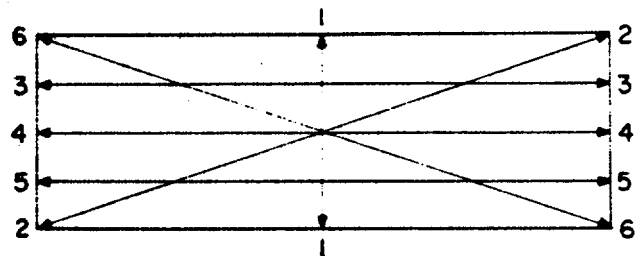


- (d) Attach fitting to thermostat housing with pressure gauge. Run hot water at 10-12 psi (69-83 kPa) into head.
- (e) Visually observe head for leakage at the injection nozzle sleeve flanges, upper deck, lower deck and all ports.

- (b) Insert feeler gauge under straight edge at each check point.
- (c) Replace cylinder head if 0.006 inch (0.15 mm) feeler gauge can be inserted under straight edge when checking the length or 0.004 inch (0.01 mm) feeler gauge can be inserted under straight edge when checking width.

(4) Inspect lower deck for flatness.

- (a) Use a straight edge long enough to span both length and width of head. Follow checking pattern shown.



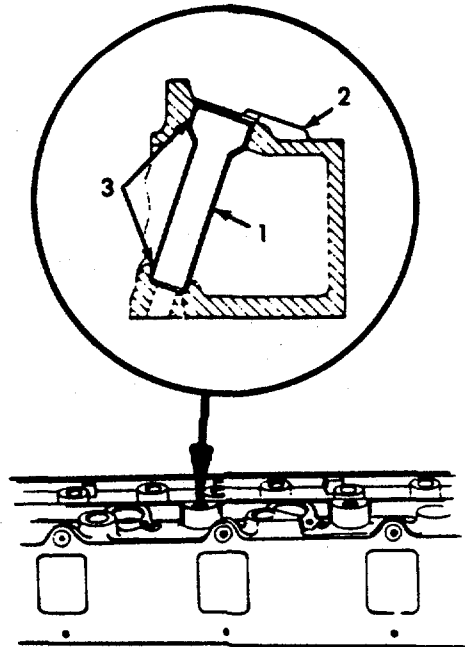


6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued).

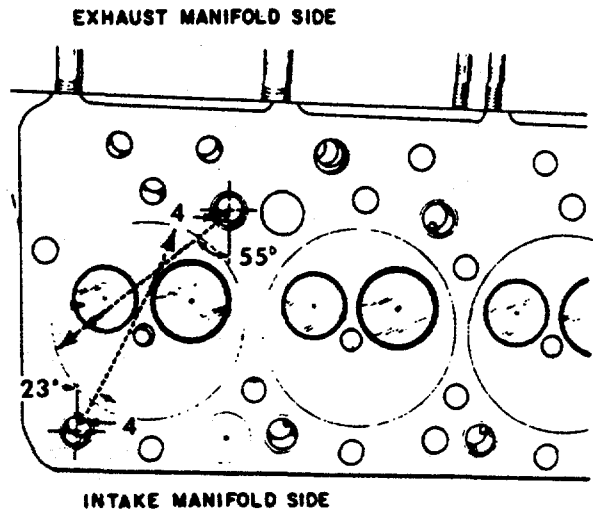
NOTE

Sudden change in contour such as scratches, gouges, etc. must not exceed 0.002 inches (0.05 mm) in depth.

- (5) Inspect nozzle sleeve bore for grease, oil, scale, or rust after removing sleeve.
  - (a) Remove nozzle sleeve (1) from cylinder head (2) by using a slide hammer and nozzle sleeve puller adapter.
  - (b) Inspect and clean bore as necessary.
  - (c) After cleaning bore, apply loctite (Appendix D, Item 27) to upper contact surface (3) of sleeve (1).
  - (d) Place nozzle sleeve (1) into cylinder head (2). Position nozzle sleeve installing tool in sleeve. Keep tool centered and tap squarely with brass hammer until sleeve is bottomed in bore.



- (6) Inspect cylinder head coolant directors for restrictions or looseness.
  - (a) Visually check for restrictions.
  - (b) Tap or pull directors by hand to check for looseness.
  - (c) Remove loose or restricted coolant directors. Use a slide hammer with a small enough jaw to hook under coolant director (4) "opening."
  - (d) New coolant directors should be tapped into place with a small hammer and block. They must be recessed 0.06 inch (1.5 mm) below the bottom deck of the cylinder head.
  - (e) Aim coolant directors at angles shown in illustration.



b. Valve guide inspection.

**CAUTION**

Failure to clean valve guide bore can cause premature valve guide wear and in severe conditions, valve breakage.

6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued)

**NOTE**

**Valve guides must be thoroughly cleaned prior to valve installation.**

- (1) Coat a brush (Appendix D, Item 9) (which has a slightly larger diameter than the I.D. of the valve guide) with soap and water.
- (2) Insert brush into I.D. of valve guide and with a turning motion, run the brush through to insure removal of gum, carbon deposits and rust preventive from the guide and spiral groove.

**NOTE**

**When installing valves and retainers do not use grease. Grease may stop the flow of lubricating oil into the valve guide and cause valve guide wear.**

- (3) Thoroughly coat guide with clean lubricating oil (Appendix D, Item 37) after cleaning operation is complete.



**All valve guides furnished as replacement parts are reamed to size; however it is necessary to ream guides to specified size after installation to remove any burrs or slight distortion caused by the pressing operation. Be extremely careful not to remove too much material. Always clean guides after this operation.**

- (4) After cleaning all valve guide bores, position alight at bottom of valve guide bore; examine walls for burning, cracking or excessive wear.
- (5) Measure I.D. of valve guide at several points. Valve guide I.D. maximum limits are:

0.3750 in.                      (9.525 mm)

- (6) Replace any guides which are burned, cracked, worn beyond limits, or without rifling.
  - (a) Remove valve guides with valve guide remover.

**NOTE**

**Install valve guides with (internal) threaded portion down. The 30 degree chamfer at the top of the guide is intended to allow excess oil to drain away from the top of the guide and the threads are intended only to distribute the small amount of oil which enters the guide, not to introduce oil. Inverting the guides can lead to excessive oil consumption.**

- (b) Use valve guide installer to install new guide. Keep valve guide recession from cylinder head surface at the maximum limits specified.

INTAKE	EXHAUST
1.227 in (31.17 mm)	1.307 in (32.20 mm)

*c. Valves inspection.*

- (1) Remove residue from valve springs, valve head and stem.



**Cleaning solvent, (Appendix D, Item 54), 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.**



**Do not use steel brushes, for these will scratch the surface and lead to valve failure.**

- (a) Clean with solvent (Appendix D, Item 54) and a brass wire brush (Appendix D, Item 7).

**6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued)**

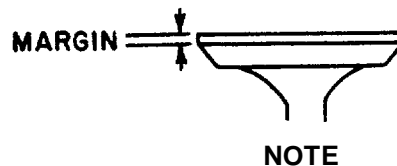
(b) Lightly polish valve surface with extremely fine emery cloth (Appendix D, Item 13).

- (2) Visually inspect each valve for excessive wear, burn marks, warpage, pitting, or scuffing at valve stem grooves, valve stems, or valve heads. Replace valves which are seriously bent, worn, burnt, warped, pitted, or scuffed.

**INSTALLATION**

- a. Resurface valve face angle, if necessary. Maintain a minimum valve face margin of 0.068 in.(1.73 mm) for intake valves and 0.045 in.(1.14 mm) for exhaust valves.
- b. Set valve in grinder to desired angle.
- c. Dress the wheel to proper angle.
- d. Take a light cut off valve face angle surface.
- e. Replace valve if more than 0.008 in. (0.20 mm) stock is removed from valve face angle or if margin falls below minimum specifications.
- f. Check valve face run out, after resurfacing, with dial indicator.
- g. Replace valve if run out (in reference to valve stem) is greater than 0.002 in. (0.05 mm) total variation in dial indicator reading.
- h. After resurfacing valves, clean valve guides and check valve face contact with valve seat using bluing ink (Appendix D, Item 23).
  - (1) Spread thin film of bluing ink (Appendix D, Item 23) on valve face. Insert valve into its guide.
  - (2) Apply pressure on exact center of valve head, while making a quarter turn in the seat.
  - (3) Remove valve, inspect impression made on seat and on valve face.
  - (4) Bluing ink (Appendix D, Item 23) should appear around entire contact surface of valve

face and valve seat to be acceptable. Check several times to prevent error. If acceptable, proceed with valve installation.



**If bluing ink (Appendix D, Item 23) DOES NOT show around the entire contact surface of the valve seat, the angles do not match and are unacceptable. If this happens, correct resurfacing valve seats; not valve faces.**

- i. Valve seat resurface.
  - (1) Dress the grinding wheel to correct angle. lightly lubricate and install correct size pilot into valve guide bore.
  - (2) Lower grinder head over pilot shank until wheel barely clears the valve seat. Turn on power. Gently apply grinding wheel to valve seat with little pressure other than weight of the wheel.
  - (3) Raise wheel frequently to prevent overheating.
  - (4) Grind seat to a smooth even surface.
  - (5) Check seat concentricity, roundness and valve face contact using bluing ink (Appendix D, Item 23) following installation procedure h.(6) After grinding seats, it may be found that seats are wider than the specified width.(7) Correct wide valve seats by grinding top edge of seat with a stone mounted on grinder head. The stone must be smaller angle (preferably 15 degrees) than the valve seat.

**NOTE**

**If valve does not seat properly after resurfacing valve seats, replace valve seats.**

**6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued).**

j. Valve seat replacement.

- (1) Remove valve seats with a slide hammer and expanding screw with pre-cup puller. Two pre-cup pullers are available for service; one for intake, one for exhaust valves.



**Cleaning solvent (Appendix D, Item 54) 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.**

- (2) Clean counter bore (in head) to assure proper valve seat mating and good heat transfer. Use cleaning solvent (Appendix D, Item 54) and brass wire brush (Appendix D, Item 7).
- (3) If right fit is not assured between mating surfaces of valve seat and cylinder head counterbore, install oversize valve seat inserts as follows:

- (a) Take a light cut from bottom in insert counterbore in cylinder head to dimensions shown below:

OVERSIZE INSERT	INTAKE	EXHAUST
.002 in	1.998-1.999 in. (50.75-50.77 mm)	1.626-1.627 in. (41.30-41.33 mm)
.015 in.	2.011-2.012 in. (51.08-51.10 mm)	1.639-1.640 in. (41.63-41.66 mm)

- (b) Maintain radii shown when enlarging counterbore for oversize inserts.

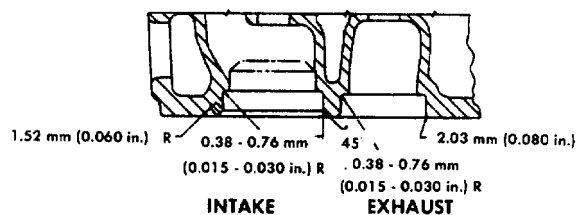
**NOTE**

**Chilling will prevent metal scraping at counterbore, ensuring maximum contact of mating surfaces.**

(4) Valve seat inserts installation.

- (a) Chill valve seat inserts and driver tool in dry ice or liquid freon for one half hour before installing.
- (b) Align insert to avoid cocking.
- (c) Press insert into cylinder head using an arbor press and insert driver. Exert an even pressure of 500 ft-lb (2225 N.m) for five seconds to assure proper seating.
- (d) Insert should be recessed into head when properly seated.

- k. Coat valve stems with clean engine oil (Appendix D, Item 36) prior to inserting them from the bottom of the head.



6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued)

- l. Return each valve (and its parts) to the position from which it was removed.
- m. Place valve seat (1), spring (2), oil shield (3), and rotator (4) onto stem of valve (5).
- n. With a valve spring compressor, compress the spring (2) far enough to install the valve locks (6) into the keeper groove (7).

**WARNING**

Cleaning solvent (Appendix D, Item 54) 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.

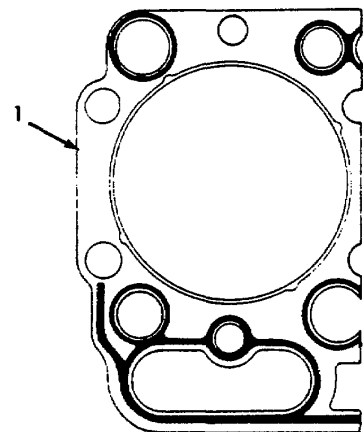
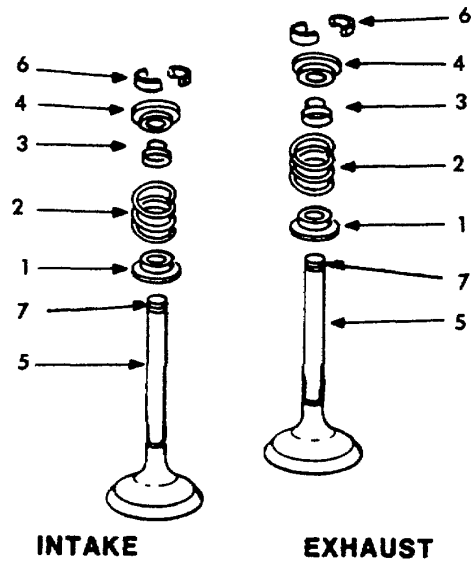
Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.

- o. Clean and dry cylinder head gasket surfaces with solvent and compressed air.
- p. Blow out cylinder head bolt holes with compressed air to prevent hydrostatic lock and possible block cracking when bolts are torqued.

**CAUTION**

Do not use gasket cement. Heat transfer may be adversely affected.

- q. Install new cylinder head gasket (1).
- r. Install rocker arm, shaft, and push rods on cylinder head (paragraph 6-5).

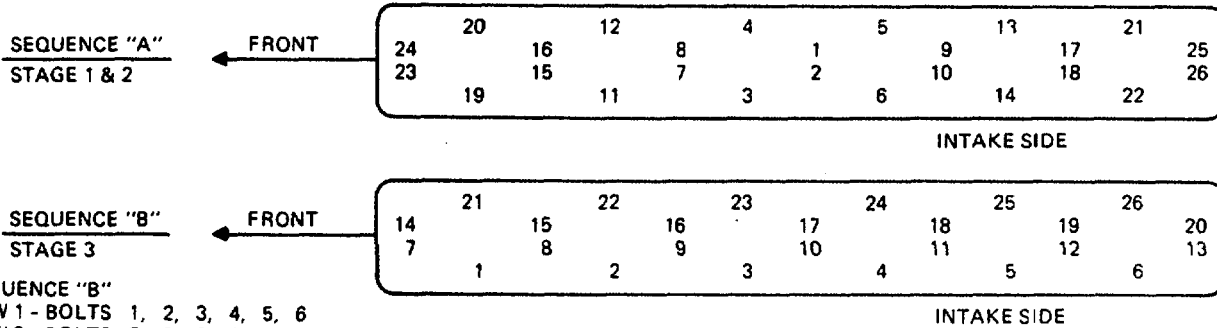


**WARNING**

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.

- s. Use a hoist and sling to place and align head on crankcase dowels. Maintain gasket alignment.
- t. Using an accurate torque wrench, torque cylinder head bolts in three stages.

6-6. CYLINDER HEAD AND VALVES MAINTENANCE (Continued).



SEQUENCE "B"  
 ROW 1 - BOLTS 1, 2, 3, 4, 5, 6  
 ROW 2 - BOLTS 7, 8, 9, 10, 11, 12, 13  
 ROW 3 - BOLTS 14, 15, 16, 17, 18, 19, 20  
 ROW 4 - BOLTS 21, 22, 23, 24, 25, 26

- u. Lubricate bolt threads, bolt head seating areas and washers with clean lubricating oil (Appendix D, Item 36).
- v. Torque bolts in three stages:

Stage 1: Following sequence "A" torque bolts to 110 ft-lb (150 N.m).  
 Stage 2: Following sequence "A" torque bolts to 155 ft-lb (210 N.m).  
 Stage 3: Following sequence "B" torque bolts in rows, 165 ft-lb (225 N.m).

**CAUTION**

**Do not back bolt off, pull up to torque level indicated. Check the two end rocker arms for freedom of motion after torquing first stage.**

**Do not adjust valves with the engine running. Severe damage can result from inserting feeler gauge between valve and valve lever due to close clearance of valve piston.**

- w. Valve lash adjustment.

**NOTE**

Valve lash may be adjusted as a separate operation without cylinder head and valve lever removal, disassembly, cleaning, inspection or repair.

All valves are adjusted by cranking the engine only twice.

Perform valve lash adjustment with the engine warm which means any temperature above freezing.

- (1) Turn the crankshaft until the number one piston is on the compression stroke and the timing pointer on the front cover is in line with the top dead center mark (pin) on vibration damper or flywheel.

**NOTE**

**Be sure that the number one piston is on the compression stroke by turning both push rods by hand to determine that both valves are closed. Valves are closed when push rods are loose and can be turned easily.**

- (2) Six valves are adjusted when the number 1 piston is at top dead center (compression) and the remaining six are adjusted when the number 6 piston is at top dead center (compression). Odd numbered valves are intake valves; and even numbered valves are exhaust valves.
- (3) Valve tappet clearance (lash) is 0.025 inch (0.64 mm) for intake valves and exhaust valves.

**CAUTION**

**When tightening head bolts, place a 0.005 inch (0.127 mm) feeler gauge between the outside brackets and the rocker levers to prevent binding.**

**6-6. CYLINDER HEAD AND VALVES MAINTENACE (Continued).**

- x. Engine timing check (using a feeler gauge).
  - (1) Adjust the number 1 intake valve with the number 1 piston set at top dead center compression stroke to 0.029 inch (0.74 mm).
  - (2) Turn the engine forward to approximately bottom dead center.
  - (3) Place a 0.004 inch (0.10 mm) feeler gauge between the valve lever and valve stem of the number 1 intake valve and slowly rotate the engine forward until the feeler gauge becomes tight. This is now the point at which the number 1 intake valve starts to open before top dead center. The degree readings should be  $24^{\circ} \pm 3^{\circ}$ .

**NOTE**

**One tooth out of time on gear train equals approximately 11 degrees movement of vibration damper.**

**If the timing on the number 1 valve is within specifications, the other valves, barring extreme camshaft lobe wear or poor adjustment, will also be in time.**

- (4) Readjust the number 1 intake valve to its proper lash as described in step w.

- (5) If timing is found to be incorrect, removal of the engine's front cover is required to inspect punch mark and gear tooth position.
- y. Engine timing check (using a dial indicator).
  - (1) Adjust the number 1 intake valve with the number 1 piston set at top dead center compression stroke to 0.029 inch (0.74 mm).
  - (2) Position the dial indicator fixture magnetic base on the valve cover fence rail with the indicator shaft on the number 1 intake valve rotor.
  - (3) Set dial indicator at zero.
  - (4) Rotate the engine approximately one full revolution either direction to a position of  $360^{\circ}$  from starting point.
  - (5) Read the dial indicator. The following readings indicate proper gear train timing: 0.155 to 0.220 inch (3.9 to 5.5 mm).
  - (6) If dial indicator readings are outside the specified range, the engine's front cover must be removed and punch mark and gear tooth position adjusted.

- z. Install valve cover (paragraph 4-90).
- aa. Install injection nozzles (paragraph 4-77).
- bb. Install engine (paragraph 5-1 1).

## 6-7. VIBRATION DAMPER MAINTENANCE

This task cover: a. Removal b. Inspection c. Installation

### INITIAL SET-UP

#### Tools

General Mechanics Tool Kit  
 Crankshaft Pulley Puller (PLT-514)  
 Heat -resistant Gloves  
 Micrometer

#### Materials/Parts

Vibration Damper (677781C91)  
 Solvent (Appendix D, Item 54)  
 Thermomelt Crayon (Appendix D, Item 54a)

#### General Safety Instructions

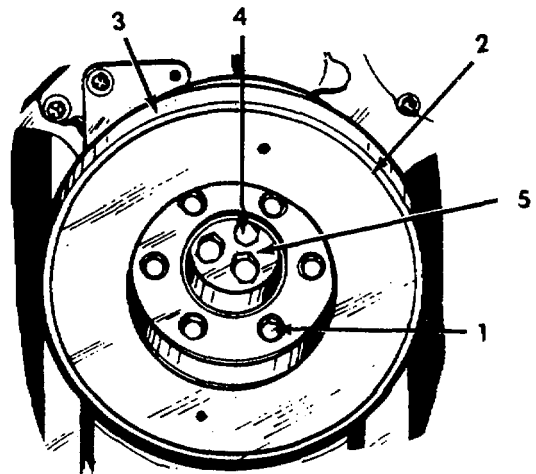
Engine OFF  
 Transmission in (N) neutral.  
 Parking brake set.  
 Batteries disconnected.

#### Equipment Condition

Para. Condition Description  
 Alternator Removed  
 4-167 Compressor Removed  
 4-183 Power Steering Pump Removed.

### REMOVAL

- a. Remove capscrews (1) which secure the vibration damper (2) to the crankshaft pulley (3) and remove the damper (2).
- b. Remove capscrews (4) with the retainer plate (5) securing the crankshaft pulley to the crankshaft.
- c. Remove crankshaft pulley (3) from the crankshaft using crankshaft pulley puller modified to the bolt pattern of the pulley.



### INSPECTION

#### **WARNING**

Cleaning solvent, (Appendix D, Item 54) 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.

- a. Clean vibration damper with cleaning solvent (Appendix D, Item 54).

#### **WARNING**

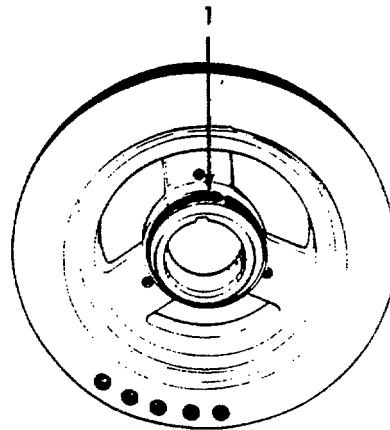
Compressed air used for cleaning or drying can create airborne particles that may enter the eyes. Pressure shall not exceed 30 psi (206 kPa). Wearing of goggles is required to avoid injury to personnel.

- b. Blow dry vibration damper with compressed air.



**6-7. VIBRATION DAMPER MAINTENANCE (Continued).**

- c. Visually inspect vibration damper for dents or leaks around cracks or seam openings in housing. Replace damper if any sign of leaks or dents is evident.
- d. Housing distortion check.
  - (1) Remove paint from vibration damper at four points, each 90° apart.
  - (2) Measure depth of damper housing at each point. If any of the points vary more than 0.002 inch (0.0508 mm), it is necessary to replace damper.
- e. Inspect the oil seal wear sleeve (1) visually for wear, nicks, and scratches.



**INSTALLATION**

**WARNING**

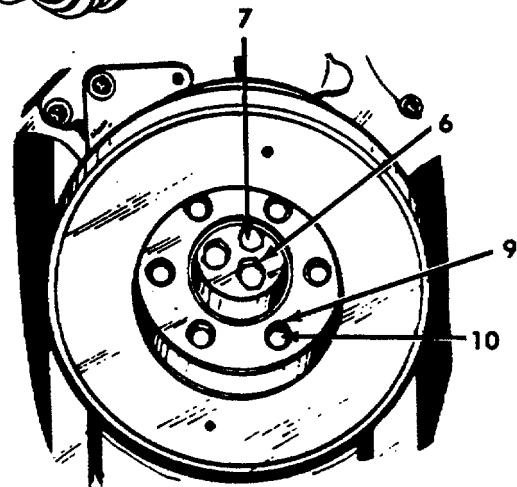
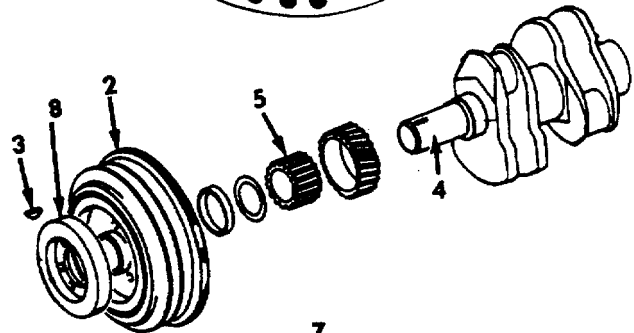
**Use heat-resistant gloves when working with high temperatures.**

- a. Heat the crankshaft pulley (2) to approximately 400° F (205° C). Use a 388° F (197° C) thermomelt crayon (Appendix D, Item 54a) to determine temperature.

**NOTE**

**The marked surface will melt and become a glossy liquid.**

- b. Install key (3) into keyway. Using heat-resistant gloves, align the keyway with the key in the crankshaft (4) and push the pulley (2) onto the shaft (4) until it contacts the oil pump drive spline (5).
- c. Install retainer plate (6) and capscrews (7). Torque capscrews to 125 ft-lbs (170 N.m).
- d. Assemble vibration damper (8) to crankshaft pulley (2) with hardened washers (9) and capscrews (10). Torque capscrews to 35 ft-lbs (47 N.m).



- e. Install power steering pump (paragraph 4-183).
- f. Install compressor (paragraph 4-167).
- g. Install alternator (paragraph 4-85).
- h. Connect batteries.

**6-8. FRONT COVER MAINTENANCE**

This task cover: a. Removal b. Inspection c. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Equipment Condition

Para. Condition Description  
 6-7 Vibration Damper Removed  
 6-11 Oil Pump Removed

Materials/Parts

Front Cover (1802246R91)  
 Gasket (675813C1)  
 Oil Seal (690437C91)

General Safety Instructions

Engine OFF.  
 Transmission in (N) neutral.  
 Parking brake set.  
 Batteries disconnected.

**REMOVAL**

- a. Remove the injection pump access cover (1) and gasket (2) from the front cover (3).
- b. Remove the bolts securing the front cover (3) to the crankcase front plate (4).
- c. Remove the front capscrews securing the front cover to the oil pan.
- d. Remove the front cover (3).
- d. Install bolts securing front cover (3) to crankcase front plate (4).
- e. Using a new gasket (2), install the injection-pump access cover (1).
- f. Press a new oil seal into the oil pump body.
- g. Install the oil pump (paragraph 6-11).
- h. Install the vibration damper (paragraph 6-7).
- i. Connect batteries.

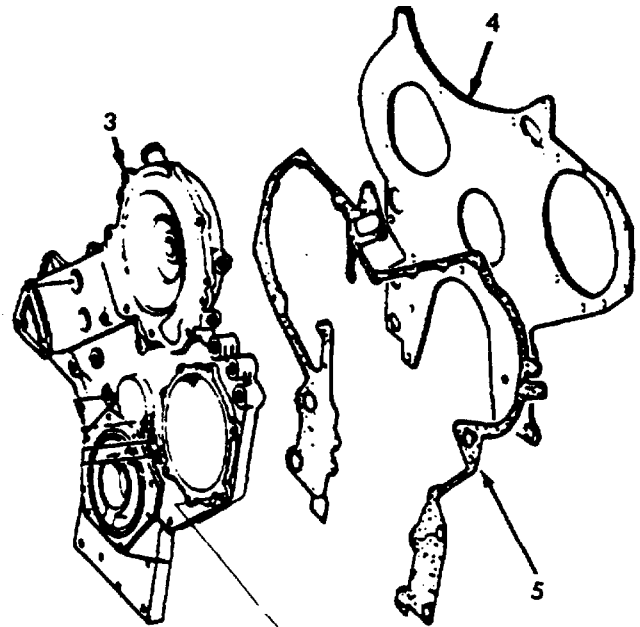
**INSPECTION**

- a. Remove all traces of gasket material from gasket surface of crankcase front cover and front plate.

**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.

- b. Blow dry front cover with compressed air.
- c. Visually inspect the front cover for cracks and distortion.
- d. Visually inspect the front plate for damage.
- e. Replace any cover or plate which is damaged.

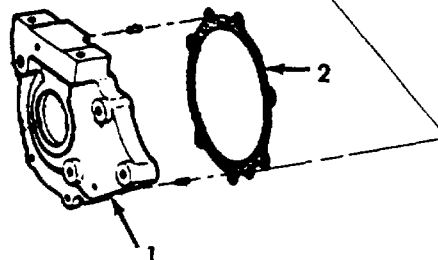


**INSTALLATION**

- a. Install a new front cover gasket (5).

**CAUTION**

**Improper front cover installation will result in cover distortion or loose engine mounting bolts.**



- b. Install the front cover (3).
- c. Install capscrews securing front cover (3) to the front of the oil pan.

6-9. CAMSHAFT AND GEAR MAINTENANCE

This task cover: a. Removal b. Inspection c. Installation

INITIAL SET-UP

Tools

- Dial Indicator
- Camshaft Bearing Service Set (SE-2893)
- General Mechanics Tool Kit
- Micrometer
- Press

Equipment Condition

Para.	Condition Description
6-6	Cylinder Head and Valves Removed
6-8	Front Cover Removed

Materials/Parts

- Cleaning Solvent (Appendix D, Item 54)
- Camshaft (1802339C92)
- Camshaft Gear (675600C1)
- Bushings (680117C1)
- Thermomelt Crayon (Appendix D, Item 54a)

REMOVAL

**NOTE**

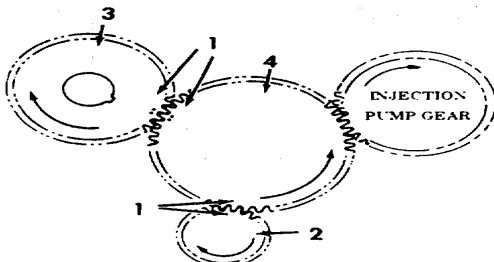
Prior to removal, cam lobe lift can be inspected with camshaft in engine by using a dial indicator. Record the lift readings of each lobe. Cam lobe lift shall be 0.2935 inch (7.455 mm). If wear is 0.020 inch (.51 mm) or greater, replace the camshaft.

- a. Crank engine until timing marks (1) on crankshaft gear (2), camshaft gear (3), and idler gear (4) are in line.

**NOTE**

Before removing the camshaft gear (3), check the camshaft end clearance 0.005 to 0.013 in (0.13 to 0.33 mm). If specification is not met, new parts are required.

- b. Rotate camshaft gear (3), and by reaching through the holes in the gear, remove two cap-screws securing camshaft thrust plate to crankcase.
- c. Remove camshaft. (Support camshaft along its length, as it is being removed, to prevent cam lobes from damaging bushings).



INSPECTION



Cleaning solvent, (Appendix D, Item 54), 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.

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.



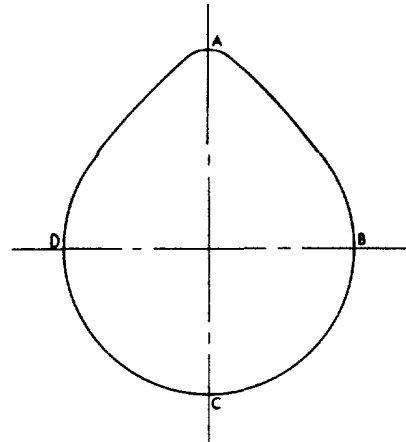
**Do not damage the journals and lobes of the camshaft, or the teeth of the gear.**

- a. Clean all parts in solvent (Appendix D, Item 54) and dry with compressed air.
- b. Visually inspect camshaft lobes for scuffs, scores, or cracks.
- c. Inspect the journals for wear. Using a micrometer, measure the camshaft journal to insure specifications of 2.2814 to 2.2825 in (57.948 to 57.976 mm) are met. If the journals are worn beyond these limits, replace the camshaft.
- d. Camshaft lobe wear check.
  - (1) Compare lifting areas of the cam lobes with a new camshaft. If excessive wear is visible, replace the camshaft

**6-9. CAMSHAFT AND GEAR MAINTENANCE (Continued).**

(2) Camshaft.

- (a) Take reading across A-C and across B-D.
- (b) Subtract B-D from A-C. This will give the cam lobe lift. Cam lobe lift shall be 0.2935 inch (7.455 mm).
- (c) Replace camshaft when cam lobe wear limit of 0.020 inch (0.51 mm) has been reached for any lobe.



- e. Visually inspect thrust plate for wear, cracks and distortion. Then, check for specified shaft end clearance of 0.005 to 0.013 inch (0.13 to 0.33 mm). Replace thrust plate if clearance is excessive or if plate is worn or damaged.
- f. Inspect camshaft drive gear for worn or damaged teeth. If the bore of the gear is widened by repeating pressing so a tight fit is no longer possible, replace the gear with a new one.
- g. Inspect bushings for wear. If worn, remove them and replace with new bushings.

(1) Remove the flywheel and flywheel housing (paragraph 6-13).

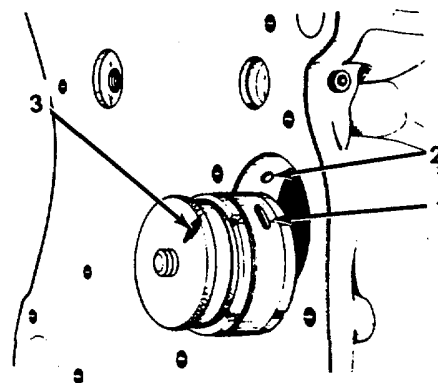
(2) Using a Camshaft Bearing Service Set, with back-up nut and expanding collet, pull the bushings out of the crankcase.

- (a) Remove the front and rear bearings first.
- (b) Pull the two intermediate bearings out the front of the crankcase.
- (c) When bushings are removed, inspect bushing bores in crankcase for burrs or other roughness liable to damage bushings when installed.

**INSTALLATION**

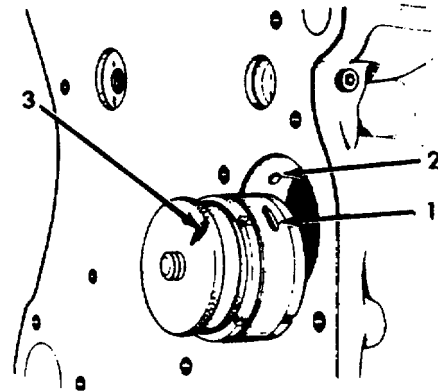
**CAUTION**

**The bushing oil holes (1) and crankcase oil holes (2) must line up.**



**6-9. CAMSHAFT AND GEAR MAINTENANCE (Continued).**

- a. If the camshaft bushings were removed, install new bushings using the camshaft bushing puller and installer tool from the camshaft bearing service set. Be sure the oil holes in the bushing (1) line up with the oil holes in the crankcase (2).
- b. To ease oil hole alignment, mark the back-up nut (3) in line with the bushing oil hole (1) when installing the bushings.
- c. Camshaft gear replacement.



- (1) The drive gear on the camshaft must be pressed off since it is a shrink fit.
- (2) Place the thrust plate on the keyway end of the camshaft against the bearing journal.
- (3) Insert the woodruff key into the keyway.

- (5) Press the gear against the shoulder on the shaft with the timing mark pointed outward.

- d. Coat the cam lobes, bearings and journals with clean engine oil (Appendix D, Item 37) and install the camshaft.
- e. Install the camshaft so that the timing marks stamped on each gear are in line.
- f. Alternately torque the thrust plate cap screws to 20 ft-lb (27 N.m) torque.
- g. Check the camshaft end play with a dial indicator. End play should be 0.005 to 0.013 in (0.13 to 0.33 mm).
- h. Install front cover (paragraph 6-8).
- i. Install cylinder head and valves (paragraph 6-6).

**NOTE**

**Use a Thermomelt crayon to determine temperature.**

- (4) Heat the camshaft gear to approximately 400° F (205° C).



**Wear asbestos gloves when installing gear.**

**6-10. TIMING AND GEAR TRAIN MAINTENANCE**

This task cover: a. Removal    b. Inspection    c. Installation

**INITIAL SET-UP**

Tools

Dial Indicator  
General Mechanics Tool Kit

Materials/Parts

Idler Gear (675764C1)  
Injection Pump Drive Gear (1802737C1)  
Cleaning Solvent (Appendix D, Item 54)  
Grease (Appendix D, Item 21)

Equipment Condition

Para. Condition Description  
6-9 Camshaft and Gear Removed

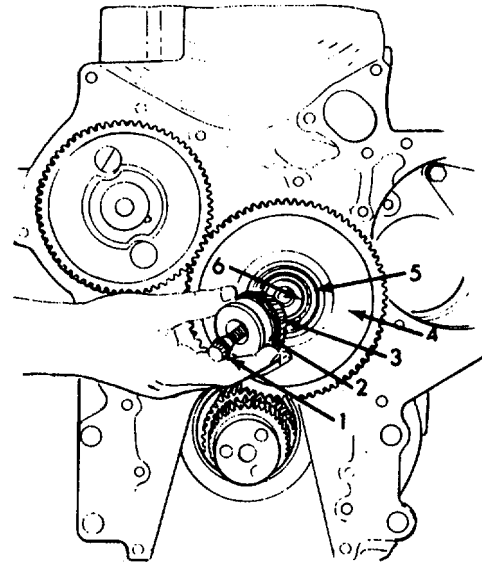
6-10. TIMING AND GEAR TRAIN MAINTENANCE (Continued).

REMOVAL

NOTE

Prior to removal of any individual gear, check the backlash between each set of gears.

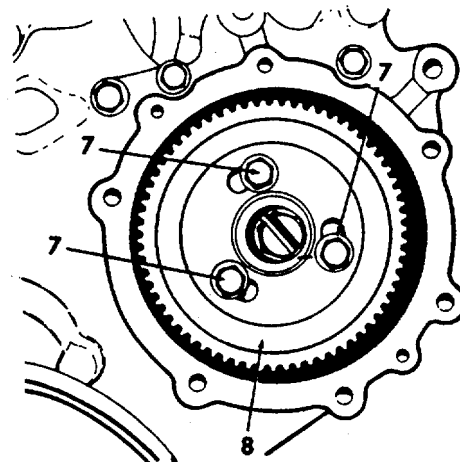
- a. Attach a dial indicator to the crankcase at a suitable location.
- b. Insert the end of the indicator between any two teeth of the gear to be measured.
- c. Move the gear by hand, slightly, then read dial indicator to determine backlash.



NOTE

Backlash between any set of timing gears should not exceed 0.016 inch (0.41 mm). Any gear exceeding this value requires service.

- d. Idler gear removal.
  - (1) Remove the retainer bolt (1), stub shaft (2), and bearing (3). A split ring prevents the bearing (3) from coming off the stub shaft (2).
  - (2) Remove idler gear (4), bearing (5), and spacer (6).
- e. Injection pump drive gear removal.



- (1) Remove three drive gear bolts (7)

- (2) Remove injection pump drive gear (8) from the dowel.

INSPECTION

**WARNING**

Cleaning solvent (Appendix D, Item 54) 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.

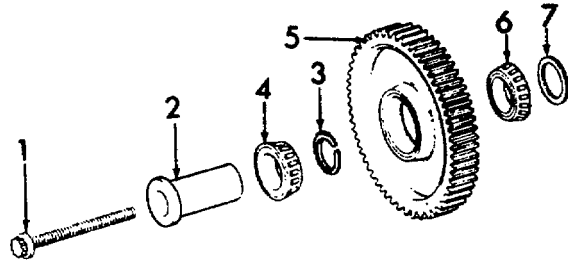
- a. Clean all parts in solvent (Appendix D, Item 54)

**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.

**6-10. TIMING AND GEAR TRAIN MAINTENANCE (Continued).**

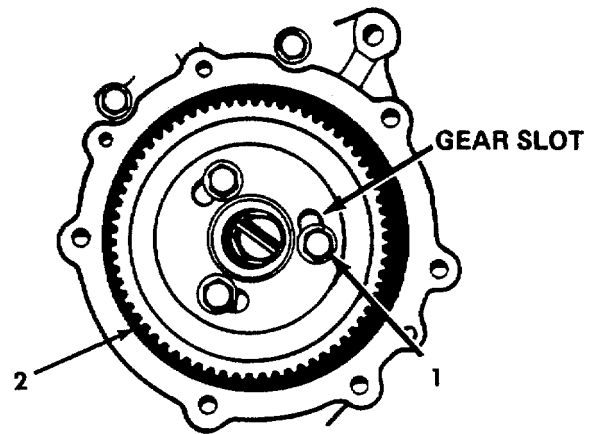
- b. Blow dry parts with compressed air.
- c. Visually inspect *all* gears for wear or damaged teeth. Replace any with evidence of damage.
- d. Visually inspect bearings, spacer, and stub shaft for wear or damage.



**INSTALLATION**

a. Idler gear installation.

- (1) Assemble spacer (1), bearing (2), spacer (3), bearing (4), and stub shaft (5) to idler gear (6).
- (2) Install assembled parts with the timing marks facing out. Be sure the rear spacer (1) is in position. A small amount of grease (Appendix D, Item 21) will aid in holding the spacer.
- (3) Install and torque the retaining bolt (7) to 85 ft-lbs (115 N.m).

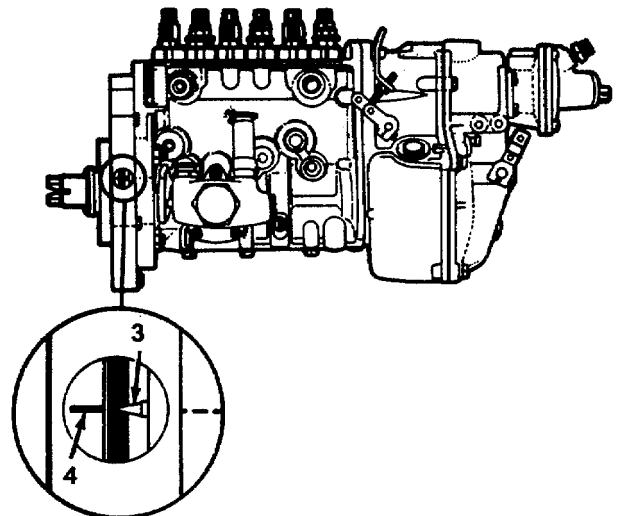


b. Injection pump gear installation.

**CAUTION**

**Be sure that engine crankshaft timing is set at specified static timing prior to going any further.**

- (1) Using drive gear bolts and washers (1), loosely install injection pump drive gear (2) to injection pump meshing it with idler gear. Make sure drive gear is positioned in gear slots so it allows for adjustments.
- (2) Align timing pointer (3) with timing mark (4) by rotating injection pump clockwise (as viewed from drive gear end.)
- (3) Holding the pump shaft with a socket wrench, torque drive gear bolts to 35 ft-lb (47 N.m).
- (4) Rotate engine crankshaft counterclockwise until pump timing pointer and timing mark align.



- (5) Observe engine to injection pump timing on crankshaft pulley. Timing should be 23° ± 1°.

c. Install camshaft and gear (paragraph 6-9).

**6-11. OIL PUMP, FILTERS, AND COOLER MAINTENANCE**

This task cover: a. Removal b. Inspection c. Installation

**INITIAL SET-UP**

Tools

Dial Indicator  
General Mechanics Tool Kit

Equipment Condition

Para. Condition Description  
6-7 Vibration Damper Removed

Materials/Parts

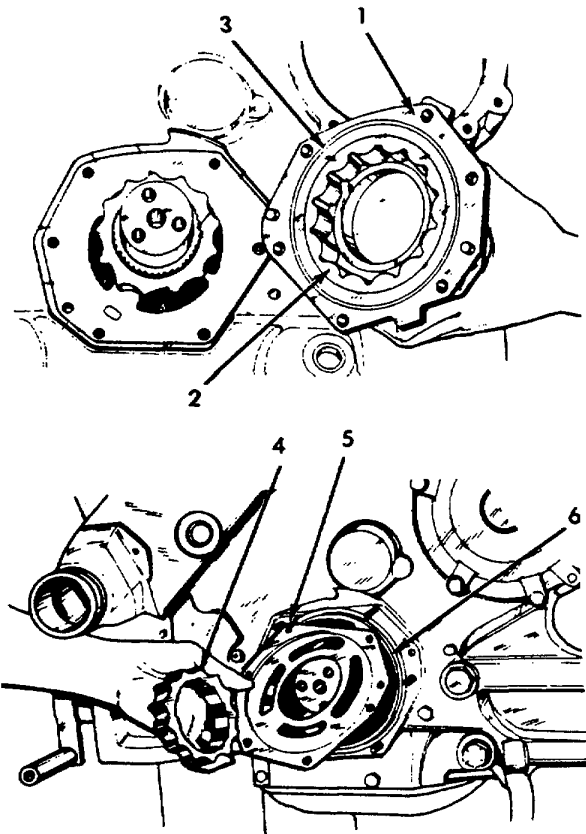
Oil Cooler (444612)  
Filter (1801090C1)  
Oil Pump Service Package (1802666C91)  
Filters (675616C91)  
Oil Filter Base Gasket (675398C1)  
Diesel Fuel (Appendix D, Item 18)  
Lubricating Oil (Appendix D, Item 37)  
Plastigage (Appendix D, Item 40a)  
Cleaning Solvent (Appendix D, Item 54).

**REMOVAL**

a. *Lubricating oil pump removal.*

**CAUTION**

Whenever the oil pump housing is removed from the crankcase front cover, be careful not to mix the six oil pump housing capscrews with any other hardware. These capscrews have a nylon pellet mounted in the threads to seal through tapped holes which go into the oil cavity behind the crankcase front cover. Installation of capscrews not so equipped will result in oil leaks at these points. The leaks will not be obvious until after the engine has been put back into service. To prevent the possible loss of the capscrew sealing characteristic, the capscrews should not be used more than two or three times.



- (1) Remove the capscrews and washers securing the pump housing to the front cover.
- (2) Remove the pump housing (1) with the outer rotor (2) and O-ring (3) from the front cover.
- (3) Remove the inner rotor (4), housing plate (5), and O-ring (6).
- (4) Remove the seal washer from the crankshaft.

b. *Oil filter removal.*

- (1) Before removing filter elements clean the elements and base with diesel fuel (Appendix D, Item 18).
- (2) Disconnect the turbocharger oil supply line at the filter base.



## 6-11. OIL PUMP, FILTERS, AND COOLER MAINTENANCE (Continued).

**CAUTION**

Whenever the oil filter base is removed from the crankcase, be careful not to mix the capscrews with any other hardware. These special screws are necessary to prevent oil leaks as one of the bolt holes connects with an oil pressure gallery.

(4) Remove the filter base with the elements attached.

(5) Remove base gasket.

c. *Oil cooler removal.*

(1) Remove four screws securing the cooler to the crankcase.

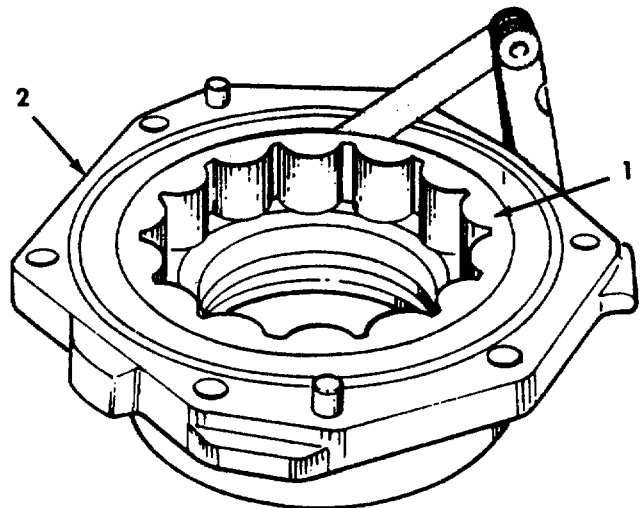
(2) Remove the cooler by pulling towards the rear of the engine.

**INSPECTION****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.

Cleaning solvent (Appendix D, Item 54) 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.

- a. Wash all parts with solvent (Appendix D, Item 54) and dry with compressed air.
- b. Visually inspect the oil pump rotors, housing, and housing plate for nicks, burrs, and scoring.

**CAUTION**

The inner and outer rotors are a matched set and cannot be replaced separately.

- c. Check the radial clearance between the outer rotor (1) and the pump housing (2) with a feeler gauge. The limits 0.0055 to 0.0095 inch (0.140 to 0.241 mm) must be maintained.

**6-11. OIL PUMP, FILTERS, AND COOLER MAINTENANCE (Continued).**

d. End clearance check.

- (1) Place a strip of plastigage (Appendix D, Item 40a) onto rotors and cover with housing, using a new O-ring in groove.
- (2) Secure housing to front cover.
- (3) Remove housing and measure the plastigage. The limits 0.0020 to 0.0048 in (0.0508 to 0.1219 mm) must be maintained.
- (4) Remove the Plastigage and outer rotor.

**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.

**CAUTION**

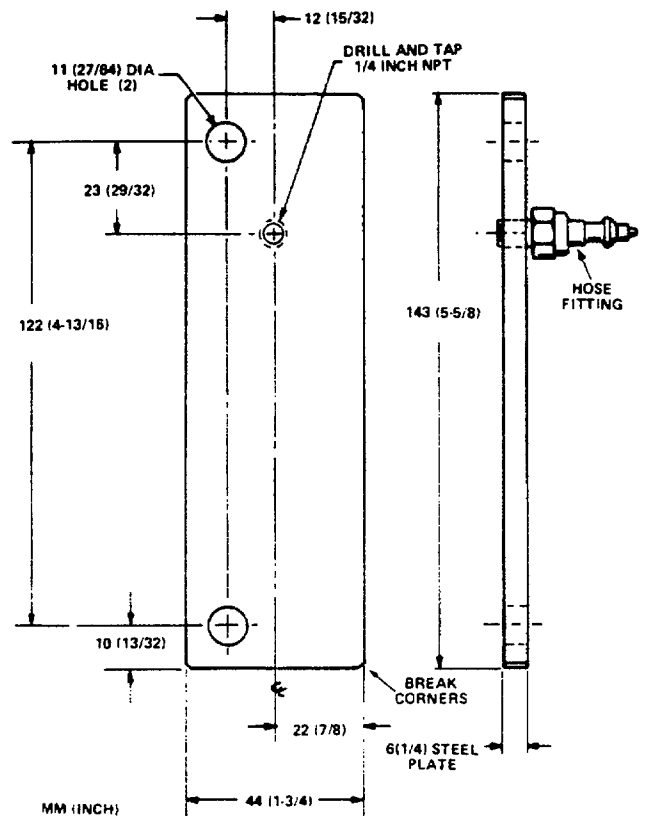
Do not use wire brushes or steel scrapers for removing deposits.

- e. Drain and blow out any foreign matter inside of the cooler. Be certain that all passages are clean and clear before installation.
- f. Air pressure test.

**WARNING**

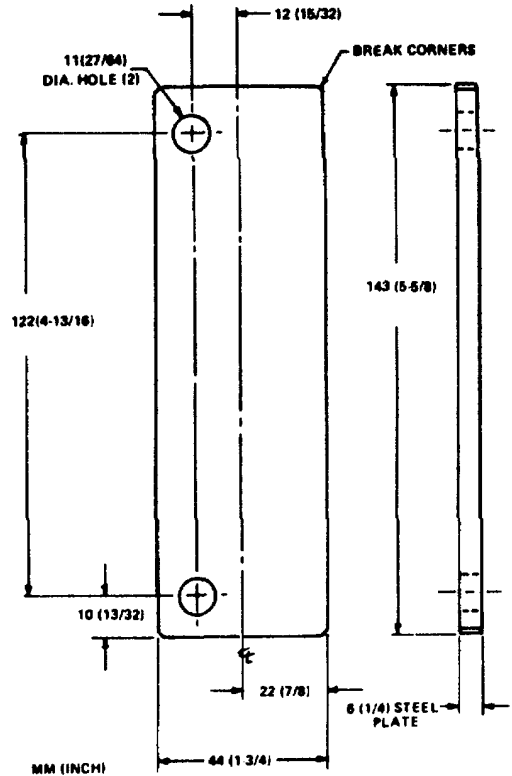
Use adequate safety precautions when performing the following tasks.

- (1) Construct two plates as specified.
- (2) Fasten plates, using new oil cooler gaskets, to the cooler.
- (3) Install an air pressure hose to the cooler.
- (4) Immerse the assembly in a container of water, heated to 120° F (49° C). This stabilizes the metal parts of the cooler.



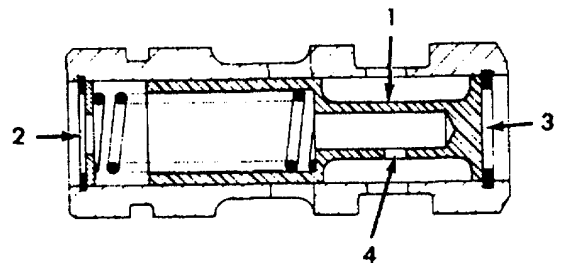
6-11. OIL PUMP, FILTERS, AND COOLER MAINTENANCE (Continued).

- (5) Apply 150 psi (935 kPa) air pressure while immersed.
- (6) Replace if there are moving or growing bubbles after one minute.
- g. Oil pressure regulator valve inspection.
  - (1) Remove valve retainer plug from crankcase.
  - (2) Remove oil pressure regulating valve from crankcase bore.
  - (3) Move the regulator inner valve assembly (1) to ensure it operates freely.
  - (4) Inspect oil pressure regulator valve as shown.
  - (5) Make sure that snaprings (2 and 3) are in position and the inner valve spool has an unobstructed 0.125 inch (3.175 mm) diameter bleed hole (4).



**NOTE**

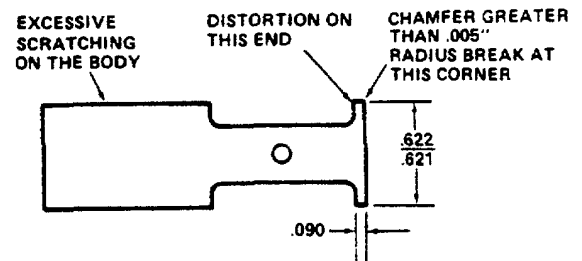
If condition exists as shown and dimensions are not as specified, replace complete valve assembly.



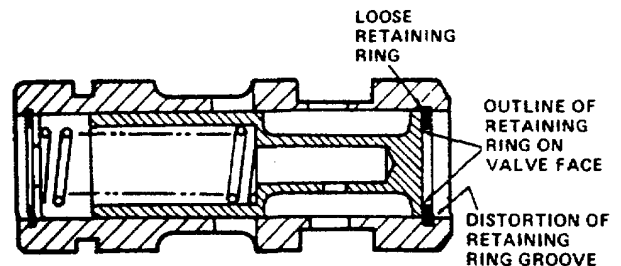
- h. Oil filter components inspection.
  - (1) Discard filter elements.
  - (2) Disassemble by-pass valve, plug and spring in filter base.

**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.



- (3) Wash all parts in diesel fuel (Appendix D, Item 18).



## 6-11. OIL PUMP, FILTERS, AND COOLER 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.**

- (4) Dry all parts with compressed air.
- (5) Visually inspect the inlet and outlet passages in the filter base for restrictions.
- (6) Visually inspect the by-pass valve for wear or damage. Replace if necessary.
- (7) Check by-pass valve spring using a valve spring load tester. Free length of 2.075 in (52.71 mm) and a test length of 0.927 in (23.55 mm) under 6.12 ft-lb (27.2 N.m) should be maintained. Replace if necessary.

**INSTALLATION**

- a. Lubricating oil pump installation.
  - (1) Press a new oil seal into the pump housing.
  - (2) Install a new seal washer with the larger diameter facing out (toward pulley), onto the crankshaft.
  - (3) Install a new O-ring into the groove in the crankcase front cover; then install the plate.
  - (4) Install the inner and outer rotors onto the crankshaft.
  - (5) Using the new O-ring in the groove in the housing, position the outer rotor in the housing and install the housing onto the crankcase front cover.
  - (6) Secure the housing to the cover.
- b. Oil filters installation.
  - (1) Install the valve and spring into the bore of the filter base. Install the plug and torque to 50 ft-lbs (67.8 N.m).
  - (2) Using a new gasket, install the filter base onto the crankcase. Secure in place with the hardware previously removed.
  - (3) Connect the turbocharger oil supply line to the base.
  - (4) Lubricate filter gasket with oil (Appendix D, Item 37) hand torque filter 1/2 to 3/4 turn after gasket contacts filter head. Do not over torque.
- c. Oil cooler installation.
  - (1) Install new O-rings on tubes from cooler to front cover.
  - (2) Using new gaskets, install the oil cooler to the crankcase.
- d. Install vibration damper (paragraph 6-7).

**6-12. PISTON AND CONNECTING ROD MAINTENANCE.**

This task cover: a. Removal b. Inspection c. Installation

**INITIAL SET-UP**

Tools

Universal Wet Sleeve Puller (PLT-502-3)  
 Arbor Press  
 Dial Indicator  
 Piston Ring Expander  
 Piston and Piston Ring Compressor (SE-1680)  
 General Mechanics Tool Kit

Materials/Parts

Piston Sleeve (682720C1)  
 Piston and Sleeve Kit (1802581C91)  
 Piston Ring Set (687429C91)  
 Piston Pin (670675C1)  
 Connecting Rod (688923C91)  
 Cleaning Solvent (Appendix D, Item 54)  
 Lubricating Oil (Appendix D, Item 37)  
 Molykote (Appendix D, Item 35)  
 Plastigage (Appendix D, Item 40a)

Equipment Condition

Para. Condition Description  
 4-92 Oil Pan Removed  
 6-6 Cylinder Head and Valves Removed

**REMOVAL**

**NOTE**

**Check crankshaft bearing bolt torque on the main bearing and connecting rod bolts anytime the oil pan is removed.**

a. Main bearing and connecting rod bolt torques check.

(1) Using a direct reading torque wrench (not a clicker type) place the socket over the bolt head and gently pull the wrench in the tightening direction to remove slack. Mark the bolt and rod with the marks in alignment. For mains, mark the cap and the socket.

(2) Loosen bolts 1/4 turn. Torque with a slow steady motion and read the torque at the moment the marks are once again aligned.

(3) On the main bearing bolts if torque is found to be below 115 ft-lb (155 N.m), and cap is not to be removed, back off 1/4 turn and retorque to 115 ft-lb (155 N.m). Those at 115 ft-lb (155 N.m) or higher should be left with marks aligned.

(4) For connecting rod bolts if the torque of both bolts is 130 ft-lb (175 N.m) or higher, and rod is not to be removed, they may be left with the marks aligned.

(5) If the torque of either bolt is found to be less than 110 ft-lb (150 N.m), the rod should be removed and inspected.

(6) If the torque of both connecting rod bolts is found to be at least 110 ft-lb (150 N.m), but either or both less than 130 lb-ft (175 N.m), the cap should be removed and the bearing inspected.

**NOTE**

**If bearing distress is noted or bearings are not a tight fit in rod and cap, new inserts should be used and the cap reinstalled. If no bearing distress is noted, reinstall the bearings and cap.**

**CAUTION**

**Before proceeding with piston and connecting rod removal, inspect the sleeves at the upper end of the ring travel for the presence of a ridge. This ridge must be removed with a fine emery cloth and a carbon scraper before the piston is removed. This prevents damage to the piston ring lands during removal and also prevents damage to new piston rings when installing the piston. When removing a piston from the crank-case, do not allow the piston skirt to strike the crankcase or the connecting rod to strike the piston sleeve, as severe damage to the sleeve could result.**

6-12. PISTON AND CONNECTING ROD MAINTENANCE (Continued).

**CAUTION**

It is advisable to wrap an oil-soaked cloth around the crankshaft connecting rod bearing journals to keep them as clean as possible. Wrap the piston and connecting rod assemblies in clean cloth also to protect them until installation.

- b. Remove the connecting rod bolts from the rod caps and remove the caps and bearing inserts from the rod ends. Keep in order and observe markings to prevent mismatching.
- c. Push the connecting rod and piston to the top of the cylinder and remove them from the top of the crankcase with extreme care.
- d. Crank the engine by hand and remove all of the remaining pistons as outlined. Be sure to replace each bearing cap on its respective connecting rod after removal of the piston from the engine.

e. Cylinder sleeve removal.

- (1) After piston and rod removal use the universal wet sleeve puller and remove cylinder sleeves.
- (2) Position the puller in the sleeve. Hold the jaws of the puller and turn the screw, which spreads the jaws to grip the edge of the cylinder sleeve. Tighten the locking bar against the top of the sleeve.
- (3) Turn the bearing-mounted forcing nut to break the cylinder sleeve loose from the crankcase.

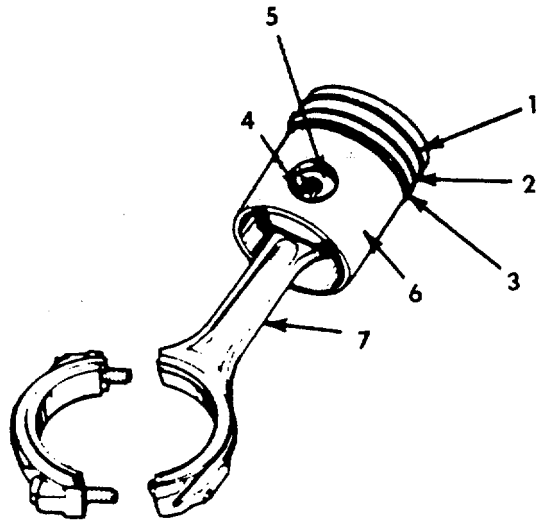
**CAUTION**

If more than one sleeve is to be removed and they are to be used again, it is important that the sleeves be marked with the cylinder number they were removed from.

- (4) Remove the sleeve; if necessary thread a slide hammer into the forcing screw to aid in removal.

f. Connecting rods, pistons and rings disassembly.

- (1) Remove the piston rings (1, 2, and 3) with a piston ring expander. Remove the top compression ring first then the remaining rings in order.
- (2) Remove the piston pin retainers (4) from each piston.



**CAUTION**

Do not apply excessive force to the piston pin. It is recommended that the piston be heated in water to 160°-180° F (71°-82° C) if the pin cannot be removed by hand when cold.

- (3) Remove the piston pin (5) by hand.
- (4) After the pin is removed, separate the piston (6) from the connecting rod (7). Tag or mark the piston and parts with the number of the bore from which they were taken, so they may be reinstalled in their respective cylinders once inspected and/or repaired.

**6-12. PISTON AND CONNECTING ROD MAINTENANCE (Continued).**

- (5) Remove connecting rod piston pin bushing using a suitable arbor press. Discard old bushing.

**CAUTION**

**Lack of attention to the integrity of connecting rod bearing bores during an overhaul may result in a rod bearing failure. Careful attention must be given to all aspects of the rod and bolts.**

**INSPECTION**

*a. Connecting rod inspection*

**WARNING**

**Cleaning solvent, (Appendix D, Item 54) 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.**

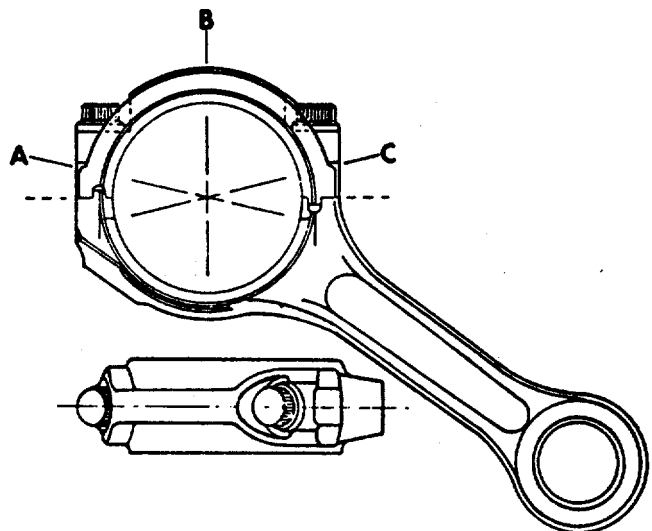
- (1) Using a cleaning solvent (Appendix D, Item 54) clean the threads and mating surfaces between the rod and cap.
- (2) Clean the oil hole at the top of the rod and keep it unclogged.
- (3) Clean all bolts thoroughly.
- (4) Inspect all bolts for nicks or damage. When lubricated, the bolts must screw into the rod face by hand. If the bolt will not screw in by hand, reclean the rod threads and try a new bolt. If a new bolt does not screw in freely, the rod must be discarded.

**CAUTION**

**Do not retap rods as this is a special rolled thread.**

- (5) When new bolts are used in a rod, they must be torqued to 130 ft-lb (175 N.m), loosened, and retorqued three times.
- (6) Check the integrity of connecting rod bearing bores for mis-match between cap and the rod and for out-of-round. These checks are only valid when the insert is omitted and bolts are torqued to 130 ft-lb (175 N.m) using lubricating oil (Appendix D, Item 37) as a lubricant under the head of the bolt and in the threads. An inside micrometer is recommended, but a dial bore gauge can be used for measurements.

- (7) Measure and record the three inside diameters of each rod at points A, B, and C.
- (8) If the difference between points A and C is over 0.004 in. (0.10 mm), the mismatch is excessive and the rod should be discarded.
- (9) If the difference between point B and the average of A and C ( $A + C$  divided by 2) exceeds 0.002 in. (0.05 mm), the rod should be discarded.



*b. Running clearance and end clearance inspection.*

**CAUTION**

**Do not turn the crankshaft during the following procedures.**

**6-12. PISTON AND CONNECTING ROD MAINTENANCE (Continued).**

(1) Running clearance check (using virgin lead wire).

- (a) Remove bearing cap, then clean and oil the crankshaft journal.
- (b) Place a suitable length of 0.010 in (0.254 mm) virgin lead wire across the bearing then install the bearing cap, torquing nuts to 115 ft-lb (155 N.m).
- (c) After torquing nuts, remove them along with the bearing cap.
- (d) Remove the virgin lead wire which will have been crushed down to the amount of clearance between the crankshaft journal and the connecting rod bearing.
- (e) Measure the crushed wire with a micrometer to determine running clearance.

(2) Running clearance check (using plastigage).

- (a) Remove bearing cap, then clean the bearing surface and exposed half of the crankshaft keeping them free of oil. (Plastigage is soluble in oil).
- (b) Place a piece of plastigage (Appendix D, Item 40a) across the bearing then install the bearing cap, torquing nuts to 115 ft-lb (155 N.m).
- (c) After torquing nuts, remove them along with the bearing cap.
- (d) The flattened plastic material will be found adhering to either the bearing shell or the crankshaft. Do not remove the Plastigage.
- (e) To determine the running clearance, compare the width of the flattened plastic material at its widest point with

the graduated marks on the envelope. The number within the graduation on the envelope indicates the clearance in thousandths of an inch.

(3) Running clearance check procedure.

- (a) The measurement should fall within 0.0018 to 0.0051 in (0.046 to 0.130 mm). Remove the test material and re-install the cap and bearing with correct torque if running clearance specifications are met.
- (b) Repeat the chosen method of testing for all the remaining connecting rods.
- (c) If the measurements are not within the specified limits, and the torque wrench is known to be accurate, remove the bearing from the connecting rod and replace it with a new bearing.

(4) Check connecting rod end clearance, using a feeler gauge. Maximum permissible bearing end clearance on crankshaft is 0.018 in (0.46 mm).

- (a) The feeler gauge must cover both the connecting rod and cap.
- (b) Excessive clearance may require replacement of the rods or shaft.
- (c) The check must be made to be certain that the specified clearance exists.
- (d) Lack of clearance could indicate a damaged rod or perhaps a rod bearing out of position.

c. Pistons and rings inspection.

(1) Soak the piston and piston pin in soap solution (until carbon is soft) and clean thoroughly.



**6-12. PISTON AND CONNECTING ROD MAINTENANCE (Continued).**

- (2) Clean all carbon from the piston ring grooves; using a nonmetallic brush. Be sure all oil holes in the piston are open.
- (3) Visually inspect the pistons for scuffed or scored skirts and cracked or worn piston ring lands. Replace the piston if necessary.
- (4) Check running clearance between the piston and cylinder sleeve (with piston rings removed) for piston skirt wear. Measure at the largest piston diameter. If running clearance exceeds 0.0065 in (0.165 mm) replace the piston.
- (5) Visually inspect the piston pins for wear. Replace any pins which show signs of corrosion or etching.

**CAUTION**

**Faulty rings cannot always be detected by the eye. Therefore, whenever a piston is removed from a cylinder, it is recommended that the piston rings be replaced.**

- (6) Visually inspect new rings for any signs of damage prior to installation.
- (7) *Proper ring gap check.*
  - (a) Push the ring down into a new cylinder sleeve with a piston. (This will position the ring squarely in the sleeve).
  - (b) Measure the gap between the ends of the ring with a feeler gauge.
  - (c) Ring gaps should be 0.016 to 0.29 in (0.41 to 0.74 mm). If ring gaps are not within limits, replace the rings.
- (8) Install new rings in the piston grooves with a suitable ring installing tool.

**NOTE**

**The number 1 (compression ring) will have the word top stamped on the ring.**

**The number 2 (intermediate ring) will be marked top, up, or with a pip on the top side of the ring.**

- (9) Inspect the windows of the oil regulating rings for blocked oilways.

**CAUTION**

**Failure to keep the oilways clear will result in uneven lubrication of the piston and sleeve.**

- (10) All rings must fit loosely in the piston ring grooves without binding.
- (11) Ring bearing surfaces must be of a smooth satin like finish with no burrs. Visually inspect new rings, prior to installation, for burrs.

**CAUTION**

**When new rings are being installed on a used piston for operation in a used sleeve, wear on the sleeve may have left a ridge where the piston reaches the top of its stroke. This ridge will cause noisy engine operation and breakage of the top ring. Remedy this by removing the ridge before installing the piston ring.**

*d. Cylinder sleeves inspection.*

- (1) Using a soap solution clean the cylinder sleeves with minimally abrasive brush.
- (2) Thoroughly clean the O-ring groove in the sleeves.

6-12. PISTON AND CONNECTING ROD 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.

- (3) Dry the sleeves with compressed air.
- (4) Clean and flush out the water jacket in the crankcase.
- (5) Measure the I.D. of the sleeve with an inside micrometer or bore gauge from the top and bottom of the sleeve where it is subjected to piston and ring travel, and the O-ring area.
  - (a) Take measurements at right angles to determine if the sleeve is out of round or excessively tapered.
  - (b) Maximum permissible diameter sleeve wear, at top of ring travel, before replacement is 0.004 in (0.10 mm).
  - (c) If sleeve does not meet specifications, it must be replaced with a new sleeve (and piston).
- (6) Inspect the sleeve for scuffing or scoring. Replace sleeve (and piston) if this condition is found.

**CAUTION**

Do not hone the cylinder sleeves.

- (7) Inspect counterbore for burrs or fractures, replace if evident.

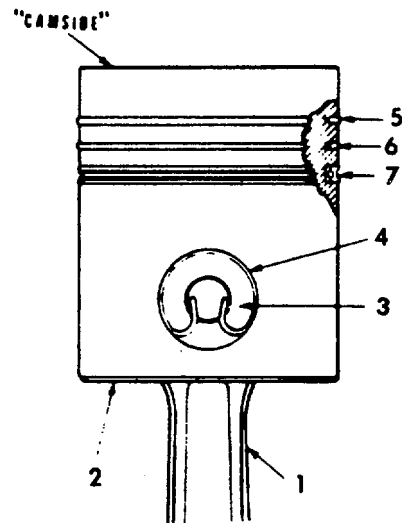
**INSTALLATION**

a. Connecting rods, pistons, and rings assembly.

- (1) Install new connecting rod piston pin bushing using a suitable arbor press. Bore or

hone the new bushing to 1.6256 to 1.6258 in. (41.2902 to 41.2953 mm) after assembly.

- (2) Generously coat the piston bore and piston with molykote (Appendix D, Item 35).
- (3) Insert the pin end of the connecting rod (1) into the piston (2) aligning bored holes of the rod and piston (the short side of the split on the crank end of the rod is to be toward the side of the piston marked cam-side).
- (4) Align the bushing in the rod with the piston pin holes in the piston and push the piston pin (3) completely into position. (Pin is a loose fit at 70° F (21° C).)
- (5) Squeeze the pronged ends of the piston pin retainer rings (4) and install a ring in the groove at each end of the piston to secure - the piston pin.
- (6) Using a piston ring expander, install the rings into the grooves of the pistons.



- (a) The compression rings (groove numbers 5 and 6) must be installed as directed by the word top, up or pip, mark stamped on the edge. The tapered face second compression rings must have the witness mark (shiny part) towards the bottom of the piston.
- (b) The oil-regulating ring (groove number 7) can be installed with either face up.

**6-12. PISTON AND CONNECTING ROD MAINTENANCE (Continued).**

The oil regulating ring coil spring must be installed in the groove before the ring.

- (7) Position the split of the top ring 30° from the piston pin bore. Position the split of the second ring 180° from the top ring and position the split of the oil ring 90° from the second.

b. Cylinder sleeve installation.

- (1) Clean and dry the bore (in the crankcase) and flange counterbore. Also clean and dry the sleeve.

**CAUTION**

**When a new piston or a new piston and connecting rod assembly are being installed, install a matched set of pistons and sleeves.**

(2) Cylinder sleeve protrusion check.

- (a) Place each sleeve in the crankcase without the O-rings. Clamp the sleeve down using three holding adapters. (Make sleeve holding adapters locally).
- (b) Use one of the hardened washers under each cap screw. Space the bolts to obtain uniform pressure on this sleeve flange. Torque the bolts in three stages: 40 ft-lb (55 N.m), 80 ft-lb (110 N.m) and 120 ft-lb (165 N.m).
- (c) Place a dial indicator, with block, across the cylinder sleeve.
- (d) With the dial indicator set on the flange of the cylinder sleeve, adjust the indicator to zero. Move the indicator block until the pointer drops to the crankcase deck and take a reading.

- (e) If the sleeve flange is below the crankcase deck, rest the indicator pointer on the crankcase deck and set the indicator at zero. Move the indicator block until the pointer drops to the sleeve flange and take a reading.
- (f) Take readings at three or four points around the sleeve and use the average reading to determine which shim, if any, is needed to bring the protrusion within the 0.002 to 0.005 in (0.05 to 0.13 mm) specification.

(3) Shim and O-ring installation.

- (a) Remove the clamping bolts and washers. Clean the top deck of the crankcase and the cylinder sleeve counterbore. Clean the sleeve.
- (b) Install the shim (if necessary) in the counterbore.
- (c) Coat the sealing O-rings with clean oil (Appendix D, Item 37) and install them into the grooves in the sleeves (without twist). The rings must be installed in the following order: bottom, center and top.

**CAUTION**

**Be sure the O-ring is properly aligned in the groove.**

- (d) Brush the sealing ring contacting surface in the crankcase with clean oil (Appendix D, Item 37).
- (e) Install the sleeve carefully into the same bore it was removed from. Press into place by hand.

**6-12. PISTON AND CONNECTING ROD MAINTENANCE (Continued).**

## c. Piston and connecting rod installation.

**NOTE**

- (1) Coat the piston and piston ring compressor with clean lubricating oil (Appendix D, Item 37).
- (2) Install the piston end rod assembly into the piston ring compressor.

**If bolts will not screw in by hand, reclean the rod threads and try a new bolt. If a new bolt does not screw in freely, the rod must be discarded. Whenever new bolts are used in a rod, they must be torqued to 130 ft-lb (175 N.m), loosened, and retorqued three times.**

**CAUTION**

**The piston and rod assemblies can be installed by turning the crankshaft only three times. Position the number 1 and 6 crankpins at top dead center. Install the number 1 and 6 piston assemblies. Repeat this procedure for the numbers 2 and 5 and numbers 3 and 4 piston and rod assemblies.**

- (5) Install the remaining rods and pistons in the same manner.

**CAUTION**

**The connecting rod bearings must be fitted. Bearing clearance checked and connecting rod end play checked, as outlined previously, prior to continuing with engine assembly.**

- (3) Coat the cylinder sleeve generously with clean lubricating oil (Appendix D, Item 37). Install the compressor, with piston and rod, into the cylinder sleeve. The numbers on the rod must face away from the camshaft while the markings on top of the piston faces toward the camshaft side of the engine. Push down on the piston carefully until it is in the cylinder sleeve. Avoid striking the sleeve with the connecting rod.
- (4) Coat the connecting rod journal and connecting rod bearings with clean engine oil.
  - (a) Install the upper half of the bearing in the connecting rod and pull the rod down onto the journal.
  - (b) Install the connecting rod bearing cap with the numbered side of the cap matching the numbered side of the rod.
  - (c) Install the bolts and torque to 60 ft-lb (80 N.m), then torque to 130 ft-lb (175 N.m).

- d. Install cylinder head and valves (paragraph 6-6).
- e. Install oil pan and gasket (paragraph 4-92).

**6-13. FLYWHEEL, CRANKSHAFT, AND MAIN BEARING MAINTENANCE (Continued).**

This task cover: a. Removal b. Inspection c. Installation

**INITIAL SET-UP**

Tools

Rockwell Hardness Tester  
 Pilot Driver  
 General Mechanics Tool Kit  
 Hoist/ Sling  
 Micrometer  
 Wire Brush

Materials/Parts

Flywheel (683961C91)  
 Ring Gear (61544H)  
 Crankshaft Bearings (684570C92)  
 Crankshaft (681319C92)  
 Cleaning Solvent (Appendix D, item 54)  
 Lubricating Oil (Appendix D, Item 37)  
 Bluing Ink (Appendix D, Item 23)  
 Lint-Free Cloth (Appendix D, Item 14)  
 Plastigage (Appendix D, Item 40a)

Equipment Condition

Para.	Condition Description
4-92	Oil Pan Removed
6-6	Cylinder Head and Valves Removed
6-10	Timing and Gear Train Removed
6-11	Oil Pump Removed

- a. Remove flywheel bolts. Pull off flywheel with ring gear. Support the flywheel so as not to damage the crankshaft dowel pin.
- b. Crankshaft bearings removal.
  - (1) Remove the capscrews securing the crankshaft bearing caps.
  - (2) Tap the caps lightly with a soft metal hammer or mallet to loosen them, then remove lower bearings.
    - (a) If the bearings are to be reused, identify each bearing as to its original position.
    - (b) Remove the lower bearing from the caps.
    - (c) Wrap the pieces in a clean cloth and store them until reassembly.

- (a) Insert a thin piece of flexible soft metal between the crankshaft and crankcase. This will push against the end of the bearing furthest from the nib holding the bearing in the crankcase support. Simultaneously, turn the crankshaft in the direction of rotation. This will cause the bearing to slide easily from position.
- (b) An alternate method of removing upper bearing halves is to hammer the closed end of a small cotter pin to form a T.
- (c) Insert the prongs of the cotter pin into the oil hole of the crankshaft journal with the flattened head just protruding. Rotate the crankshaft and the cotter pin head will push the bearing from position.

c. Crankshaft removal.

**NOTE**

**If the crankshaft is to be removed, disregard step 3.**

- (3) Remove the upper bearing halves as described in methods (a) or (b).



**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.**

**6-13. FLYWHEEL, CRANKSHAFT, AND MAIN BEARING MAINTENANCE (Continued).**

- (1) Lift the crankshaft out of the crankcase with a hoist and sling.
- (2) Remove the upper main bearing halves.
- (3) Remove the rear oil seal wear sleeve using a muffler chisel. Hold chisel flat against the crankshaft to prevent damage by the chisel's point.

**INSPECTION**

a. *Crankshaft and main bearings inspection.*

**WARNING**

**Cleaning solvent, (Appendix D, Item 54), 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.**

- (1) Clean all parts with cleaning solvent (Appendix D, Item 54).

**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.**

- (2) Dry with compressed air.
- (3) Clean all the crankshaft internal oil passages of any dirt or sludge that may have accumulated. Run a wire brush (Appendix D, Item 8) through the oil passages to loosen the deposits, then wash the passages and external surfaces of the crankshaft thoroughly with oil (Appendix D, Item 37). Blow the passages and external surfaces dry with compressed air.
- (4) Visually inspect the bearings for wear and evidence of uneven bearing support. If such

evidence is found, examine the bearing caps and supporting surfaces of the crankcase for high spots and burrs.

- (5) Visually inspect the crankshaft journals for scoring.
- (6) Measure the diameter of each journal using a micrometer. Measure each journal at two points, at right angles to each other. Move the micrometer over the entire width of the journal. Limits of 3.3742 to 3.3755 in (85.705 to 85.738 mm) must be observed.
- (7) Check hardness on every journal which incurred a bearing failure or shown evidence of overheating.
  - (a) Using a Rockwell Hardness Tester, check at least three locations.

**NOTE**

**Fillet hardened shafts should be checked as close to the fillet as possible. Non-fillet hardened shafts should be checked at least 1/2 inch (13 mm) from the fillet.**

- (b) Check rod journals at top, bottom and one other location. (Top and bottom determined with journal at top dead center).
- (c) Minimum hardness: 45 RC. If any reading is below the minimum hardness, replace the crankshaft.
- (8) Inspect the crankshaft gear teeth and splined collar for wear and chipping. Replace damaged parts as required.
- (9) Visually inspect the drilled holes in the main and connecting rod journals to assure that all passages are open after cleaning.

6-13. FLYWHEEL, CRANKSHAFT, AND MAIN BEARING MAINTENANCE (Continued).

b. Flywheel and ring gear inspection.

**WARNING**

Cleaning solvent, (Appendix D, Item 54), 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.

- (1) Wash the flywheel and ring gear in cleaning solvent (Appendix D, Item 54)

**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.

- (2) Dry with compressed air.
- (3) Visually inspect flywheel for excessive scoring or heat cracks. Replace if necessary.
- (4) Inspect the ring gear for broken teeth and replace it if necessary.

c. Crankcase inspection.

- (1) During overhaul it is best to clean the crankcase in a chemical hot tank. This removes all carbonous material and mineral deposits that collect in the cooling passages.
- (2) Clean all lube oil passages thoroughly.

**WARNING**

Cleaning solvent, (Appendix D, Item 54) 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.

- (3) Remove gallery plugs and swab with a brush (Appendix D, Item 9) and cleaning solvent (Appendix D, Item 54)

**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.

- (4) Clean all threaded holes with a tap of appropriate size and blow clean with compressed air.
- (5) Check the crankcase deck for pulled thread holes which may interfere with the head and gasket fit. Lightly file these areas to restore flatness.

**CAUTION**

Do not resurface the block. Any defects in the surface not correctable by light filing necessitates crankcase replacement.

- (6) Inspect the 12 piston oil jet tubes. Be sure they are open and clean.

**CAUTION**

Do not remove oil jets unless damaged.

- (7) Oil jet tube replacement.
  - (a) Remove damaged tubes with a pilot driver.

**6-13. FLYWHEEL, CRANKSHAFT, AND MAIN BEARING MAINTENANCE (Continued).**

- (b) Install new oil jet tubes with the same pilot driver.
- (c) The jet tube (when installed) must not project above the surface; but must be recessed 1/8 inch (3mm) below the surface.
- (d) The top half of the main bearing insert is slotted to provide a flow of oil to the jet tubes and camshaft bushings.

**INSTALLATION**

a. Crankcase trueness check (prior to installation).

- (1) Using a lint-free cloth (Appendix D, Item 14) wipe the bearing supports of the crankcase free of oil.
- (2) Support the crankcase bottom side up using wooden blocks to level it.
- (3) Install the upper halves of the bearings (bearings with oil hole in center) on the crankcase.
  - (a) If the original bearings are to be reinstalled, be sure they go to the positions from which they were removed.
  - (b) The nibs of the bearings must fit into the notches in the crankcase bearing supports.
- (4) Apply bluing ink (Appendix D, Item 23) on the crankshaft main journals and lower them carefully and evenly onto the bearings. Do not install the bearing caps and lower bearings.
- (5) Rotate the crankshaft approximately 1/2 revolution.
- (6) Remove the crankshaft evenly and inspect the upper bearings for an even transfer of bluing (Appendix D, Item 23) from journals to bearings.

- (7) Replace any bearings that do not show an over-all even bluing.

**NOTE**

**Replace all bearings with new, if one of the original bearings has to be replaced.**

- (8) When satisfied that the crankcase is in good order and free from any distortion and burrs around the upper bearing seats, proceed with installation.

- (a) Clean all bluing from the bearings and crankshaft journals.

- (b) If using the original bearings coat the bearing surfaces with a small amount of clean oil (Appendix D, Item 37).

- (c) Install the bearing halves (bearing with oil hole in center).

- (d) Carefully install the crankshaft.

b. New main bearing caps installation.

- (1) Place a drill rod or a new drill of any size from 1/4 to 1/2 in (6 to 13 mm) in the bore of the OLD caps. Measure the distance from the face of the cap to the drill rod shank with a depth gauge and record the reading.
- (2) Measure the diameter of the drill rod shank with a micrometer and add this reading to the one taken with the depth gauge, to derive dimension.

**NOTE**

**If the cap being replaced is broken and dimension cannot be determined, use one of the other caps to measure this dimension. Install and torque the capscrews to 115 ft-lb (155 N.m) before continuing.**



**6-13. FLYWHEEL, CRANKSHAFT, AND MAIN BEARING MAINTENANCE (Continued).**

- (3) Mill or grind surface of the NEW cap to dimension plus 0.002 in (0.05 mm).

**NOTE**

**0.002 in (0.05 mm) is added to dimension to allow enough stock for a finish cut on surface after the cap and bearing have been fitted to the crankcase.**

**The bearing cap must be located on its machined side when grinding surface to hold squareness.**

- (4) Clamp the OLD bearing cap to a surface plate.
- (5) Place a drill rod of any size from 1/4 to 1/2 inch (6 to 13 mm) on the inside of the cap (against notched side). Measure this distance with a micrometer and record the reading.
- (6) Measure the diameter of the drill rod shank and add this reading to the reading taken in step (5) above. This will be dimension A.
- (7) Measure dimension A of the NEW bearing cap in the same manner as described in steps (3), (5), and (6) above.
- (8) Subtract dimension A of the OLD cap from dimension A of the NEW cap and record the difference. Mill or grind this amount from surface C of the new cap. Dimension A of both caps will now be equal.

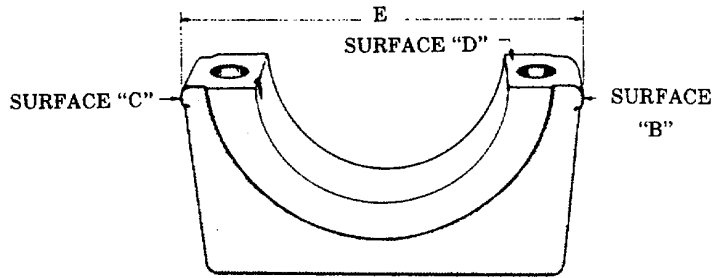
**NOTE**

**Surface C must be held square with surface D and parallel to the bearing bore.**

- (9) Mill or grind surface B of the new cap until the dimension E 6.050-6.052 in. (153.67-153.72 mm) shown from surface C to B is obtained.

**NOTE**

**Surface B must be held square with surface D and parallel to the bearing bore.**



c. Main bearings installation.

- (1) Install a new bearing in a new bearing cap or the original bearing in the original bearing cap, as called for.
- (2) Bearing clearance check.

**NOTE**

**Do not turn the crankshaft during this procedure.**

- (a) Clean the bearing surface and the exposed half of the crankshaft journal. Be sure these surfaces are free of oil.
- (b) Place a suitable length of 0.010 inch (0.254 mm) virgin lead wire or a piece of plastigage (Appendix D, Item 40a) across the bearing surface.
- (c) Install the bearing cap and torque the cap screws to 115 ft-lb (155 N.m).
- (d) Remove the bearing cap. When virgin lead is used, measure the crushed thickness with a micrometer and record the results. When plastigage is used, the flattened plastic material will be found adhering to either the bearing or the crankshaft. Do not remove the plastigage. Determine bearing clearance by comparing the width of the flattened plastic with the graduations on the envelope.

**6-13. FLYWHEEL, CRANKSHAFT, AND MAIN BEARING MAINTENANCE (Continued).**

- (3) For old bearings and caps, if the crankshaft, bearings and crankcase are in good condition, the bearing running clearance should fall within 0.0018 to 0.0051 in. (0.046 to 0.130 mm).
  - (a) If the clearance obtained is more or less than the specified amount, replace with a new bearing.
  - (b) Should the clearance remain excessive, it may be necessary to replace the crankshaft.
- (4) New bearings and caps installation.
  - (a) Measure the diameter of the crankshaft journal and record this reading. If it is less than 3.3742 to 3.3755 in. (85.705 to 85.738 mm), subtract the difference from the virgin lead or plastigage reading.
  - (b) Subtract the bearing running clearance of 0.0018 to 0.0051 in. (0.046 to 0.130 mm) from the measurement obtained in step 4a. Mill or grind this amount from surface of the new bearing cap.
  - (c) Recheck the bearing running clearance, with virgin lead or plastigage, to assure 0.0018 to 0.0051 in. (0.046 to 0.130 mm) specifications are met.
- (5) Remove the plastigage or virgin lead.
- (6) Add clean oil (Appendix D, Item 37) to the bearing and install the center main bearing cap.
- (7) Torque the cap screws to 115 ft-lb (155 N.m).
- (8) Check each main bearing in the same manner described above, steps (1) through (7).
  - d. Crankshaft end clearance check.
    - (1) Loosen the rear main bearing cap screws.
    - (2) Hold the crankshaft towards the front of the engine, using a suitable bar or large screwdriver, so the crankshaft thrust surface is tight against the rear of the thrust flange of the bearing in the crankcase.
    - (3) Check the clearance across the bearing split. 0.006 to 0.012 in. (0.15 to 0.30 mm) clearance must be maintained.
    - (4) Hold the crankshaft towards the rear of the engine and check the clearance across the bearing split. If the clearance is more than specified, replace the rear main bearing with a new one.
    - (5) With the feeler gauge in place, torque the rear main bearing cap to 115 ft-lb (155 N.m) torque.
    - (6) Remove the feeler gauge and wedging tool.
    - (7) Pull the connecting rods down onto the crankshaft. Be sure that the bearings are in place.
      - (a) Install the connecting rod bearings and bearing caps. Make sure that the correct cap is located on its rod and that the identifying numbers are on the intake manifold side of the engine.
      - (b) Oil the bearings with clean engine oil (Appendix D, Item 37).
      - (c) Torque the connecting rod bolts to 130 ft-lb (175 N.m).
  - e. Ring gear replacement.
    - (1) Remove the ring gear from the flywheel by heating the gear with a torch to expand it. Then drive gear from the flywheel.

**6-13. FLYWHEEL, CRANKSHAFT, AND MAIN BEARING MAINTENANCE (Continued).**

(2) New ring gear installation.

**WARNING**

**Use heat-resistant gloves when working with high temperatures.**

(a) Heat the gear to 500°-550° F (260°-290° C) for expansion.

(b) Place the hot gear into the flywheel.

(c) The chamfered edge of the ring gear I.D. must be next to the shoulder of the flywheel.

f. Install flywheel with ring gear and secure with flywheel bolts.

g. Install oil pump (paragraph 6-11).

h. Install timing and gear train (paragraph 6-10).

i. Install cylinder head and valves (paragraph 6-6).

j. Install oil pan (paragraph 4-92).

**Section III. MAINTENANCE OF TRANSMISSION ASSEMBLY**

General.....	Para. 6-14	Transmission Repair.....	Para. 6-15
Rear Retainer Oil Seal Replacement.....	6-16		

**6-14. GENERAL.**

This section contains information on the maintenance of the transmission assembly that are maintainable at the General Support level.

**6-15. TRANSMISSION REPAIR.**

This task covers: a. Disassembly    b. Repair    c. Assembly

**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- Lifter Tool (J-6795-01)
- Front Support Lifter (J-24473)
- Center Support Lifter (J-24455)
- Gear Unit Lifter (J-24454)
- Converter End Play Gauge (J-24470)
- Dial Indicator
- Bearing Installer (J-23549)
- Converter Pump Hub Roller Bearing Remover and Installer (J-28435)
- Hydraulic Press
- Pressure Gauge
- Stator Base Plate (J-29521-1)
- Stator Top Plate (J-29521-2)
- Fixture Stand (J-25587-1)
- Rivet Remover Pin (J-29121-3)
- Stator Staking Tool (J-29121-1)
- Turbine Base Plate (J-29375-1)
- Guide Plate (J-29375-2)
- Turbine Staking Tool (J-29375-3)
- Rivet Remover Tool (J-29375-4)
- Drill Bushing (J-29375-5)
- Bushing Installer (J-24648)
- Adjusting Ring Tool (J-24314)
- Valve Body Parts Tray Set (J-33163)
- Valve Pin Remover (J-24412-2)
- Slide Hammer (J-6125-1)
- Main Pressure Regulator and Lockup Spring Compressor (J-24459-A)
- Spring Compressor Adapter (J-24459-5) Gauge (J-29198-2)
- Oil Seal Installer (J-24449)
- Slide Gauge Tool (J-26857)
- Centering Band (J-24461)
- Valve Pin Installer (J-24458)
- Compressor Tool (J-6438-01)

Tools (Continued).

- Forward Clutch Clearance Gauge (J-26917)
- Compressor Base (J-24204-2)
- Fourth Clutch Clearance Gauge (J-26917)
- Center Support Bushing Installer (J-24794)
- Lockring Installer (J-24453)
- Planetary Rebuilding Set (J-25587-01)
- Bushing Installer Tool (J-24469)
- Main and Output Shaft Orifice Installer (J-24369)
- Output Shaft Bearing Installer (J-24451)
- Driver Handle (J-8092)
- Output Shaft Oil Seal and Dust Shield Remover (J-24171)
- First Clutch Spring Compressor (J-24452)
- Governor Support Pin Remover (J-28708)
- Governor Support Pin Installer (J-28684)
- Selector Shaft Seal Remover (J-26401)
- Selector Shaft Seal Installer (J-26282)
- Compressor Base (J-24475-1)
- Compressor Bar (J-24475-2)
- Center Bolt (J-23717-1)
- Center Support Selective Snapping Gauge (J-34127)
- Second Clutch Gauge (J-26915)
- Third Clutch Gauge (J-26916)
- Front Support Block (J-25587-4)
- Center Support Block (J-25587-4)
- Rear Support Block (J-25587-3)
- Front Pin Remover (J-25587-16)
- Center Pin Remover (J-25587-16)
- Rear Pin Remover (J-25587-16)
- Rear Pin Remover & Installer Adapter (J-25587-2)
- Rear Pin Remover & Installer Spacer (J-25587-6)
- Front Loading Pin (J-25587-22) (6)
- Center Loading Pin (J-25587-18) (4)
- Rear Loading Pin (J-25587-18) (4)
- Front Guide Pin (J-25587-50) (6)
- Center Guide Pin (J-25587-48) (4)
- Rear Guide Pin (J-25587-48) (4)

**6-15. TRANSMISSION REPAIR (Continued).**

**INITIAL SET-UP (Continued)**

Tools (Continued).

- Front Installer (J-25587-13)
- Center Installer (J-25587-1 1)
- Rear Installer (J-25587-12)
- Front Swaging Tool Holder (J-25587-17)
- Center Swaging Tool Holder (J-25587-17)
- Rear Swaging Tool Holder (J-25587-17)
- Front Swaging Tool (J-25587-27) (2)
- Center Swaging Tool (J-25587-23) (2)
- Rear Swaging Tool (J-25587-23) (2)

Materials/Parts

- Oil Pan Gasket (23016682)
- Oil Filter (23019201)
- Washers (6834908)

Materials/Parts (Continued).

- Anchor Bolt (23045343)
- Washer (23013841)
- Front Support Gasket (23014221)
- Governor Kit (6880353)
- Cleaning Solvent (Appendix D, Item 54)
- Transmission Oil (Appendix D, Item 38)
- Grease (Appendix D, Item 21)
- Grease (Appendix D, Item 22)
- Loctite (Appendix D, Item 27)

Equipment Condition

- Para. Condition Description
- 4-156 Transmission Removed

**DISASSEMBLY**

a. Torque converter removal.

- (1) Position the transmission front upward.
- (2) Remove the converter retaining strap used for shipping and handling.
- (3) Attach lifter tool and lift the complete torque converter (1) from the transmission.

b. Oil pan removal

- (1) Remove the modulator retainer bolt (2). Remove the retainer (3). If not previously removed, remove the modulator control.
- (2) Remove the twenty-one washer-head screws (4) that retain the oil pan (5).
- (3) Remove the oil pan (5) and gasket (6).
- (4) Remove the oil filter retaining screw.
- (5) Remove and separate the oil filter (7) and the oil filter tube (8).
- (6) Discard the oil filter (7). Discard the seal-ring (9) from the upper end of the tube.

c. Modulated lock-up valve removal.

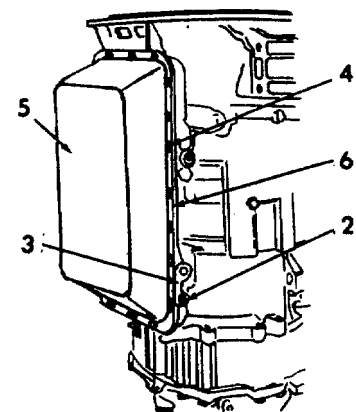
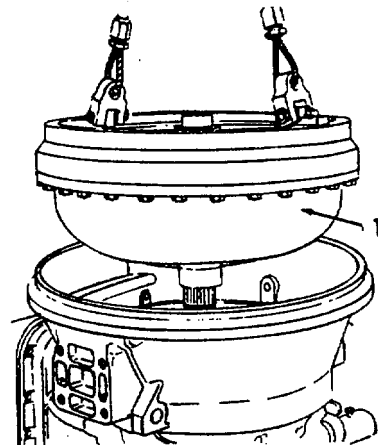
- (1) Remove bolts that retain the modulated lock-up valve body (10) to the transmission housing.
- (2) Remove modulated lock-up valve assembly (10).

d. Tube adapter removal.

- (1) Remove the four bolts (11) that retain the tube adapter (12) to the transmission housing.

- (2) Remove the two bolts (13) that retain the first clutch feed tube (14) to the valve body.

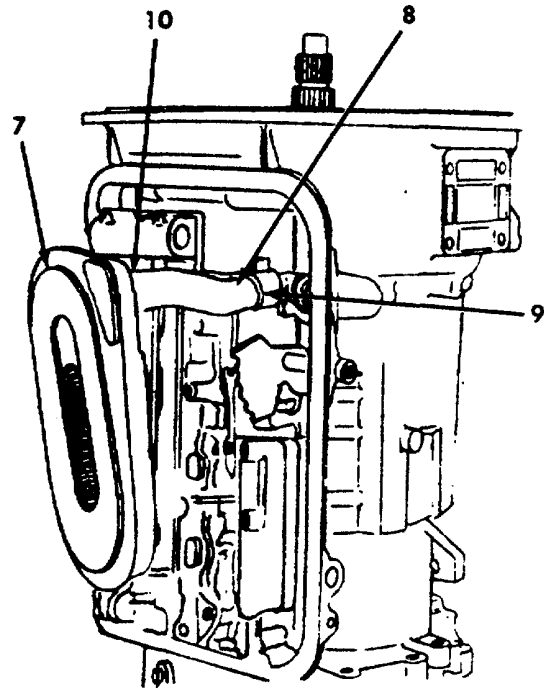
- (3) Remove the tube adapter (12) and tubes (15 and 16) as an assembly.



**6-15. TRANSMISSION REPAIR (Continued).**

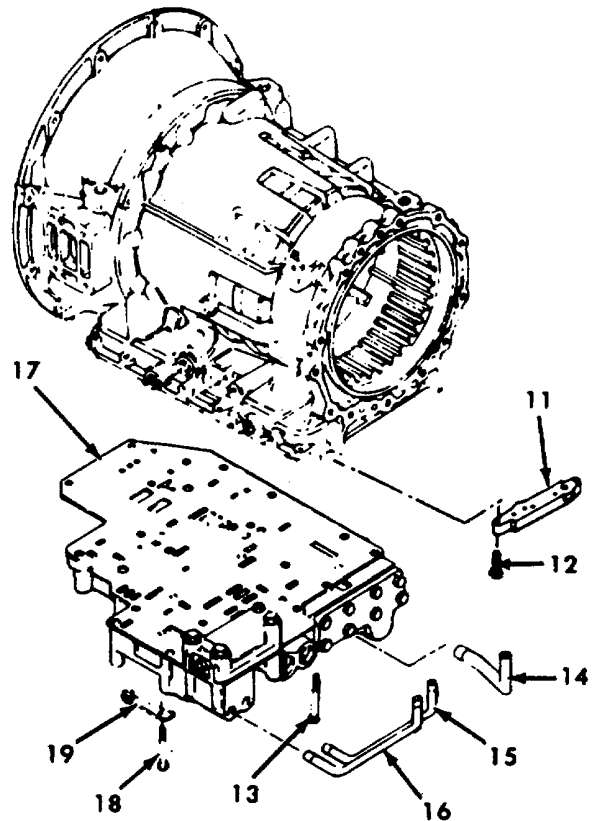
e. Control valve assembly removal.

- (1) Using a rubber band, or a suitable substitute, secure the range selector valve to a pad on the control valve body (17). Remove the bolt that attaches the detent spring and roller assembly (18). Remove the detent spring and roller assembly (18). Loosen two bolts at the top of the control valve body (17) to act as support bolts. Remove the remaining bolts that attach the control valve body (17) to the transmission housing.
- (2) Hold the control valve body assembly (17) firmly and remove the two remaining bolts. Remove the control valve in a downward and outward movement to clear the actuator pin from the housing bore.



f. Oil pump and front support removal.

- (1) Remove twelve bolts and twelve rubber-covered washers that retain the oil pump and front support assembly. Discard rubber-covered washers.
- (2) Install front support lifter onto the converter ground sleeve. Be sure the lifter is secure before removing the front support.



**WARNING**

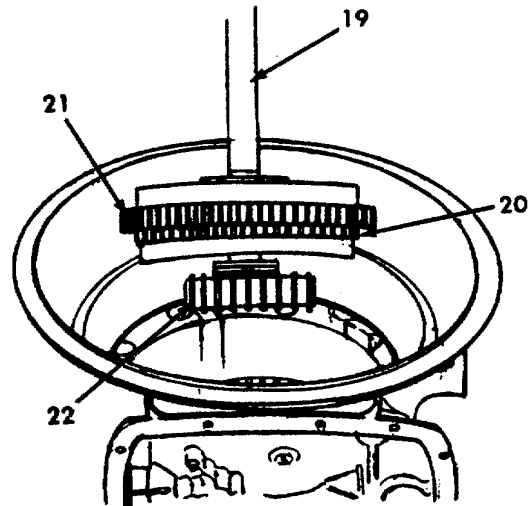
When lifting an object, make sure the hoist is fastened securely. Be sure the item being lifted does not exceed the capacity of the lifting device.

**CAUTION**

The pump and front support assembly is fitted to the transmission housing with very little clearance. It may bind in the housing if the housing is cold. Heat the housing slightly, if necessary. Do not use a torch to heat the housing. A sun lamp or a current of warm air will be sufficient. If the pump and support assembly starts upward and then binds, tap it downward and lift again.

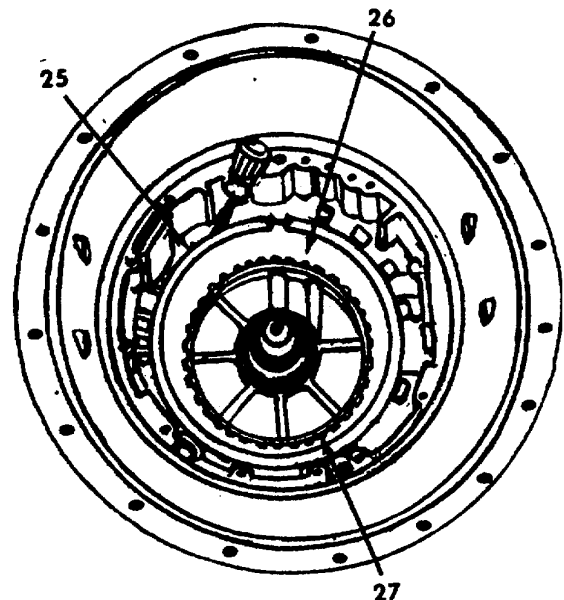
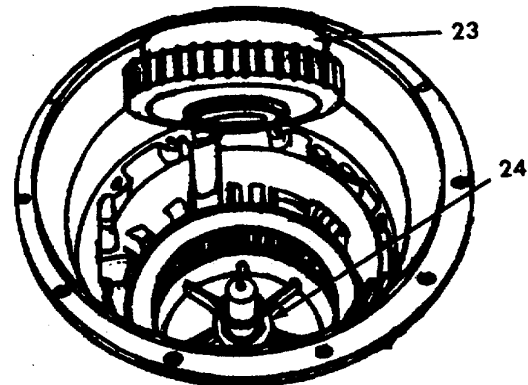
**6-15. TRANSMISSION REPAIR (Continued).**

- (3) Attach a hoist to the lifter and carefully remove the oil pump and front support assembly. Remove the support gasket. Remove the thrust bearing race assembly at the rear of the support assembly.
- g. Grasp the turbine shaft (19) and lift the forward clutch (20) and attached PTO gear (21) and fourth clutch hub (22) from the transmission housing. Remove the thrust bearing race assembly at the rear of the clutch.
- h. Grasp the spring retainer of the fourth clutch, and lift the fourth clutch assembly (23) from the transmission. Remove the thrust bearing race assembly (24).
- i. Remove the snapping (25) that retains the third clutch back plate (26). Remove the back plate (26). Remove six plates of the third clutch (27).



j. Center support removal.

- (1) Remove the center support anchor bolt and washer from the bottom of the transmission. Retain the used bolt for selective snapping selection at assembly. A new bolt and washer must be used at final assembly.
- (2) Remove snapping (28) that retains the center support assembly (29).



**CAUTION**

The center support is fitted to the transmission case with very little clearance. It may bind in the case if the case is cold. Heat the case slightly, if necessary. Do not use a torch to heat the case. A sunlamp, or a current of warm air is sufficient. If the support assembly starts upward and then binds, tap it downward and lift again.

## 6-15. TRANSMISSION REPAIR (Continued).

(3) Place the center support lifter into the recess between the sealrings on the support hub, and remove the center support assembly (30) from the transmission. Remove thrust bearing race assembly from the hub of the center support.

k. Remove the four bolts that retain the governor cover. Remove the cover and gasket. Carefully remove the governor assembly. Remove the speedometer driven gear assembly from the transmission rear cover.

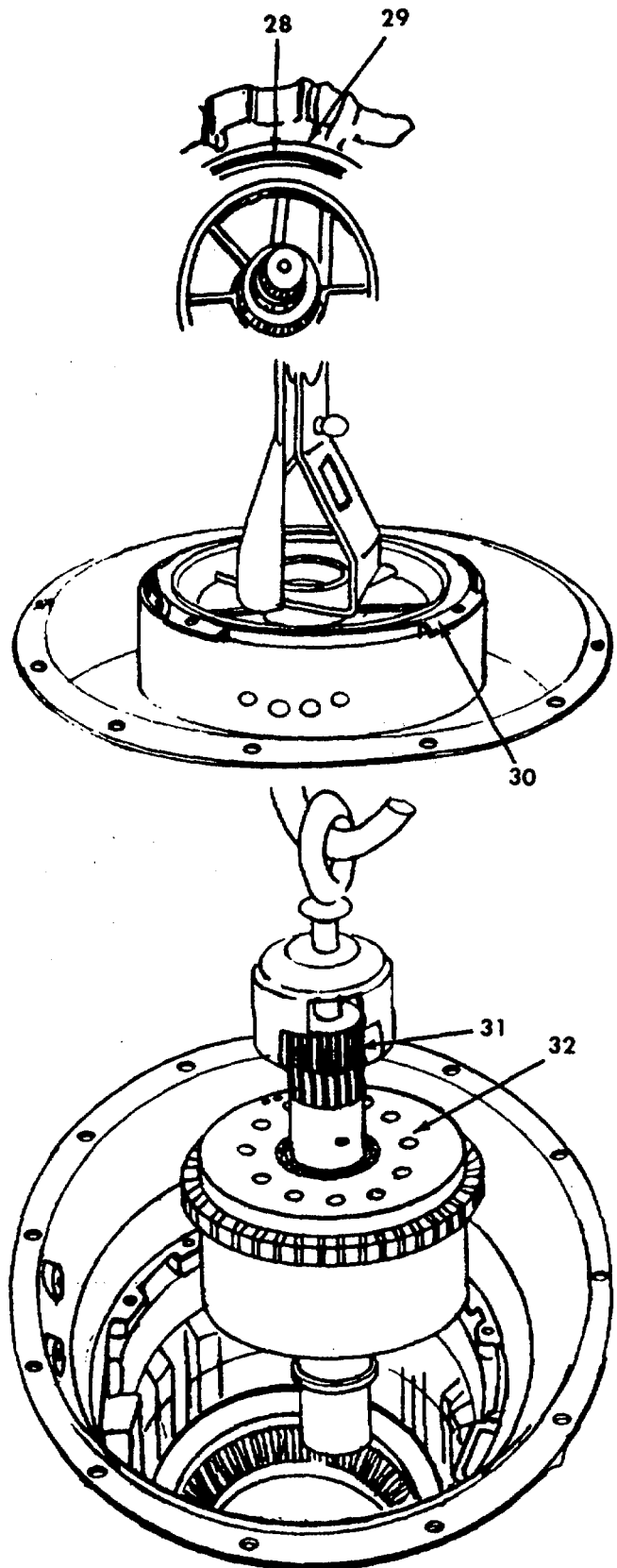
l. Gear unit removal.

**WARNING**

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

(1) Install gear unit lifter behind the splines of the main shaft (31). Attach a hoist to the lifter tool and remove the gear unit (32) from the transmission housing.

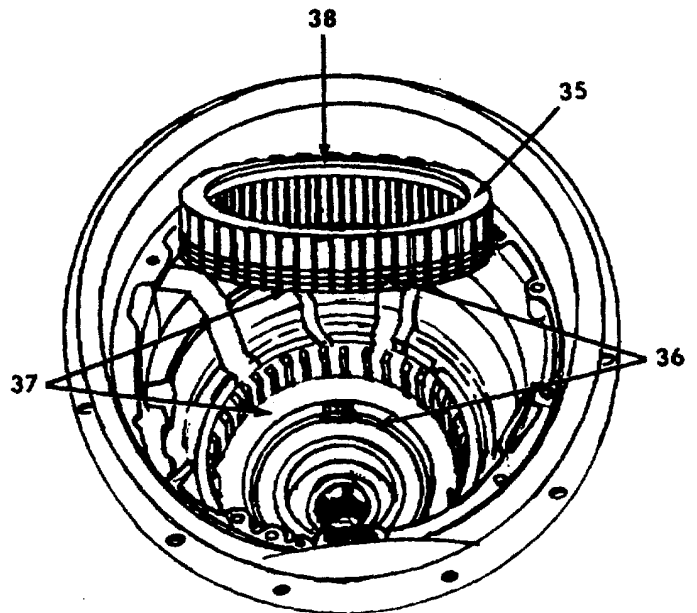
(2) Governor drive gear, speedometer drive gear, and sleeve spacer may remain on the output shaft or in the transmission housing. Remove all three items.





**6-15. TRANSMISSION REPAIR (Continued).**

- m. Remove snapping (33). Remove six second clutch plates (34) and clutch backplate.
- n. Remove snapping that retains first clutch backplate (35). Remove ten first clutch plates (36) and (37), ring gear (38) and backplate (36) as an assembly. Remove the remaining two first clutch plates (37).
- o. Invert the transmission. Remove fourteen bolts and washers that retain the rear cover (39) to the transmission housing (40). Carefully remove the rear cover assembly and the attached parts. Remove the rear cover gasket (41).



**REPAIR**

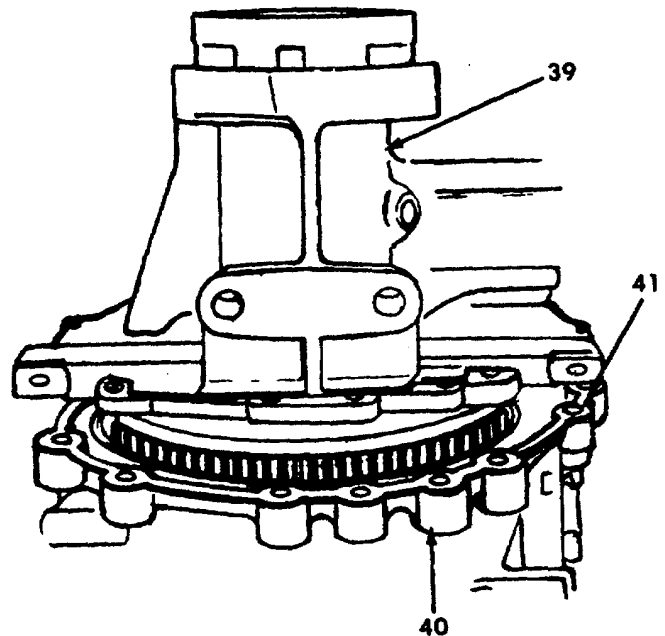
- a. *Torque converter repair.*

**NOTE**

**Before disassembling the converter assembly, it is necessary to check the amount of converter end play.**

- (1) *End play check.*

- (a) Support the converter assembly on the converter cover (pump hub upward). Place converter end play gauge into the converter pump hub.
- (b) Hold the center screw of the gauge and tighten the nut until the gauge is securely retained. Do not overtighten.
- (c) Install the dial indicator. Adjust the indicator bracket so the stem of the indicator is in firm contact with the top of the center screw. Set the dial to read zero.
- (d) Using both hands, lift the center screw as far as possible. Record dial indicator reading.
- (e) End play exceeding 0.025 inch (0.64 mm) indicates wear of converter components, and required replacement of worn components and the selection of a new spacer.

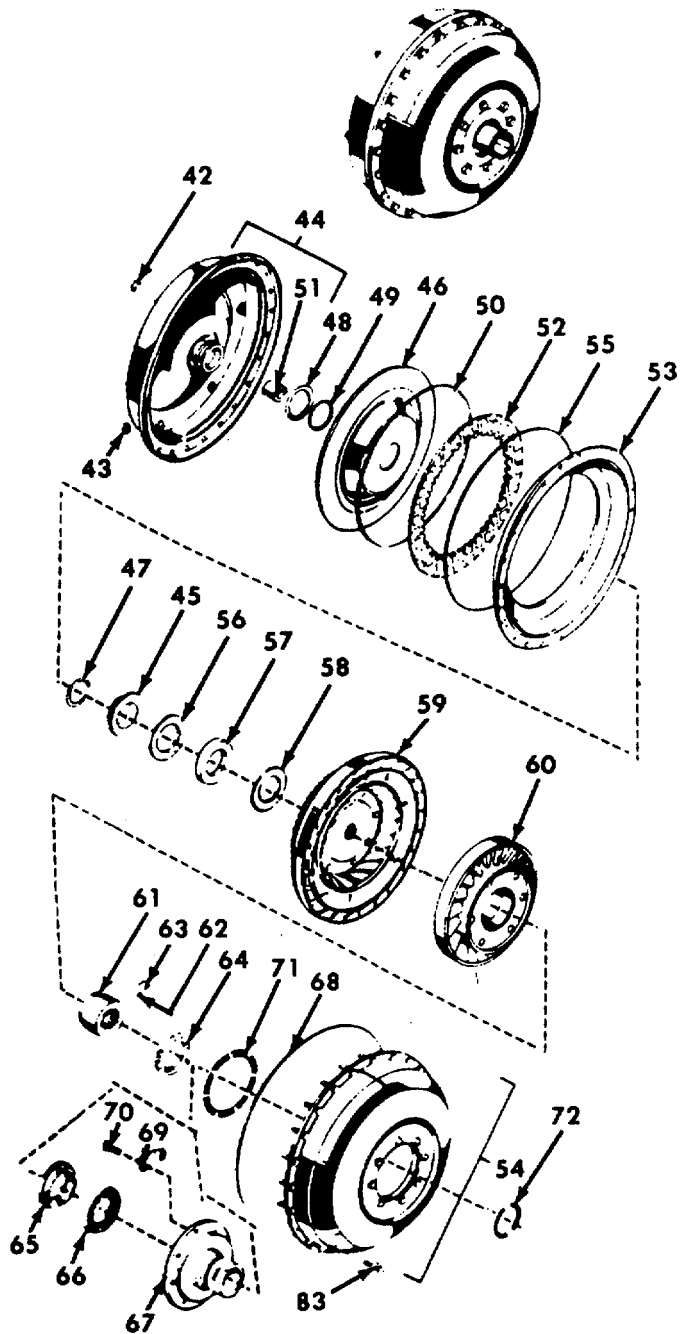


- (f) If end play does not exceed 0.025 inch (0.64 mm), disassemble the converter for inspection and cleaning. Reassemble with the same spacer (except when major parts must be replaced).

6-15. TRANSMISSION REPAIR (Continued).

(2) *Disassembly.*

- (a) Remove six rubber I.D. retainers from the converter cover assembly.
- (b) Remove twenty-four nuts (43) from cover (44).
- (c) Remove, as a unit, the converter cover, lock-up clutch piston and related parts.
- (d) Place cover assembly on the work table with the lock-up clutch piston up. Remove bearing race (45). Compress the center of the piston (46) and remove snapping (47).
- (e) Turn cover assembly over (piston down) and bump the cover sharply on a wood surface to remove the piston. Remove sealing retainer (48) and sealing (49) from cover (44). Remove sealing (50) from piston (46).
- (f) Remove bushing (51) only if replacement is necessary.
- (g) Remove lock-up clutch plate (52).
- (h) Remove lock-up clutch backplate (53) from torque converter pump (54). Remove sealing (55) from plate (53).
- (i) Remove the converter turbine assembly (56), bearing race (57), and spacer (58) from the hub of turbine (59).
- (j) Remove the converter turbine assembly (59).
- (k) Grasp the stator (60) and the roller race (61) and remove as a unit.
- (l) Position stator assembly (60) on the work table so that the free-wheel roller race (61) is upward. Remove the roller race by rotating it clockwise while lifting it out of the converter stator.
- (m) Remove the ten rollers (62) and ten springs (63) from stator assembly (60).



6-15. TRANSMISSION REPAIR (Continued).

**WARNING**

Cleaning solvent (Appendix D, Item 54) 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.

- (n) Check needle bearing assembly (64). Wash and flush the needle bearing assembly thoroughly with cleaning solvent (Appendix D, Item 54). Dry it, and lubricate with transmission oil (Appendix D, Item 38). Replace the freewheel race only and rotate the bearing while pressing upon the freewheel race. If there is no roughness or binding, the needle bearing assembly may be left in the stator and cam assembly and reused. Do not mistake dirt or grit for a damaged needle bearing. Reclean and reoil the needle bearing if dirt is suspected. Check the needle bearing end of freewheel race for smooth finish. Replace the freewheel race if the bearing end is scratched or contains chatter marks.

**NOTE**

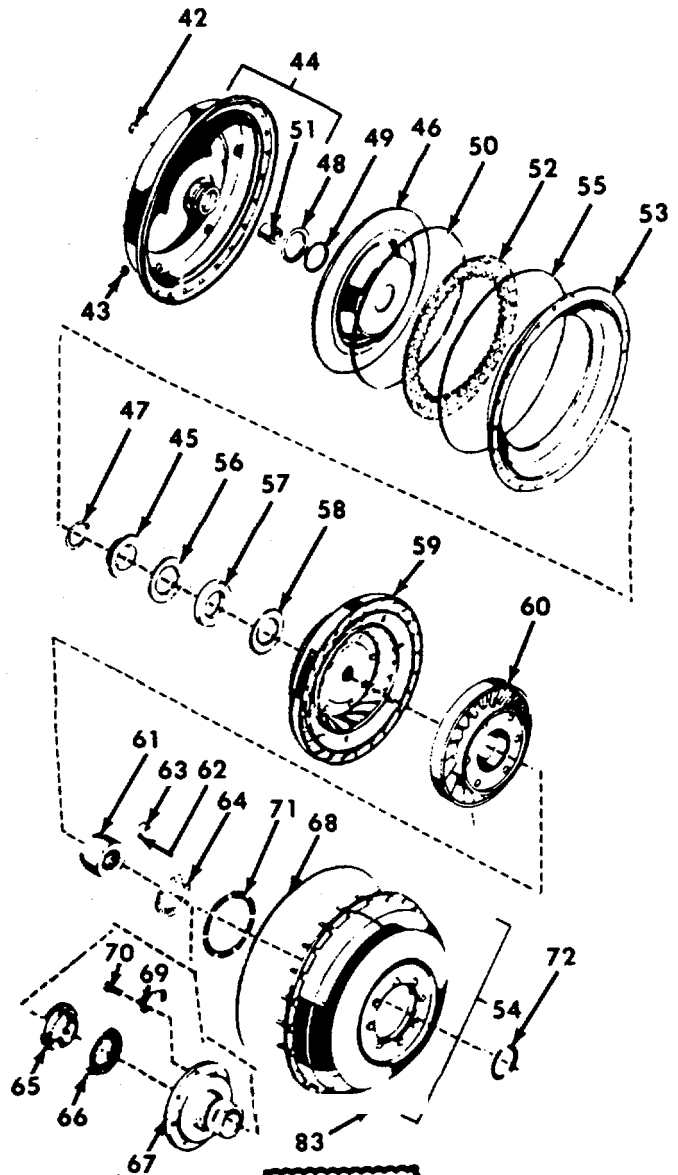
If it is necessary to repair the stator assembly (60), remove needle bearing assembly (64) before starting repair procedure.

- (o) If needle bearing assembly (64) needs replacement, follow steps (p) through (r) below.

**CAUTION**

Do not scratch or nick any stator bores. Do not attempt to disassemble the stator and cam assembly, unless part replacement is necessary.

- (p) If the needle bearing must be replaced, remove it carefully to avoid nicking the aluminum bore in which it is held.
- (q) Place a new bearing assembly, thrust race first, into the aluminum bore of the stator. Using bearing installer, install the thrust bearing.



**CAUTION**

Apply the load only to the outer shell of the bearing during installation.

- (r) Drive the bearing assembly into the stator until the top of the outer shell is 0.025-0.035 inch (0.64-0.89 mm) above the shoulder in the side plate. The installing tool will seat on the stator area surrounding the bearing when the bearing is properly installed.
- (s) Remove needle bearing (64), bearing race (65), and remove roller bearing (66) with converter pump hub roller bearing remover and installer from converter pump hub (67). Remove sealing (68).

## 6-15. TRANSMISSION REPAIR (Continued).

- (t) Flatten the corners of lockstrips (69) and remove eight bolts (70) and four lockstrips from converter pump hub (67).
- (u) Remove hub (67) and gasket (71) from pump (54). Remove sealing (72).

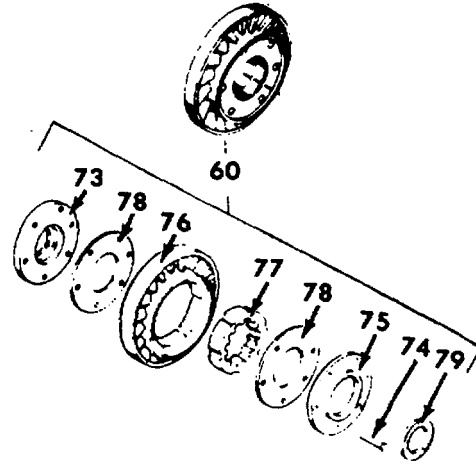
## (3) Stator repair.

**NOTE**

Do not disassemble the stator assembly (60) unless replacement of stator thrust washer (73), rivets (74) or washer (75) is necessary. If stator (76) or cam (77) is cracked or damaged, replace the complete stator assembly (60).

A hydraulic press having a minimum capacity of five tons, an adjustable table, and a pressure gouge to assist in determining rivet staking load is required to repair the stator assembly (60).

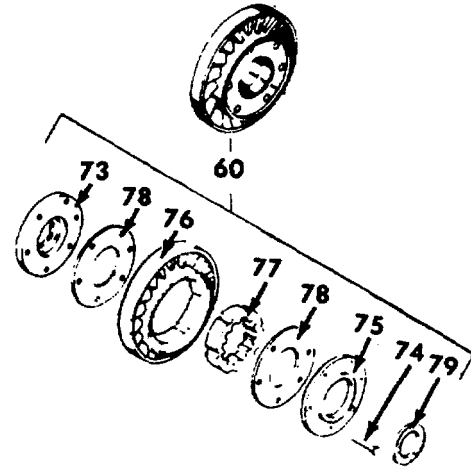
- (a) Place the stator assembly (60) in a drill press, formed rivet side up.
- (b) Using a 3/8 inch drill, align and drill the rivet, removing the formed head.
- (c) Place base plate under the stator assembly. Be sure the holes in the base plate are under the rivet heads. Place top plate on top of the stator assembly (60).
- (d) Install the 5/8-11x3.25 inch bolt to hold the two plates together. Torque the bolt to 60 ft-lb (81 N.m).
- (e) Place fixture stand on a hydraulic press. Install rivet remover pin into the fixture head. Tighten the tool retainer thumb screw.
- (f) Place the stator assembly (60) with base and top plates, onto the fixture stand, drilled rivet side up.
- (g) Align the rivet remover pin with the drilled rivet and press the rivet (74) from the stator assembly (60). Repeat the above process for each rivet (74).



- (h) Remove the retaining bolt and top plate. Separate thrust washer (73), side plate washer (75), two cam washers (78), and cam (77) from stator (76).
- (i) Inspect the stator and cam for cracks, rivet holes or burrs or swelling. Deburr as required. If cam or stator is cracked or distorted, replace the stator assembly (60).
- (j) Clean the stator assembly components. Assemble cam (77) and stator (76) with the roller pocket. Install cam washer (78) one on each side of the stator. Install side plate washer (75) and thrust washer (73).
- (k) Align the six rivet holes and insert six new 1/4x1.94 inch rivets (74) into the stator assembly from the rear to the front of the stator.
- (l) Place the stator assembly (60) on base plate. Be sure the rivet heads rest on the base plate, between clearance holes. Install top plate and the 5/8-11x3.25 inch retaining bolt. Strike the top plate with a rubber mallet to seat components. Torque retainer bolt to 60 ft-lb (81 N.m).

6-15. TRANSMISSION REPAIR (Continued).

- (m) Place the stator assembly (60) on fixture stand. Install staking tool into the fixturehead and tighten the thumb screw finger tight.
- (n) Apply approximately 800 pound (3629 kg) load to swage each rivet head. Swage the second rivet 180 degrees from the first. Locate the third rivet, 60 degrees from the second and swage it. Locate the fourth rivet 180 degrees from the third, etc., until all rivets are swaged.
- (o) Remove the retaining bolt, top plate, base plate and staking tool. Install new needle bearing (79) referring to paragraphs a. (2) (o) through a. (2) (r) above.



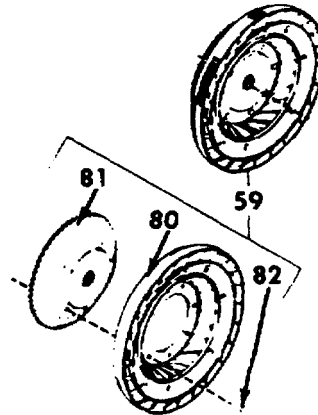
(4) Converter turbine repair.

**NOTE**

**Do not disassemble the turbine unless the turbine hub must be replaced. If the converter turbine is damaged, replace the assembly (59).**

**A hydraulic press having a minimum capacity of ten tons (9,070 kg), an adjustable press bed with a 25 inch (635 mm) opening and a pressure gauge to assist in determining the rivet swaging load, are required to repair the turbine assembly (59).**

- (a) Punch alignment marks on the turbine (80) and turbine hub (81) to show their relationship.
- (b) Place base plate on a work table, rivet hole side up.
- (c) Place converter turbine assembly (59) front side upward (turbine vanes down), on top of the base plate. Align the eight rivets (82) in the hub to the holes in the base plate.
- (d) Place guide plate on top of converter turbine assembly (59). Centrally locate each rivet (82) in the guide plate holes.



- (e) Install the 1/2-13x3-1/2 inch clamping bolt to retain the guide plate, turbine and base plate together. Torque the bolt 50 ft-lb (68 N.m).
- (f) Place the turbine assembly and fixture in the drill press.

**CAUTION**

**Do not use a hammer to remove the rivets, damage to turbine assembly may result.**

- (g) Place drill bushing into guide plate. Using a 1/4 inch drill, drill approximately 3/16 inch deep into the rivet.

## 6-15. TRANSMISSION REPAIR (Continued).

- (h) Place the drill guide into the next hole. Rotate the converter turbine assembly to the next hole and drill the rivet head. Continue until all the rivet heads have been drilled.
- (i) Place the turbine and fixture in a hydraulic press. Install rivet remover tool into the guide plate, Press out each rivet.
- (j) Remove the 1/2-13x3-1/2 inch bolt, guide plate and base plate.
- (k) Inspect the turbine for cracks, distortion and abrasions. If defects are noted, the turbine assembly must be scraped.
- (l) Inspect the rivet holes for burrs. Deburr as necessary.
- (m) Assemble the new and reusable turbine parts. Be sure to align the punch marks on the turbine and hub. Use eight new rivets (82) to ensure proper indexing.
- (n) Install the eight new rivets (82) through the turbine (80) and turbine hub (81).
- (o) Assemble turbine base plate solid side of the plate against the rivet heads.
- (p) Place guide plate on top of the assembled components. Centrally locate the rivets in the holes of the guide plate.
- (q) Retain the turbine assembly, base plate and guide plate with one 1/2-13x3-1/2 inch bolt. Torque the bolt to 50 ft-lb (68 N.m).
- (r) Place the assembled turbine and fixture in the hydraulic press.
- (s) Insert turbine staking tool into one of the holes in guide plate. Using an alternating pattern, swage the first rivet. Rotate 180 degrees from the first rivet and swage the second rivet. Rotate 90 degrees and swage the third rivet, then 180 degrees, etc., until all the rivets have been swaged.
- (t) Remove staking tool, retaining bolt, guide plate and base plate.

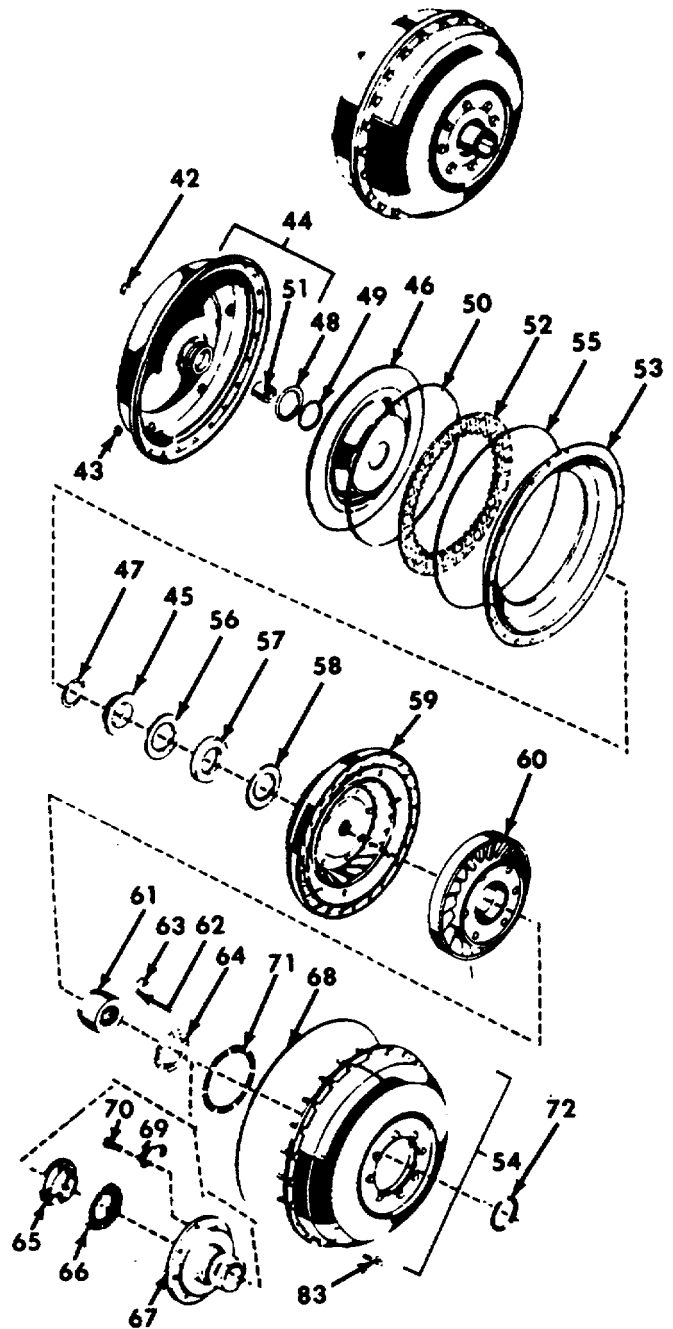
**NOTE**

**Balance each repaired assembly using a rotating type static balance to within 0.50 oz. in. (360 N.m), by welding the weights to the shroud.**

6-15. TRANSMISSION REPAIR (Continued).

(5) Assembly.

- (a) Install new gasket (71) (must be dry when installed) onto converter pump (54). Install hub (67) into pump (54) aligning the holes in the hub and gasket with the holes in the pump.
- (b) Install four new lockstrips (69) and eight 1/4-20x5/8 bolts (70) through hub (67) into pump (54). Tighten the bolts 9-11 ft-lb (12-15 N.m). Bend the corners of the lockstrips against the bolt heads.
- (c) Replace all damaged or missing flange bolts (83). Make sure all the balance weights are in their original positions.
- (d) Install sealing (68) into the groove in the outer circumference of converter pump (54). Install roller bearing (66) with converter pump hub roller bearing remover and installer, bearing race (65) (lugged side first) and needle bearing (64) into converter pump hub (67). Install sealing (72) into the groove of hub (67).
- (e) Place the stator and cam assembly on the work table, bearing side down. Cover the bottoms of the stator cam pockets with grease (Appendix D, Item 21). Install stator roller retainer.
- (f) Install ten freewheel rollers (62) and then springs (63). The open end of the spring touching the roller must be toward the center of the stator cam assembly. The rollers are installed in the shallow ends of the cam pockets.
- (g) Install the freewheel roller race (61), shoulder-side first, until the race engages the rollers. Rotate the race in a clockwise direction while pressing downward until the race touches the collapsible retainer. Lift up on the stator assembly (60) and pull on the cord to remove the retainer. Continue rotating the race while pressing downward. When the race is fully seated,



rotate it firmly in the opposite direction to lock the stator and cam assembly.

- (h) Grasp the stator and cam assembly and hold the roller race firmly to retain it in position. Install the stator assembly (60).
- (i) Install the converter turbine assembly (59).

## 6-15. TRANSMISSION REPAIR (Continued).

## NOTE

Install the same spacer (58) removed, only if the end play reading taken before disassembly was satisfactory, and if no parts affecting end play are being replaced. Install the spacer into the hub of converter turbine (59).

- (j) Install bearing race (57), outer lip upward, into hub of turbine assembly (59). Grease (Appendix D ,Item 21) and install bearing (56) onto the bearing race (57).
- (k) Install sealring (55) onto lockup clutch backplate (53). Install the backplate onto the torque converter pump. Align the balance mark on the backplate with the balance mark on the converter pump.
- (l) Install lockup clutch plate (52) to plate (53).
- (m) If the converter cover bushing (51) in the converter hub was removed, use bushing installer to install a new bushing (51). After installation, the bushing inside diameter should be 0.9990-1.0010 inch (25.375-25.425 mm).
- (n) Install sealring retainer (48) , smaller end first, onto converter cover hub (44). Install sealring (49) into the retainer. Install sealring (50) onto piston (46).

**CAUTION**

The lockup clutch will not release if the piston is not engaged with the piston guide pins.

## NOTE

To make installation of the lockup piston easier, place a pencil mark in line with the pin nearest the orifice in the piston. Then, when the piston is installed, use the pencil mark as a guide for the location of the pin beneath the orifice. One recessed hole is concentric with the orifice. Rotate the piston slightly, if necessary, during installation to ensure that the piston engages the pins. To verify that the piston is seated, measure the distance from the pump cover mounting surface to the piston. This is approximately 1-1/2 inches (38 mm).

- (o) Install the lockup clutch piston (46) into the converter cover (44) with the balance marks aligned so that the piston guide pins will enter the nearest holes in the piston.
- (p) Using hand pressure on the center of piston (46), install snapring (47). Install bearing race (45) inner lip first, into the hub of converter cover (44). Use grease (Appendix D, Item 2 1) to retain it.
- (q) Install, as a unit, the converter cover, lockup clutch piston and related parts. Align the balance marks on the cover with the balance marks on the lockup clutch backplate and the converter pump. Secure the converter cover with twenty-four nuts (43). Torque the nuts evenly to 19-23 ft-lb (26-31 N.m).
- (r) Install six rubber ID retainers (42) onto each of the six drive studs on the converter cover.

## NOTE

The end play check is necessary if spacer was not installed at buildup. The check is recommended even if spacer (58) was installed, to verify that proper end play 0.001-0.025 inch (0.03-0.64 mm) remains after rebuild. Omit if the end play reading is satisfactory.



6-15. TRANSMISSION REPAIR (Continued).

(6) End play check

- (a) Support the converter assembly on the converter cover (pump hub upward). Place converter end play gauge into the converter pump hub. Hold the center screw of the gauge downward and tighten the nut until the gauge is securely held in the converter turbine hub. Do not overtighten.
- (b) Install the dial indicator. Adjust the indicator bracket so the dial is in contact with the top of the center screw. Set the dial to read zero.
- (c) Using both hands, lift the center screw as far as possible. Record dial indicator reading (this is dimension B). Select the proper size spacer.
- (d) It is not necessary to disassemble the complete converter to install the selected spacer. Remove only those items necessary to install the spacer.
- (e) Disassemble the converter by following paragraph a. (2) steps (b), (c) and (i).
- (f) Install the selected spacer into the turbine hub.
- (g) Assemble the converter by following paragraph a. (5), (j) and (q). The end play may be rechecked as in a. (6). Proper end play is any dimension between 0.001 and 0.025 inch (0.03 and 0.64 mm).

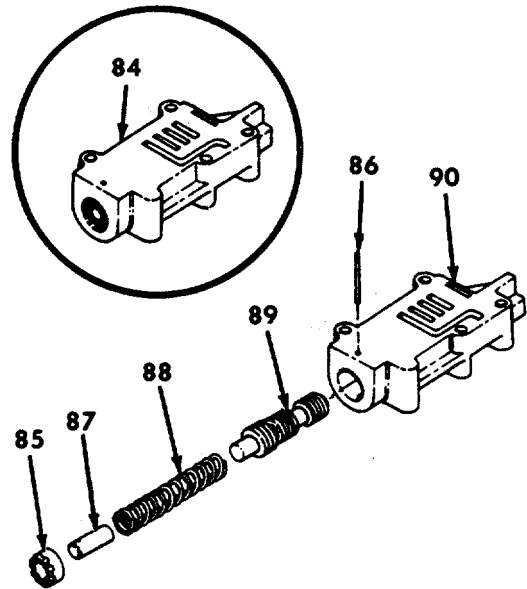
SPACER CHART

<u>Dimension B</u> <u>inches (mm)</u>	<u>User Parts No.</u>	<u>Color</u>
Less than 0.0177 (0.449)	Use no spacer	
0.0177-0.034 (0.449-0.86)	6837429	Gold
0.034-0.049 (0.86-1.24)	6837430	Silver
0.049-0.062 (1.24-1.57)	6837431	Plain
0.062-0.079 (1.57-2.00)	6837432	Black
0.079-0.093 (2.00-2.369)	6837433	Copper

b. Modulated lockup valve (84) repair.

(1) Disassembly

- (a) Mark adjusting ring (85) to indicate its position in relation to pin (86).
- (b) Depress ring (85) against spring pressure, and remove pin (86).
- (c) Remove adjusting ring (85), valve stop (87), spring (88), and valve (89) from valve body (90).



(2) Assembly

- (a) Install valve (89) (smaller diameter first, into valve body (90).
- (b) Install spring (88). Install valve stop (87) undrilled end first, into spring (88).

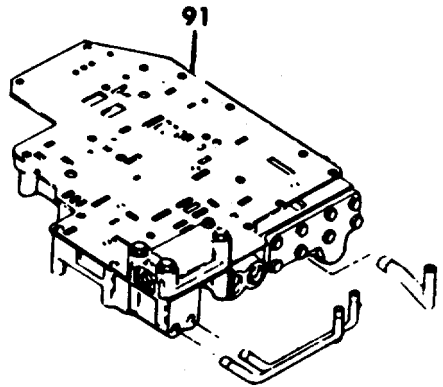
**6-15. TRANSMISSION REPAIR (Continued).**

- c) Install adjusting ring (85), flat side first, over valve top (87). Align the adjusting ring as it was previous to disassembly.
- d) Depress ring (85) against spring pressure, and install pin (86) through the holes in valve body (90), valve stop (87) and into the slot of adjusting ring (85). Be sure the adjusting ring is aligned with the pin as it was before removal. Adjusting ring tool may be used to properly locate the adjusting ring.

- c. *Control valve repair.*
- (1) Disassembly.

**CAUTION**

The valve body assembly (91) contains a number of springs, some of which are similar and can be mistakenly interchanged. If springs are not reinstalled in the same locations from which removed, the calibration of valve body functions will be lost. For these reasons, it is recommended that each spring, at removal, be tagged with its item number and utilize valve body parts tray set.



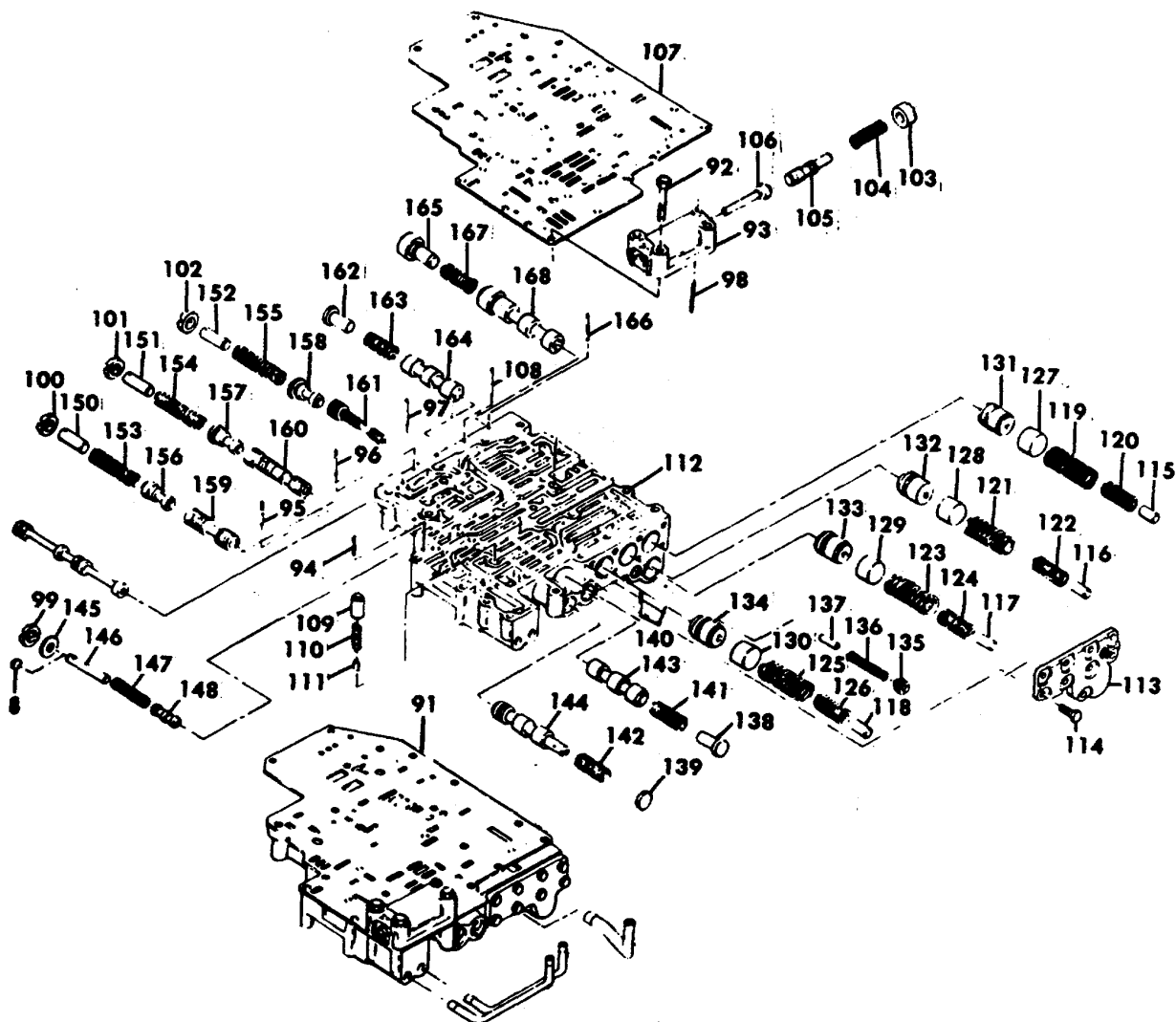
6-15. TRANSMISSION REPAIR (Continued).

- (a) Place valve assembly (91) on the work table, modulator valve body (93) upward.
- (b) Remove three bolts (92) from the modulator body (93) and remove the modulator body (93).
- (c) Remove retaining pin (98) from modulator body (93) while applying pressure to adjusting ring (103). Remove the adjusting ring (103).
- (d) Remove spring (104), valve (105), and actuator pin (106).

**NOTE**

Before removing pins (94, 95, 96, 97, and 98), make a note or sketch that shows the position of adjusting rings (99, 100, 101, 102 and 103) in respect to their retaining pins. If the valve body is reassembled with the same springs, and the adjusting rings are in their original positions, the original calibration of the valve body is maintained.

- (e) Remove separator plate (107). A slot is included in the separator plate that engages the flared end of retaining pin (108). The separator plate must be slid lengthwise to disengage it from pin (108).
- (f) Remove priority valve (109), spring (110) and stop (111).
- (g) Place control valve body (112) on the work table, flat side down.



6-15. TRANSMISSION REPAIR (continued).

**NOTE**

**Trimmer valve cover (113) is spring loaded and must be restrained while the bolts (114) are being removed.**

- (h) Remove eight bolts (114) from trimmer valve cover (113).
- (i) Remove trimmer valve cover (113). Remove valve stops (115, 116, 117 and 118).
- (j) Remove springs (119, 120, 121, 122, 123, 124, 125 and 126). Remove trimmer plugs (127, 128, 129, and 130). Remove trimmer valves (131,132,133, and 134).
- (k) Remove trim accumulator valve (135), spring (136), and stop (137).

**NOTE**

**Valve stop (138) and spacer (139) are spring loaded and must be restrained while pins (140) are being removed.**

- (l) Remove two retainer pins (140) from the control valve body (112).
- (m) Remove valve stop (138) and machined spacer (139).
- (n) Remove relay valve springs (141 and 142). Remove relay valve (143 and 144).

**NOTE**

**Record location of the adjusting ring (99) in relation to retaining pin (94) before removal.**

- (o) Depress adjusting ring (99). Remove pin (94), ring (99), washer (145), valve stop (146) spring (147) and valve (148).
- (p) Remove selector valve.

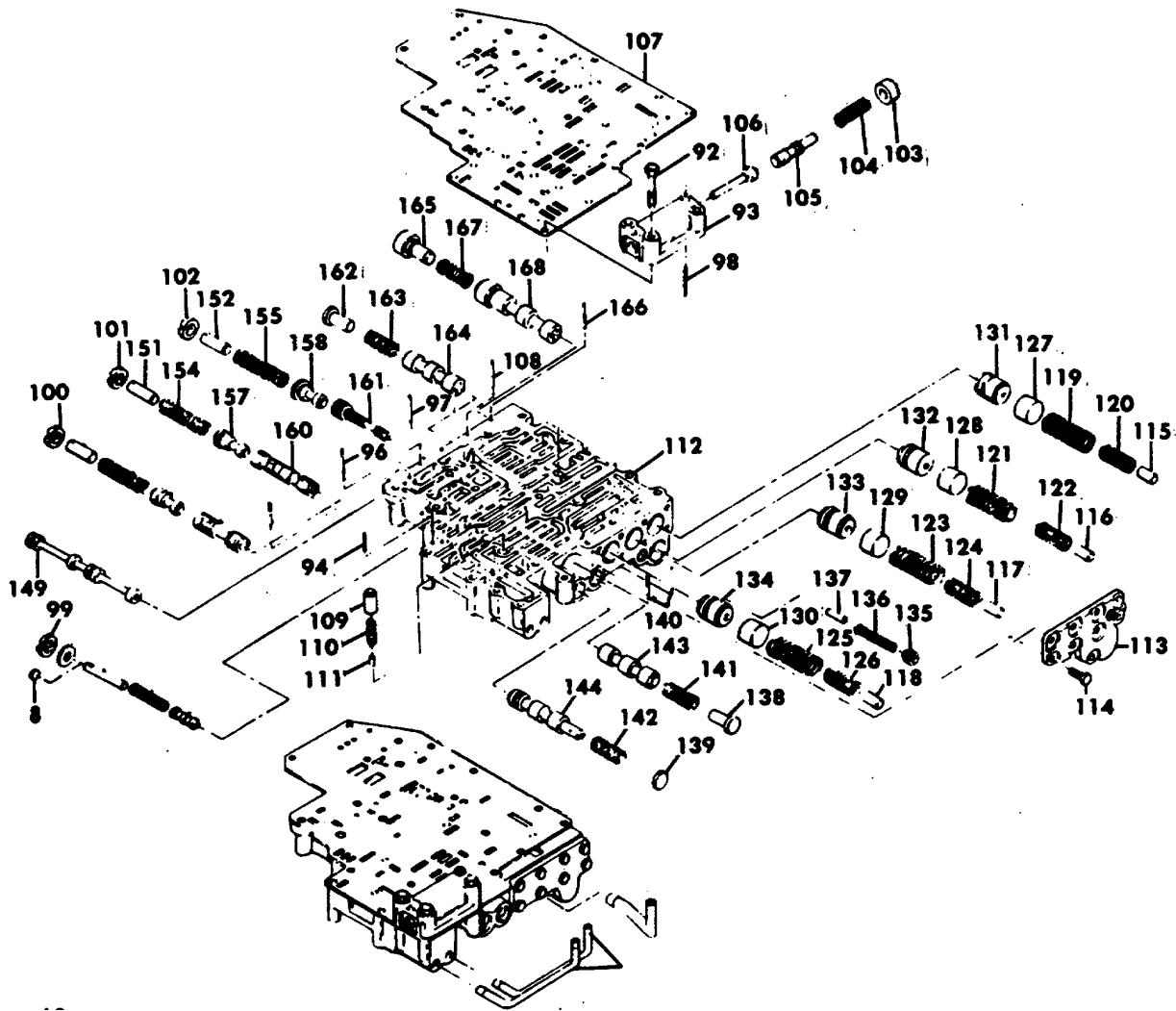
- (q) Compress adjusting rings (100, 101, and 102), and remove retainer pins (95, 96, and 97). Remove the adjusting rings.
- (r) Remove valve stops (150, 151 and 152). Remove spring (153, 154 and 155). Remove modulator valves (156, 157 and 158). Remove shift valves (159, 160 and 161).
- (s) Compress relay valve stop (162), and remove retainer pin (108).
- (t) Remove valve stop (162), valve spring (163), and relay valve (164).
- (u) Depress trimmer regulator valve stop (165) and remove retainer pin (166).
- (v) Remove valve stop (165), spring (167), and valve (168).

(2) *Assembly.*

- (a) Install valve (148) into its bore in valve body (112).
- (b) Install spring (147), valve stop (146) (drilled end last), washer (145) and adjusting ring (99) into the bore.
- (c) Depress the adjusting ring (99) against spring pressure and install pin (94). Install pin through the hole in body (112)and valve stop (146).
- (d) Install valve (159), shorter land first, into valve body (112).
- (e) Into the same bore, install valve (156) smaller end first. Install spring (153), valve stop (150) and adjusting ring (100).
- (q) Depress ring (100) against spring pressure and install pin (95) so that it passes through valve stop (150) and retains ring (100).

**6-1 5. TRANSMISSION REPAIR (Continued).**

- (g) Install valve (160), smaller end first, into valve body (112).
- (h) Into the same bore, install valve (157), smaller end first. Install spring (154), valve stop (151), and adjusting ring (101).
- (i) Depress ring (101) against spring pressure and install pin (96) so that it passes through valve stop (151) and retains ring (101).
- (j) Install valve (161), smaller end first, into valve body (112).
- (k) Into the same bore, install valve (158), smaller end first, spring (155), valve stop (152) and adjusting ring (102).
- (l) Depress adjusting ring (102) against spring pressure and install pin (97) so that it passes through valve stop (152) and retains ring (102).
- (m) Install valve (164) into valve body (112).
- (n) Into the same bore, install spring (163) and valve stop (162). Depress valve stop (162) against spring pressure and install pin (108).



**6-15. TRANSMISSION REPAIR (Continued).**

- (o) Install valve (168), smaller end first, into valve body (112).
- (p) Into the same bore, install spring (167) and valve stop (165). Depress valve stop (165) and install pin (166).
- (q) Install trimmer valve (131) open end first, into valve body (112).
- (r) Into the same bore, install plug (127), springs (119 and 120) and valve stop (115).
- (s) Install trimmer valve (132) open end first, into valve body (112).
- (t) Into the same bore, install plug (128), springs (121 and 122) and valve stop (116).
- (u) Install trimmer valve (133), open end first, into valve body (112).
- (v) Into the same bore, install plug (129), springs (123 and 124) and valve stop (117).
- (w) Install trimmer valve (134) open end first, into valve body (112).
- (x) Into the same bore, install plug (130), springs (125 and 126) and valve stop (118).
- (y) Install stop (137), spring (136), and valve (135) into the bore.
- (z) Install cover (113) over the trimmer springs and accumulator valve. Force the cover against spring pressure, and install eight 1/4-20x5/8 inch bolts (114). Torque the bolts to 9-11 ft-lb (12-15 N.m).
- (aa) Install valve (143) into valve body (112).
- (bb) Into the same bore, install spring (141) and valve stop (138). Depress stop (138) against spring pressure, and install pin (140).
- (cc) Install valve (144) larger end first, into valve body (112).
- (dd) Into the same bore, install spring (142) and machined spacer (139). Depress the machined spacer against spring pressure, and install pin (140).
- (ee) Install actuator rod (106) smaller end first, into valve body (112). Install valve (105) longer and first, into the same bore.
- (ff) Install spring (104) and adjusting ring (103).
- (gg) Depress adjusting ring (103) against spring pressure, and install pin (98) so that it retains ring (103).
- (hh) Install valve stop (111), spring (110) and priority valve (109) open end first, into valve body (112).
- (ii) Place separator plate (107) onto body (112) so the bolt holes align. The slot in the separator plate, must engage the flared end of pin (108).
- (jj) Install the assembled modulator valve onto separator plate (107). Align the bolt holes.
- (kk) Install three 1/4-20x1-3/4 inch bolts (92) through valve body (93), plate (107) and into valve body (112).
- (ll) After making sure that the plate and valve body are properly aligned so that all valve body mounting bolts will pass through them, torque bolts (92) to 8-12 ft-lb (11-16 N.m).
- (mm) Install selector valve (149), drilled end first, into valve body (112). Secure the valve against dropping out, with a rubber band, cord, or soft wire.
- (nn) Using adjusting ring tool, position adjusting rings (99, 100, 101, 102 and 103) as they were before the valve body was disassembled.
- (oo) If the valve body assembly is not to be installed immediately, cover it with a plastic bag or wrap it to protect it from dust, dirt and moisture.

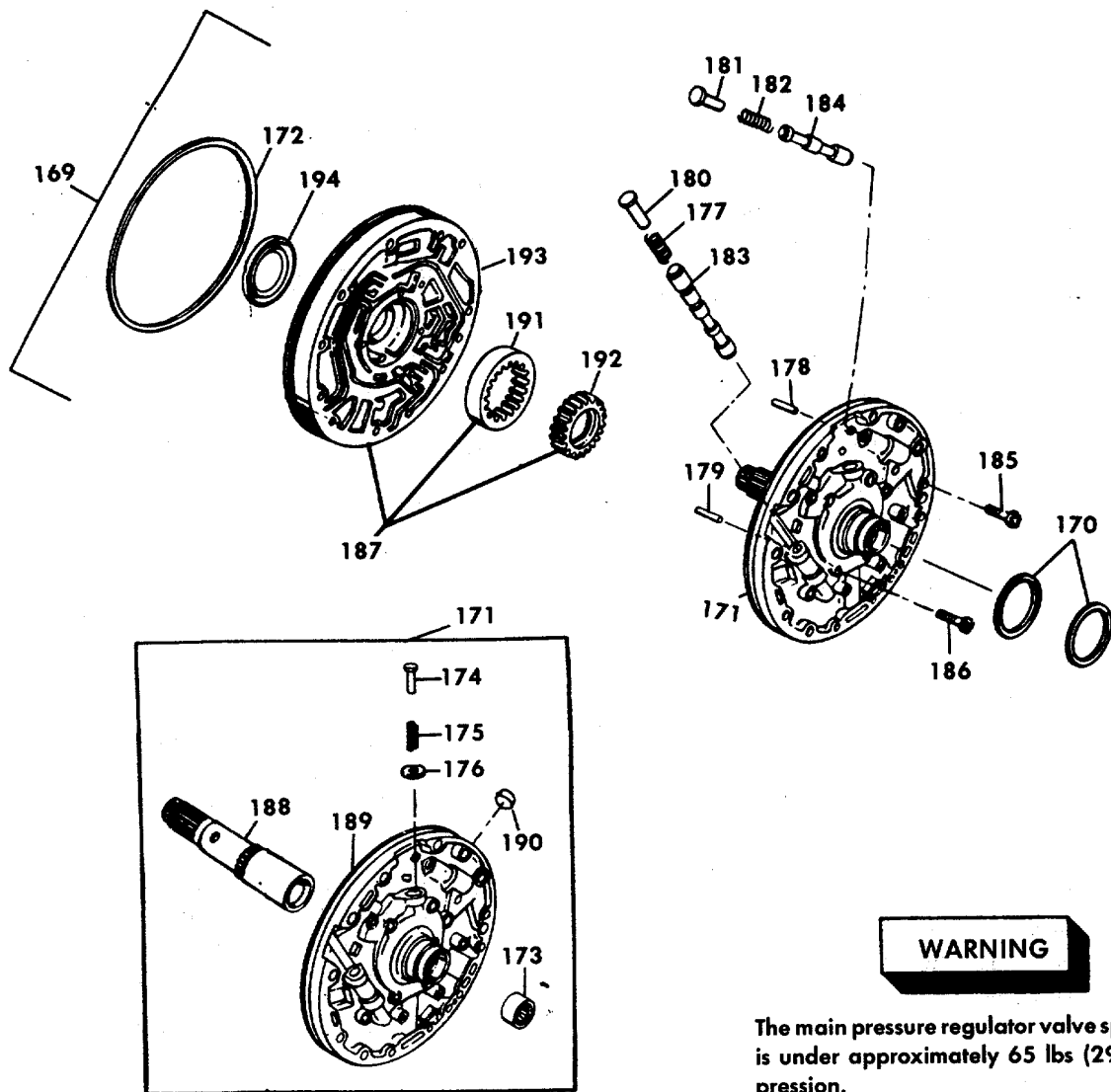
6-1 5. TRANSMISSION REPAIR (Continued).

d. Oil pump and front support repair.

(1) Disassembly.

- (a) Place the oil pump and support assembly (169) on a work table, support side upward.
- (b) Remove butt-joint seal-rings (170) from the hub of the front support (171).
- (c) Remove oil pump searing (172).

- (d) Remove roller bearing assembly (173) from the bore of the converter ground sleeve only if replacement is necessary.
- (e) If parts replacement is necessary, install valve pin remover onto the head of the converter pressure regulator valve guide pin (174). Attach slide hammer to the valve pin remover tool and remove guide pin (174), valve spring (175) and regulator valve (176).



**WARNING**

The main pressure regulator valve spring (177) is under approximately 65 lbs (290 N) compression.

**6-15. TRANSMISSION REPAIR (Continued).**

- (f) Attach the main pressure regulator and lockup spring compressor and adapters to the front support. Tighten the compressor screws, removing all forces from the pin retainers (178, and 179). Remove the pins (178 and 179).
- (g) Carefully loosen the screws on the spring compressor until it can be removed from the front support. Remove valve stops (180 and 181), valve springs (177 and 182), regulator valve (183) and lockup valve (184).
- (h) Remove the fourteen bolts (185 and 186) that hold the oil pump and the front support together.
- (i) Separate front support assembly (171) from oil pump body and gear assembly (187).
- (j) If ground sleeve (188) is damaged and support (189) is serviceable, press the sleeve out of the support. Mark the position of the lube passage in the ground sleeve on front support prior to removal for correct installation of the new sleeve. If movement is detected, the parts must be replaced as an assembly.
- (k) If replacement of plug (190) is necessary, remove the plug from the circumference of support.
- (l) Remove oil pump gears (191 and 192) from oil pump body (193).
- (m) If body (193) is damaged, replace oil pump assembly (187).
- (n) Remove oil seal (194) from oil pump body (193).
- (o) Determine the serviceability of the sealing grooves on the front support hub. Insert, do not force, gauge into the groove on the support hub. Rotate the gauge 360 degrees around the hub. If the gauge does not rotate freely, the support is damaged and should be replaced.

(2) *Assembly.***NOTE**

**If an oil seal installer is not available, install the seal, spring loaded lip first, into the seal bore of the oil pump. Press the seal to 0.050-0.070 inch (1.27-1.79 mm) below the front surface of the pump body.**

- (a) If oil seal (194) was removed from oil pump body (193), install a new one. Place the oil pump body on the work table, flat side down. Seat the oil seal on the installer with the spring loaded lip facing away from the tool. Attach driver handle to the oil seal installer. Drive the seal into the pump housing. Remove the seal installer and apply a high temperature seal lubricant (Appendix D, Item 22) to the inside diameter of the oil seal (194).
- (b) Invert oil pump body, flat side up. Install drive gear (192) and driven gear (191) into the oil pump body. Place a straight edge across the surface of the oil pump. Insert a thickness gauge between the straight edge and the driven gear (191). Measurement can also be made with slide gauge tool. If the clearance is not 0.001-0.003 inch (0.025-0.076 mm) selective driven gears are available. Repeat the above procedure for drive gear (192); if clearance is not 0.0012-0.0020 inch (0.030-0.051 mm) selective drive gears are available.
- (c) If plug (190) was removed from support (189), replace it. Press the plug into the bore to 0.010 inch (0.25 mm) below counterbore support assembly.



6-15. TRANSMISSION REPAIR (Continued).

NOTE

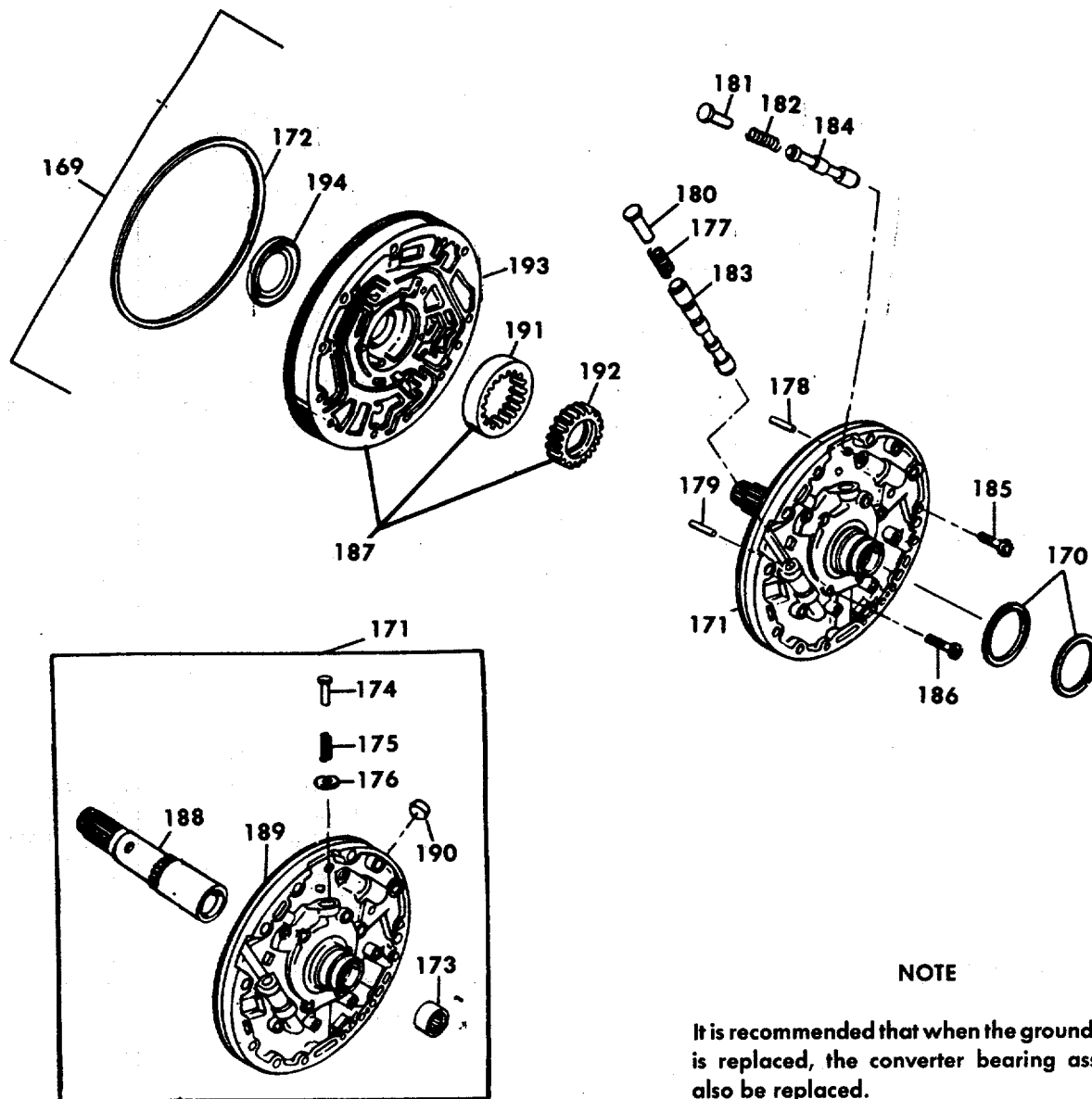
If the ground sleeve (188) was remove, must be able to measure and check runout. If unable to check runout of ground sleeve, replace with new assembly.

(d) Support the front support in a press (8 ton minimum) with the pump face of the front support facing up. Place ground sleeve (188) in center bore, align sleeve lube hole with mark on support.

(e) Press the sleeve (188) into the front support. The sleeve is properly positioned with a dimension of 6.005-5.995 in. (152.53-152.27 mm) measured from thrust bearing surface to the end of the sleeve.

(f) Measure the runout of the sleeve at an area below the splines, not to exceed 0.006 inch (0.152 mm) maximum.

(g) Machine the bearing bore of sleeve to a diameter of 1.6255-1.6245 inch (41.29-41.26 mm) and a depth of 2.010 inch (51.0 mm). Clean the assembly of any metal chips and dirt.



NOTE

It is recommended that when the ground sleeve is replaced, the converter bearing assembly also be replaced.

**6-15. TRANSMISSION REPAIR (Continued).**

- (h) Place needle bearing (173) into ground sleeve (188) with the numbered end of the bearing cage facing up. Using bearing installer and driver handle, drive the bearing into the ground sleeve. The bearing, when installed, must withstand a 200 lb (91 kg) load without moving.

**NOTE**

**If the tools are not available, drive the bearing (numbered end of bearing cage up) into the ground sleeve until the bearing is 1.240-1.260 inch (31.50-32.00 mm) from the face of the hub.**

- (i) Place the oil pump body and gear assembly (187) on the work table, front side down. Align the bolt holes in front support assembly (171) with those in assembly (187). Install two 5/16-18x1-3/4 inch bolts (186) approximately 180 degrees apart. Tighten the bolts one or two threads.
- (j) Install centering band around the oil pump body and front support assembly (169). Install the remaining ten 5/16-18x1-3/4 inch bolts (186) and two 3/8-16x1-1/2 inch bolts (185).
- (k) Check the centering band to ensure a secure fit. The split line between the pump and the support must be perfectly smooth after bolt installation. Torque twelve 5/16-18 bolts (186) to 17-20 ft-lb (23-27 N.m). Torque the 3/8-16 bolts to 36-43 ft-lb (49-58 N.m).
- (l) Install main regulator valve (183) and lockup valve (184) longer land first, into their proper bores in support assembly (171).

- (m) Install springs (177 and 182) and valve stops (180 and 181) into their proper bores. Install main regulator and lock-up valve spring compressor and adapters on front support. Compress the springs and stops to allow installation of pins (178 and 179).

**NOTE**

**If valve pin installer is not available, install the guide pin and components to extend 1.16 to 1.20 inches (29.5 to 30.5 mm) above the finished surface.**

- (n) If valve guide pin (174) was removed, replace it with a new one. Using valve guide pin installer, plate the pin into the installer. Place spring (175) and valve (176) onto valve guide pin (174). Install the valve guide pin and components into the front support.
- (o) Lubricate sealring (172) with an oil-soluble grease (Appendix D, Item 21) and install it into the groove on the outer circumference of the oil pump body. Be sure the sealring does not twist in its groove.

**NOTE**

**Front support sealrings (170) must not be installed onto the support hub until final assembly of the transmission.**

6-15. TRANSMISSION REPAIR (Continued).

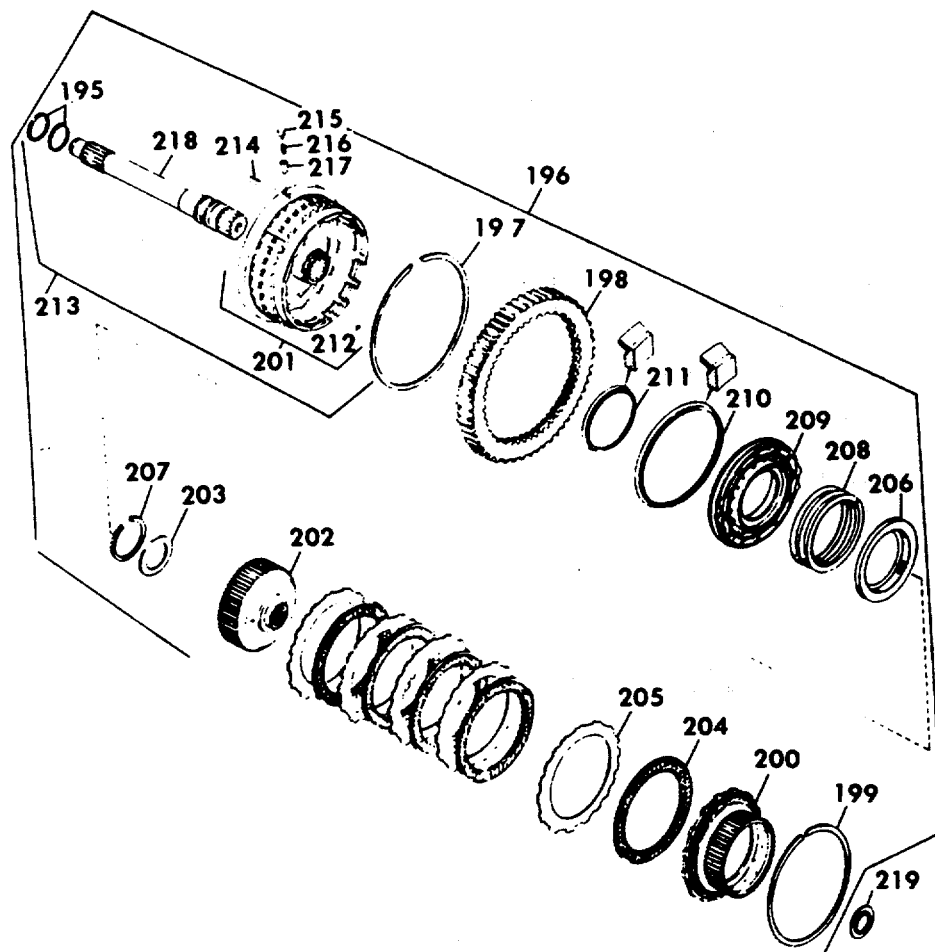
e. Forward clutch and turbine shaft repair.

(1) Disassembly.

- (a) Remove sealrings (195) from the housing and shaft assembly (196).
- (b) The PTO gear is removed by compressing the snapping, located within the gear, and sliding the gear from the housing. To compress the snapping (197), insert ten pieces of steel shim stock, 3/32x3x0.020 inch thick (2.38x76.2x0.508 mm thick) between the snapping (197) and the PTO gear (198). To accomplish this, locate the snapping gap, and at the cutout nearest the gap,

press the snapping into the groove in the housing. Slip a piece of shim stock between the snapping and the inner ends of the splines of the PTO gear. Repeat the operation at the other side of the snapping gap.

- (c) Then, working at each opening (missing spline) to compress the snapping, insert the remaining pieces of shim stock at approximately 3 inch (7.22 mm) increments. Slide the gear from the housing. Remove the snapping (197). If the gear does not slip easily, check for a break in the light that can be seen between the gear and housing; work to depress the snapping in that area.



## 6-15. TRANSMISSION REPAIR (Continued).

- (d) Remove the snapping (199) that retains the fourth clutch hub (200) in the forward clutch housing (201). Remove the fourth clutch hub (200) and the forward clutch hub (202) from the housing.
- (e) Remove thrust bearing race assembly (203), the bearing assembly may adhere to either forward clutch hub (202) or the hub of forward clutch housing (201). Remove five internal-splined plates (204) and five external tanged plates (205) from the forward clutch housing (201).
- (f) Place the housing and shaft assembly in a press. Using compressor tool, depress the spring retainer (206) and remove the retainer snapping (207). Remove the retainer (206) piston return spring (208) and piston (209). Remove sealring (210) from the piston (209) and sealring (211) from the housing (201).
- (g) Remove balls (212) from housing and shaft assembly (213) only if replacement is necessary. If necessary, clear the bores of staked metal and remove the balls.
- (h) Remove pin (214), plug (215), valve spring (216) and valve (217) from the outer circumference of forward clutch housing assembly (213).
- (i) Press turbine shaft (218) from housing (201) only if replacement is necessary. To press the shaft from the housing, place the assembly, shaft downward, in a press. Support the assembly at the front hub of the housing.

## (2) Assembly

- (a) If turbine shaft (218) was removed, press the new one to a firm seat against housing (201). To ensure a satisfactory fit, a minimum of 250 lb (1112 N) press out force is required. The total runout must be within 0.005 inch (0.127 mm).

- (b) Inspect centrifugal valve parts (214, 215, 216 and 217) for damage. If damaged, replace with new parts. Be sure the color code of any new part is the same as the part replaced. All three parts (214,215, and 216) must be identically coded.
- (c) Install centrifugal valve (217), conical end first, into its bore in forward clutch housing (201). Place spring (216) inside the valve. Compress the spring with plug (215) and retain the spring and plug with pin (214).
- (d) If balls (212) were removed, replace them. Place each ball in its bore. Stake each bore at three equally spaced places. Each bore is properly staked when the ball has at least 0.040 inch (1.02 mm) axial movement and when the ball is retained by the stakes when a 30 lb (133 N) load is applied against the ball.
- (e) Before completing the assembly, the clutch clearance must be established. One method is by direct measurement and is outlined in steps (f) through (k).

**CAUTION**

**If either piston sealring (210 or 211) is installed incorrectly, the forward clutch will not operate properly.**

- (f) Position the clutch housing and shaft assembly (213) shaft downward, on a work table. Lubricate and install the piston sealrings (210 and 211) into their grooves in the housing hub and piston. Make sure the sealring lips face toward the oil pressure side of the piston. Install the piston (209) into the housing.
- (g) Alternately install the five external-tanged plates (205) and five internal-splined plates (204). Install the fourth clutch driving hub (200) and retain it with the snapping (199).

6-15. TRANSMISSION REPAIR (Continued).

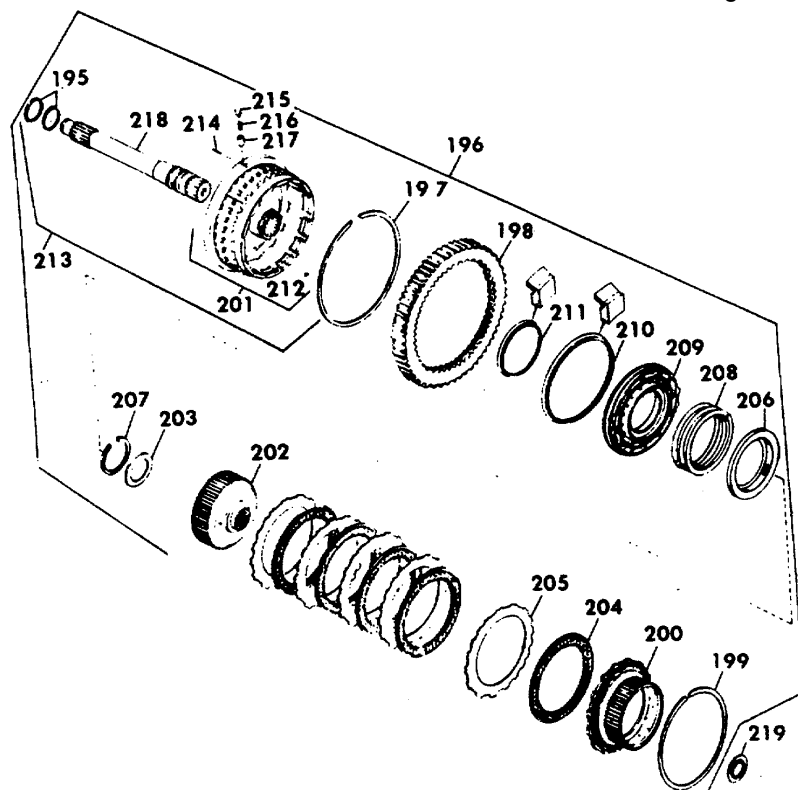
- (h) Hold the fourth clutch driving hub (200) firmly against the snapping and, using forward clutch clearance gauge check the clearance between the fourth clutch driving hub (200) and the internal-splined clutch plate (204). The prescribed clearance for the forward clutch is 0.079-0.130 inch (2.01-3.30 mm). When clearance is achieved, the first step of clearance gauge will fit between the hub and plate; the second step will not.
- (i) If the clearance is excessive (second step of gauge fits), replace the thinner clutch plates with new plates. If the clearance is still excessive after all ten plates and fourth clutch drive hub (200) have been replaced, a thicker piston (209) is required.

- (j) If the clearance is insufficient (first step of gauge will not fit), a thinner piston (209) is required.
- (k) Remove the snapping (199) that retains the fourth clutch driving hub (200) and remove the hub (200). Remove the forward clutch plates (204 and 205).

**CAUTION**

**If either piston sealing (210 or 211) is installed incorrectly, the forward clutch will not operate properly.**

- (l) Lubricate and install the piston sealings (210 and 211) into their grooves in the housing hub (201) and piston (209). Make sure the sealing lips face toward the oil pressure side of the piston. Install the piston (209) into the housing.
- (m) Place the clutch housing and shaft assembly, and assembled piston on a press bed. Install the piston return spring (208) and spring retainer (206) and position the snapping (207) on the hub. Using compressor tool, depress the spring retainer (206) sufficiently to install the snapping (207) into its groove in the housing hub.



6-15. TRANSMISSION REPAIR (Continued).

- (n) Return the subassembly to the work table, and install the thrust bearing race assembly (203) onto the inside of the forward clutch housing, lube relief scallops down. Retain the assembly with oil-soluble grease (Appendix D, Item 21).
- (o) Position the clutch housing and shaft, shaft downward, on a work table. Place the forward clutch hub (202) outer splines first, onto the hub of the forward clutch housing. Install the ten clutch plates (205 and 204) starting with an external-tanged plate.

**NOTE**

The difference of thickness between the outside of the snapping and the inside must not exceed 0.0015 inch (0.040 mm). Excessive taper may cause the snapping (199) to become dislodged from the snapping groove.

- (p) Install the fourth clutch driving hub (200) and retain it with the snapping (199). Install the PTO gear snapping (197) onto the forward clutch housing. Install the PTO gear (198), chamfered inside diameter first, from the rear of the clutch housing. Slide the gear onto the housing until the snapping (197) engages its mating groove in the gear.
- (q) Install the thrust bearing race assembly (219) onto the forward clutch hub, lube scallops up. Retain with oil-soluble grease (Appendix D, Item 21).
- (r) Invert the assembly and install two sealings (195) at the base of the shaft and one near the end of the shaft. Retain the sealings with oil-soluble grease (Appendix D, Item 21).

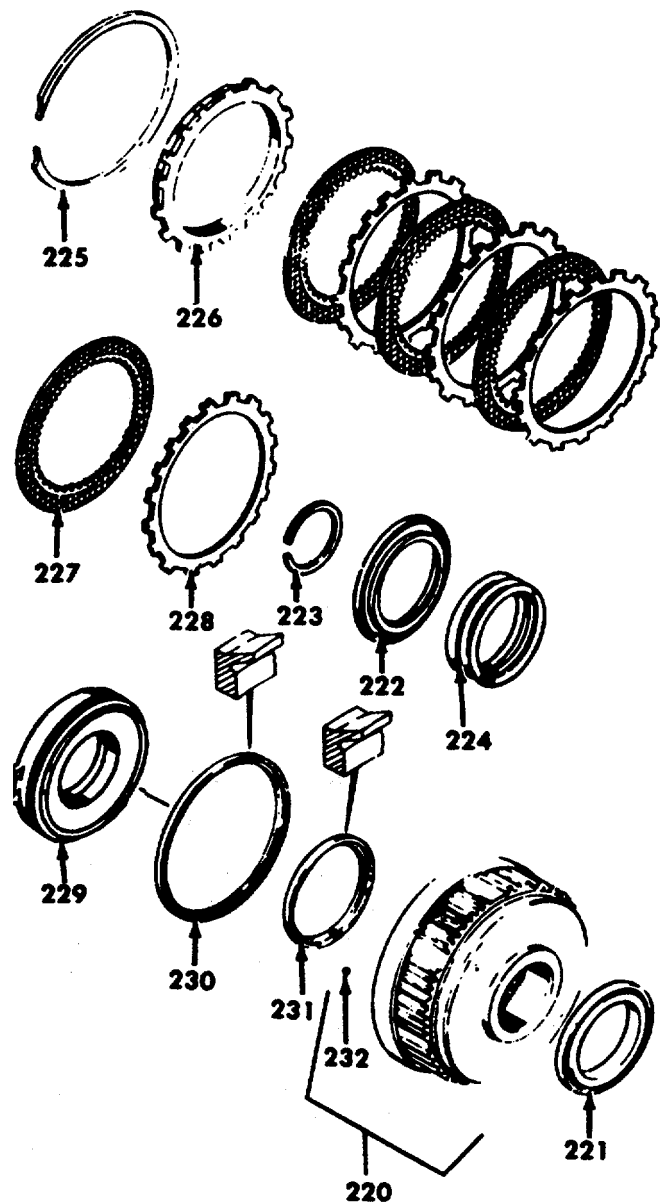
f. Fourth clutch repair.

(1) Disassembly.

- (a) If not previously removed, remove thrust bearing race assembly (219) from the front hub of fourth clutch

housing (220). Remove bearing race (221) from the rear hub of the clutch housing if not previously removed.

- (b) Using compressor tool, and compressor base, depress the spring retainer (222), sufficiently to allow removal of the snapping (223). Remove the snapping (223). Remove the spring retainer (222) and remove the piston return spring (224) which is directly beneath the retainer. Remove the snapping (225) that retains the backplate (226) and remove the backplate (226).



6-15. TRANSMISSION REPAIR (Continued).

- (c) Remove the eight clutch plates (227 and 228) and piston (229). Remove sealring (230) from the piston and sealring (231) from fourth clutch housing (220).
- (d) Remove balls (232) from fourth clutch housing (220) only if replacement is necessary. If necessary, clear the affected bores of staked metal and remove the balls (232).

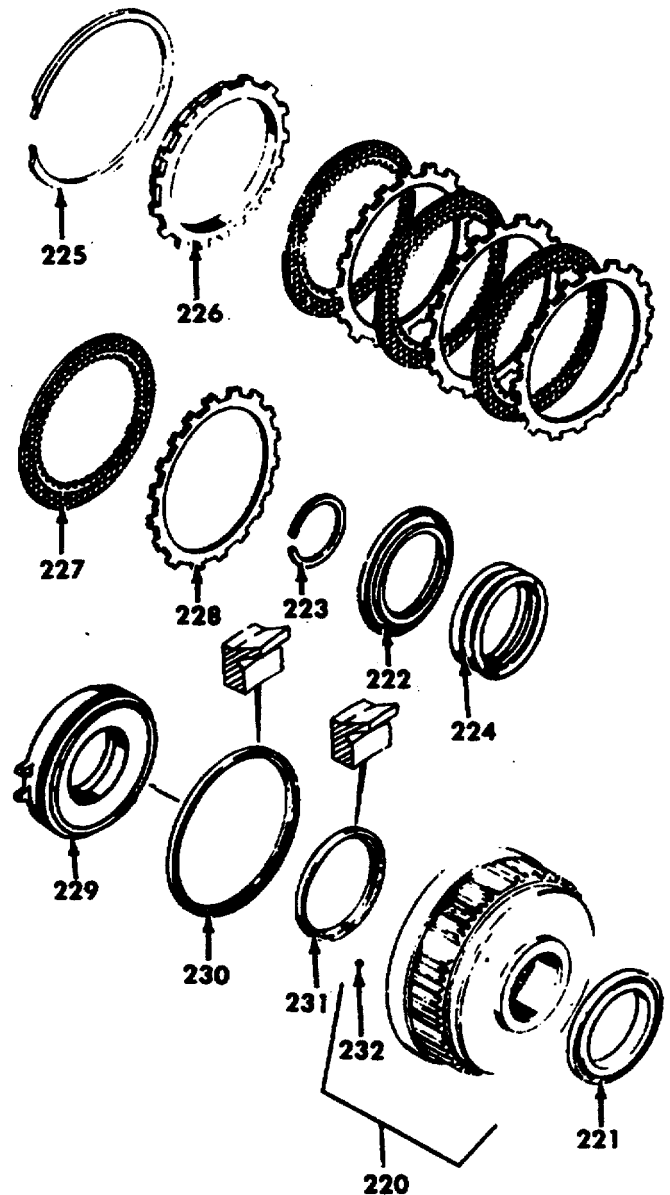
(2) Assembly.

- (a) If balls (232) were removed, replace them. Place each ball in its bore. Stake each bore at three equally spaced places. Each bore is properly staked when the ball has at least 0.040 inch (1.02 mm) axial movement and when the ball is retained by the stakes when a 301b (133 N) load is applied against the ball.
- (b) Before completing the assembly, the clutch clearance must be established. One method is by direct measurement and is outlined in (c) through (g).

**CAUTION**

If either piston sealring (230 or 231) is installed incorrectly, the fourth clutch will not operate properly.

- (c) Position the fourth clutch housing, rear hub downward, on a work table. Lubricate and install the piston sealrings (230 and 231) into their grooves in the housing hub and piston. Make sure the sealring lips face toward the oil pressure side of the piston.
- (d) Install the piston (229) into the fourth clutch housing. Alternately install the four external-tanged plates (228) and four internal-splined plates (227). Install the backplate (226) and retain it with the snaprings (225).



- (e) Using fourth clutch clearance gauge, check the clearance between the backplate and the first internal-splined plate. The prescribed clearance for the fourth clutch is 0.064-0.125 inch (1.625-3.175 mm). When this clearance is achieved, the first step of the gauge will fit between the backplate (226) and the clutch plate; the second step will not.
- (f) If the clearance is excessive (second step of gauge fits), replace the thinner clutch plates with new plates. If the

**6-15. TRANSMISSION REPAIR (Continued).**

clearance is still excessive after all eight plates and the backplate have been replaced, a thicker piston (229) is required.

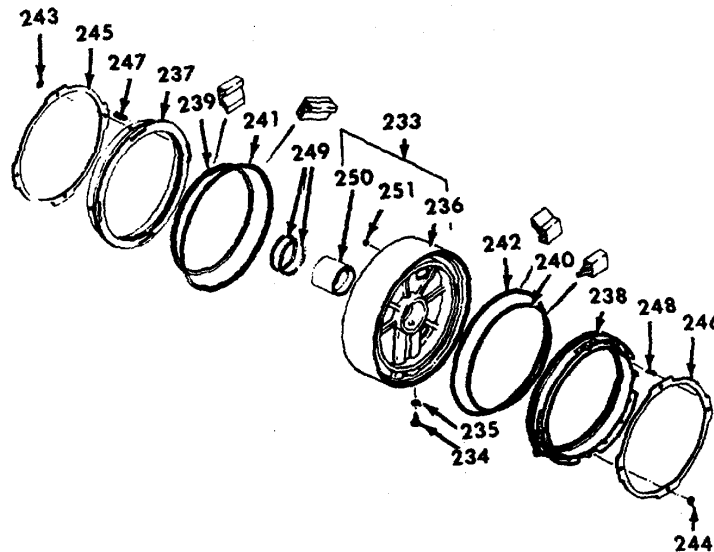
- (g) If the clearance is insufficient (first step of gauge will not fit), a thinner piston (229) is required.
- (h) Install the piston return spring (224) and spring retainer (222). Using compressor tool and compressor base, depress the spring retainer (222). Install the snapping (223) to retain the spring retainer (222).
- (i) Install the bearing race (221) outer lip first, onto the rear hub of the clutch housing. Use oil-soluble grease (Appendix D, Item 21) to retain the races during subsequent assembly.

**g. Center support assembly repair.**

**(1) Disassembly.**

(a) Place center support assembly (233) vertically (upright), on the work table.

- (e) If parts replacement is necessary, disassemble the two piston assemblies. Cut the self-locking retainer rings (243 and 244) to prevent damaging the piston projections. Remove four self locking retainer rings (243 and 244), a retainer (245 or 246) and twenty springs (247 or 248) from each piston (237 or 238).
- (f) Remove two sealrings (249) from the hub of the center support assembly.
- (g) If the bushing (250) in the center support is worn or damaged, collapse the bushing (250) inward at the bushings splitline and remove.
- (h) Remove the ball (251) freed by removing the bushing (250) from the hub of the support (236).
- (i) Determine the serviceability of the sealring grooves on the center support hub. Insert, do not force, gauge into the groove on the center support hub. Rotate the gauge 360 degrees around the hub. If the gauge does not rotate freely, the support is damaged and should be replaced.



- (b) Remove oil filter (234) and sealring (235) from center support (236).
- (c) Remove pistons (237 and 238) with attached parts.
- (d) Remove the inner sealrings (239 and 240) and outer sealrings (241 and 242) from each piston.



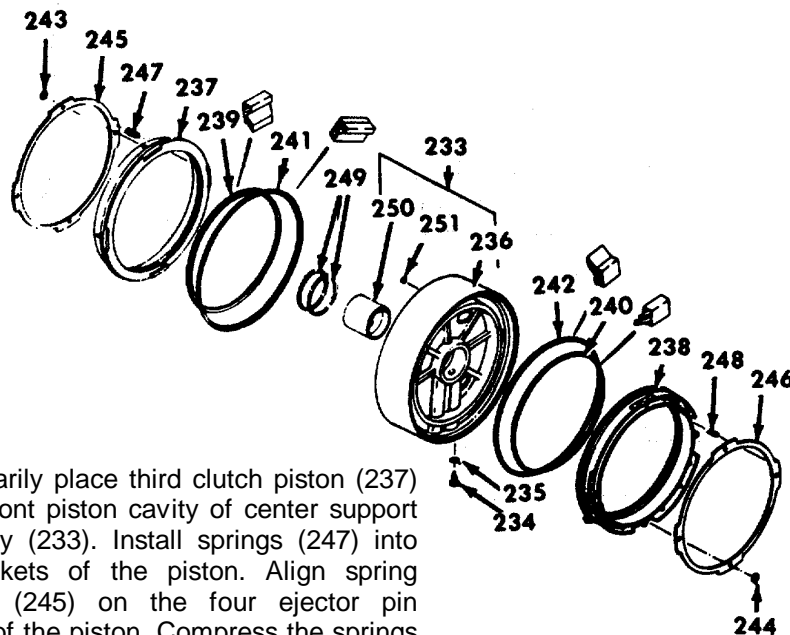
6-15. TRANSMISSION REPAIR (Continued).

(2) Assembly.

- (a) If the bushing (250) and ball (251) were removed from the center support, install new parts.
- (b) Install the ball (251) and bushing (250). Use center support bushing installer to press the bushing into the center support. The bushing is prebored and requires no reaming.

ton. Compress the springs by forcing the retainer (246) into the recess at the outer edge of the center support. Install new selflocking retainer rings (244) on the ejector pins of the piston, using lockring installer. Remove the piston (238) from the center support (233).

- (e) Grease (with oil-soluble grease, Appendix D, Item 2 1) and install inner sealrings (239 and 240) and outer sealrings (241 and 242) onto pistons (237 and 238). The lips of all the sealrings must be toward the piston cavities of the center support.



- (c) Temporarily place third clutch piston (237) in the front piston cavity of center support assembly (233). Install springs (247) into the pockets of the piston. Align spring retainer (245) on the four ejector pin bosses of the piston. Compress the springs by forcing the retainer into the recess at the outer edge of the center support. Install new self-locking retainer rings (243) on the ejector pins of the piston, using lockring installer. Remove the piston (237) from the center support (233).

**NOTE**

**If the pistons are not installed to the bottom of their cavities during installation of self-locking retainer rings (243 and 244) proper clutch clearance cannot be established.**

- (d) Temporarily place second clutch piston (238) into the rear cavity of center support assembly (233). Install springs (248) into the pockets of the piston (238). Align spring retainer (246) on the four ejector pin bosses of the pis-

- (f) Inspect the piston cavities in center support assembly (236) for any obstruction or foreign material. Install piston (238) into the rear of the center support, engaging the lug on the piston with the recess in the support. Be sure the lips of both the inner sealring (240) and outer sealring (242) face the bottom of the piston cavity. Leave the assembled third clutch piston (237) out of the center support until final installation of the center support assembly.

6-15. TRANSMISSION REPAIR (Continued).

- (g) If oil filter (234) and sealring (235) were removed, install new ones. Install the new filter and sealring closed end of the cone first into the center support. Be sure the sealring on the filter seats against the shoulder in the support.

- (b) Remove the front sun gear (253). Remove the thrust washer (254) from the gear.
- (c) Lift off the front planetary carrier assembly (255). Remove the thrustwasher (256) from the assembly.

**NOTE**

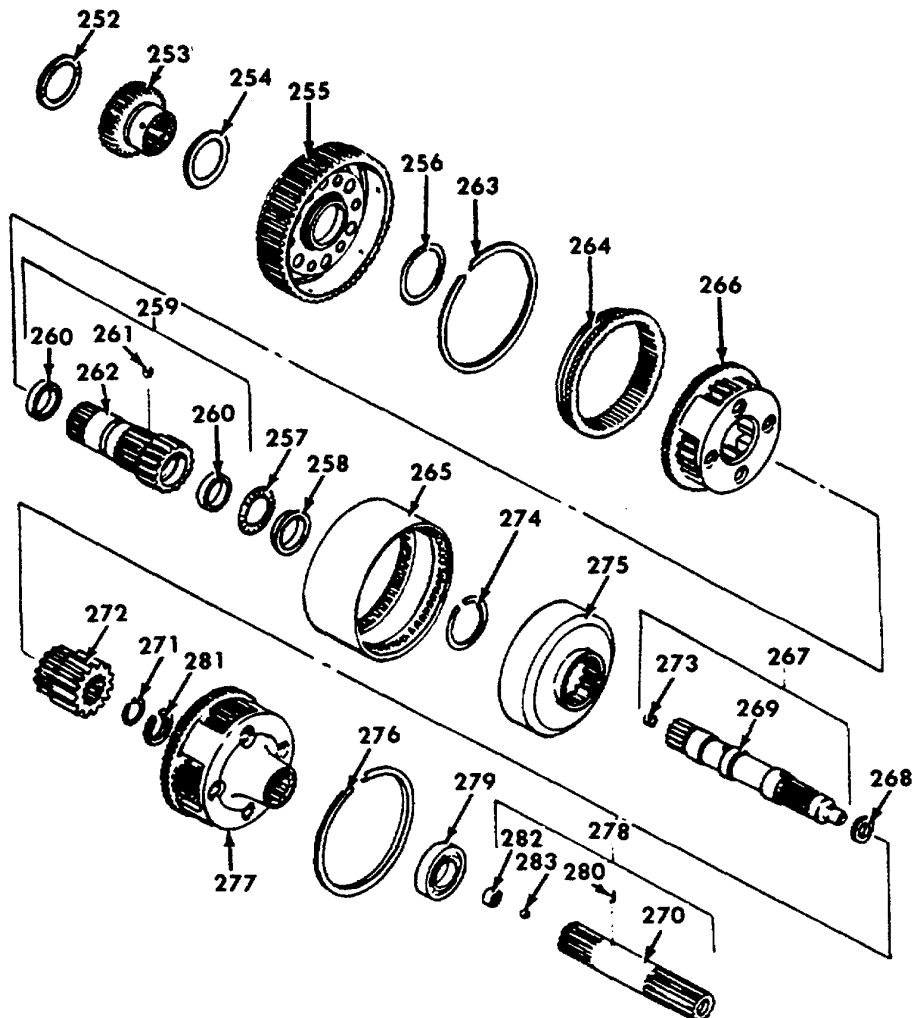
**Center support sealrings (249) must not be installed onto the support hub until final assembly of the transmission.**

**NOTE**

**Bearing assembly (257) and bearing race (258) may come out when sun gear shaft assembly (259) is removed.**

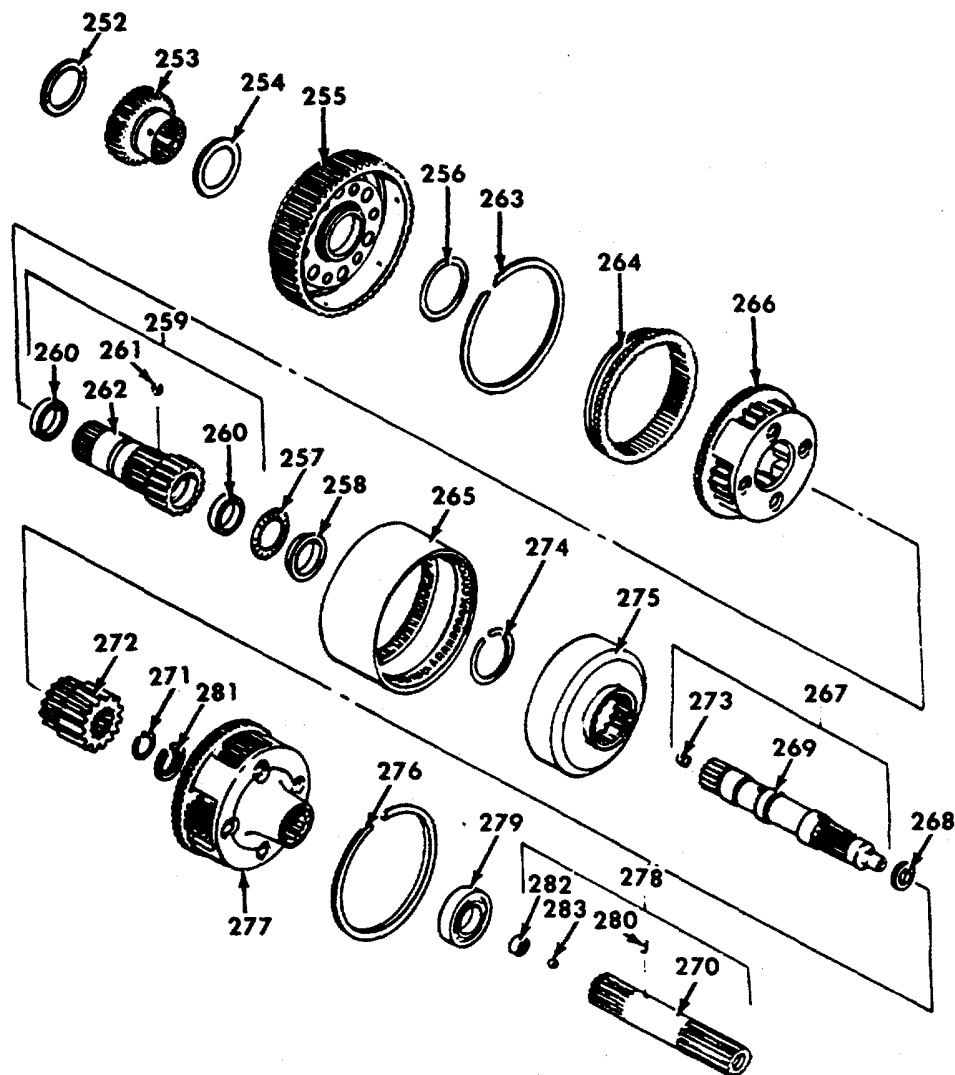
- h. *Gear unit and main shaft assembly repair.*
  - (1) *Disassembly.*
    - (a) Remove the thrust washer (252) from the front of the gear unit.

- (d) Remove the center sun gear shaft assembly (259). If parts replacement is necessary, remove bushings (260) and spring pins (261) from shaft (262).
- (e) Remove bearing assembly (257) and bearing (258).



6-15. TRANSMISSION REPAIR (Continued).

- (f) Remove the snapping (263) that retains the front planetary ring gear (264). Remove the ring gear (264) from the planetary connecting drum (265).
- (g) Lift out the center planetary carrier assembly (266).
- (h) Remove the main shaft (267) and its attached parts, from the planetary connecting drum (265).
- (i) Remove thrust washer (268) from shaft (269) or from the front of shaft (270).
- (j) Remove the spiral snapping (271) that retains the rear planetary sun gear (272) on the main shaft (269).
- (k) Remove snapping (274) from rear planetary sun gear (272). Remove gear (272) from center planetary ring gear (275).
- (l) Position the remaining assembly so that the planetary connecting drum (265) is downward, and remove the snapping (276) that retains the rear planetary carrier assembly (277). Lift the carrier assembly, and output shaft, out of the drum.
- (m) Tap output shaft assembly (278) forward, toward carrier assembly (277), until ball bearing (279) is lightly pinched between spring pin (280) and carrier assembly (277).



**6-15. TRANSMISSION REPAIR (Continued).**

- (n) Working through the front of carrier assembly (277), remove snapping (281). Tap the shaft assembly (278) rearward, and remove it from the carrier assembly.
- (o) Press the shaft assembly (278) from ball bearing (279).
- (p) Remove spring pin (280), needle roller bearing (282), and cup plug (283) from shaft (270) only if parts replacement is necessary.

**CAUTION**

**Do not disassemble carrier assembly unless parts replacement is necessary. Failure of one pinion requires replacement of the entire pinion gear set because they are selectively matched.**

(2) *Planetary carrier repair.*

**NOTE**

**Complete replacement of the assembly may be warranted, depending on the amount of labor, time, parts replacement and extent of repair.**

**NOTE**

**The procedures for all planetary carrier assemblies differ only in the proper tool selection for the specific application. The special tool chart details the tool number required for a specific application and identifies the carrier involved (front, center and rear). If the tool is common to all of the planetary carrier assemblies, its number will not be listed in the test. If the tool is not common, the test will refer to the chart.**

- (a) Visually inspect planetary carrier assembly for evidence of excessive wear, overheat indication, damage or heavy metal contamination.
- (b) Check end play of planetary carrier pinions. With washer held flat, insert feeler gauge between carrier and thrust washer. End play must be within 0.008-0.031 inch (0.20-0.79 mm).

- (c) Fabricate six dummy pins (284) for front carrier which are 0.5117/0.5114 inch (12.99/12.98 mm) diameter by 2.50 inch (63.5 mm) long.
- (d) Place the front carrier on a work table, rear downward.
- (e) Press the bushing (284) (front carrier only) from the carrier. Do not scratch or score the bushing bore.
- (f) Place the carrier in a press, rear downward.
- (g) Apply loctite (Appendix D, Item 27) to the outer diameter of a new bushing (285). Using bushing installer tool, install the new bushing into the bore of the front planetary carrier. Press the bushing 0.265-0.275 inch (6.73-6.99 mm) below its adjacent surface.

*SPECIAL TOOL CHART*

**NOTE: All tools have a basic number (J-25587) and a suffix. Only the suffix is shown below. The figures in parentheses are quantities required.**

PLANETARY CARRIER ASSEMBLY	SUPPORT BLOCK	PIN REMOVER	PIN REMOVER & INSTALLER ADAPTER	PIN REMOVER & INSTALLER SPACER	LOADING PIN	GUIDE PIN	INSTALLER	SWAGING TOOL HOLDER	SWAGING TOOL
FRONT	-4	-16			-22 (6)	-50 (6)	-13	-17	-27 (2)
CENTER	-4	-16			-18 (4)	-48 (4)	-11	-17	-23 (2)
REAR	-3	-16	-2	-6	-18 (4)	-48 (4)	-12	-17	-23 (2)

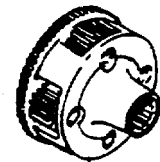
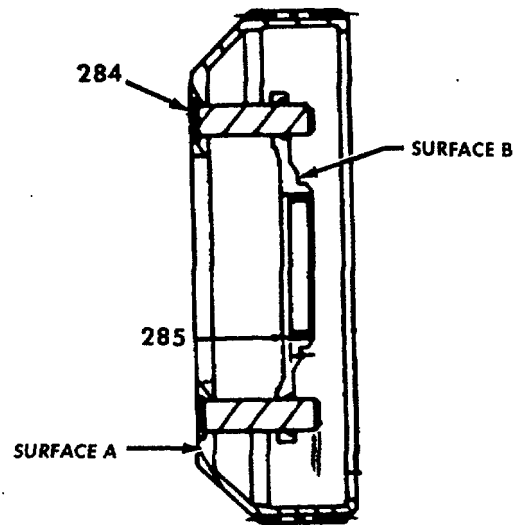
6-15. TRANSMISSION REPAIR (Continued).

- (h) Using a lathe with a four jaw chuck, mount the carrier with surface A facing the chuck. Insert the six fabricated dummy pins (284) into the pinion pin holes. Adjust the chuck, centering the carrier based on surface B and the runout of the dummy pins (284).
- (i) Total runout of the bushing (285) after boring must not exceed 0.002 inch (0.05 mm).

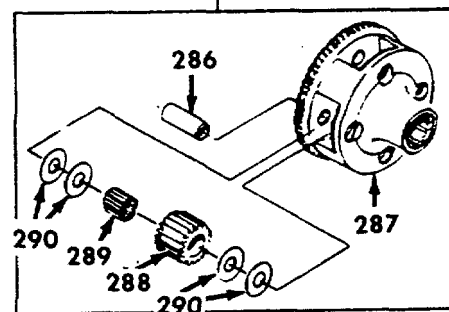
**NOTE**

The hydraulic press, used with planetary rebuilding set, should have a ten ton (9000 kg) capacity, an adjustable press bed of 25 inches (64 cm) minimum opening and a pressure gauge to assist in determining proper installation and staking of the pinion pins.

- (j) Using a drill that is slightly smaller than the pinion pin (286) diameter, drill into the swaged ends of the pins (only one end required). Do not drill into the carrier. The rear ends of all pinion pins except those in the center carrier assembly will be drilled. Drill the front ends of the center assembly pins.
- (k) Place press fixture in a hydraulic press. Select the proper spacer and adapter, if required, from the special tool chart. Position these parts (if used) to support the carrier assembly (drilled ends of pinion pins upward) solidly on the press fixture.
- (l) Install pin remover into the ram of the press fixture. Press the pinion pins (286) from the carrier assembly (287).
- (m) Remove the pinion groups, consisting of pinions (288), bearings (289) and thrust washers (290).
- (n) Lubricate needle rollers (289) and thrust washers (290) with oil-soluble grease (Appendix D, Item 21) before assembling the pinion groups. Assemble all of the pinion groups for the carrier assembly (287). Each group is assembled by inserting the proper loading pin into the



TYPICAL PLANETARY CARRIER



bore of the pinion, installing the needle roller bearings around the loading pin, installing a steel thrust washer at each end of the pinion, and installing a bronze thrust washer onto each steel thrust washer.

- (o) Position the carrier assembly (287) rear end upward (except the center carrier). Install all pinion groups into the planetary carrier, aligning the loading pins with the pin bores in the carrier.

**6-15 TRANSMISSION REPAIR (Continued)**

- (p) Install the proper pinion guide pins, larger diameters first, into the pinion pin bores. Push the guide pins through the carrier until the loading pins drop out.
- (q) Position the carrier assembly on the press fixture, using the proper pin remover and installed adapter (if required).

**NOTE**

**Pin installers are shaped to avoid interference with bosses on the carrier assemblies. They must be installed in the ram so the cutaway portion of the installer will clear the bosses when the pinion pin (286) is pressed in.**

- (r) Select the proper pin installer, and install it into the press fixture ram.

**CAUTION**

**Do not put pressure on the carrier. Distortion of the carrier will damage it.**

- (s) Place a pinion pin (286) on the pilot end of the pin guide located below the press fixture ram. Press the pinion pin into the carrier until the installer contacts the carrier.
- (t) Install the remaining pinion pins (286).

- (u) Remove the carrier assembly from the press fixture. Install swaging tool holder into the opening of the press fixture bed. Install a swaging tool into the holder. Install another swaging tool into the press fixture ram. Lubricate both ends of the pinion pins with oil-soluble grease (Appendix D, Item 21).
- (v) Position the carrier assembly, rear end upward (except the center carrier) on the press fixture. Use the proper support block to level the carrier while the lower swaging tool is supporting the lower end of the one pinion pin.

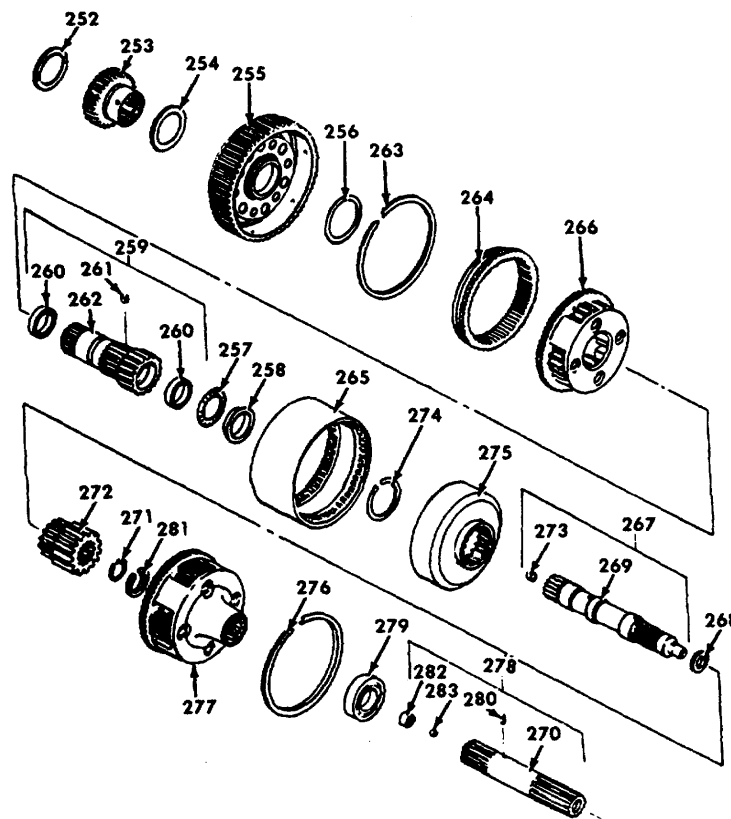
**NOTE**

**Swaging pressure varies with the size of the pinion pins (approximately two tons for front carriers; three tons for center and rear carriers). While applying pressure, rotate the pinions and feel for reduction of end play. The pinions must rotate freely and have 0.008-0.031 inch (0.20-0.79 mm) minimum end play after swaging the pins.**

6.15 TRANSMISSION REPAIR (Continued)

(3) Assembly.

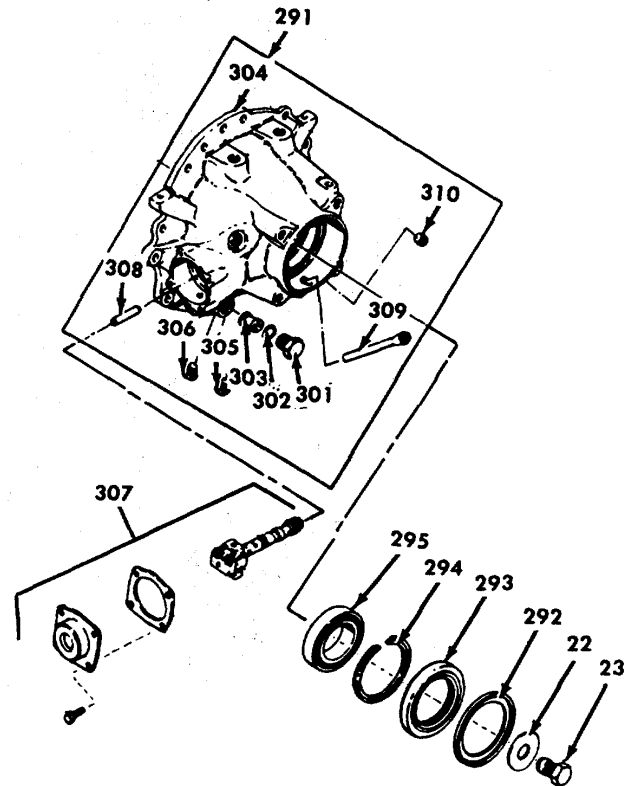
- (a) If cup plug (283) was removed from shaft (270), install a new plug. Place the plug on the end of main and output shaft orifice installer. Install the plug into the output shaft just below the chamber.
- (b) If bearing (282) was removed from shaft (270), install a new bearing. Place bearing (282) on output shaft bearing installer, numbered end of bearing facing the tool. Attach driver handle to the installer. Install the bearing into the output shaft 0.370 inch (9.398 mm) below the face of the shaft.
- (c) If spring pin (280) was removed from shaft (270), install a new pin. Press the pin into the shaft until the pin's outer end is 0.150 to 0.170 inch (3.81 to 4.32 mm) from the shaft surface adjacent to the pin.
- (d) If lubrication orifice plug (273) was removed from main shaft (269), install a new one. Place the orifice plug on the main and output shaft orifice installer. Install the new orifice plug into the main shaft. If the installer is not available, press the plug into the shaft until it is recessed 0.140 to 0.180 inch (3.56 to 4.57 mm) below the front end of the shaft.
- (e) Install ball bearing (279) onto the front of output shaft assembly (278). Position the bearing against spring pin.
- (f) Install shaft assembly (278) with bearing (279), front end first, into the rear of rear planetary carrier assembly (277). Tap the shaft until bearing (279) contacts the carrier's rear hub.



6-15 TRANSMISSION REPAIR (Continued)

- (g) Install snapping (281) to retain the shaft. Press the shaft rearward until the snapping is seated firmly in the carrier's counter bore.
- (h) Position the planetary connecting drum (265) front (long internal splines) downward, and install the rear planetary carrier assembly and output shaft. Install the snapping (276) that retains the rear planetary carrier assembly (277).
- (i) Install rear planetary sun gear (272) into the rear of center planetary ring gear (275). Retain the sun gear with snapping (274).
- (m) Install main shaft assembly (267), rear first, into the front of rear planetary sun gear (272). Retain the shaft assembly by installing the spiral snapping (271).
- (k) Coat thrust washer (268) with oil soluble grease (Appendix D, Item 21) and install it onto the rear of the main shaft (267).
- (l) Install the main shaft, and its attached parts, into the planetary connecting drum (265). The main shaft must seat against the thrust washer that seats against the output shaft.
- (m) Coat both the bearing race (258) and needle bearing assembly (257) with oil-soluble grease (Appendix D, Item 21). Install the race (258) inner lip upward. Install the needle bearing assembly (257) onto the race (258).
- (n) Install the center planetary carrier assembly (266), pinions first, into the center planetary ring gear (275) and planetary connecting drum (265). Install the front planetary ring gear (264) outer splines first. Retain the ring gear with a snapping (263).
- (o) Install the center sun gear shaft assembly (259) larger diameter first. The shaft must seat on needle bearing assembly (257).

- (p) Coat the thrust washer (256) with oil-soluble grease (Appendix D, Item 21) and install it onto the rear hub of the front planetary carrier assembly (255). Install the carrier assembly (255).
- (q) Coat the thrust washer (254) with oil-soluble grease (Appendix D, Item 21) and install it onto the rear of the front sun gear. Install the front sun gear (253), indexing the missing internal spline teeth location with the spring pins in the center sun gear shaft assembly (259).
- (r) Coat the front thrust washer (252) with oil-soluble grease (Appendix D, Item 21) and install it onto the center sun gear shaft.
- i. *Rear cover repair.*
  - (1) Disassembly.
    - (a) Place the rear cover assembly (291) on the work table, front side down.





**6-15 TRANSMISSION REPAIR (Continued)**

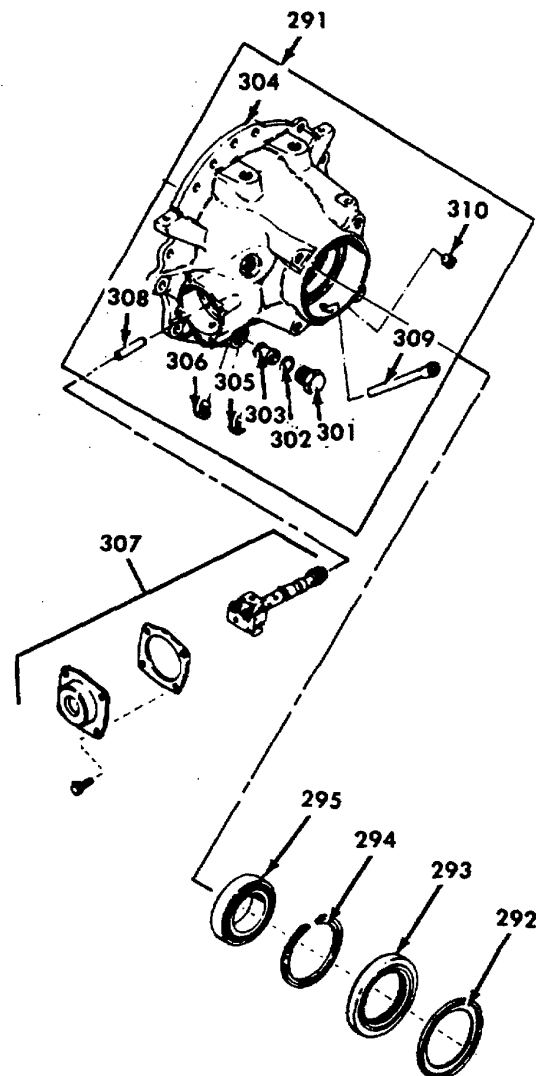
- (b) Using output shaft oil seal and dust shield remover, remove the dust shield (292).
- (c) Using remover again, remove the oil seal (293) from the rear cover (291).
- (d) After removing the beveled snapping (294) that retains the rear output shaft bearing (295) remove the bearing(295). Use a soft drift and drive against the bearing outer race.
- (e) Place first clutch spring compressor on the piston spring retainer (296). Install spring compressor base. Compress the spring retainer (296) and remove the snapping (297). Carefully release the spring compressor and remove it.
- (f) Remove the spring retainer (296) and twenty-six springs (298).
- (g) Remove the clutch piston (299). Re-move the inner sealring (300) and outer sealrings (301) from the piston.
- (h) Remove plug (301), sealring (302), and oil filter (303) from the cover (304). Remove plugs (305) and (306).
- (i) The governor (307) may be disassembled for cleaning and inspection. Do not disassemble the governor unless the kit consisting of two governor weight pins and the cover gasket is available.
- (j) Follow the directions furnished with the kit to disassemble the governor (307).
- (k) If replacement is necessary, remove the governor support pin (308) using governor support pin remover.
- (l) Remove tube (309) and plug (310) only if replacement is necessary.

pin installer to install the governor support pin (308).

**NOTE**

**Accuracy of location and concentricity with the governor bore is of the utmost importance. The pin must be installed 5.886 to 5.896 inch (149.50 to 149.76 mm) from the outside edge of rear cover bore to closest edge of pin.**

- (b) Install drain tube (309) into rear cover. Press rubber tube (309) into cover (304) until it is 0.020-0.150 inch (0.51-3.81 mm) below the surface in the cover.

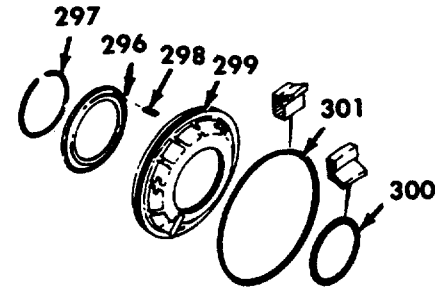


**(2) Assembly**

- (a) If removed, install the governor support pin (308). Use governor support

**6.15 TRANSMISSION REPAIR (Continued)**

- (c) Lubricate sealrings (301 and 300) with transmission fluid (Appendix D, Item38), and install them into the grooves of piston (299). The lips of both seals must be toward the rear of the piston.



**NOTE**

**If installation is difficult, remove the piston and check the seal and cover bore before again attempting installation.**

- (d) Carefully install the piston (299) into the rear cover (304). Use extreme care to prevent the lip of either seal folding back over itself.
- (e) Install one spring (298) into each of twenty-six pockets of the first clutch piston (299). Install the spring retainer(296) cupped side first, onto the springs (298).
- (f) Install spring compressor base and compressor. Compress the springs(298) until the snapping (297) can be installed.
- (g) Install filter (303), sealring (302) into cover (304). Install plugs. Torque plugs(306 and 305) to 4-5 ft-lb (5-7 N.m).Torque plug (310) to 12-16 ft-lb (16-22 N.m). Torque filter plug to 50-70ft-lb (68-95 N.m).
- (h) Assemble the governor (307) as out-lined in the directions furnished with the governor service kit.
- (i) Check the governor port openings as outlined in the kit instructions.

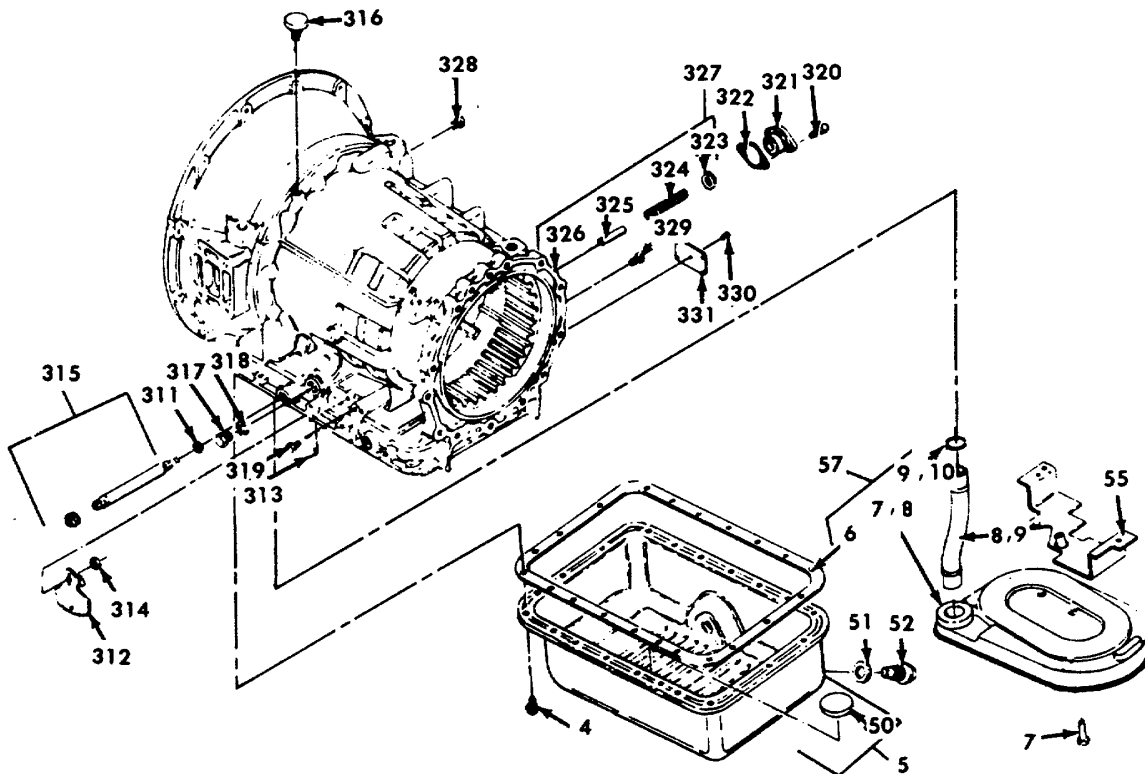
6.15 TRANSMISSION REPAIR (Continued)

j. Transmission housing repair.

(1) Disassembly.

- (a) Remove oil seal (311) from the bore in the housing, using selector shaft seal remover. Screw remover into seal. Hold the remover housing and tighten the remover screw against the shaft, drawing the seal out.
- (b) To remove manual detent lever (312), remove shaft retainer pin (313) and nut (314). Hold the detent lever (312) in one hand, and remove the shaft (315) (file the burred detent lever side of the shaft first), carefully pulling it through the oil seal in the housing. Remove the detent lever (312).
- (c) If replacement of the breather (316) is necessary, use an open end wrench and rotate the breather counterclockwise. Remove the breather (316).

- (d) Remove the 3/4-16 plug (317) and washer (318) and the two 1/8 inch plugs (319) only if necessary for cleaning internal passages.
- (e) Remove two bolts (320) that retain the lubrication valve adapter (321). Remove the adapter (321) and discard the gasket (322).
- (f) Transmission assembly has lubrication regulator valve (323), spring (324) and valve guide tube (325) pressed into housing (326) as an assembly (327). Do not remove this assembly (327) unless parts replacement is necessary. If necessary remove the tube with lube valve spring guide tool. The spring (324) and valve (323) will also come out.
- (g) Remove the 1/8 inch plugs (328 and 329) from the right side of the transmission housing (326).



6.15 TRANSMISSION REPAIR (Continued)

**NOTE**

**All replacement parts orders require information from the nameplate. Therefore it is imperative that the new nameplate (331 ) (if replaced)be stamped with identical information.**

- (h) Remove the drive screw (330) and nameplate (331) only if its replacement is necessary.

(2) *Assembly.*

- (a) If the 1/8 inch plugs (328) and (329)were removed, replace them. Torque the plugs to 4-8 ft-lb (5-11 N.m). If anew nameplate (331) is required, all information on the old plate must be metal stamped into the new plate. In-install the new plate (331) and retain it with a drive screw (330).
- (b) If lubrication valve (323), spring (324)and tube (325) were removed, install new parts. Assemble valve (323) and spring (324) onto tube (325), respectively. Install the assembly (327) into its bore in housing (326). Press the valve tube (325) into its bore until it is 0.58 inch (14.7 mm) below the external surface of the adapter mounting boss. Utilization of lube valve spring guide tool simplifies the installation of the lube valve assembly (327). Install a new gasket (322) onto the valve adapter (321). Install the adapter into the bore. Retain the adapter (321) with two new 1/4-20x7/8 inch socket-head bolts (320). Use bolts (320) only one time. Torque the bolts to 12-15 ft-lb (16-20N.m).
- (c) If plug (317) and washer (318) or the two 1/8 inch plugs (319) were removed, replace them. Torque the 3/4-16 plug (317) to 50-60 ft-lb (68-81 N.m). Torque the two 1/8 inch plugs (319) to 4-8 ft-lb (5-11 N.m).

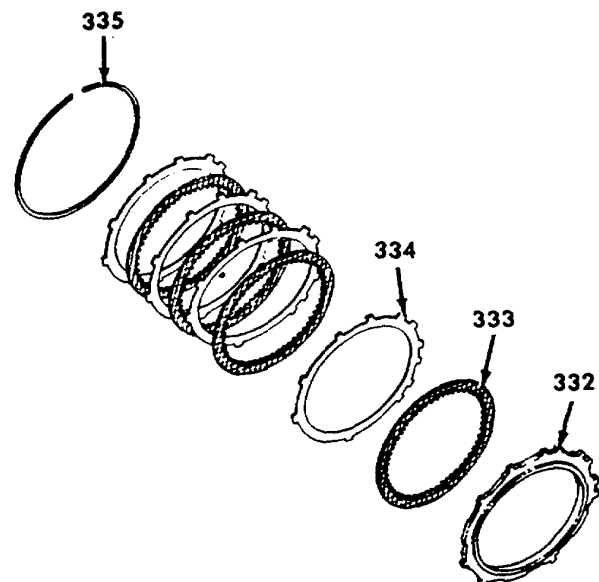
- (d)Place the selector shaft oil seal (311) sealing lip away from tool onto selector

shaft seal installer. Install the seal(311) into the housing bore. Lubricate the inner bore of the seal. Selector shaft seal installer permits installation of the oil seal with or without the selector shaft (315) installed.

- (e) Guide the grooved end of selector shaft (315) through seal (311) after removing burrs from the shaft to protect the oil seal. Position detent lever (312) so that the selector valve pin extends toward the inside of the housing, and engage the slot in the detent lever with flats on the selector shaft. Install nut (314) and retainer pin (313) to retain the shaft and lever. Torque the nut (314) to 15-20 ft-lb (20-27 N.m)
- (f) If the breather (316) was removed, in-stall a new breather. Tighten the breather sufficiently, using care not to distort or crush the breather stem.

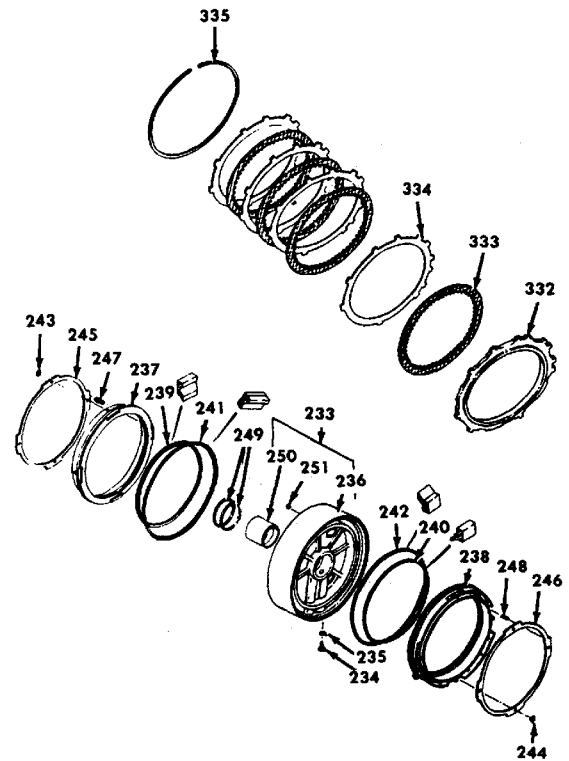
**ASSEMBLY**

- a. Clutches, center support, planetary gearing and rear cover assembly.
  - (1) Selecting center support snapping.
    - (a) Position the transmission housing, converter end up. Install second clutch backplate (332).



**6.15 TRANSMISSION REPAIR (Continued)**

- (b) Beginning with an internal-splined clutch plate, alternately install three internal-splined (333) and three external-tanged (334) clutch plates into the transmission housing. Retain the plates with snapping (335).
- (c) Remove third clutch piston (237) from center support assembly (233). Attach center support lifter into the recess between the sealing grooves on the support hub.



- (d) Align the tapped hole in the support(233) with the anchor hole in the transmission housing. Carefully lower the support into the housing, seating it firmly against the second clutch retaining snapping. Remove the lifting bracket from the support. Retain the support by installing the original 3/8-16x2-1/4 inch self locking anchor bolt and washer. Tighten the bolt finger tight.

- (e) Install compressor base over the hub of the center support (233). Install compressor bar and center bolt (tool), retaining the bar to the transmission with two 3/9-16x1-1/4 inch bolts. Compress the support by applying a torque of 5 ft-lb to center bolt (tool).

- (f) Using center support snapping gauge, measure the clearance between the top edge of the center support and the top of the snapping groove in the housing. Select the proper snapping, using the following table.

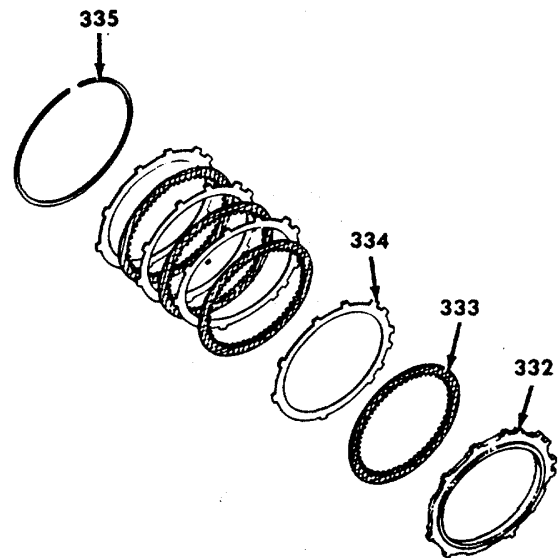
<u>Measured Clearance</u> in. (mm)	<u>Snapping Thickness</u> in. (mm)	<u>Snapping Color</u>
0.150-0.154 (3.81)-(3.91)	0.148-0.150 (3.76)-(3.81)	White
0.154-0.157 (3.91)-(3.99)	0.152-0.154 (3.86)-(3.91)	Yellow
0.157-0.160 (3.99)-(4.06)	0.155-0.157 (3.94)-(3.99)	Green
0.160-0.164 (4.06)-(4.17)	0.158-0.160 (4.01)-(4.06)	Red

**6.15 TRANSMISSION REPAIR (Continued)**

(g) Install the selected snapping and remove the compressor from the transmission.

(2) *Second clutch clearance.*

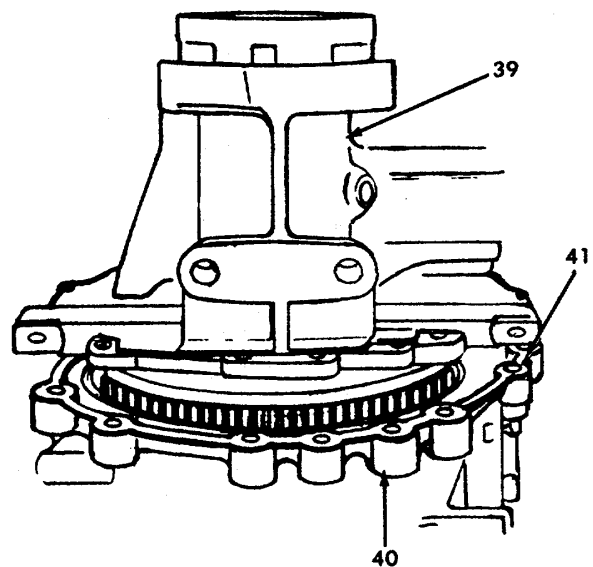
- (a) Invert the transmission housing, output end upward.
- (b) Using second clutch gauge, check the second clutch plate clearance. Insert the gauge between the backplate (332) and the transmission housing. The pre-scribed clearance is 0.049-0.111 inch (1.24-2.82 mm). When this clearance is achieved, the first step of the gauge will fit between the backplate and the transmission housing; the second step will not.
- (c) If the clearance is not satisfactory, measure the total plate thickness, and replace all plates necessary to satisfy the prescribed clearance. If required the backplate (332) may be replaced by a thicker or thinner plate.



(3) *Rear cover installation.*

- (a) Place the rear cover gasket (41) on the transmission housing, aligning the holes in the gasket with those in the housing.
- (b) Install the rear cover assembly (39), onto the transmission housing (40).
- (c) Install fourteen 1/2-13x1-1/2 inch bolts and washers to retain the rear cover assembly (39). Torque two bolts that are 180 degrees apart to 33 ft-lb (45 N.m). Move approximately 90 degrees around the bolt circle and re-peat the operation. Torque the remaining bolts at 180 degree increments to 33 ft-lb (45 N.m). Repeat the entire process and torque the fourteen bolts to 67-80 ft-lb (91-108 N.m).

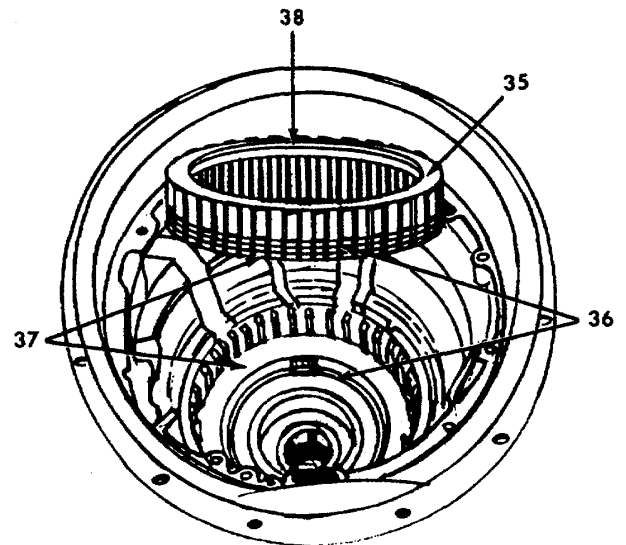
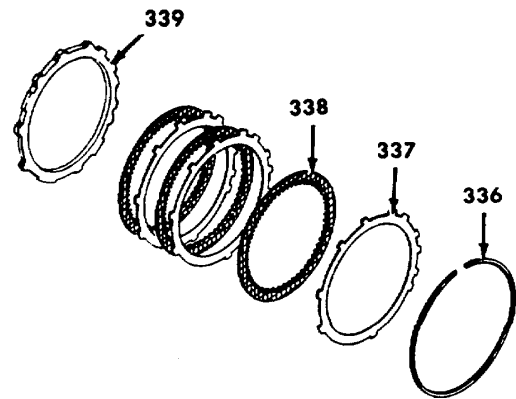
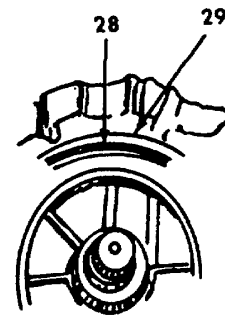
(a)



6.15 TRANSMISSION REPAIR (Continued)

(4) *First clutch clearance.*

- (a) Invert the transmission, front side up.
- (b) Remove the selected snapping (30) that retains the center support (29). Remove the center support anchor bolt and washer. Attach center support lifter to the, hub of the support. Remove the center support from the transmission. Remove the lifting bracket from the center support (29).
- (c) Remove the first clutch retaining snapping (336). Remove the six second clutch plates (337 and 338) and the backplate (339) from the transmission housing. Retain the second clutch plates in a pack. Do not intermix with other plates.
- (d) Install one external-tanged (337), one internal-splined (338) and one external-tanged (337) first clutch plates into the transmission housing.
- (e) Place the rear planetary ring gear (38) (extended tooth side down) on the worktable. Beginning with an internal-splined clutch plate (36), install five internal-splined (36) and four external-tanged (37) clutch plates and the back-plate (35) (flat side first) onto the ring gear (38). Install the ring gear (38) and plates as an assembly into the transmission housing.
- (f) Retain the first clutch plate pack with a snapping.
- (g) Using first clutch clearance gauge, check the clearance between the snapping and backplate (35). The prescribed clearance for the first clutch is 0.074-0.147 inch (1.88-3.73 mm). When this clearance is achieved, the first step of the gauge will fit between the snapping and backplate; the second step will not.
- (h) If the clearance is not satisfactory, measure the total plate thickness, and replace all plates necessary to satisfy



the prescribed clearance. If required, the back plate (35) may be replaced by a thicker or thinner plate (35).

6-15 TRANSMISSION REPAIR (Continued)

(5) Gear unit assembly installation.

- (a) Attach gear unit lifter behind the splines of the main shaft (32).



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 a hoist, carefully lower the gear unit (33) into the transmission housing. Engage the pinions of the rear planetary carrier assembly with the teeth of the rear planetary ring gear.

(6) Second clutch installation.

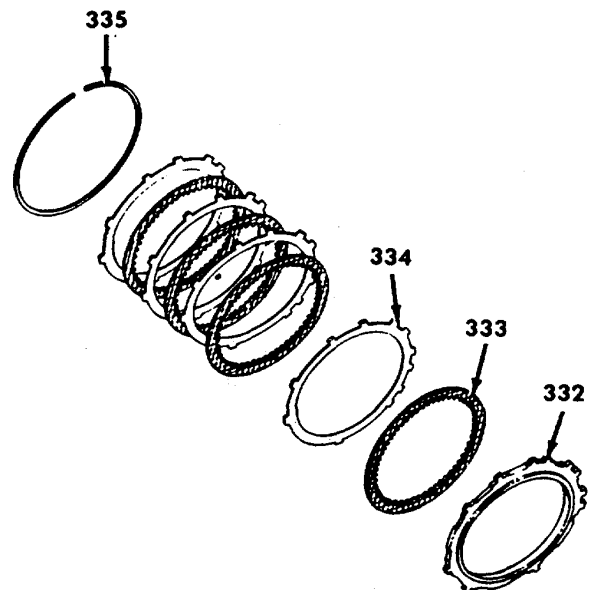
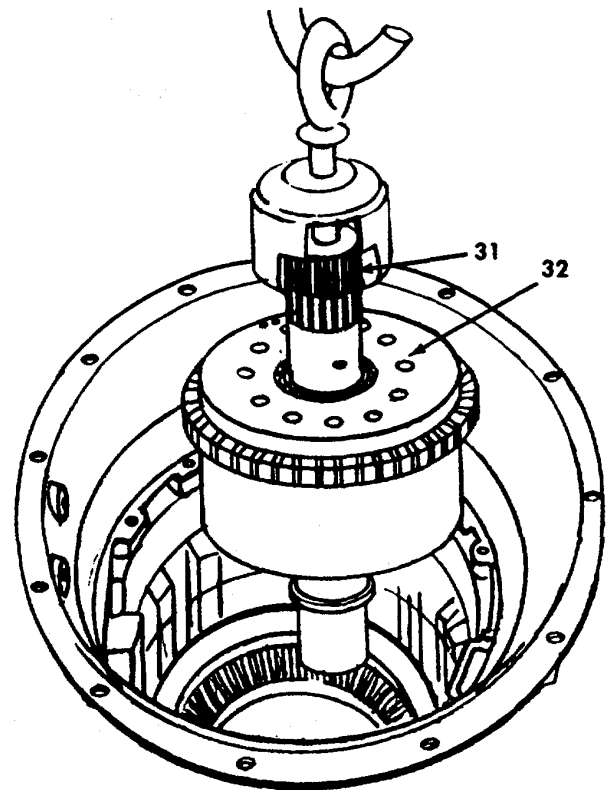
**NOTE**

Prior to installation of the second clutch, be sure the clutch pack satisfies the required clearance.

- (a) Install the second clutch plate pack into the transmission. Install second clutch backplate (332). Beginning with an internal splined plate (333) alternately install three plates (333) and three plates (334).
- (b) Install the snapping (335) to retain the second clutch. Place the snapping (335) gaps at the top of the main case. Be sure the thrust washer is in place on the front sun gear.

(7) Center support installation.

- (a) Install the third clutch piston into the center support. Use care to ensure that the piston sealings are not pinched nor distorted when the piston is installed.
- (b) Attach center support lifter into the recess between the sealring grooves on the support hub.





**6.15 TRANSMISSION REPAIR (Continued)**

- (c) Align the tapped hole in the support with the anchor bolt hole in the transmission housing. Install the center sup-port (30) and seat it firmly against the second clutch snapping.
- (d) Remove the lifter from the center sup-port. Start a new 3/8-16x3 inch special selflocking bolt and chamfered washer into the center support assembly.
- (e) Install the snapping (29) to retain the center support (28). Place the snapping gaps at the top of the main case. Torque the center support anchor bolt to 39-46 ft-lb (53-62 N.m).

**CAUTION**

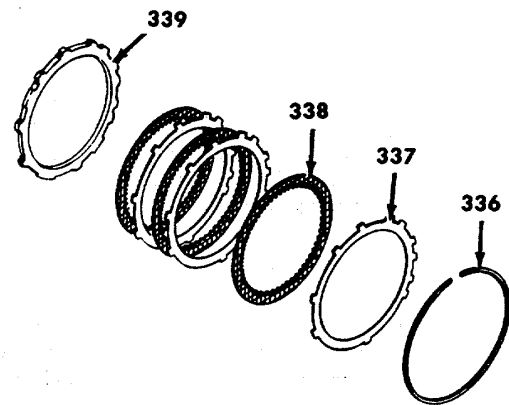
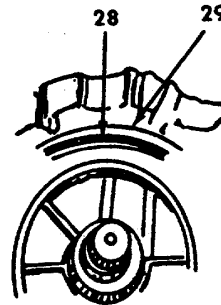
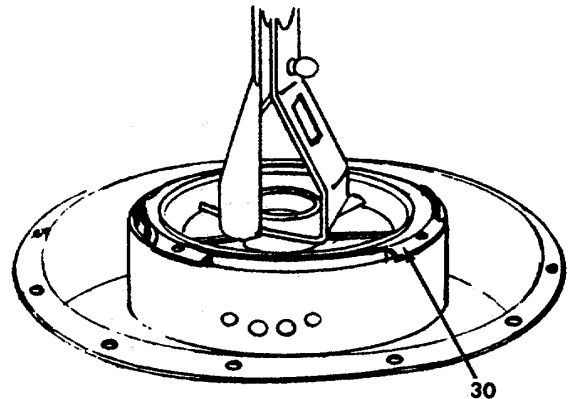
**Improper installation of butt-joint sealrings may cause transmission failure.**

- (f) Install needle roller thrust bearing race assembly, lube relief scallops, black oxide race up, onto the center support hub. Install two sealrings onto the hub.

**(8) Third clutch clearance.**

- (a) Starting with an external-tanged plate(337), alternately install the three external-tanged plates (337) and three internal-splined plates (338). Note location of the three set of double tangs. If the tangs are not positioned properly, movement of the stationary plates will occur.
- (b) Install the backplate (339) and retain it with the snapping (336). Using third clutch clearance gauge, check the clearance between the snapping (336) and backplate (339). The prescribed clearance for the third clutch is 0.050 to 0.114inch (1.27 to 2.90mm). When this clearance is achieved, the first step of the gauge will fit between the snapping and the backplate; the second step will not.
- (c) If the clearance is not satisfactory, measure the total plate thickness and replace all plates necessary to satisfy the prescribed clearance. If required, the backplate (339) may be replaced by a thicker or thinner plate.

(d)



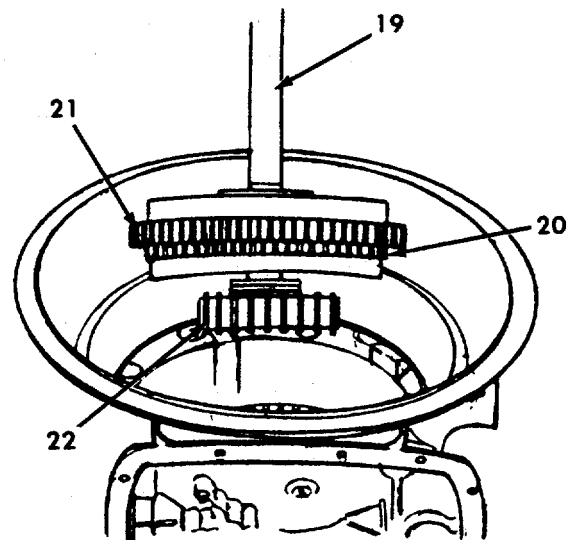
**6-15 TRANSMISSION REPAIR (Continued)**

*(9) Clutch spline alignment.*

Align the internal splines of the third clutch plates to the external splines on the fourth clutch housing. Grasp the fourth clutch assembly by the spring retainer and install it onto the center support hub.

*(10) Forward clutch and turbine shaft.*

- (a) Align the internal-splined plates of the fourth clutch, and direct air into the fourth clutch apply port. The air will apply the fourth clutch and prevent movement of the clutch during installation of the forward clutch assembly.
- (b) Be sure thrust bearing race assembly is in place, black oxide race (lube scallops) facing down on the fourth clutch housing hub (22).
- (c) Install the forward clutch assembly (20) while engaging the fourth clutch hub (22) within the internal-splined plates of the fourth clutch. When the forward clutch assembly (20) is properly seated, the front surface of the forward clutch housing will be approximately 1/2 inch (12.7 mm) behind the forward edge of the PTO opening. Another check is to apply air in short bursts to the fourth clutch and watch the forward clutch assembly for an up and down movement. If the assembly does not move, it is properly seated.



*b. Oil pump and front support installation.*

- (1) Install the front support gasket. Be sure the two hook type sealrings at the base of the turbine shaft are held in place with oil-soluble grease (Appendix D, Item 21).



**Improper installation of butt-joint sealrings may cause transmission failure.**

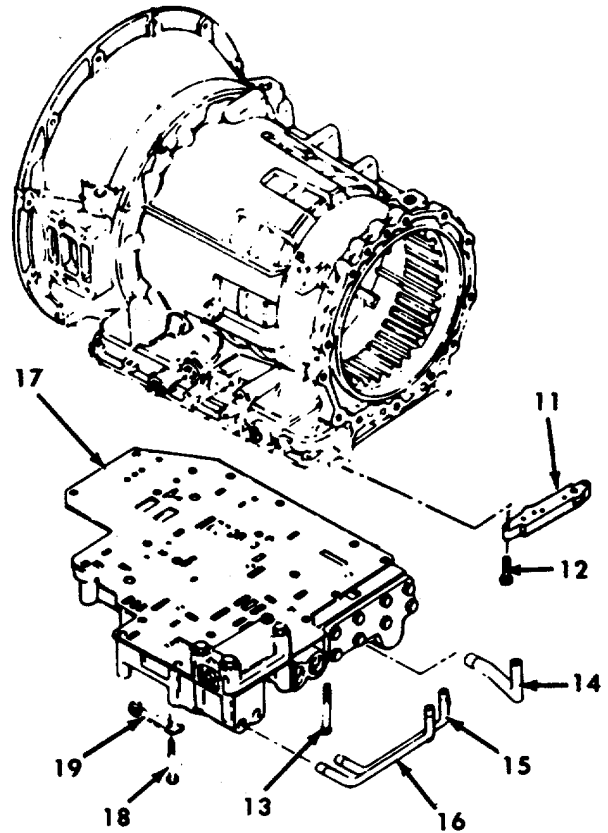
- (2) Install thrust bearing race assembly onto the hub of support assembly black oxide

race (lube scallops) up. Install two butt-joint sealrings onto the hub. Retain the bearing and sealrings with oil-soluble grease (Appendix D, Item 21).

- (3) Lubricate sealring with oil-soluble grease (Appendix D, Item 21) and install it onto support assembly. Install two 3/8-16x6inch headless guide screws into the transmission housing. Attach front support lifter to the converter ground sleeve. Align all the holes in the front support with the corresponding holes in the transmission housing. Index two of these holes in the corresponding holes containing the two guide bolts and install the front support.

6-15 TRANSMISSION REPAIR (Continued)

- (4) Install ten of the twelve 3/8-16x3-3/8 inch bolts and rubber-covered washers. Remove the two guide bolts and install the two remaining support bolts. Do not tighten the bolts in sequence. Maintain an even pull on the outer perimeter of the support by tightening the first two bolts 180 degrees apart to 15 ft-lb (20 N.m). Move approximately 90 degrees around the bolt circle and re-peat the operation. Torque the remaining opposite pairs of bolts. Repeat the entire process, tightening all twelve bolts to 24-32 ft-lb (33-43 N.m).



c. Control valve installation.

With the range selector valve suitably secured, position the control valve assembly so the actuator pin enters the housing bore. Install the control valve body (17) and retain it with two 1/4-20x3 inch bolts and seventeen 1/4-20x2-1/4 inch bolts. Do not install the two first clutch feed tube retainer bolts (13). Leave the bolts sufficiently loose to move the valve body for engagement of the selector valve with the shift pin.

d. Tube adapter installation.

- (1) Place the tube adapter (11) and tubes (14) and (15) in position so the tubes can be inserted into their respective bores in the valve body.
- (2) Install the long first clutch feed tube (14) into the drilled boss on the valve body. Insert the governor feed and pressure tubes (15). Be sure each tube is seated properly.
- (3) Install four 1/4-20x1-1/4 inch bolts (12) to retain the tube adapter (11). Torque the bolts to 8-12 ft-lb (11-16 N.m)
- (4) Engage the notch in the range selector valve with the pin on the detent lever. Position the detent spring (19) to engage a notch in the detent lever and install one 1/4-20x1 -3/4 inch bolt (18) to retain it. Install the two bolts (13) that retain the first clutch feed tube (14). Torque the bolt to 8-12 ft-lb (11-16 N.m). Working from the center outward, torque two 1/4-20x3 inch bolts and seven-teen 1/4-20x2-1/4 inch bolts to 8-12 ft-lb (11-16 N.m).

(1)

e. Valve body installation.

Install the modulated lockup valve body assembly (10). Install three 1/4-20x2 inch bolts to retain the valve body. Torque the bolts to 8-12 ft-lb (11-16 N.m).

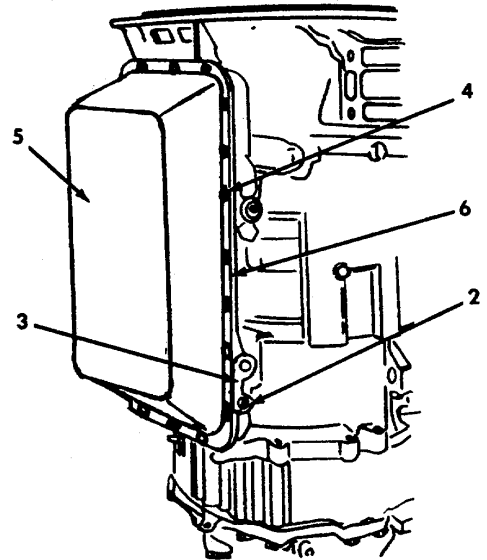
f. Oil filter and pan installation.



When installing the oil filter (7), oil filter tube (8), and sealing (9), care must be exercised to prevent twisting the tube or filter in any way that might pinch, cut or deform the sealing. An air-tight seal must be maintained to enable the oil pump to draw oil from the sump free of entrained air.

**6-15 TRANSMISSION REPAIR (Continued)**

- (1) Install the oil filter tube (8) into the oil filter(7). Install the sealring (9) onto the upper end of the tube. Apply oil-soluble grease (Appendix D, Item 21) to both the sealring and its bore in the transmission housing. Install the filter assembly and retain it with 5/16-18x5/8 bolt. Torque the bolt to 10-15 ft-lb (14-20 N.m).
- (2) Install two 5/16-18x3 inch headless guide screws into the transmission housing. Install the oil pan (5) gasket (6). Install the oil pan and retain it with twenty-one washer-head screws (4). Remove the two guide bolts for installation of last two screws. Torque the screws to 15-20ft-lb (20-27N.m). Pan bolts must retain a minimum of 5 ft-lb (7 N.m) after gasket set to prevent leak-age.



i).

g. Torque converter installation.

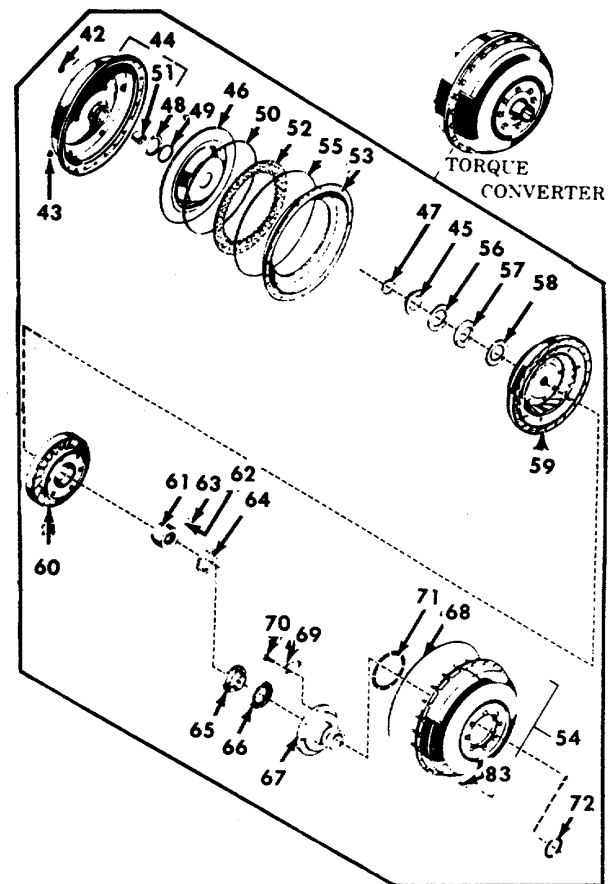
**CAUTION**

Check to ensure that sealring (72) is lubricated with oil-soluble grease (Appendix D, Item 21 ) and installed into its groove in pump hub (67) before installing the torque converter assembly.

- (1) Attach torque converter lifter to the torque converter assembly.

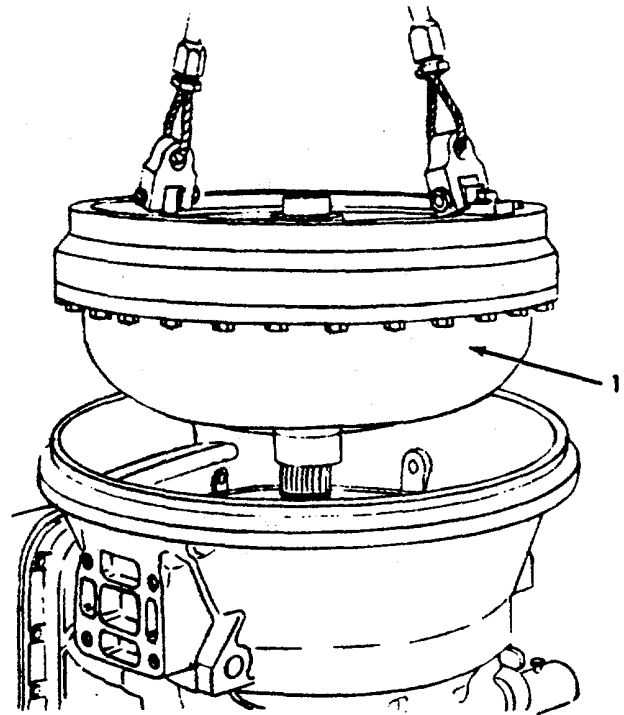
**WARNING**

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



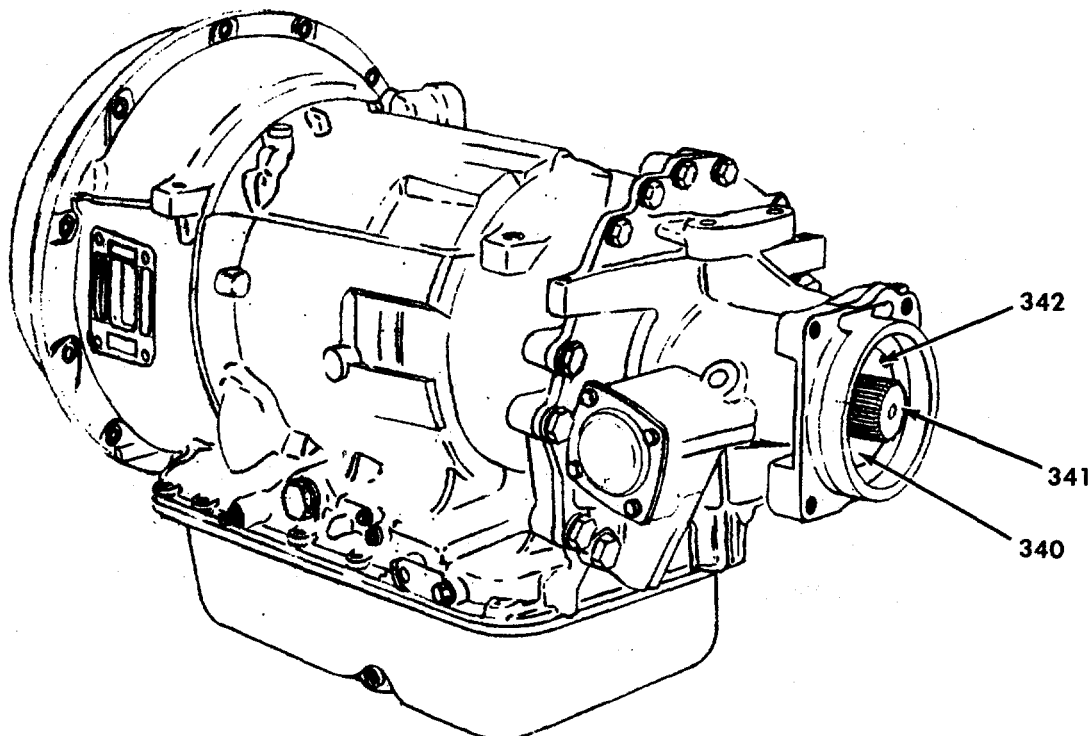
## 6-15 TRANSMISSION REPAIR (Continued)

- (2) Suspend the torque converter assembly (1) on a hoist. Install the assembly onto the transmission while rotating it to engage the flats on the pump hub with the flats in the transmission oil pump. Also the splines of the turbine hub (within the converter) must engage the splines of the turbine shaft.
- (3) When the converter assembly (1) is seated, measure the distance from the transmission mounting flange to the converter cover. This distance should be approximately  $9/16$  inch (14.29 mm). If the measurement is significantly greater than  $9/16$  inch (14.29 mm), raise the converter assembly slightly, rotate it to align the pump hub flats, and reseal it.
- (4) Remove lifter. Install a retaining strap to prevent the torque converter assembly from moving. Keep this strap in place until ready to install the transmission into the vehicle.



### h. Governor drive gear installation.

Install governor drive gear (340), slot first, on to the output shaft assembly (341). Engage the slot (342) in the drive gear with the protruding pin on the output shaft (341). Install speedometer drive gear (340) and sleeve spacer on to the output shaft (341).



**6-16. REAR RETAINER OIL SEAL REPLACEMENT.**

This task covers: a. Removal b. Installation

**INITIAL SET-UP**

Tools

General Mechanics Tool Kit

Materials/Parts

Rear Seal Kit (691631C91)  
 Oil (Appendix D, Item 37)  
 Grease (Appendix D, Item 21)  
 RTV Sealant (Appendix D, Item 45)

Equipment Condition

Para.	Condition Description
6-13	Flywheel Removed

**REMOVAL**

- a. Using a chisel, split the oil seal.



**Be careful not to damage the seal bore in the housing.**

- b. Remove the seal from the flywheel housing.
- c. Cut the wear sleeve with a muffler chisel. Be careful not to damage the crankshaft flange.
- d. Remove the wear sleeve.

- (2) Fill double lip seal with grease (Appendix D, Item 21) at cavity between lips.



**Seal (1) must be installed onto side of sleeve with chamfer in O. D. (2) to avoid damage to seal lip.**

- (3) Assemble seal (1) onto sleeve by pushing the seal in the direction of the arrow.

**INSTALLATION**

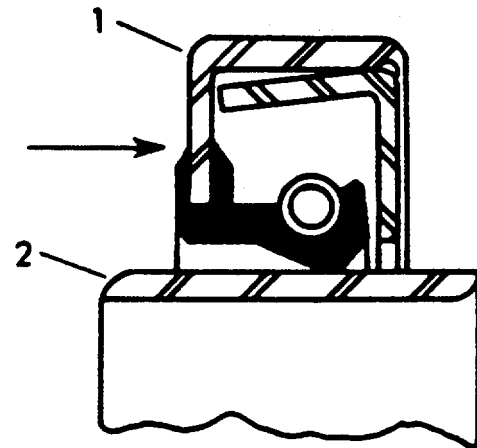


**Care should be taken not to damage the bore while filing the chamfer edge.**

- a. Inspect the oil seal bore for a chamfer. If no chamfer is found, use a file to break the edge of the bore. This will prevent possible damage to the oil seal casing during installation.
  - b. Prior to wear sleeve and oil seal installation, clean the bore and crankshaft of all foreign material.
  - c. If the oil seal and wear sleeve are not utilized (reassembled), assemble seal to sleeve prior to installing onto crankshaft.
- (1) Clean and lubricate single lip seal with clean oil (Appendix D, Item 37).

**NOTE**

**Seal bore in housing must be concentric with crankshaft within 0.010 inch (0.25 mm) full indicator measure as shaft is rotated 360°.**



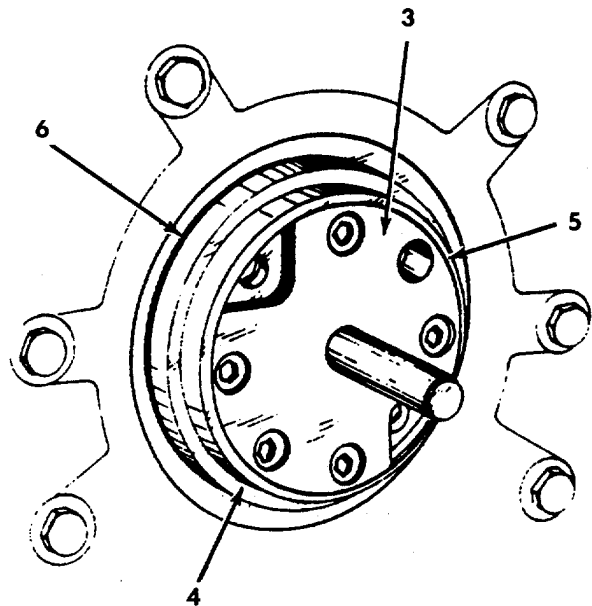
**6-16. REAR RETAINER OIL SEAL REPLACEMENT (Continued).**

- d. Attach the centering plate (3) to the crank shaft flange (4) using the four allen head screws. Do not tighten the screws at this time.

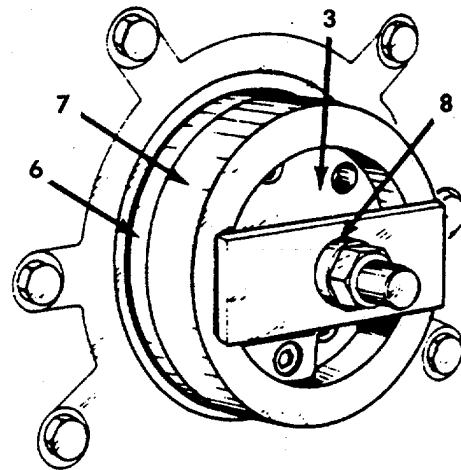
**NOTE**

**Only four bolt holes in the crankshaft will line up with the holes in the centering plate.**

**Never remove the oil seal from the sleeve during assembly.**



- e. Position the wear sleeve (5) with oil seal (6) on the centering plate (3) and crankshaft. Tighten the four allen head screws.
- f. Coat the I.D. of wear sleeve (5) and O.D. of oil seal (6) with a thin film of RTV sealant (Appendix D, Item 45). Do not get any sealant on the seal lip or O.D. of the wear sleeve (5).
- g. Position the wear sleeve and oil seal installing tool (7) on the centering plate (3) then tighten thrust washer (8). This will center the wear sleeve (5) and oil seal (6) on the crankshaft.
- (h) Install flywheel (paragraph 6-13).



**Section IV. MAINTENANCE OF TRANSFER CASE ASSEMBLY**

General .....	Para. 6-17	Transfer Case Repair .....	Para. 6-18
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**6-17. GENERAL.**

This section contains information on the maintenance of the transfer case assembly that are maintainable at the General Support level.

**6-1 8. TRANSFER CASE REPAIR.**

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This task covers: a. Disassembly b. Repair c. Assembly

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**INITIAL SET-UP**

Tools

- General Mechanics Tool Kit
- Gear Puller
- Magnet
- Drift
- Alignment Tool (Kelsey Hayes 866 271)
- Arbor Press
- Rubber Mallet

Materials/Parts

- Cleaning Solvent (Appendix D, Item 54)
- Shop Towel (Appendix D, Item 55)
- Lubricating Oil (Appendix D, Item 37)
- Lubriplate (Appendix D, Item 34)
- Bolt Thread Sealant (Appendix D, Item 47)
- Transfer Case (872 165 005)

Equipment Condition

- Para. Condition Description
  - 4-159 Transfer Case Removed
  - 4-159 Transfer Case Installed
- 

**DISASSEMBLY**

- a. If any mounting brackets are still attached to the transfer case, remove them before beginning disassembly.

**NOTE**

**Be sure the outside of the transfer case is clean before beginning disassembly.**



**A gear puller may be required to remove the yoke or companion flange.**

- b. Remove companion flange or yoke on upper and lower shafts by removing locknut and washer. Discard locknuts and washers.

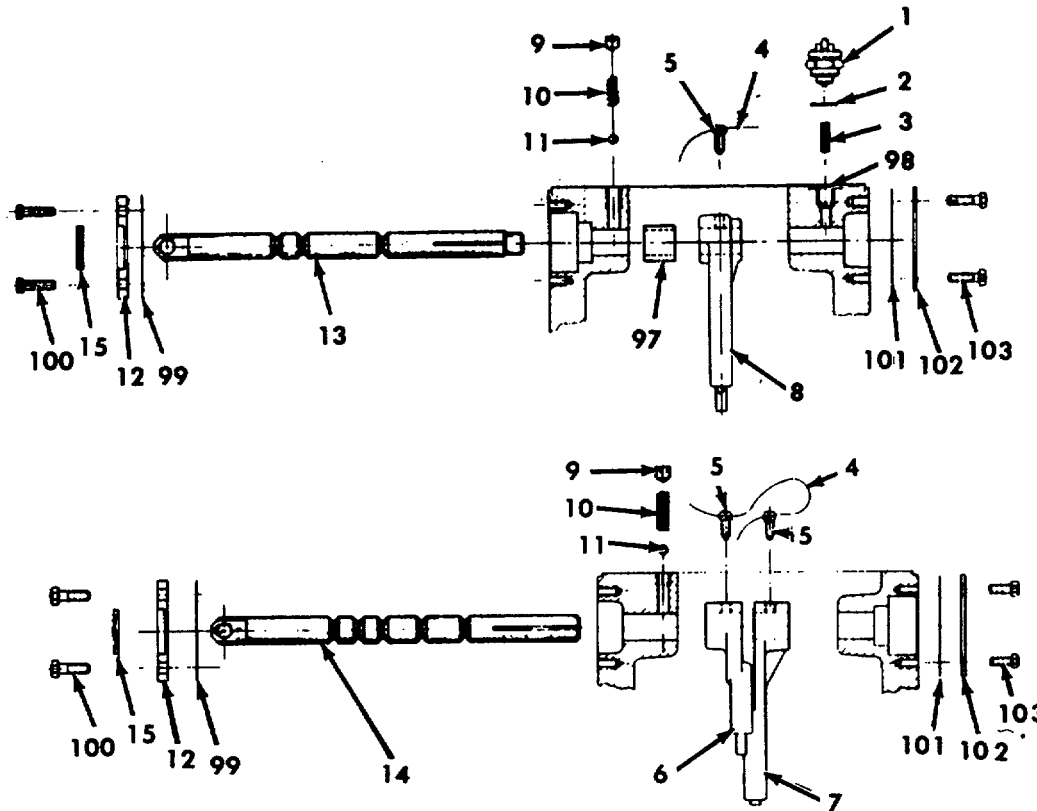
**NOTE**

**Carefully wash with solvent (Appendix D, Item 54) and relubricate all bearings with lubricating oil (Appendix D, Item 37) as removed and protectively wrap until ready for use. Remove bearings with pullers or in a manner which will not damage bearings being reused.**

- c. Remove the capscrews and lockwashers securing main case cover to transfer case. If necessary, lightly tap cover plate with a rubber mallet to loosen and remove.



6-18. TRANSFER CASE REPAIR (Continued).



d. Shifter shafts disassembly.

- (1) Unscrew the indicator light switch (1) from housing and remove spacer washers (2). Be sure to note the amount of spacers removed. Remove the plunger (3) from inside housing by using a magnet.
- (2) Cut the lockwires (4) from the shift forks set screws (5) and remove the set screws (5) from each shift fork (6), (7), and (8).
- (3) Remove each detent set screw (9) from housing. Scrap set screws and replace them at reassembly. Remove each detent spring (10) and by using a magnet, remove each detent ball (11).

- (4) Remove applicable bolts from each shift shaft seal carrier (12) and remove the seal carriers from housing.
- (5) Withdraw each shift shaft (1 3 and 1 4) from housing. As the shift shaft is withdrawn from the housing, remove each shift fork (6, 7 and 8) from the shafts.
- (6) Inspect seal (15) on each seal carrier. Remove any discrepant seal and replace with new.
- (7) Remove the shift forks (6, 7, and 8) from inside of housing and label them according to their position in the transfer case. Labeling will aid reassembly.

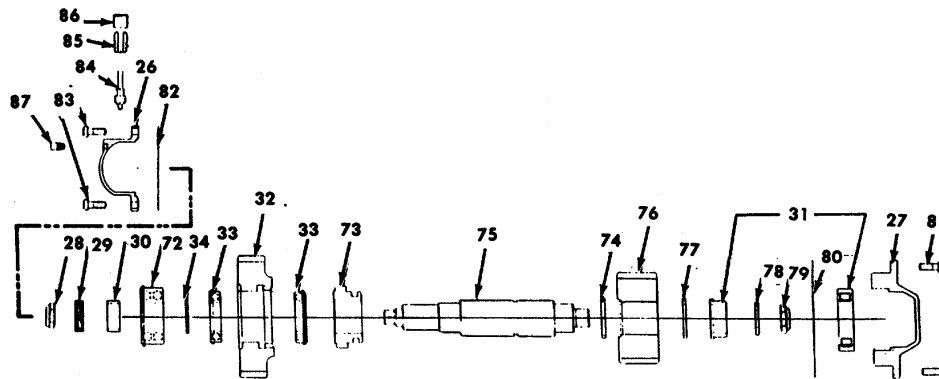
6-18. TRANSFER CASE REPAIR (Continued).

e. Input shaft disassembly.

- (1) Remove the rear cover (16) and the front seal carrier (17).
- (2) Use a brass rod or aluminum bar to protect the end of the shaft, tap threaded end

f. Intermediate shaft removal.

- (1) Remove the capscrews from the front cap(26) and the rear cap (27). Remove the front speedometer cap (26), nut (28), speedometer drive gear (29) and spacer (30).Screw alignment tool on to the end of the shaft. Place alignment studs in two holes of the rear cap (27). Drive on end of alignment tool until the rear cap (27) is clear of the case housing. Remove the cap along with the outer race and roller assembly of bearing (31). Block between the under drive gear( 32) and the rear of the case. Continue to drive the alignment tool until the shaft is



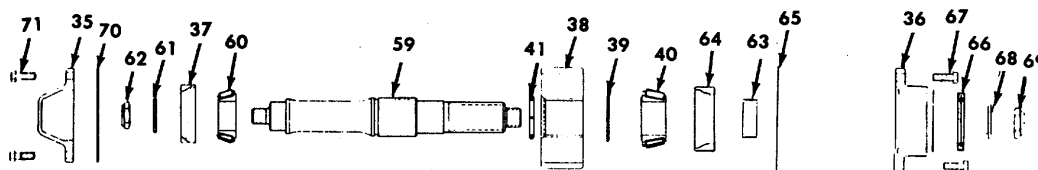
enough to place the direct drive gear (18) just against the inside back wall of the transfer case housing. Slide the under drive pinion gear (19) toward the front of the case, exposing the split retaining ring (20). Use a drift to drive the retaining ring from the shaft.

- (3) Tap on the rear end of the shaft and remove the shaft and the front bearing (21) at the front of the case. Since the bearings (22) and (23) are press fitted on the shaft, the shaft will not slip out easily.
- (4) The gears (18 and 19), clutch (24), washer (25) and the bearing (23) can now be removed from inside the case.

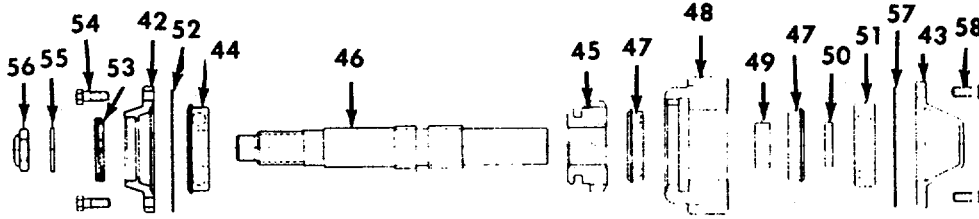
free of the gear (32) and the transfer case. Remove the gear (32) with bearing (33) still in phase and the spacer ring (34) from inside the case.

g. Rear output shaft removal.

- (1) Remove the front cover (35) and the rear cover (36). Tap the output end of the shaft (rear end of shaft) and remove bearing cup (37) from the front of the case. Block between the gear (38) and the case while continuing to drive the shaft out of the front of the case.
- (2) Remove the gear (38), spacer ring (39) and bearing cone (40) from inside the case.
- (3) Remove split ring (41) from the shaft only if it is being replaced.



6-18. TRANSFER CASE REPAIR (Continued).



h. Front output shaft removal.

- (1) Remove the seal carrier (42) from the front of the case and the cap (43) from the rear of the case. Drive the shaft from the rear of the case until the front bearing (44) is clear of the housing. Use a bearing puller between the bearing and the case to remove the bearing from the shaft. The shaft and gear assembly can now be removed.
- (2) Remove the shaft from the gear in an arbor press.

- (3) To prevent corrosion damage, dried parts should be immediately coated with a light oil (Appendix D, Item 37).

b. Inspection.

- (1) Carefully inspect all parts being reused for signs of wear or damage. Examine all bearing surfaces, ball bearing assemblies and roller bearing cups and cones for wear, pitting or overheating. Examine gears for pitting, scoring and broken teeth. Shafts should be examined for nicks, mars, and damaged threads. Check all shift forks and slots in sliding clutches for extreme wear or discoloration from heat. Also check the teeth engagement of the sliding clutches for partial engagement pattern. Discrepant parts or any part showing signs of wear or damages should be repaired or replaced.

REPAIR

a. Parts cleaning.



Cleaning solvent (Appendix D, Item 54) 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.

- (1) Clean all components with solvent (Appendix D, Item 54).



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.

- (2) Dry all parts after cleaning with a clean, soft shop towel (Appendix D, Item 55). Compressed air can be used to dry in accessible areas of large parts. Compressed air should not be used to spin dry bearings. Spin dry-ing bearings may cause damage to the mat-ing surfaces due to lack of lubrication.

ASSEMBLY

NOTE

All parts must be clean and all gasket surfaces must be free of old gasket material.

In order to reduce chances of galling or scoring and to provide initial lubrication for the oil seals, lubricate housing bores, shaft splines and-bearing mounting surfaces, and sealing lips on oil seals with Lubriplate (Appendix D, Item 34) or equal.

When installing bearings, use flanged end bearing drivers that will apply equal force to both inner and outer races of the bearings. If tubular or sleeve type drivers are used, apply the force to either the inner or outer race or both races as needed to put the bearing in place without pushing through the bearing balls.

6-18. TRANSFER CASE REPAIR (Continued).

NOTE

Utilizing guide studs will simplify the installation of gaskets, bearing carriers, seal carriers and caps.

Before installation, universal joint yokes or companion flanges should be coated with Lubriplate (Appendix D, Item 34) on the seal operating area. They should be torqued into place with the locknuts torqued to the proper specified torque before the cover is installed on the case and before the shim thickness is determined for both the input shaft and the rear output shaft. The retaining nuts for the universal joint yoke or companion flange can be torqued or loosened most easily when all components, except shift forks are in place. At that time, it is impossible to engage both the direct drive and the underdrive clutch gears and effectively lock all shafts against rotation.

Seal bolt threads with sealant (Appendix D, Item 47) or equal pliable setting sealant. Bolt threads that are not sealed will leak oil.

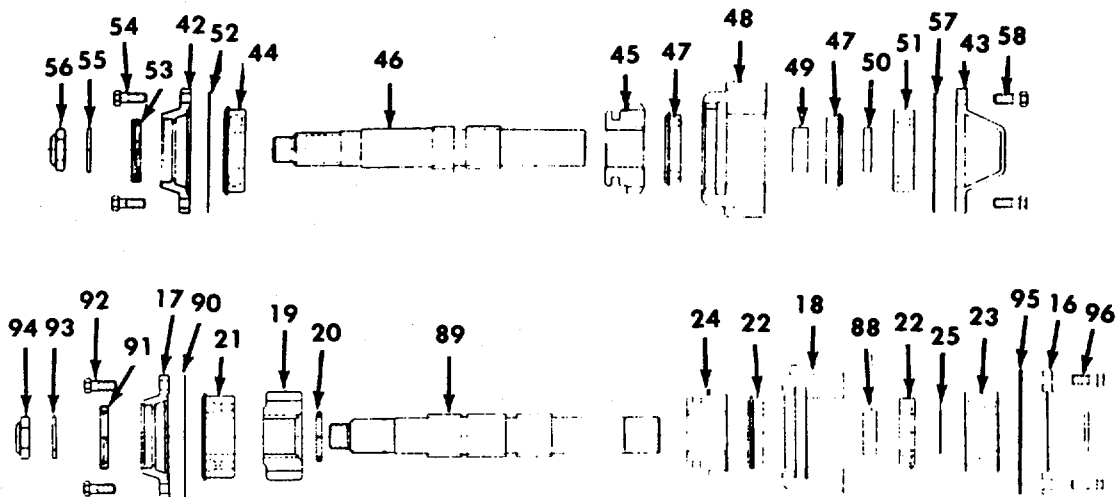
Replacement seals are coated (on the outside) and should not be coated prior to their installation into the carriers, however, they should be coated on the sealing lip with Lubriplate (Appendix D, Item 34). Seal installation can best be made with an arbor press.

a. Clutch gear and bearing assembly.

Apply Lubriplate (Appendix D, Item 34) to the bearing bores of each of the three clutching gears. Press the bearings into place by applying a force to the outer race. Be sure to put the applicable spacer rings (88 and 49) in place prior to the installation of the second bearing in the 35 tooth clutching gears (18 and 48).

b. Front output shaft assembly.

- (1) Insert the plain end of the shaft (46) into the clutch gear assembly (47, 48, and 49). Install spacer ring (50) and the ring bearing (51) onto the shaft (46). Slide the clutch (45) onto the splined end of the shaft (46). Engage the teeth of the clutch (45) with the teeth in the clutch gear (48). Put this assembly into the case through the cover opening with the gear at the opposite side of the housing from the front output opening. Put the threaded end of the shaft into the front output opening and swing the gear end partially into the intermediate shaft rear opening to allow the opposite end of the shaft to enter the front output opening. Slide shaft through the front output opening enough to allow backing the bearing into the rear case bearing bore.



**6-18. TRANSFER CASE REPAIR (Continued).**

- (2) Slip the front bearing (44) over the end of the shaft and into the housing bore. The bearing snapping should be on the outboard side of the bearing. Tap bearing into place.
- (3) Install the front output seal carrier gasket (52) and the seal carrier (42) with the seal (53) in place. Apply sealant (Appendix D, Item 47) to bolt threads, then torque bolts(54) to 45 ft-lb (61.02 N.m).
- (4) Coat the seal surface and the splined hole of the front output yoke with Lubriplate (Appendix D, Item 34).
- (5) Align the yoke onto the shaft and tap it into place. Lightly coat one side of the yoke retaining washer (55) with sealant (Appendix D, Item 47) and then install the coated side next to the yoke. Install the locknut (56) and torque it to 300 ft-lb (406.80 N.m).
- (6) Temporarily install the rear cap (43) in place without shims (57). Torque bolts (58) to 25 ft-lb (33.80 N.m). Measure gap between the case housing and the flange of the cap (43). Select a shim stack that is 0.010 to 0.15 inch larger than the gap dimensions measured. Remove the bolts (58) and cap (43) and then install the selected shims and reinstall the cap. Coat bolt threads with sealant (Appendix D, Item 47), install and torque bolts (58) to 45 ft-lb (61.02 N.m).
- (7) Make certain the bearings are pulled tight against the shaft shoulders and that the shaft rotates freely, do this by spinning the shaft.

*c. Rear output shaft assembly.*

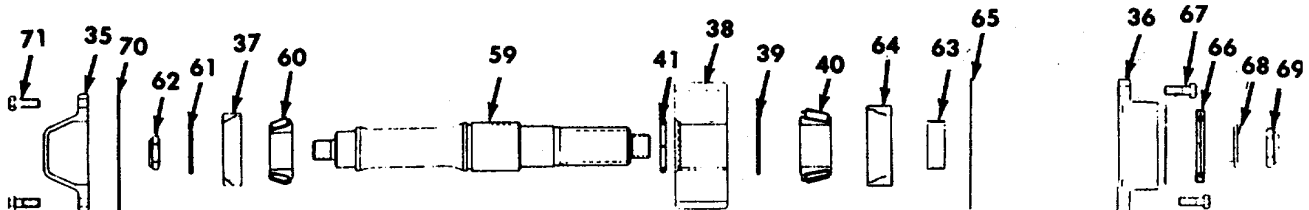
- (1) Install the split retaining ring (41) onto the shaft (59). (If removed at disassembly).

- (2) Press the front bearing cone (60) tight against the shaft shoulder and then install the washer (61) and locknut (62). Torque the locknut to 300 ft-lb (406.80 N.m).
- (3) Coat the splined bore of the gear (38) with Lubriplate (Appendix D, Item 34).
- (4) Lower the rear output gear (38) into the case with the flat face against the back wall of the case and the chamfered side toward the front of the case.
- (5) Coat the shaft splines with Lubriplate (Appendix D, Item 34).
- (6) Insert the shaft through the proper hole in the front of the case and align the shaft splines with the gear splines. Protect the threaded end of the shaft and tap the shaft into the gear until the retaining ring seats in the chamfer of the gear.
- (7) Install the spacer ring (39).



**Use heat-resistant gloves when working with high temperatures.**

- (8) Heat the rear bearing cone (40) to approximately 250° (121° C). Handle bearing with heat resistant gloves and install quickly after heating, tapping it into place if necessary.
- (9) Install the spacer tube (63) onto the shaft (59).
- (10) Move the shaft toward the front of the case to visually inspect the mating parts.
- (11) Install the front bearing cup (37) and the rear bearing cup (64) allowing the rear cup to remain projecting between 3/8 inch and 1/4 inch from the case.
- (12) Install the rear output carrier gasket (65) and the rear output carrier (36) along with seal (66). Coat retaining bolt threads in sealant (Appendix D, Item 47), install and torque bolts (67) to 45 ft-lb (61.02 N.m).



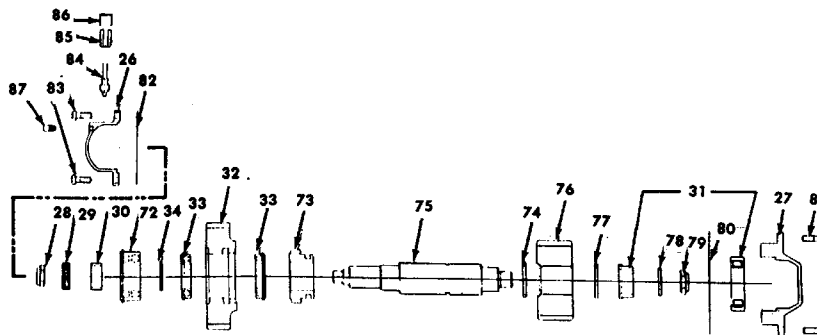
6-18. TRANSFER CASE REPAIR (Continued).

- (13) Coat the seal surface and the splined hole of the rear output companion flange with Lubriplate (Appendix D, Item 34), then install flange. Lightly coat one side of the retaining washer (68) with sealant (Appendix D, Item 47) and then install the coated side next to the companion flange. Install the locknut (69) and torque it to 300 ft-lb (406.80 N.m).
- (14) Temporarily install the rear output shaft front cover (35) without shims (70) and torque bolts (71) to 25 ft-lb (33.90 N.m). Measure the gap between the cover (35) and the case housing. Select a shim stack that is 0.010 to 0.005 inch larger than the gap dimension measured. Remove the bolts (71) and the cap (35) and then install the selected shims and reinstall the cap. Coat the bolt threads with sealant (Appendix D, Item 47), install and torque bolts (71) to 45 ft-lb (61.02 N.m).

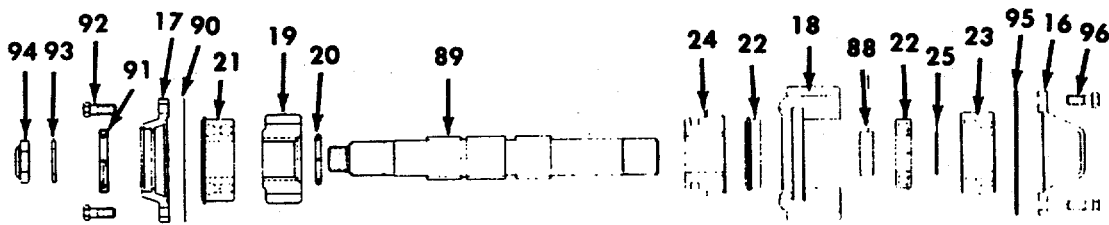
d. Intermediate shaft assembly.

- (1) Install the double row ball bearing (72) in the housing bore opposite the large opening at the rear of the case. Temporarily retain the bearing with a bolt and washer.
- (2) Insert the alignment tool through the bearing with the tapped end toward the inside of the case.

- (3) Put the bearing spacer washer (34) in place onto the alignment tool on the inside of the case. Place the underdrive driven gear (32) and bearing assembly (33) on the alignment tool. Insert the sliding clutch (73) into the engaged position inside the underdrive driven gear (32).
- (4) Install the split retaining ring (74) into the groove on the intermediate shaft (75).
- (5) Insert the shaft through the large opening on the back of the case. Align shaft with clutch splines and engage the end of the shaft with alignment tool. Screw the tool and shaft together and then pull the shaft through the bearings. Once the shaft is pulled through, remove the alignment tool. Install the spacer tube (30), speedometer (29), and locknut (28) on the end where the alignment tool was removed.
- (6) Put the direct drive gear (76) onto the shaft with the chamfered spline side toward the front of the case so the chamfer will fit upon to the split retaining ring (74).
- (7) Install the spacer washer (77) and the roller bearing inner race (31) on the shaft. Make sure the shoulder on the race is toward the gear to allow the cover and the bearing outer race and roller assembly to fit over the inner race.
- (8) Install the retaining washer (78) and lock-nut (79) on the shaft. Torque the nut (28) on the speedometer gear end to 175 ft-lb (237.30 N.m) while restraining the nut on the opposite end of the shaft.
- (9) Torque the rear locknut (79) to 300 ft-lb (406.80 N.m) while restraining the front output yoke from turning.



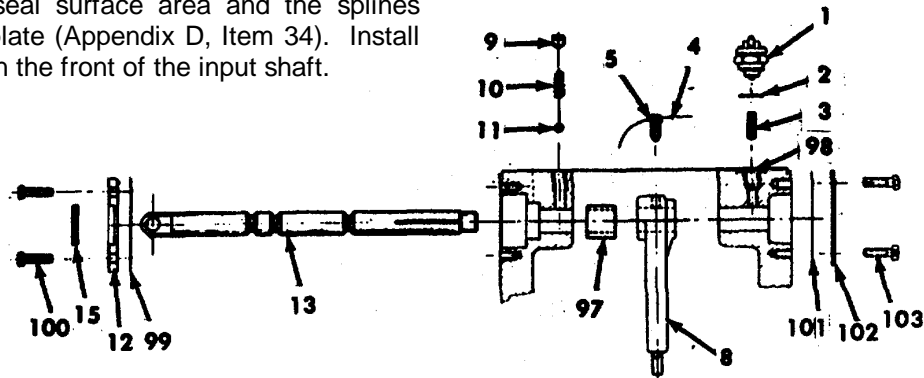
6-18. TRANSFER CASE REPAIR (Continued).



- (10) Install the intermediate shaft rear cover gasket (80) and cover (27) utilizing guide studs to simplify installation. Coat bolt threads with sealant (Appendix D, Item 47), install and torque bolts (8 1) to 45 ft-lbs (61.02 N.m). (No end play adjustment is required.)
- (11) Remove the bolt and washer that was used to temporarily retain the bearing (72). Position the speedometer cap gasket (82) over the front of the shaft. make sure the oil return hole in the gasket is aligned with the hole in the case.
- (12) Place the speedometer cap (26) in place along with the speedometer cable. Coat bolt threads with sealant (Appendix D, Item 47), install and torque bolts (83) to 45 ft-lb (61.02 N.m).
- (13) Install the speedometer driven gear (84) and speedometer driven gear connector sleeve (85) into the speedometer cap (26). The speedometer driven gear connector sleeve (85) should have been capped with a plastic cap (86) when the speedometer cable was removed in order to keep speedometer gear clean.
- (14) Install vent (87) in the speedometer cap (26).
- e. *Input shaft assembly.*
  - (1) Place the direct drive gear (18) with bearings (22) and spacer (88) already installed, into the housing against the back wall. The gear should mesh with the gear on the intermediate shaft and rest against the side wall of the case housing.
  - (2) Insert the direct drive gear clutch (24) into the direct drive gear (18).
  - (3) From the front of the case, insert the end of the shaft (89) that is not threaded. The shaft should project into the case between 3/4 inch and 2 inches.
  - (4) Slip the underdrive pinion gear (19) with the projecting face toward the shaft, onto the end of the shaft.
  - (5) Slide the shaft (89) through the underdrive pinion gear (19) and into the direct drive sliding clutch (24). Align the splines when they come into contact with the pinion gear. Continue shaft installation, align the splines with splines in the underdrive gear sliding clutch (18). Continue to slide shaft into place through bearings (22) and gear (18). Slip the spacer washer (25) (.06 in. thick) over the rear end of the shaft.
  - (6) Slide the input shaft front bearing (21) and rear bearing (23) onto the shaft. Using a suitable driver, tap bearings into the case housing bore and into place on the shaft.
  - (7) Push the input shaft as far to the rear of the case housing as it will go. Then push the underdrive pinion gear toward the front of the case. Install the split retaining ring (20) in place in the half round groove that should now be exposed. Check for proper fit.
  - (8) Install the input seal carrier gasket (90) and the input seal carrier (17) along with seal (91) on the front of the case housing. Coat retaining bolt threads in sealant (Appendix D, Item 47), install and torque bolts (92) to 45 ft-lb (61.02 N.m)

6-18. TRANSFER CASE REPAIR (Continued).

- (9) Coat the seal surface area and the splines with Lubriplate (Appendix D, Item 34). Install the yoke on the front of the input shaft.



Lightly coat one side of the retaining washer (93) with sealant (Appendix D, Item 47) and then install it onto the shaft with the coated side facing the input yoke. Install the yoke retaining locknut (94) and torque it to 300 ft-lb (406.80 N.m).

- (10) Temporarily install the input shaft rear cap (16) without shims (95) and torque bolts (96) to 25 ft-lb (33.90 N.m). Measure the gap between the input shaft rear cap (16) and the case housing. Select a shim stack that is 0.010 to 0.005 in. larger than the gap dimension measured. Remove the cap (16) and then install the selected shims (95) and reinstall the cap. Coat the bolt threads with sealant (Appendix D, Item 47), install and torque bolts (96) to 45 ft-lb (61.02 N.m).

clear the underdrive shift fork (7) (7-5/8 inches long). The underdrive shift fork (7) should be installed at this time with the hub portion of the shift fork facing the rear of the case and the forked end into the groove in the clutch on the intermediate shaft. Slide the shift shaft through this fork and into the hole on the back of the case.

- (2) Align the retaining screw hole on the underdrive shift fork (7) with the rear-most groove in the shift shaft. Install the shift fork set screw (5) into the fork. Position the flat face of the eye end of the shift shaft paralleled to a line through the input and rear output shaft centerlines in order to put the flat side in a vertical plane on the installed case. Torque the shift fork set screw to 25 ft-lb (33.90 N.m).

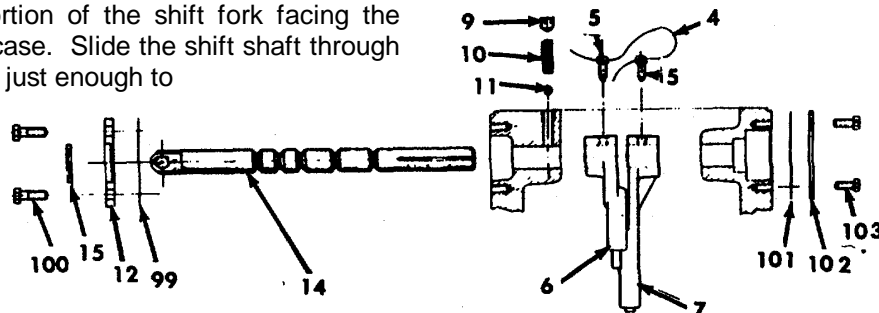
f. *Shifter shafts assembly.*

**NOTE**

**There are three shift forks used in this transfer case. Each shift fork is a different length.**

- (1) Insert the shift shaft (14), the one with 5 grooves, into the shift shaft hole next to the input shaft until the shaft is visible through the cover opening. Position the direct drive clutch shift fork (6) (5-7/8 inches long) into the groove in the clutch on the input shaft with the long hub portion of the shift fork facing the front of the case. Slide the shift shaft through the shift fork just enough to

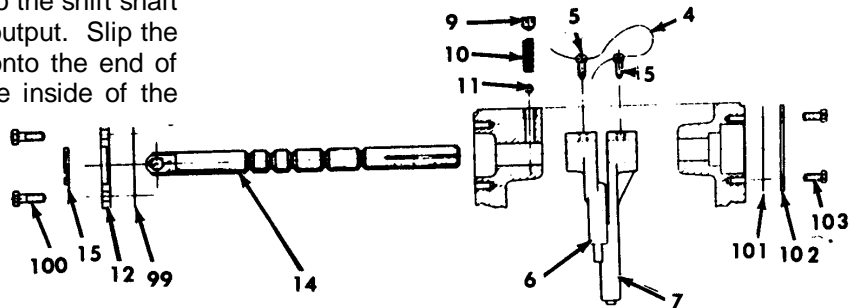
- (3) Slide the direct drive fork (6) and clutch to position the fork set screw hole over the next shift shaft groove and install set screw (5). To insure maintenance of fork-to-clutch clearance, hold the two shift forks in either clockwise or counterclockwise direction and then torque set screw. Torque set screws (5) to 25 ft-lb (33.90 N.m) and lockwire (4).





6-18. TRANSFER CASE REPAIR (Continued).

- (4) Insert the front drive shift shaft (13), the one with 3 grooves on the shaft, into the shift shaft hole closest to the front drive output. Slip the shift travel limiting tube (97) onto the end of the shaft as it emerges on the inside of the case.



- (5) Place the forked end of the front drive shift fork (8) (6-3/4 inches long) into the groove in the front drive clutch.

while shifting into and out of front drive. Add or subtract washers (2) as necessary to make the switch operate properly.

- (6) Align hub end of shift fork with the shift shaft. Shift shaft should be inserted through the fork and into the hole in the back of the case housing inner wall.

- (11) Install gaskets (101) and shift shaft caps (102). Torque the bolts (103) to 15 ft-lb (20.34 N.m).

- (7) Rotate the shaft so the flat face of the eye end of the shaft is paralleled to a line connecting the centerline of the input shaft with the rear output shaft centerline and with the flat or longitudinally grooved portion (on the rear end of the shift shaft) away from the hole (98) for the front drive indicator switch. Failure to do this may result in improper switch operation.

- (12) Insert each detent ball (11) and detent spring (10) into the proper bore in the top of housing. Install each detent set screw (9) and torque screw until it takes a force of 25 to 40 lbs (33.90 to 54.24 N.m) to push the shift shaft out of detent.

g. Final assembly.

- (8) Align the shift shaft rear most circumferential groove under the shift fork (8) set screw hole. Install the shift fork set screws (5) into the fork. Torque the shift fork set screw (5) to 25 ft-lb (33.90 N.m) and lockwire (4).

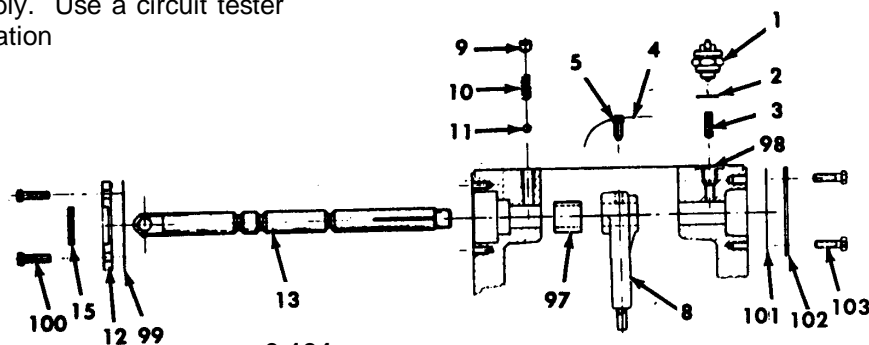
- (1) Make sure there are no loose tools, bolts, or other foreign objects in the assembly. Rotate all shafts (while observing through the cover opening) with the shift shafts shifted to all positions.

- (9) Insert seal (15) into carriers (12) with lip facing down. Install carriers (12) and gaskets (99) on the front of the case (over the shift shaft ends) with the seal to the outside and torque the bolts (100) to 15 ft-lb (20.34 N.m).

- (2) Position the cover gasket and cover by aligning holes. Install a lockwasher on each capscrew and coat the capscrew threads with sealant (Appendix D, Item 47). Install capscrews and torque to 45 ft-lb (61.02 N.m).

- (10) Install the plunger (3) into the front drive indicator switch hole (98) with the rounded end toward the shaft. Install the shift indicator switch (1) with the number of washers (2) removed in disassembly. Use a circuit tester to test the switch operation

- (3) Install the drain and fill plugs.
- (4) Attach all applicable mounting brackets before reinstalling the case in the truck.
- (5) Install transfer case (paragraph 4-159).



**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

## 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 over-all 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 with prescribed standards.
- c. *Service.* Operations required periodically to keep an item in proper operating condition. i.e., to clean (includes decontamination 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 equipment 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.
- 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.

**B-2. MAINTENANCE FUNCTIONS (Continued).**

- 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 1, including fault location/ troubleshooting<sup>2</sup>, removal/installation, and disassembly/assembly 3, procedures, and maintenance actions 4, to identify troubles, and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly) end item, or system.
- 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 number, 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 "001".
- b. Column 2, Component/Assembly.* Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.
- 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:

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1 Services - inspect, test, service. adjust, align, calibrate, and/or replace.

2 Fault 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).

3 Disassemble/assemble -encompasses the step-by-step taking apart (or breakdown) of a, spare/functional group for the category of maintenance under consideration.

4 Actions - welding, grinding, riveting, straightening, facing remachinery, and/or resurfacing.

**B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II (Continued).**

- C..... Operator or Crew
- O ..... Organizational Maintenance
- F.....Direct Support Maintenance
- H..... General Support Maintenance
- L..... Specialized Repair Activity (SRA) <sup>5</sup>
- 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.
- 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 7, 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.

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<sup>5</sup> This 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.

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
00	TWIN AGENT 4x4 FIREFIGHTING TRUCK								
01	ACCESSORIES	Inspect	.50						
	FUNNEL, POLYETHYLENE	Replace		.25					
	FILLER TUBE	Replace		.25					
	AIRCRAFT CRASH RESCUE TOOL KIT	Replace		.25					
	FUNNEL, STEEL	Replace		.25					
02	AUXILIARY FIREFIGHTING EQUIPMENT	Inspect	.50						
	HYDRAULIC RESCUE TOOL	Replace		.25				1	
	HYDRAULIC RESCUE TOOL POWER UNIT	Service Replace Repair		.25 .25	2.0				
	10 TON HYDRAULIC RESCUE KIT	Service Replace		.25 .25					
	RESCUE SAW	Service Replace Repair		.50 .25	2.0			1, 24, 25 26, 27 1	
	INVERTER	Replace Test		1.0 5.0					
03	TWIN AGENT FIREFIGHTING SYSTEM	Inspect Service Replace	.50	.50 1.0				1 1,3,4	B
	HANDRAILS	Replace		.25				1	
	NITROGEN CYLINDERS	Replace		.50				1	
	CONTROLS AND GAUGES	Replace		.50				1	
	PIPING VALVES, FITTINGS, AND REGULATORS	Replace		2.0				1	
	P-K-P AGENT TANK	Replace		1.0				1, 3, 4	
	AFFF AGENT TANK	Replace		1.0				1, 3, 4	
04	REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY	Inspect Replace	.25	1.0				1, 3, 4	B
	FOAM NOZZLE ASSEMBLY	Replace		.25				1	
	DRY CHEMICAL NOZZLE Y ASSEMBLY	Replace		.25				1	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
04	REMOTE MANUAL, TWIN AGENT TUIRRET ASSEMBLY (Continued).								
	CONTROLS AND GAUGES	Replace		.50				1	
05	HOSE REEL ASSEMBLY	Inspect	.25						
		Service		.50				10	
		Replace		1.0				1,3,4	
	HOSE ROLLERS	Replace		.25				1	A
	DUAL AGENT HANDLINE	Replace		.50				1	C
		Repair		1.0				1	
	HOSE	Replace		.50				1	
	MOTOR	Replace		.50				1	D
	SWIVEL JOINT/ELBOW	Replace		.50				1, 5	
	REWIND SWITCH	Replace		.50				1	
06	FIRE BODY ASSEMBLY	Inspect	.50					1	
		Replace		1.0				1	
	DECK LIGHTS	Replace		.50				1	
		Repair		.50				1	
	CLEARANCE LIGHTS	Replace		.50				1	
		Repair		.50				1	
	REAR QUARTZ FLOOD LIGHTS	Replace		.50				1	
		Repair		.50				1	
	REAR STATION CHARGERS	Replace		.50				1	
	REAR SLAVE RECEPTACLE	Replace		.50				1	
	INVERTER RECEPTACLES	Replace		.50				1	
	BACK-UP LIGHTS	Replace		.50				1	
		Repair		.50				1	E
	TURN AND STOP LIGHTS	Replace		.50				1	
		Repair		.50				1	E
	BACK-UP ALARM	Replace		.25				1	
	CONPARTMENT LIGHTS	Replace		.50				1	
		Repair		.50				1	E
06	FIRE BODY ASSEMBLY								
	COMPARTMENT DOOR ASSEMBLY	Replace		.75				1	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
07	ENGINE COOLING SYSTEM	Inspect Service	.50	.25				1	
	DEAERATION TANK	Replace		.50				1	
	FAN SHROUD	Replace		1.0				1	
	FAN AND CLUTCH	Replace		.50				1	
	DRIVE BELTS	Replace Adjust		.50 .50				1,8 1,8	
	HOSES AND PIPING	Replace		.75				1	
	WATER PUMP	Replace		.50				1	
	THERMOSTAT AND HOUSING	Replace		.50				1	
	RADIATOR	Replace		2.0				1	
	08	ENGINE FUEL SYSTEM	Inspect	1.0					
AIR CLEANER		Replace			.50			1	
FUEL FILTERS		Replace		1.0				1, 6	
FUEL PUMP		Replace		1.0				1	
FUEL LINES		Replace		1.0				1	
FUEL TANK		Replace		1.0				1	
ACCELERATOR PEDAL		Replace		1.0				1	
09	DIESEL FUEL INJECTION SYSTEM	Inspect	.50						
	INJECTION LINES	Replace		1.0				1,7	
	INJECTION PUMP	Replace Repair		1.0			2.0	1 1	B
	INJECTION NOZZLES	Replace		1.0				1,7	
10	ENGINE EXHAUST SYSTEM	Inspect	.50						
	EXHAUST PIPES	Replace		1.0				1	
	TAIL PIPE	Replace		1.0				1,12, 22	
	MUFFLER	Replace		1.0				1	



Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
11	ENGINE AND ACCESSORIES	Inspect		1.0					
		Replace			6.0			1, 3, 28, 29	A
		Repair				8.0		1	C
	BATTERIES	Inspect	.25						
		Replace		.50				1	
	CABLES	Inspect	.25						
		Service Replace		.50 .50					
	ALTERNATOR	Inspect		.25					
		Replace		.50				1	
		Repair			2.0			1, 30, 31, 32, 33, 34, 35	C
	STARTER	Inspect		.25					
		Replace		.50				1	
		Repair			3.0			1, 35, 31, 36	C
	TURBOCHARGER	Inspect		.50					
		Replace		.50				1	
	INTAKE MANIFOLD	Inspect		.25					
		Replace			2.0			1	
	EXHAUST MANIFOLD	Inspect		.25					
		Replace			2.0			1	
	VALVE COVER	Inspect		.25					
Replace			.50				1		
ROCKER ARM. SHAFT AND PUSHRODS	Inspect				.50				
	Replace				2.0		1		
CYLINDER HEAD AND VALVES	Inspect				.50		1, 3, 4, 49, 50, 51, 52		
	Replace					1.0	1, 3, 4, 48, 57		
VIBRATION DAMPER	Inspect				.25		1		
	Replace				1.0		1, 58, 59, 60		
FRONT COVER	Inspect				.50		1		
	Replace				1.0		1		
CAMSHAFT AND GEAR	Inspect				.50		1, 60, 61		
	Replace				1.0		1, 54, 17		
TIMING AND GEAR TRAIN	Inspect				.50		1, 54		
	Replace				2.0				

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEM

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
11	ENGINE AND ACCESSORIES (Continued).								
	DIPSTICK AND TUBE	Inspect Replace		.25 1.0				1	
	OIL PUMP, FILTERS AND COOLER	Inspect Replace				.50 1.0		1 1, 54	C
	OIL PAN	Inspect Replace	.25	1.0				1	
	PISTONS AND CONNECTING RODS	Inspect Replace				.50 1.0		1, 62, 34 54, 44, 27	
	FLYWHEEL, CRANKSHAFT AND MAIN BEARINGS	Inspect Replace				.50 2.25		1, 60, 64 3, 4, 15	
	ENGINE MOUNTINGS	Inspect Replace		.50	1.0			1, 12	
12	CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS AND INDICATORS	Inspect Replace	.25		35.0			1, 3, 4	A
	HEADLIGHTS	Adjust Replace Repair		.25 .25 .25				1 1 1	E
	FRONT CLEARANCE LIGHTS	Replace Repair		.25 .25				1 1	E
	FRONT TURN SIGNAL LIGHTS	Replace Repair		.25 .25				1 1	E
	CAB SPOTLIGHTS	Replace Repair		.25 .50				1 1	E
	QUARTZ FLOOD LIGHT	Replace Repair		.25 .25				1 1	E
	ENGINE COMPARTMENT LIGHTS	Replace Repair		.25 .25				1 1	E
	ROOF WARNING LIGHT	Replace Repair		.25 .50				1 1	D, E
	AIR HORNS	Replace		.50				1	
	WINDSHIELD WASHER/WIPER ASSEMBLY	Service		.25					A
	WIPERS	Replace		.25				1	A

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
12	CAB ASSEMBLY, LIGHTS, SWITCHES. GAUGES, CONTROLS AND INDICATORS (Continued).								
	MOTOR	Replace		.50				1	
	WASHER	Replace		1.50				1	
	SPEEDOMETER	Replace		.50				1	
	CONTROL SWITCHES AND GAUGES	Replace		2.0				1	
	CONTROL KNOBS AND INDICATORS	Replace		1.5				1	
	SIREN/PUBLIC ADDRESS SYSTEM	Inspect	.25					1	
		Replace		1.0				1	A
	EXTERNAL SPEAKER	Inspect	.25						
		Replace		.50				1	
	HEATER/DEFROSTER	Inspect		1.25					
		Replace		1.25				1	
	STEERING WHEEL	Replace		.50				1, 25	
	STEERING COLUMN	Replace		1.0				1	
	BRUSH GUARD	Replace		.50					
	GRILLE	Replace		.50				1	
	HOOD ASSEMBLY	Replace		.75				1	
	RADIATOR SE'PPORT	Replace		.50				1	
	MIRRORS	Replace		.50				1	
	DOORS	Replace		1.0				1	
		Adjust		.50				1	
	SEATS	Replace		1.0				1	
	GLASS	Replace		.50				1.9	
	CAB PANELS	Replace			1.0			37,38, 49, 40	
		Repair			4.0			1, 32, 19, 41, 42	

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
13	ELECTRICAL SYSTEM	Inspect		1.0					
	CAB ELECTRICAL SYSTEM	Replace		4.0			1		
	CHASSIS ELECTRICAL SYSTEM	Replace		4.0			1		
14	PROPELLER SHAFT ASSEMBLY	Service		.50				10	
		Inspect	.50						
	UNIVERSAL JOINTS	Replace		.50				1,11	
	REAR PROPELLER SHAFT	Replace		1.0				1	
	SLIP YOKE, REAR	Replace		.50				1	
	FRONT PROPELLER SHAFT	Replace		1.0				1	
	15	TRANSMISSION ASSEMBLY	Service		.50				
		Inspect		.50					
		Replace		7.0					
		Repair				16.0		1,3, 4 1, 65 thru 141, 54	
REAR RETAINER OIL SEAL		Replace				1.0		1	
16	SHIFT CONTROL LEVER AND LINKAGE	Replace		1.0				1	
	TRANSFER CASE ASSEMBLY	Service		.25				1	
		Inspect		.50					
		Replace		9.0					
	Repair				10.0		1 1, 25, 142 11, 143, 34, 19		
	TRANSFER CASE SHIFT LEVER AND LINKAGE	Replace		1.0					
17	TIRE RIM ASSEMBLY	Service	.25						
		Inspect	.50						
		Align		.50				1	
	Replace		.50				12, 13, 14, 15, 2		
18	AIR BRAKE SYSTEM	Inspect		2.0					
	SLACK ADJUSTER	Replace		1.0				1	
	MAXI-CHAMBERS	Replace		1.0				1	
	COMPRESSOR	Replace		1.0				1	
	Repair				2.0		1, 43, 44		

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
18	AIR BRAKE SYSTEM (Continued).								
	AIR DRYER	Replace Repair		1.0	2.0			1 1, 45	
	SERVICE BRAKES	Service Replace		1.0 1.75				1	
	BRAKE DRUMS	Service Replace		1.0 1.75				1,16,30 1,19	
	AIR LINES AND PIPING	Replace		2.0				1	
	VALVES &ND SWITCHES	Replace		1.0				1	
	AIR TANKS	Replace		1.0				1	
	BRAKE PEDAL	Replace		1.0				1	
19	STEERING ASSEMBLY	Inspect		1.0					A
	PITMAN ARM	Replace		1.0				1	
	TIE RODS	Replace		1.0				1	
	DRAG LLNK	Replace		1.0				1, 17	
20	POWER STEERING SYSTEM	Service Inspect		.50 .75				1	A
	POWER STEERING' GEAR	Replace Repair		1.0	2.0			1 1, 25, 46, 47 1, 11	
	PITMIAN SHAFT SEAL	Replace		1.0				1,18 1,18	
	POWER STEERING PUMP	Replace Repair		1.0	2.0				
21	FRONT SUSPENSION ASSEMBLY	Inspect		1.0					
	SHOCK ABSORBERS	Replace		.75				1,3	
	WHEEL/DRUM	Replace		1.0				1,19	
	BEARLNGS	Replace		.75				1,19	
	SPINDLE	Replace		.75				1	
	STEERIN.K-NUCKLE AND ARM	Replace		1.0				1	
	LEAF SPRINGS AND BUSHIN'GS	Replace		3.0				1,11, 12,22	
22	REAR SUSPENSION ASSEMBLY	Inspect		1.0					

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS:

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			UNIT		INTERMEDIATE	DEPOT			
			C	O	F	H	D		
22	REAR SUSPENSION ASSEMBLY (Continued). LEAF SPRINGS AND BUSHINGS	Replace		3.0				1,12, 22,17	
23	REAR AXLE ASSEMBLY	Inspect Replace		.50 2.75				1,12, 3	
	REAR WHEEL BEARINGS	Replace		.50				1	
	DIFFERENTIAL SIDE GEAR AND PINION	Replace		1.0				1,20	
	AXLE SHAFT	Replace		1.0				1,21	
	HUB AND DRUM ASSEMBLY	Replace		.75				1,19	
24	FRONT AXLE ASSEMBLY	Inspect Replace		.50 2.75				1,12,22	
	FRONT AXLE SHAFT	Replace		1.0				1,23	
	AXLE JOINT ASSEMBLY	Replace		.75				1,23	
25	FRAME ASSEMBLY	Inspect		1.0					
	BUMPERS	Replace		.50				1	
	TOW HOOKS	Replace		.50				1	
	CROSSMEMBERS	Replace			1.0			1	F
	FRAME RAILS	Replace			4.0			1,3,22	F

## Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

NO.	MAINTENANCE CATEGORY	NOMENCLATURE	NSN	TOOL NO.
1	O, F, H	General Mechanics Tool Kit		(SE-2442)
2	C, O	Tire Pressure Gauge		
3	O, F, H	Hoist		
4	O, F, H	Sling		
5	O	Pipe Wrench		
6	O	Oil/Fuel Filter Wrench		
7	O	Fuel Line Nut Wrenches		
8	O	Tension Gauge		
9	O	Seal Tool		
10	O	Grease Gun		
11	O, H	Drift		
12	O, F	Jack		
13	O	Lug Wrench		
14	O	Tire Changing Machine		
15	O, H	Wire Brush		
16	O	Steam Cleaner		
17	O, H	Press		
18	O, F	Suction Pump		
19	O, F, H	Rubber Mallet		
20	O	Roller Type Jack		
21	O	Hammer/Sledge, 5-6 lb		
22	O, F	Jack Stands		
23	O	Vise		
24	F	Plastic Hammer		
25	F, H	Gear Puller		
26	F	Tachometer		
27	F, H	Ring Compressor		
28	F	Lifting Chains		
29	F	Engine Stand		
30	O, F	Lathe		
31	F	Voltmeter		
32	F	Heat Gun		
33	F	Bearing Puller		
34	F, H	Arbor Press		
35	F	Ammeter		
36	F	Test Light		
37	F	Electric Drill		
38	F	Metal Drill Bits		
39	F	Pneumatic Chisel		
40	F	C-Clamps		
41	F	File		
42	F	Grinder		
43	F	3/4 Inch Allen Wrench		
44	F, H	Ring Expander		
45	F	1/2 Inch Diameter Steel Rod		
46	F	Catch Basin		
47	F	Seal Driver		
48	H	Valve Guide Remover		
49	H	Slide Hammer		

## Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

NO.	MAINTENANCE CATEGORY	NOMENCLATURE	NSN	TOOL NO.
50	H	Nozzle Sleeve Puller Adapter		(SE-2587)
51	H	Nozzle Sleeve Installing Tool		(SE-2534)
52	H	Brass Hammer		
53	H	Valve Spring Compressor		
54	H	Dial Indicator		
55	H	Valve Guide Installer		(SE-1943)
56	H	Intake Pre-Cup Puller		(PLT-509-5)
57	H	Exhaust Pre-Cup Puller		(PLT-509-6)
58	H	Crankshaft Pulley Puller		(PLT-514)
59	H	Heat-Resistant Gloves		
60	H	Micrometer		
61	H	Camshaft Bearing Service Set		(SE-2893)
62	H	Universal Wet Sleeve Puller		(PT-502-3)
63	H	Pilot Driver		
64	H	Rockwell Hardness Tester		
65	H	Lifter Tool		(J-6795-01)
66	H	Front Support Lifter		(J-24473)
67	H	Center Support Lifter		(J-24455)
68	H	Gear Unit Lifter		(J-24454)
69	H	Converter End Play Gauge		(J-24470)
70	H	Bearing Installer		(J-23549)
71	H	Converter Pump Hub Roller Bearing Remover and Installer		(J-28435)
72	H	Hydraulic Press		
73	H	Pressure Gauge		
74	H	Stator Base Plate		(J-29521-1)
75	H	Stator Top Plate		(J-29521-2)
76	H	Fixture Stand		(J-25587-1)
77	H	Rivet Remover Pin		(J-29121-3)
78	H	Stator Staking Tool		(J-29121-1)
79	H	Turbine Base Plate		(J-29375-1)
80	H	Guide Plate		(J-29375-2)
81	H	Turbine Staking Tool		(J-29375-3)
82	H	Rivet Remover Tool		(J-29375-4)
83	H	Drill Bushing		(J-29375-5)
84	H	Bushing Installer		(J-24648)
85	H	Adjusting Ring Tool		(J-24314)
86	H	Valve Body Parts Tray Set		(J-33163)
87	H	Valve Pin Remover		(J-24412-2)
88	H	Slide Hammer		(J-6125-1)
89	H	Main Pressure Regulator and Lockup Spring Compressor		(J-24459-A)
90	H	Spring Compressor Adapter		(J-24459-5)
91	H	Gauge		(J-29198-2)
92	H	Oil Seal Installer		(J-24449)
93	H	Slide Gauge Tool		(J-26857)
94	H	Centering Band		(J-24461)
95	H	Valve Pin Installer		(J-24458)
96	H	Compressor Tool		(J-6438-01)



## Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

NO.	MAINTENANCE CATEGORY	NOMENCLATURE	NSN	TOOL NO.
97	H	Forward Clutch Clearance Gauge		(J-26917)
98	H	Compressor Base		(J-24204-2)
99	H	Fourth Clutch Clearance Gauge		(J-26917)
100	H	Center Support Bushing Installer		(J-24794)
101	H	Lockring Installer		(J-24453)
102	H	Planetary Rebuilding Set		(J-25587-01)
103	H	Bushing Installer Tool		(J-24469)
104	H	Main and Output Shaft Orifice Installer		(J-24369)
105	H	Output Shaft Bearing Installer		(J-24451)
106	H	Driver Handle		(J-8092)
107	H	Output Shaft Oil Seal and Dust Shield Remover		(J-24171)
108	H	First Clutch Spring Compressor		(J-24452)
109	H	Governor Support Pin Remover		(J-28708)
110	H	Governor Support Pin Installer		(J-28684)
111	H	Selector Shaft Seal Remover		(J-26401)
112	H	Selector Shaft Seal Installer		(J-26282)
113	H	Compressor Base		(J-24475-1)
114	H	Compressor Bar		(J-24475-2)
115	H	Center Bolt		(J-23717-1)
116	H	Center Support Selective Snapping Gauge		(J-34127)
117	H	Second Clutch Gauge		(J-26915)
118	H	Third Clutch Gauge		(J-26916)
119	H	Front Support Block		(J-25587-4)
120	H	Center Support Block		(J-25587-4)
121	H	Rear Support Block		(J-25587-3)
122	H	Front Pin Remover		(J-25587-16)
123	H	Center Pin Remover		(J-25587-16)
124	H	Rear Pin Remover		(J-25587-16)
125	H	Rear Pin Remover and Installer Adapter		(J-25587-2)
126	H	Rear Pin Remover and Installer Spacer		(J-25587-6)
127	H	Front Loading Pin		(J-25587-22)
128	H	Center Loading Pin		(J-25587-18)
129	H	Rear Loading Pin		(J-25587-18)
130	H	Front Guide Pin		(J-25587-50)
131	H	Center Guide Pin		(J-25587-48)
132	H	Rear Guide Pin		(J-25587-48)
133	H	Front Installer		(J-25587-13)
134	H	Center Installer		(J-25587-11)
135	H	Rear Installer		(J-25587-12)
136	H	Front Swaging Tool Holder		(J-25587-17)
137	H	Center Swaging Tool Holder		(J-25587-17)
138	H	Rear Swaging Tool Holder		(J-25587-17)
139	H	Front Swaging Tool		(J-25587-27)
140	H	Center Swaging Tool		(J-25587-23)
141	H	Rear Swaging Tool		(J-25587-23)
142	H	Magnet		
143	H	Alignment Tool		Kelsey Hayes (866-271)

**Section IV. REMARKS**

REFERENCE CODE	REMARKS
A	Operational test.
B	Repair by authorized dealer only.
C	Repair by replacing unserviceable parts.
D	Repair of motor is not authorized.
E	Repair by replacing unserviceable lamps only.
F	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 Twin Agent 4x4 Firefighting Truck to help you inventory items required for safe and efficient operation.

**C-2. GENERAL.**

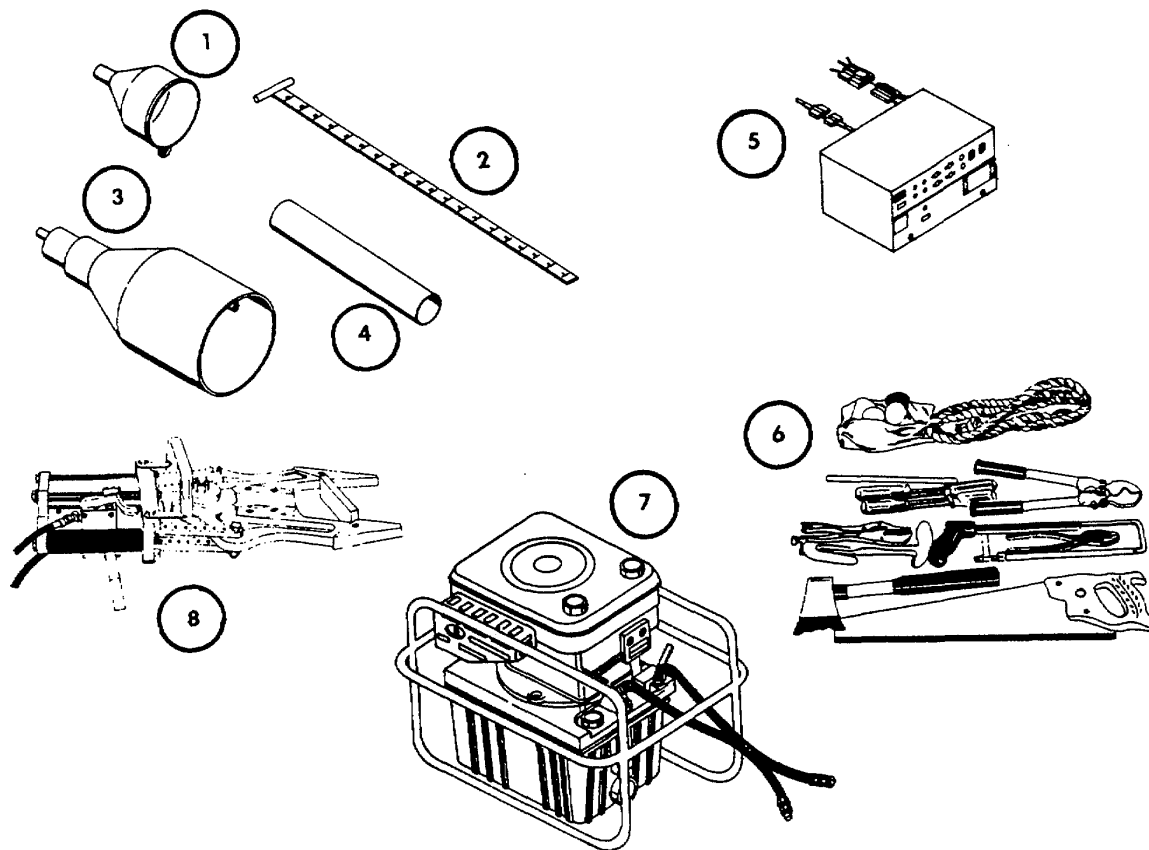
The Components of End Item and Basic Issue Item Lists are divided into the following sections:

- 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 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 Twin Agent 4x4 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 Twin Agent 4x4 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 FS CM (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).
- 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



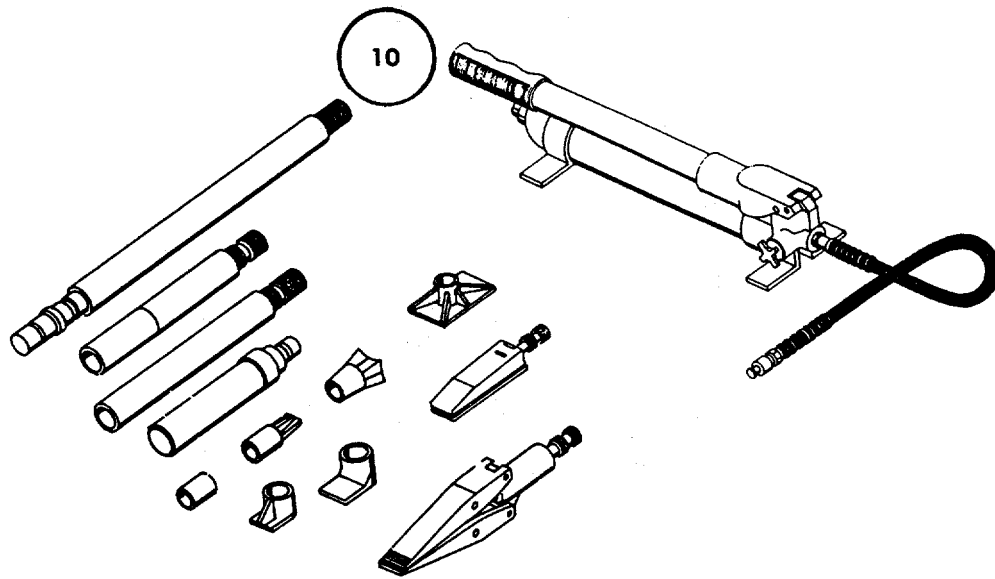
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PAR NUMBER	(4) USUABLE ON CODE UM	(5) QTY. RQR
1		Funnel, Polyethylene (38205) DUN-3009	EA	1
2		Rod, Measuring (38302) 603424B001	EA	1
3		Funnel, Steel (38205) 101511D001	EA	1
4		Tube, Filler (38205) 603426B001	EA	1
5		Inverter (57054) A40120	EA	1
6	4210-00-900-8557	Kit, Rescue, Aircraft Crash (12183) CRK5	EA	1
7		Power Unit, Hydraulic Rescue Tool (67311) 9999-0003	EA	1
8		Tool, Hydraulic Rescue (67311) 9999-0017	EA	1

COMPONENTS OF END ITEM (Continued)



(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PAR NUMBER	(4) USUABLE ON CODE UM	(5) QTY. RQR
9		Kit, Rescue Saw (30978) 800287  Saw 800285 Case 098200 Tool Kit 098306 Drive Belt 305240 Pre-Air Filter 315533 Main Air Filter 315530 2-Cycle Oil 700230 Gas Can 700219 Goggles 700235 Gasoline Stabilizer 700225 Carbide Blade 700200 Abrasive Wheel 700100 Abrasive Wheel 700150 Hearing Protector 098156 Instruction Book 701042	EA	1

COMPONENTS OF END ITEM (Continued).



(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) USUABLE ON CODE	(5) QTY TM RQR
10		Kit, 10 Ton, Hydraulic Rescue (26952) 65066  Hydraulic Pump      65420 Hydraulic Hose      65593 Tube, 10 in.          65610 Tube, 28 in.          65628 Tube, 5 in.            65605 Tube, 18 in.          65618 Ram. 10 Ton          65452 Saddle                65637 Wedge                 65639 V Base. 90'          65638 Flat Base              65640 Wedge Ram            65445 Toe Ram                65543 Plunger                65642 Spread Ram            65447	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 Twin Agent 4x4 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	MIL-A-46153	Antifreeze, Ethylene Glycol	gl
3	O	MIL-F-24385	Aqueous Film Forming Foam (AFFF)	gl
4	O		Block, wood	ea
5	O		Brake adjustment gauge	ea
6	O	MIL-B-46176	Brake fluid, silicone	gl
7	O		Brush, brass bristle	ea
8	O		Brush, medium bristle	ea
9	O		Brush, soft bristle	ea
10	O		Cartridge, adhesive	ea
11	O	Essex No. SCD551.2 (83527)	Cartridge, adhesive urethane	ea
12	O, F		Cloth, crocus, 400 grain	ea
13	O		Cloth, emery, fine	ea
14	O, F, H		Cloth, soft, lint-free	ea
15	O, F, H		Coolant	gl
16	O	O-D-1407	Dry chemical, potassium bicarbonate (P-K-P)	lb
17	F		Filler	gl
18	O	VV-F-800	Fluid, diesel	gl
19	O		Fluid, power steering	gl
19A	O	VV-G-1690C	Gasoline, leaded or unleaded	gl
20	O	MIL-G-10924	Grease, lubricating automotive	lb
21	O	MIL-G-23549	Grease, lubricating general purpose	lb
22	O	MIL-G-813220	Grease, lubricating wide temperature	lb
23	O	MIL-G-813220	Ink, bluing	ea



## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

ITEM NO.	CATEGORY	SPECIFICATION	DESCRIPTION	U/M
24	O, H		Jelly, petroleum	lb
25	O	General Motors No. 9636067 (92677)	Kit, service, adhesive	ea
26	O, F		Kit, repair, hot melt adhesive	ea
27	O, H	Navistar No. 577588C1 (89346)	Loctite	oz
28	O, H	General Motors No. 1050677 (92677)	Lubricant	lb
29	O, H	General Motors No.1052365 (92677)	Lubricant	lb
30	O	General Motors No. 1051717 (92677)	Lubricant, rubber	gl
31	O		Lubricant, rubber, non-silicone based	gl
32	O		Lubricant, silicone	gl
33	O		Lubricant, speedometer	gl
34	O		Lubricant	lb
35	O, H		Molykote	gl
36	O	MIL-L-2105C	Oil, gear, multipurpose	gl
37	O	MIL-L-2104C	Oil, lubricating	gl
38	O	DEXRON II	Oil, transmission	gl
39	O		Oil, vegetable	gl
40	F	MIL-T-704	Paint, gloss lime yellow	gl
40A	H		Plastigage	ea
41	O	Essex No. SCD435.20 (83527)	Primer, black gloss	gl

## Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

ITEM NO.	CATEGORY	SPECIFICATION	DESCRIPTION	U/M
42	O	Essex No. SCD435.18 (83527)	Primer, clear gloss	gl
43	O	Essex No. SCD435.34 (83527)	Primer, pinchweld	ea
34	F	Putty		gl
45	O, H	General Motors No. 1052915 (92677)	RTV sealant	gl
46	O, F	Sandpaper, fine		ea
47	O	General Motors No. 1052080 (92677)	Sealant	gl
48	O, H	General Motors No. 1052080 (92677)	Sealant	gl
49	O, H	General Motors No. 1052356 (92677)	Sealant, anerobic	gl
50	O, H	General Motors No. 1052357 (92677)	Sealant, anerobic	gl
51	F	Type I	Sealant, body	lb
52	O	MIL-S-81733	Sealing compound, pipe joint and thread	oz
53	O, F, H		Solder	ea
54	O, H	P-D-680, Type II	Solvent, cleaning	gl
54A	H		Thermomelt Crayon	ea
55	O		Towel. shop	ea
56	O		Windshield washer fluid	gl

**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 performances 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 listing 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 item 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.
- f. *Qty. Inc. in Unit (Column 7)*. The Quantity Incorporated 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	P/N	Part Number
GPM	Gallons Per Minute	psi	pounds per square inch
LH	Left Hand	qty	quantity
max	maximum	RH	Right Hand
mfg	manufacturing	rpm	revolutions per minute
min	minimum or minute	U/M	Unit of Measure
No.	number(s)	wt.	weight
NSS	Not Sold/Service Separately		

**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 INDEX OF FSCM NUMBERS**

07337	Red Dot/L. E. Mason Company 98 Business Street Boston, MA 02136	16764	Delco Remy Division General Motors Corporation 2401 Columbus Avenue, P.O. Box 2439 Anderson, IN 46018
12183	Halprin Supply Company 3804 S. Broadway Place Los Angeles, CA 90037	19954	Eaton Corporation Fluid Power Operations Marshall Division 1101 W. Hanover Street Marshall, MI 49068
12662	Peterson Manufacturing Company 4200 East 135th Street Grandview, MO 64030	20038	Exide Corporation 101 Gibraltar Road Horsham, PA 19044
13445	Cole-Hersee Company 20 Old Colony Avenue South Boston, MIA 02127	21292	Fabco Division Kelsey-Hayes Company 1249 67th Street, P.O. Box 8276 Oakland, CA 94662

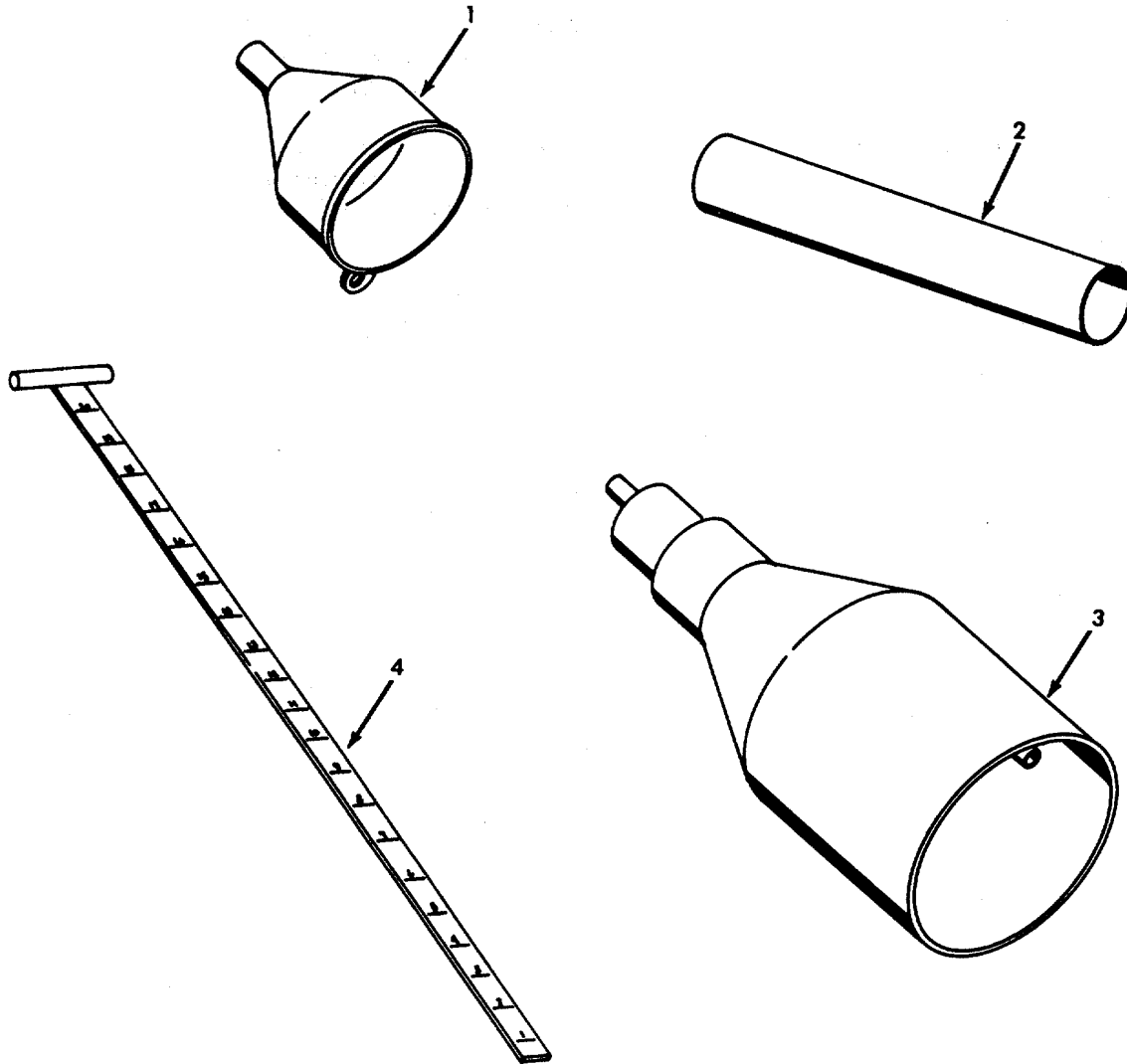
26952	Enerpac (Blackhawk) Division of Applied Power, Inc. 13000 W. Silver Springs Drive Butler, WI 53007	70418	Airow Safety Device Company Holman Street Mt. Holly, N,J 08060
31211	Motorola, Inc. Motorola Automotive Products Division 1299 East Algonquin Road Schaumburg, IL 60196	73342	General Motors Corporation Detroit Diesel Allison Division 1100 Main Street, Plant 2A P.O. Box 894 E7 Indianapolis, IN 46206
35510	Leece-Neville Cleveland Division Sheller-Globe Corporation 1374 East 51st Street Cleveland, OH 44103	74545	Harvey Hubbell, Inc. 584 Derby Milford Road Orange, CT 06477
38205	CDN Research and Development Limited Division of Nordic International 1044 Rangeview Road Mississauga, Ontario, Canada L5E 1H3	75582	Leviton Manufacturing, Inc. 59-25 Little Neck Parkway Little Neck, NY 11362
40342	Midland-Ross Corporation 20600 Chagrin Boulevard Cleveland, OH 44122	76123	Mars Signal Light 1224 Industrial Boulevard Naples, FL 33942
57054	Dynamote Corporation 1200 W. Nickerson Street Seattle, WA 98119	77977	Signal-Stat Corporation 1200 Commerce Avenue Union, NJ 112113
59556	Kovatch Corporation 1 Industrial Complex Nesquehoning, PA 18240	78977	Unity Manufacturing Company 1260 N. Claybourn Avenue Chicago, IL 60610
60319	South Park Corporation 1019 North Concord Street, P.O. Box 61 South St. Paul, MN 55075	85925	Emico, Inc. 123 N. Main Street P.O. Box 368 Dublin, PA 18917
66461	Public Safety Equipment 1842 Craig Park Court St. Louis, MO 63146	89346	International Harvester Truck Branch 6125 Urbana Road, P.O. Box 600 Springfield, OH 45501
67311	F. M. Brick Industries, Inc. 254A County Line Road Hatboro, PA 19040	9D455	Thomas Body Parts, Inc. 1001 Rockland Street Reading, PA 19604
7F200	Havis-Shields Equipment Corporation Box 533 Willow Grove, PA 19090	93395	National Auto Glass Specifications, Inc. 9050 Livernois Detroit, MI 48204
		94222	Southco, Inc. 210 N. Brinton Lake Road Concordville, PA 19331

## ALPHABETICAL INDEX OF FSCM NUMBERS

70418	Arrow Safety Device Company Holman Street Mt. Holly, NJ 08060	73342	General Motors Corporation Detroit Diesel Allison Division 1100 Main Street Plant 2A P.O. Box 894 E7 Indianapolis, IN 46206
38205	CDN Research and Development Limited Division of Nordic International 1044 Rangeview Road Mississauga, Ontario, Canada L5E 1H3	12183	Halprin Supply Company 3804 S. Broadway Place Los Angeles, CA 90037
13445	Cole-Hersee Company 20 Old Colony Avenue South Boston, MA 02127	7F200	Havis-Shields Equipment Corporation Box 533 Willow Grove, PA 19090
16764	Delco Remy Division General Motors Corporation 2401 Columbus Avenue, P.O. Box 2439 Anderson, IN 46018	74545	Harvey Hubbell, Inc. 584 Derby Milford Road Orange, CT 06477
57054	Dynamote Corporation 1200 W. Nickerson Street Seattle, WA 98119	89346	International Harvester Truck Branch 6125 Urbana Road, P.O. Box 600 Springfield, OH 45501
19954	Eaton Corporation Fluid Power Operations Marshall Division 1101 W. Hanover Street Marshall, MI 49068	59556	Kovatch Corporation 1 Industrial Complex Nesquehoning, PA 18240
85925	Emico, Inc. 123 N. Main Street P.O. Box 368 Dublin, PA 18917	35510	Leece-Neville Cleveland Division, Sheller Globe Corporation 1374 East 51st Street Cleveland, OH 44103
26952	Enerpack (Blackhawk) Division of Applied Power Inc. 13000 W. Silver Springs Drive Butler, WI 53007	75582	Leviton Manufacturing, Inc. 59-25 Little Neck Parkway Little Neck, NY 11362
20038	Exide Corporation 101 Gibraltar Road Horsham, PA 19044	76123	Mars Signal Light 1224 Industrial Boulevard Naples, FL 33942
21292	Fabco Division Kelsey-Hayes Company 1249 67th Street, P.O. Box 8276 Oakland, CA 94662	40342	Midland-Ross Corporation 20600 Chagrin Boulevard Cleveland, OH 44122
67311	F. M. Brick Industries, Inc. 254A County Line Road Hatboro, PA 19040	31211	Motorola, Inc. Motorola Automotive Products Division 1299 East Algonquin Road Schaumburg, IL 60196

93395	National Auto Glass Specifications, Inc. 9050 Livernois Detroit, MI 48204	94222	Southco, Inc. 210 N. Brinton Lake Road Concordville, PA 19331
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
66461	Public Safety Equipment 1842 Craig Park Court St. Louis, MO 63146	9D455	Thomas Body Parts, Inc. 1001 Rockland Street Reading, PA 19604
07337	Red Dot/L. E. Mason Company 98 Business Street Boston, MA 02136	78977	Unity Manufacturing Company 1260 N. Claybourn Avenue Chicago, IL 60610
77977	Signal-Stat Corporation 1200 Commerce Avenue Union, NJ 11211		

GROUP 00 TWIN AGENT 4x4 FIREFIGHTING TRUCK  
Section II. REPAIR PARTS LIST



GROUP 01. ACCESSORIES

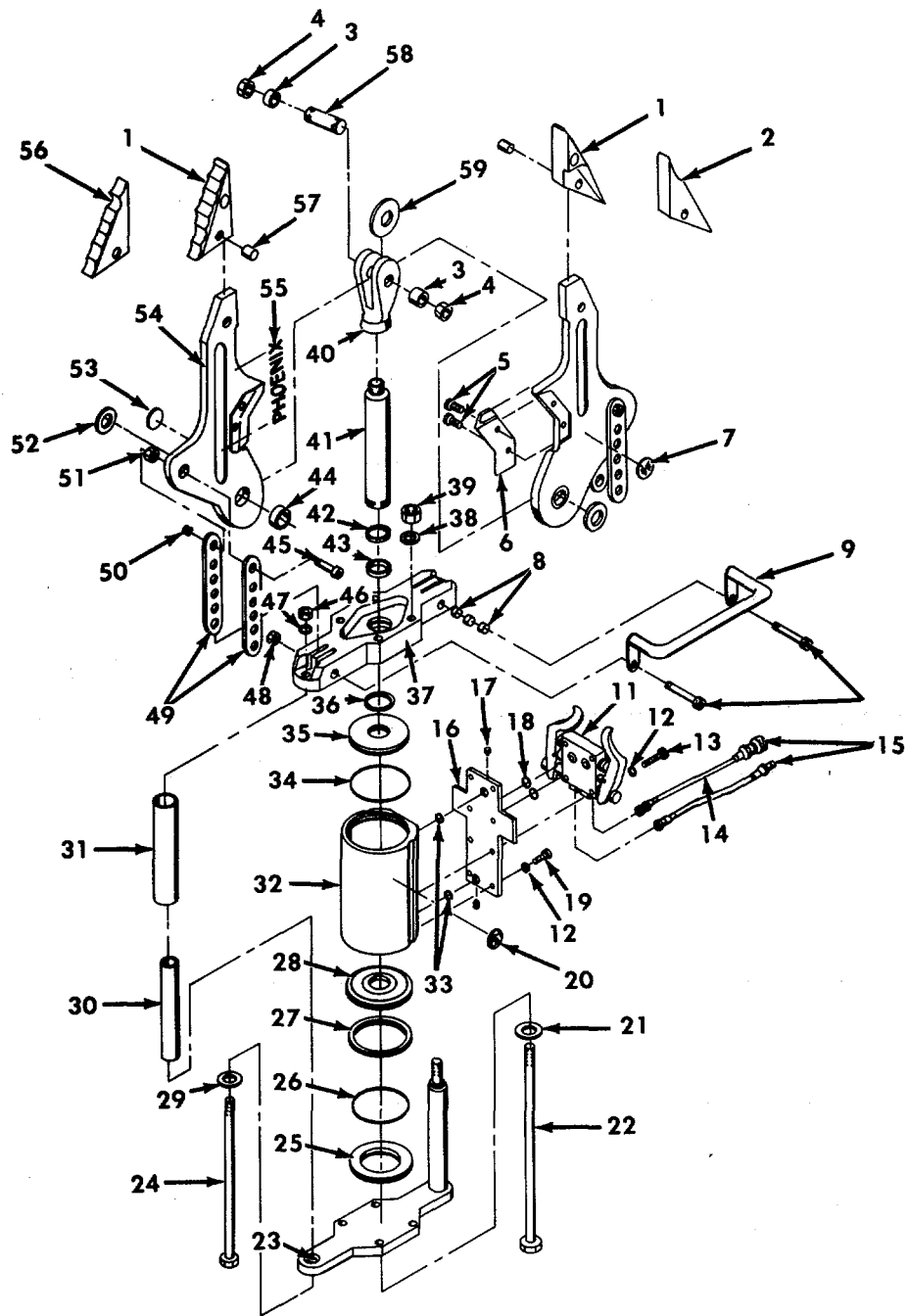
FIGURE E-1. ACCESSORIES



Group 01. Accessories

Figure E-1. Accessories

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	DUN-3009	59556	138-00028	POLETHEYLENE FUNNEL	1
2	38205	603426B001	59556	138-00029	FILLER TUBE	1
3	38205	101511D001	59556	138-00027	STEEL FUNNEL	1
4	38205	603424B001	59556	138-00030	MEASURING ROD	1



GROUP 02. AUXILIARY FIREFIGHTING EQUIPMENT

FIGURE E-2. HYDRAULIC RESCUE TOOL

Group 02. Auxiliary Firefighting Equipment

Figure E-2. Hydraulic Rescue Tool

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	67311	9999-0017	59556	138-00016	HYDRAULIC RESCUE TOOL	1
1	67311	1232-0001	59556	138-00016-1	JAW	2
2	67311	1248-0008	59556	138-00016-2	AIRCRAFT CUTTER JAW	1
3	67311	1236-0015	59556	138-00016-3	YOKE BUSHING	2
4	67311	1231-0017	59556	138-00016-4	PIVOT NUT	2
5	67311	1231-0001	59556	138-00016-5	FLAT HEAD SCREW	1
6	67311	1236-0016	59556	138-00016-6	CUTTER BLADE	1
7	67311	1242-0006	59556	138-00016-7	DIRECTIONAL DECAL	1
8	67311	1236-0039	59556	138-00016-8	LINK-TOP BUSHING	1
9	67311	1236-0038	59556	138-00016-9	STEEL SIDE HANDLE	1
10	67311	1231-0031	59556	138-00016-10	LINK BOLT	1
11	67311	9999-0014	59556	138-00016-11	VALVE ASSEMBLY	1
12	67311	1231-0020	59556	138-00016-12	HICOLLAR LOCKWASHER	1
13	67311	1231-0034	59556	138-00016-13	VALVE/SUBPLATE SCREW	1
14	67311	1242-0001	59556	138-00016-14	SINGLE LINE HOSE, 12 inches	1
15	67311	1241-0002	59556	138-00015-10	CONNECTOR SET	1
16	67311	1236-0035	59556	138-00016-16	VALVE SUBPLATE	1
17	67311	1231-0040	59556	138-00016-17	SUBPLATE PLUG	1
18	67311	1238-0009	59556	138-00016-18	FACE SEAL	1
19	67311	1231-0033	59556	138-00016-19	SUBPLATE SCREW	1
20	67311	1242-0007	59556	138-00016-20	DECAL, Round	1
21	67311	1231-0037	59556	138-00016-21	CYLINDER WASHER	1
22	67311	1231-0027	59556	138-00016-22	CYLINDER BOLT	1

Group 02. Auxiliary Firefighting Equipment

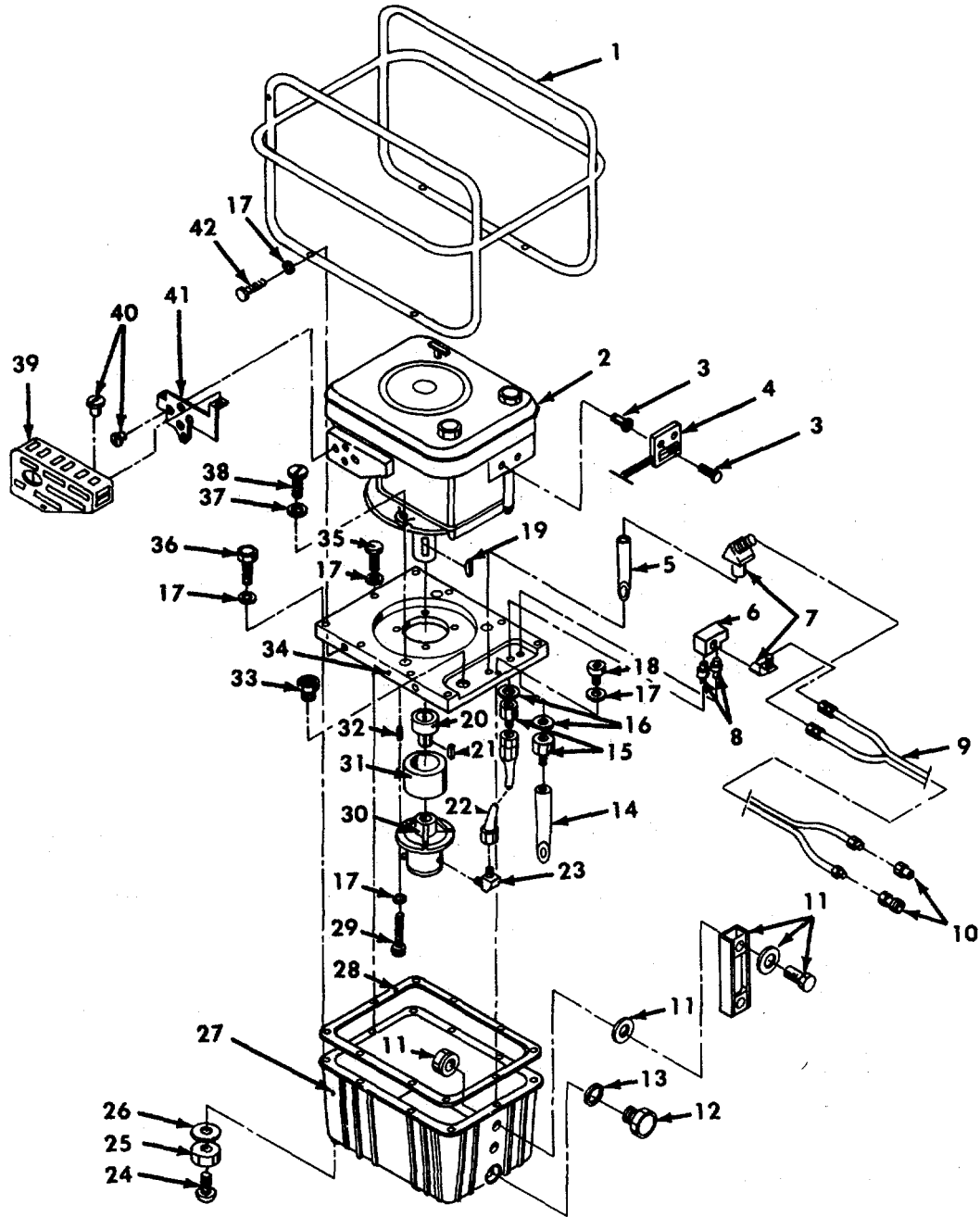
Figure E-2. Hydraulic Rescue Tool

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	67311	1236-0030	59556	138-00016-23	CYLINDER BASE	1
24	67311	1231-0029	59556	138-00016-24	HANDLE BOLT	1
25	67311	1236-0033	59556	138-00016-25	BASE CYLINDER PLUG	1
26	67311	1238-0012	59556	138-00016-26	CYLINDER PLUG SEAL	1
27	67311	1238-0006	59556	138-00016-27	PISTON, "T" Seal W/ B. U.	1
28	67311	1236-0012	59556	138-00016-28	PISTON	1
29	67311	1231-0036	59556	138-00015-16	HANDLE FLAT WASHER	1
30	67311	1236-0034	59556	138-00016-30	ALUMINUM HANDLE	1
31	67311	1236-0037	59556	138-00016-31	ALUMINUM HANDLE COVER	1
32	67311	1236-0036	59556	138-00016-32	CYLINDER	1
33	67311	1238-0014	59556	138-00016-33	SUBPLATE SEAL	1
34	67311	1238-0012	59556	138-00016-34	CYLINDER PLUG SEAL	1
35	67311	1236-0032	59556	138-00016-35	TOP CYLINDER PLUG	1
36	67311	1238-0003	59556	138-00016-36	PISTON ROD, "T" Seal W/B.U.	1
37	67311	1236-0029	59556	138-00016-24	CYLINDER TOP	1
38	67311	1231-0037	59556	138-00016-21	CYLINDER WASHER	1
39	67311	1231-0028	59556	138-00016-39	CYLINDER LOCK NUT	1
40	67311	1236-0017	59556	138-00016-40	YOKE	1
41	67311	1236-0011	59556	138-00016-41	PISTON ROD	1
42	67311	1238-0002	59556	138-00016-42	PISTON ROD SCRAPER	1
43	67311	1236-0007	59556	138-00016-43	PISTON ROD BUSHING	1
44	67311	1236-0027	59556	138-00016-44	ARM YOKE BUSHING	1
45	67311	1231-0024	59556	138-00016-45	ARM SHOULDER BOLT	1

Group 02. Auxiliary Firefighting Equipment

Figure E-2. Hydraulic Rescue Tool

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
46	67311	1231-0030	59556	138-00016-46	HANDLE NUT	1
47	67311	1231-0038	59556	138-00016-47	HANDLE LOCK WASHER	1
48	67311	1231-0032	59556	138-00016-48	LINK NUT	1
49	67311	1236-0031	59556	138-00016-49	SEVEN HOLE LINK	1
50	67311	1231-0025	59556	138-00016-50	ARM LOCKNUT	1
51	67311	1236-0026	59556	138-00016-51	ARM LINK BUSHING	1
52	67311	1237-0005	59556	138-00016-52	BELLEVILLE WASHER	1
53	67311	1248-0006	59556	138-00016-53	DIRCTIONAL DECAL SET	1
54	67311	1236-0023	59556	138-00016-54	ALUMIMUN ARM	1
55	67311	1248-0008	59556	138-00016-55	DECAL	1
56	67311	1248-0007	59556	138-00016-56	AIRCRAFT SPREADER JAW	1
57	67311	1235-0002	59556	138-00016-57	JAW PIN	1
58	67311	1231-0005	59556	138-00016-58	PIVOT BOLT	1
59	67311	1236-0020	59556	138-00016-59	BRONZE ARM BEARING	1



GROUP 02. AUXILIARY FIREFIGHTING EQUIPMENT  
 FIGURE E-3. HYDRAULIC RESCUE TOOL POWER UNIT  
 E-12

Group 02. Auxiliary Firefighting Equipment

Figure E-3. Hydraulic Rescue Tool Power Unit

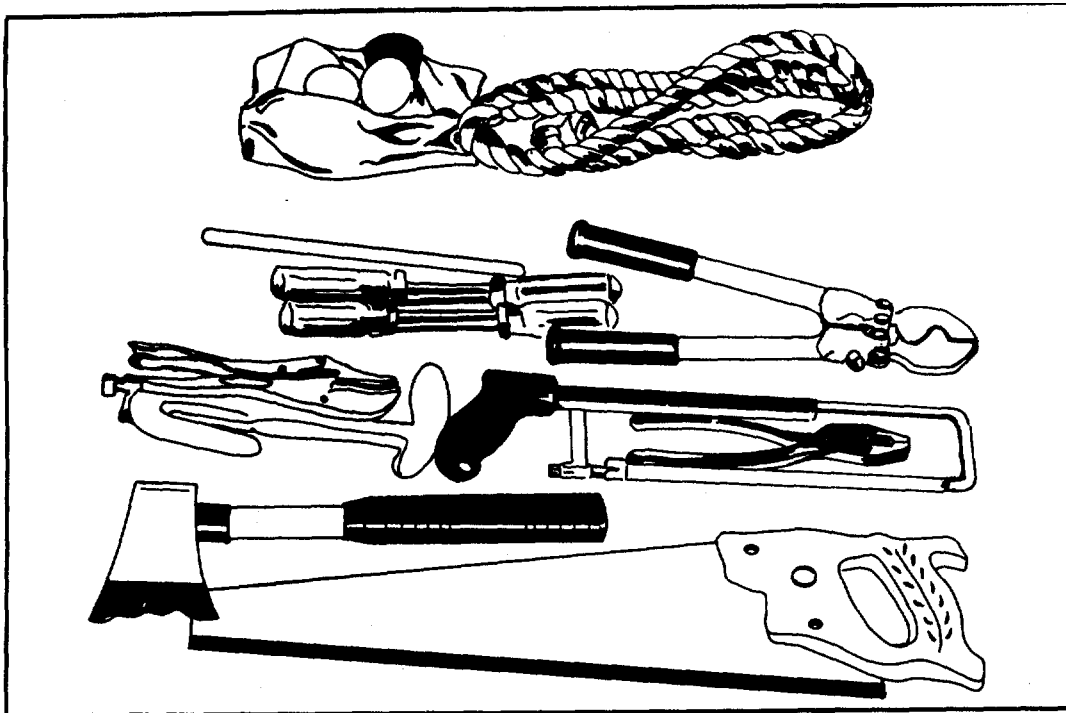
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	67311	9999-0003	59556	138-00015	HYDRAULIC RESCUE TOOL AND POWER UNIT ASSEMBLY	1
1	67311	6236-0014	59556	138-00015-1	ROLL CAGE	1
2	67311	6236-0003	59556	138-00015-2	ENGINE	1
3	67311	6231-0011	59556	138-00015-3	THROTTLE SCREW	2
4	67311	6236-0012	59556	138-00015-4	THROTTLE CONTROL	1
5	67311	6236-0016	59556	138-00015-5	RETURN TUBE	1
6	67311	6236-0018	59556	138-00015-6	DUMP VALVE	2
7	67311	6241-0001	59556	138-00015-7	TWIN HOSE FITTING	2
8	67311	6241-0003	59556	138-00015-8	DUMP VALVE FITTING	2
9	67311	1242-0002	59556	138-00015-9	TWIN HOSE, 15 foot	1
10	67311	1241-0002	59556	138-00015-10	CONNECTOR SET	1
11	67311	6236-0021	59556	138-00015-11	LIQUID LEVEL GAUGE	1
12	67311	6231-0012	59556	138-00015-12	DRAIN PLUG	1
13	67311	6238-0001	59556	138-00015-13	DRAIN PLUG SEAL	1
14	67311	6236-0017	59556	138-00015-14	DUMP TUBE	1
15	67311	6241-0004	59556	138-00015-15	CLAMP FITTING	2
16	67311	1231-0036	59556	138-00015-16	CLAMP FITTING WASHER	3
17	67311	6231-0018	59556	138-00015-17	LOCKWASHER	18
18	67311	6231-0010	59556	138-00015-18	FRONT COVER SCREW	1
19	67311	6231-0008	59556	138-00015-19	ENGINE KEY	1
20	67311	6236-0005	59556	138-00015-20	ENGINE, Pump Adapter	1
21	67311	6231-0009	59556	138-00015-21	PUMP KEY	1

Group 02. Auxiliary Firefighting Equipment

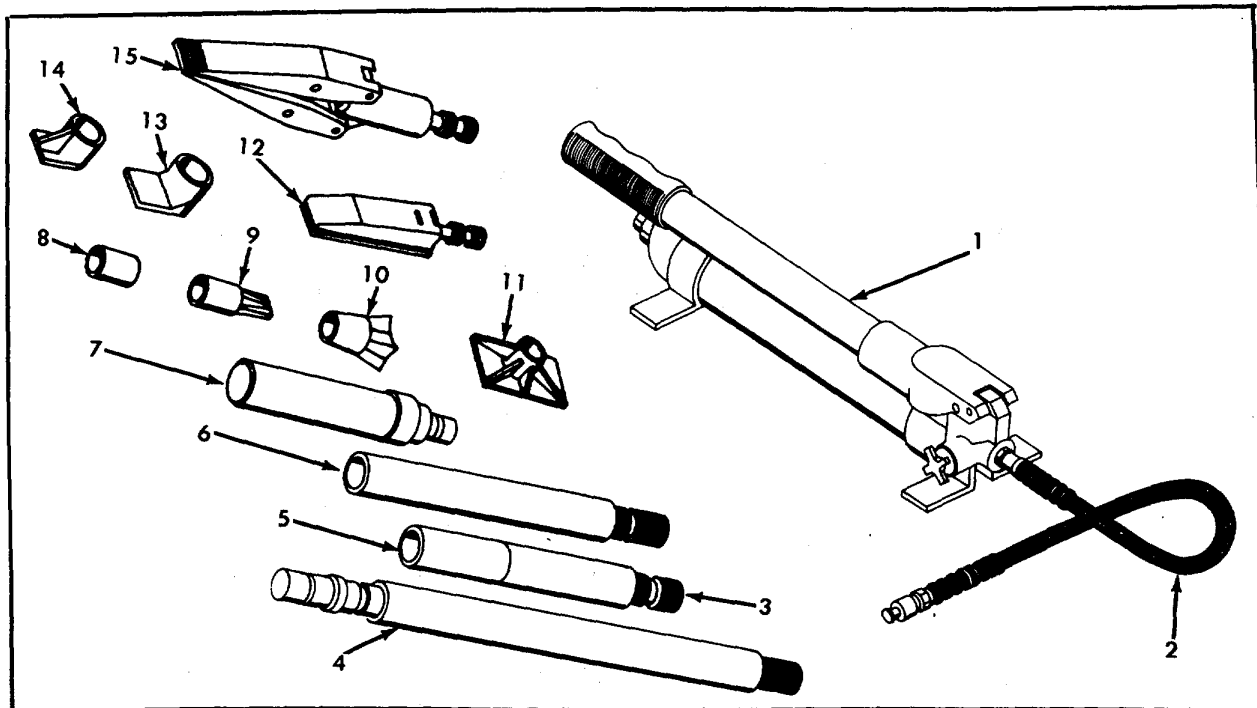
Figure E-3. Hydraulic Rescue Tool Power Unit

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	67311	6242-0001	59556	138-00015-22	PRESSURE HOSE	1
23	67311	6241-0002	59556	138-00015-23	PUMP, Hose Fitting	1
24	67311	6231-0004	59556	138-00015-24	SHOCK MOUNT SCREW	4
25	67311	6248-0002	59556	138-00015-25	SHOCK MOUNT	4
26	67311	6231-0015	59556	138-00015-26	SHOCK MOUNT WASHER	4
27	67311	6236-0002	59556	138-00015-27	RESERVOIR	1
28	67311	6236-0011	59556	138-00015-28	RESERVOIR GASKET	1
29	67311	6231-0006	59556	138-00015-29	PUMP BOLT	4
30	67311	6236-0008	59556	138-00015-30	PUMP	1
31	67311	6236-0010	59556	138-00015-31	PUMP SPACER	1
32	67311	1231-0039	59556	138-00015-32	HELICOIL INSERT	4
33	67311	6236-0020	59556	138-00015-33	FILL/BREATHER PLUG	1
34	67311	6236-0006	59556	138-00015-34	COVER PLATE	1
35	67311	6231-0017	59556	138-00015-35	REAR COVER SCREW	1
36	67311	6231-0001	59556	138-00015-36	COVER SCREW	8
37	67311	6231-0003	59556	138-00015-37	ENGINE LOCKWASHER	3
38	67311	6231-0002	59556	138-00015-38	ENGINE BOLT	3
39	67311	6236-0022	59556	138-00015-39	MUFFLER GUARD	1
40	67311	6236-0022	59556	138-00015-39	MUFFLER SCREW	7
41	67311	6236-0022	59556	138-00015-39	MUFFLER BRACKET	1
42	67311	6231-0007	59556	138-00015-42	ROLLCAGE BOLT	4





GROUP 02. AUXILARY FIREFIGHTING EQUIPMENT  
FIGURE E-4. AIRCRAFT CRASH RESCUE TOOL KIT



GROUP 02. AUXILARY FIREFIGHTING EQUIPMENT  
FIGURE E-5. 10 TON HYDRAULIC RESCUE KIT

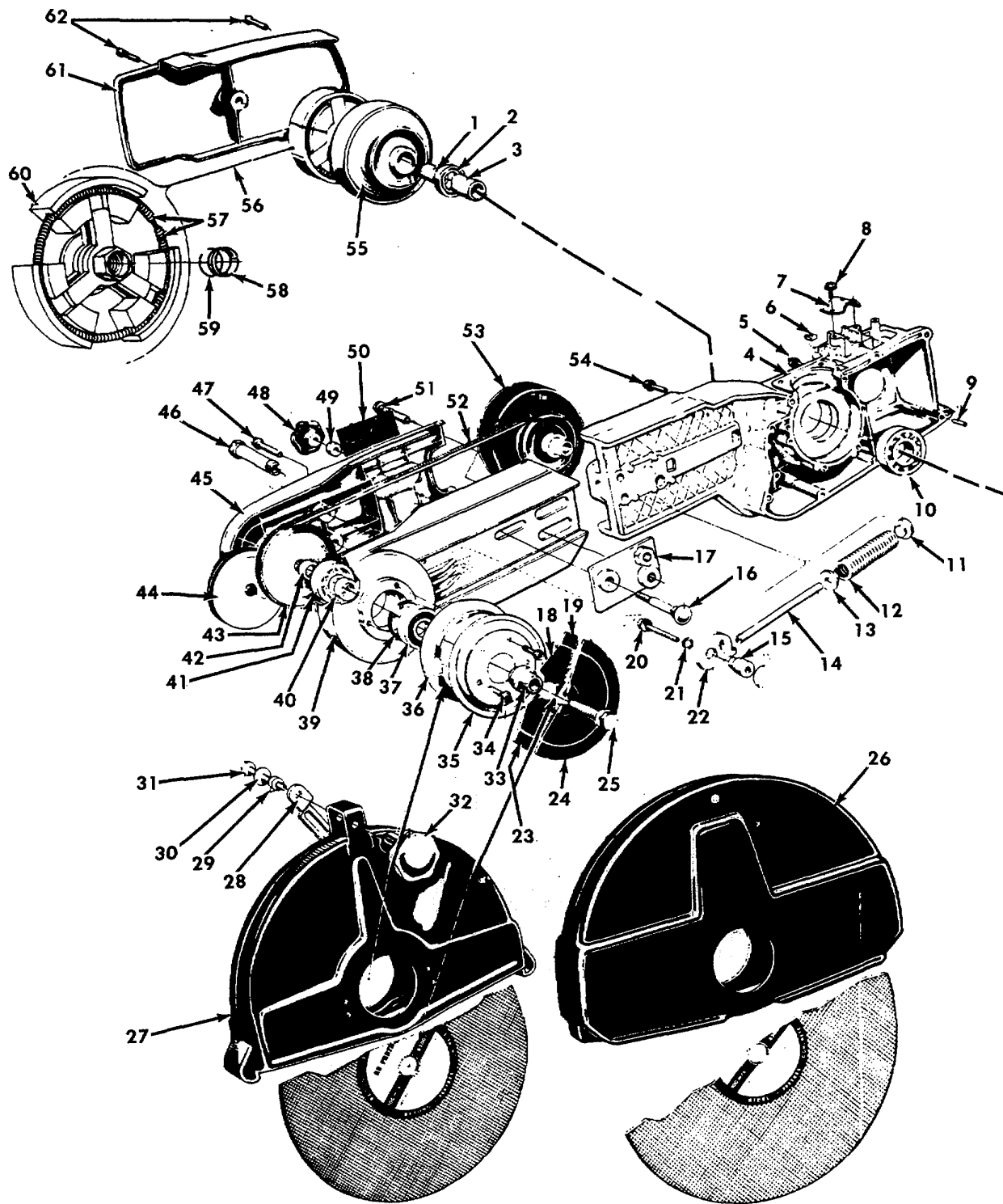
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Group 02. Auxiliary Firefighting Equipment

Figure E-4. Aircraft Crash Rescue Tool Kit

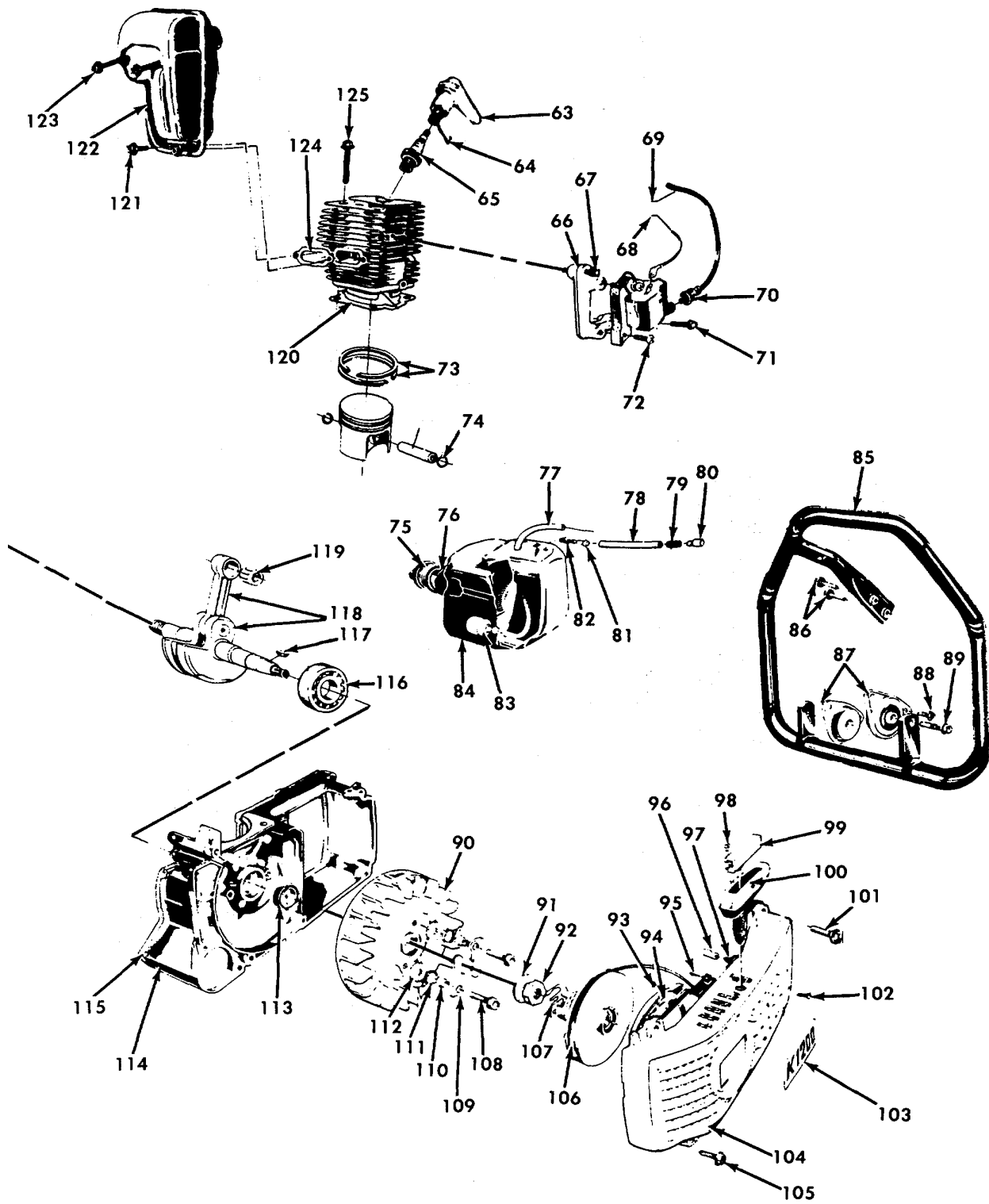
Figure E-5. 10 Ton hydraulic Rescue Kit

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-4	12183	CRK5	59556	138-00031	AIRCRAFT CRASH RESCUE KIT, NSN 4210-00-900-8557	1
E-5	26952	65066	59556	138-00017	10 TON HYDRAULIC RESCUE KIT ASSEMBLY	1
1	26952	65420	59556	138-00017-1	HYDRAULIC PUMP, 10 Ton W/Hose And Handle	1
2	26952	65593	59556	138-00017-2	HOSE, Hydraulic, 6 Feet	1
3	26952	65610	59556	138-00017-3	TUBE, 10 inches	1
4	26952	65628	59556	138-00017-4	TUBE, 28 inches	1
5	26952	65605	59556	138-00017-5	TUBE, 5 inches	1
6	26952	65618	59556	138-00017-6	TUBE, 18 inches	1
7	26952	65452	59556	138-00017-7	RAM, 10 Ton	1
8	26952	65637	59556	138-00017-8	SERRATED SADDLE	1
9	26952	65639	59556	138-00017-9	WEDGE HEAD	1
10	26952	65638	59556	138-00017-10	VEE BASE, 90° Degree	1
11	26952	65640	59556	138-00017-11	FLAT BASE	1
12	26952	65445	59556	138-00017-12	WEDGIE RAM	1
13	26952	65543	59556	138-00017-13	TOE RAM	1
14	26952	65642	59556	138-00017-14	TOE PLUNGER	1
15	26952	65447	59556	138-00017-15	SPRED RAM	1



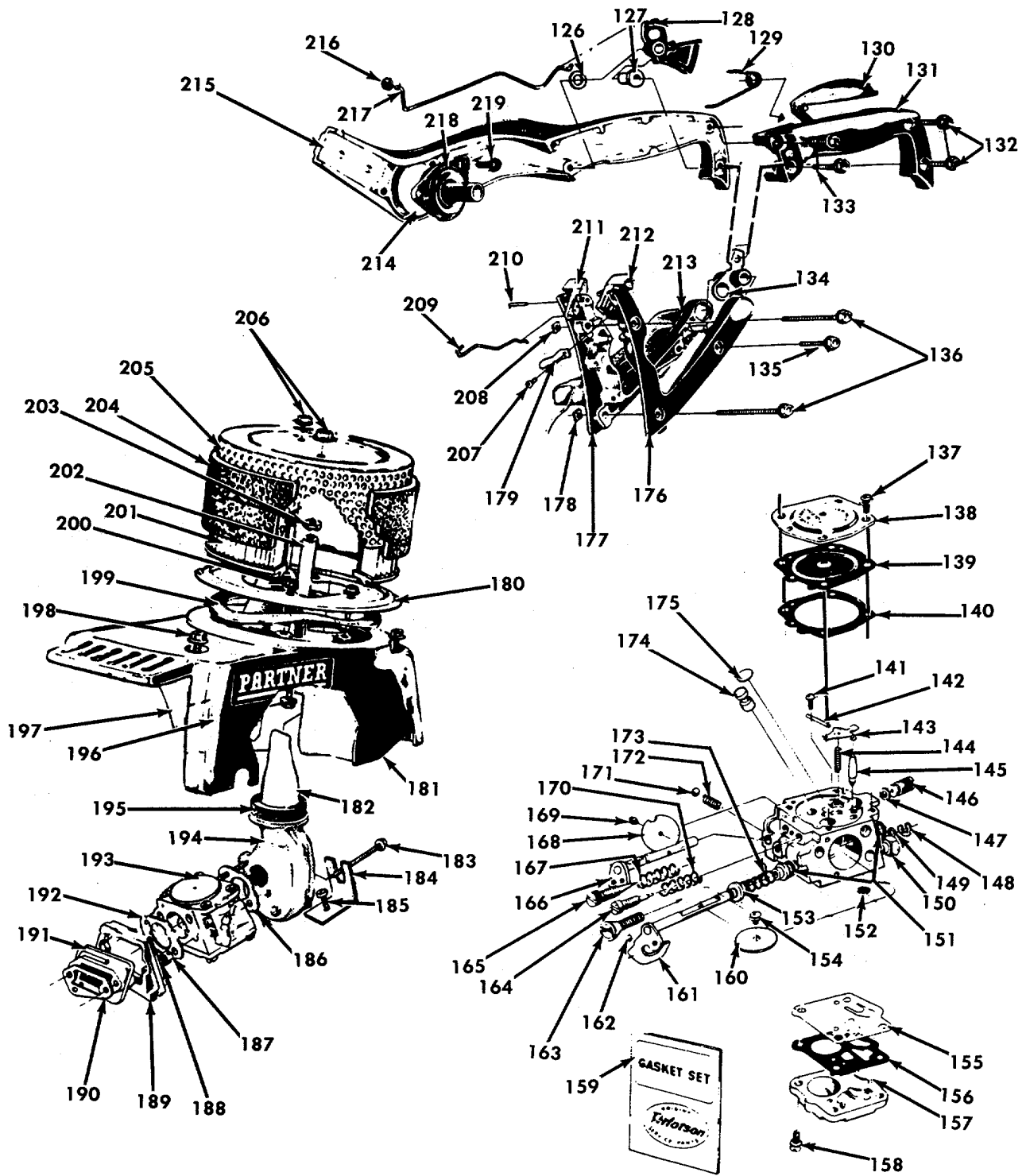
GROUP 02. AUXILIARY FIREFIGHTING EQUIPMENT

FIGURE E-6. RESCUE SAW (SHEET 1 OF 3)L



GROUP 02. AUXILIARY FIREFIGHTING EQUIPMENT

FIGURE E-6. RESCUE SAW (SHEET 2)



GROUP 02. AUXILIARY FIREFIGHTING EQUIPMENT

FIGURE E-6. RESCUE SAW (SHEET 3)L

Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	12183		59556	138-00041	RESCUE SAW, MODEL MK1200	1
2	12183	505302415	59556	138-00041-1	BEARING, Needle	1
3	12183	505275700	59556	138-00041-2	RING, Seal	1
4	12183	505267290	59556	138-00041-3	HUB	1
5	12183	505341205	59556	138-00041-4	HOUSING	1
6	12183	503200009	59556	138-00041-5	SCREW	1
7	12183	503226501	59556	138-00041-6	NUT	1
8	12183	505269160	59556	138-00041-7	PLATE	1
9	12183	503200001	59556	138-00041-8	SCREW	1
10	12183	720130700	59556	138-00041-9	PIN, Cylinder	1
11	12183	503250002	59556	138-00041-10	BEARING, Ball	1
12	12183	505267757	59556	138-00041-11	FLANGE	1
13	12183	505293144	59556	138-00041-12	SPRING	1
14	12183	505267757	59556	138-00041-11	FLANGE	1
15	12183	505202932	59556	138-00041-13	PUSHROD	1
16	12183	505267879	59556	138-00041-14	SPACER	1
17	12183	727646501	59556	138-00041-15	SCREW	1
18	12183	505269195	59556	138-00041-16	PLATE, Nut	1
19	12183	505268353	59556	138-00041-17	WASHER, Flange, 14 inches	1
20	12183	506025301	59556	138-00041-18	WASHER, Flange, 14 inches	1
21	12183	503200001	59556	138-00041-8	SCREW	1
		230035	59556	138-00041-19	WASHER	1

Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	12183	505262172	59556	138-00041-20	ECCENTRIC	1
23	12183	505268333	59556	138-00041-21	WASHER, Flange, 12 inches	1
24	12183	505268339	59556	138-00041-22	WASHER, Flange, 12 inches	1
25	12183	503200041	59556	138-00041-23	SCREW, Flange	1
26	12183	5053504-57	59556	138-00041-24	BLADE GUARD	1
27	12183	5053504-56	59556	138-00041-25	BLADE GUARD	1
28	12183	505350263	59556	138-00041-26	ROD, Cap	1
29	12183	505270609	59556	138-00041-27	GASKET	1
30	12183	503230033	59556	138-00041-28	WASHER	1
31	12183	503200031	59556	138-00041-29	SCREW	1
32	12183	505307307	59556	138-00041-30	KNOB, Lock	1
33	12183	505267682	59556	138-00041-31	CASE, Nave	1
34	12183	503200004	59556	138-00041-32	SCREW	1
35	12183	505268324	59556	138-00041-33	FLANGE, Support	1
36	12183	505262154	59556	138-00041-34	SUPPORT	1
37	12183	503251003	59556	138-00041-35	BEARING, Ball	2
38	12183	503270001	59556	138-00041-36	RING, Lock	1
39	12183	505341215	59556	138-00041-37	ARM, Cutting	1
40	12183	505267291	59556	138-00041-38	SPACER	1
41	12183	503251003	59556	138-00041-35	BEARING	1
42	12183	505267292	59556	138-00041-39	SPACER	1
43	12183	505303692	59556	138-00041-40	V-BELT	1

Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
44	12183	505303691	59556	138-00041-41	PULLEY	1
45	12183	505341210	59556	138-00041-42	GUARD, Arm	1
46	12183	506025001	59556	138-00041-43	SHAFT	1
47	12183	503200008	59556	138-00041-44	SCREW	1
48	12183	505307307	59556	138-00041-30	KNOB, Lock	1
49	12183	505267872	59556	138-00041-45	SPACER	1
50	12183	505397295	59556	138-00041-46	LABEL	1
51	12183	503200042	59556	138-00041-47	SCREW, Flange	1
52	12183	505305240	59556	138-00041-48	V-BELT	1
53	12183	505303756	59556	138-00041-49	DRIVE WHEEL	1
54	12183	503200007	59556	138-00041-50	SCREW	1
55	12183	505303755	59556	138-00041-51	CLUTCH	1
56	12183	505303240	59556	138-00041-52	CLUTCH ACCESSORIES ASSEMBLY	1
57	12183	505294112	59556	138-00041-53	CLUTCH, Spring	1
58	12183	505265903	59556	138-00041-54	CLUTCH, Ring	1
59	12183	505265815	59556	138-00041-55	CLUTCH, Holder	1
60	12183	505303212	59556	138-00041-56	CLUTCH, Weight, Centrifugal	1
61	12183	505341211	59556	138-00041-57	CAP, Clutch	1
62	12183	503200008	59556	138-00041-44	SCREW	1
63	12183	501485401	59556	138-00041-58	CABLE, Ignition	1
64	12183	501485601	59556	138-00041-59	CABLE, Hose	1
65	12183	503235011	59556	138-00041-60	SPARK PLUG	1



Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
66	12183	505340927	59556	138-00041-61	PLATE, Armature	1
67	12183	503200001	59556	138-00041-08	SCREW	1
68	12183	505320192	59556	138-00041-62	CABLE, Primary	1
69	12183	505320179	59556	138-00041-63	CABLE, Spark Plug	1
70	12183	505277516	59556	138-00041-64	CAP, Insulating	1
71	12183	503200001	59556	138-00041-8	SCREW	1
*72	12183	723129751	59556	138-00041-65	SCREW	1
73	12183	501612702	59556	138-00041-66	RING, Piston	1
74	12183	501056401	59556	138-00041-67	RING, Lock	1
75	12183	505312226	59556	138-00041-68	CAP, Fuel Tank	1
76	12183	740481804	59556	138-00041-69	O-RING	1
77	-12183	505310658	59556	138-00041-70	HOSE, Fuel	1
78	12183	505310743	59556	138-00041-71	HOSE	1
79	12183	505315173	59556	138-00041-72	STRAINER	1
80	12183	505312786	59556	138-00041-73	KIT, Vent	1
81	12183	505311148	59556	138-00041-74	NIPPLE	1
82	12183	505277518	59556	138-00041-75	SLEEVE, Cable	1
83	12183	501877601	59556	138-00041-76	FILTER, Fuel	1
84	12183	505318338	59556	138-00041-77	TANK, Fuel	1
85	12183	505350250	59556	138-00041-78	HANDLE, Front	1
86	12183	503200001	59556	138-00041-8	SCREW	1
87	12183	505279517	59556	138-00041-79	ABSORBER	1

## Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
88	12183	503200003	59556	138-00041-80	SCREW	1
89	12183	503200001	59556	138-00041-8	SCREW	1
90	12183	505325621	59556	138-00041-81	FLYWHEEL	1
91	12183	503230101	59556	138-00041-82	WASHER	1
92	12183	503222101	59556	138-00041-83	NUT, Lock	1
93	12183	731231001	59556	138-00041-84	NUT	1
94	12183	505295110	59556	138-00041-85	SPRING, Starter	1
95	12183	503210101	59556	138-00041-184	SCREW	1
96	12183	505310671	59556	138-00041-87	HOSE	1
97	12183	505279197	59556	138-00041-88	PLATE	1
98	12183	505305120	59556	138-00041-89	CABLE	1
99	12183	505269107	59556	138-00041-90	HOUSING	1
100	12183	505307115	59556	138-00041-91	HANDLE, Starter	1
101	12183	503200005	59556	138-00041-92	SCREW	1
102	12183	503203101	59556	138-00041-93	SCREW	1
103	12183	505397328	59556	138-00041-94	LABEL	1
104	12183	505340942	59556	138-00041-95	CASTING, Fan	1
105	12183	503200001	59556	138-00041-8	SCREW	1
106	12183	505303734	59556	138-00041-96	DRUM, Cable	1
107	12183	505297917	59556	138-00041-97	SPRING, Lock	1
108	12183	503200021	59556	138-00041-98	BOLT	1
109	12183	505269179	59556	138-00041-99	PAWL, Starter	1

Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
110	12183	505277566	59556	138-00041-100	NUT, Lock	1
111	12183	505295613	59556	138-00041-101	SPRING	1
112	12183	503230032	59556	138-00041-102	WASHER	1
113	12183	505275715	59556	138-00041-103	RING, Seal	1
114	12183	505341205	59556	138-00041-4	HOUSING	REF
115	12183	505272070	59556	138-00041-104	GASKET	1
116	12183	503250002	59556	138-00041-10	BEARING, Ball	1
117	12183	735880600	59556	138-00041-105	KEY, Woodruff	1
118	12183	505300790	59556	138-00041-106	CRANKSHAFT	1
119	12183	505302331	59556	138-00041-107	BEARING, Needle	1
120	12183	505272082	59556	138-00041-108	GASKET	1
121	12183	503200003	59556	138-00041-80	SCREW	1
122	12183	505350415	59556	138-00041-109	MUFFLER	1
123	12183	503200017	59556	138-00041-110	SCREW	1
124	12183	505272084	59556	138-00041-111	GASKET	1
125	12183	503200005	59556	138-00041-92	SCREW	1
126	12183	503230011	59556	138-00041-112	WASHER	1
127	12183	505267673	59556	138-00041-113	SPACER	1
128	12183	505279103	59556	138-00041-114	CONTROL, Throttle	1
129	12183	505295614	59556	138-00041-115	SPRING	1
130	12183	505279104	59556	138-00041-116	CATCH, Throttle	1
131	12183	505340754	59556	138-00041-117	HANDLE, Left Half	1

Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
132	12183	503200001	59556	138-00041-8	SCREW	1
133	12183	503200008	59556	138-00041-44	SCREW	1
134	12183	505279503	59556	138-00041-118	ABSORBER	1
135	12183	503200001	59556	138-00041-8	SCREW	1
136	12183	503200010	59556	138-00041-119	SCREW	1
137	12183	501221101	59556	138-00041-120	SCREW	1
138	12183	505316462	59556	138-00041-121	COVER, Diaphragm	1
139	12183	501220901	59556	138-00041-122	DIAPHRAGM, Main	1
140	12183	501220801	59556	138-00041-123	GASKET	1
141	12183	501485201	59556	138-00041-124	SCREW	1
142	12183	501222101	59556	138-00041-125	SPINDLE, Lever	1
143	12183	501222001	59556	138-00041-126	LEVER	1
144	12183	501222501	59556	138-00041-127	SPRING, Lever	1
145	12183	501466701	59556	138-00041-128	VALVE, Needle, Inlet	1
146	12183	501502401	59556	138-00041-129	GOVERNOR, Speed	1
147	12183	501485001	59556	138-00041-130	SEAL, Ring	1
148	12183	505316617	59556	138-00041-131	RING, Lock	1
149	12183	503230102	59556	138-00041-132	WASHER	1
150	12183	501238801	59556	138-00041-133	NIPPLE	1
151	12183	505316495	59556	138-00041-134	SEAL, Ring	1
152	12183	501222401	59556	138-00041-135	STRAINER	1
153	12183	501427101	59556	138-00041-136	BUSHING	1

Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
154	12183	501223001	59556	138-00041-137	SCREW	1
155	12183	505316409	59556	138-00041-138	DIAPHRAGM, Pump	1
156	12183	501221301	59556	138-00041-139	GASKET	1
157	12183	501221401	59556	138-00041-140	COVER, Pump, Fuel	1
158	12183	501221501	59556	138-00041-141	SCREW	1
159	12183	505316403	59556	138-00041-142	GASKET SET	1
160	12183	505316114	59556	138-00041-143	FLAP, Throttle	1
161	12183	505316619	59556	138-00041-144	SHAFT, Throttle	1
162	12183	502058301	59556	138-00041-145	BALL, Nylon	1
163	12183	505316603	59556	138-00041-146	SCREW, Idle	1
164	12183	505316453	59556	138-00041-147	SCREW, Adjust, Low Speed	1
165	12183	505316454	59556	138-00041-148	SCREW, Adjust, High Speed	1
166	12183	505316602	59556	138-00041-149	SHAFT, Choke	1
167	12183	501221701	59556	138-00041-150	SPRING, Pressure	1
168	12183	502012201	59556	138-00041-151	FLAP, Choke	1
169	12183	501223001	59556	138-00041-137	SCREW	1
170	12183	505316458	59556	138-00041-152	SPRING, Pressure	1
171	12183	501220401	59556	138-00041-153	BALL, Interlock	1
172	12183	501222501	59556	138-00041-127	SPRING, Lock	1
173	12183	505316605	59556	138-00041-154	SPRING	1
174	12183	505316613	59556	138-00041-155	VALVE	1
175	12183	501220301	59556	138-00041-156	WASHER, Expansion	1

Group 02. Auxiliary Firefighting Equipment

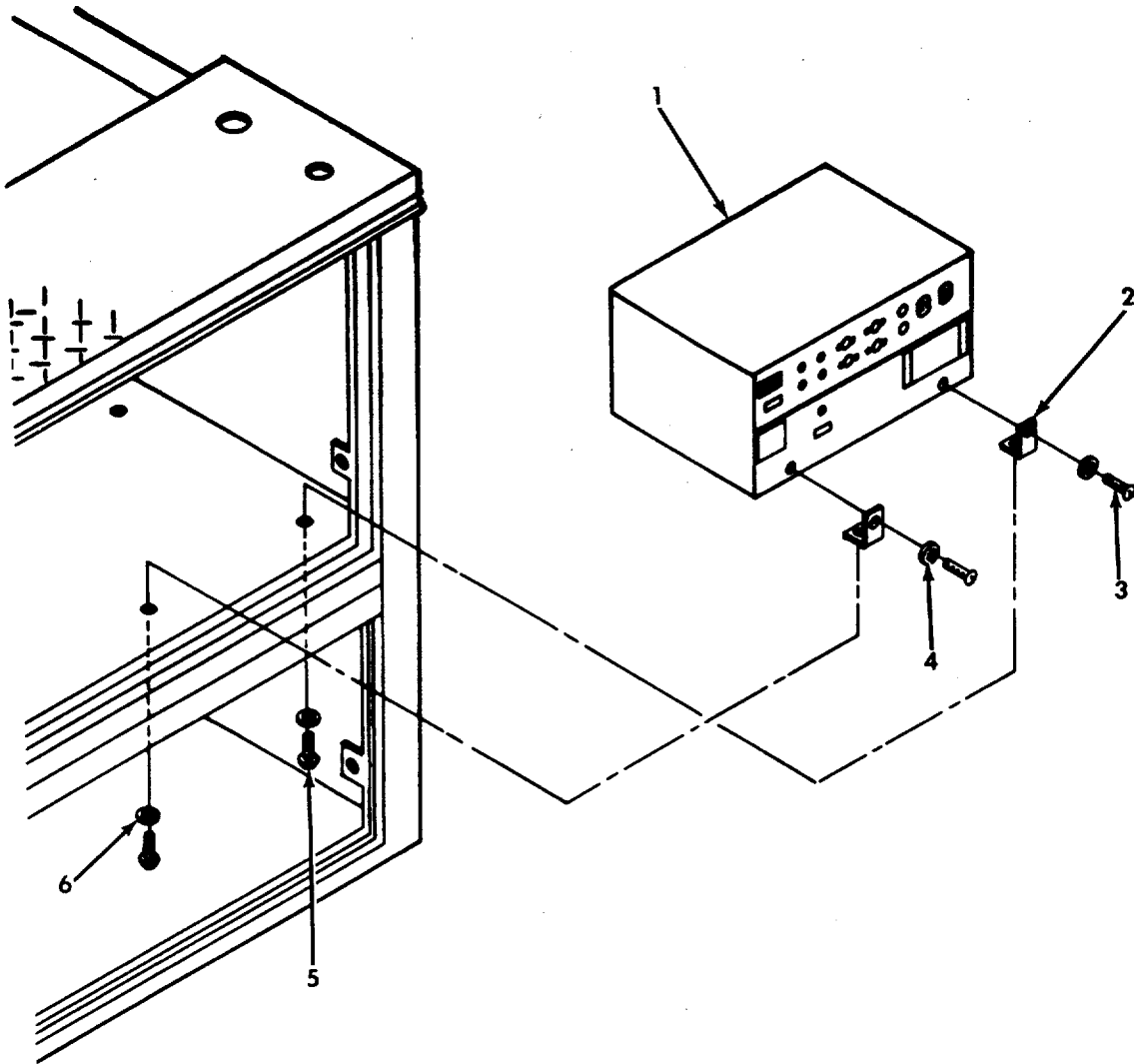
Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
198	12183	503200012	59556	138-00041-163	SCREW	1
199	12183	505270616	59556	138-00041-177	SEAL	1
200	12183	503200002	59556	138-00041-165	SCREW	1
201	12183	505315530	59556	138-00041-178	FILTER, Air Main	1
202	12183	505267867	59556	138-00041-179	SPACER	1
203	12183	503221010	59556	138-00041-180	NUT	1
204	12183	505315533	59556	138-00041-181	FILTER, Pre	1
205	12183	505315531	59556	138-00041-182	CAP, Filter	1
206	12183	503220101	59556	138-00041-183	NUT, Flange	1
207	12183	503210101	59556	138-00041-184	SCREW	1
208	12183	503226501	59556	138-00041-6	NUT	1
209	12183	505269441	59556	138-00041-185	ROD, Choke	1
210	12183	721425820	59556	138-00041-186	PIN	1
211	12183	505279071	59556	138-00041-187	BUTTON, Choke	1
212	12183	505279072	59556	138-00041-188	BUTTON, Stop	1
213	12183	721425820	59556	138-00041-186	PIN	1
214	12183	505270820	59556	138-00041-189	SHIM	1
215	12183	505340826	59556	138-00041-190	HANDLE, Right Half	1
216	12183	735581800	59556	138-00041-191	WASHER, Lock	1
217	12183	505269421	59556	138-00041-192	ROD, Throttle	1
218	12183	505279507	59556	138-00041-193	ABSORBER	1
219	12183	503200003	59556	138-00041-80	SCREW	1

## Group 02. Auxiliary Firefighting Equipment

Figure E-6. Rescue Saw

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
176	12183	505341037	59556	138-00041-157	BRACKET, Left	1
177	12183	505341035	59556	138-00041-158	BRACKET, Right	1
178	12183	503226501	59556	138-00041-6	NUT	1
179	12183	505292122	59556	138-00041-159	SPRING, Contact	1
180	12183	505315532	59556	138-00041-160	HOLDER, Filter	1
181	12183	505341230	59556	138-00041-161	COVER	1
182	12183	505315544	59556	138-00041-162	FILTER, Spill	1
183	12183	503200012	59556	138-00041-163	SCREW	1
184	12183	505269276	59556	138-00041-164	ANGLE, Mounting	1
185	12183	503200002	59556	138-00041-165	SCREW	1
186	12183	505272067	59556	138-00041-166	GASKET	1
187	12183	725533355	59556	138-00041-167	SCREW	1
188	12183	735114650	59556	138-00041-168	WASHER	1
189	12183	505272087	59556	138-00041-169	SEAL	1
190	12183	505272085	59556	138-00041-170	GASKET	1
191	12183	505279189	59556	138-00041-171	FLANGE, Insulation	1
192	12183	505272079	59556	138-00041-172	GASKET	1
193	12183	505316621	59556	138-00041-173	CARBURETOR	1
194	12183	505310439	59556	138-00041-174	INTAKE PIPE	1
195	12183	505270617	59556	138-00041-175	SEAL	1
196	12183	503200012	59556	138-00041-163	SCREW	1
197	12183	505397316	59556	138-00041-176	CASING, Cylinder	1



GROUP 02. AUXILARY FIREFIGHTING EQUIPMENT

FIGURE E-7. INVERTER

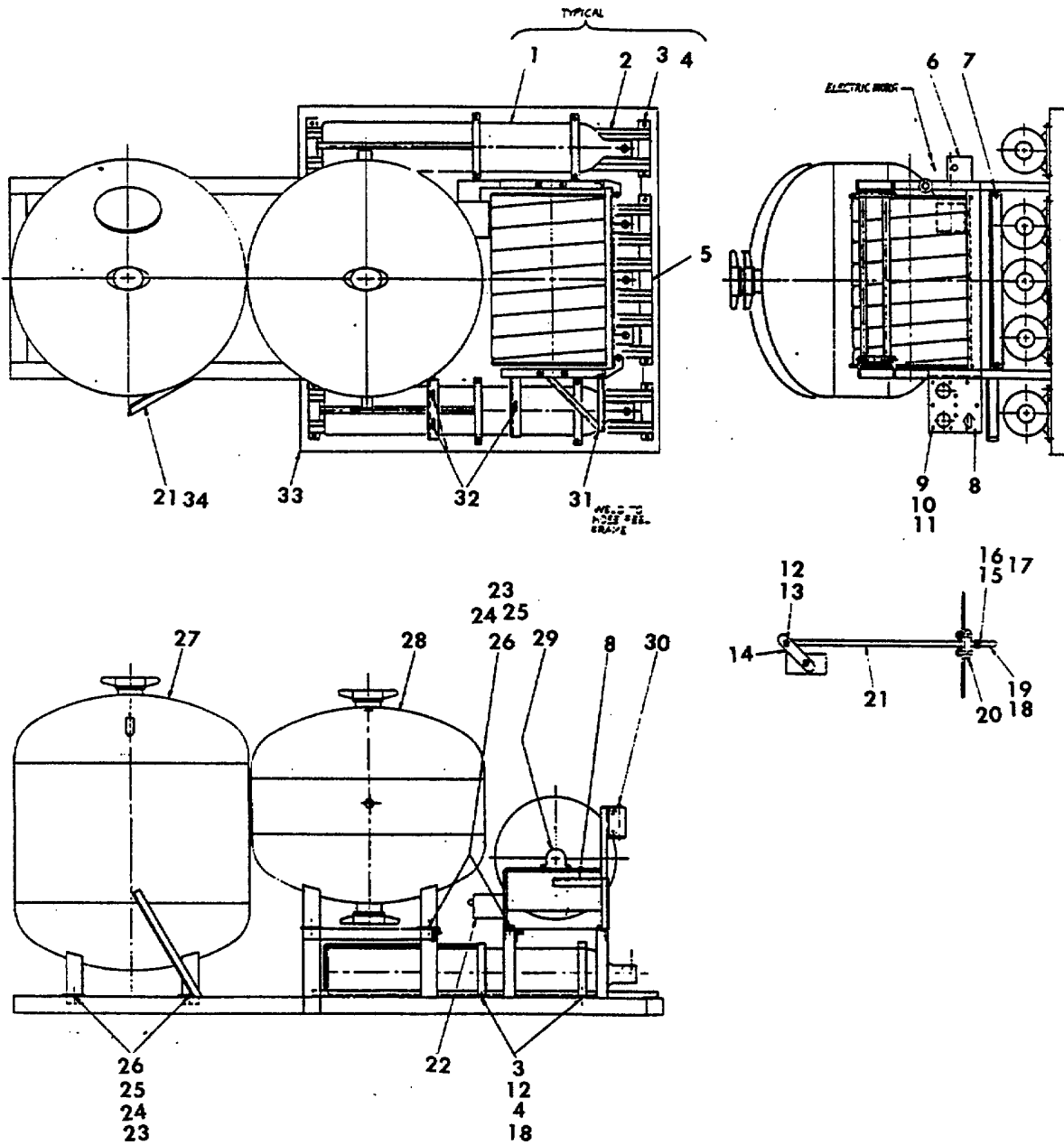
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Group 02. Auxiliary Firefighting Equipment

Figure E-7. Inverter

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	57054	A40120	59556	123-00038	INVERTER ASSEMBLY	1
2	-----	COML			INVERTER	4
3	-----	COML			BRACKET, Mounting	4
4	-----	COML			BOLT, 1/4-20 x 3/4 inch Long	2
5	-----	COML			WASHER, Lock, 1/4 inch	2
6	-----	COML			BOLT, 1/4-20 x 1 inch	4
					WASHER, Lock, 1/4 inch	4



GROUP 03. TWIN AGENT FIREFIGHTING SYSTEM

FIGURE E-8. TWIN AGENT FIREFIGHTING SYSTEM

Group 03. Twin Agent Firefighting System

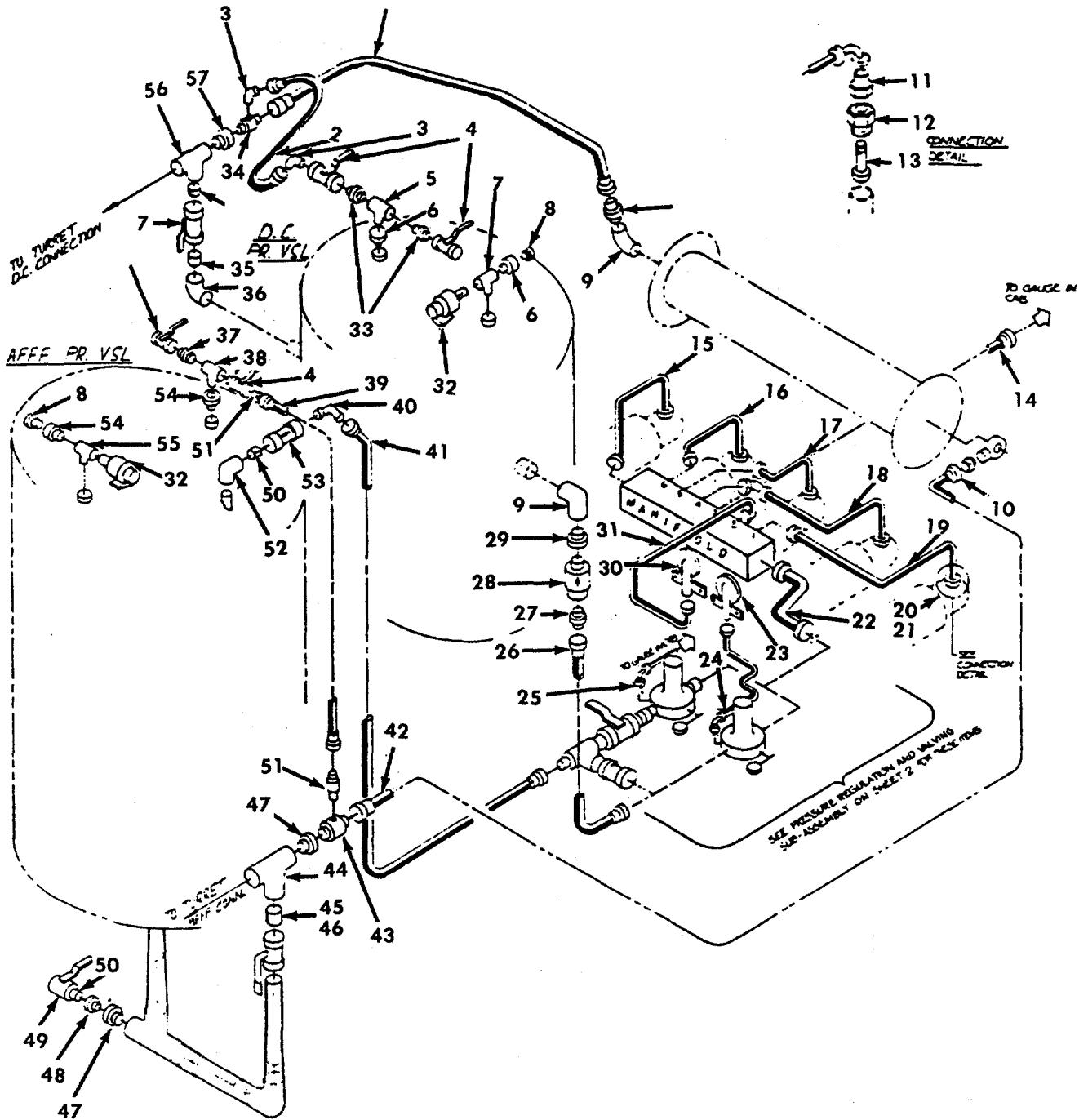
Figure E-8. Twin Agent Firefighting System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	C46300001	59556	138-90004-1	SKID UNIT ASSEMBLY	REF
2	38205	100109C006	59556	138-90004-2	NITROGEN CYLINDER, 300 Foot Capacity	2
3	38205	C11100148	59556	138-90004-3	CYLINDER RACK, Single	24
4	38205	C01150420	59556	138-90004-4	HEX HEAD CAPSCREW, 3/8-16 UNC x 1 inch	24
5	38205	101453C004	59556	138-90004-5	LOCKWASHER, Spring, 3/8 inch	1
6	38205	101516C001	59556	138-90004-6	CYLINDER RACK, Multiple	1
7	38205	C22760300	59556	138-90004-7	SWITCH AND RELAY ASSEMBLY	2
8	38205	101515C001	59556	138-90004-8	WING NUT, 1/2-13 UNC	1
9	38205	C06060289	59556	138-90004-9	PANEL	12
10	38205	C22080216	59556	138-90004-10	BUTTON HEAD MACHINE SCREW, #10-24 UNC x 3/4 inch Long	12
11	38205	C01150416	59556	138-90004-11	HEX NUT, #10-24 UNC	12
12	38205	C01020323	59556	138-90004-12	LOCKWASHER, #10	14
13	38205	C22470004	59556	138-90004-13	FLAT WASHER, 3/8 inch	1
14	38205	101517B001	59556	138-90004-14	LOCKNUT, Nylon Insert Hex, 3/8-16 UNC	1
15	38205	C06500132	59556	138-90004-15	LEVER	2
16	38205	C22050210	59556	138-90004-16	BOLT, 1/4-20 UNC x 3/4 inch Long	2
17	38205	C011504418	59556	138-90004-17	NUT, Hex, 1/4-20 UNC	2
18	38205	C22050212	59556	138-90004-18	LOCKWASHER, 1/4 inch	13
19	38250	7172004643	59556	138-90004-19	NUT, Hex, 3/8-16 UNC	1
20	38250	7271003633	59556	138-90004-20	TEE HANDLE	1
					ESCUTCHEON PLATE	1

Group 03. Twin Agent Firefighting System

Figure E-8. Twin Agent Firefighting System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	38205	101513B001	59556	138-90004-21	ROD, 3/8 inch Diameter x 17 inches Long	1
22	38205	GES-LB38C	59556	138-90004-22	CONDUIT BOX	1
23	38205	C22050214	59556	138-90004-23	NUT, Hex, 1/2-13	16
24	38205	C01150422	59556	138-90004-24	LOCKWASHER, Spring, 1/2 inch	16
25	38205	C01020327	59556	138-90004-25	FLAT WASHER, 1/2 inch	16
26	38205	C11100413	59556	138-90004-26	BOLT, Hex Head, 1/2-13 UNC x 1-1/4 inches Long	16
27	38205	101460D002	59556	138-90004-27	AFFF VESSEL	1
28	38205	101460D001	59556	138-90004-28	DRY CHEMICAL VESSEL	1
29	38205	93231130-10BR	59556	138-90004-29	TWIN HOSE REEL, DC-AFFF, H93	1
30	59556		59556	138-90004-30	GUIDE ASSEMBLY TOP REWIND	1
31	38205	101514C001	59556	138-90004-31	GAUGE PANEL FRAME	1
32	38205	C17310023	59556	138-90004-32	U-BOLT, C/W Nuts, 5/16 inch	3
33	38205	603421D001	59556	138-90004-33	FRAME WELDMENT	1
34	38205	C17310006	59556	138-90004-34	U-BOLT, C/W Nuts, 3/8 inch	1



GROUP 03. TWIN AGENT FIREFIGHTING SYSTEM

FIGURE E-9. PIPING, VALVES, FITTINGS, AND REGULATOR

## Group 03. Twin Agent Firefighting System

Figure E-9. Piping, Valves, Fittings, and Regulator

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	A44212064	59556	138-90004-70	SKID PIPING ASSEMBLY HOSE ASSEMBLY, 1-1/2 inches x 35 inches Long	1
2	38205	A44212065	59556	138-90004-71	HOSE ASSEMBLY, 1/4 inch, 16 inches Long	1
3	38205	C38240401	59556	138-90004-72	ELBOW, Male Connector, 45° Degree	2
4	38205	C43080200	59556	138-90004-73	BALL VALVE, 1/4 inch	4
5	38205	C35052401	59556	138-90004-40	TEE, Male Branch, 1/4 inch	1
6	38205	C35051304	59556	138-90004-75	BUSHING, Reducing, 1/2 x 1/4 inch	2
7	38205	C35052403	59556	138-90004-76	TEE, Male Branch, 1/2 inch	1
8	38205	RDW-6452-1	59556	138-90004-77	RELIEF VALVE, Heat Sensitive	2
9	38205	C32440701	59556	138-90004-78	ELBOW, 1-1/2 NPT, 90° Degree	2
10	38205	101486B2416	59556	138-90004-79	CONNECTOR, Male, 1-1/2 x 1 inch Special	1
11	38205	C38240604	59556	138-90004-80	CONNECTOR, Female	5
12	38205	C46300200	59556	138-90004-81	NUT, Gland	5
13	38205	C46300300	59556	138-90004-82	NIPPLE, Gland	5
14	38205	A44212066	59556	138-90004-52	HOSE ASSEMBLY, 1/4 inch, 180 inches Long	1
15	38205	A44212068	59556	138-90004-48	HOSE ASSEMBLY, 3/8 inch, 23 inches Long	1
16	38205	A44212069	59556	138-90004-49	HOSE ASSEMBLY, 3/8 inch, 21 inches Long	1
17	38205	A44212070	59556	138-90004-50	HOSE ASSEMBLY, 3/8 inch, 22 inches Long	1

Group 03. Twin Agent Firefighting System

Figure E-9. Piping, Valves, Fittings, and Regulator

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
18	38205	A44212071	59556	138-90004-51	HOSE ASSEMBLY, 3/8 inch, 29 inches Long	1
19	38205	A44212072	59556	138-90004-54	HOSE ASSEMBLY, 3/8 inch, 36 inches Long	1
20	38205	C46300100	59556	138-90004-89	NITROGEN CYLINDER EMPTY	5
21	38205	C46300001	59556	138-90004-01	NITROGEN CYLINDER FILLED	REF
22	38205	A44212073	59556	138-90004-46	HOSE ASSEMBLY, 3/4 inch, 22 inches Long	1
23	38205	H07302007	59556	138-90004-92	LOW PRESSURE GAUGE FITTING GROUP	1
24	38205	A44212063	59556	138-90004-41	HOSE ASSEMBLY, 1/4 inch, 24 inches Long	1
25	38205	A44212062	59556	138-90004-94	HOSE ASSEMBLY, 1/4 inch, 144 inches Long	1
26	38205	A44212074	59556	138-90004-66	HOSE ASSEMBLY, 1 inch, 21 inches Long	1
27	38205	C38240017	59556	138-90004-65,	CONNECTOR, Male, 1 inch	1
28	38205	C43800614	59556	138-90004-97	CHECK VALVE, 1 inch, Vertical	1
29	38205	C32410721	59556	138-90004-98	BUSHING, Reducer, 1-1/2 x 1 NPT	1
30	38205	H07302008	59556	138-90004-99	HIGH PRESSURE GAUGE FITTING GROUP	1
31	38205	A44212067	59556	138-90004-100	HOSE ASSEMBLY, 1/4 inch, 34 inches Long	1
32	38205	C43710110	59556	138-90004-101	PRESSURE RELIEF	2
33	38205	C35050801	59556	138-90004-102	NIPPLE, Pipe, Hex, 1/4 inch	2
34	38205	101505B24-24S	59556	138-90004-103	CONNECTOR, Male, 1-1/2 inch, Special	1
35	38205	C32490415	59556	138-90004-104	NIPPLE, Close, 2 inches	2

Group 03. Twin Agent Firefighting System

Figure E-9. Piping, Valves, Fittings, and Regulator

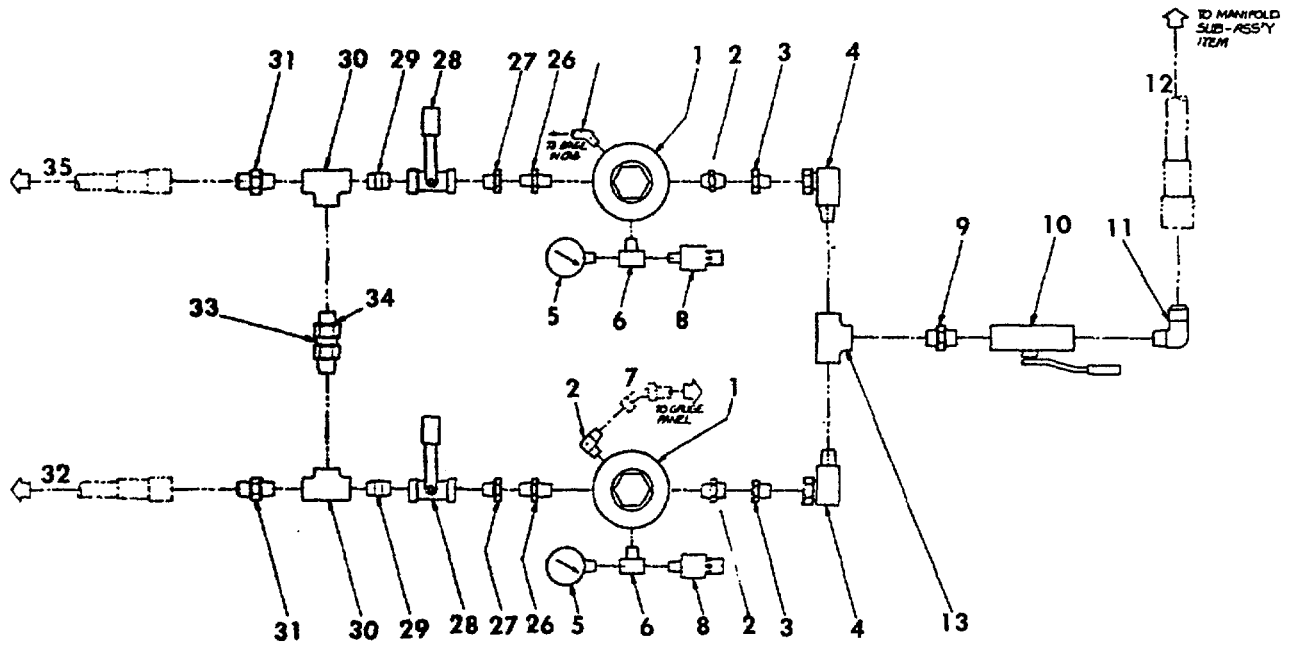
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
36	38205	C32440808	59556	138-90004-105	ELBOW, 2 inches, 90° Degree, 200 lb.	1
37	38205	C35070401	59556	138-90004-106	NIPPLE, Pipe, Hex, 1/4 inch	4
38	38205	C35072401	59556	138-90004-107	TEE, Male Branch, 1/4 inch	1
39	38205	A44212076	59556	138-90004-108	HOSE ASSEMBLY, 1/4 inch, 45 inches Long	1
40	38205	C38240414	59556	138-90004-109	ELBOW, Male Connector, 45° Degree	1
41	38205	A44212075	59556	138-90004-110	HOSE ASSEMBLY, 1 inch, 72 inches Long	1
42	38205	A44212077	59556	138-90004-111	HOSE ASSEMBLY, 1-1/2 inches, 70 inches Long	1
43	38205	101505B24 24B	59556	138-90004-112	CONNECTOR, Male, Special	1
44	38205	C32770408	59556	138-90004-113	TEE, 2 inch NPT, 150 lbs.	2
45	38205	C32790115	59556	138-90004-114	NIPPLE, Close, 2 inches	1
46	38205	C43080207	59556	138-90004-115	BALL VALVE, 2 inches	2
47	38205	C32710226	59556	138-90004-116	BUSHING, Reducer, 2 x 1-1/2 inch NPT	2
48	38205	C32710221	59556	138-90004-117	BUSHING, Reducer, 1-1/2 x 1 inch NPT	1
49	38205	C43080204	59556	138-90004-118	BALL VALVE, 1 inch NPT	1
50	38205	C32790112	59556	138-90004-119	NIPPLE, Close, 2 inches	2
51	38205	C38250001	59556	138-90004-120	CONNECTOR, Male, 1/4 inch	2
52	38205	C32740905	59556	138-90004-121	ELBOW, 90° Degree, 1 inch	1
53	38205	C43800104	59556	138-90004-122	CHECK VALVE, 1 inch, Horizontal	1
54	38205	C35070904	59556	138-90004-123	BUSHING, 1/2 x 1/4 inch	2
55	38205	C35072403	59556	138-90004-124	TEE, Male Branch, 1/2 inch	2



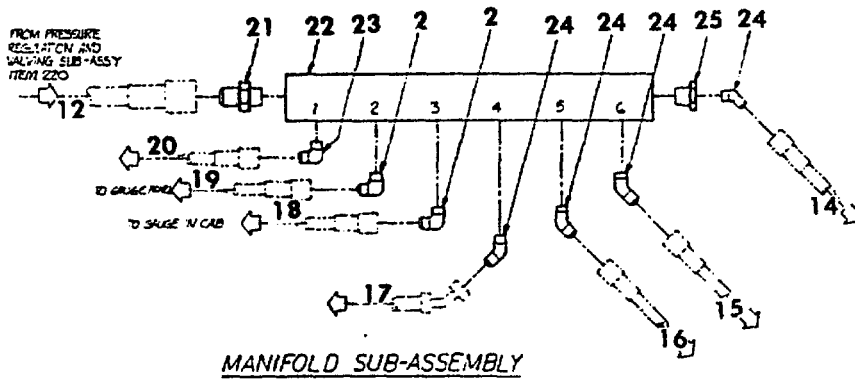
Group 03. Twin Agent Firefighting System

Figure E-9. Piping, Valves, Fittings, and Regulator

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
56 57	38205 38205	C32470303 C32410726	59556 59556	138-90004-125 138-90004-126	TEE, 2 inches, 300 lbs. BUSHING, Reducer, 2 x 1-1/2 inch	1 1



PRESSURE REGULATION AND VALVING SUB-ASSEMBLY



MANIFOLD SUB-ASSEMBLY

GROUP 03. TWIN AGENT FIREFIGHTING SYSTEM

FIGURE E-10. PRESSURE REGULATOR AND MANIFOLD

Group 03. Twin Agent Firefighting System

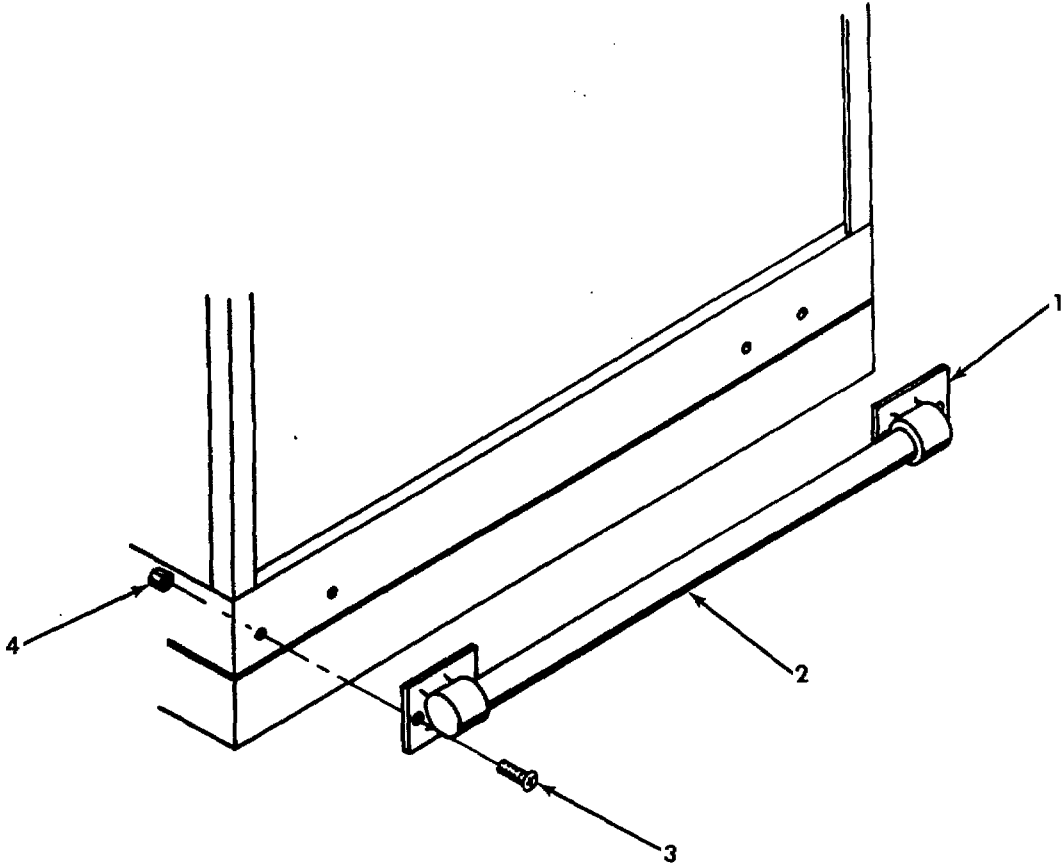
Figure E-10. Pressure Regulation and Manifold

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	C43720100	59556	138-90004-35	SKID PIPING ASSEMBLY	2
2	38205	C38240200	59556	138-90004-36	PRESSURE REGULATOR VALVE, 1/2 inch	3
3	38205	101507B12-08	59556	138--90004-37	ELBOW, Male Connector, 90° Degree	2
4	38205	C35052704	59556	138-90004-38	BUSHING, Reducer, 3/4 x 1/2 inch	2
5	38205	C4526000B	59556	138-90004-39	Special	2
6	38205	C35052401	59556	138-90004-40	SWIVEL, Pipe, 90° Degree	2
7	38205	A44212063	59556	138-90004-41	PRESSURE GAUGE, 0-400 PSI	2
8		NSS			TEE, Male Branch, 1/4 inch	REF
9	38205	C35050804	59556	138-90004-43	HOSE ASSEMBLY, 1/4 inch, 24 inches	REF
10	38205	C43080312	59556	138-90004-44	Long	REF
11	38205	C38240211	59556	138-90004-45	RELIEF VALVE, 400 PSI,(Part of Item #1)	1
12	38205	A44212073	59556	138-90004-46	NIPPLE, Pipe, Hex, 3/4 inch	1
13	38205	C35052104	59556	138-90004-47	BALL VALVE, 3/4 inch	1
14	38205	A44212068	59556	138-90004-48	ELBOW, Male Connector, 90° Degree	REF
15	38205	A44212069	59556	138-90004-49	HOSE ASSEMBLY, 3/4 inch, 22 inches	REF
16	38205	A44212070	59556	138-90004-50	Long	REF
					TEE, 3/4 inch	1
					HOSE ASSEMBLY, 3/8 inch, 23 inches	REF
					Long	REF
					HOSE ASSEMBLY, 3/8 inch, 21 inches	REF
					Long	REF
					HOSE ASSEMBLY, 3/8 inch, 22 inches	REF
					Long	REF

## Group 03. Twin Agent Firefighting System

Figure E-10. Pressure Regulation and manifold

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
17	38205	A44212071	59556	138-90004-51	HOSE ASSEMBLY, 3/8 inch, 29 inches Long	REF
18	38205	A44212066	59556	138-90004-52	HOSE ASSEMBLY, 1/4 inch, 180 inches Long	REF
19	38205	A44212067	59556	138--90004-100	HOSE ASSEMBLY, 1/4 inch, 34 inches Long	REF
20	38205	A44212072	59556	138-90004-54	HOSE ASSEMBLY, 3/8 inch, 36 inches Long	REF
21	38205	C38240014	59556	138-90004-55	CONNECTOR, Male	1
22	38205	101509C001	59556	138-90004-56	MANIFOLD BLOCK	1
23	38205	C38240202	59556	138-90004-57	ELBOW, Connector, Male, 90° Degree	1
24	38205	C38240404	59556	138-90004-58	ELBOW, Connector, Male, 45° Degree	4
25	38205	C35051308	59556	138-90004-59	BUSHING, Reducer, 3/4 x 1/4 inch	1
26	38205	C35050003	59556	138-90004-60	NIPPLE, Pipe, Hex, 1/2 inch	4
27	38205	C35051311	59556	138-90004-61	BUSHING, Reducer, 1 x 1/2 inch	2
28	38205	C43080204	59556	138-90004-118	BALL VALVE, 1 inch	2
29	38205	C32490412	59556	138-90004-63	NIPPLE, Close, 1 inch	2
30	38205	C32470405	59556	138-90004-64	TEE, 1 inch	2
31	38205	C38240017	59556	138-90004-65	CONNECTOR, Male, 1 inch	2
32	38205	A44212074	59556	138-90004-66	HOSE ASSEMBLY, 1 inch, 21 inches Long	REF
33	38205	101506B1616	59556	138-90004-67	PIPE UNION SWIVEL ASSEMBLY, 1 inch Special	1
34	38205	C35052811	59556	138-90004-68	PIPE SWIVEL CONNECTOR	1
35	38205	A44212075	59556	138-90004-110	HOSE ASSEMBLY, 1 inch, 72 inches Long	REF



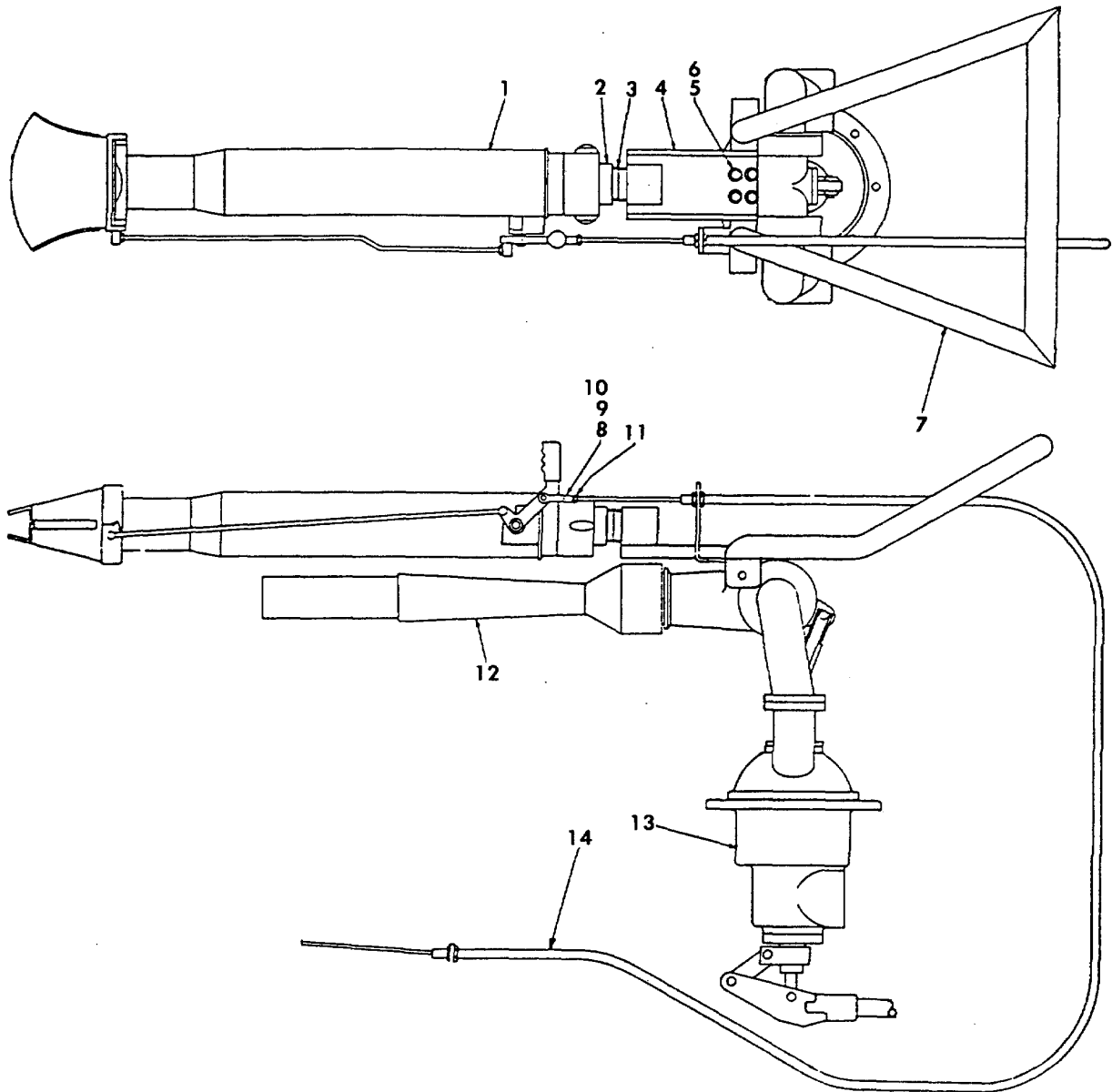
GROUP 03. TWIN AGENT FIREFIGHTING SYSTEM

FIGURE E-11. HANDRAILS

Group 03. Twin Agent Firefighting System

Figure E-11. Handrails

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	60319	ZRB-57	59556	117-00009	HANDRAIL ASSEMBLY BRACKET, Handrail	2
2	59556	117-00008	59556	117-00008	HANDRAIL, Stainless Steel Type 304, 1-1/4 inch	1
3	----	COML			BOLT, Phillips Cross Head, 1/4 x 1 inch	4
4	----	COML			NUT, Lock Hex Head, 1/4 inch	4



GROUP 04. REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY

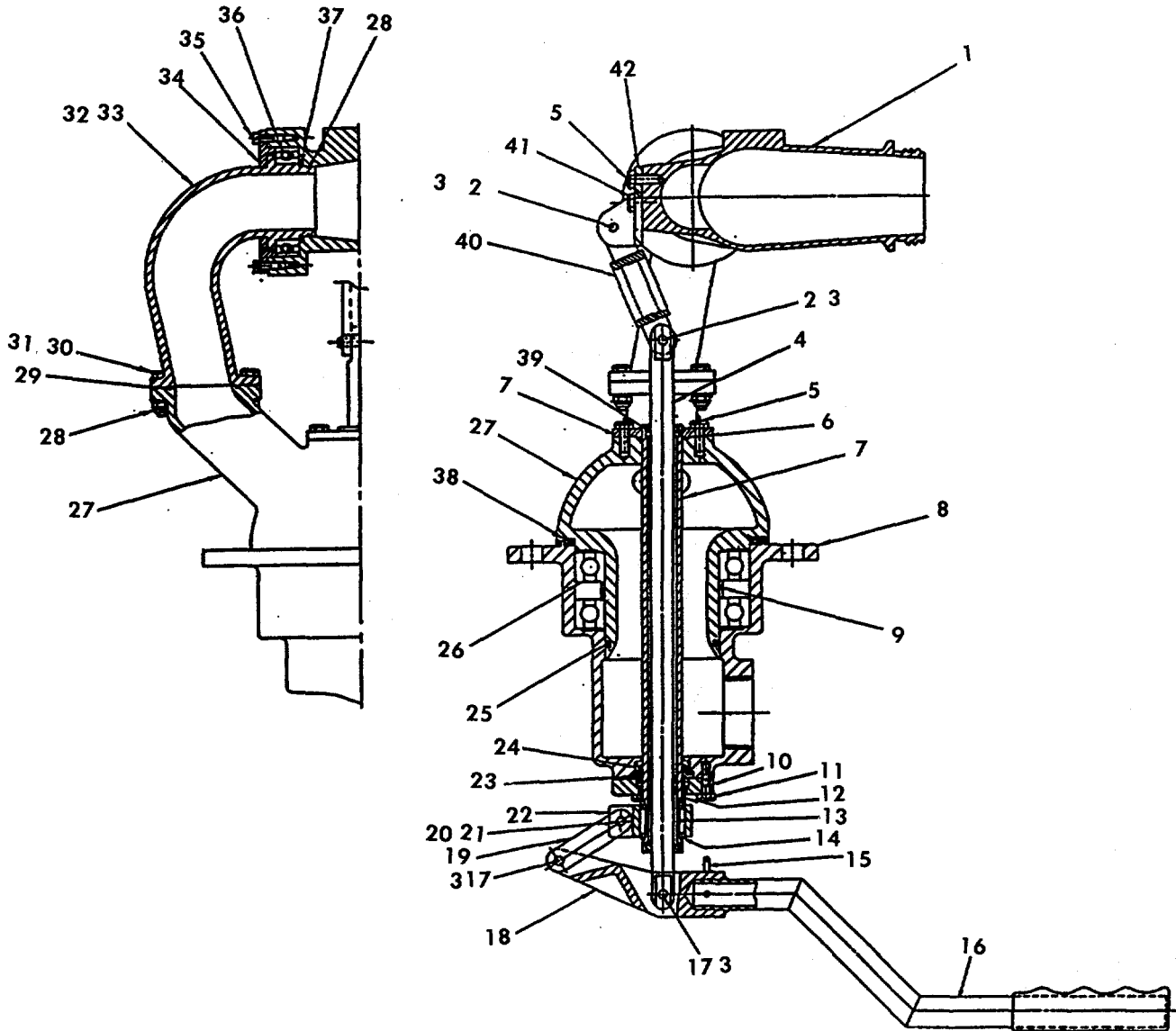
FIGURE E-12. REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY

Group 04. Remote Manual Twin Agent Turret Assembly

Figure E-12. Remote Manual Twin Agent Turret Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	101508C002	59556	221-90001	TURRET ASSEMBLY	1
2	38205	100145C002	59556	221-90001-1	A.F.F.F. NOZZLE	1
3	38205	101496B001	59556	221-90001-2	TURRET NOZZLE ADAPTER	1
4	38205	C32790114	59556	221-90001-3	CLOSE PIPE NIPPLE, 1-1/2 inch SCH 40	1
5	38205	101497C001	59556	221-90001-4	TURRET NOZZLE MOUNT	1
6	38205	C11040644	59556	221-90001-5	HEX HEAD CAP SCREW, 5/16-18 UNC x 1 inch Long	4
7	38205	C01100010	59556	221-90001-6	LOCK WASHER, 5/16 inch	4
8	38205	101471C002	59556	221-90001-7	MONITOR CONTROL HANDLE	1
9	38205	C25371103	59556	221-90001-8	CLEVIS, 1/4-28 UNF	1
10	38205	C00640127	59556	221-90001-9	CLEVIS PIN, 1/4 Diameter x 11/16 inches Long	1
11	38205	C00160122	59556	221-90001-10	COTTER PIN, 1/16 Diameter x 1/2 inch	1
12	38205	C22020104	59556	221-90001-11	HEX NUT, 1/4-28 UNF	1
13	38205	100156B007	59556	221-90001-12	DRY CHEMICAL NOZZLE	1
14	38205	101145D001	59556	221-90001-13	REMOTE MANUAL MONITOR, 2 inches	1
	38205	FCC-173-LTT -3-96	59556	221-90001-14	CONTROL CABLE	1





GROUP 04. REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY

FIGURE E-13. MONITOR ASSEMBLY

## Group 04. Remote Manual Twin Agent Turret Assembly

Figure E-13. Monitor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	101145D001	59556	221-90004-13	MONITOR ASSEMBLY, 2 inch Manual	1
2	38205	352305D101	59556	221-90001-16	BARREL BASE, Machining	1
3	38205	C00620113	59556	221-90001-17	CLEVIS PIN, 1/4 Diameter x 1-1/4 inch Long	2
4	38205	C00170224	59556	221-90001-18	COTTER PIN, 1/16 Diameter x 3/4 inch Long	4
5	38205	101141B001	59556	221-90001-19	ELEVATION DRIVE ROD	1
6	38205	C11100401	59556	221-90001-20	HEX HEAD CAP SCREW, 5/16-18 UNC x 3/4 inch Long	7
7	38205	014223	59556	221-90001-21	O-RING, 1-7/8 inch O.D. x 1-5/8 inch I.D. x 1/8 inch Thick	1
8	38205	101144C001	59556	221-90001-22	TORQUE TUBE ASSEMBLY	1
9	38205	101124C001	59556	221-90001-23	MONITOR BASE, Machining	1
10	38205	101139B001	59556	221-90001-24	SPACER RING, Internal	1
11	38205	101136B001	59556	221-90001-25	BEARING RETAINER RING	1
12	38205	C11100407	59556	221-90001-26	HEX HEAD CAP SCREW, 1/4-20 UNC x 1 inch Long	3
13	38205	101137B001	59556	221-90001-27	BEARING SPACER RING	1
14	38205	M26022000	59556	221-90001-28	SQUARE KEY, .188 x .188 x 1 inch	2
15	38205	C01960438	59556	221-90001-29	EXTERNAL RETAINING RING, 1-1/4 inch	1
16	38205	C00680019	59556	221-90001-30	HITCH PIN CLIP	1
17	38205	101498C001	59556	221-90001-31	HANDLE, Monitor Remote Control	1
18	38205	C00620114	59556	221-90001-32	CLEVIS PIN, 1/4 inch Diameter x 1-5/8 inch Long	2
19	38205	101147C001	59556	221-90001-33	PIVOT CONTROL ARM	1

## Group 04. Remote Manual Twin Agent Turret Assembly

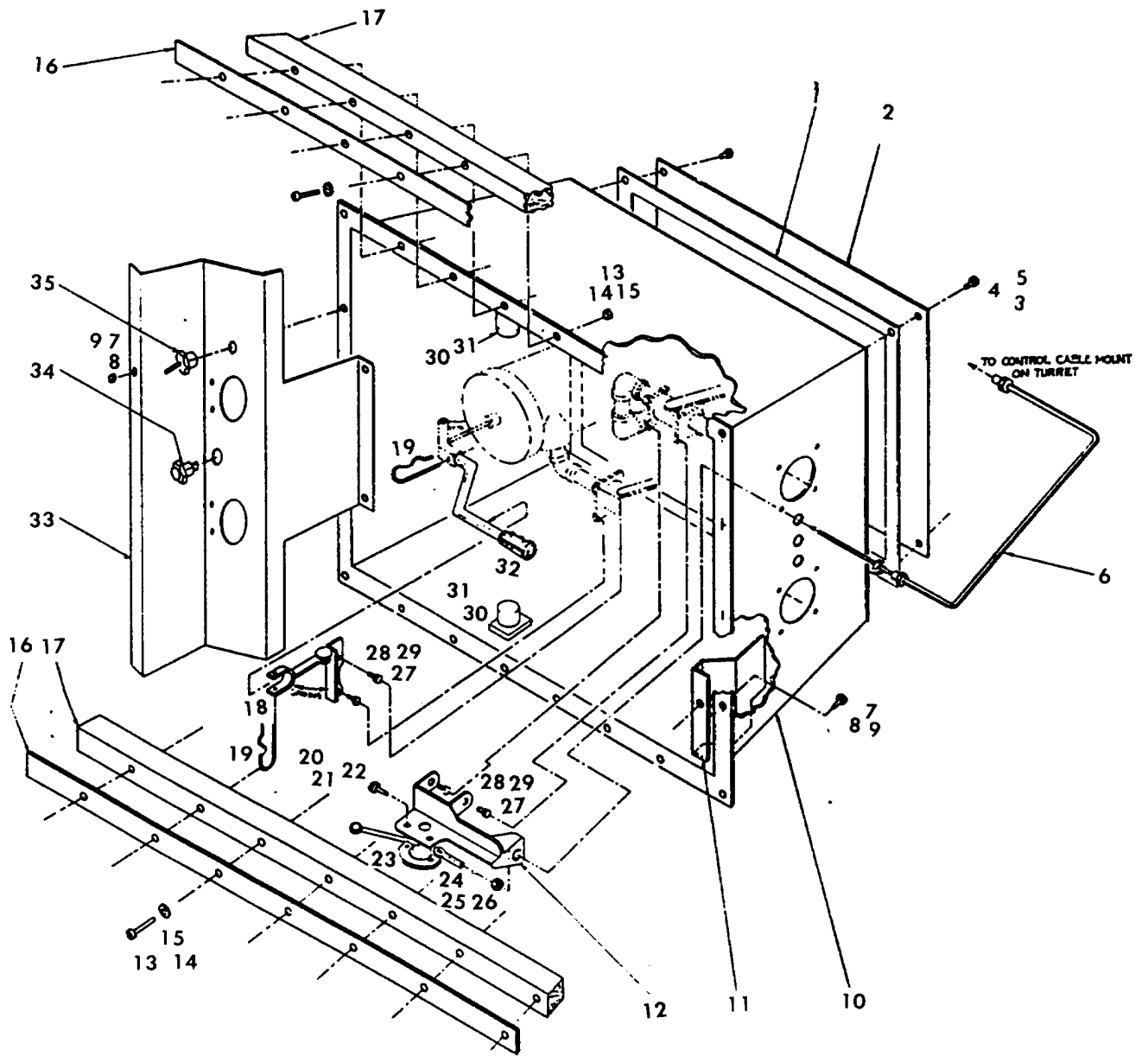
Figure E-13. Monitor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	38205	101052B001	59556	221-90001-34	PIVOT LINK, Lower	1
20	38205	C1110408	59556	221-90001-35	HEX HEAD CAP SCREW, 1/4-20 UNC x 2-1/2 inches Long	1
21	38205	C22470003	59556	221-90001-36	SELF LOCKING NUT, Nylon Insert, 1/4-20 UNC	1
22	38205	101148B001	59556	221-90001-37	TORQUE TUBE DRIVER	1
23	38205	101135B001	59556	221-90001-38	BUSHING, Lower Monitor	1
24	38205	C47580001	59556	221-90001-39	U-CUP SEAL, 1-1/4 inch O.D. x 1/4 inch I.D. x 1/4 inch Thick	1
25	38205	010738	59556	221-90001-40	QUAD RING, 3-3/4 inch O.D. x 3-1/2 inch I.D. x 1/8 inch Thick	1
26	38205	7162002328	59556	221-90001-41	BALL BEARING	2
27	38205	101126D001	59556	221-90001-42	YOKE BASE, Machining	1
28	38205	014225	59556	221-90001-43	O-RING, 2-1/8 inch O.D. x 1-7/8 inch I.D. x 1/8 inch Thick	2
29	38205	014227	59556	221-90001-44	O-RING, 2-3/8 inch O.D. x 2-1/8 inch I.D. x 1/8 inch Thick	1
30	38205	C11100402	59556	221-90001-45	HEX HEAD CAP SCREW, 5/16-18 UNC x 1-1/4 inch Long	8
31	38205	C22410118	59556	221-90001-46	SELF LOCKING NUT, Nylon Insert, 5/16-18 UNC	8
32	38205	352303D105	59556	221-90001-47	LEFT HAND BRANCH DISCHARGE, Machining	1
33	38205	352303D106	59556	221-90001-48	RIGHT HAND BRANCH DISCHARGE, Machining	1
34	38205	101512B001	59556	221-90001-49	BEARING RETAINER	2
35	38205	C10540414	59556	221-90001-50	SOCKET HEAD CAP SCREW, 1/4-20 UNC x 3/4 inch Long	12

Group 04. Remote Manual Twin Agent Turret Assembly

Figure E-13. Monitor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
36	38205	7162002327	59556	221-90001-51	BALL BEARING	2
37	38205	SPX-RSN-212	59556	221-90001-52	EXTERNAL RETAINING RING, 2-1/8 inch Diameter	2
38	38205	M40182020	59556	221-90001-53	FELT SEAL	1
39	38205	PAR-U625	59556	221-90001-54	WIPER RING, 5/8 inch I.D.	1
40	38205	101408N001	59556	221-90001-55	LINK ARM, Elevation Control	1
41	38205	C111100410	59556	221-90001-56	HEX HEAD CAP SCREW, 5/16-18 UNC x 1/2 inches Long	2
42	38205	101149B001	59556	221-90001-57	ELEVATION DRIVE FLANGE, Machining	1



GROUP 04. REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY

FIGURE E-14. TURRET BOX

## Group 04. Remote Manual Twin Agent Turret Assembly

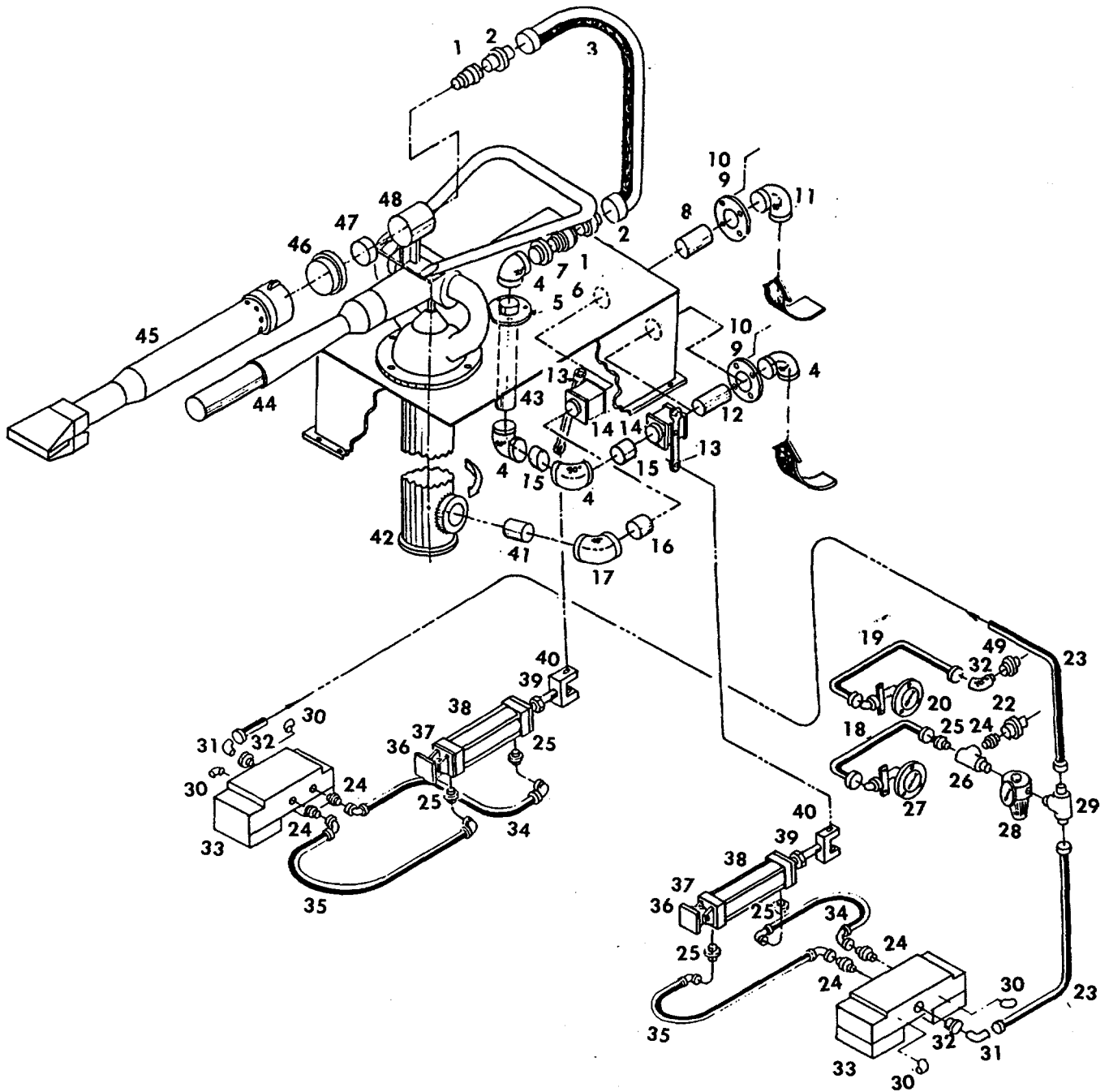
Figure E-14. Turret Box

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	101525C001	59556	221-90001-58	TURRET BOX MECHANICAL ASSEMBLY	1
2	38205	101526C001	59556	221-90001-59	GASKET	1
3	38205	C11100400	59556	221-90001-60	TURRET PANEL	1
4	38205	C01020319	59556	221-90001-61	BOLT, Hex, 1/4-20 UNC x 1 inch	16
5	38205	C22050210	59556	221-90001-61	FLAT WASHER, 1/4 inch	16
6	38205	C22050210	59556	138-90004-16	NUT, Hex, 1/4-20 UNC	16
7	38205	NSS	59556	221-90001-64	CONTROL CABLE ASSEMBLY	1
8	38205	C1110414	59556	221-90001-64	BOLT, Hex, 1/4-20 UNC x 5/8 inches	10
9	38205	C01020319	59556	221-90001-61	FLAT WASHER, 1/4 inch	10
10	38205	C22050210	59556	138-90004-16	NUT, Hex, 1/4-20 UNC	10
11	38205	101524D001	59556	221-90001-67	TURRET BOX	1
12	38205	101523C001	59556	221-90001-68	BRACKET	1
13	38205	101518C001	59556	221-90001-69	DISPERSION CONTROL BRACKET	1
14	38205	C07030550	59556	221-90001-70	FILLISTER HEAD MACHINE SCREW, 1/4-20 UNC x 2-1/2 inches	14
15	38205	C01020319	59556	221-90001-61	FLAT WASHER, 1/4 inch	14
16	38205	C22050210	59556	221-90001-72	NUT, Hex, 1/4-20 UNC	14
17	38205	101528C001	59556	221-90001-72	CLAMP STRIP	2
18	38205	101527C001	59556	221-90001-73	CAB ROOF SPACER	2
19	38205	101520C001	59556	221-90001-74	HANDLE SECURING BRACKET	1
20	38205	C00680019	59556	221-90004-30	HITCH PIN CLIP, 3/16 Diameter x 3-3/4 inches Long	2
21	38205	C11040620	59556	221-90001-76	BOLT, Hex, 1/4-20 x 3/4 inch	2

Group 04. Remote Manual Twin Agent Turret Assembly

Figure E-14. Turret Box

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	38205	C01010218	59556	221 90001-77	FLAT WASHER, 1/4 inch	4
22	38205	C22020204	59556	221 90001-78	NUT, Hex, 1/4-20 UNC	2
23	38205	QDT-C72036	59556	221-90001-79	FRICTION TYPE CONTROL LEVER	1
24	38205	C25371103	59556	221-90001-08	CLEVIS, 1/4-28 UNF	1
25	38205	C00640127	59556	221-90001-09	CLEVIS PIN, 1/4 x 11/16 inches Long	1
26	38205	C00160122	59556	221-90001-10	COTTER PIN, 1/16 x 1/2 inches Long	1
27	38205	C11040621	59556	221-90001-83	BOLT, Hex, 3/8-16 UNC x 1-1/2 inches	4
28	38205	C01010223	59556	221-90001-84	FLAT WASHER, 3/8 inch	8
29	38205	C22020206	59556	221-90001-85	NUT, Hex, 3/8-16 UNC	4
30		NSS	59556		RELAY SOCKET	1
31		NSS	59556		RELAY	1
32		NSS	59556		MONITOR HANDLE	1
33	38205	101519C001	59556	221-90001-86	GAUGE PANEL	1
34		NSS	59556		PILOT LIGHT	1
35		NSS	59556		TOGGLE SWITCH	1



GROUP 04. REMOTE MANUAL TWIN AGENT TURRET ASSEMBLY

FIGURE E-15. TURRET PIPING, CONTROLS, AND GAUGES



## Group 04. Remote Manual Twin Agent Turret Assembly

Figure E-15. Turret Piping, Controls and Gauges

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	067452	59556	221-90001-92	TURRET PIPING ASSEMBLY	2
2	38205	101486B2424	59556	221-90001-93	HOSE SWIVEL, 1-1/2	2
3	38205	A44212058	59556	221-90001-94	CONNECTOR, Male, 1-1/2 inch	1
4	38205	C32740108	59556	221-90001-95	HOSE ASSEMBLY, With Special Brass Insert	4
5	38205	101502B001	59556	221-90001-96	ELBOW, 2 inches x 90° Degree	1
6	38205	101503B001	59556	221-90001-97	SPECIAL FLANGE	1
7	38205	C32710226	59556	138-90004-116	GASKET	1
8	38205	C32490618	59556	221-90001-100	REDUCING BUSHING, 2 inches x 1-1/2 inch	1
9	38205	101500B001	59556	221-90001-101	T.B.E NIPPLE, 2 inches SCH. 80 x 13 Long	2
10	38205	101501B001	59556	221-90001-102	FLANGE, 2 inches, 4-bolt	3
11	38205	C32440605	59596	221-90001-103	GASKET	1
12	38205	C32791104	59556	221-90001-104	ELBOW, 2 inches x 90° Degree, 300 lbs	1
13	38205	101504C001	59556	221-90001-105	T.B.E. NIPPLE, 2 inches SCH. 40 x 13 Long	2
14	38205	C43080402	59556	221-90001-106	HANDLE	2
15	38205	C32790115	59556	138-90004-114	BALL VALVE, 2 inches	2
16	38205	C32490610	59556	221-90001-108	CLOSE NIPPLE, 2 inches	1
17	38205	C32440908	59556	221-90001-109	T.B.E. NIPPLE, 2 inches SCH. 80 x 5 inches Long	1
					ELBOW, 2 inches x 45° Degree, 300 lbs.	

## Group 04. Remote Manual Twin Agent Turret Assembly

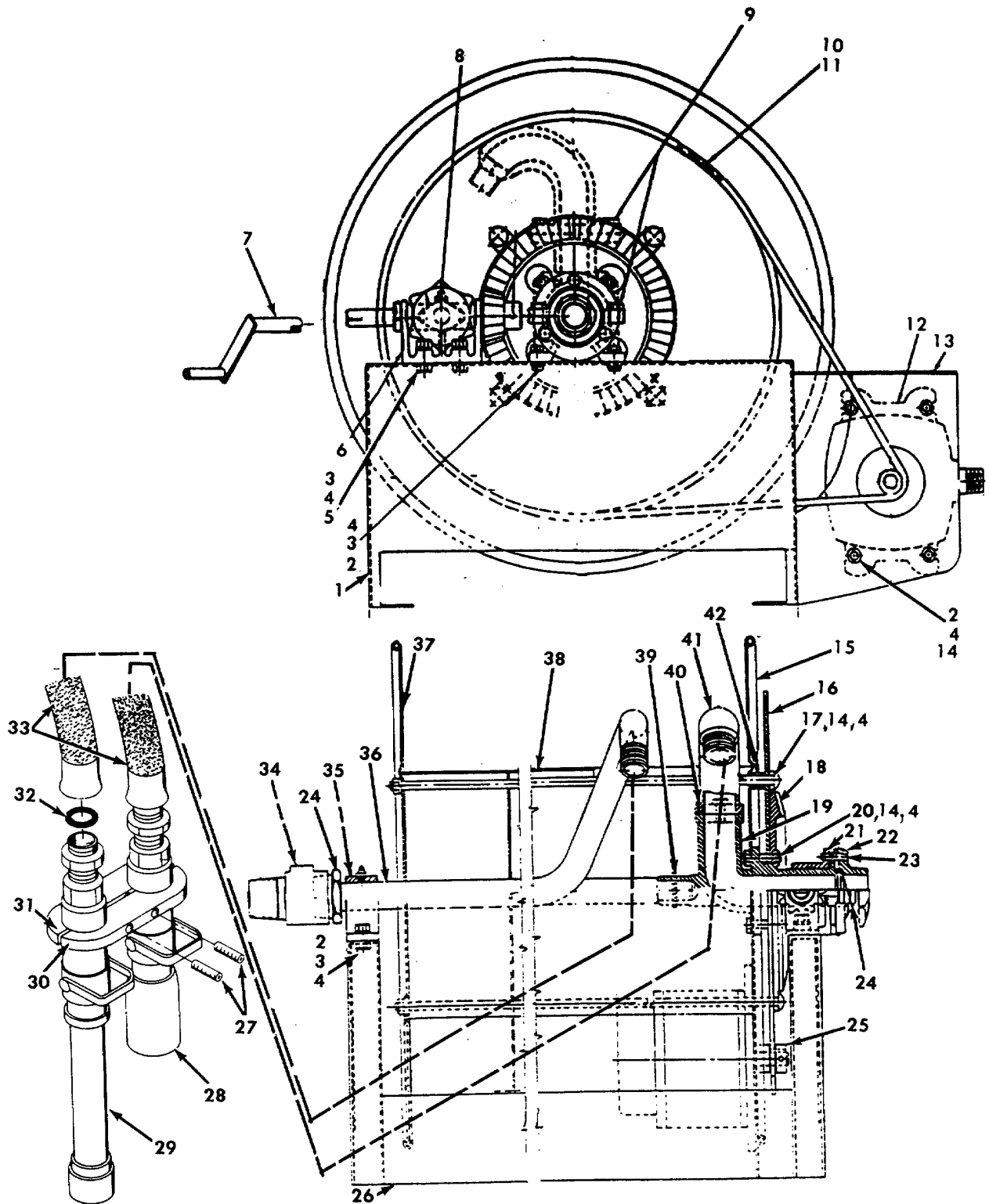
Figure E-15. Turret Piping, Controls and Gauges

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
18	38205	A44212060	59556	221-90001-110	HOSE ASSEMBLY	1
19	38205	A44212061	59556	221-90001-111	HOSE ASSEMBLY	1
20	38205	H07302008	59556	138-90004-99	HIGH PRESSURE GAUGE FITTING GROUP	1
21	38205	C38240401	59556	138-90004-72	ELBOW, Male Connector, 45° Degree	1
22	38205	FVW-1495L	59556	221-90001-114	BULKHEAD FITTING	2
23	38205	A44212056	59556	221-90001-115	HOSE ASSEMBLY	2
24	38205	C35050801	59556	138-90004-102	HEX NIPPLE, 1/4 NPT	5
25	38205	C38240002	59556	221-90001-117	CONNECTOR, Male, 3/8 inch Pipe/ 1/4 inch Tube	4
26	38205	C35052301	59556	221-90001-118	MALE STREET TEE, 1/4 inch	1
27	38205	H07302007	59556	138-90004-92	LOW PRESSURE GAUGE FITTING GROUP	1
28	38205	SHD-5452- 3300	59556	221-90001-120	PRESSURE REGULATOR	1
29	38205	C35052401	59556	138-90004-40	MALE BRANCH TEE	1
30	38205	C33550300	59556	221-90001-122	ELBOW, Male Connector, 90° Degree	4
31	38205	C38240200	59556	138-90004-36	HOSE ASSEMBLY	1
32	38205	C35051301	59556	221-90001-124	REDUCING BUSHING, 3/8 inch x 1/4 inch	2
33	38205	SHD-L95-22 -221-12VDC	59556	221-90001-125	SOLENOID VALVE	2
34	38205	A44212057	59556	221-90001-126	HOSE ASSEMBLY	2
35	38205	A44212059	59556	221-90001-127	HOSE ASSEMBLY	2
36	38205	SHD-B273- 129	59556	221-90001-128	DETACHABLE EYE BRACKET	2

Group 04. Remote Manual Twin Agent Turret Assembly

Figure E-15. Turret Piping, Controls and Gauges

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
37	38205	SHD-B712-070	59556	221-90001-129	DETACHABLE CLEVIS	2
38	38205	SHD-FWB10-1321	59556	221-90001-130	AIR CYLINDER, 5 inch Stroke	2
39	38205	101499B001	59556	221-90001-131	CLEVIS EXTENSION	2
40	38205	SHD-3197-0437	59556	221-90001-132	ROD CLEVIS, C/W Pin 54	2
41	38205	C32490415	59556	138-90004-104	CLOSE NIPPLE, 2 inches SCH. 80	1
42	38205	101145D001	59556	221-90001-13	REMOTE MANUAL MONITOR, 2 inches	1
43	38205	C32791122	59556	221-90001-135	T.B.E. NIPPLE, 2 inch SCH. 40 x 5-1/4 inches Long	1
44	38205	100156B007	59556	221-90001-12	DRY CHEMICAL NOZZLE ASSEMBLY	1
45	38205	100145D002	59556	221-90001-137	FOAM NOZZLE ASSEMBLY	1
46	38205	101496B001	59556	221-90001-02	ADAPTER, 2-1/2 inch Male CSA/ 1-1/2 inch Female NPT	1
47	38205	C32790114	59556	221-90001-03	CLOSE NIPPLE, 1-1/2 inch SCH. 40	1
48	----	COML			COUPLING, 1-1/2 inches	1



GROUP 05. HOSE REEL ASSEMBLY

FIGURE E-16. HOSE REEL ASSEMBLY

## Group 05. Hose Reel Assembly

Figure E-16. Hose Reel Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	38205	326178	59556	138-90004-127	HOSE REEL ASSEMBLY FRAME, Channel	2
2	38205	CS3/8x1	59556	138-90004-128	CAPSCREW, 3/8-16 UNC x 1 inch	8
3	38205	WL3/8ID	59556	138-90004-129	LOCKWASHER, 3/8 I.D.	6
4	38205	NH3/8-16	59556	138-90004-130	NUT, Hex, 3/8-16 UNC	18
5	38205	CS3/8x1-1/2	59556	138-90004-131	CAPSCREW, 3/8-16 UNC x 1-1/2 inch	2
6	38205	360268	59556	138-90004-132	HANDWIND, Brake Assembly	1
7	38205	326060	59556	138-90004-133	HANDLE, Crank	1
8	38205	316259	59556	138-90004-134	GREASE FITTING, 1/8 NPT	1
9	38205	CS3/8x3/4	59556	138-90004-135	CAPSCREW, 3/8-16 UNC x 3/4 Long	4
10	38205	316240	59556	138-90004-136	CHAIN, 3/8 Pitch	1
11	38205	316242	59556	138-90004-137	CONNECTOR, Chain, 3/8 Pitch	1
12	38205	370023	59556	138-90004-138	MOTOR, Electric, 1/2 Horse Power, 110 Volt AC	1
13	38205	326218	59556	138-90004-139	PLATE, Mounting, Motor	1
14	38205	W.P.3/8ID	59556	138-90004-140	WASHER, Flat, 3/8 Diameter	10
15	38205	326247	59556	138-9004-141	HEAD, 23 O.D. x 2-1/2 I.D.	1
16	38205	316200	59556	138-90004-142	SPROCKET, 150T x 3/8 Pitch	1
17	38205	316225	59556	138-90004-143	ROD, Tie, 3/8 Round x 32 Long	4
18	38205	323058	59556	138-90004-144	GEAR, Crown, 1-1/2 Pattern No. 90	1
19	38205	323360	59556	138-90004-145	SPINDLE, Pattern No. 10L	1
20	38205	CS3/8x1-3/4	59556	138-90004-146	CAPSCREW, 3/8-16 UNC x 1-3/4 Long	1
21	38205	327078	59556	138-90004-147	HOUSING, Swing Joint, 1-1/2 inches	1

## Group 05. Hose Reel Assembly

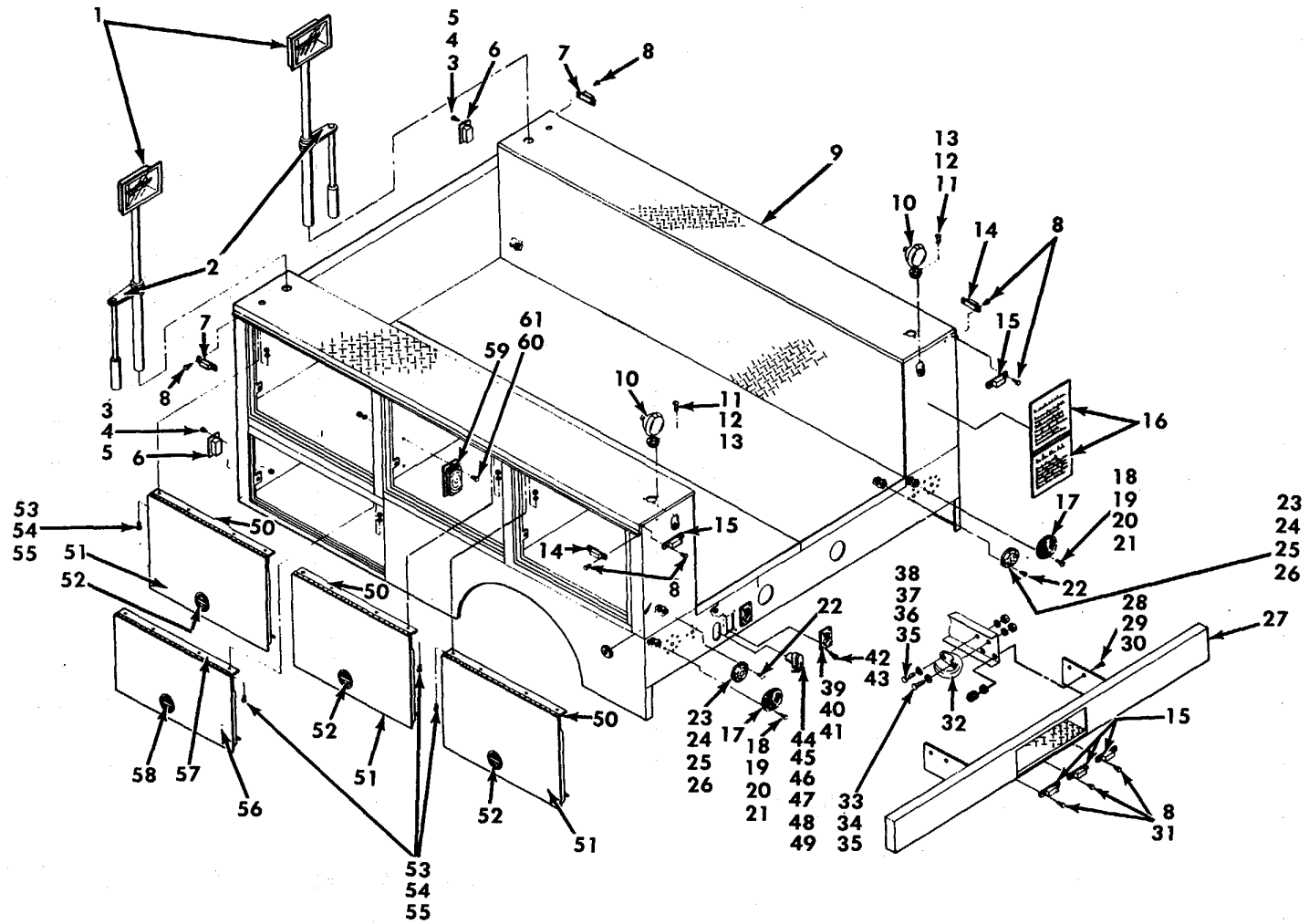
Figure E-16. Hose Reel Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	38205	327075	59556	138-90004-148	ADAPTER, Swing Joint, 1-1/2 S.J. x 1-1/2 NPTM, Pattern No. 13	1
23	38205	CS5/16x1	59556	138-90004-149	CAPSCREW, 5/16-18 UNC x 1 inch	3
24	-----	COML			BUSHING, Reducer, 1-1/2 NPTM x 1 NPTF, Steel	1
25	38205	316204	59556	138-90004-150	SPROCKET, 10T x 3/8 Pitch	1
26	38205	326079	59556	138-90004-151	PLATE, Tie	1
27	38205	C10540010	59556	138-90004-152	CAP	2
28	38205	H75002007	59556	138-90004-153	DRY CHEMICAL NOZZLE ASSEMBLY	1
29	38205	H75002008	59556	138-90004-154	AFFF NOZZLE ASSEMBLY	1
30	38205	7231002514	59556	138-90004-155	COLLAR, Lower	1
31	38205	7231002513	59556	138-90004-156	COLLAR, Upper	1
32	38205	7141004124	59556	138-90004-157	GASKET	1
33	38205	A44212101	59556	138-90004-158	HOSES	2
34	38205	327100	59556	138-90004-159	ADAPTER, Swivel, Hose, 1-1/2 inches	1
35	38205	310212	59556	138-90004-160	BEARING ASSEMBLY, 1-5/16 I.D. x Pattern #310	1
36	38205	322501	59556	138-90004-161	SPINDLE AND GOOSENECK ASSEMBLY, 1 inch	1
37	38205	326264	59556	138-90004-162	HEAD, 23 O.D. x 1-5/16 I.D.	1
38	38205	326046	59556	138-90004-163	DRUM, 11-1/4 Diameter x 30 inches	1
39	38205	C00510207	59556	138-90004-164	PIN, Roll, 3/16 Diameter x 1-1/4 inches	1
40	38205	014224	59556	138-90004-165	O-RING, 1-3/4 I.D. x 2 O.D.	1

Group 05. Hose Reel Assembly

Figure E-16. Hose Reel Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
41	38205	323079	59556	138-90004-166	GOOSENECK, 1-1/2 Swing Joint x 1 NPTM. Pattern #12	1
42	38205	SP3/8x5/8	59556	138-90004-167	SPACER, 3/8 Schedule 40 x 5/8 inch Long	4



GROUP 06. FIRE BODY ASSEMBLY

FIGURE E-17. FIRE BODY ASSEMBLY



Group 06. Fire Body Assembly

Figure E-17. Fire Body Assembly

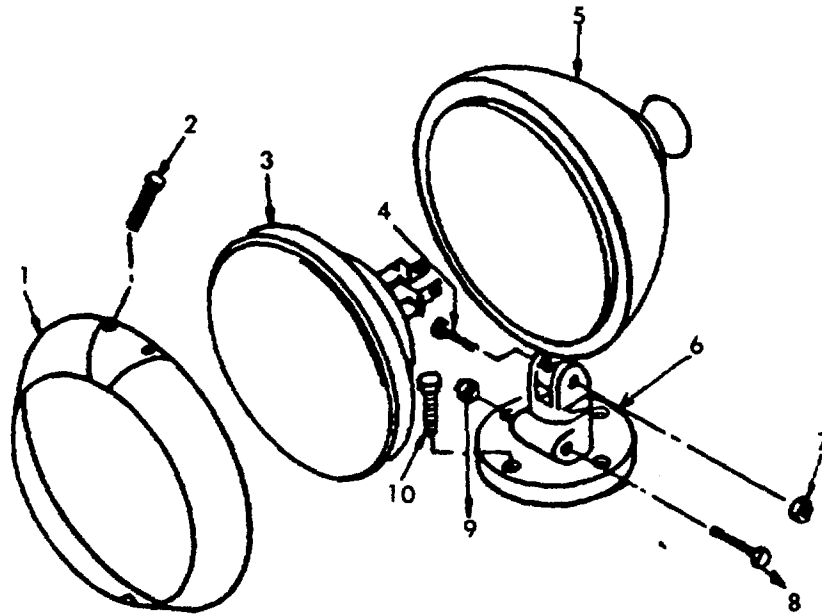
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	7F200	305-500	59556	138-90005	LAMP, Quartz W/Telescoping Pole	2
2	59556	KFT-008	59556	KFT-008	ANTI-ROTATE, Spotlight Device	2
3	-----	COML			BOLT, No.8 x 1/2 inch	8
4	-----	COML			WASHER, Lock, No.8	8
5	-----	COML			NUT, Hex No.8	8
6	59556	123-90005	59556	123-90005	RECEPTACLE ASSEMBLY, W/Cover	2
7	70418	057-00-712	59556	270-00002	LAMP, Clearance, Amber, 2-1/2 Lens	2
8	-----	COML			BOLT, Cross Head, NO.10 x 1/2 inch	18
9	59556	101-90045	59556	101-90045	BODY ASSEMBLY	1
10	78977	AG-R-4413	59556	152-00003	LIGHT, Deck	2
11	-----	COML			BOLT, 1/4 x 1 inch	8
12	-----	COML			WASHER, Flat, 1/4 inch	8
13	-----	COML			NUT, Lock, Hex Head, 1/4 inch	8
14	70418	057-00-722	59556	270-00003	LAMP, Clearance, Red, 2-1/2 Lens	2
15	70418	052-00-722	59556	270-00004	LAMP, Clearance, Red, 3-1/2 Lens	5
16	59556	197-00005	59556	197-00005	PLATE, Instruction	1
17	77977	CE-650-ST	59556	124-00004	LAMP ASSEMBLY, Stop/Tail/Turn/Park	2
18	-----	COML			BOLT, No.8 x 3/4 inch	4
19	-----	COML			WASHER, Star, No.8	4
20	-----	COML			WASHER, Flat, No.8	4
21	-----	COML			NUT, Hex Head, No.8	4
22	-----	COML			BOLT, No.6 x 3/4 inch	6

Group 06. Fire Body Assembly  
 Figure E-17. Fire Body Assembly

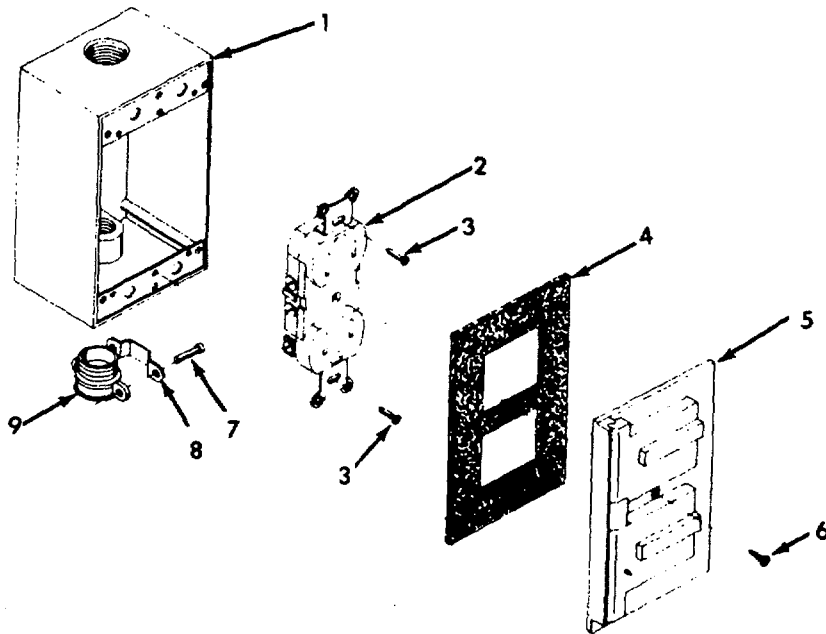
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	77977	2693W	59556	270-00001	LIGHT ASSEMBLY, Back-Up	2
24	----	COML			WASHER, Flat, 3/8 inch	4
25	----	COML			WASHER, Flat, 1/4 inch	4
26	----	COML			NUT, Hex Head, 1/4 inch	4
27	59556	KFT-002	59556	KFT-002	BUMPER, Rear	1
28	----	COML			BOLT, 5/8 x 1-1/2 inches	4
29	----	COML			WASHER, Flat, 5/8 inch	8
30	----	COML			NUT, Hex Head, 5/8 inch	4
31	----	COML			WASHER, Lock, No.10	6
32	59556	003-00007	59556	003-00007	HOOK, Tow Rear	2
33	----	COML			BOLT, 1/2 x 1 inch	2
34	----	COML			WASHER, Flat, 1/2 inch	2
35	----	COML			NUT, Hex Head, 1/2 inch	4
36	----	COML			BOLT, 1/2 x 1-1/4 inches	2
37	----	COML			WASHER, Star, 1/2 inch	1
38	----	COML			WASHER, Flat	2
39	74545	5369C	59556	123-00039	PLUG, Female Battery Charger	2
40	74545	5378C	59556	123-00040	INLET, Flanged	2
41	74545	WP-1	59556	123-00041	COVER	2
42	----	COML			BOLT, Phillips Head, No.10-3/4 inch	8
43	----	COML			NUT, Hex No.10	8
44	----	COML			BOLT, Phillips Head, 1/4 x 1-1/4 inch	2

Group 06. Fire Body Assembly  
 Figure E-17. Fire Body Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
45	----	COML			NUT, Hex, 1/4 inch	2
46	59556	4622	59556	123-00042	RECEPTACLE, Slave	1
47	59556	R-65-G3B	59556	123-00043	PLUG	1
48	----	COML			CHAIN, Retaining, 6 inches	1
49	----	COML			SCREW, No.6-32 x 1/2 inches	1
50	59556	KFT-021U	59556	KFT-021U	HINGE, Upper Door, 35-3/4 inches	6
51	59556	KFT-004A	59556	KFT-004A	DOOR, Compartment,Upper	6
52	9D455	92L	59556	155-00002	LATCH, Door Upper	6
53	----	COML			BOLT, Phillips Head, 1/4 x 3/4 inch	44
54	----	COML			WASHER, Lock, 1/4 inch	44
55	----	COML			NUT, Lock, 1/4 inch	44
56	59556	KFT-004B	59556	KFT-004B	DOOR, Compartment Lower	2
57	59556	KFT-021L	59556	KFT-021L	HINGE, Lower Door, 41-1/4 inches	2
58	9D455	92L	59556	155-00002	LATCH, Door Lower	2
59	12662	M-393	59556	156-00001	LIGHT ASSEMBLY, Compartment	8
60	----	COML			BOLT, No.10-32 x 1/2 inches	16
61	----	COML			NUT, Lock No.10	16



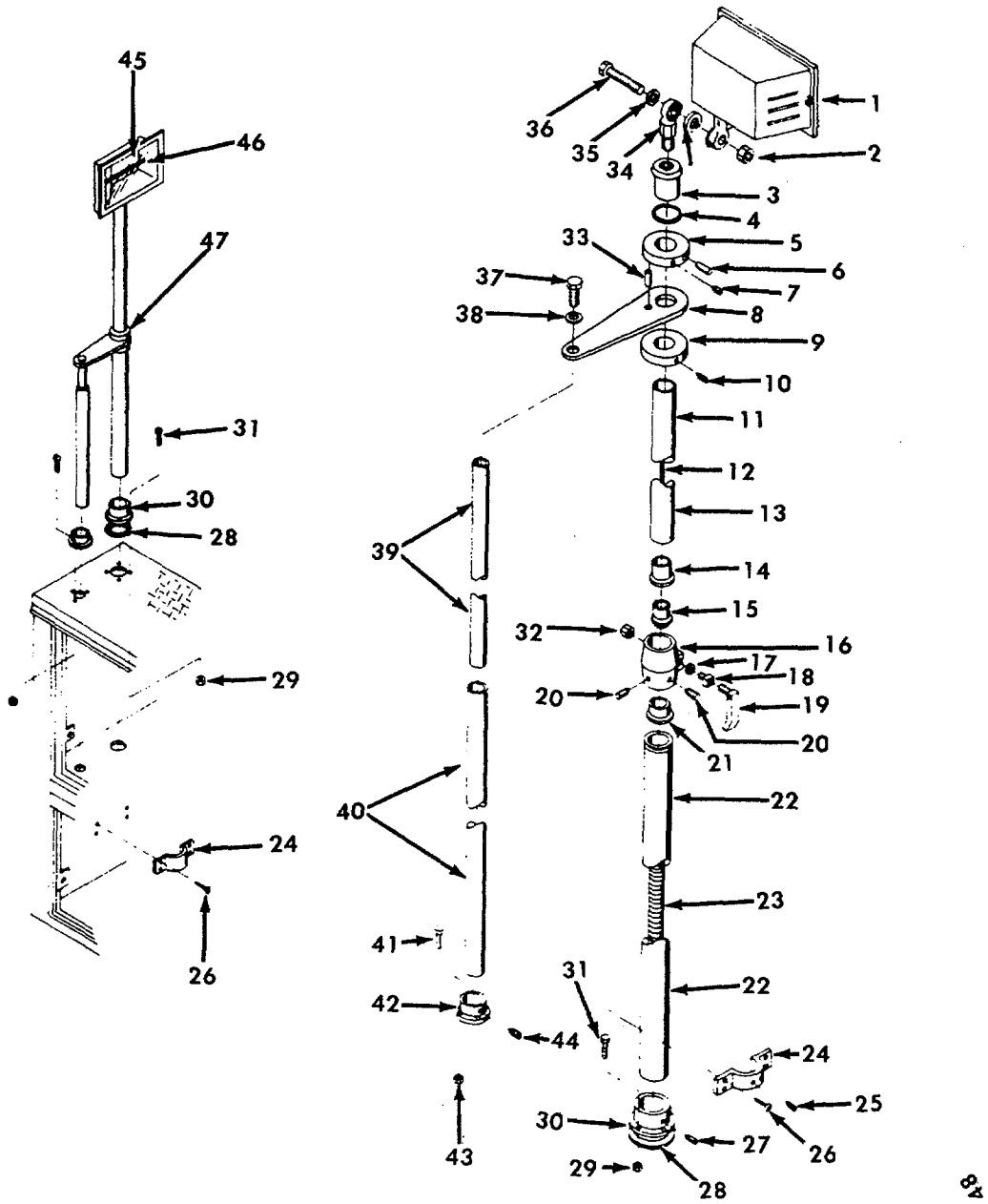
GROUP 06. FIRE BODY ASSEMBLY  
FIGURE E-18. DECK LIGHT



GROUP 06. FIRE BODY ASSEMBLY  
FIGURE E-19. INVERTER RECEPTACLE

Group 06. Fire Body Assembly  
 Figure E-18. Deck Light  
 Figure E-19. Inverter Receptacle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-18	78977	AG-R-4413	59556	152-00003	DECK LIGHT ASSEMBLY	REF
1	78977	6565-U	59556	152-00003-1	RETAINING RING	1
2	-----	COML			SCREW, 8-32 x 1 inch	2
3	78977	4413	59556	152-00003-2	LAMP, Sealed Beam	1
4	78977	7286	59556	152-00003-4	BOLT, 5/16 x 1-1/4 NC	1
5	78977	7178	59556	152-00003-3	HOUSING	1
6	78977	7036	59556	152-00003-5	BASE	1
7	78977	2219	59556	152-00003-6	NUT, Locking, 5/16 inch	1
8	78977	7240	59556	152-00003-7	BOLT, 1/4 x 1-1/2 NC	1
9	78977	2218	59556	152-00003-8	NUT, 1/4 inch	1
10	78977	7041	59556	152-00003-9	SCREW, 8-32 x 3/4 inch	4
E-19	59556	123-90005	59556	123-90005	INVERTER RECEPTACLE	REF
1	07337	1H31	59556	123-00003	HOUSING	1
2	75582	5800	59556	123-00002	RECEPTACLE	1
3	NSS				SCREW	2
4	NSS				GASKET	1
5	07337	CCD	59556	123-00004	COVER, Hinged	1
6	NSS				SCREW	1
7	NSS				SCREW	2
8	NSS				CLAMP	1
9					CONNECTOR	1



GROUP 06. FIRE BODY ASSEMBLY  
 FIGURE E-20. REAR QUARTZ SPOTLIGHT

Group 06. Fire Body Assembly  
Figure E-20. Rear Quartz Spotlight

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	7F200	305-500	59556	138-90005	QUARTZ LAMP ASSEMBLY, W/Telescoping Pole	REF
1	7F200	1-2A	59556	138-90005-1	LIGHT FIXTURE, (Includes Nos. 2, 3, 34, 35, 36 and 45)	1
2	7F200	1-3A	59556	138-90005-2	NUT, Locking, 5/16-18	1
3	7F200	1-3	59556	138-90005-3	WASHER, Nylon	2
4		NSS			BUSHING, Top	1
5		NSS			O-Ring, Rubber	1
6	59556	KFT-008C	59556	KFT-008C	COLLAR, Upper, (Includes No. 7 and 8)	1
7		NSS			PIN	1
8	-----	COML			SCREW, Set Hex Head, 5/16-24 NF x 1/2 inches Long	1
9	59556	KFT-008A	59556	KFT-008A	FRAME, Main, (Includes Nos. 33, 37, and 38)	1
10	59556	KFT-008B	59556	KFT-008B	COLLAR, Lower (Includes No. 11)	1
11	-----	COML			SCREW, Set Hex Head, 5/16-24 NF x 1/2 inches Long	1
12	7F200	1-6	59556	138-90005-4	POLE, Inner, 4 Foot	1
13	7F200	1-15	59556	138-90005-5	CORD, Straight, 3 Foot, 16/3 SJO	1
14	7F200	1-10	59556	138-90005-6	NYLINER, Inner Top Pole, Sleeve	1
15	7F200	1-12	59556	138-90005-7	BUSHING, Lower Top Pole	1
16	NSS				CASTING, Clamp	1
17	-----	COML			WASHER	1
18	-----	COML			NUT	1

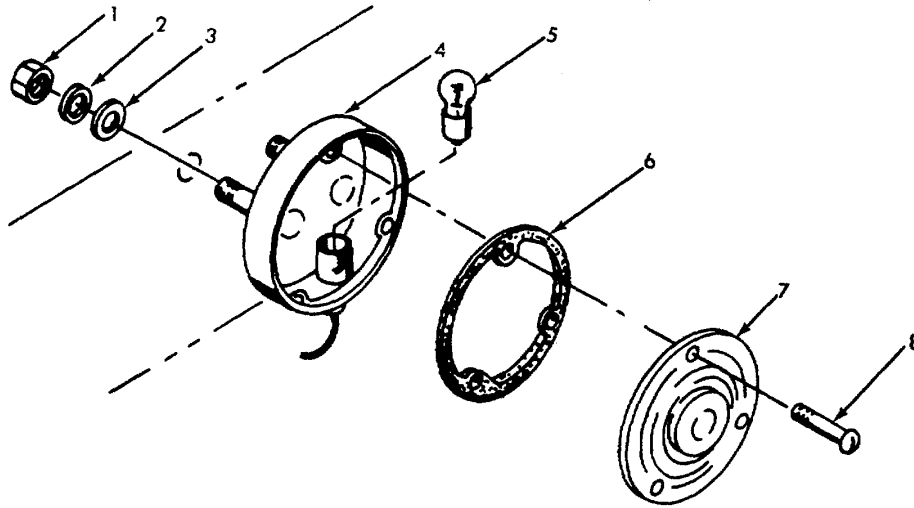
Group 06. Fire Body Assembly  
 Figure E-20. Rear Quartz Spotlight

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	7F200	1-7	59556	138-90005-8	HANDLE, W/Nuts And Washer, (Includes Nos. 17, 18, and 32)	1
20	COML				SCREW, Set, 1/4 x 20 x 1/4 inch	2
21	7F200	1-13	59556	138-90005-9	BUSHING, Strain Relief	1
22	7F200	1-14	59556	138-90005-10	POLE, Outer, 5 Foot	1
23	7F200	1-16	59556	138-90005-11	CORD, Coil, 12 Foot, 16/3 SJO	1
24	7F200	2	59556	138-90005-12	BRACKET, Securing	1
25	7F200	1-9	59556	138-90005-13	SCREW, Set	2
26	-----	COML			SCREW, Securing	4
27	7F200	1-19	59556	138-90005-14	SCREW, Set, 1/4 x 20 x 1/4 inch	2
28	-----	COML			WASHER	1
29	-----	COML			NUT	4
30	7F200	1B	59556	138-90005-15	MOUNTING, Thru-Body	1
31	-----	COML			SCREW	4
32		NSS			NUT	1
33		NSS			PIN	1
34	7F200	1-SW-KNL	59556	138-90005-16	KNUCKLE, Mounting	1
35		NSS			WASHER, Flat	1
36	7F200	1-3A	59556	138-90005-02	BOLT, Stainless, 5/16 x 2-1/4 inch (Includes No. 35)	1
37	NSS				BOLT	1
38	NSS				WASHER	1
39	59556	KFT-008D	59556	KFT-008D	PIPE, Inner	1
40	59556	KFT-008E	59556	KFT-008E	PIPE, Outer	1

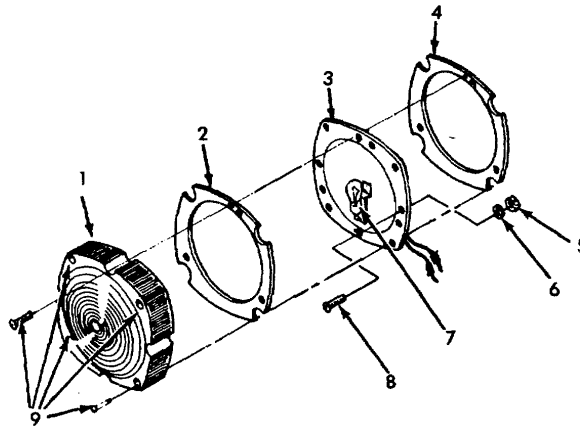


Group 06. Fire Body Assembly  
 Figure E-20. Rear Quartz Spotlight

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
41	----	COML	59556		BOLT	3
42		NSS	59556		COLLAR	1
43	----	COML	59556		NUT	1
44	----	COML			SCREW, Set Hex Head, 5/8-18 NF x 1 inch Long	1
45	7F200	1-500G	59556	138-90005-18	GLASS PANEL, For Light Assembly	1
46	7F200	1-500	59556	138-90005-19	BULB, Quartz, 500 Watt	1
47	59556	KFT-008	59556	KFT-008	ANTI-ROTATE SPOTLIGHT DEVICE ASSEMBLY (Includes Item Nos. 6,7, 8, 9, 10, 11, 33, 37, 38, 39, 40, 41, 42, 43 and 44)	2
--	7F200	6-413	59556	138-90005-20	KIT, Service, (Includes Item Nos. 4, 5, 14, 15, 16, 20, 21, 28 and 30)	AR



GROUP 06. FIRE BODY ASSEMBLY  
FIGURE E-21. BACK-UP LIGHT



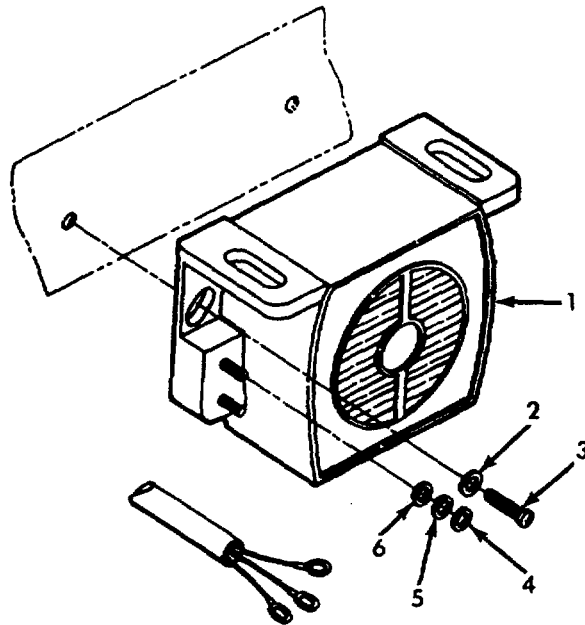
GROUP 06. FIRE BODY ASSEMBLY  
FIGURE E-22. TURN AND STOP LIGHT  
E-78

Group 06. Fire Body Assembly  
 Figure E-21. Back-Up Light  
 Figure E-22. Turn and Stop Light

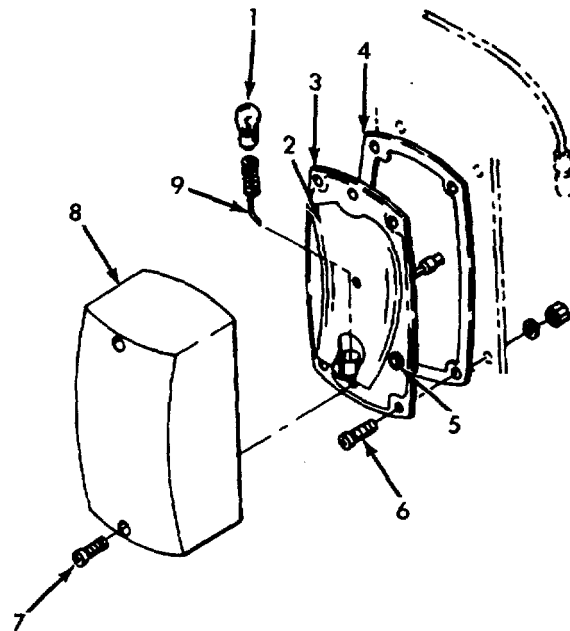
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-21	77977	2693W	59556	270-00001	BACK-UP LIGHT ASSEMBLY	1
1	-----	COML			NUT, 5/16 inch	2
2	-----	COML			LOCKWASHER, 5/16 inch	2
3	-----	COML -			WASHER, 5/16 inch	2
4		NSS			HOUSING	1
5	77977	00-01157-00000	59556	270-00001-1	BULB, 12 Volt	1
6	-----	NSS			GASKET	1
7	77977	9016	59556	270-00001-2	LENS, White	1
8		NSS			SCREW	3
	77977	9021	59556	270-00001-3	KIT, (Includes No.7, No.6, and No.8)	1
E-22	77977	CE-650-ST	59556	124-00004	TURN AND STOP LIGHT ASSEMBLY	1
1	77977	24-59382-10000	59556	124-00004-1	LENS, Red	1
2	77977	15-59384-00000	59556	124-00004-2	GASKET, Lens	1
3	77977	19-59729-10100	59556	124-00004-3	BODY	1
4	77977	15-59386-00002	59556	124-00004-4	GASKET, Body	1
5	-----	COML			NUTS, No.8	3
6	-----	COML			WASHER, Star No.8	3

Group 06. Fire Body Assembly  
 Figure E-21. Back-Up Light  
 Figure E-22. Turn and Stop Light

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
7	77977	00-01157-00000	59556	270-00001-1	BULB, 12 Volt	1
8	-----	COML			SCREW, No.8 x 3/4 inch	3
9	77977	31-50053-00000	59556	124-00004-5	SCREW	5



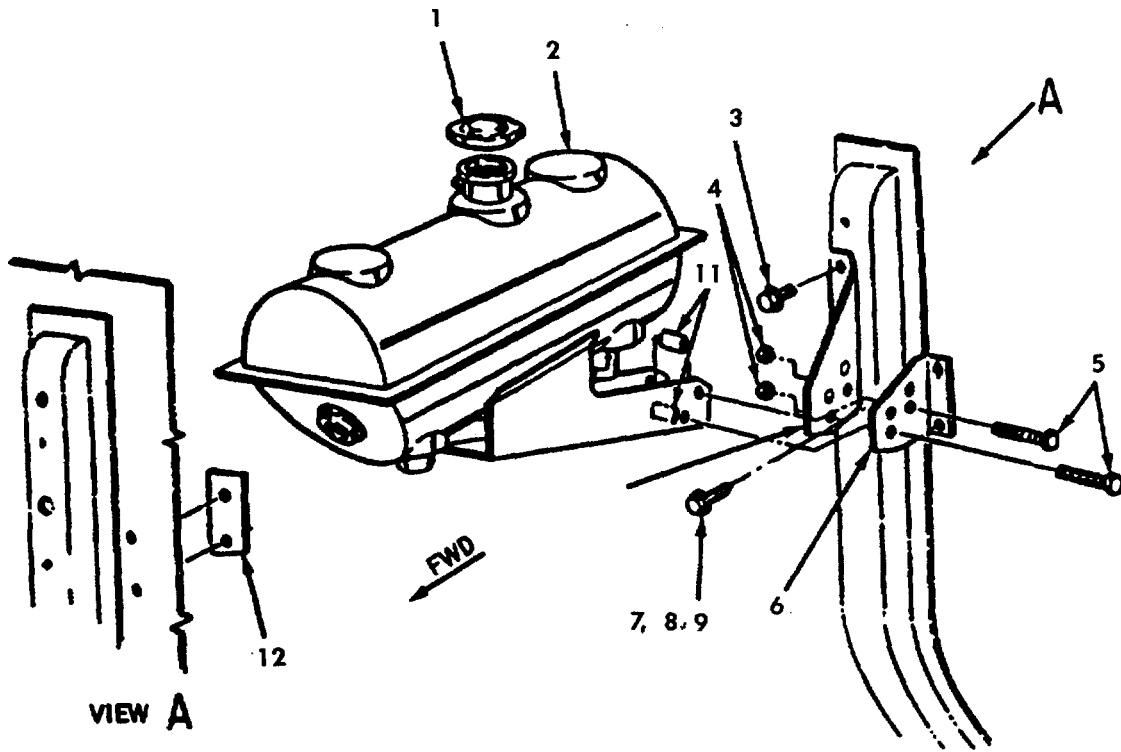
GROUP 06. FIRE BODY ASSEMBLY  
FIGURE E-23. BACK-UP ALARM



GROUP 06. FIRE BODY ASSEMBLY  
FIGURE E-24. COMPARTMENT LIGHT

Group 06. Fire Body Assembly  
 Figure E-23.. Back-Up Alarm  
 Figure E-24. Compartment Light

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-23						
1	77977	322	59556	151-00004	ALARM BACK-UP	1
2	----	COML			ALARM, Back-Up	2
3	----	COML			WASHER, 1/4 inch	2
4	----	COML			SCREW, 1/4-20 x 3/4 inch	2
5	----	COML			NUT, 8-32	2
6	----	COML			LOCKWASHER, 8-32	2
					WASHER, 8-32	2
E-24	12662	M-393	59556	156-00001	COMPARTMENT LIGHT ASSEMBLY	REF
1	12662	1156	59556	156-00001-1	BULB	1
2	12662	1877021	59556	156-00001-2	REFLECTOR	1
3	12662	306991	59556	156-00001-3	HOUSING	1
4	12662	306242	59556	156-00001-4	GASKET	1
5	12662	30618	59556	156-00001-5	GROMMET	1
6	12662	43032	59556	156-00001-6	SCREWS	4
7	12662	306331	59556	156-00001-7	SCREWS	2
8	12662	30625A	59556	156-00001-8	LENS, Amber	1
9	12662	11007	59556	156-00001-9	PIGTAIL, Single	1

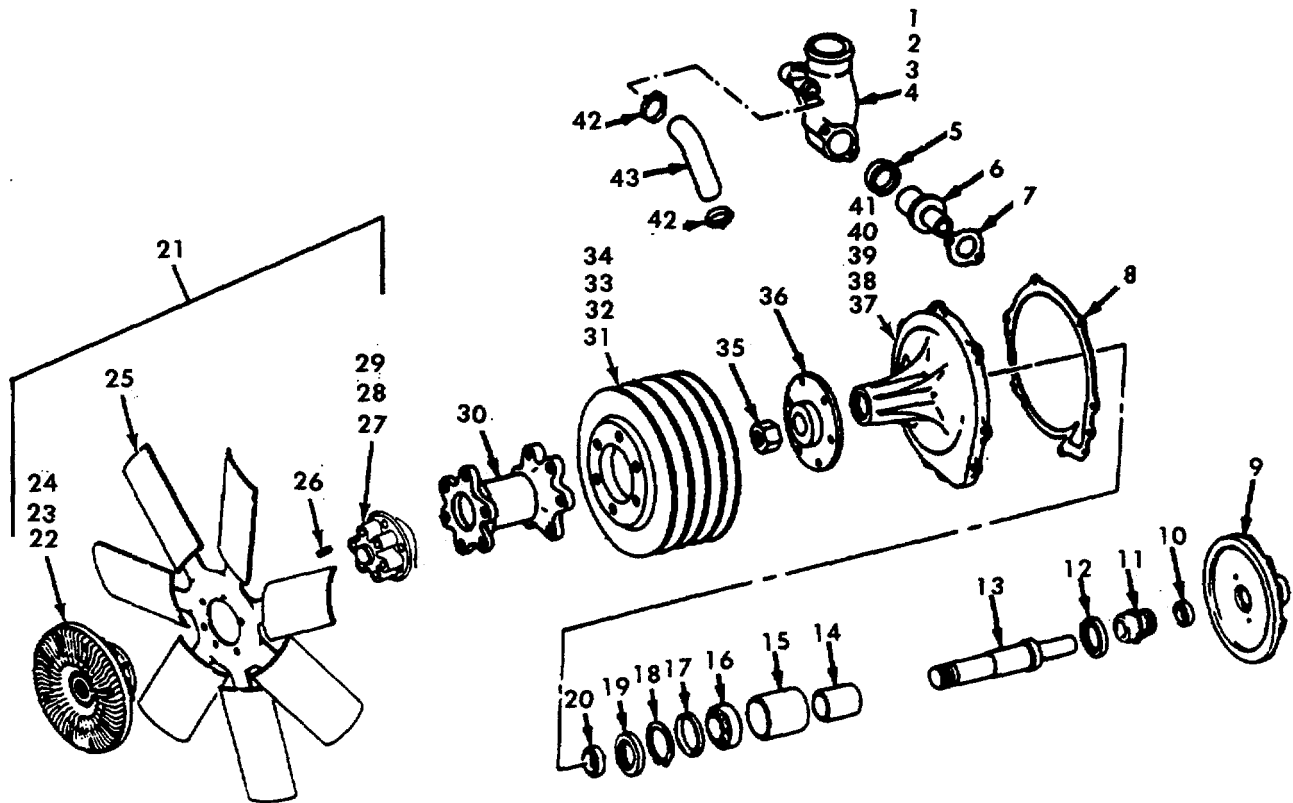


GROUP 07. ENGINE COOLING SYSTEM  
FIGURE E-25. DEAERATION TANK

Group 06. Fire Body Assembly  
Figure E-25. Deaeration Tank

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	530874R1	59556	019-90004-230	TANK, Deaeration Mounting Assembly	REF
2	89346	586531C2	59556	019-90004-231	CAP, Tank Fill	1
3	89346	403810C91	59556	019-90004-232	TANK, Deaeration	1
4	89346	9413979	59556	019-90004-232	BOLT, Sems Hex Head, 5/16-18 UNC x 1.00	2
5	89346	24845R1	59556	006-90002-170	NUT, Hex Lock, 3/8-16 UNC	4
6	89346	483128C2	59556	019-90004-234	BOLT, Hex Head, 3/8-16 UNC x 1 inch	4
7	89346	3/8R	59556	019-90004-235	BRACKET, Tank Support Left	1
8	89346	140483H	59556	MS35338-46	WASHER, Lock, 3/8 inch	2
9	89346	403859C92	59556	016-90005-38	BOLT, Hex Head, 3/8-16 UNC x 1-1/4 inch	2
10	89346	483127C2	59556	019-90004-238	BOLT, Sems Hex Head, 3/8-16 UNC x 1.12	2
11	89346	371623C2	59556	019-90004-239	BRACKET, Tank Support Right	1
12	59556	019-90004-241	59556	019-90004-240	SPACER, 2.70 inches Long	2
				019-90004-241	BAR, Reinforcement	1





GROUP 07. ENGINE COOLING SYSTEM  
 FIGURE E-26. FAN, WATER PUMP, AND THERMOSTAT

Group 07. Engine Cooling System  
 Figure E-26. Fan, Water Pump, and Thermostat

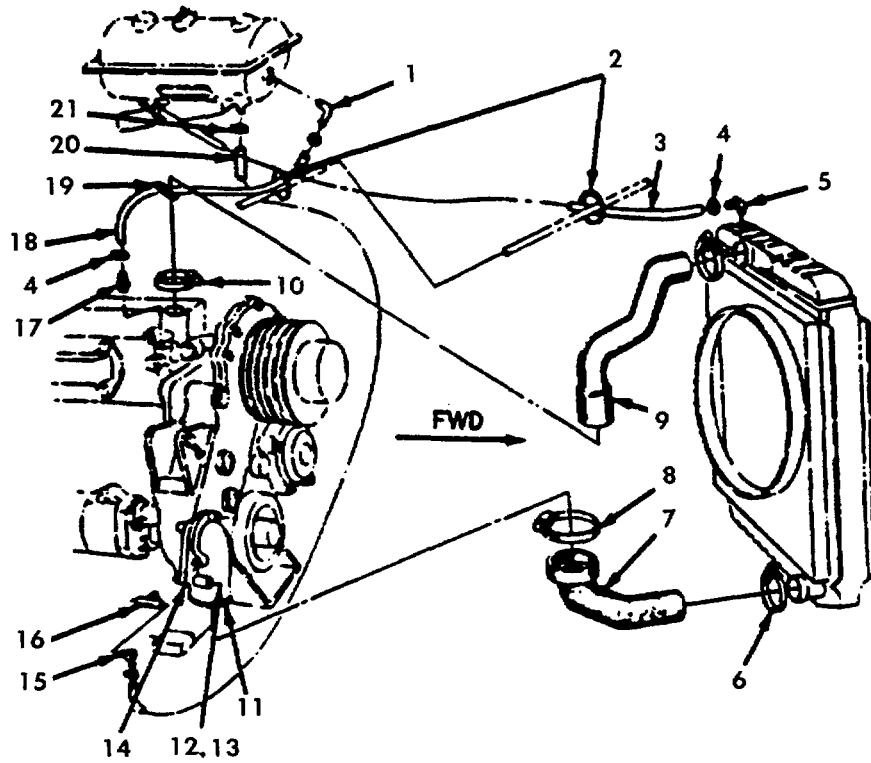
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	685155C92	59556	019-90004-856	WATER PUMP ASSEMBLY, (Includes Nos. 9 Thru 20, 26, 27, 28 Thru 32)	1
1	89346	686757C2	59556	019-90004-857	HOUSING, Thermostat	1
2	89346	277232R1	59556	019-90004-129	BOLT, Hex Head, 3/8 NC x 2-3/4 inch	2
3	89346	25896R1	59556	019-90004-182	WASHER, Hardened, 3/8 inch	2
4	89346	444612	59556	019-90004-860	PLUG, 1/8 NPT	1
5		NSS			SEAL, Thermostat	1
6		NSS			THERMOSTAT	1
7	89346	675384C1	59556	019-90004-863	GASKET, Thermostat Housing	1
8	89346	675808C1	59556	019-90004-864	GASKET, Water Pump Housing	1
9	89346	676320C1	59556	019-90004-865	IMPELLER, Water Pump	1
10	89346	688870C1	59556	019-90004-866	SEAT, Water Pump Seal	1
11		NSS			SEAL, Water Pump	1
12	89346	2806267C91	59556	019-90004-868	SEAL, Water Pump Bearing	1
13	89346	685153C1	59556	019-90004-869	SHAFT, Water Pump	1
14	89346	685152C1	59556	019-90004-870	SPACER, Bearing, Inner	1
15	89346	677141C1	59556	019-90004-871	SPACER, Bearing, Outer	1
16	89346	677148C91	59556	019-90004-872	BEARING, W/Spacer, Jet	1
17	89346	677715C1	59556	019-90004-873	SPACER, Retaining Ring	1
18	89346	272842R1	59556	019-90004-874	RING, Retaining	1
19	89346	1806268C91	59556	019-90004-875	SEAL, Water Pump Bearing	1
20	89346	673308C2	59556	019-90004-876	SLEEVE, Water Pump	1

Group 07. Fire Body Assembly  
Figure E-26. Fan, Water Pump, and Thermostat

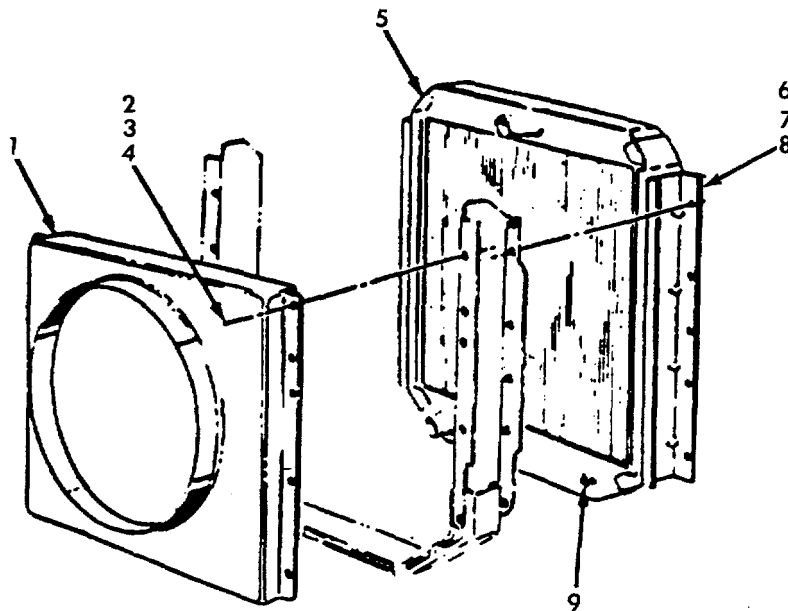
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	L120024962	59556	019-90004-79	FAN DRIVE ASSEMBLY, (Includes Item Nos. 22 Thru 29)	1
22	89346	492146C1	59556	019-90004-80	FAN, Drive	1
23	89346	25502R1	59556	019-90004-179	NUT, Hex	6
24	89346	120214	59556	019-90004-82	WASHER, Lock	6
25	89346	587656C1	59556	019-90004-83	FAN	1
26	89346	481979C3	59556	019-90004-84	STUD, 3/8 inch	6
27	89346	481775C1	59556	019-90004-85	SPACER, Fan	1
28	89346	120382	59556	019-90004-86	WASHER, Lock, 3/8 inch	6
29	89346	25523R1	59556	016-90005-13	NUT, Hex	6
30	89346	481775C1	59556	019-90004-85	SPACER, Fan W/Viscous Drive	27
31	89346	689420C1	59556	019-90004-878	STUD	AR
32	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 Regular	6
33	89346	24841R1	59556	019-90004-880	BOLT, Hex Head, 3/8 NC x 1-1/2 inch	6
34	89346	689344C1	59556	019-90004-881	PULLEY, Water Pump	1
35	89346	691342C1	59556	019-90004-882	NUT, Hex, 3.4 NF	1
36	89346	685157C1	59556	019-90004-883	HUB, Water Pump Pulley	1
37	89346	677856C2	59556	019-90004-884	HOUSING, Water Pump Bearing	1
38	89346	140483H	59556	016-90005-38	BOLT, Hex Head, 5/16 NC x 1-1/4 inch	4
39	89346	25522R1	59556	016-90005-49	NUT, Hex Head, 3/8 UNC	2
40	89346	25896R1	59556	019-90004-182	WASHER, Flange, 3/8 inch	6
41	89346	680481C1	59556	019-90004-330	PIN, Dowel	2
42	89346	681896C1	59556	019-90004-889	CLAMP, Hose	2

Group 07. Engine Cooling System  
 Figure E-26. Fan, Water Pump and Thermostat

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
43	89346	672242C1	59556	019-90004-890	HOSE, Thermostat By-Pass Housing	1
--	89346	687161C91	59556	019-90004-891	PACKAGE, Water Pump Coolant Seal (Includes Item Nos. 10 and 11)	1
--	89346	1801191C91	59556	019-90004-892	PACKAGE, Thermostat And Seal (Includes Item Nos. 5 and 6)	1



GROUP 07. ENGINE COOLING SYSTEM  
 FIGURE E-27. RADIATOR HOSES AND PIPING



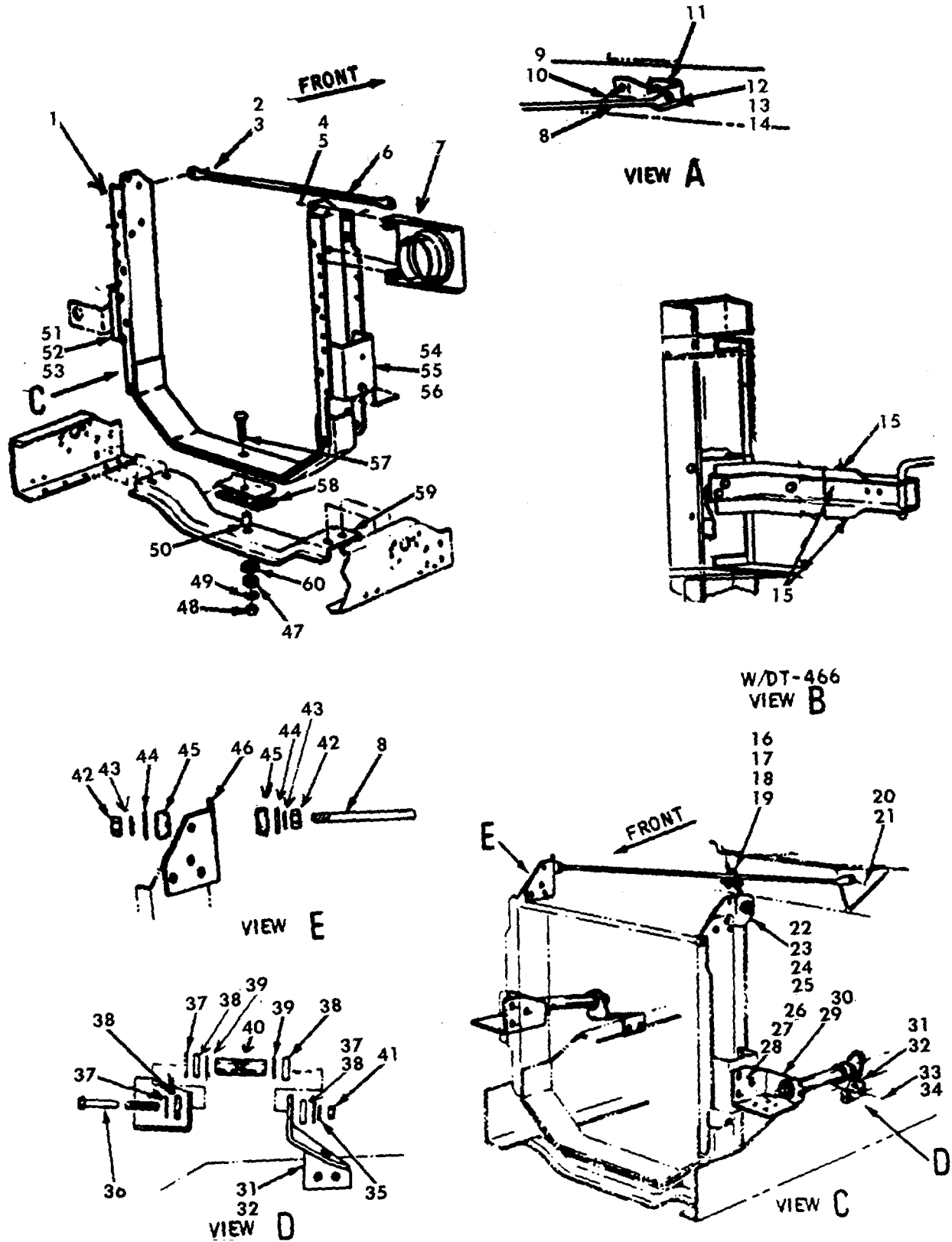
GROUP 07. ENGINE COOLING SYSTEM  
 FIGURE E-28. RADIATOR AND SHROUD

Group 07. Engine Cooling System  
 Figure E-27. Radiator Hoses and Piping  
 Figure E-28. Radiator and Shroud

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-27						REF
1	89346	482731C1	59556	050-90008-1	PIPING ASSEMBLY, Radiator ELBOW, 90° Degree, Hose Connection 1/4 NPT x 1/4 OD	1
2	89346	289862C1	59556	050-90008-2	STRAPLOCK	AR
3	89346	364357C1	59556	050-90008-3	HOSE, Bulk, 102CM	1
4	89346	279025R91	59556	050-90008-4	CLAMP, Hose No.6	4
5	89346	465108C1	59556	050-90008-5	ELBOW, 90° Degree Hose Connection 3/8 NPT x 3/8 OD	1
6	89346	279029R91	59556	050-90008-6	CLAMP, Hose No. 48	2
7	89346	486129C91	59556	050-90008-7	HOSE, Coolant, Lower	1
8	89346	995224R1	59556	019-90004-120	CLAMP, Hose No.52	1
9	89346	571967C1	59556	050-90008-9	HOSE, Coolant, Upper	1
10	89346	995223R1	59556	050-90008-10	CLAMP, Hose No.44	1
11	89346	921454C2	59556	050-90008-11	ELBOW, Water Inlet	1
12	89346	25709R1	59556	006-90002-168	WASHER, 3/8 Flange	3
13	89346	277232R1	59556	019-90004-129	BOLT, Hex Head, 3/8-16 UNC x 2-3/4 inch	3
14	89346	673396C1	59556	050-90008-14	GASKET, Water Inlet	1
15	89346	413729C1	59556	050-90008-15	ELBOW, 90° Degree, Hose Connection 3/4 NPT x 1/0 OD	1
16	89346	444140	59556	050-90008-16	TEE, Automotive, 3/4-14 NPT	1
17	89346	61181H	59556	050-90008-17	NIPPLE, Hose Connection, 1/8-27 NPTF x 1/4 ID Hose	1
18	89346	382997C1	59556	050-90008-18	HOSE, Bulk, 130CM Long	1
19	89346	291207C1	59556	039-00013-47	STRAP, Cable Lock	AR

Group 07. Engine Cooling System  
 Figure E-27. Radiator Hoses and Piping  
 Figure E-28. Radiator and Shroud

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	364361C1	59556	050-90008-20	HOSE, Bulk, 71.0CM/28.0IN	1
21	89346	311164C91	59556	050-90008-21	CLAMP, Hose No.20	2
E-28					RADIATOR AND SHROUD MOUNTING	
1	89346	485200C3	59556	050-90008-22	SHROUD Fan	1
2	89346	435318C1	59556	050-90008-23	BOLT, Hex Head, 5/16 inch	9
3	89346	25708R1	59556	015-90005-21	WASHER, Flat, 5/16 inch	9
4	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	9
5	89346	493362C3	59556	050-90008-25	RADIATOR	1
6	89346	25228R1	59556	016-90005-59	BOLT, Hex Head, 5/16-18 x 3/4 inch	10
7	89346	25708R1	59556	015-90005-21	WASHER, Flat, 5/16 inch	10
8	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	10
9	89346	125407H1	59556	050-90008-28	DRAINCOCK, 1/4 MPT	1



GROUP 07. ENGINE COOLING SYSTEM  
 FIGURE E-29. RADIATOR COLLAR AND STAY ROD



Group 07. Engine Cooling System  
Figure E-29. Radiator Collar and Stay Rod

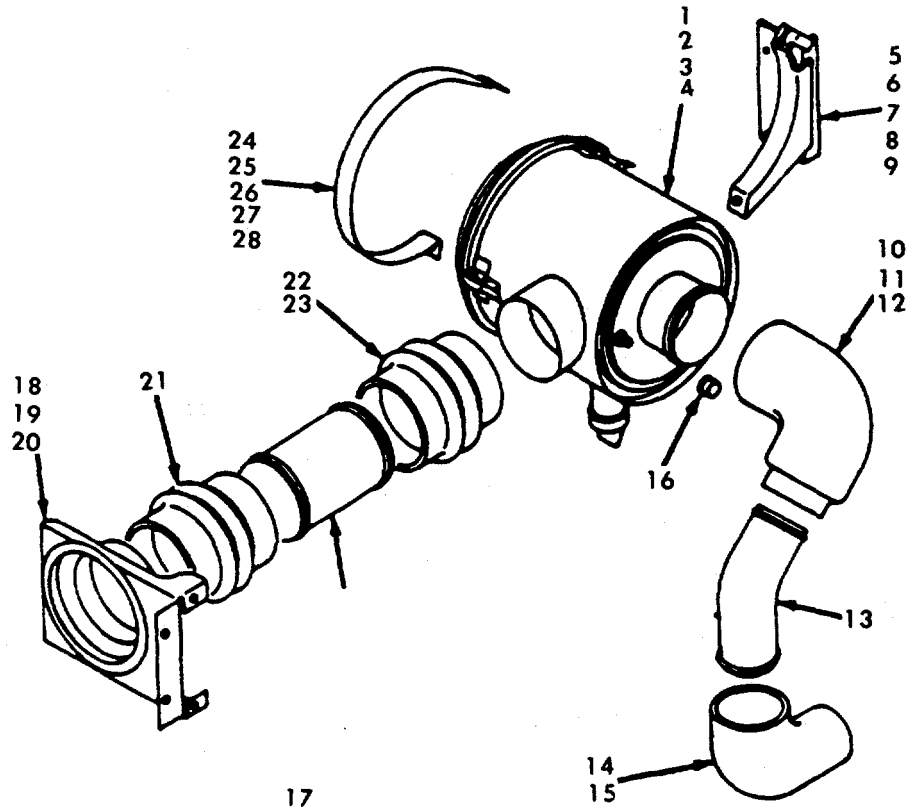
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	483533C6	59556	050-90008-22	RADIATOR COLLAR AND STAY ASSEMBLY	1
2	89346	25493R1	59556	015-90005-19	SUPPORT, Radiator	2
3	89346	5/16R	59556	MS35338-45	BOLT, Hex Head, 5/16-18 UNC x 1.0 inch	2
4	89346	25228R1	59556	016-90005-59	WASHER, Lock, 5/16 inch	4
5	89346	5/16R	59556	MS35338-45	BOLT, Hex Head, 5/16-18 x 3/4 inch	4
6	89346	483512C1	59556	050-90008-27	WASHER, Lock, 5/16 inch	1
7	89346	483532C2	59556	050-90008-28	ROD, Core Support	1
8	89346	483513C2	59556	050-90008-29	BRACKET, Air Intake	2
9	89346	25520R1	59556	030-00008-02	ROD, Radiator Upper Stay	4
10	89346	5/16R	59556	MS35338-45	NUT, Hex Head, 5/16-18 UNC	4
11	89346	488542C3	59556	050-90008-32	WASHER, Lock, 5/16 inch	2
12	89346	25493R1	59556	015-90005-19	BRACKET, Stay Rod Mounting	2
13	89346	25520R1	59556	030-00008-02	BOLT, Hex Head, 5/16-18 UNC x 1.0 inch	2
14	89346	5/16R	59556	MS35338-45	NUT, Hex Head, 5/16-18 UNC	2
15	89346	2643374R1	59556	050-90008-36	WASHER, Lock, 5/16 inch	AR
16	89346	264230C1	59556	050-90008-37	SEALER, Plastisol	1
17	89346	264231C1	59556	050-90008-38	U-BOLT	1
18	89346	118624	59556	050-90008-39	PLATE, U-Bolt	2
19	89346	5/16R	59556	MS35338-45	NUT, Hex Jam, 5/16-24	2
20	89346	25493R1	59556	015-90005-19	WASHER, Lock, 5/16 inch	2
					BOLT, Hex Head, 5/16-18 UNC x 1.0 inch	2

Group 07. Engine Cooling System  
 Figure E-29. Radiator Collar and Stay Rod

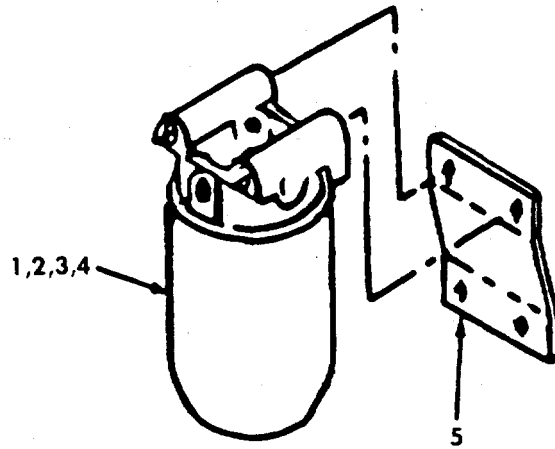
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	2
22	89346	491497C4	59556	050-90008-43	BRACKET, Radiator Stay Rod, Left	1
23	89346	25228R1	59556	016-90005-59	BOLT, Hex Head, 5/16-18 x 3/4 inch	3
24	89346	25520R1	59556	030-00008-02	NUT, Hex, 5/16-18	3
25	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	3
26	89346	140483H	59556	016-90005-38	BOLT, Hex Head, 3/8-16 UNC x 1-1/4 inch	14
27	89346	3/8R	59556	MS35338-46	WASHER, Locking, 3/8 inch	28
28	89346	25522R1	59556	016-90005-49	NUT, Hex Lock, 3/8-16	14
29	89346	483791C2	59556	050-90008-50	BRACKET, Stay Rod Lower, Left	1
30	89346	483792C2	59556	050-90008-51	BRACKET, Stay Rod Lower, Right	1
31	89346	483916C1	59556	050-90008-52	BRACKET, Cab and Radiator Stay Rod, Left	1
32	89346	483918C1	59556	050-90008-53	BRACKET, Cab and, Radiator Stay Rod, Right	1
33	89346	414052C1	59556	009-90006-54	BOLT, Flange Hex Head, 1/2-20 UNRF x 1-1/2 inch	4
34	89346	414087C1	59556	006-90002-150	NUT, Flange Hex, 1/2-20 UNF	4
35	89346	5/8R	59556	MS35338-50	WASHER, Lock, 5/8 inch	2
36	89346	27955R1	59556	050-90008-57	BOLT, Hex Head, 5/8-11 x 10-1/2 inch	2
37	89346	103348	59556	050-90008-58	WASHER, Flat, 1/0 inch	8
38	89346	459591C1	59556	050-90008-59	INSULATOR, Stay Rod Lower	8
39	89346	5/8T	59556	MS27183-21	WASHER, Flat, 5/8 inch	8

Group 07. Engine Cooling System  
Figure E-29. Radiator Collar and Stay Rod

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
40	59556	050-90008-61	59556	050-90008-61	SPACER, Pipe	2
41	89346	25528R1	59556	039-90013-19	NUT, Hex Head, 5/8-11 UNC	2
42	89346	25524R1	59556	050-90008-63	NUT, Hex, 7/16-14 UNC	4
43	89346	7/16R	59556	MS35338-47	WASHER, Lock, 7/16 inch	4
44	----	COML			WASHER, Flat, 2 inches	4
45	89346	299341C1	59556	050-90008-65	INSULATOR, Stay Rod Upper	4
46	89346	491499C4	59556	050-90008-66	BRACKET, Radiator Stay Rod, Right	1
47	89346	471477C1	59556	050-90008-67	INSULATOR, Core Support	1
48	89346	9412230	59556	006-90002-159	NUT, Hex Head Lock, 1/2-13 UNC	1
49	89346	22191R1	59556	050-90008-69	WASHER, Flat, 1/2 inch	1
50	89346	487704R1	59556	050-90008-70	SPACER	1
51	89346	483521C3	59556	050-90008-71	BRACKET, Hinge Tilt Hood, Left	1
52	89346	24840R1	59556	016-90005-36	BOLT, Hex Head, 3/8 inch	4
53	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	4
54	89346	483523C3	59556	050-90008-74	BRACKET, Hinge Tilt Hood, Right	1
55	89346	24840R1	59556	016-90005-36	BOLT, Hex Head, 3/8-16 UNC x 1 inch	4
56	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	4
57	89346	27463R1	59556	050-90008-77	BOLT, Carriage, 1/2-13 UNC x 3-3/4 inch	1
58	89346	471478C1	59556	050-90008-78	INSULATOR, Core Support Mounting, Crossmember, Radiator	1
59	89346	468349C2	59556	050-90008-79	CROSSMEMBER, Radiator	1
60	89346	471475C1	59556	050-90008-80	RETAINER, Insulator	1



GROUP 08. ENGINE FUEL SYSTEM  
FIGURE E-30. AIR CLEANER



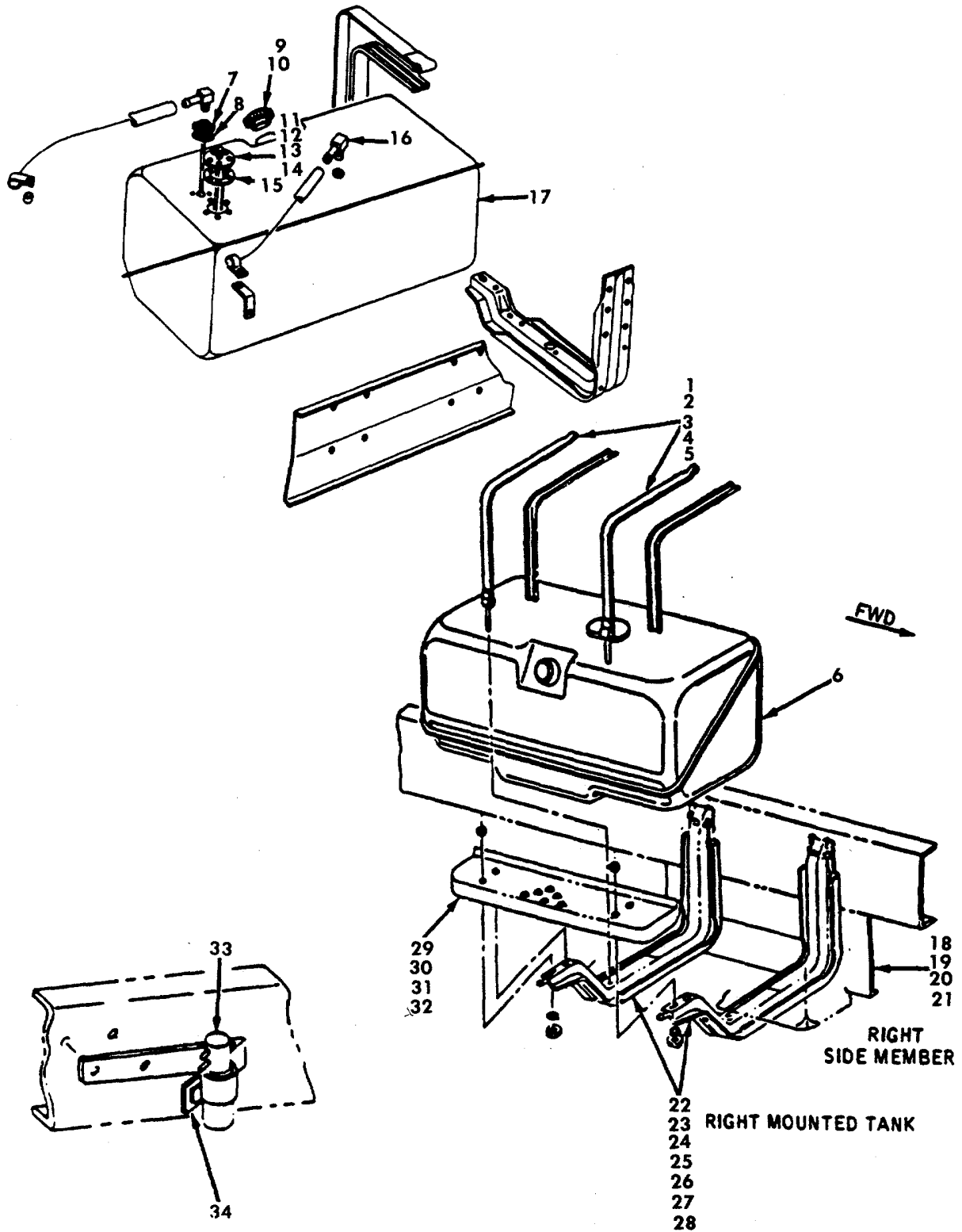
GROUP 08. ENGINE FUEL SYSTEM  
FIGURE E-31. FUEL FILTER

Group 08. Engine Fuel System  
 Figure E-30. Air Cleaner  
 Figure E-31. Fuel Filter

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-30					AIR CLEANER AND MOUNTING ASSEMBLY	
1	89346	492919C91	59556	019-90004-105	CLEANER, Air	1
2	89346	476742C1	59556	019-90004-106	COVER, Air Cleaner	1
3	89346	476741C1	59556	019-90004-108	ELEMENT, Air Cleaner	1
4	89346	496716C1	59556	019-90004-109	VALVE, Ejection	1
5	89346	482736C1	59556	019-90004-110	BRACKET, Air Cleaner Mounting, Left	1
6	89346	482478C1	59556	019-90004-111	BRACKET, Air Cleaner Mounting, Right	1
7	89346	25288R1	59556	019-90004-112	BOLT, Hex Head, 5/16 NC x 3/4 inch	2
8	89346	9413994	59556	019-90004-113	NUT, Hex Lock, 5/16 NC	AR
9	89346	593394C1	59556	019-90004-114	INSULATOR, Air Cleaner Bracket Mounting	2
10	89346	515718C1	59556	019-90004-115	ELBOW, Reducing Clamp	1
11	89346	327094R91	59556	019-90004-116	ELBOW, Reducing Clamp, At Cleaner	1
12	89346	422688R91	59556	019-90004-117	ELBOW, Reducing Clamp, At Pipe	1
13	89346	482758C1	59556	019-90004-118	PIPE, Engine Air Intake	1
14	89346	548222R1	59556	019-90004-119	ELBOW, 90° Degree Hose	1
15	89346	995224R1	59556	019-90004-120	CLAMP, No.52 Type F Hose	1
16	89346	105410	59556	019-90004-121	CAP, 1/8 inch Locknut	1
17	89346	482757C1	59556	019-90004-122	PIPE, Air Intake	1
18	89346	483532C2	59556	019-90004-123	BRACKET, Air Intake	1
19	89346	25228R1	59556	016-90005-59	BOLT, Hex Head, 5/16 NC x 3/4 inch	4
20	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	4
21	89346	586552C1	59556	019-90004-103	HOSE, Bracket To Pipe	1

Group 08. Enginefuel System  
 Figure E-30. Air Cleaner  
 Figure E-31. Fuel Filter

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	586552C1	59556	029-90004-103	HOSE, Air Cleaner To Pipe	1
23	89346	371677R91	59556	019-90004-127	CLAMP, Hose	2
24	89346	595968C1	59556	019-90004-128	STRAP, Air Cleaner	2
25	89346	277232R1	59556	019-90004-129	BOLT, Hex Head, 3/8 NC x 2-3/4 inch	2
26	89346	9413979	59556	006-90002-170	NUT, Hex Lock, 3/8 NC	2
27	89346	25709R1	59556	006-90002-168	WASHER, Flange, 3/8 inch	2
28	89346	593395C1	59556	019-90004-132	INSULATOR, Air Cleaner Strap Mounting	2
E-31					FUEL FILTER ASSEMBLY	REF
1	89346	702255C1	59556	019-90004-34	FILTER, Fuel	1
2	89346	612277C2	59556	019-90004-35	HEADER, Fuel Filter	1
3	89346	24845R1	59556	019-90004-234	BOLT, 1/4 x 1-1/4 PHC, Type 8	2
4	89346	9413979	59556	006-90002-170	NUT, 3/8 PHC, P/T Lock, Type 8	2
5	89346	588194C1	59556	019-90004-38	BRACKET, Fuel Filter	1



GROUP 08. ENGINE FUEL SYSTEM  
 FIGURE E-32. FUEL TANK AND LINES

(E-101 Blank)/E-102

## Group 08. Engine Fuel System

Figure E-32. Fuel Tank and Lines

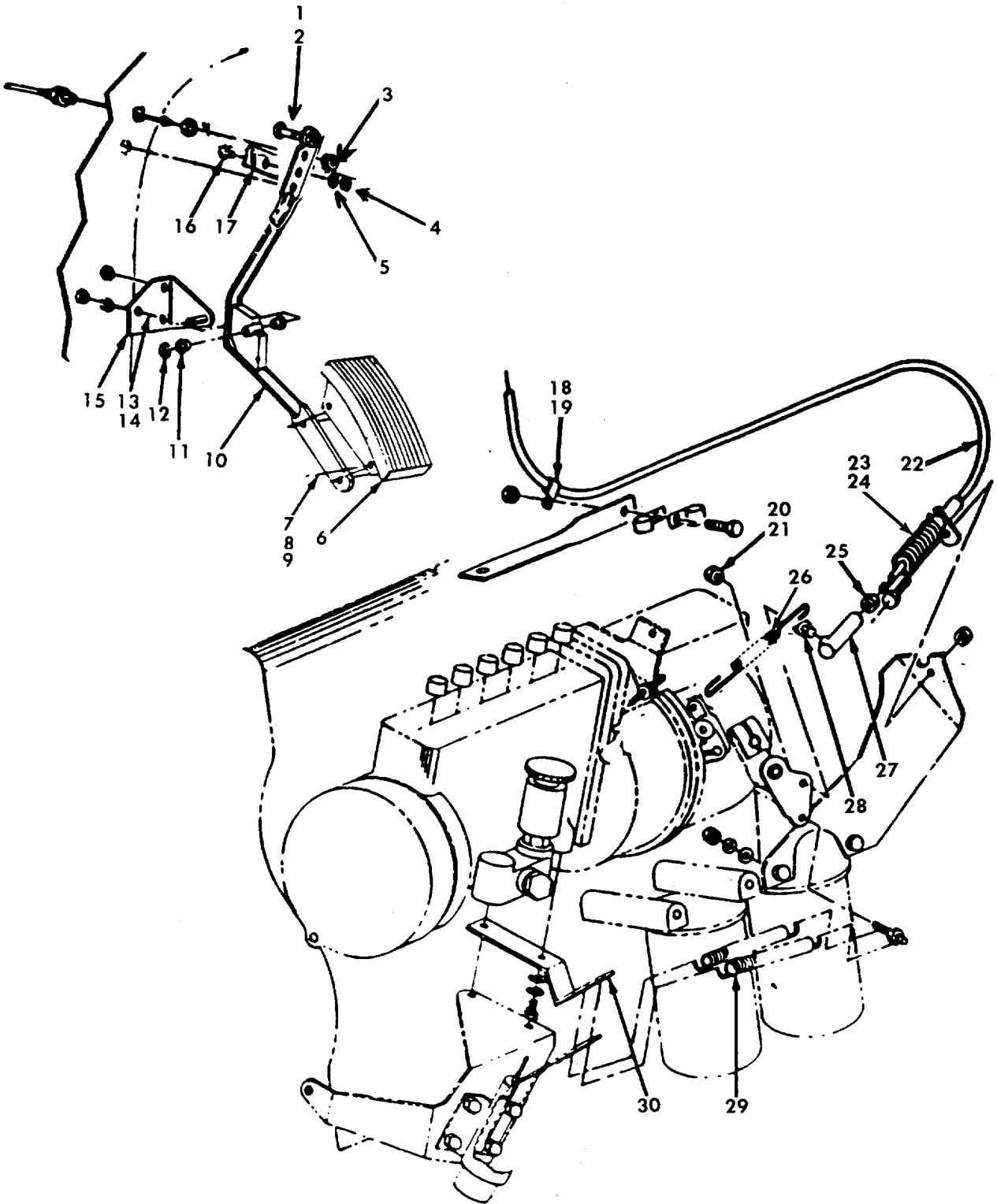
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	471501C1	59556	015-90005-1	FUEL TANK ASSEMBLY	2
2	89346	471444C1	59556	015-90005-2	STRAP, Fuel Tank	2
3	89346	275804R1	59556	015-90005-3	LINING, Fuel Tank	1
4	89346	24844R1	59556	015-90005-4	BOLT, Hex Head, 3/8-16 UNC x 3 inch, W/Right Front Support	1
5	89346	9413979	59556	006-90002-170	BOLT, Hex Head, 3/8-16 UNC x 3-1/2 inch, W/Right Rear Support	4
6	89346	464762C93	59556	015-90005-6	NUT, Hex Lock, 3/8-16 UNC	1
7	89346	509045C1	59556	015-90005-7	FUEL TANK, (Includes Item Nos. 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17)	1
8	89346	489700C1	59556	015-90005-8	OUTLET, Fuel Tank	1
9	89346	490683C1	59556	015-90005-9	GASKET, Fuel Outlet	1
10	89346	111142R1	59556	015-90005-10	CAP, Filler	1
11	89346	473817C1	59556	015-90005-11	GASKET, Filler Cap	1
12	89346	26627R1	59556	015-90005-12	GAUGE, Fuel Sender	5
13	89346	336024C1	59556	015-90005-13	SCREW, Pan Cross Head Tap, No. 10-16 x 3/4 SST	1
14	89346	27199R1	59556	015-90005-14	PLATE, Fuel Sender Gauge Hole	5
15	89346	345253C1	59556	015-90005-15	SCREW, Pan Cross Recessed Head Tap No. 10-16 x 5/8 inch	1
16	89346	447151C1	59556	015-90005-16	GASKET, Fuel Sender Gauge	AR
17	89346	464762C91	59556	015-90005-17	BREATHER, Ball Check	1
18		NSS			TANK, Fuel	1
					SHIELD, Fuel Tank Heat	1



Group 08. Engine Fuel System

Figure E-32. Fuel Tank and Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	89346	25493R1	59556	015-90005-19	BOLT, Hex Head, 5/16-18 UNC x 1 inch	4
20	89346	9413977	59556	015-90005-20	NUT, Hex Lock, 5/16-18 UNC	4
21	89346	25708R1	59556	015-90005-21	WASHER, Flange, 5/16 inch	4
22	89346	464585C1	59556	015-90005-22	SUPPORT, Front	1
23	89346	532401C2	59556	015-90005-23	SUPPORT, Rear	1
24	89346	414051C1	59556	009-90006-74	BOLT, Hex Head Flange	AR
25	89346	414052C1	59556	009-90006-54	BOLT, Flange Hex Head, 1/2-20 UNRF x 1-1/2 inch	AR
26	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Lock, 1/2-20 UNF	AR
27	89346	24862R1	59556	006-90002-165	BOLT, Hex Head, 1/2-13 UNC x 1-1/2 inch	AR
28	89346	9412230	59556	006-90002-159	NUT, Hex Lock, 1/2-13 UNC	AR
29	89346	471599C3	59556	015-90005-29	STEP, Running Board	1
30	89346	24839R1	59556	015-90005-30	BOLT, Hex Head, 3/8-16 UNC x 3/4 inch	4
31	89346	9413979	59556	006-90002-170	NUT, Hex Lock, 3/8-16 UNC	4
32	89346	25709R1	59556	006-90002-168	WASHER, Flat, 3/8 inch	2
33	89346	217554R91	59556	015-90005-33	VALVE, Fuel, Tank Selector	1
34	89346	594394C2	59556	015-90005-34	BRACKET, Fuel Selector Valve	1



GROUP 08. ENGINE FUEL SYSTEM

FIGURE E-33. ACCELERATOR PEDAL AND CONTROL ASSEMBLY

## Group 08. Engine Fuel System

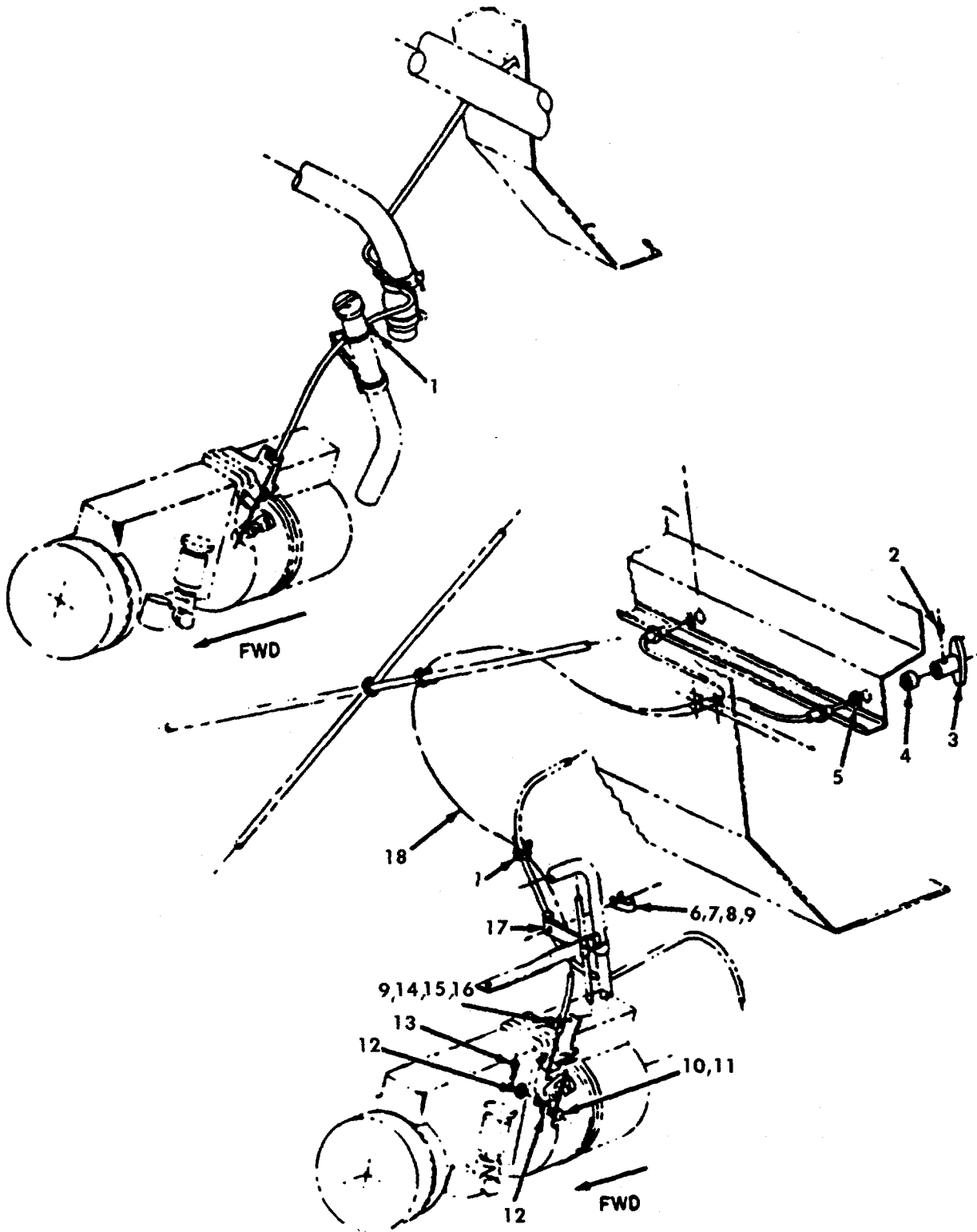
Figure E-33. Accelerator Pedal and Control Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	25232R1	59556	030-00008-1	ACCELERATOR PEDAL AND CONTROL ASSEMBLY	1
2	89346	25520R1	59556	030-00008-2	BOLT, Hex Head, 5/16-18 UNC x 2 inches	2
3	89346	480460C2	59556	030-00008-3	NUT, Hex Head, 5/16-18 UNC	1
4	89346	252220R1	59556	030-00008-4	RETAINER, Cable Slug	1
5	89346	5/16R	59556	MS35338-45	NUT, Hex Head, 5/16-18 UNC	1
6	89346	482606C1	59556	030-00008-6	WASHER, Lock, 5/16 inch	1
7	89346	27095R1	59556	030-00008-7	PEDAL, Accelerator	2
8	89346	3/16R	59556	MS35338-43	SCREW, Pan Head, No. 10-24 x 1 inch	2
9	89346	120361	59556	030-00008-9	WASHER, Locking, No.10	2
10	89346	495433C1	59556	030-00008-10	NUT, Hex, No. 10-24 x 1 inch	1
11	89346	479220C1	59556	030-00008-11	ROD, Accelerator Pedal	2
12	89346	110668R1	59556	030-00008-12	BUSHING	1
13	89346	25751R1	59556	030-00008-13	RING, Retaining	3
14	89346	5/16R	59556	MS35338-45	BOLT, Hex Head, 5/16-18 UNC x 1-1/4 inches Long	3
15	89346	495395C1	59556	030-00008-15	WASHER, Locking, 5/16 inch	1
16	89346	25228R1	59556	016-90005-59	BRACKET, Accelerator Pivot	1
17	89346	592568C1	59556	030-00008-17	BOLT, Hex Head, 5/16-18 UNC x 3/4 inch	1
18	89346	172429	59556	030-00008-18	BRACKET, Throttle Cable	1
					SCREW, Hex Head Tapping, 1/4-20 x 5/8 inch	1

Group 08. Engine Fuel System

Figure E-33. Accelerator Pedal and Control Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
20	89346	25736R1	59556	030-00008-20	NUT, HEx Lock, 1/4-28 UNF	1
21	89346	107377H	59556	030-00008-21	NUT, Hex Lock, No. 10-32	1
22	89346	475177C3	59556	030-00008-22	CABLE, Accelerator	1
23	89346	25222R1	59556	019-90004-277	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
24	89346	26110R1	59556	030-00008-24	NUT, Hex Lock, 1/4-20 UNC	1
25	89346	25930R1	59556	019-90004-968	NUT, Hex Jam, 1/4-28 UNF	1
26	89346	1806793C1	59556	030-00008-26	SPRING, Throttle Lever	1
27	89346	465120C1	59556	030-00008-27	BALL, Joint	1
28	89346	398000C1	59556	030-00008-28	BALL, Stud	1
29	89346	580664C1	59556	030-00008-29	SPRING, Return	2
30	89346	492814C1	59556	030-00008-30	BRACKET, Return Spring	1



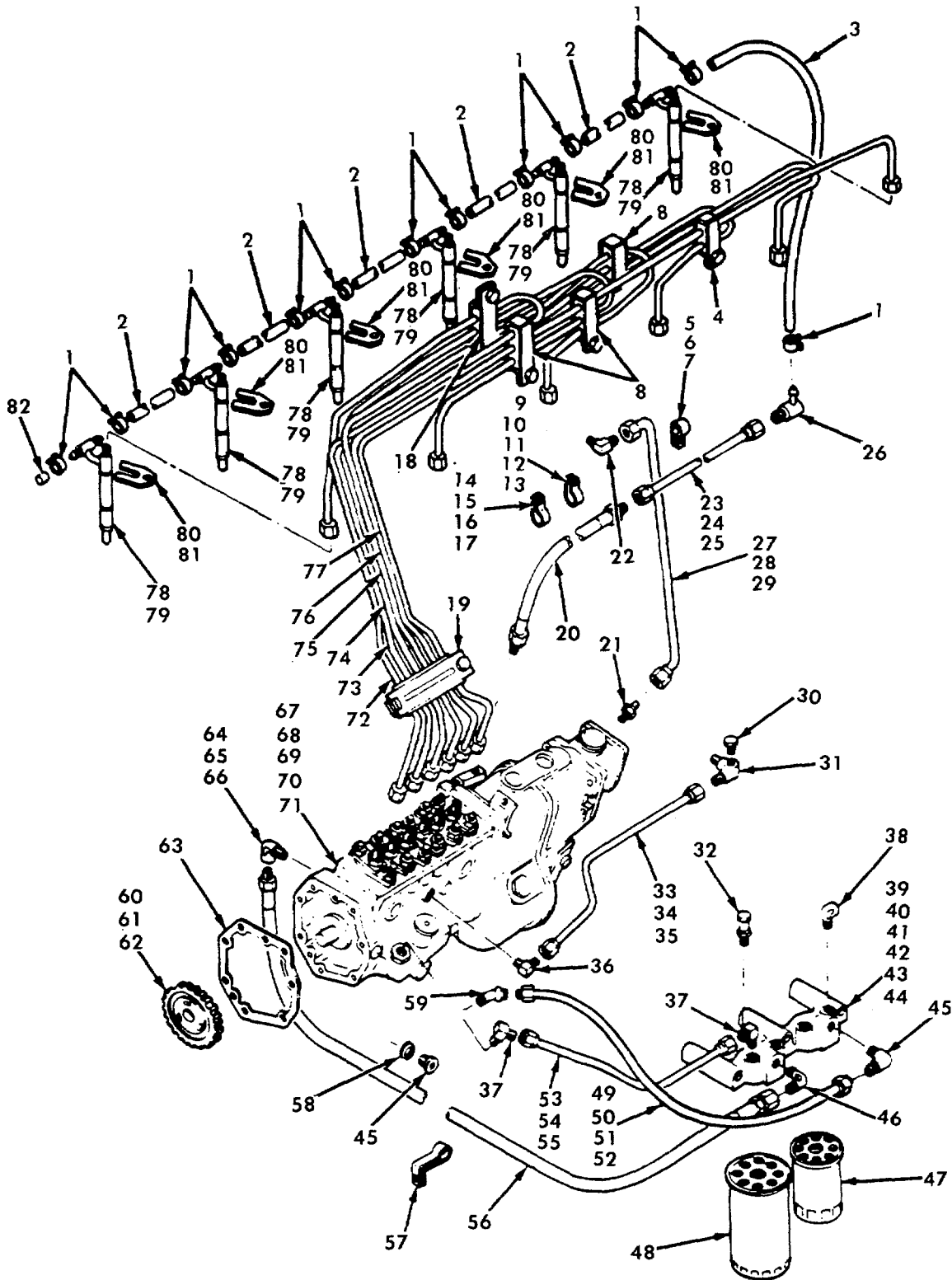
GROUP 08. ENGINE FUEL SYSTEM

FIGURE E-34. ENGINE SHUTDOWN CONTROL AND LINKAGE

Group 08. Engine Fuel System

Figure E-34. Engine Shutdown Control and Linkage

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	289862C1	59556	019-90004-270	ENGINE SHUTDOWN ASSEMBLY	REF
2	89346	370782C1	59556	019-90004-271	STRAP, Cable Lock	AR
3	89346	371146C1	59556	019-90004-272	SCREW, Set	1
4	89346	363423C1	59556	019-90004-273	KNOB, Engine Shutdown Control	1
5	89346	7/16R	59556	MS35338-47	NUT, Special	1
6	89346	299403C1	59556	019-90004-275	WASHER, Lock, 7/16 inch	1
7	89346	25519R1	59556	019-90004-276	CLIP, Shutdown, Cable	1
8	89346	25222R1	59556	019-90004-277	NUT, Hex, 1/4-20	1
9	89346	1/4R	59556	MS35338-44	BOLT, Hex Head, 14-20 x 3/4 inch	1
10	89346	109420R2	59556	019-90004-279	WASHER, Lock, 1/4 inch	2
11	89346	436747	59556	019-90004-280	SWIVEL, Arm Lever	1
12	89346	25707R1	59556	019-90004-281	SCREW, No. 10-32x5/16 inch	1
13	89346	449787C1	59556	019-90004-282	WASHER, Flange, 1/4 inch	2
14	89346	25222R1	59556	019-90004-277	PIN, Cotter	1
15	89346	25519R1	59556	019-90004-276	BOLT, Hex Head, 1/4-20 x 3/4 inch	1
16	89346	685848C1	59556	019-90004-285	NUT, Hex Head, 1/4-20	1
17	89346	301420C1	59556	019-90004-286	CLIP, Shut-Off Cable	1
18	89346	315446C91	59556	019-90004-287	EXTENSION, C1ip	1
					CABLE, Engine Shutdown, 60 inches Long	1



GROUP 09. DIESEL FUEL INJECTION SYSTEM

FIGURE E-35. INJECTION LINES

## Group 09. Diesel Fuel Injection System

Figure E-35. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	1802453C1	59556	019-90004-396	FUEL INJECTION PIPING ASSEMBLY	13
2	89346	680246C1	59556	019-90004-397	CLAMP, Hose	5
3	89346	680246C1	59556	019-90004-397	HOSE, 5 inches	1
4	89346	1802796C91	59556	019-90004-399	HOSE, 19 inches	1
5	89346	680116C1	59556	019-90004-400	CLAMP, Injection Pipe, No. 2	1
6	89346	25768R1	59556	019-90004-401	CLIP, Fuel Return Tube	1
7	89346	25896R1	59556	019-90004-182	SCREW, Hex Head, 3/8 x 5/8 inch	1
8	89346	1802959C91	59556	019-90004-403	WASHER, Hardened, 3.8 inch	1
9	89346	299566C1	59556	019-90004-404	CLAMP, Injection Pipe, No.3	3
10	89346	86224H	59556	019-90004-405	CLAMP, Fuel Return Hose	2
11	89346	689324C1	59556	019-90004-406	SPACER, Pipe Injector, 1/4 inch	2
12	89346	27326R1	59556	019-90004-407	STUD, Bolt	1
13	89346	25521R1	59556	019-90004-408	WASHER, 5/16 Hardened	1
14	89346	299566C1	59556	019-90004-404	NUT, Hex 5/16 NF	1
15	89346	86244H	59556	019-90004-410	PIPE, Injection	1
16	89346	27439R1	59556	019-90004-411	SPACER, 1/4 inch Pipe	1
17	89346	27326R1	59556	019-90004-407	BOLT, 5/16 x 1-3/4 inch	1
18	89346	1802800C91	59556	019-90004-413	WASHER, 5/16 Hardened	1
19	89346	1802947C91	59556	019-90004-414	CLAMP, Injection Pipe, No.5	1
20	89346	1806503C1	59556	019-90004-415	CLAMP, Injection Pipe, No.6	1
21	89346	606885C1	59556	019-90004-416	HOSE, Fuel Return	1
22	89346	319615R1	59556	019-90004-417	CONNECTOR	1
					ELBOW	1



Group 09. Diesel Fuel Injection System

Figure E-35. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	89346	691074C92	59556	019-90004-418	TUBE, Fuel Return	1
24	89346	265204R1	59556	019-90004-419	RING	2
25	89346	265205R1	59556	019-90004-420	NUT	2
26	89346	673196C1	59556	019-90004-421	TEE, Fuel Leakoff	1
27	89346	691068C91	59556	019-90004-422	TUBE, Aneroid	1
28	89346	915500R1	59556	019-90004-423	SLEEVE, Tube	2
29	89346	915499R1	59556	019-90004-424	NUT, Coupling	2
30	89346	444612	59556	019-90004-425	PLUG, Pipe, 1/8-27	1
31	89346	686839C1	59556	019-90004-426	ELBOW, Side Outlet Flex	1
32	89346	39677DA	59556	019-90004-427	VALVE, Bleeder	AR
33	89346	1802773C91	59556	019-90004-428	TUBE, Oil Lube	1
34	89346	685158C1	59556	019-90004-429	SLEEVE, Tube	2
35	89346	915499R1	59556	019-90004-424	NUT, Coupling	2
36	89346	319615R1	59556	019-90004-417	ELBOW, Inlet To Pump	1
37	89346	606845C1	59556	019-90004-432	ELBOW, 90° Degree, 3/8 x 1/4 NPT	2
38	89346	444054	59556	019-90004-433	ELBOW, 45° Degree, 1/4-18 NPTF	1
39	89346	1802964C2	59556	019-90004-434	HEADER, Filter	1
40	89346	24846R1	59556	019-90004-181	SCREW, Hex Head, 3/8 x 4-1/2 inch	3
41	89346	142127R1	59556	019-90004-436	WASHER, Hardened Special	AR
42	89346	25896R1	59556	019-90004-182	WASHER, 3/8 Hardened	3
43	89346	444000	59556	019-90004-438	ADAPTER, 1/4-18	1
44	89346	444614	59556	019-90004-439	PLUG, 1/8-27 NPT	AR
45	89346	606845C1	59556	019-90004-432	ELBOW, 90° Degree	1

## Group 09. Diesel Fuel Injection System

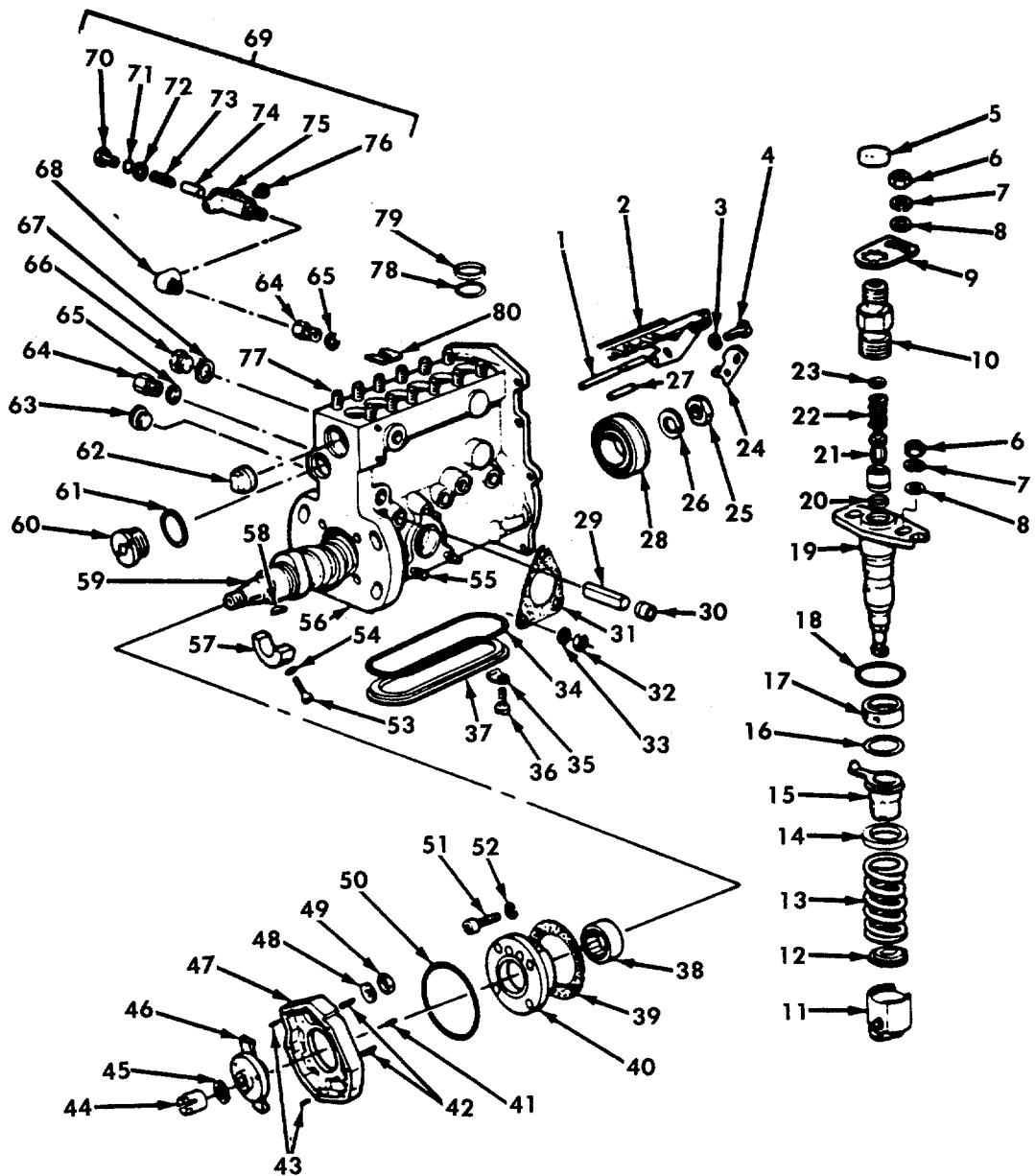
Figure E-35. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
46	89346	118755	59556	019-90004-441	ELBOW, Final Filter, 90° Degree x 1/4 NPT	1
47	89346	625627C1	59556	019-90004-442	FILTER, Primary Fuel W/Gasket	1
48	89346	672603C2	59556	019-90004-443	FILTER, Final Fuel W/Gasket	1
49	89346	1802846C1	59556	019-90004-444	HOSE, Pump Inlet	1
50	89346	1806602C91	59556	019-90004-445	TUBE	1
51	89346	265204R1	59556	019-90004-419	SLEEVE, Tube	2
52	89346	265205R1	59556	019-90004-420	NUT, Tube Fitting	2
53	89346	691072C91	59556	019-90004-448	TUBE, Pump Outlet	1
54	89346	265204R1	59556	019-90004-419	SLEEVE, Tube	2
55	89346	265204R1	59556	019-90004-419	NUT, Tube Fitting	2
56	89346	688188C1	59556	019-90004-451	HOSE, Fuel Filter To Injection Pump	1
57	89346	1802756C1	59556	019-90004-452	CLAMP, Inlet Hose	1
58	89346	689568C1	59556	019-90004-453	GASKET, Adapter Win	1
59	89346	606889C1	59556	019-90004-454	ELBOW, Fuel Inlet	1
60	89346	1802737C1	59556	019-90004-455	GEAR, Injection Pump	1
61	89346	24840R1	59556	016-90005-36	BOLT, Hex Head, 3/8 x 16 inch	3
62	89346	25544R1	59556	019-90004-174	WASHER, Hardened, 3.8 inch	3
63	89346	675609C1	59556	019-90004-458	GASKET, Injection Pump Mounting	1
64	89346	25533R1	59556	019-90004-459	WASHER, Flat, 5/16 inch	2
65	89346	678026C1	59556	019-90004-460	WIRE	2
66	89346	687459C1	59556	019-90004-461	LOCK, Wire Seal	2
67	89346	1802604C92	59556	019-90004-462	PUMP, Fuel Injection(See Figure E-36)	1

Group 09. Diesel Fuel Injection System

Figure E-35. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346 NSS NSS NSS	1806271C91	59556	019-90004-463	PUMP HOUSING, (See Figure E-36) GOVERNOR, (See Figure E-37) SHUT-OFF, (See Figure E-34) SUPPLY PUMP, (See Figure E-40)	REF REF REF REF
68	89346	25235R1	59556	019-90004-464	BOLT, 5/16-18 x 2 inches	2
69	89346	25533R1	59556	019-90004-459	WASHER, Flat, 5/16 inch	2
70	89346	678026C1	59556	019-90004-460	WIRE	2
71	89346	687459C1	59556	019-90004-467	LOCK, Wire Seal	2
72	89346	1802951C1	59556	019-90004-468	PIPE, Injection No. 1	1
73	89346	1802952C1	59556	019-90004-469	PIPE, Injection No. 2	1
74	89346	1802953C1	59556	019-90004-470	PIPE, Injection No. 3	1
75	89346	1802954C1	59556	019-90004-471	PIPE, Injection No. 4	1
76	89346	1802955C1	59556	019-90004-472	PIPE, Injection No. 5	1
77	89346	1802956C1	59556	019-90004-473	PIPE, Injection No. 6	1
78	89346	6688840C91	59556	019-90004-474	NOZZLE AND NOZZLE HOLDER	1
79	89346	682810C1	59556	019-90004-475	GROMMET, Injection Dust	6
80	89346	675479C2	59556	019-90004-476	CRAB, Injector	6
81	89346	691105C1	59556	019-90004-477	BOLT, Hex Head	6
82	89346	1802452C1	59556	019-90004-478	CAP, Fuel Return No. 1	1



GROUP 09. DIESEL FUEL INJECTION SYSTEM

FIGURE E-36. INJECTION PUMP

Group 09. Diesel Fuel Injection System

Figure E-36. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	1802604C92	59556	019-90004-462	FUEL INJECTION PUMP ASSEMBLY	REF
2	89346	691254C1	59556	019-90004-288	PIN, Pump Rack	1
3	89346	691255C1	59556	019-90004-289	RACK, Plunger Control	1
4	89346	933987R1	59556	019-90004-290	WASHER, Control Rack	2
5	89346	931393R1	59556	019-90004-291	SCREW, Control Rack	2
6	89346	1806328C1	59556	019-90004-292	CAP, Delivery Valve Sealing	6
7	89346	691265C1	59556	019-90004-293	NUT, Pump Housing Stud And Plunger Plate Lock	18
8	89346	933983R1	59556	019-90004-294	WASHER, Housing Stud And Plunger	18
9	89346	1806270C1	59556	019-90004-295	SPACER, Housing Stud And Plunger Plate Lock	18
10	89346	1806294C1	59556	019-90004-296	PLATE, Plunger Lock	6
11	89346	1806288C1	59556	019-90004-297	HOLDER, Delivery Valve	6
12	89346	691236C91	59556	019-90004-298	TAPPET, W/Roller, Bushing, Pin And Ring	6
13	89346	691235C1	59556	019-90004-299	SEAT, Lower Spring	6
14	89346	691226C1	59556	019-90004-300	SPRING, Tappet Roller	6
15	89346	691234C1	59556	019-90004-301	SEAT, Upper Spring	6
16	89346	691233C1	59556	019-90004-302	SLEEVE, Control	6
17	89346	691232C1	59556	019-90004-303	RING, Cap Retainer Snap	6
18	89346	1806291C1	59556	019-90004-304	CAP, Impact	6
19	89346	1806290C1	59556	019-90004-305	O-RING, Impact Cap	6
20	89346	1806287C1	59556	019-90004-306	PLUNGER AND BARREL	6
	89346	1806292C1	59556	019-90004-307	GASKET, Delivery Valve	6

## Group 09. Diesel Fuel Injection System

Figure E-36. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	1806833C91	59556	019-90004-308	VALVE, W/Cap	6
22	89346	3132382R1	59556	019-90004-309	SPRING, Delivery Valve	6
23	89346	3079241R1	59556	019-90004-310	WASHER, Valve Spring	6
24	89346	1806272C1	59556	019-90004-311	PLATE, Stop	1
25	89346	691251C1	59556	019-90004-312	NUT, Camshaft Rear	1
26	89346	691250C1	59556	019-90004-313	WASHER, Camshaft Rear Lock	1
27	89346	691256C1	59556	019-90004-314	PIN, Stop Plate	1
28	89346	691249C91	59556	019-90004-315	BEARING, Camshaft Rear	1
29	89346	1806278C1	59556	019-90004-316	SPACER, Camshaft	3
30	89346	691270C1	59556	019-90004-317	PLUG, Camshaft	3
31	89346	1802931C1	59556	019-90004-318	GASKET, Fuel Supply Pump	1
32	89346	933988R1	59556	019-90004-319	NUT, Supply Pump Stud	3
33	89346	933987R1	59556	019-90004-290	WASHER, Lock	3
34	89346	1806504C1	59556	019-90004-321	GASKET, Bottom Cover	1
35	89346	691268C1	59556	019-90004-322	WASHER, Cover Screw Lock	6
36	89346	1806919C1	59556	019-90004-323	SCREW, Bottom Cover	6
37	89346	1806416C1	59556	019-90004-324	COVER, Housing Bottom	1
38	89346	1806273C91	59556	019-90004-325	BEARING, Camshaft Front	1
39	89346	1806274C1	59556	019-90004-326	GASKET, Front Bearing Housing	1
40	89346	1806275C1	59556	019-90004-327	HOUSING, Front Bearing	1
41	89346	691349C1	59556	019-90004-328	POINTER, Timing	1
42	89346	691313C1	59556	019-90004-329	STUD, Adapter	4
43	89346	680481C1	59556	019-90004-330	PIN, Dowel	2

## Group 09. Diesel Fuel Injection System

Figure E-36. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
44	89346	1802705C1	59556	019-90004-331	NUT, Pump Drive Hub	1
45	89346	691243C1	59556	019-90004-332	WASHER, Pump Drive Hub Lock	1
46	89346	1802649C1	59556	019-90004-333	HUB, Injection Pump	1
47	89346	1802642C91	59556	019-90004-334	ADAPTER, Injection (Includes Item Nos. 41 Thru 43)	1
48	89346	625566C1	59556	019-90004-335	WASHER, Adapter Stud	4
49	89346	691314C1	59556	019-90004-336	NUT, Adapter Stud	4
50	89346	670875C1	59556	019-90004-337	RING, Front Bearing Housing	1
51	89346	1806918C1	59556	019-90004-338	SCREW, Front Bearing Housing	4
52	89346	1806276C1	59556	019-90004-339	WASHER, Front Bearing Housing	4
53	89346	1806285C1	59556	019-90004-340	SCREW, Camshaft Support	2
54	89346	1806284C1	59556	019-90004-341	WASHER, Support Lock	2
55	89346	397624C1	59556	019-90004-342	STUD, Pump Housing Fuel Supply	3
56	89346	1806271C91	59556	019-90004-463	HOUSING, Pump, (Includes Item Nos. 55, 60, 61, 62, 77, 78, and 79)	1
57	89346	691252C1	59556	019-90004-344	SUPPORT, Camshaft	1
58	89346	3056409R1	59556	019-90004-345	KEY, Camshaft Woodruff	1
59	89346	1806505C1	59556	019-90004-346	CAMSHAFT, Injection Pump	1
60	89346	691260C1	59556	019-90004-347	PLUG, Housing Screw	1
61	89346	933608R1	59556	019-90004-348	GASKET, Housing Plug	1
62	89346	691263C1	59556	019-90004-349	PLUG, Housing Rack	1
63	89346	1806293C1	59556	019-90004-350	PLUG, Housing Screw	1
64	89346	625924C1	59556	019-90004-351	FITTING, Fuel In And Out	2
65	89346	397630C1	59556	019-90004-352	GASKET, Fuel In And Out, Fitting	2

Group 09. Diesel Fuel Injection System

Figure E-36. Injection Lines

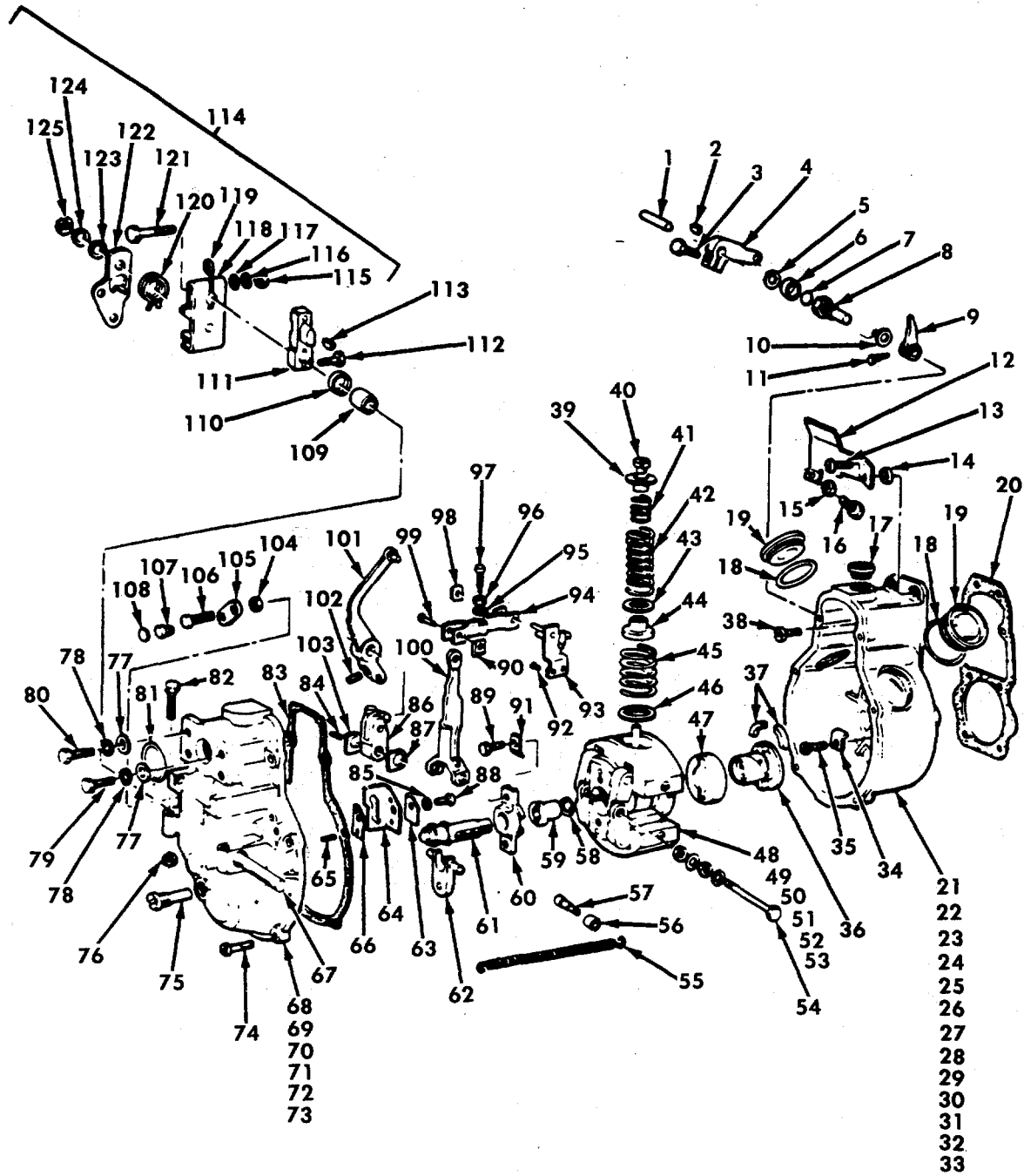
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
66	89346	691271C1	59556	019-90004-353	PLUG, Port Closure	1
67	89346	933222R1	59556	019-90004-354	GASKET, Port Closure Plug	1
68	89346	444041	59556	019-90004-355	ELBOW, Overflow	1
69	89346	670889C91	59556	019-90004-356	VALVE, Check	1
70	89346	625601C1	59556	019-90004-357	PLUG	1
71	89346	933610R1	59556	019-90004-358	GASKET, Piston Plug	1
72	89346	625600C1	59556	019-90004-359	WASHER, 0.3 MM	1
73	89346	625598C1	59556	019-90004-360	SPRING, Piston	1
74		NSS			VALVE, Stem	1
75		NSS			BODY, Valve	1
76	89346	1806417C1	59556	019-90004-361	PLUG, Piston	1
77	89346	2806269C1	59556	019-90004-362	STUD, Pump Housing	12
78	89346	691262C1	59556	019-90004-363	O-RING, Housing Plunger	6
79	89346	691261C1	59556	019-90004-364	SPACER, Housing Plunger	6
80	89346	1802256C1	59556	019-90004-365	SHIM, Plunger And Barrel, 1.0 MM	AR
	89346	1802257C1	59556	019-90004-366	SHIM, Plunger And Barrel, 1.05 MM	AR
	89346	1802258C1	59556	019-90004-367	SHIM, Plunger And Barrel, 1.1 MM	AR
	89346	1802259C1	59556	019-90004-368	SHIM, Plunger And Barrel, 1.15 MM	AR
	89346	1802260C1	59556	019-90004-369	SHIM, Plunger And Barrel, 1.2 MM	AR
	89346	1802261C1	59556	019-90004-370	SHIM, Plunger And Barrel, 1.25 MM	AR
	89346	1802262C1	59556	019-90004-371	SHIM, Plunger And Barrel, 1.3 MM	AR
	89346	1802263C1	59556	019-90004-372	SHIM, Plunger And Barrel, 1.35 MM	AR
	89346	1802264C1	59556	019-90004-373	SHIM, Plunger And Barrel, 1.4 MM	AR



Group 09. Diesel Fuel Injection System

Figure E-36. Injection Lines

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
89346		1802265C1	59556	019-90004-374	SHIM, Plunger And Barrel, 1.45 MM	AR
89346		1802266C1	59556	019-90004-375	SHIM, Plunger And Barrel, 1.5 MM	AR
89346		1802267C1	59556	019-90004-376	SHIM, Plunger And Barrel, 1.55 MM	AR
89346		691315C1	59556	019-90004-377	SHIM, Plunger And Barrel, 1.6 MM	AR
89346		691316C1	59556	019-90004-378	SHIM, Plunger And Barrel, 1.65 MM	AR
89346		691317C1	59556	019-90004-379	SHIM, Plunger And Barrel, 1.7 MM	AR
89346		691318C1	59556	019-90004-380	SHIM, Plunger And Barrel, 1.75 MM	AR
89346		691319C1	59556	019-90004-381	SHIM, Plunger And Barrel, 1.8 MM	AR
89346		691320C1	59556	019-90004-382	SHIM, Plunger And Barrel, 1.85 MM	AR
89346		691321C1	59556	019-90004-383	SHIM, Plunger And Barrel, 1.9 MM	AR
89346		691322C1	59556	019-90004-384	SHIM, Plunger And Barrel, 1.95 MM	AR
89346		691323C1	59556	019-90004-385	SHIM, Plunger And Barrel, 2.0 MM	AR
89346		691324C1	59556	019-90004-386	SHIM, Plunger And Barrel, 2.05 MM	AR
89346		691325C1	59556	019-90004-387	SHIM, Plunger And Barrel, 2.1 MM	AR
89346		691326C1	59556	019-90004-388	SHIM, Plunger And Barrel, 2.15 MM	AR
89346		691327C1	59556	019-90004-389	SHIM, Plunger And Barrel, 2.2 MM	AR
89346		691328C1	59556	019-90004-390	SHIM, Plunger And Barrel, 2.25 MM	AR
89346		691329C1	59556	019-90004-391	SHIM, Plunger And Barrel, 2.3 MM	AR
89346		691330C1	59556	019-90004-392	SHIM, Plunger And Barrel, 2.35 MM	AR
89346		691331C1	59556	019-90004-393	SHIM, Plunger And Barrel, 2.4 MM	AR
89346		691332C1	59556	019-90004-394	SHIM, Plunger And Barrel, 2.45 MM	AR
89346		691333C1	59556	019-90004-395	SHIM, Plunger And Barrel, 2.5 MM	AR



GROUP 09. DIESEL FUEL INJECTION SYSTEM

FIGURE E-37. INJECTION PUMP GOVERNOR ASSEMBLY

Group 09. Diesel Fuel Injection System

Figure E-37. Injection Pump Governor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					GOVERNOR, INJECTION PUMP AND RELATED PARTS	
1	89346	1806297C1	59556	019-90004-506	SHAFT, Stop Lever	1
2	89346	397695C1	59556	019-90004-507	KEY, Woodruff	1
3	89346	397697C1	59556	019-90004-508	SCREW, Hex Head	1
4	89346	1806301C1	59556	019-90004-509	CONTROL, Stop Lever	1
5	89346	1806303C1	59556	019-90004-510	SHIM, Stop Lever	1
6	89346	1806300C1	59556	019-90004-511	CAP, Nut	1
7	89346	1806299C1	59556	019-90004-512	O-RING, Stop Lever	1
8	89346	1806296C1	59556	019-90004-513	BUSHING, Governor Housing	1
9	89346	1806298C1	59556	019-90004-506,	LEVER, Stop	1
10	89346	1806302C1	59556	019-90004-515	SPACER, Stop Lever	1
11	89346	397689C1	59556	019-90004-516	SCREW, Hex Head	1
12	89346	1806336C91	59556	019-90004-517	BRACKET, W/Screw	1
13	89346	1806306C1	59556	019-90004-518	SCREW, Governor Housing And Bracket	1
14	89346	1806339C1	59556	019-90004-519	RING, Spacer	2
15	89346	1806338C1	59556	019-90004-520	NUT, Shut-Off Bracket	1
16	89346	1806337C1	59556	019-90004-521	SCREW, Shut-Off Bracket	1
17	89346	439184C1	59556	019-90004-522	PLUG, Governor Housing Top	1
18	89346	397721C1	59556	019-90004-523	GASKET, Side Plug	2
19	89346	397720C1	59556	019-90004-524	PLUG, Governor Housing Side	2
20	89346	691277C1	59556	019-90004-525	GASKET, Governor Housing To Pump	1

## Group 09. Diesel Fuel Injection System

Figure E-37. Injection Pump Governor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	1806566C91	59556	019-90004-526	HOUSING, W/Bushing	1
22	89346	1806557C91	59556	019-90004-527	HOUSING, Governor	1
23	89346	1806297C1	59556	019-90004-506	SHAFT	1
24	89346	1806298C1	5, 9556	019-90004-514	LEVER	1
25	89346	1806566C91	59556	019-90004-526	HOUSING	1
26	89346	1806301C1	59556	019-90004-509	CONTROL	1
27	89346	1806303C1	59556	019-90004-510	SHIM	1
28	89346	1806302C1	59556	019-90004-515	SPACER	1
29	89346	1806300C1	59556	019-90004-511	CAP	1
30	89346	1806299C1	59556	019-90004-512	O-RING	1
31	89346	397695C1	59556	019-90004-507	KEY, Woodruff	1
32	89346	397689C1	59556	019-90004-516	SCREW	1
33	89346	397697C1	59556	019-90004-508	SCREW	1
34	89346	691283C1	59556	019-90004-539	WASHER, Governor Housing Special Lock	4
35	89346	1806304C1	59556	019-90004-540	SCREW, Governor Housing	4
36	89346	397680C1	59556	019-90004-541	HUB, Flyweight Drive	1
37	89346	397682C1	59556	019-90004-542	DAMPER, Flyweight Rubber	4
38	89346	1806305C1	59556	019-90004-543	SCREW, Governor Housing	2
39	89346	1802310C1	59556	019-90004-544	SEAT, Spring	2
40	89346	1802309C1	59556	019-90004-545	NUT, Round	2
41	89346	1806308C1	59556	019-90004-546	SPRING, Inner	1
42	89346	397764C1	59556	019-90004-547	SPRING, Middle	1

Group 09. Diesel Fuel Injection System

Figure E-37. Injection Pump Governor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
43	89346	397769C1	59556	019-90004-548	SHIM, Middle Spring	1
44	89346	691084C1	59556	019-90004-549	SEAT, Spring, 16.95 MM	1
	89346	691085C1	59556	019-90004-550	SEAT, Spring, 17.10 MM	1
	89346	691086C1	59556	019-90004-551	SEAT, Spring, 17.25 MM	1
45	89346	684872C1	59556	019-90004-552	SPRING, Outer	2
46	89346	691087C1	59556	019-90004-553	SHIM, Outer Spring	AR
47	89346	684108C1	59556	019-90004-554	RETAINER, Flyweight	1
48	89346	1806358C91	59556	019-90004-555	FLYWEIGHT, Governor	1
49	89346	397680C1	59556	019-90004-541	HUB	1
50	89346	397682C1	59556	019-90004-542	DAMPER	4
51	89346	684108C1	59556	019-90004-554	RETAINER	1
52	89346	397643C1	59556	019-90004-559	BOLT	1
53	89346	397679C1	59556	019-90004-560	NUT	1
54	89346	397643C1	59556	019-90004-559	BOLT, Governor Flyweight	1
55	89346	1806311C1	59556	019-90004-562	SPRING, External	1
56	89346	1806356C1	59556	019-90004-563	BUSHING, Retaining Pin	1
57	89346	1806355C1	59556	019-90004-564	PIN, Retaining	1
58	89346	1806359C1	59556	019-90004-565	SHIM, Flyweight Securing Nut 1.60 MM	AR
	89346	1806360C1	59556	019-90004-566	SHIM, Flyweight Securing Nut 1.63 MM	AR
	89346	1806361C1	59556	019-90004-567	SHIM, Flyweight Securing Nut 1.66 MM	AR
	89346	180362C1	5955	019-90004-568	SHIM, Flyweight Securing Nut 1.69 MM	AR
	89346	1806363C1	59556	019-90004-569	SHIM, Flyweight Securing Nut 1.72 MM	AR
	89346	1806364C1	59556	019-90004-570	SHIM, Flyweight Securing Nut 1.75 MM	AR

Group 09. Diesel Fuel Injection System

Figure E-37. Injection Pump Governor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	1806365C1	59556	019-90004-571	SHIM, Flyweight Securing Nut 1.78 MM	AR
	89346	1806366C1	59556	019-90004-572	SHIM, Flyweight Securing Nut 1.81 MM	AR
	89346	1806367C1	59556	019-90004-573	SHIM, Flyweight Securing Nut 1.84 MM	AR
	89346	1806368C1	59556	019-90004-574	SHIM, Flyweight Securing Nut 1.87 MM	AR
	89346	1806369C1	59556	019-90004-575	SHIM, Flyweight Securing Nut 1.90 MM	AR
	89346	1806370V1	59556	019-90004-576	SHIM, Flyweight Securing Nut 1.93 MM	AR
	89346	1806371C1	59556	019-90004-577	SHIM, Flyweight Securing Nut 1.96 MM	AR
	89346	1806372C1	59556	019-90004-578	SHIM, Flyweight Securing Nut 1.99 MM	AR
	89346	1806373C1	59556	019-90004-579	SHIM, Flyweight Securing Nut 2.02 MM	AR
	89346	1806374C1	59556	019-90004-580	SHIM, Flyweight Securing Nut 2.05 MM	AR
	89346	1806375C1	59556	019-90004-581	SHIM, Flyweight Securing Nut 2.08 MM	AR
	89346	1806376C1	59556	019-90004-582	SHIM, Flyweight Securing Nut 2.11 MM	AR
	89346	1806377C1	59556	019-90004-583	SHIM, Flyweight Securing Nut 2.14 MM	AR
59	89346	397679C1	59556	019-90004-560	NUT, Flyweight Securing	1
60	89346	397703C1	59556	019-90004-585	BUSHING , Guide	1
61	89346	397701C1	59556	019-90004-586	SLEEVE, Guide	1
62	89346	397702C1	59556	019-90004-587	BLOCK, Guide	1
63	89346	1700920C1	59556	019-90004-588	PLATE, Lock	1
64	89346	684112C1	59556	019-90004-589	S-PLATE	1
65	89346	397777C1	59556	019-90004-590	PIN, S-Plate	2
66	89346	397773C1	59556	019-90004-591	SHIM, S-Plate, .20 MM	AR
	89346	397774C1	59556	019-90004-592	SHIM, S-Plate, .30 MM	AR
	89346	397776C1	59556	019-90004-593	SHIM, S-Plate, .50 MM	AR

## Group 09. Diesel Fuel Injection System

Figure E-37. Injection Pump Governor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	397775C1	59556	019-90004-594	SHIM, S-Plate, .80 MM	AR
67	89346	1806315C1	59556	019-90004-595	SHAFT, Governor Control Lever	1
68	89346	1806313C91	59556	019-90004-596	COVER, Governor	1
69	89346	691300C1	59556	019-90004-597	SEAL	2
70	89346	1806315C1	59556	019-90004-595	SHAFT	1
71	89346	397783C1	59556	019-90004-599	SPRING	1
72	89346	932261R1	59556	019-90004-600	KEY, Woodruff	1
73	89346	933987R1	59556	019-90004-290	WASHER	1
74	89346	931113R1	59556	019-90004-602	SCREW, Governor Cover	6
75	89346	397749C1	59556	019-90004-603	BOLT, Guide	1
76	89346	933988R1	59556	019-90004-319	NUT, Lever Stop	1
77	89346	397746C1	59556	019-90004-605	WASHER, Flange	4
78	89346	933987R1	59556	019-90004-290	WASHER, Lock	4
79	89346	397778C1	59556	019-90004-607	SCREW, Aneroid	2
80	89346	1806357C1	59556	019-90004-608	SCREW, Aneroid	2
81	89346	691402C1	59556	019-90004-609	O-RING, Aneroid	1
82	89346	1808129C1	59556	019-90004-610	SCREW, Lever Stop	1
83	89346	1700925C1	59556	019-90004-611	GASKET, Governor Cover	1
84	89346	397783C1	59556	019-90004-599	SPRING, Governor Rocker Arm	1
85	89346	933987R1	59556	019-90004-290	WASHER, Lock	1
86	89346	1806314C1	59556	019-90004-614	BLOCK, Guide	1
87	89346	397730C1	59556	019-90004-615	PLATE, Governor Rocker Arm	1
88	89346	1802054C1	59556	019-90004-616	SCREW, Hex Head	1

## Group 09. Diesel Fuel Injection System

Figure E-37. Injection Pump Governor Assembly

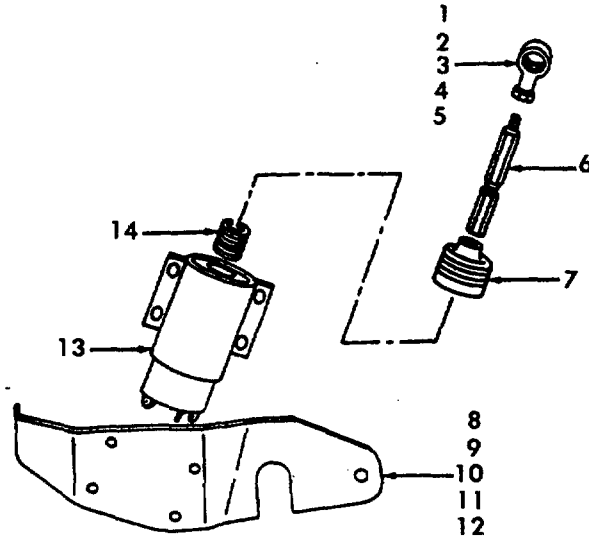
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
89	89346	1802055C1	59556	019-90004-617	SCREW, Guide Bushing	2
90	89346	691092C1	59556	019-90004-618	CLIP, Link	1
91	89346	397705C1	59556	019-90004-619	PLATE, Guide Bushing Lock	2
92	89346	1806310C1	59556	019-90004-620	RIVET, Connecting Plate	2
93	89346	1806309C1	59556	019-90004-621	PLATE, Connecting	1
94	89346	468962C1	59556	019-90004-622	LINK, Fulcrum Lever And Connecting Plate	1
95	89346	684864C1	59556	019-90004-623	WASHER, Link Lock	1
96	89346	1806312C1	59556	019-90004-624	NUT, Link SC	1
97	89346	1700917C1	59556	019-90004-625	SCREW, Link	1
98	89346	691092C1	59556	019-90004-618	CLIP, Link	1
99	89346	1700581C1	59556	019-90004-627	PIN, Link	1
100	89346	1806335C1	59556	019-90004-628	LEVER, Fulcrum	1
101	89346	397782C1	59556	019-90004-629	ARM, Governor Rocker	1
102	89346	397783C1	59556	019-90004-599	SPRING, Governor Rocker Arm	1
103	89346	397730C1	59556	019-90004-615	PLATE, Governor Rocker Arm	1
104	89346	933988R1	59556	019-90004-319	NUT, Seal	1
105	89346	1802064C1	59556	019-90004-633	HOLDER, Seal	1
106	89346	1802561C1	59556	019-90004-634	SCREW, Stop	1
107	89346	684858C1	59556	019-90004-635	SCREW, Seal Holder	1
108	89346	397755C1	59556	019-90004-636	PLUG, Seal	1
109	89346	397725C1	59556	019-90004-637	BUSHING, Governor Cover	2
110	89346	1808310C91	59556	019-90004-638	SEAL, Control Lever Shift	2



Group 09. Diesel Fuel Injection System

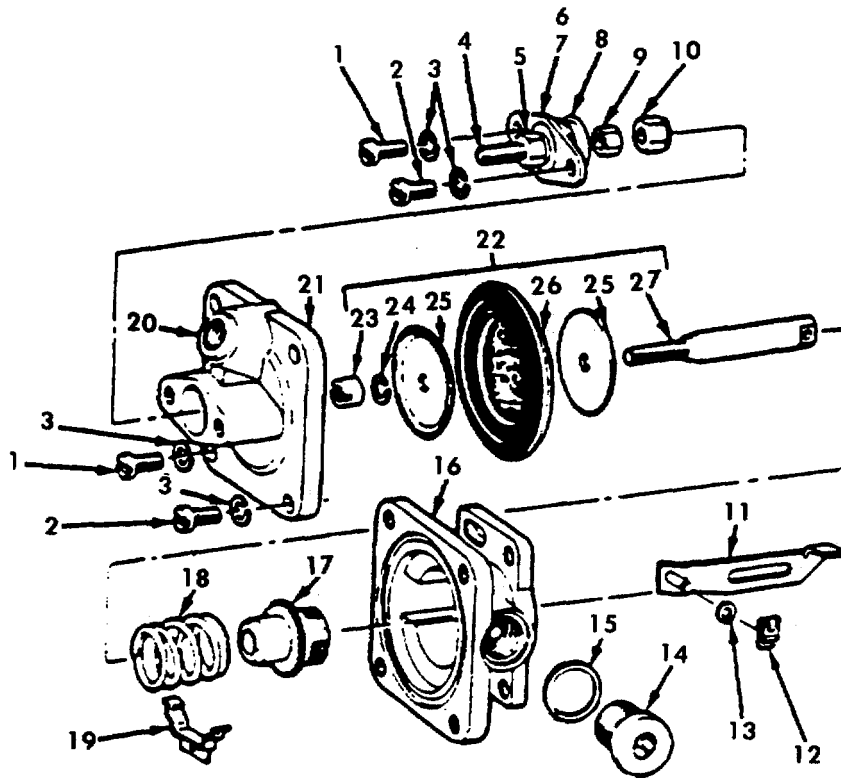
Figure E-37. Injection Pump Governor Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
111	89346	1806325C1	59556	019-90004-639	LEVER, Throttle	1
112	89346	684871C1	59556	019-90004-640	SCREW, Throttle Lever	1
113	89346	932618R1	59556	019-90004-641	KEY, Woodruff	1
114	89346	1806330C91	59556	019-90004-191	LEVER, Connecting	1
115	89346	397748C1	59556	019-90004-643	NUT, Control Lever SC	1
116	89346	680201C1	59556	019-90004-644	WASHER, Lock	1
117	89346	397746C1	59556	019-90004-605	WASHER, Control Lever SC	1
118	89346	1701015C1	59556	019-90004-646	LEVER, W/Shift, Control	1
119	89346	425987C1	59556	019-90004-647	SPACER, Control Lever	1
120	89346	1806332C1	59556	019-90004-648	SPRING, Control Lever	1
121	89346	397745C1	59556	019-90004-649	SCREW, Control Lever	1
122	89346	1806331C1	59556	019-90004-650	LEVER, Control	1
123	89346	397692C1	59556	019-90004-651	WASHR, Control Lever	1
124	89346	397664C1	59556	019-90004-652	SHIM, Control Lever, .20 MM	AR
	89346	1806334C1	59556	019-90004-653	SHIM, Control Lever, .30 MM	AR
125	89346	1806333C1	59556	019-90004-654	C-CLIP, Control Lever	1
---	89346	1806484C91	59556	019-90004-655	KIT, Cover Governor, (Includes Item Nos. 63 Thru 67, 76, 82, 84, 85, 86, 88, 101, 102, 103, and 109 Thru 113)	KT



GROUP 09. DIESEL FUEL INJECTION SYSTEM

FIGURE E-38. INJECTION PUMP SOLENOID



GROUP 09. DIESEL FUEL INJECTION SYSTEM

FIGURE E-39. INJECTION PUMP ANEROID

Group 09. Diesel Fuel Injection System

Figure E-38. Injection Pump Solenoid

Figure E-39. Injection Pump Aneroid

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-38					SOLENOID, INJECTION PUMP	
1	89346	1803254C1	59556	019-90004-964	ROD, End	1
2	89346	25652R1	59556	019-90004-965	BOLT, 1/4-28 x 1 inch	1
3	89346	27616R1	59556	019-90004-966	WASHER, 1/4 inch, Hardened	1
4	89346	115109	59556	019-90004-168	WASHER, 1/4 inch, Lock	3
5	89346	25930R1	59556	019-90004-968	NUT, Hex Jam, 1/4 NF	2
6	89346	1801344C1	59556	019-90004-969	BALL, Joint	1
7		NSS			BOOT, Solenoid Dust	1
8	89346	1801452C1	59556	019-90004-970	BRACKET, Solenoid Mounting	1
9	89346	25483R1	59556	019-90004-971	BOLT, 1/4-20 x 1 inch	4
10	89346	27616R1	59556	019-90004-966	WASHER, Hardened, 1/4 inch	8
11	89346	115109R1	59556	019-90004-973	WASHER, Lock, 1/4 inch	4
12	89346	25519R1	59556	019-90004-276	NUT, Hex, 1/4 NC	4
13	89346	1802650C91	59556	019-90004-975	SOLENOID, (Includes Item Nos. 2 and 9)	1
14		NSS			SPRING, Solenoid Return	1
E-39					ANEROID, INJECTION PUMP	
1	89346	1802132C1	59556	019-90004-976	SCREW, Diaphragm Stop And Cover	4
2	89346	1806353C1	59556	019-90004-977	SCREW, W/Seal Hole, Diaphragm Stop And Cover	2
3	89346	933987R1	59556	019-90004-290	WASHER, Diaphragm Stop And Cover	6
4	89346	1806349C1	59556	019-90004-979	PIN, Diaphragm Stop, Threaded	1

Group 09. Diesel Fuel Injection System

Figure E-38. Injection Pump Solenoid

Figure E-39. Injection Pump Aneroid

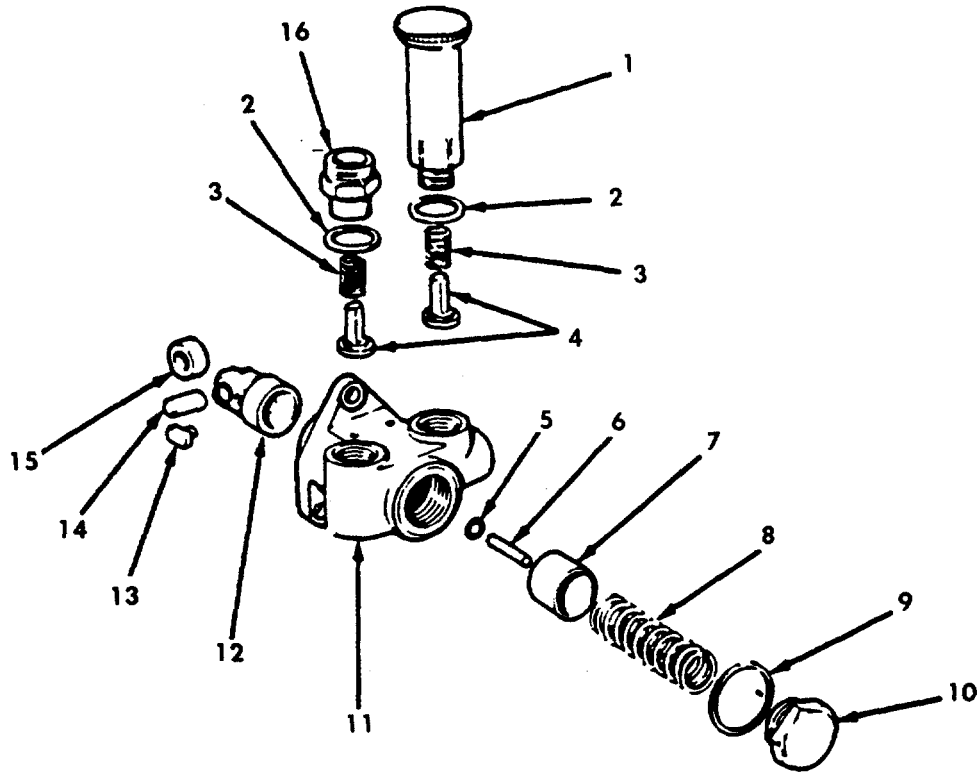
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
5	89346	1806350C1	59556	019-90004-980	NUT, Diaphragm Stop Pin, Hex	1
6	89346	1806348C91	59556	019-90004-981	STOP, W/Nut, (Includes Item Nos. 4, 5 and 8)	1
7	89346	1806841C1	59556	029-90004-981	CAP, End, Diaphragm Stop	1
8	89346	625492C91	59556	019-90004-983	O-RING, Diaphragm Stop	1
9	89346	1806351C1	59556	019-90004-984	NUT, Diaphragm Stop, Lock	1
10	89346	1806346C1	59556	019-90004-985	NUT, Diaphragm Stop, Hex	1
11	89346	1700924C1	59556	019-90004-986	LINK, Aneroid	1
12	89346	1700926C1	59556	019-90004-987	CLIP, Aneroid Link	1
13	89346	933722R1	59556	019-90004-988	WASHER, Aneroid Link	1
14	89346	691271C1	59556	019-90004-353	PLUG, Aneroid Housing	1
15	89346	933222R1	59556	019-90004-354	GASKET, Aneroid Housing Plug	1
16		NSS			HOUSING, Aneroid	1
17	89346	1806342C1	59556	019-90004-991	BUSHING, Guide	1
18	89346	1806341C1	59556	019-90004-992	SPRING, Aneroid Diaphragm	1
19	89346	684850C1	59556	019-90004-993	CLIP, Aneroid	1
20	89346	1806389C1	59556	019-90004-994	BUSHING, Diaphragm Cover	1
21	89346	1806352C91	59556	019-90004-995	COVER, W/Bushing, Diaphragm (Includes Item No. 20)	1
22	89346	1806347C91	59556	019-90004-996	SHAFT AND DIAPHRAGM, Aneroid	1
23	89346	1806345C1	59556	019-90004-997	NUT, Diaphragm Shaft Rod	1
24	89346	1806838C1	59556	019-90004-998	WASHER, Diaphragm Shaft, Lock	1
25	89346	1806343C1	59556	019-90004-999	SEAT, Diaphragm	2

Group 09. Diesel Fuel Injection System

Figure E-38. Injection Pump Solenoid

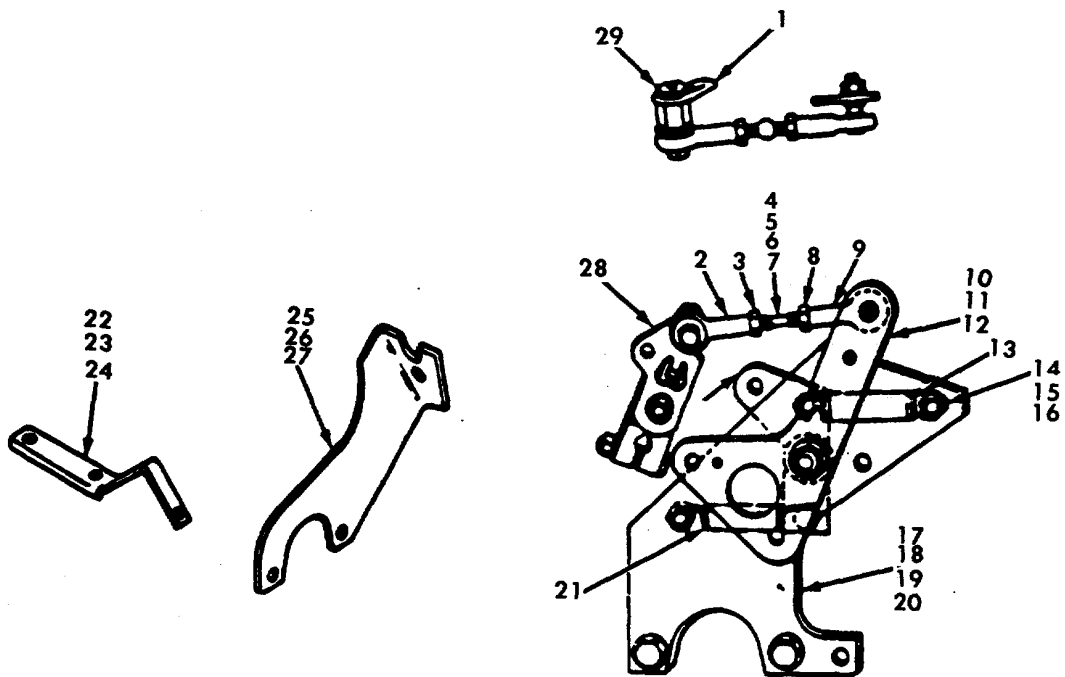
Figure E-39. Injection Pump Aneroid

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
26	89346	1806344C1	59556	019-90004-001	DIAPHRAGM, Aneroid	1
27	89346	1806840C1	59556	019-90004-002	SHAFT, Aneroid Diaphragm	1



GROUP 09. DIESEL FUEL INJECTION SYSTEM

FIGURE E-40. FUEL SUPPLY PUMP



GROUP 09. DIESEL FUEL INJECTION SYSTEM

FIGURE E-41. INJECTION PUMP LINKAGE

Group 09. Diesel Fuel Injection System

Figure E-40 Fuel Supply Pump  
 Figure E-41. Injection Pump Linkage

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-40					FUEL SUPPLY PUMP ASSEMBLY	REF
1	89346	684492C93	59556	019-90004-490	PUMP, Hand Priming	1
2	89346	625550C1	59556	019-90004-491	GASKET, Housing Fitting	2
3	89346	760583R1	59556	019-90004-492	SPRING, Valve	2
4	89346	684726C1	59556	019-90004-493	VALVE, Pump	2
5	89346	691272C1	59556	019-90004-494	O-RING, Pressure Spindle	1
6		NSS			SPINDLE, Pressure	1
7		NSS			PISTON	1
8	89346	691307C1	59556	019-90004-495	SPRING, Plunger Return	1
9	89346	670882C1	59556	019-90004-496	GASKET, Screw Plug	1
10	89346	691308C1	59556	019-90004-497	PLUG, Screw	1
11		NSS			HOUSING, Pump	1
12	89346	1802159C1	59556	019-90004-498	TAPPET, W/Pin, Roller And Sliders, Roller	1
13		NSS			SLIDER	2
14		NSS			PIN	1
15		NSS			ROLLER	1
16	89346	691306C1I	59556	019-90004-499	FITTING, Housing	1
E-41					LINKAGE ASSEMBLY, FUEL INJECTION PUMP	
1	89346	1803309C1	59556	019-90004-164	HOOK, Special Extension	1
2	89346	1803254C1	59556	019-90004-165	ROD, End	1

## Group 09 Diesel Fuel Injection System

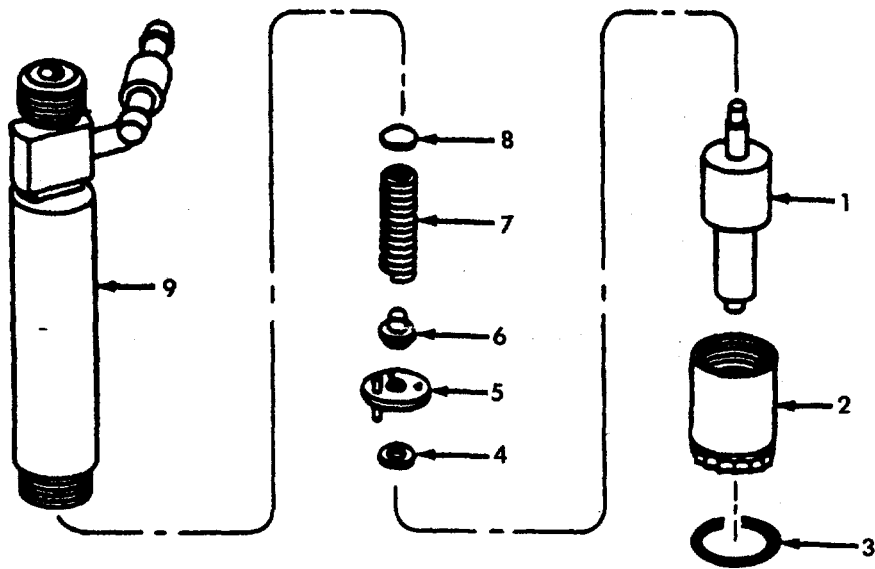
Figure E-40. Fuel Supply Pump  
Figure E-41. Injection Pump Linkage

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
3	89346	26030R1	59556	019-90004-166	NUT, 1/4-28	1
4	89346	690919C1	59556	019-90004-167	ROD, Control Left, Right Hand	1
5	89346	115109	59556	019-90004-168	WASHER, Lock, 1/4 inch	3
6	89346	26030R1	59556	019-90004-166	NUT, 1/4-28	1
7	89346	26258R1	59556	019-90004-170	BOLT, 1/4-28 x 1-1/4 inch	1
8	89346	126183	59556	019-90004-171	NUT, 1/4-28 Left Hand	1
9	89346	690950C1	59556	019-90004-172	BALL JOINT, 1/4-28 Left Hand	1
10	89346	1803086C1	59556	019-90004-173	LEVER, Engine Control	1
11	89346	25544R1	59556	019-90004-174	WASHER, 3/8 Hardened	1
12	89346	9413979	59556	006-90002-170	NUT, Lock, 3/8 inch	16
13	89346	466994C1	59556	019-90004-176	SPRING, Return	1
14	89346	579166C2	59556	019-90004-177	ANCHOR, Spring	3
15	89346	116120	59556	019-90004-178	WASHER, Lock, 5/16 inch	3
16	89346	25502R1	59556	019-90004-179	NUT, 5/16-18	3
17	89346	1803084C1	59556	019-90004-180	BRACKET, Bellcrank	1
18	89346	24846R1	59556	019-90004-181	BOLT, Hex Head, 3/8-16 x 4-1/2 inch	3
19	89346	25896R1	59556	019-90004-182	WASHER, 3/8 Hardened	3
20	89346	185062R1	59556	019-90004-183	BUSHING, Nylon	2
21	89346	127361H	59556	019-90004-184	SPRING, Return	1
22	89346	1803100C1	59556	019-90004-185	BRACKET, Spring Anchor	1
23	89346	25228R1	59556	016-90005-59	BOLT, Hex Head, 5/16-18 x 3/4 inch	2
24	89346	116120	59556	019-90004-178	WASHER, Lock, 5/16 inch	2



Group 09. Diesel Fuel Injection System  
 Figure E-40. Fuel Supply Pump  
 Figure E-41. Injection Pump Linkage

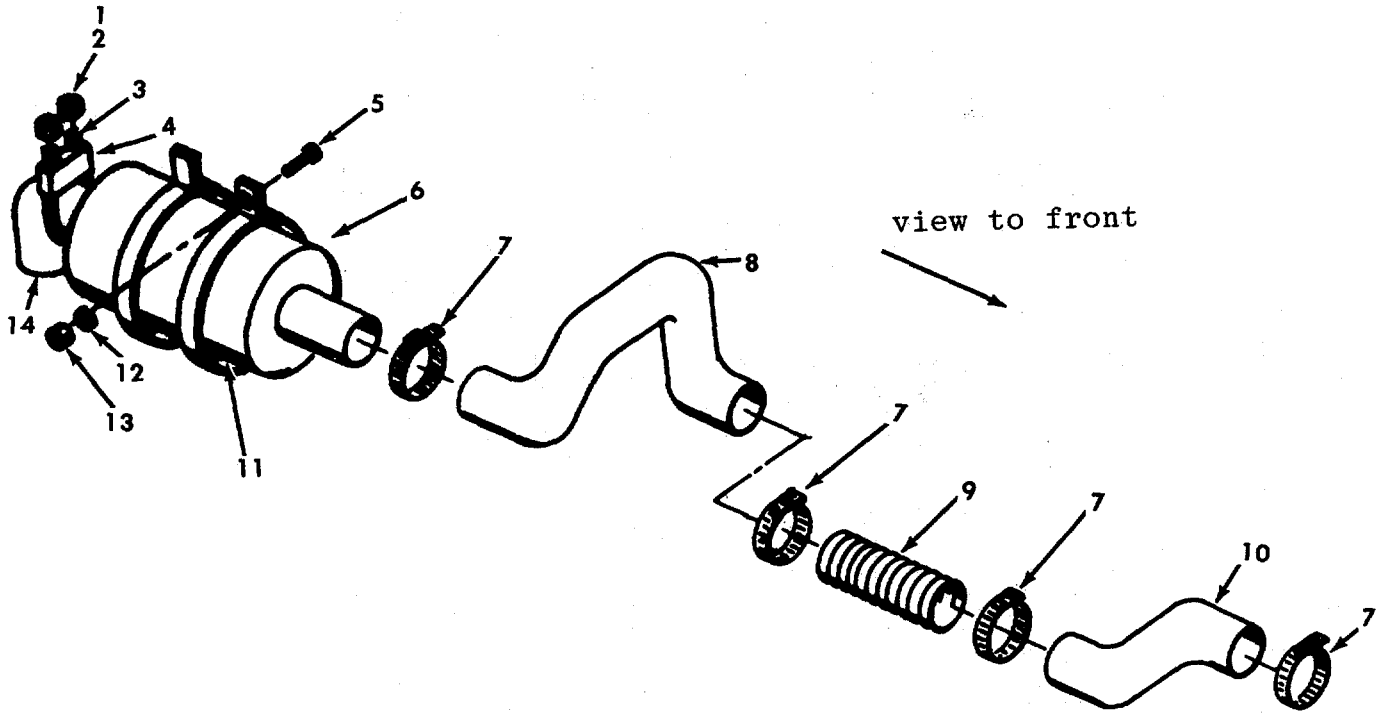
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
25	89346	1803098C1	59556	019-90004-188	BRACKET, Throttle Cable	1
26	89346	24846R1	59556	019-90004-181	BOLT, Hex Head, 3/8-16 x4-1/2 inch	3
27	89346	25896R1	59556	019-90004-182	WASHER, 3/8 inch Hardened	3
28	89346	1806330C91	59556	019-90004-191	LEVER, Control	1
29	89346	688336C1	59556	019-90004-192	NUT, Pump Return Spring	1



GROUP 09. DIESEL FUEL INJECTION SYSTEM  
FIGURE E-42. INJECTION NOZZLE

Group 09. Diesel Fuel Injection System  
 Figure E-42. Injection Nozzle

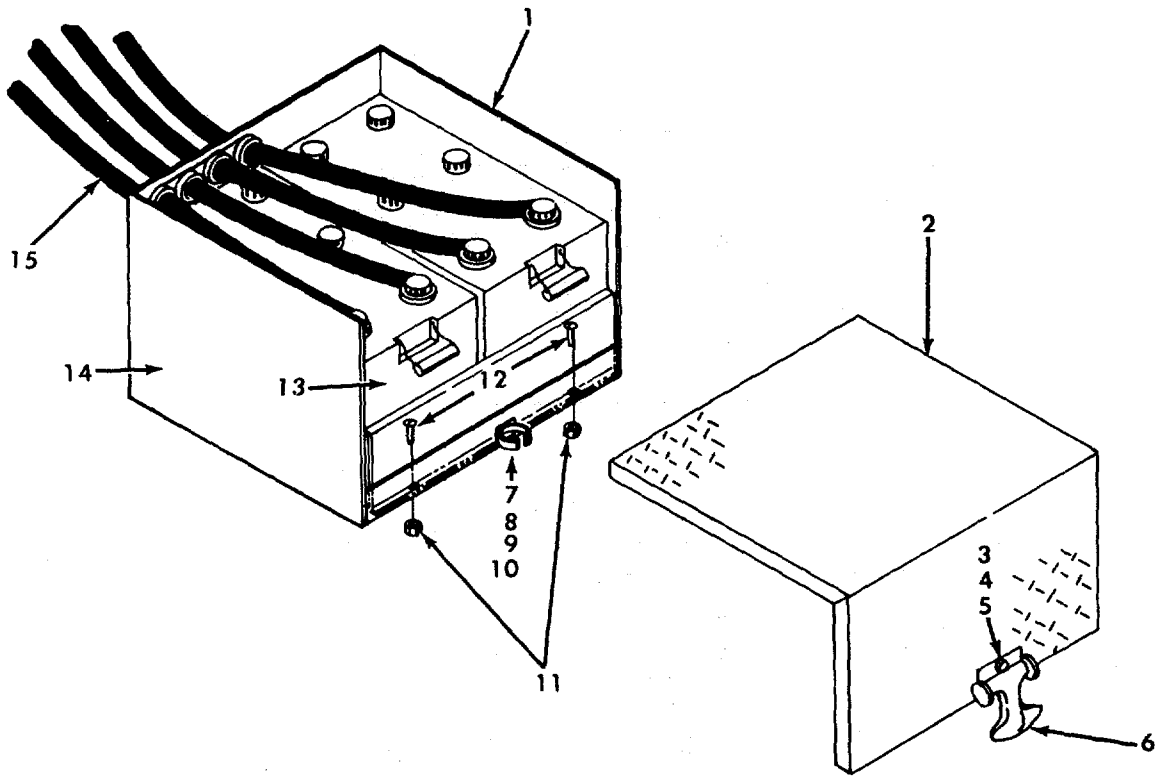
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	668884OC91	59556	019-90004-474	NOZZLE ASSEMBLY, W/HOLDER	REF
	89346	687214C1	59556	019-90004-656	NOZZLE, Injector	1
	89346	680435C1	59556	019-90004-657	NUT, Nozzle Cap	1
	89346	675477C1	59556	019-90004-658	GASKET, Injector Nozzle	6
	89346	680414C1	59556	019-90004-659	SPACER, Nozzle	2
	89346	680434C1	59556	019-90004-660	SPACER, Valve Stop	1
	89346	680433C1	59556	019-90004-661	GUIDE, Spring Seat	1
	89346	680424C1	59556	019-90004-662	SPRING, Pressure Adjusting	1
	89346	680415C1	59556	019-90004-663	SPACER, Spring, .002 Thick	AR
	89346	680416C1	59556	019-90004-664	SPACER, Spring, .007 Thick	AR
	89346	680418C1	59556	019-90004-665	SPACER, Spring, .010 Thick	AR
	89346	680419C1	59556	019-90004-666	SPACER, Spring, .025 Thick	AR
	89346	680421C1	59556	019-90004-667	SPACER, Spring, .028 Thick	AR
	89346	680422C1	59556	019-90004-668	SPACER, Spring, .030 Thick	AR
	89346	680423C1	59556	019-90004-669	SPACER, Spring, .035 Thick	AR
	89346	680420C1	59556	019-90004-670	SPACER, Spring, .375 Thick	AR
	89346	680413C1	59556	019-90004-671	BODY, Nozzle Holder	1



GROUP 10. ENGINE EXHAUST SYSTEM  
FIGURE E-43. ENGINE EXHAUST SYSTEM

Group 09. Engine Exhaust System  
Figure E-43. Engine Exhaust System

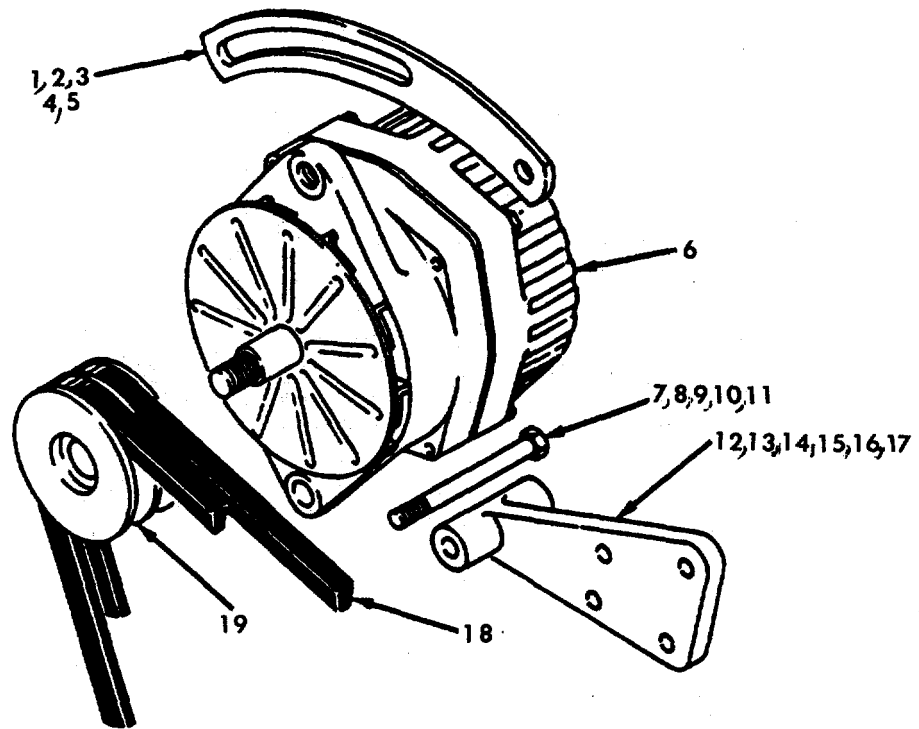
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					EXHAUST SYSTEM	
1	89346	9413981	59556	027-90005-1	NUT, Hex Locking, 7/16-14 UNC	2
2	89346	25846R1	59556	027-90005-2	WASHER, Flat, 7/16 inch	2
3	89346	450165C1	59556	027-90005-3	U-Bolt, 7/16-14 UNC	1
4	89346	451788C2	59556	027-90005-4	SADDLE, C1amp	1
5	89346	140483H	59556	016-90005-38	BOLT, Hex Head, 3/8-16 UNC x 1-1/4 inch	2
6	89346	482167C1	59556	027-90005-6	MUFFLER	1
7	89346	338614C1	59556	027-90005-7	CLAMP, Exhaust	4
8	89346	683076C1	59556	027-90005-8	PIPE, Exhaust	1
9	89346	767738C1	59556	027-90005-9	TUBE, Flexible Exhaust	1
10	89346	683520C1	59556	027-90005-10	PIPE, Exhaust	1
11	89346	481731C1	59556	027-90005-11	BRACKET, Muffler Support	2
12	89346	25709R1	59556	006-90002-168	WASHER, Flat, 3/8 inch	2
13	89346	9413979	59556	006-90002-170	NUT, Hex Locking, 3/8-16 UNC	2
14	89346	258387C2	59556	027-90005-14	PIPE, Tail	1



GROUP 11. ENGINE AND ACCESORIES  
FIGURE E-44. BATTERIES AND CABLES

Group 11. Engine And Accessories  
 Figure E-44. Batteries and Cables

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	59556	109-90003	59556	109-90003	BATTERY, BOX AND CABLE, ASSEMBLY	1
2	59556	109-90003-6	59556	109-90003-6	BOX, Battery (W/Cover)	1
3	----	COML			COVER, Battery	1
4	----	COML			BOLT, No.10 x 3/4 inch Long	2
5	----	COML			WASHER, Lock, No.10	2
6	94222	37-10-101-10	59556	109-00002	NUT, Hex, No.10	2
7		NSS			LATCH, Battery Cover	1
8	----	COML			CATCH, Latch	1
9	----	COML			BOLT, No.10 x 1/2 inch Long	2
10	----	COML			WASHER, Lock, No.10	2
11	----	COML			NUT, Hex, No.10	2
12	----	COML			NUT, Lock, Hex, 5/16 inch	2
13	20038	COM-80	59556	123-00044	BOLT, 5/16 x 1/2 inch Long	2
14		NSS			BATTERY, 12 Volt	2
15	59556	123-00045	59556	123-00045	RETAINER, Battery	1
					CABLES, Battery, 00 Gauge, 3 Feet	4

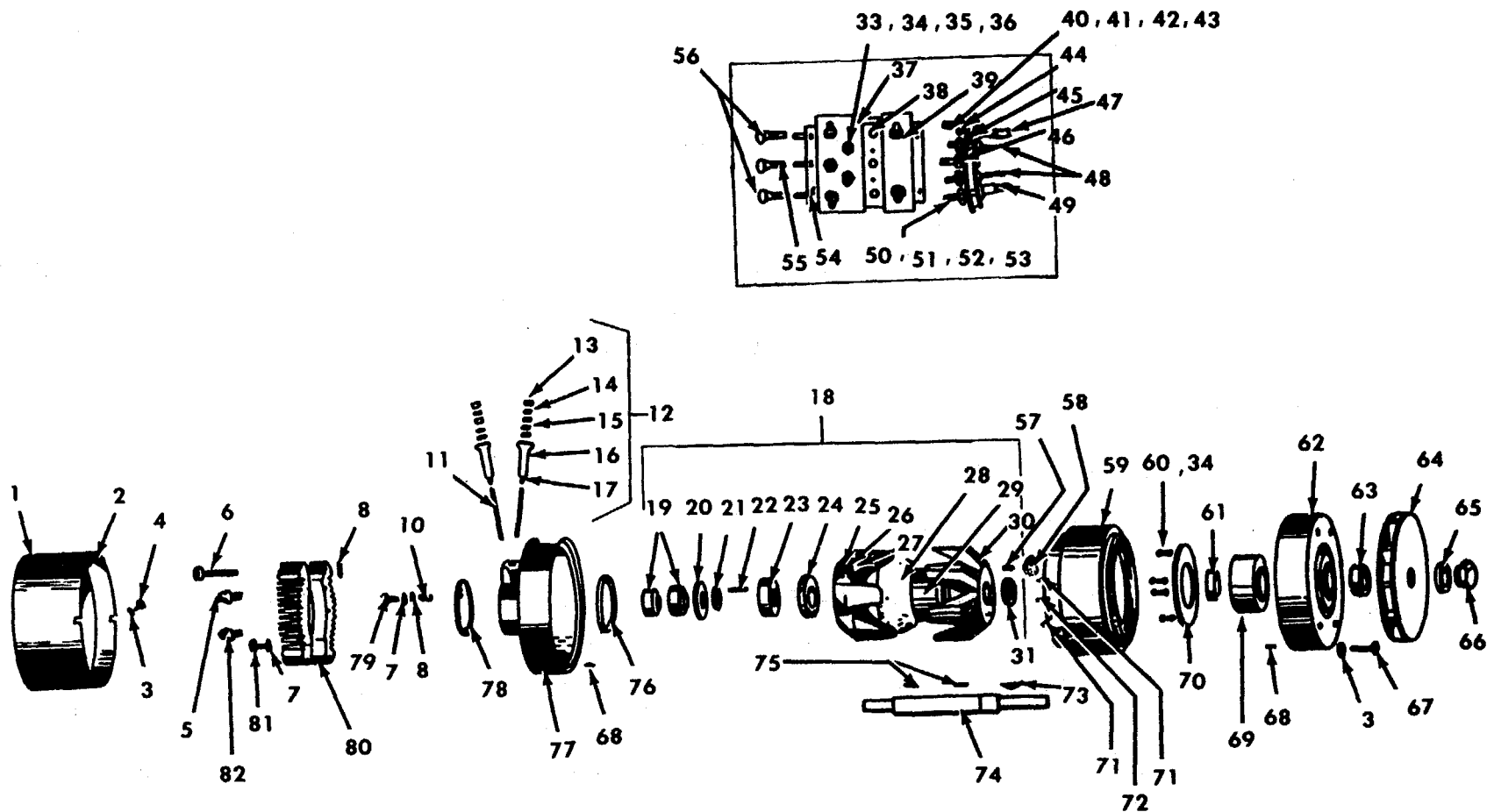


GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-45. ALTERNATOR MOUNTING



Group 11. Engine And Accessories  
Figure E-45. Alternating Mounting

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					ALTERNATOR, BRACKET AND MOUNTING ASSEMBLY	REF
1	89346	471530C1	59556	257-00014-1	STRAP, Alternator Adjusting	1
2	89346	140483H	59556	016-90005-38	BOLT, Hex Head, 3/8 NC x 1-1/4 inch	1
3	89346	24881R1	59556	257-00014-3	BOLT, Hex Head, 1/2 NC x 1-1/4 inch	1
4	89346	25710R1	59556	080-90016-17	WASHER, Flat, 1/2 inch	2
5	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 Regular	1
6	89346	A0018050AB	59556	257-00010	ALTERNATOR, Without Pulley, 145 AMP	1
7	89346	25687R1	59556	257-00014-7	BOLT, Mounting Bracket, Hex Head, 1/2 NC x 6 inches	1
8	89346	26704R1	59556	257-00014-8	BOLT, Mounting Bracket, Hex Head, 5/16 x 5-1/2 inches	1
9	89346	24844R1	59556	015-90005-04	BOLT, Mounting Bracket, Hex Head, 3/8 x 3-1/2 inches	1
10	89346	9412230	59556	006-90002-159	NUT, Hex Locking, 1/2 NC	1
11	89346	25710R1	59556	080-90016-17	WASHER, Flat, 1/2 inch	2
12	89346	689427C1	59556	257-00014-12	BRACKET, Alternator Mounting	1
13	89346	25236R1	59556	257-00014-13	BOLT, Hex Head, 5/16 NC x 3 inches	3
14	89346	275804R1	59556	015-90005-03	BOLT, Hex Head, 3/8 NC x 3 inches	1
15	89346	25522R1	59556	016-90005-49	NUT, Hex, 3/8 NC	1
16	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 Regular	3
17	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 Regular	1
18	89346	686617C91	59556	257-00014-18	BELT, Alternator Drive	1
19	89346	689342C1	59556	257-00014-19	PULLEY, Alternator Drive	1



GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-46. ALTERNATOR ASSEMBLY

Group 11. Engine And Accessories  
Figure E-46. Alternator Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	35510	A0018050AB	59556	257-00010	ALTERNATOR ASSEMBLY	REF
1	35510	99382	59556	257-00010-1	COVER ASSEMBLY, Rectifier	1
2	35510	76326	59556	257-00010-2	INSULATOR	1
3	35510	75297	59556	257-00010-3	WASHER, Belleville, #10	9
4	35510	4484	59556	257-00010-4	SCREW, Hex Head, 10-32x3/8 inch	2
5	35510	96123	59556	257-00010-5	RECTIFIER AND LEAD ASSEMBLY, Negative	3
6	35510	75283	59556	257-00010-6	SCREW, Hex Head, 1/4-20x2-1/2 inch	4
7	35510	74994	59556	257-00010-7	WASHER, Belleville, 1/4 inch	9
8	35510	4470	59556	257-00010-8	WASHER, Insulation	11
9	35510	24747	59556	257-00010-9	SLEEVING, Glass, 2-1/16 inch Long	4
10	35510	75284	59556	257-00010-10	INSULATOR, Bushing	3
11	35510	71128	59556	257-00010-11	BRUSH	2
12	35510	28456	59556	257-00010-12	HOLDER AND STUD ASSEMBLY	2
13	35510	2435	59556	257-00010-13	WASHER, Lock, #8	4
14	35510	2525	59556	257-00010-14	NUT, Hex, Brass, 8-32	4
15	35510	13624	59556	257-00010-15	WASHER, Guard	2
16	35510	28596	59556	257-00010-16	HOLDER, Brush	2
17	35510	2371	59556	257-00010-17	SCREW, 8-32x3/4 inch	2
18	35510	96121	59556	257-00010-18	ROTOR ASSEMBLY	1
19	35510	32260	59556	257-00010-19	SLIP RING ASSEMBLY	1
20	35510	32056	59556	257-00010-20	WASHER, Insulation	1
21	35510	29659	59556	257-00010-21	RING, Snap	1

Group 11. Engine And Accessories  
Figure E-46. Alternator Assembly

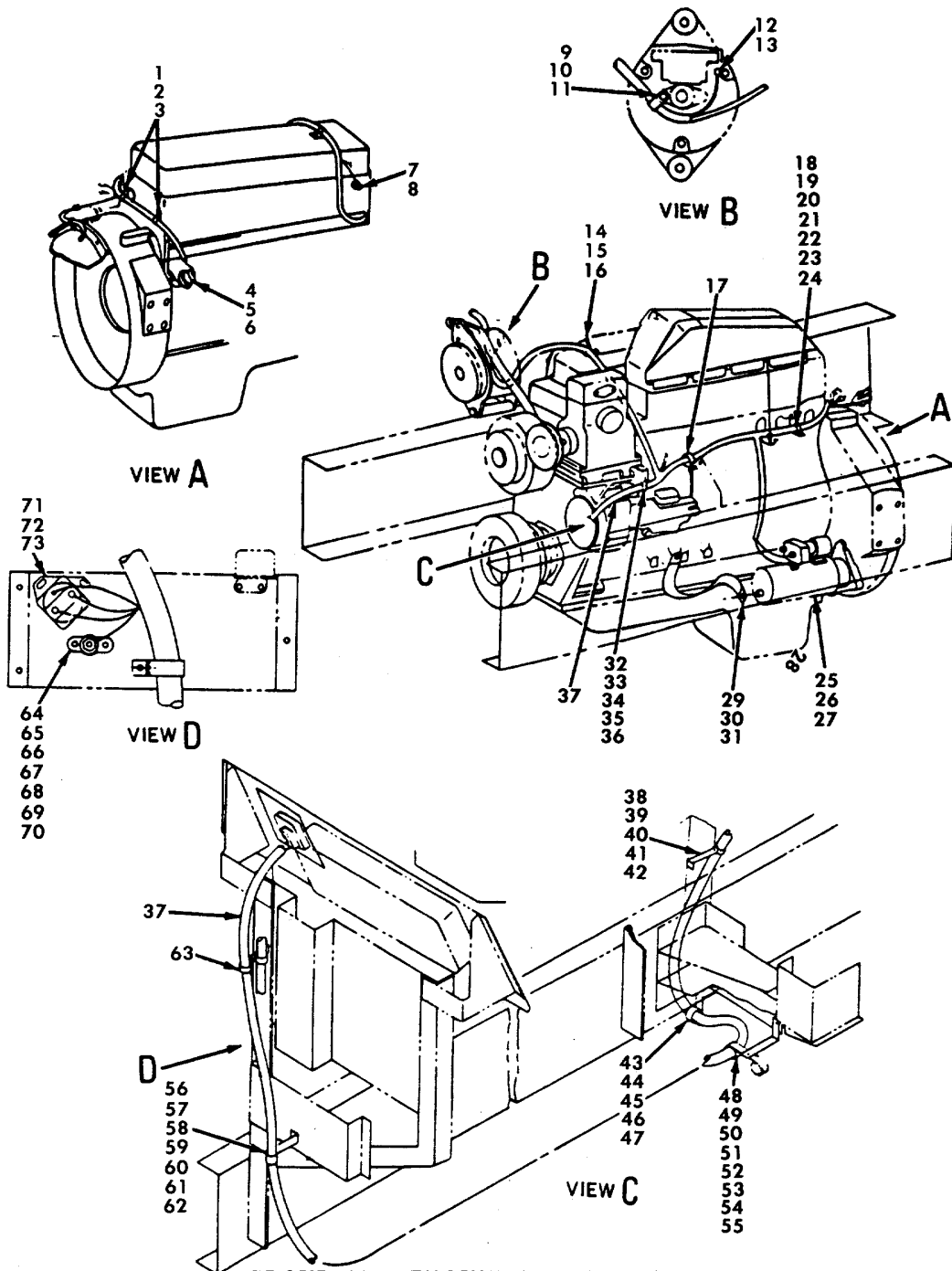
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	35510	30300	59556	257-00010-22	WEDGE, Slot	1
23	35510	74090	59556	257-00010-23	BEARING, 205	1
24	35510	54972	59556	257-00010-24	NUT, Hex, 1-3/16-18	1
25		NSS			ROTOR HALF	1
26	35510	30295	59556	257-00010-25	CLIP	1
27	35510	28334	59556	257-00010-26	SCREW, Drive, #8	1
28	35510	96122	59556	257-00010-27	ROTOR COIL ASSEMBLY	1
29	35510	59844	59556	257-00010-28	HUB	1
30		NSS			ROTOR HALF	1
31	35510	29658	59556	257-00010-29	RING, Snap	1
32	35510	76305	59556	257-00010-30	TERMINAL ASSEMBLY	1
33	35510	26141	59556	257-00010-31	WASHER, Guard, #10	2
34	35510	2434	59556	257-00010-32	WASHER, Lock, #10	8
35	35510	4340	59556	257-00010-33	NUT, Hex, 10-32	2
36	35510	57536	59556	257-00010-34	SCREW, Terminal, 10-24	2
37	35510	75287	59556	257-00010-35	INSULATOR, Outer	1
38	35510	73704	59556	257-00010-36	SCREW, Hex Head, 10-32xl/2 inch	3
39	35510	75298	59556	257-00010-37	INSULATOR, Outer	1
40	35510	2771	59556	257-00010-38	NUT, Hex, 1/4-20	4
41	35510	2523	59556	257-00010-39	WASHER, Lock, 1/4 inch	4
42	35510	2524	59556	257-00010-40	WASHER, Guard, 1/4 inch	4
43	35510	31420	59556	257-00010-41	SCREW, Terminal, 1/4-20	4
44	35510	31419	59556	257-00010-42	BUSHING, Insulation	6

Group 11. Engine And Accessories  
Figure E-46. Alternator Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
45	35510	75280	59556	257-00010-43	INSULATOR, Inner	1
46	35510	75279	59556	257-00010-44	INSULATOR, Inner	1
47	35510	76292	59556	257-00010-45	LEAD ASSEMBLY, (G-)	1
48	35510	76284	59556	257-00010-46	LEAD ASSEMBLY, (F)	2
49	35510	76293	59556	257-00010-47	LEAD ASSEMBLY, (G+)	1
50	35510	59040	59556	257-00010-49	NUT, Hex, 5/16-18	1
51	35510	57753	59556	257-00010-50	SCREW, Terminal, 5/16-18	1
52	35510	3231	59556	257-00010-51	WASHER, Lock, 5/16	1
53	35510	26228	59556	257-00010-52	WASHER, Guard, 5/16	1
54	35510	75277	59556	257-00010-53	PLATE, Terminal	1
55	35510	76285	59556	257-00010-54	LEAD ASSEMBLY, A.C.	1
56	35510	76290	59556	257-00010-55	LEAD ASSEMBLY, A.C.	2
57	35510	7268	59556	257-00010-56	SCREW, Round Head, 10-32x5/16 inch	2
58	35510	57537	59556	257-00010-57	PLATE	1
59	35510	99379	59556	257-00010-58	STATOR ASSEMBLY	1
60	35510	5179	59556	257-00010-59	SCREW, Round Head, 10-32x1/2 inch	4
61	35510	29652	59556	257-00010-60	COLLAR	1
62	35510	99356	59556	257-00010-61	HOUSING, Drive End	1
63	35510	59120	59556	257-00010-62	SPACER, Fan	1
64	35510	77625	59556	257-00010-63	FAN AND SHROUD ASSEMBLY	1
65	35510	3841	59556	257-00010-64	WASHER	1
66	35510	31838	59556	257-00010-65	NUT, Hex Lock, 5/8-18	1
67	35510	58510	59556	257-00010-66	SCREW, Hex Head, 10-32x4-1/4 inch	4

Group 11. Engine And Accessories  
 Figure E-44. Alternator Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
68	35510	16333	59556	257-00010-67	PIN, 1/8 Diameter x 1/2 inch Long	2
69	35510	74091	59556	257-00010-68	BEARING, 306	1
70	35510	29663	59556	257-00010-69	RETAINER, Bearing	1
71	35510	99367	59556	257-00010-71	LEAD ASSEMBLY	2
72	35510	99366	59556	257-00010-72	LEAD ASSEMBLY	1
73	35510	6399	59556	257-00010-70	KEY, Woodruff, #8	1
74	35510	59110	59556	257-00010-73	SHAFT	1
75	35510	28843	59556	257-00010-74	KEY, 5/32 "Square x 3/4" Long	2
76	35510	74834	59556	257-00010-75	O-RING	1
77	35510	99699	59556	257-00010-76	HOUSING AND O-RING ASSEMBLY	1
78	35510	74991	59556	257-00010-77	INSULATOR, Terminal	1
79	35510	21740	59556	257-00010-78	SCREW, Hex Head, 1/4-20x3/4 inch	3
80	35510	58441	59556	257-00010-79	MOUNT, Rectifier	2
81	35510	8428	59556	257-00010-80	SCREW, Hex Head, 1/4-20x1/2	2
82	35510	96124	59556	257-00010-81	RECTIFIER AND LEAD ASSEMBLY, Positive	3



GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-47. STARTER MOUNTING AND WIRING

Group 11. Engine And Accessories  
 Figure E-47. Starter Mounting and Wiring

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					STARTER MOTOR AND ENGINE WIRING ASSEMBLY	
1	89346	299407C1	59556	019-90004-893	CLAMP	2
2	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	2
3	89346	25228R1	59556	019-90004-895	BOLT, Hex Head, 5/16-18 UNC x 3/4 inch	2
4	89346	584051C2	59556	019-90004-896	SENDER, Oil Pressure	1
5	89346	115999	59556	019-90004-897	NUT, Hex No. 10	1
6	89346	3/16R	59556	MS35338-43	WASHER, Lock No.10	1
7	89346	479758C1	59556	019-90004-899	SENDER, Water Temperature	1
8	89346	107377H	59556	019-90004-900	NUT, Hex Lock, No 10-32 UNF	1
9	89346	299413C1	59556	019-90004-901	CLAMP	1
10	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	1
11	89346	25653R1	59556	019-90004-903	BOLT, Hex Head, 5/16-18 UNC x 1/2 inch	1
12	89346	27298R1	59556	019-90004-904	NUT, Hex, 1/4-20 UNC	1
13	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
14	89346	299413C1	59556	019-90004-906	CLAMP	1
15	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	1
16	89346	118624	59556	019-90004-908	NUT, Jam, 5/16-24 UNF	1
17	89346	469968C1	59556	019-90004-909	CLAMP	1
18	89346	895792R1	59556	019-90004-910	EXTENSION, C1ip	1
19	89346	299608C1	59556	019-90004-911	CLAMP	1
20	89346	25519R1	59556	019-90004-912	NUT, Hex, 1/4-20 UNC	1



Group 11. Engine And Accessories  
Figure E-47. Batteries and Cables

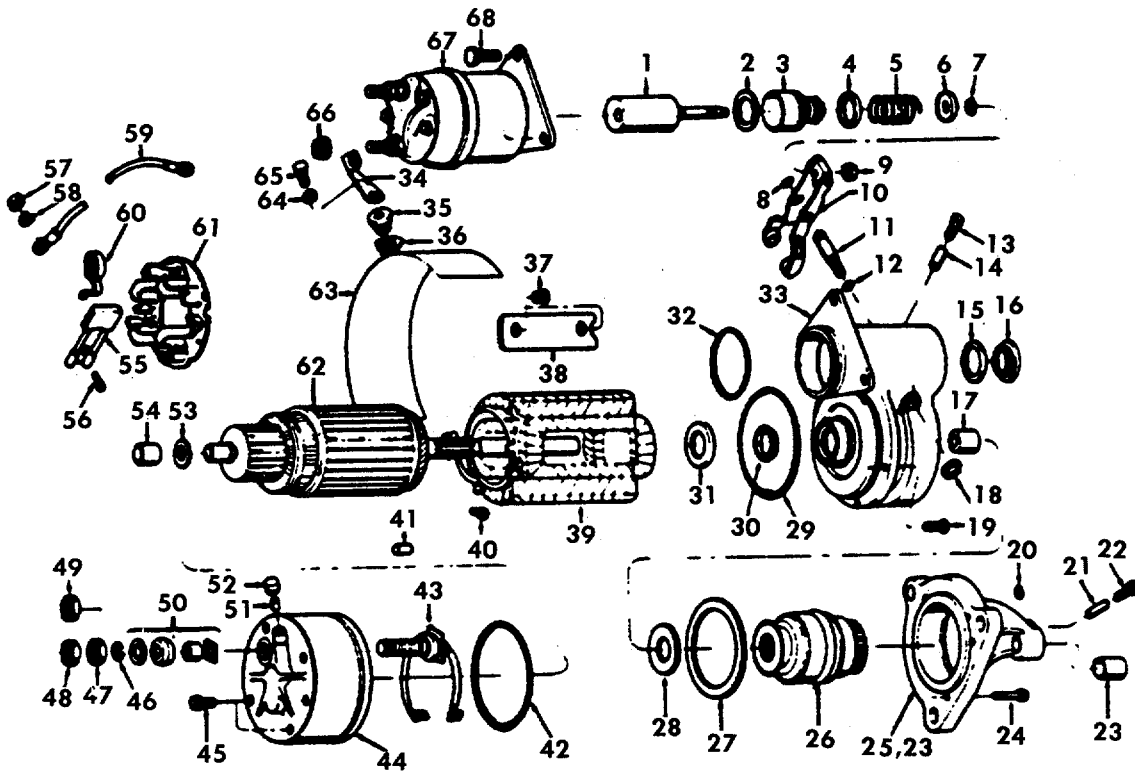
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	25222R1	59556	019-90004-913	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
22	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
23	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	1
24	89346	24838R1	59556	019-90004-916	BOLT, Hex Head, 3/8-16 UNC x 1/2 inch	1
25	16764	1990405	59556	019-00006	MOTOR, Starter, Assembly	1
26	89346	20379OC1	59556	019-90004-917	WASHER, Lock, 1/2 inch	3
27	89346	24863R1	59556	019-90004-918	BOLT, Hex Head, 1/2-13 UNC x 1-3/4 inch	3
28	89346	482633C92	59556	019-90004-919	CABLE, Strap, Ground	1
29	89346	25709R1	59556	019-90004-920	WASHER, Flat, 3/8 inch	1
30	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	1
31	89346	24839R1	59556	019-90004-922	BOLT, Hex Head, 3/8-16 UNC x 3/4 inch	1
32	89346	434380C1	59556	019-90004-923	EXTENSION, C1ip	1
33	89346	299608C1	59556	019-90004-924	CLAMP	1
34	89346	25519R1	59556	019-90004-925	NUT, Hex, 1/4-20 UNC	1
35	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
36	89346	25222R1	59556	019-90004-927	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
37	89346	508776C92	59556	019-90004-928	HARNESS, Engine	1
38	59556	019-90004-928	59556	019-90004-928	EXTENSION, C1ip	1
39	89346	299608C1	59556	019-90004-929	CLAMP	1

Group 11. Engine And Accessories  
Figure E-47. Starter Mounting and Wiring

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
40	89346	25222R1	59556	019-90004-930	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
41	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
42	89346	25519R1	59556	019-90004-932	NUT, Hex, 1/4-20 UNC	1
43	89346	288201C1	59556	019-90004-933	EXTENSION, C1ip	1
44	89346	299608C1	59556	019-90004-934	CLAMP	1
45	89346	25519R1	59556	019-90004-935	NUT, Hex, 1/4-20 UNC	1
46	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
47	89346	25483R1	59556	019-90004-937	BOLT, Hex Head, 1/4-20 UNC x 1 inch	1
48	89346	88188H	59556	019-90004-938	EXTENSION, C1ip	1
49	89346	299277C91	59556	019-90004-939	CLAMP	1
50	89346	25519R1	59556	019-90004-940	NUT, Hex, 1/4-20 UNC	1
51	89346	25707R1	59556	019-90004-941	WASHER, Flat, 1/4 inch	2
52	89346	120382	59556	019-90004-942	WASHER, Lock, 1/4 inch	1
53	89346	24839R1	59556	019-90004-943	BOLT, Hex Head, 3/8-16 UNC x 3/4 inch	1
54	89346	25483R1	59556	019-90004-944	BOLT, Hex Head, 1/4-20 UNC x 1 inch	1
55	89346	9413979	59556	019-90004-945	NUT, Hex Lock, 3/8-16 UNC	1
56	59556	019-90004-946	59556	019-90004-946	EXTENSION, C1ip	1
57	89346	299277C91	59556	019-90004-947	CLAMP	1
58	89346	25519R1	59556	019-90004-948	NUT, Hex, 1/4-20 UNC	1
59	89346	26110R1	59556	019-90004-949	NUT, Hex, Lock, 1/4-20 UNC	1
60	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1

Group 11. Engine And Accessories  
 Figure E-47. Starter Mounting and Wiring

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
61	89346	25222R1	59556	019-90004-951	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
62	89346	25483R1	59556	019-90004-952	BOLT, Hex Head, 1/4-20 UNC x 1 inch	1
63	89346	299608C1	59556	019-90004-953	CLAMP	1
64	89346	365628C1	59556	019-90004-954	BLOCK, Junction	1
65	89346	25709R1	59556	019-90004-955	WASHER, Flat, 3/8 inch	1
66	89346	26667R1	59556	019-90004-956	SCREW, Pan Head Cross Recessed, Machine No. 10-24 UNC x 3/4 inch	2
67	89346	3/16R	59556	MS35338-43	WASHER, Lock, No. 10	2
68	89346	120361	59556	019-90004-958	NUT, Hex, No. 10-24 UNC	2
69	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	1
70	89346	25522R1	59556	019-90004-960	NUT, Hex, 3/8-16 UNC	1
71	89346	545756R1	59556	019-90004-961	SWITCH, Magnetic	1
72	89346	2611OR1	59556	019-90004-962	NUT, Hex, Lock, 1/4-20 UNC	2
73	89346	25222R1	59556	019-90004-963	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	2



GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-48. STARTER ASSEMBLY

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Group 11. Engine And Accessories  
Figure E-48. Starter Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	16764	1990405	59556	019-00006	CRANKING MOTOR ASSEMBLY	1
2	16764	1988121	59556	019-00006-1	PLUNGER	1
3	16764	1948519	59556	019-00006-2	WASHER, Plunger Assembly	1
4	16764	1985243	59556	019-00006-3	BOOT	1
5	16764	1948520	59556	019-00006-4	RETAINER, Plunger Spring, 1-13/64 Hole	1
6	16764	1948521	59556	019-00006-5	SPRING, Plunger	1
7	16764	1948526	59556	019-00006-6	RETAINER, Plunger Spring, 13/32 Hole	1
8	16764	9416374	59556	019-00006-7	SNAP RING, Plunger Assembly	1
9	16764	1894643	59556	019-00006-8	O-RING, Shift Lever Shaft, 1/2 OD	1
10	16764	9412305	59556	019-00006-9	NUT, Plunger Rod Guide Adjusting	1
11	16764	1988097	59556	019-00006-10	LEVER, Shift	1
12	16764	1948529	59556	019-00006-11	SHAFT, Shift Lever	1
13	16764	1894642	59556	019-00006-12	O-RING, Shift Lever Shaft, 3/8 OD	1
14	16764	1985246	59556	019-00006-13	CUP, Oil Reservoir, Lever Housing	1
15	16764	1985247	59556	019-00006-14	WICK, Oil Reservoir, Lever Housing	1
16	16764	1964857	59556	019-00006-15	GASKET, Inspection Plug, Lever Housing	1
17	16764	1945356	59556	019-00006-16	PLUG, Inspection, Lever Housing	1
18	16764	1988096	59556	019-00006-17	BUSHING, Lever Housing	1
19	16764	9416374	59556	019-00006-18	SNAP RING, Shift Lever Shaft	1
20	16764	1914869	59556	019-00006-19	SCREW, Lever Housing Attachment	1
	16764	1949619	59556	019-00006-20	PLUG, Drive Housing Mounting Holes	1

Group 11. Engine And Accessories  
Figure E-48. Starter Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	16764	1978754	59556	019-00006-21	WICK, Oil Reservoir, D.E.	1
22	16764	1978756	59556	019-00006-22	CUP, Oil Reservoir, D.E.	1
23	16764	1894635	59556	019-00006-23	BUSHING, Drive Housing	2
24	16764	1948537	59556	019-00006-24	SCREW, Drive Housing Attachment	1
25	16764	1988779	59556	019-00006-25	HOUSING DRIVE	1
26	16764	1893560	59556	019-00006-26	DRIVE ASSEMBLY	1
27	16764	1851960	59556	019-00006-27	O-RING, Between Drive Housing And Lever Housing	1
28	16764	1911644	59556	019-00006-28	WASHER, Brake	1
29	16764	1916272	59556	019-00006-29	O-RING, Between Lever Housing And Frame	1
30	16764	1918047	59556	019-00006-30	SEAL, Oil, Lever Housing	1
31	16764	1936466	59556	019-00006-31	WASHER SPACE D.E.	1
32	16764	1985304	59556	019-00006-32	O-RING, Between Switch And Lever Housing	1
33	16764	1988436	59556	019-00006-33	HOUSING LEVER	1
34	16764	1988134	59556	019-00006-34	CONNECTOR, Field Terminal To Switch	1
35	16764	1988340	59556	019-00006-35	INSULATOR, Field Terminal (Outside Frame)	1
36	16764	1988339	59556	019-00006-36	INSULATOR, Field Terminal (Inside Frame)	1
37	16764	1968396	59556	019-00006-37	SCREW, Pole Shoe	1
38	16764	1934478	59556	019-00006-38	POLE, Shoe	1
39	16764	1988111	59556	019-00006-39	FIELD COIL, (4 Coils)	1

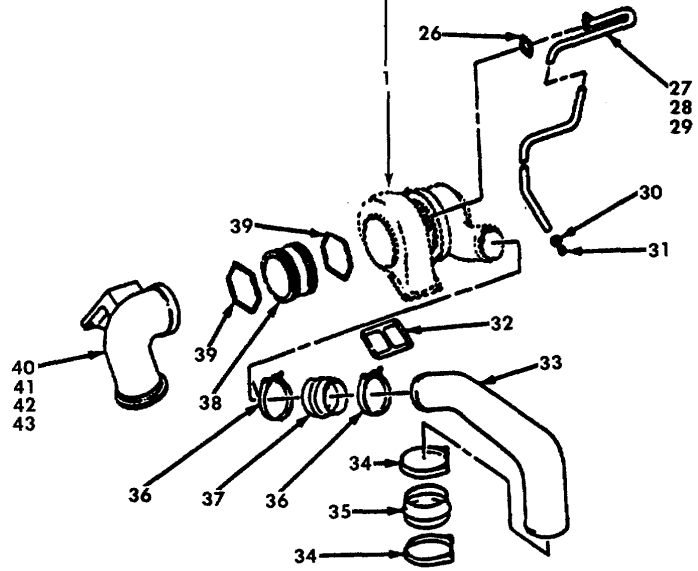
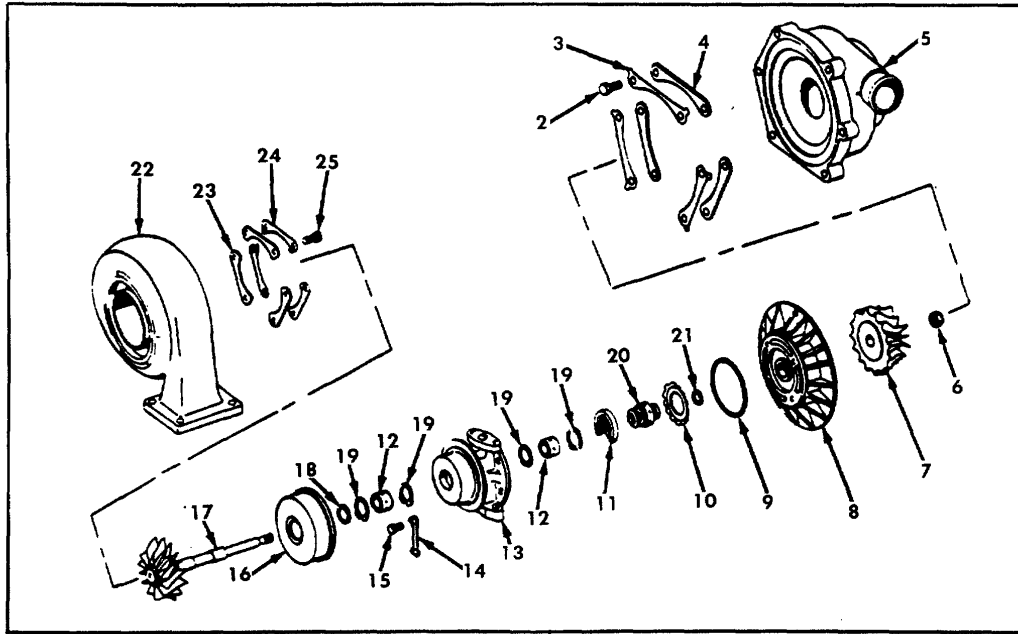
Group 11. Engine And Accessories  
Figure E-48. Starter Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
40	16764	1968998	59556	019-00006-40	SCREW, Field Coil Lead To Brush Holder Attachment	1
41	16764	456652	59556	019-00006-41	PIN, Spring, (In Frame)	1
42	16764	1985320	59556	019-00006-42	O-RING, On Motor Frame C.E. End	2
43	16764	1988128	59556	019-00006-43	LEAD, C.E. Terminal	1
44	16764	1988126	59556	019-00006-44	FRAME, C.E.	1
45	16764	1988135	59556	019-00006-45	SCREW AND WASHER ASSEMBLY, C.E. Frame Attachment	1
46	16764	1914647	59556	019-00006-46	WASHER, Terminal, C.E. Frame	1
47	16764	9421427	59556	019-00006-47	LOCK WASHER, Terminal Stud, C.E.	1
48	16764	9439624	59556	019-00006-48	NUT, Terminal, C.E. Frame	1
49	16764	1979451	59556	019-00006-49	NUT AND WASHER ASSEMBLY, C.E. Terminal	1
50	16764	10495183	59556	019-00006-50	INSULATION, Package, C.E. Terminal	1
51	16764	1988138	59556	019-00006-51	WICK, Oil Reservoir, C.E.	1
52	16764	1985246	59556	019-00006-52	CUP, Oil Reservoir, C.E.	1
53	16764	1985617	59556	019-00006-53	WASHER, Thrust C.E.	1
54	16764	1943628	59556	019-00006-54	BUSHING, C.E. Frame	1
55	16764	1852892	59556	019-00006-55	BRUSH	1
56	16764	1968998	59556	019-00006-56	SCREW, Brush Attachment	1
57	16764	432230	59556	019-00006-57	NUT, Shunt Lead To Switch Attachment	1
58	16764	453435	59556	019-00006-58	LOCK WASHER, Shunt Lead To Switch Attachment	1
59	16764	1979448	59556	019-00006-59	LEAD ASSEMBLY	1

Group 11. Engine And Accessories  
 Figure E-48. Starter Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
60	16764	1985314	59556	019-00006-60	SPRING, Brush	1
61	16764	1988121	59556	019-00006-61	BRUSH PLATE ASSEMBLY	1
62	16764	1987989	59556	019-00006-62	ARMATURE	1
63	16764	1988100	59556	019-00006-63	INSULATOR, Field Coil, C.E.	1
64	16764	1905125	59556	019-00006-64	WASHER, Plain, Field Terminal	1
65	16764	9440917	59556	019-00006-65	SCREW, Connector To Field Attachment	1
66	16764	1979451	59556	019-00006-66	NUT, Field Coil Connect To Switch Attachment	1
67	16764	1115593	59556	019-00006-67	SWITCH	1
68	16764	1985332	59556	019-00006-68	SCREW AND WASHER ASSEMBLY, Switch Attachment	1





GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-49. TURBOCHARGER

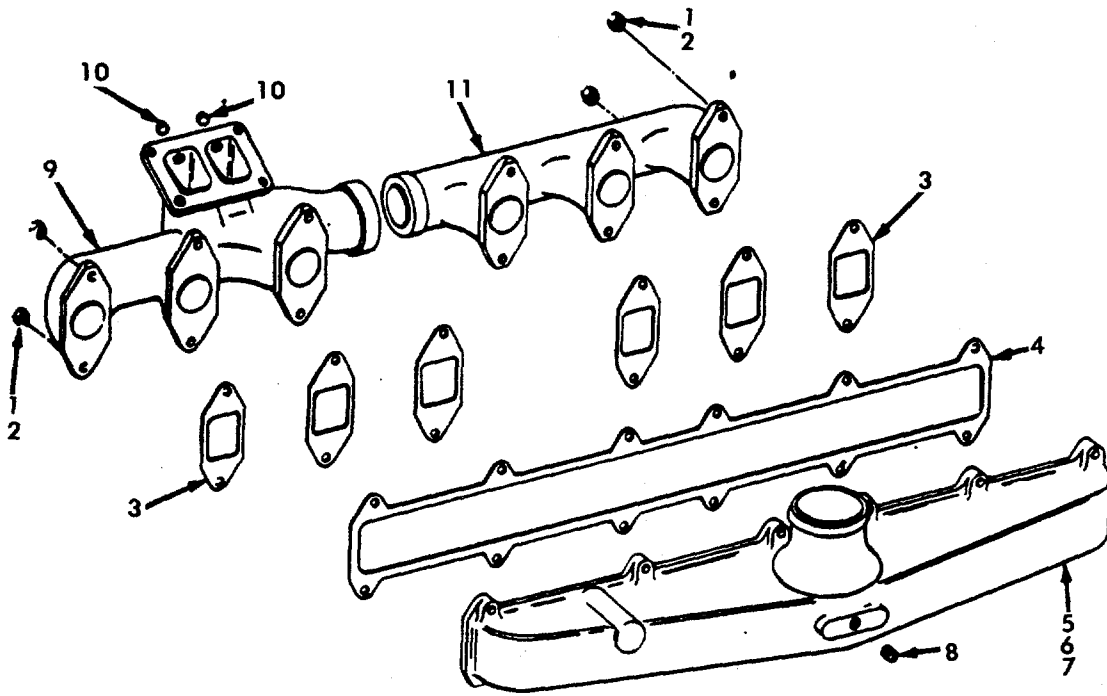
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Group 11. Engine And Accessories  
Figure E-49. Turbocharger

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	1806078C91	59556	019-90004-713	TURBOCHARGER PIPING ASSEMBLY	1
2	89346	684246C1	59556	019-90004-755	TURBOCHARGER ASSEMBLY	6
3	89346	615739C1	59556	019-90004-732	BOLT, Hex Head, 5/16 NC x 1/2 inch	3
4	89346	684245C1	59556	019-90004-733	PLATE, Housing Lick	3
5	89346	684366C1	59556	019-90004-734	CLAMP, Housing Plate	1
6	89346	615741C1	59556	019-90004-735	HOUSING, Commutator	1
7	89346	684364C1	59556	019-90004-736	NUT, Impeller Lock	1
8	89346	630614C91	59556	019-90004-737	WHEEL, Impeller	1
9	89346	343847R1	59556	019-90004-738	PLATE, W/Spring, Back	1
10	89346	615747C1	59556	019-90004-739	SEAL, Ring	1
11	89346	615745C1	59556	019-90004-740	SPRING, Plate	1
12	89346	687965C1	59556	019-90004-741	COLLAR, Thrust	2
13	89346	684360C91	59556	019-90004-742	BEARING, Housing	1
14	89346	625675C1	59556	019-90004-743	HOUSING, W/Seal, Center	2
15	89346	25480R1	59556	019-90004-744	PLATE, Backplate Lock	4
16	89346	627771C1	59556	019-90004-745	BOLT, Hex Head, 1/4 NC x 5/8 inch	1
17	89346	1806082C1	59556	019-90004-746	SHROUD, Turbine	1
18	89346	684359C1	59556	019-90004-747	WHEEL, W/Shift, Turbine	1
19	89346	627774C1	59556	019-90004-748	SEAL, Ring	4
20	89346	627773C1	59556	019-90004-749	RING, Retaining	1
21	89346	615746C1	59556	019-90004-750	BEARING, Thrust	1
					RING, Piston	1

Group 11. Engine And Accessories  
Figure E-49. Turbocharger

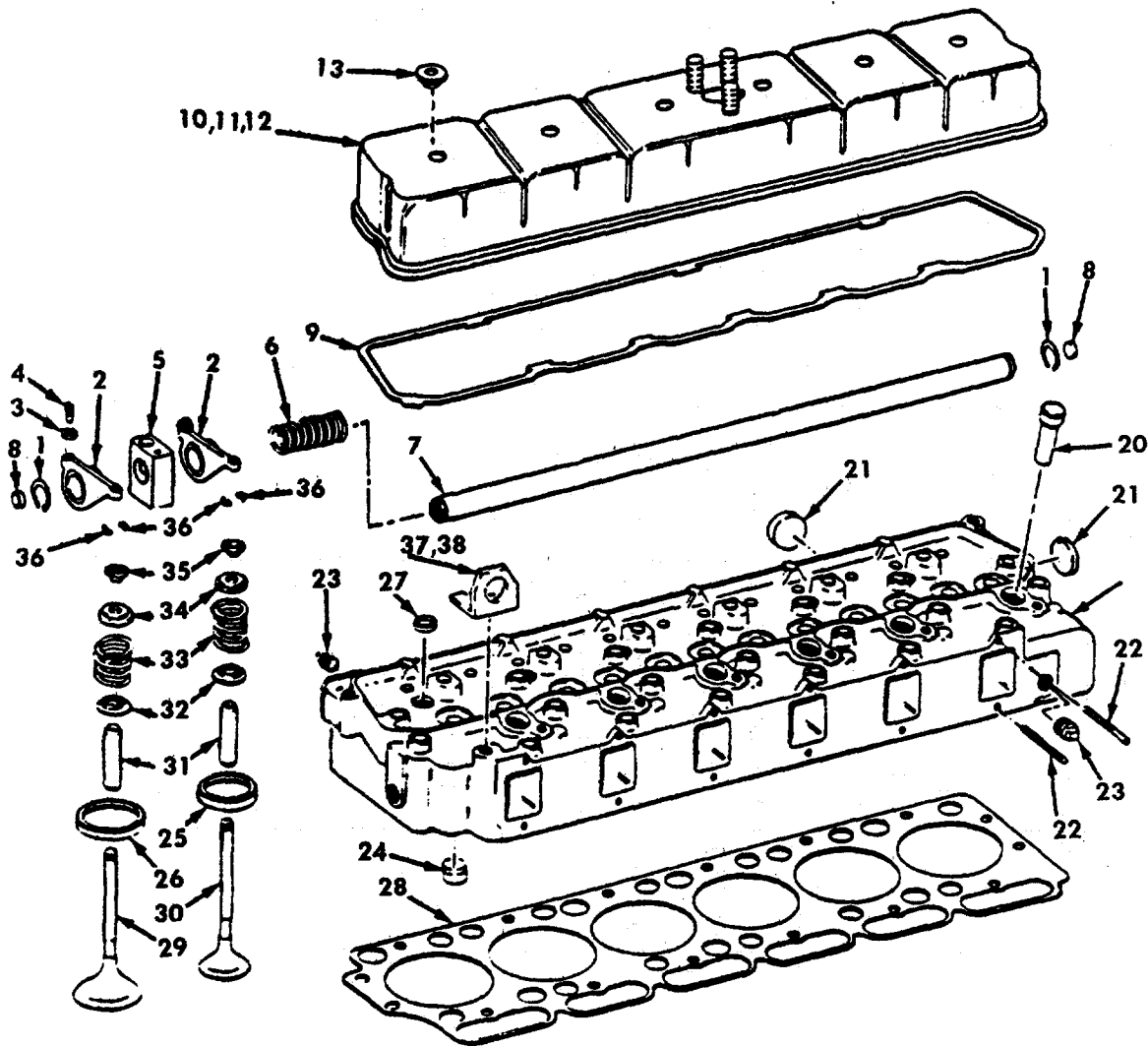
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	630675C1	59556	019-90004-751	HOUSING, Turbine	1
23	89346	630610C1	59556	019-90004-752	CLAMP, Housing Plate	3
24	89346	630609C1	59556	019-90004-753	PLATE, Housing Lock	3
25	89346	18763R1	59556	019-90004-754	BOLT, Hex Head, 5/16 x 1/2 inch	6
26	89346	253660R1	59556	019-90004-714	GASKET, Oil Inlet Tube	1
27	89346	677755C91	59556	019-90004-715	TUBE, Oil Inlet	1
28	89346	25493R1	59556	019-90004-716	BOLT, Hex Head, 5/16 UNC x 1 inch	2
29	89346	27326R1	59556	019-90004-717	WASHER, Hardened, 5/16 inch	2
30	89346	265205R1	59556	019-90004-718	NUT, Tube Mounting	1
31	89346	265204R1	59556	019-90004-719	SLEEVE, Tube Mounting	1
32	89346	670073C1	59556	019-90004-720	GASKET, Turbocharger	1
33	89346	691179C91	59556	019-90004-721	PIPE, Air Outlet	1
34	89346	687456C1	59556	019-90004-722	CLAMP, Air Outlet Pipe	2
35	89346	310385R2	59556	019-90004-723	HOSE, Air Outlet Pipe	AR
36	89346	687456C1	59556	019-90004-724	CLAMP, Air Outlet Pipe	2
37	89346	675723C2	59556	019-90004-725	HOSE, Air Outlet Pipe	1
38	89346	675317C1	59556	019-90004-726	SLEEVE, Turbocharger Exhaust	1
39	89346	702299C1	59556	019-90004-727	RING, Seal	2
40	89346	683520C1	59556	019-90004-728	ELBOW, Turbocharger Exhaust	1
41	89346	25522R1	59556	019-90004-729	NUT, Hex, 3/8 NC	2
42	89346	140483H	59556	019-90004-730	BOLT, Hex Head, 3/8 NC x 1-1/4 inch	4
43	89346	25896R1	59556	019-90004-731	WASHER, Hardened, 3/8 inch	



GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-50. INTAKE AND EXHAUST MANIFOLDS

Group 11. Engine And Accessories  
 Figure E-50. Intake and Exhaust Manifolds

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	682987C1	59556	019-90004-756	MANIFOLD ASSEMBLY, EXHAUST AND INTAKE	12
2	89346	684034C1	59556	019-90004-757	NUT, Special	12
3	89346	688928C1	59556	019-90004-758	WASHER, Flange, 7/16 inch	6
4	89346	682199C1	59556	019-90004-759	GASKET, Exhaust Manifold	1
5	89346	675633C91	59556	019-90004-760	GASKET, Intake Manifold	1
6	89346	26679R1	59556	019-90004-761	MANIFOLD, W/Plug, Intake	11
7	89346	27326R1	59556	019-90004-762	BOLT, Hex Head, 5/16 NC x 1-1/4 inch	12
8	89346	444576	59556	019-90004-763	WASHER, Lock, 5/16 Regular	1
9	89346	683564C91	59556	019-90004-764	PLUG, Hex Head, 1/4 NPT	1
10	89346	444614	59556	019-90004-765	MANIFOLD, W/Plugs Exhaust Front	2
11	89346	675779C3	59556	019-90004-766	PLUG, Hex Head, 1/8 NPT	1
					MANIFOLD, Exhaust Rear	



GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-51. VALVE COVER, ROCKER ARMS, SHAFTS, PUSHRODS,  
 CYLINDER HEAD AND VALVES

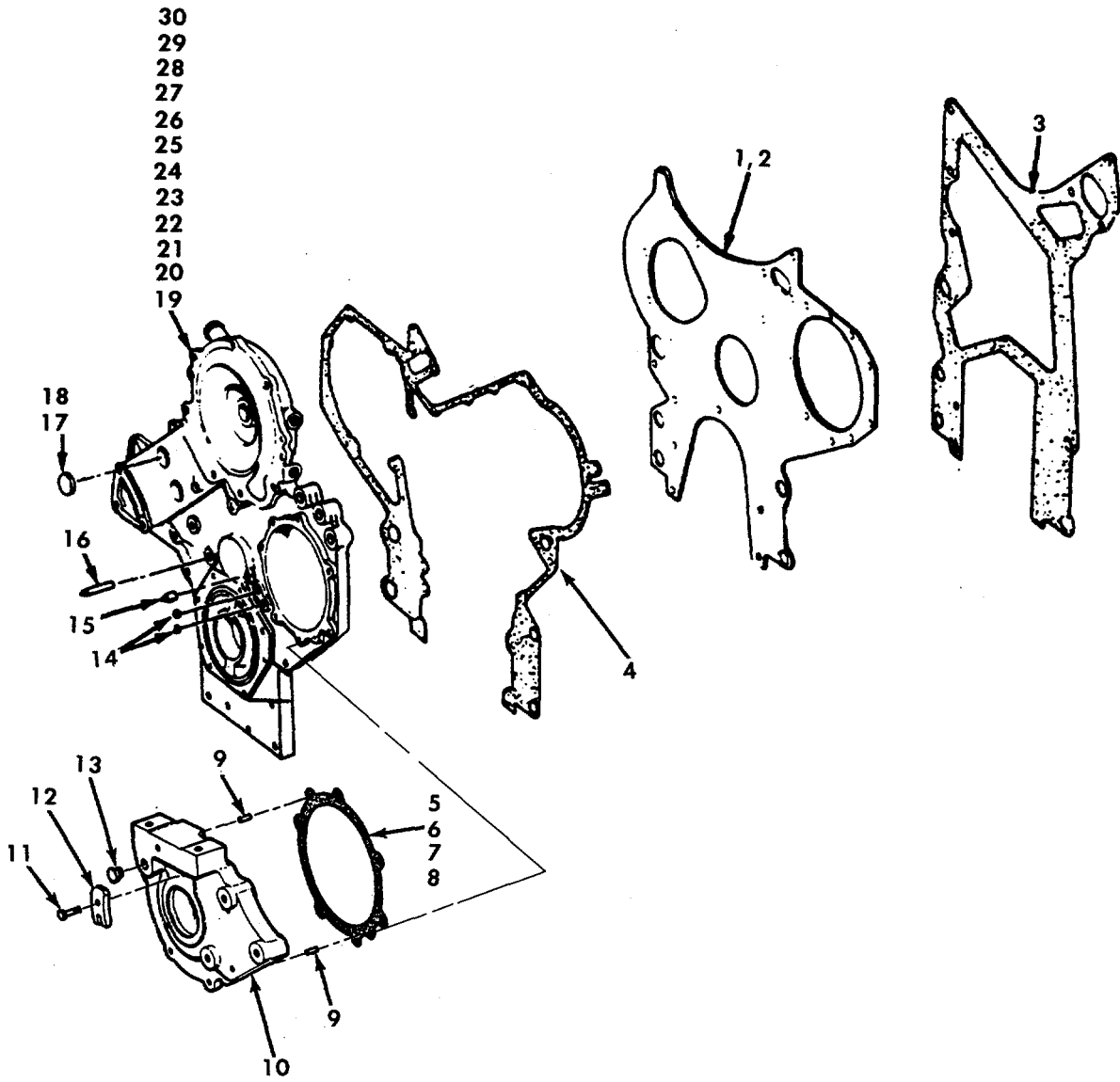
Group 11. Engine And Accessories  
 Figure E-51. Valve Cover, Rocker Arms, Shafts, Pushrods, Cylinder Head and Valves

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	24577R1	59556	019-90004-39	CYLINDER HEAD ASSEMBLY	REF
2	89346	688999C91	59556	019-90004-40	RING, Retaining	2
3	89346	133093R1	59556	019-90004-41	ARM, Rocker Valve, (Includes Items #3 and #4)	12
4	89346	16067DA	59556	019-90004-42	NUT, Adjusting Screw	12
5	89346	675547C2	59556	019-90004-43	SCREW, Rocker Arm Adjusting	12
6	89346	675105C1	59556	019-90004-44	BRACKET, Rocker Arm Shaft	6
7	89346	675660C92	59556	019-90004-45	SPRING, Rocker Arm Shaft	5
8	89346	291171C1	59556	019-90004-46	SHAFT, With Plugs, Rocker Arm	1
9	89346	675109C2	59556	019-90004-47	PLUG, Cup, 9/16 inch	2
10	89346	690339C1	59556	019-90004-48	GASKET, Valve Cover	1
11	89346	25654R1	59556	019-90004-49	COVER, Valve	1
12	89346	689324C1	59556	019-90004-50	BOLT, Hex Head, 5/16 NC x 1-1/2 inch	5
13	89346	677692C1	59556	019-90004-51	BOLT, Valve Cover Stud	1
14	89346	687199C92	59556	019-90004-52	GROMMET, Valve Cover	6
15	89346	691476C1	59556	019-90004-53	HEAD, Cylinder, (Includes #20, 21, 22, 23, 24, 25, 26, 27)	1
16	89346	676119C1	59556	019-90004-54	BOLT, Cylinder Head, Short	20
17	89346	252018R1	59556	019-90004-55	BOLT, Cylinder Head, Long	6
18	89346	367972C92	59556	019-90004-56	WASHER, Cylinder Head Bolt	26
19	89346	864445R1	59556	019-90004-57	VALVE, Heater Shut-Off	1
20	89346	675442C1	59556	019-90004-58	NIPPLE, 3/4 NPT x 1 inch Hose	1
21	89346	601093C1	59556	019-90004-59	SLEEVE, Injector	6
					PLUG, Cup, 1-1/2 inch	6

Group 11. Engine And Accessories  
 Figure E-51. Valve Cover, Rocker Arms, Shafts, Pushrods, Cylinder Head and Valves

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	682840C1	59556	019-90004-60	STUD, Exhaust Manifold	12
23	89346	444667	59556	019-90004-61	PLUG, Pipe, 1/2 NPT	2
24	89346	691183C1	59556	019-90004-62	DIRECTOR, Water	12
25	89346	671563C1	59556	019-90004-63	INSERT, Exhaust Valve, .002 oversize	6
	89346	671565C1	59556	019-90004-64	INSERT, Exhaust Valve, .015 oversize	6
26	89346	671559C1	59556	019-90004-65	INSERT, Intake Valve, .002 oversize	6
	89346	671561C1	59556	019-90004-66	INSERT, Intake Valve, .015 oversize	6
27	89346	21427R1	59556	019-90004-67	PLUG, Cup, 1-1/8 inch	6
28	89346	676108C2	59556	019-90004-68	GASKET, Cylinder Head	1
29	89346	675046C2	59556	019-90004-69	VALVE, Intake	6
30	89346	676865C2	59556	019-90004-70	VALVE, Exhaust	6
31	89346	675439C1	59556	019-90004-71	GUIDE, Valve	12
32	89346	675443C1	59556	019-90004-72	SEAT, Valve Spring	12
33	89346	682064C1	59556	019-90004-73	SPRING, Valve	12
34	89346	682221C92	59556	019-90004-74	COIL, Roto, With Shield, Top	12
35	89346	681234C1	59556	019-90004-75	SHIELD, Oil	12
36	89346	41339D	59556	019-90004-76	LOCK, Valve Spring	24
37	89346	675455C1	59556	019-90004-77	EYE, Lifting	1
38	89346	25830R1	59556	019-90004-78	BOLT, Hex Head, 9/16 NC x 1-1/4 inch	1





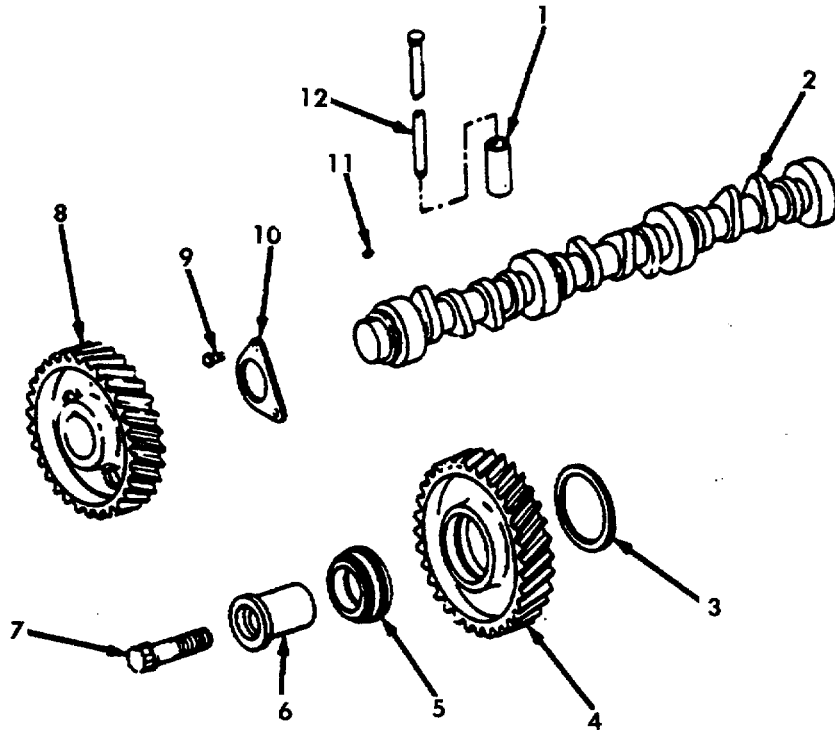
GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-52. FRONT COVER

Group 11. Engine And Accessories  
Figure E-52. Front Cover

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	675811C1	59556	019-90004-13	CRANKCASE FRONT COVER ASSEMBLY	1
2	89346	9409011	59556	019-90004-14	PLATE, Crankcase Front Cover	4
3	89346	675812C1	59556	019-90004-15	BOLT, Hex Head, Lock, 5/16 NC x 3/4 inch	1
4	89346	675813C1	59556	019-90004-16	GASKET, Crankcase Front Plate	1
5	89346	675816C1	59556	019-90004-846	GASKET, Crankcase Front Cover	1
6	89346	25235R1	59556	019-90004-847	GASKET, Injection Pump Access	1
7	89346	27326R1	59556	019-90004-848	BOLT, Hex Head, 5/16-18 x 2-1/2 inch	9
8	89346	25520R1	59556	019-90004-849	WASHER, Hardened, 5/16 inch	3
9	89346	680481C1	59556	019-90004-845	NUT, 5/16-18	2
10	89346	1803050C91	59556	019-90004-850	PIN, Dowel	1
11	89346	691105C1	59556	019-90004-851	COVER ASSEMBLY, Injection Pump	1
12	89346	675479C2	59556	019-90004-852	BOLT	1
13	89346	444624	59556	019-90004-853	CRAB, Injection Nozzle	1
14	89346	17012R1	59556	019-90004-17	PLUG, Hex Head Pipe, 3/8-18	2
15	89346	367572R1	59556	019-90004-18	BALL, 3/8 Chrome	1
16	89346	691379C1	59556	019-90004-19	POINTER, Timing	1
17	89346	23624R1	59556	019-90004-20	INDICATOR, Timing	3
18	89346	444667	59556	019-90004-21	PLUG, Cup	2
19		NSS			PLUG, Pipe Square Socket, 1/2 NPT	1
20	89346	26677R1	59556	019-90004-22	COVER, Crankcase Front	3
					BOLT, Hex Head Lock, 5/16 NC x 3/4 inch	

Group 11. Engine And Accessories  
 Figure E-52.. Front Cover

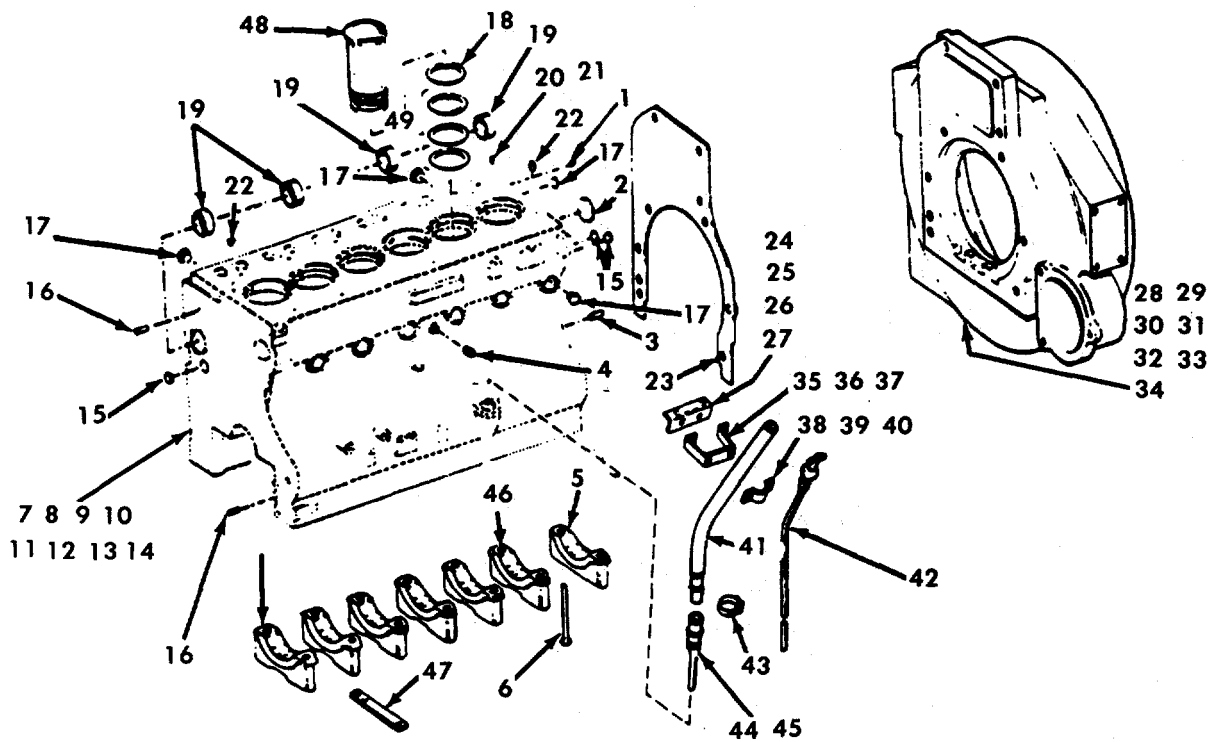
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	25654R1	59556	019-90004-23	BOLT, Hex Head Lock, 5/16 NC x 1-1/2 inch	2
22	89346	24641R1	59556	019-90004-24	BOLT, Hex Head, 3/8 NC x 2-1/4 inch	1
23	89346	27326R1	59556	019-90004-25	WASHER, Flange, 5/16 inch	15
24	89346	25896R1	59556	019-90004-26	WASHER, Flange, 3/8 inch, Hardened	1
25	89346	444630	59556	019-90004-27	PLUG, Pipe Square Socket, 3/8 NPT	2
26	89346	25520R1	59556	019-90004-28	NUT, 5/16 inch	1
27	89346	445751	59556	019-90004-29	PLUG, Pipe, 1/2 inch	2
28	89346	686883C1	59556	019-90004-30	BASE, Steering Pump Mounting	1
29	89346	675455C1	59556	019-90004-31	EYE, Lifting	2
30	89346	1802246C91	59556	019-90004-32	KIT, Front Cover	KT



GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-53. CAMSHAFT AND GEAR TRAIN

Group 11. Engine And Accessories  
 Figure E-53. Camshaft and Gear Train

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	1802340C1	59556	019-90004-1	CAMSHAFT ASSEMBLY	REF
2	89346	1802339C92	59556	019-90004-2	TAPPET, Valve	12
3	89346	675767C1	59556	019-90004-3	CAMSHAFT, (Includes Items No. 8,10, and 11)-	1
4	89346	675764C1	59556	019-90004-4	SPACER, Idler Gear	1
5	89346	327185R91	59556	019-90004-5	GEAR, Idler	1
6	89346	675765C1	59556	019-90004-6	BEARING, Idler Gear	1
7	89346	676588C1	59556	019-90004-7	SHAFT, Idler Gear	1
8	89346	675600C1	59556	019-90004-8	BOLT, Idler Gear Shaft	1
9	89346	9409011	59556	019-90004-9	GEAR, Camshaft	1
10	89346	676144C1	59556	019-90004-10	BOLT, Camshaft Thrust Plate	2
11	89346	218211	59556	019-90004-11	PLATE, Camshaft Thrust	1
12	89346	675621C1	59556	019-90004-12	KEY, Woodruff, 1/4x3/4 inch	1
					ROD, Valve Push	12



GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-54. DIPSTICK, TUBE, AND CRANKCASE

Group 11. Engine And Accessories  
Figure E-54. Dipstick, Tube, and Crankcase

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	1802336	59556	019-90004-788	CRANKCASE ASSEMBLY (Includes Item Nos. 1 Thru 17)	1
1	89346	50410DA	59556	019-90004-789	PLUG, Hex Locket, 1/8 NPT	5
2	89346	682444C1	59556	019-90004-790	RING, Camshaft Seal Rear	1
3	89346	680484C1	59556	019-90004-791	DOWEL, 1/2 x 1-1/8 inch	2
4	89346	444625	59556	019-90004-792	PLUG, Pipe	1
5	89346	680243C1	59556	019-90004-793	CAP, Main Bearing Rear	1
6	89346	1802582C1	59556	019-90004-794	BOLT, Main Bearing Cap	14
7	89346	1802333C92	59556	019-90004-795	CRANKCASE	1
8	89346	9409949	59556	019-90004-796	PLUG, Pipe Square Socket, 3/4 NPT	2
9	89346	343464R1	59556	019-90004-797	TUBE, Oil Jet Cooling	12
10	89346	687002C1	59556	019-90004-798	INSERT, Crankcase	AR
11	89346	17008R1	59556	019-90004-799	BALL, Oil Jet Cooling Tube	12
12	89346	25493R1	59556	019-90004-800	Bolt, Hex Head, 5/16 NC x 1 inch	2
13	89346	27326R1	59556	019-90004-801	WASHER, Flange, 5/16 inch	2
14	89346	623083R1	59556	019-90004-802	WASHER, Lock, 5/16 Regular	2
15	89346	327412R1	59556	019-90004-803	PLUG, Cup, 13/16 inch	3
16	89346	680483C1	59556	019-90004-804	DOWEL, 3/8 x 7/8 inch	2
17	89346	23623R1	59556	019-90004-805	PLUG, Cup, 1-1/4 inch	9
18	89346	680333C92	59556	019-90004-806	KIT, Cylinder Sleeve Shim	AR
19	89346	680117C1	59556	019-90004-807	BEARING Set, Camshaft	1
20	89346	617256C1	59556	019-90004-808	SCREW, Set	1
21	89346	16013R1	59556	019-90004-809	BALL, Steel	1
22	89346	684902C1	59556	019-90004-810	DOWEL, Bushing	2

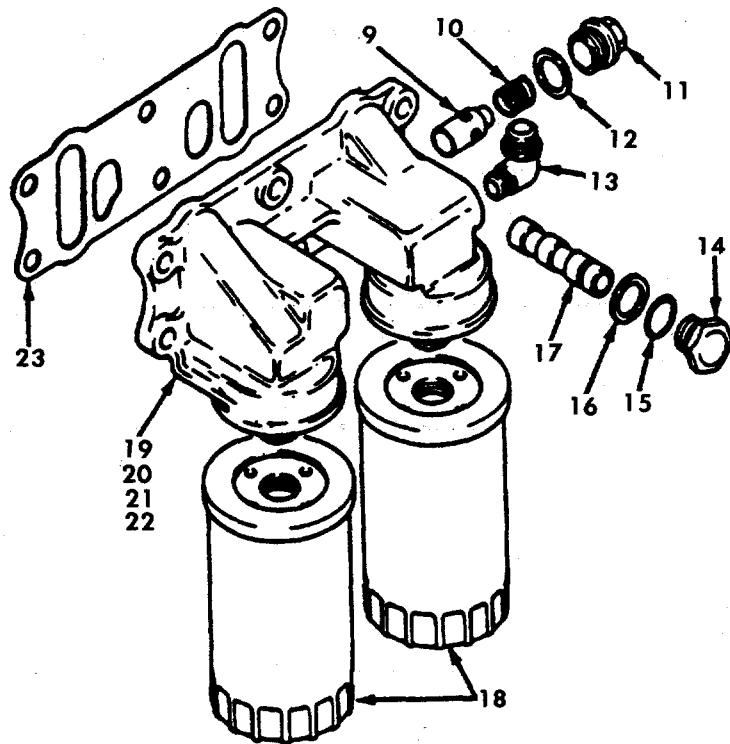
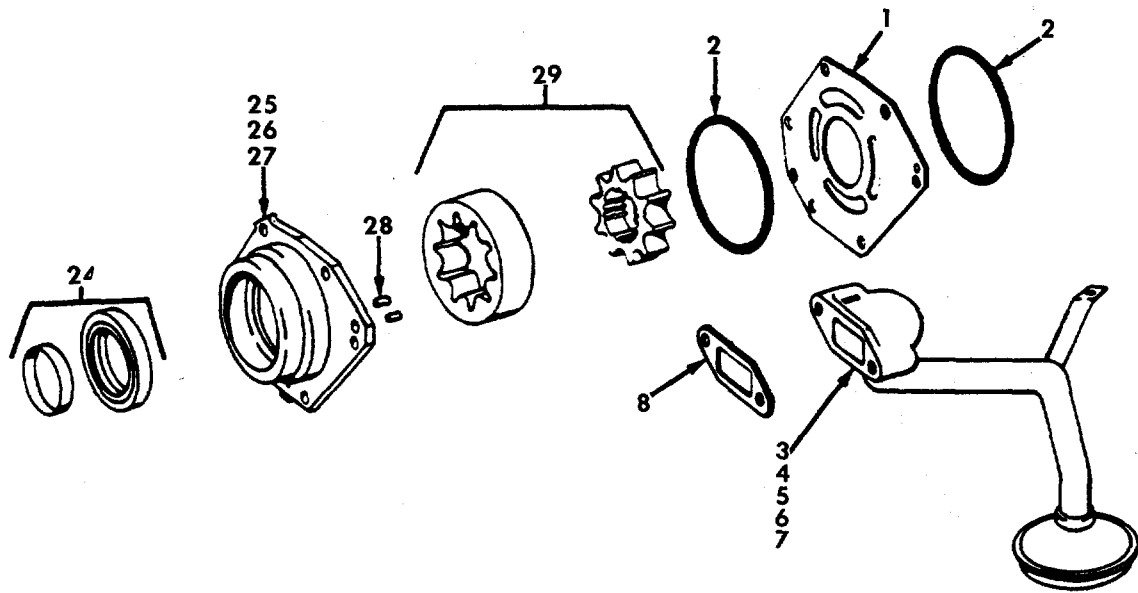
Group 11. Engine And Accessories  
Figure E-54.. Dipstick, Tube, and Crankcase

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	89346	682945C1	59556	019-90004-811	GASKET, Flywheel Housing	1
24	89346	691851C1	59556	019-90004-812	BRACKET, Oil Filler Tube	1
25	89346	86224H	59556	019-90004-813	SPACER, 1/4 Pipe	2
26	89346	25234R1	59556	019-90004-814	BOLT, Hex Head, 5/16-18 x 2-1/4 inch	2
27	89346	27326R1	59556	019-90004-815	WASHER, 5/16 inch	2
28	89346	686704C3	59556	019-90004-816	HOUSING, Flywheel	1
29	89346	25278R1	59556	019-90004-817	BOLT, Hex Head, 1/2 NC x 1-7/8 inch	8
30	89346	686999C1	59556	019-90004-818	STUD, Crankcase Housing	4
31	89346	26273R1	59556	019-90004-819	WASHER, Flange, 1/2 inch	8
32	89346	686702C1	59556	019-90004-820	PLATE, Housing Cover	1
33	89346	25493R1	59556	019-90004-821	BOLT, Hex Head, 5/16 NC x 1 inch	2
34	89346	27326R1	59556	019-90004-822	WASHR, Flange, 5/16 inch	2
35	89346	691850C1	59556	019-90004-823	BRACKET, Oil Filler Tube	1
36	89346	24840R1	59556	019-90004-824	BOLT, Hex Head, 3/8-16 x 1 inch	2
37	89346	25896R1	59556	019-90004-825	WASHER, 3/8 inch	2
38	89346	691836C1	59556	019-90004-826	CLAMP, Oil Filler Tube	1
39	89346	25493R1	59556	019-90004-827	BOLT, Hex Head, 5/16-18 x 1 inch	2
40	89346	27326R1	59556	019-90004-828	WASHR, 5/16 inch	2
41	89346	691848C1	59556	019-90004-829	TUBE, Oil Filler	1
42	89346	691796C1	59556	019-90004-830	GAUGE, Oil Level, Rear Sump	1
43	89346	690835C1	59556	019-90004-831	CLAMP, Tube	1
44	89346	691846C1	59556	019-90004-832	TUBE, Oil Gauge	1
45	89346	60352D	59556	019-90004-833	SEAL, Ring, 3/32 x 1-3/8 inch	1



Group 11. Engine And Accessories  
 Figure E-54. Dipstick, Tube, and Crankcase

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
46	89346	680241C1	59556	019-90004-834	CAP, Main Bearing Front And Intermediate	6
47	89346	673761C1	59556	019-90004-835	BRACKET, Suction Pipe Support	1
48	89346	682720C1	59556	019-90004-836	SLEEVE,-(See Figure 12-065	AR
49	89346	680086C1	59556	019-90004-837	KIT, Cylinder Sleeve O-Ring	6



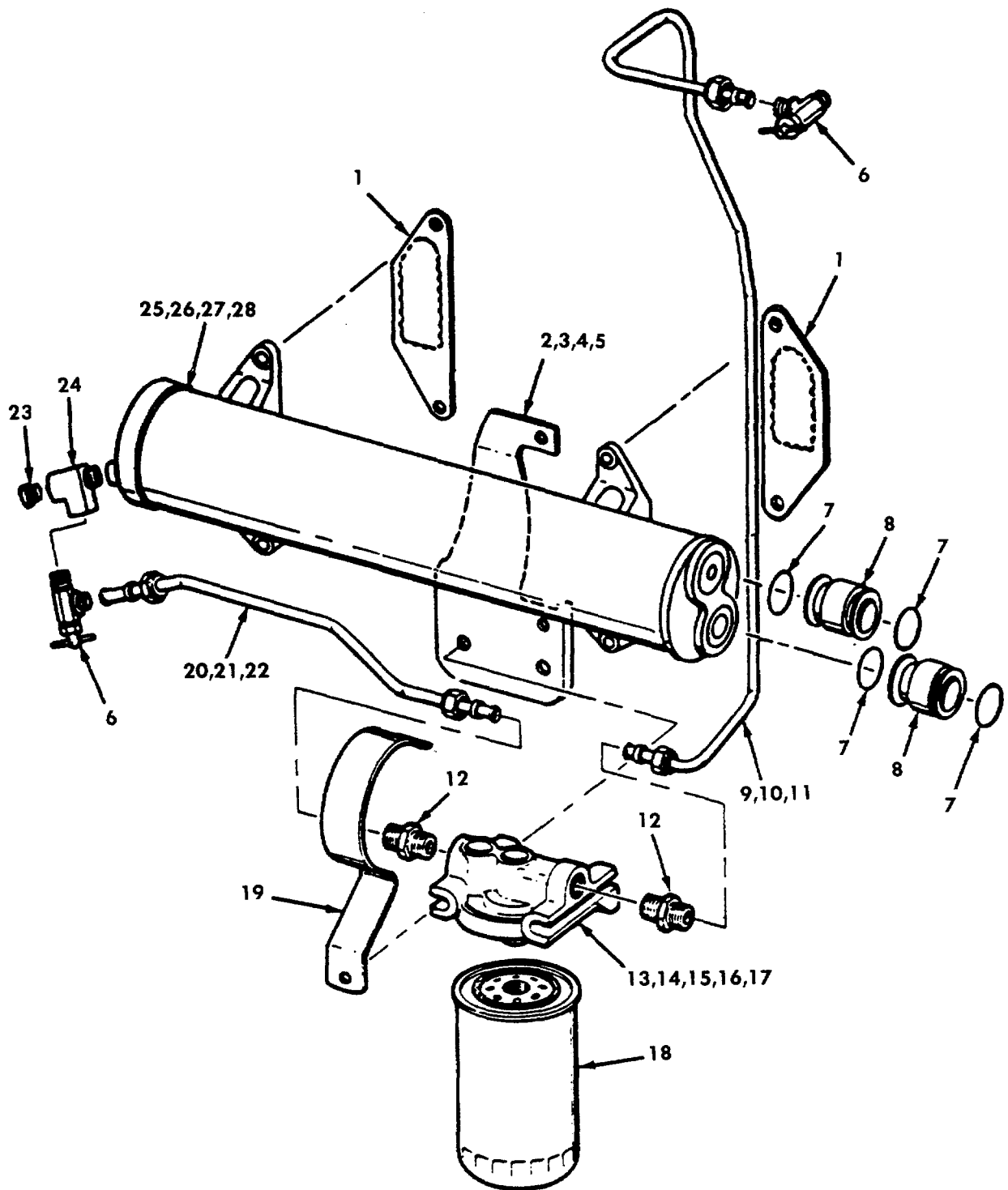
GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-55. OIL PUMP AND FILTER

Group 11. Engine And Accessories  
 Figure E-55. Oil Pump and Filters

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	675365C1	59556	019-90004-134	OIL PUMP W/RELATED PARTS ASSEMBLY	1
2	89346	686451C1	59556	019-90004-135	PLATE, Oil Pump Housing	2
3	89346	691533C2	59556	019-90004-136	RING, Oil Pump Housing	1
4	89346	25492R1	59556	019-90004-137	TUBE, Oil Pump Inlet	1
5	89346	25750R1	59556	019-90004-138	BOLT, Hex Head, 5/16 NC x 7/8 inch	2
6	89346	27326R1	59556	019-90004-139	BOLT, Hex Head, 5/16 NC x 1-3/4 inch	3
7	89346	116120	59556	019-90004-140	WASHER, 5/16 inch, Hardened	1
8	89346	671821C1	59556	019-90004-141	WASHER, 5/16 inch, Lock	1
9	89346	601917C1	59556	019-90004-142	GASKET, Oil Pump Inlet Tube	1
10	89346	676137C1	59556	019-90004-143	VALVE, Filter By-Pass	1
11	89346	676135C1	59556	019-90004-144	SPRING, Filter By-Pass Valve	1
12	89346	676136C1	59556	019-90004-145	PLUG, Base Valve	1
13	89346	606845C1	59556	019-90004-146	GASKET, Filter By-Pass Valve	1
14	89346	675395C1	59556	019-90004-147	ELBOW, 90° Degree	1
15	89346	349055R2	59556	019-90004-148	CAP. Pressure Regulator	1
16	89346	261624R1	59556	019-90004-149	O-RING, Valve	1
17	89346	680237C91	59556	019-90004-150	GASKET, Regulator Valve Cap	1
18	89346	675616C91	59556	019-90004-151	VALVE, W/Gasket, O-Ring, Regulating	2
19	89346	677323C1	59556	019-90004-152	ELEMENT, Oil Filter	1
					BASE, W/Adapters, Oil Filter (Includes Nos. 1,2,3,4,and 5)	

Group 11. Engine And Accessories  
 Figure E-55. Oil Pump and Filters

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	26311R1	59556	019-90004-153	BOLT, Hex Head, Lock, 3/8 NC x 1-1/4 inch	5
21	89346	690206C1	59556	019-90004-154	BOLT, Stud, 3/8 NC x 3/8 NF	2
22	89346	25896R1	59556	019-90004-155	WASHER, Flange, 3/8 inch	6
23	89346	675398C1	59556	019-90004-156	GASKET, Oil Filter Base	1
24	89346	690437C91	59556	019-90004-157	KIT, Front Oil Seal And Wear Sleeve	AR
25	89346	684500C91	59556	019-90004-158	HOUSING, W/Pins, Oil Pump (Includes No.2)	1
26	89346	27971R1	59556	019-90004-159	BOLT, Hex Head, 5/16 NC x 1-1/8 inch	6
27	89346	27326R1	59556	019-90004-160	WASHER, Lock, 5/16 inch	6
28	89346	680482C1	59556	019-90004-161	PIN, Dowel	2
29		NSS			SET, Inner and Outer Rotor	AR
--	89346	1802666C91	59556	019-90004-162	PACKAGE, Oil Pump Service (Includes Nos. 1,2,10,13, and 14)	AR



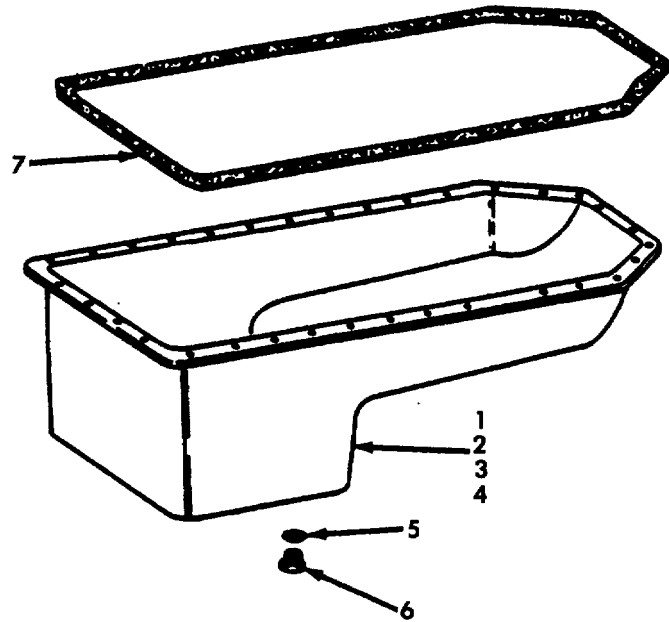
GROUP 11. ENGINE AND ACCESSORIES  
 FIGURE E-56. OIL COOLER ASSEMBLY

Group 11. Engine And Accessories  
 Figure E-56. Oil Cooler Assembly

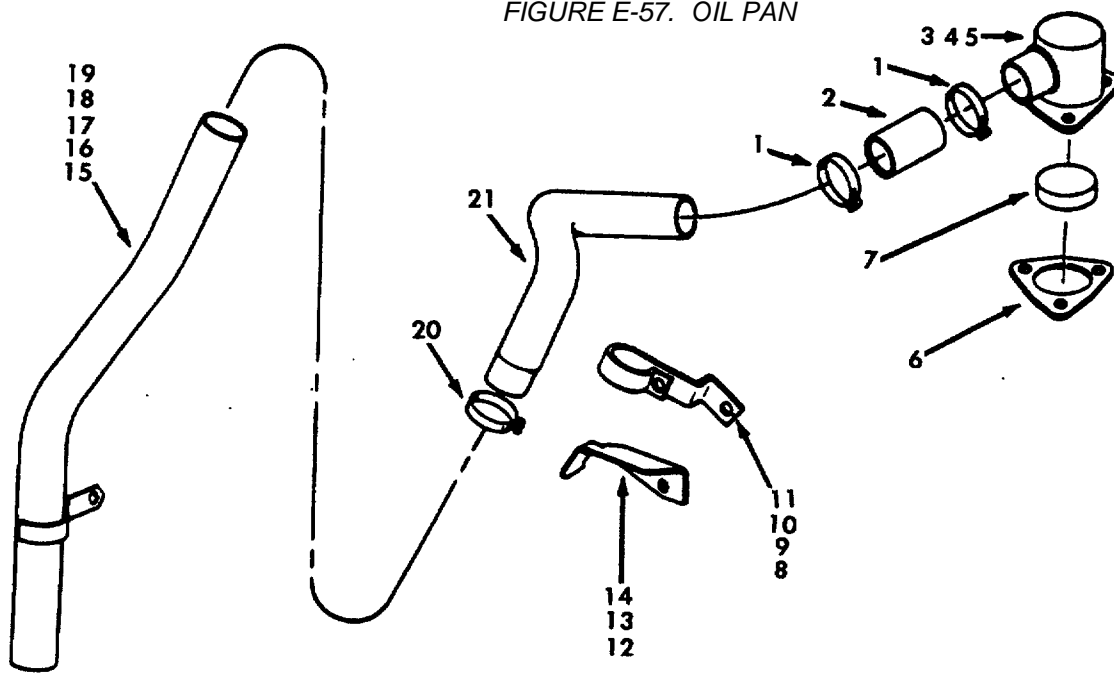
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	467513C1	59556	019-90004-202	COOLER AND FILTER ASSEMBLY	REF
2	89346	1800690C1	59556	019-90004-203	SEAL, Oil Cooler Mounting	2
3	89346	24841R1	59556	019-90004-204	BRACKET, Coolant Filter	1
4	89346	25896R1	59556	019-90004-205	BOLT, Hex Head, 3/8-16	2
5	89346	3/8R	59556	019-90004-205	WASHER, Hardened, 3/8 inch	2
6	89346	121894C1	59556	MS35338-46	WASHER, Lock, 3/8 inch	2
7	89346	252483R1	59556	019-90004-207	VALVE, Shut-Off	2
8	89346	677110C1	59556	019-90004-208	O-RING	4
9	89346	1800589C91	59556	019-90004-209	TUBE, Cooler To Front Cover	2
10	89346	265205R1	59556	019-90004-210	TUBE, Coolant Filter	1
11	89346	265204R1	59556	019-90004-211	NUT	2
12	89346	333773R1	59556	019-90004-212	RING	2
13	89346	1800029C1	59556	019-90004-213	CONNECTOR, Flex	2
14	89346	3-8x41-2Y	59556	019-90004-214	HEADER, Coolant Filter	1
15	89346	25784R1	59556	019-90004-215	BOLT, Hex Head, 3/8-16x4-1/2 inch	1
16	89346	142127R1	59556	019-90004-216	BOLT, Hex Head, 3/8-16x4-1/2 inch	1
17	89346	25896R1	59556	019-90004-217	WASHER, Hardened	1
18	89346	1801090C1	59556	019-90004-218	WASHER, Lock, 3/8 inch	2
19	89346	1801115C1	59556	019-90004-219	FILTER, Coolant	1
20	89346	1800588C91	59556	019-90004-220	SPRING, Filter Header	1
21	89346	265205R1	59556	019-90004-221	TUBE, Coolant Filter	1
22	89346	265204R1	59556	019-90004-222	NUT	2
				019-90004-223	RING	2

Group 11. Engine And Accessories  
 Figure E-56. Oil Cooler Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	89346	444612	59556	019-90004-224	PLUG, Hex Head, 1/8 inch	1
24	89346	1800515C1	59556	019-90004-225	TEE, Reducing	1
25	89346	680239C92	59556	019-90004-226	COOLER, W/Seals And O-Rings, Oil (Includes Nos. 1 and 7)	AR
26	89346	140483H	59556	019-90004-227	BOLT, Hex Head, 3/8 NC x 1-1/4 inch	4
27	89346	25896R1	59556	019-90004-228	WASHER, Hardened, 3/8 inch	4
28	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 Regular	4



GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-57. OIL PAN



GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-58. CRANKCASE VENT ASSEMBLY

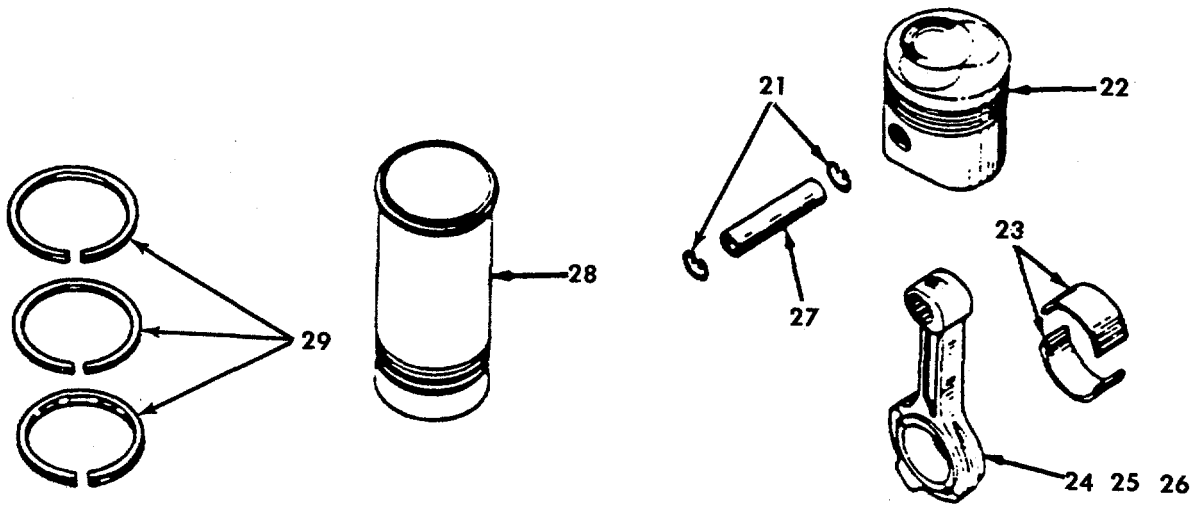
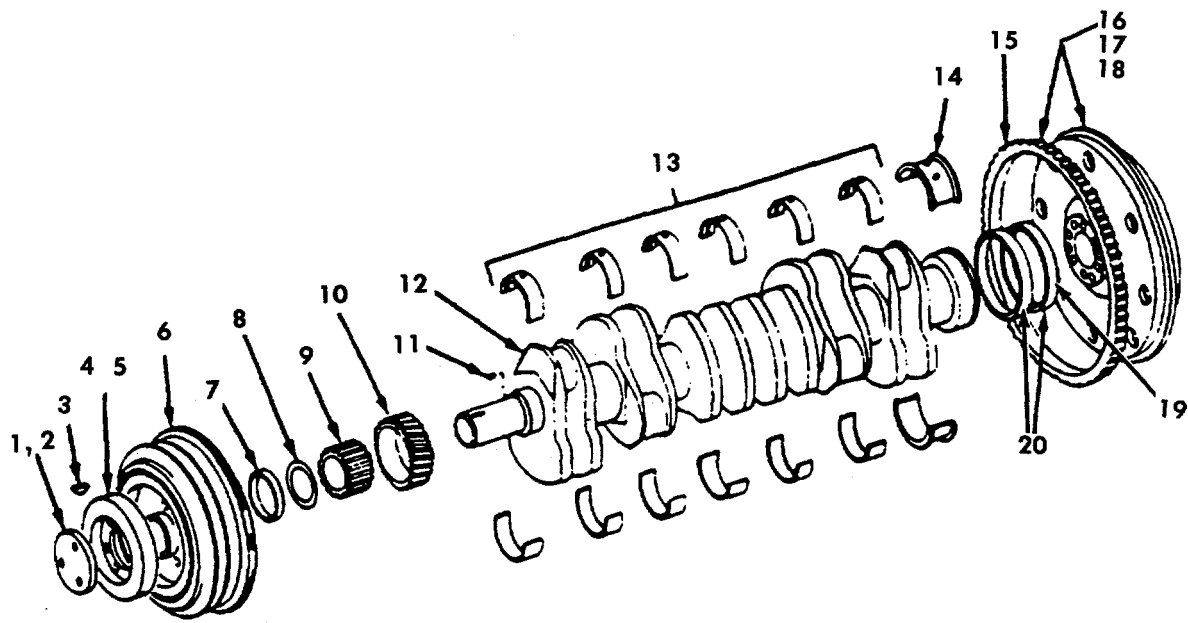


Group 11. Engine And Accessories  
 Figure E-57. Oil Pan  
 Figure E-58. Crankcase Vent Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-57					OIL PAN ASSEMBLY	
1	89346	1801398C91	59556	019-90004-838	PAN, W/Drain Plug and Gasket	1
2	89346	677490C1	59556	019-90004-839	SCREW, W/Connecting Washer	30
3	89346	690358C1	59556	019-90004-840	SCREW, W/Washer	4
4	89346	445751	59556	019-90004-841	PLUG, Hex Head, 1/2 NPT	1
5	89346	59658D	59556	019-90004-842	GASKET, Drain Plug	1
6	89346	688067C1	59556	019-90004-843	PLUG, Drain	1
7	89346	671827C1	59556	019-90004-844	GASKET, Oil Pan	1
E-58					VENT ASSEMBLY, CRANKCASE	
1	89346	279024R91	59556	019-90004-767	CLAMP	2
2	89346	690460C1	59556	019-90004-768	HOSE, Housing To Tube	1
3	89346	690354C1	59556	019-90004-769	HOUSING, Breather	1
4	89346	9413977	59556	019-90004-770	NUT, Hex, 5/16 NC	3
5	89346	691644C1	59556	019-90004-771	WASHER, Flange	3
6	89346	693973C4	59556	019-90004-772	GASKET, Breather Housing	1
7	89346	690233C1	59556	019-90004-773	ELEMENT, Breather	1
8	89346	690561C1	59556	019-90004-774	SUPPORT, Breather Tube	1
9	89346	24840R1	59556	019-90004-775	BOLT, Hex Head, 3/8 NC x 1 inch	2
10	89346	25522R1	59556	019-90004-776	NUT, Hex, 3/8 NC	2
11	89346	25896R1	59556	019-90004-777	WASHER, Hardened, 3/8 inch	2
12	89346	690458C1	59556	019-90004-778	SUPPORT, Breather Tube	1

Group 11. Engine And Accessories  
 Figure E-57. Oil Pan  
 Figure E-58. Crankcase Vent Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
13	89346	24840R1	59556	019-90004-779	BOLT, Hex Head, 3/8 NC x 1 inch	1
14	89346	25896R1	59556	019-90004-780	WASHER, 3/8 inch, Hardened	2
15	89346	690580C1	59556	019-90004-781	TUBE, Lower Breather	1
16	89346	25523R1	59556	019-90004-782	NUT, Hex, 3/8 NF	1
17	89346	25896R1	59556	019-90004-783	WASHER, 3/8 inch, Hardened	1
18	89346	454096	59556	019-90004-784	ELBOW, 45° Degree Pipe Street, 1/8 NPT	1
19	89346	24186R1	59556	019-90004-785	PLUG, 1/8 Pipe	1
20	89346	279024R91	59556	019-90004-786	CLAMP. Tube	1
21	89346	690560C1	59556	019-90004-787	TUBE, Upper Breather	1



GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-59. PISTONS, CONNECTING RODS, FLYWHEEL, CRANKSHAFT, AND MAIN BEARINGS

Group 11. Engine And Accessories  
 Figure E-59. Pistons, Connecting Rods, Flywheel, Crankshaft, and Main Bearings

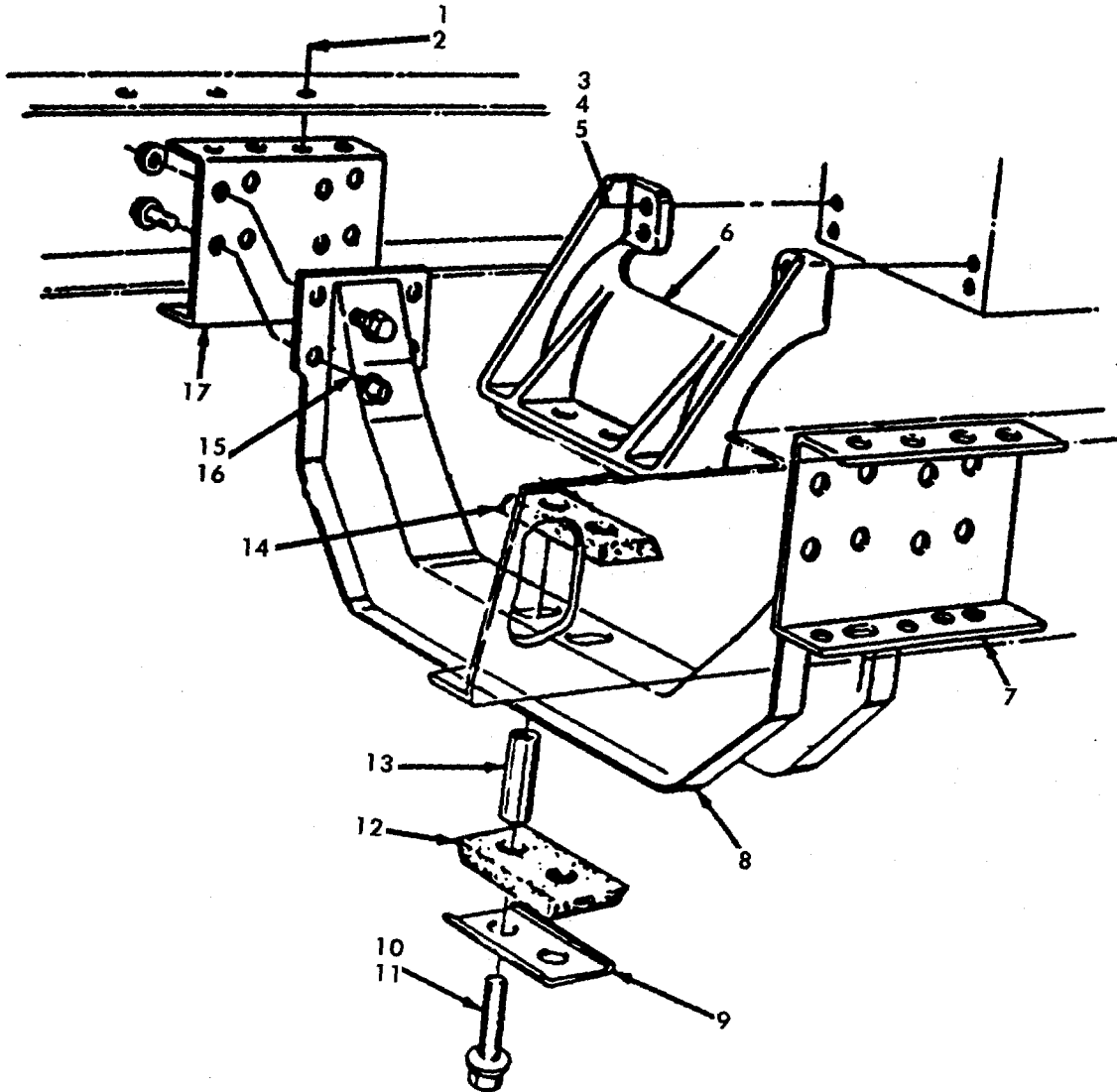
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	675412C1	59556	019-90004-675	CRANKSHAFT, PISTON, AND RELATED PARTS	1
2	89346	24862R1	59556	019-90004-676	PLATE, Damper	3
3	89346	691044C1	59556	019-90004-677	BOLT, Hex Head, 1/2 NC x 1-1/2 inch	1
4	89346	677781C91	59556	019-90004-678	KEY, Woodruff, 5/16 x 1 inch	1
5	89346	687024C1	59556	019-90004-679	DAMPER, Vibration	1
6	89346	1802393C91	59556	019-90004-680	WASHER, Seal	1
7		NSS			PULLEY, W/Sleeve, Crankshaft (Includes No. 7)	1
8	89346	687024C1	59556	019-90004-682	SLEEVE	1
9	89346	675364C1	59556	019-90004-683	RING, Retaining	1
10	89346	675406C1	59556	019-90004-684	SPLINE, Oil Pump Drive	1
11	89346	17135R1	59556	019-90004-685	GEAR, Crankshaft	1
12	89346	681319C92	59556	019-90004-686	PIN, Roll	1
13	89346	684570C92	59556	019-90004-687	CRANKSHAFT, W/Bearing Assembly, (Includes Item Nos. 13, 14, and 23)	6
	89346	684573C92	59556	019-90004-688	BEARING, Crankshaft, Front/Intermediate, Standard Set	6
	89346	687391C2	59556	019-90004-689	BEARING, Crankshaft, Front/Intermediate, .010 Undersized	6
	89346	684576C92	59556	019-90004-690	BEARING, Crankshaft, Front/Intermediate, .020 Undersized	6
14	89346	684579C91	59556	019-90004-691	BEARING, Crankshaft, Front/Intermediate, .030 Undersized BEARING, Crankshaft, Rear Standard	1

Group 11. Engine And Accessories  
 Figure E-59. Pistons, Connecting Rods, Flywheel, Crankshaft, and Main Bearings

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	684582C91	59556	019-90004-692	BEARING, Crankshaft, Rear Standard .010 Undersized	1
	89346	687394C1	59556	019-90004-693	BEARING, Crankshaft, Rear Standard .020 Undersized	1
	89346	684585C91	59556	019-90004-694	BEARING, Crankshaft, Rear Standard .030 Undersized	1
15	89346	61544H	59556	019-90004-695	GEAR, Ring	1
16	89346	683961C91	59556	019-90004-696	FLYWHEEL, With Ring Gear	1
17	89346	25279R1	59556	019-90004-697	BOLT, Hex Head, 1/2 NF x 2 inches	8
18	89346	652934C1	59556	019-90004-698	WASHER, Flat, 1/2 inch	8
19	89346	332303R1	59556	019-90004-699	GASKET, Rear Oil Seal	1
20	89346	691631C91	59556	019-90004-700	KIT, Crankshaft Wear Sleeve And Rear Oil Seal (No. 19)	1
21	89346	326874R1	59556	019-90004-701	RETAINER, Piston Pin	12
22	89346	1802581C91	59556	019-90004-702	KIT, Piston And Sleeve, (Includes Item Nos. 21, 27, and 28)	6
23	89346	1808059C91	59556	019-90004-703	PIN, Piston, Standard	6
	89346	1808060C91	59556	019-90004-704	PIN, Piston, .010 Undersized	6
	89346	1808061C91	59556	019-90004-705	PIN, Piston, .020 Undersized	6
	89346	1808062C91	59556	019-90004-706	PIN, Piston, .030 Undersized	6
24	89346	688923C91	59556	019-90004-707	ROD, Connecting	6
25	89346	676679C2	59556	019-90004-708	BOLT, Connecting Rod	12
26	89346	675006C1	59556	019-90004-709	BUSHING, Connecting Rod	6
27	89346	670675C1	59556	019-90004-710	PIN, Piston	6
28	89346	682720C1	59556	019-90004-711	SLEEVE, Cylinder	6

Group 11. Engine And Accessories  
 Figure E-59. Pistons, Connecting Rods, Flywheel, Crankshaft, and Main Bearings

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
29	89346	687429C91	59556	019-90004-712	SET, Piston Ring	1

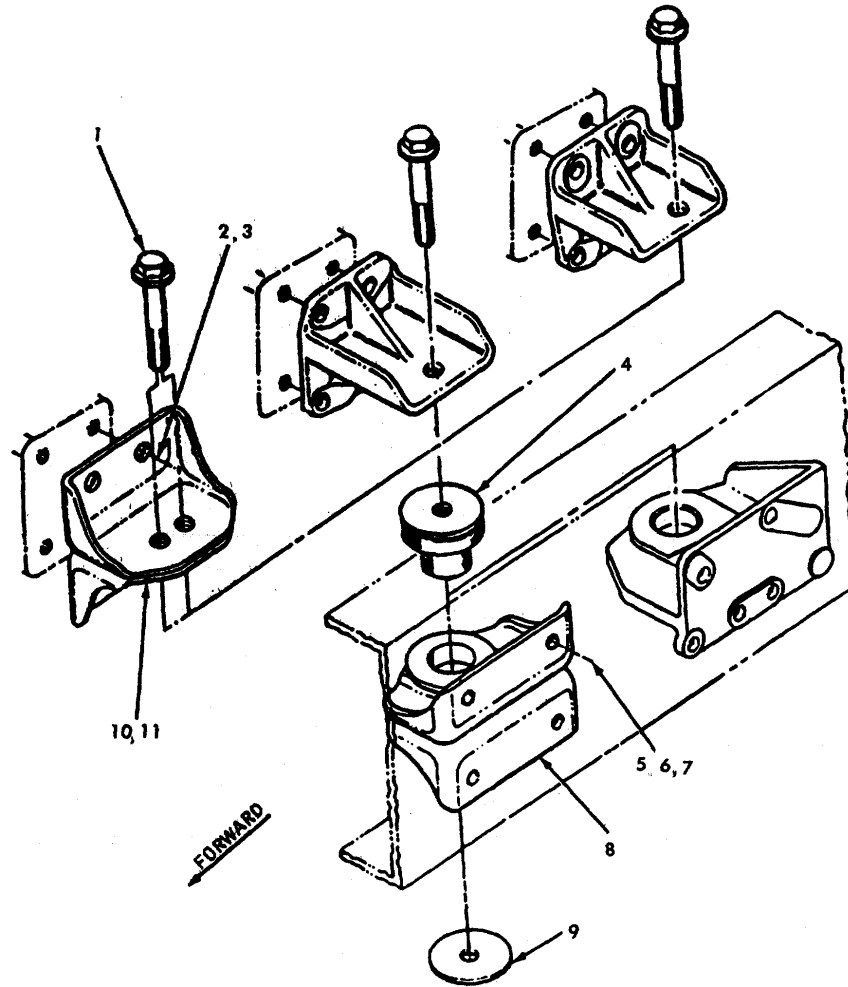


GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-60. FRONT ENGINE MOUNTING

Group 11. Engine And Accessories  
Figure E-60. Front Engine Mounting

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	414052C1	59556	018-90005-12	CROSSMEMBER, ENGINE MOUNTING FRONT ASSEMBLY	8
2	89346	414087C1	59556	018-90005-13	BOLT, Flange Hex Head, 1/2-20 UNRF x 1-1/2 inch	8
3	89346	25340R1	59556	018-90005-14	NUT, Hex, 1/2-20 UNF	2
4	89346	24875R1	59556	018-90005-15	BOLT, Hex Head, 5/8-11 UNC x 3-1/4 inch	2
5	89346	25711R1	59556	018-90005-16	BOLT, Hex Head, 5/8-11 UNC x 2 inches	4
6	89346	463526C1	59556	018-90005-17	WASHER, Flat Hardened, 5/8 inch	1
7	89346	471640C2	59556	018-90005-18	BRACKET, Engine Front Mounting	1
8	89346	492077C2	59556	018-90005-19	BRACKET, Crossmember Mounting, Left	1
9	89346	286234C2	59556	018-90005-20	CROSSMEMBER, Engine Front Mounting	1
10	89346	428997C1	59556	018-90005-21	RETAINER, Insulator, Engine Mounting	1
11	89346	9412230	59556	018-90005-22	BOLT, Flange Hex Head, 1/2 x 20 x 4-3/4 inch	2
12	89346	286235C2	59556	018-90005-23	NUT, Leck, 1/2-13 UNC	1
13	89346	371623C2	59556	018-90005-24	INSULATOR, Engine Mounting Lower	2
14	89346	286236C2	59556	018-90005-25	SPACER, Pipe	1
15	89346	414052C1	59556	018-90005-26	INSULATOR, Engine Mounting Upper	8
16	89346	414087C1	59556	018-90005-27	BOLT, Flange Hex Head, 1/2-20 UNF x 1-1/2 inch	8
17	89346	471641C2	59556	018-90005-28	NUT, Flange Hex, 1/2-20 UNF	1
					BRACKET, Crossmember Mounting Right	

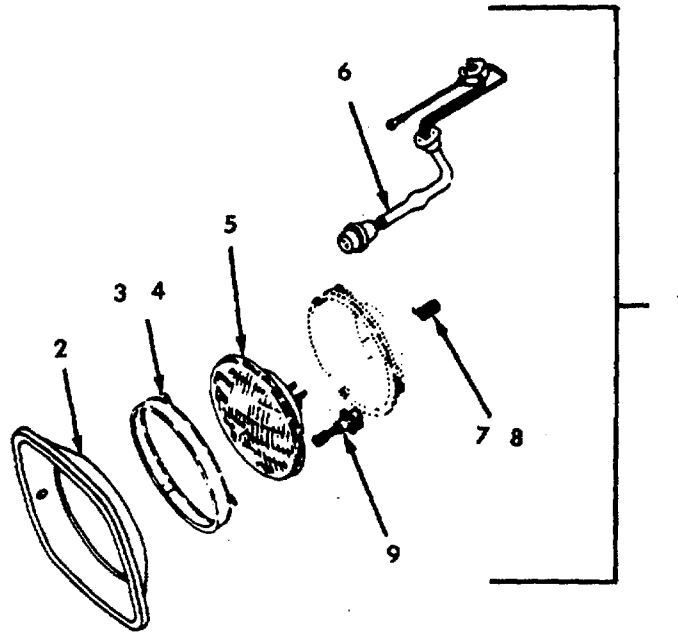




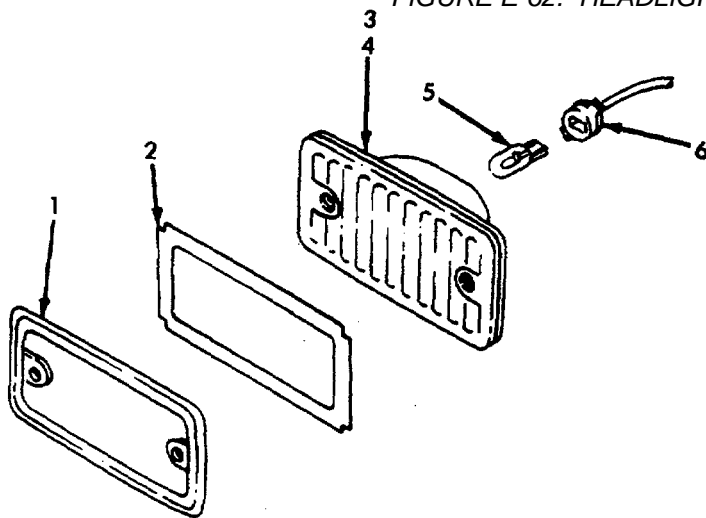
GROUP 11. ENGINE AND ACCESSORIES  
FIGURE E-61. REAR ENGINE MOUNTING

Group 11. Engine And Accessories  
 Figure E-61. Rear Engine Mounting

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	414085C1	59556	018-90005-1	BRACKET ASSEMBLY, ENGINE MOUNTING REAR BOLT, Flange Hex Head, 5/8-18 UNRF x 3-3/4 inch	2
2	89346	24862R1	59556	018-90005-2	BOLT, Hex Head, 1/2-13 UNC x 1-1/2 inches	8
3	89346	25710R1	59556	018-90005-3	WASHER, Flange, 1/2 inch	8
4	89346	479237C1	59556	018-90005-4	INSULATOR, Engine	2
5	89346	414055C1	59556	018-90005-5	BOLT, Flange Hex Head, 1/2-20 UNRF x 2-1/4 inches	2
6	89346	414052C1	59556	018-90005-6	BOLT, Flange Hex Head, 1/2-20 UNRF x 1-1/2 inch	6
7	89346	414087C1	59556	018-90005-7	NUT, Flange Hex Head, 1/2-20 UNF	8
8	89346	479387C1	59556	018-90005-8	BRACKET, Frame Rear Engine	2
9	89346	5/8T	59556	MS35338-21	WASHER, Flange	2
10	89346	473975C1	59556	018-90005-10	BRACKET, Rear Engine Left	1
11	89346	479376C1	59556	018-90005-11	BRACKET, Rear Engine Right	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-62. HEADLIGHTS



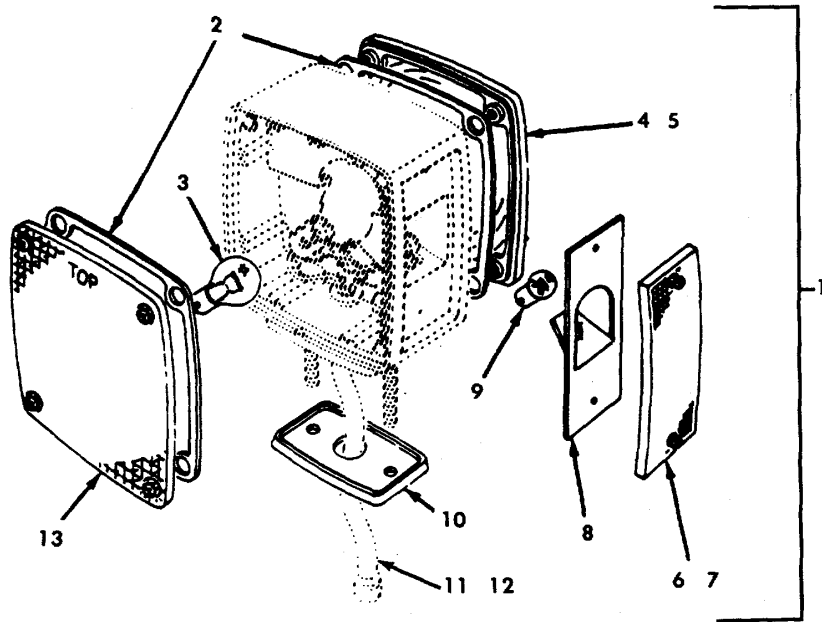
GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-63. FRONT CLEARANCE LIGHTS

GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

Figure E-62. Headlights

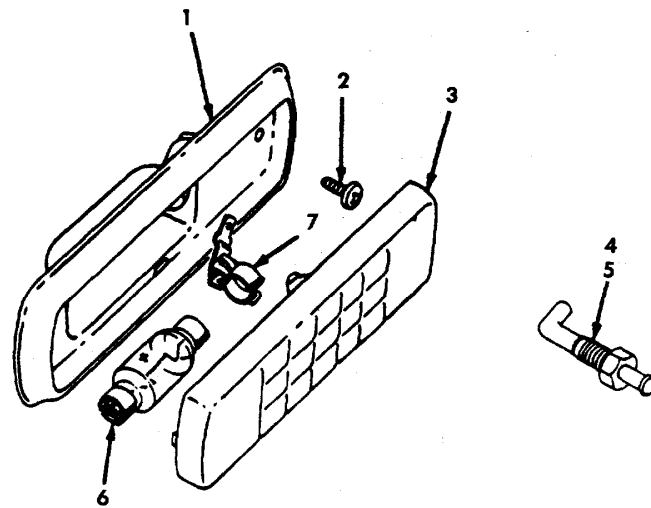
Figure E-63. Front Clearance Lights

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-62						
1	89346	465458C91	59556	080-90016-150	HEADLIGHT ASSEMBLY	1
2	89346	586277C1	59556	080-90016-151	HEADLIGHT ASSEMBLY, (Includes Item Nos. 5,6, and Mounting Ring)	2
3	89346	466857C1	59556	080-90016-152	HEADLIGHT, Bezel	1
4	89346	24329R1	59556	080-90016-153	RETAINER, Seal Beam	3
5	89346	5962548	59556	080-90016-154	SCREW, Retaining	1
6	89346	572979C91	59556	080-90016-155	LAMP, Headlight No.6014	1
7	89346	450157C2	59556	080-90016-156	HARNES, Headlight	2
8	89346	160541	59556	080-90016-157	SPRING, Headlight	2
9	89346	469540C2	59556	080-90016-158	SCREW, Filler Cross Recessed Head 1/4 NC	2
E-63						
1	89346	463576C2	59556	080-90016-159	CLEARANCE LIGHT	1
2	89346	487621C1	59556	080-90016-160	BEZEL, Marker Light	1
3	89346	451677C92	59556	080-90016-161	SEAL, Marker Light	1
4	89346	27196R1	59556	080-90016-162	LIGHT, W/Lens, Cab Marker	5
5	89346	26617R1	59556	080-90016-163	SCREW, Pan Cross Recessed Head, Tap	1
6	89346	470184C91	59556	080-90016-164	LAMP, 3 Candlepower	1
					HARNES	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-64. FRONT TURN SIGNAL LIGHTS



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

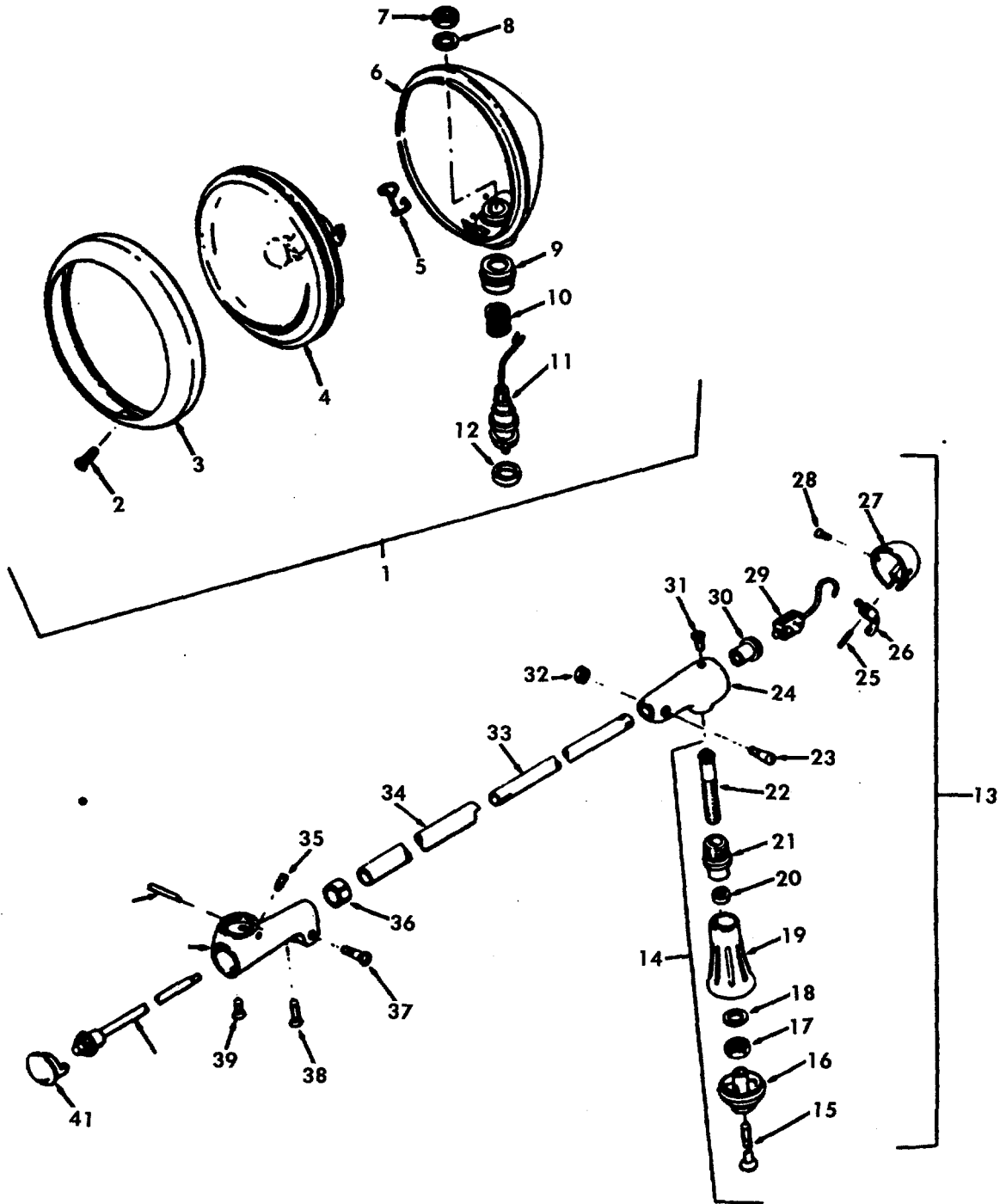
FIGURE E-65. CAB DOME LIGHTS

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators  
 Figure E-64. Front Turn Signal Lights  
 Figure E-65. Cab Dome Lights

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-64						
1	89346	517263C91	59556	080-90016-165	LIGHT ASSEMBLY, W/Lens And Lamp, Left and Right	1
2	89346	455531C1	59556	080-90016-166	GASKET, Lens	4
3	89346	9417866	59556	080-90016-167	LAMP, 32 Candlepower	2
4	89346	455529C1	59556	080-90016-168	LENS, Turn Signal and Parking, Red	1
5	89346	26502R1	59556	080-90016-169	SCREW, Cross Recessed Head, No. 32 x 3/4 inch	16
8-						
6	89346	455528C1	59556	080-90016-170	LENS, Side Marker, Amber	2
7	89346	26502R1	59556	080-90016-171	SCREW, Cross Recessed Head, No. 8-32 x 3/4 inch	8
8	89346	455532C1	59556	080-90016-172	GASKET, Side Marker Lens	2
9	89346	152240	59556	080-90016-173	LAMP, Side Marker	2
10	89346	449038C1	59556	080-90016-174	PAD, Light Mounting	2
11	89346	483240C91	59556	080-90016-175	CABLE, Turn Signal	1
12	89346	572979C91	59556	080-90016-176	HARNESS, Front End	1
13	89346	460768C1	59556	080-90016-177	LENS, Turn Signal and Parking, Amber	1
E-65						
1	89346	463179C1	59556	080-90016-178	CAB DOME LIGHTS BASE, Dome Lamp	1
2	89346	26282R1	59556	080-90016-179	SCREW, Pan Head Cross Recessed, Tap, No.6-20 x 3/4 inch	2
3	89346	296446C1	59556	080-90016-180	LENS, Dome Light	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators  
 Figure E-64. Front turn Signal Lights  
 Figure E-65. Cab Dome Lights

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
4	89346	485588C1	59556	080-90016-181	SWITCH, Door Jam	1
5	89346	27198R1	59556	080-90016-182	SCREW, Tap, No.10-16 x 5/8 inch	2
6	89346	294436C1	59556	080-90016-183	LAMP, 12 Candlepower	1
7	89346	300853C1	59556	080-90016-184	TERMINAL, C1ip	2



GROUP 12. CAB ASEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-66. CAB SPOTLIGHTS



Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

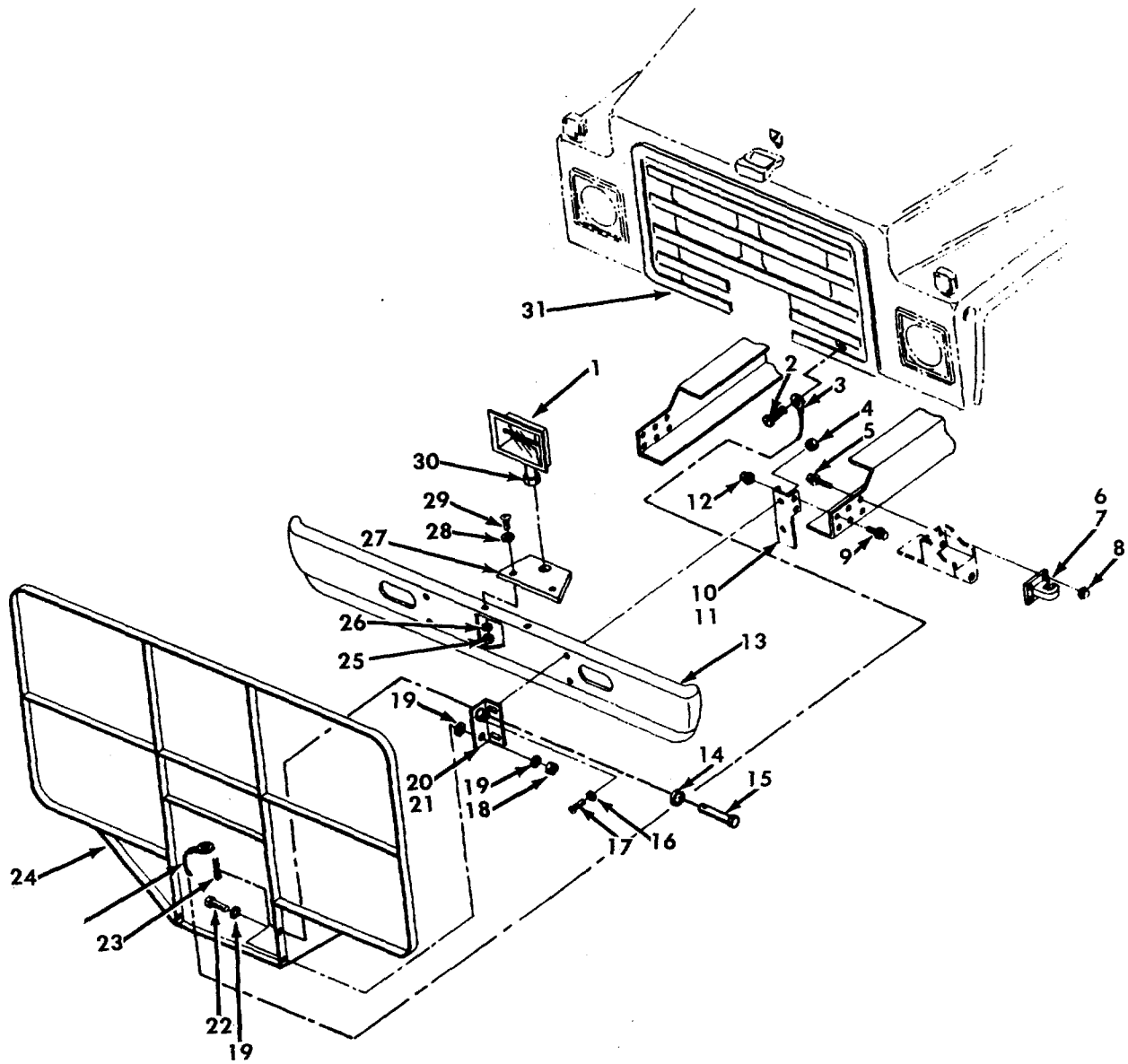
Figure E-66. Cab Spotlights

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	79877	225B	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	MS18005-4530	59556	MS18005-4530	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

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-66. Cab Spotlights

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	78977	6123	59556	151-00007-22	BUSHING, Tube	
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
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	6141B	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 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES,  
CONTROLS, AND INDICATORS

FIGURE E-67. QUARTZ LIGHT, FRONT BUMPER, AND GRILLE

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

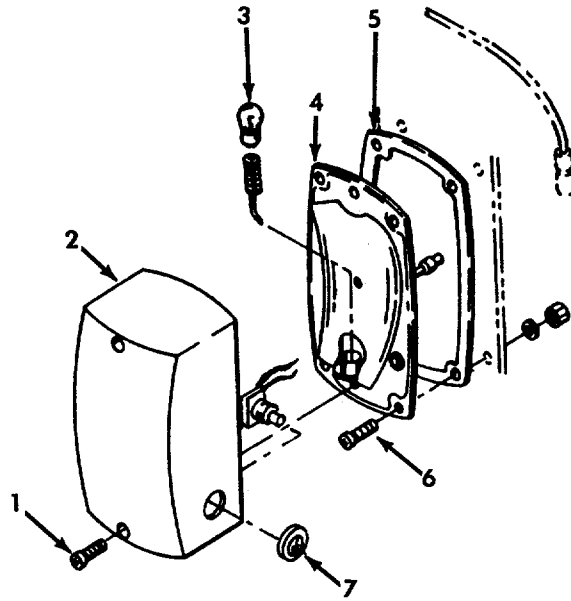
Figure E-67. Quartz light, front Bumper, and Grille

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	78977	305	59556	002-90002-1	FRONT BUMPER ASSEMBLY LIGHT ASSEMBLY, Quartz, See Figure Page , For Detailed Break- down	REF 1
2	89346	588200C1	59556	002-90002-2	SCREW, 1/4-20 x 1 inch, Black	2
3	59556	002-90002-3	59556	002-90002-3	CABLE, Pigtail	2
4	89346	9412230	59556	002-90002-4	NUT, Hex, Locking, 1/2-13 UNC	4
5	89346	414057C1	59556	002-90002-5	BOLT, Flange, Hex Head, 1/2-20 UNRF x 2-3/4 inch	4
6	89346	473210C1	59556	002-90002-6	HOOK, Towing, Left	1
7	89346	492825C1	59556	002-90002-7	HOOK, Towing, Right	1
8	89346	414087C1	59556	002-90002-8	NUT, Flange, Hex Head, 1/2-20 UNF	12
9	89346	414052C1	59556	002-90002-9	BOLT, Flange, Hex Head, 1/2-20 UNRF x 1-1/4	4
10	89346	573941C1	59556	002-90002-10	BRACKET, Bumper, Mounting, Left	1
11	89346	573943C1	59556	002-90002-11	BRACKET, Bumper, Mounting, Right	1
12	89346	414087C1	59556	002-90002-12	NUT, Flange, Hex Head, 1/2-20 UNF	12
13	59556	KFT-010	59556	KFT-010	BUMPER, Front	1
14	----	COML			WASHER,	2
15	----	COML			PIN,	2
16	89346	25710R1	59556	002-90002-13	WASHER, Hardened	4
17	89346	22741R1	59556	002-90002-14	BOLT, Hex Head, 1/2-13 UNC x 1-1/4 inch	4
18	----	COML			NUT, Hex Head, 1/2 inch	2
19	----	COML			WASHER, Locking, 1/2 inch	2

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-67. . Quartz light, front Bumper, and Grille

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	59556	KFT-0031L	59556	KFT-003-1L	BRACKET, Mounting, Brush Guard, Left	1
21	59556	KFT-003-1R	59556	KFT-0031R	BRACKET, Mounting, Brush Guard, Right	1
22	----	COML			BOLT, 1/2 inch x 1-3/4 inch	2
23	----	COML			PIN, Spring	2
24	59556	KFT-003	59556	KFT-003	GUARD, Brush	1
25	----	COML			NUT, 1/2-13	2
26	----	COML			WASHER, Lock, 1/2 inch	2
27	59556	KFT-010-4	59556	KFT-010-4	BRACKET, Light	1
28	----	COML			WASHER, Flat, 1/2 inch	2
29	----	COML			BOLT, 1/2-13 x 1-1/2 inch	2
30	----	COML			NUT, 1/2 inch (Electrical Threads)	1
31	59556	KFT-011	59556	KFT-011	GRILLE	1



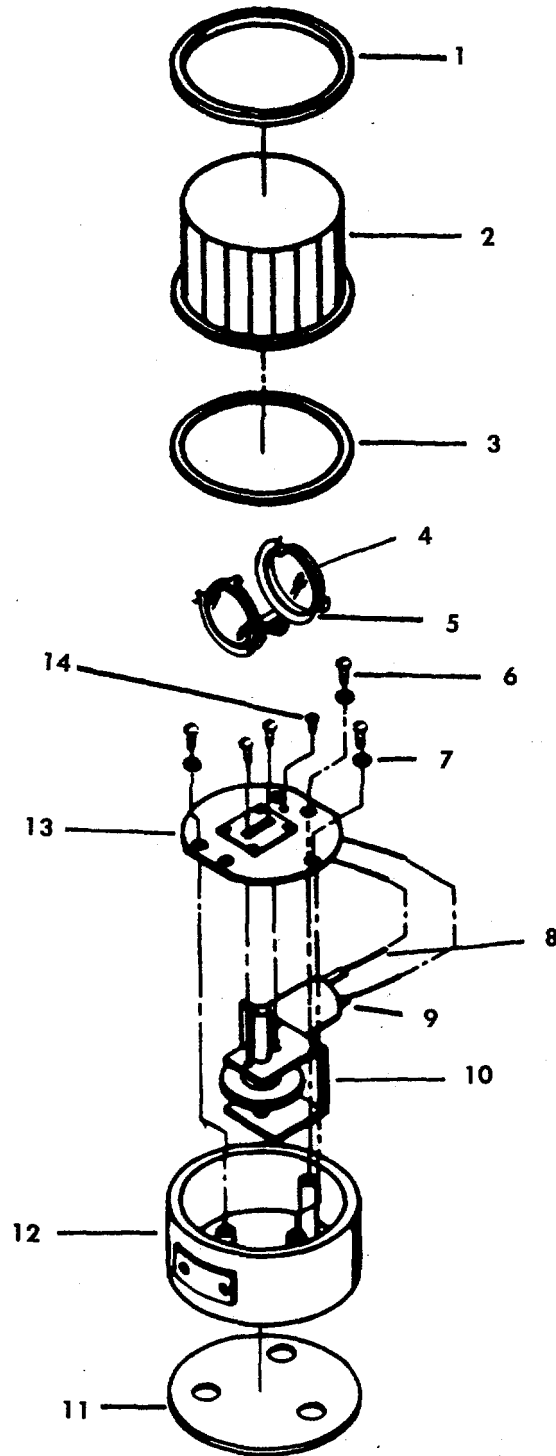
GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES,  
CONTROLS, AND INDICATORS

FIGURE E-68. ENGINE COMPARTMENT LIGHT

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-68. Engine Compartment Lights

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	12662	391	59556	156-00002	LAMP ASSEMBLY	1
2	12662	306331	59556	156-00002-1	SCREW	2
3	12662	39125	59556	156-00002-2	LENS	1
4	12662	1141	59556	156-00002-3	BULB	1
5	12662	39199	59556	156-00002-4	HOUSING	1
6	12662	306242	59556	156-00002-5	GASKET	1
7	12662	43032	59556	156-00002-6	SCREW	4
	12662	39034	59556	156-00002-7	NUT	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

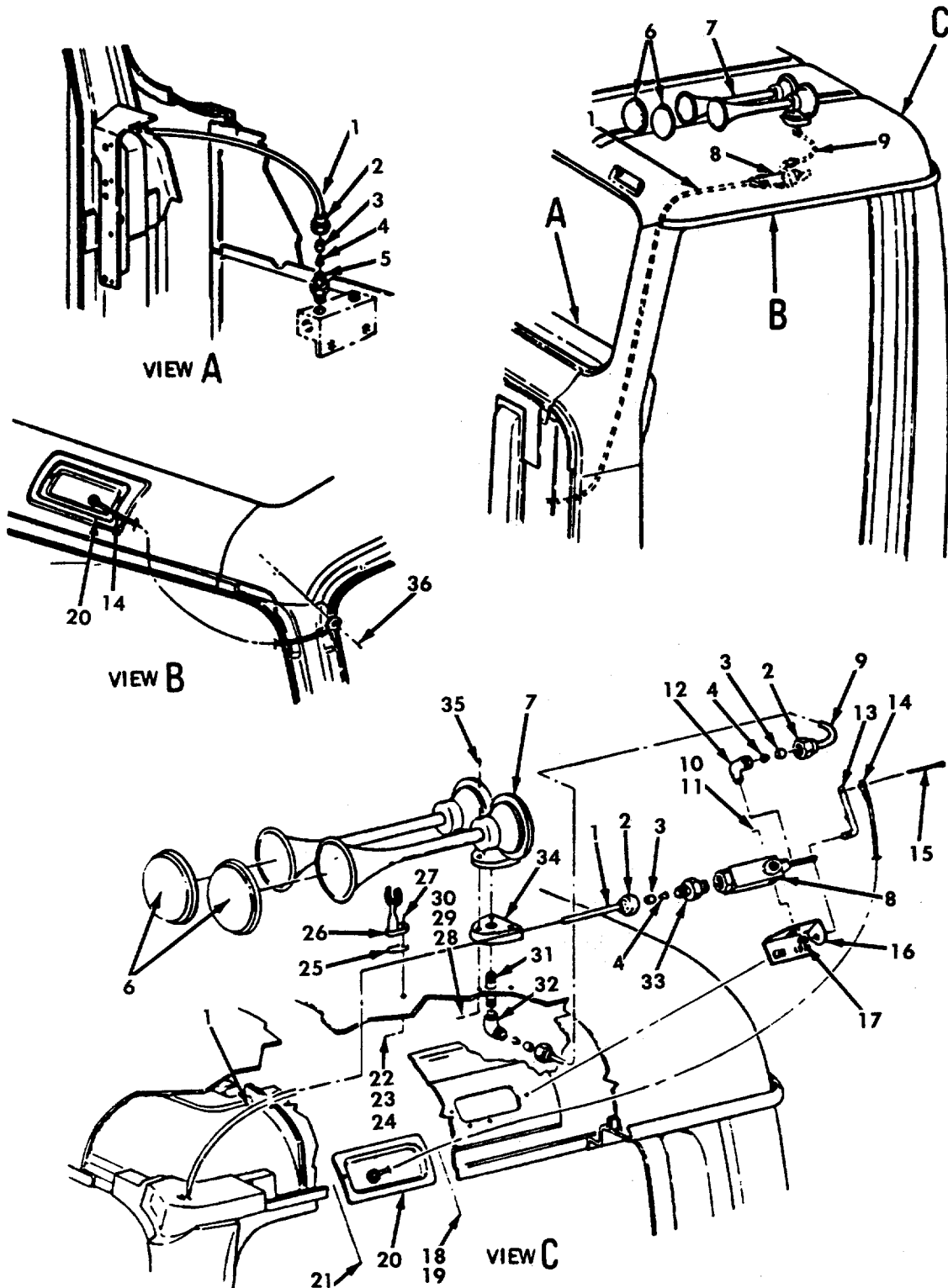
FIGURE E-69. ROOF WARNING LIGHT



Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-69. Roof Warning Lights

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	76123	SW2-RC	59556	152-00011	ROOF WARNING LIGHT ASSEMBLY, Rotating	REF
1	76123	SW-24C	59556	152-00011-1	RETAINER, Chrome	1
2	76123	SW-25R	59556	152-00011-2	DOME, Red	1
3	76123	SW-26	59556	152-00011-3	GASKET, Lens	1
4	76123	21-9	59556	152-00011-4	BULB	2
5	76123	SW-20	59556	152-00011-5	TWO LAMP HOLDER KIT, W/O Bulb	1
6	76123	SHX-NG-P	59556	152-00011-6	SCREW	4
7	76123	WIS-IA-P	59556	152-00011-7	WASHER	4
8	76123	CR-18-4	59556	152-00011-8	CONDUCTOR	2
9	76123	TRG-AB-1	59556	152-00011-9	TERMINATOR	2
10	76123	SW-9	59556	152-00011-10	MOTOR ASSEMBLY	1
11	76123	SW-15	59556	152-00011-11	GASKET, Roof	1
12	76123	SW-14C	59556	152-00011-12	BASE, Chrome	1
13	76123	SW-5	59556	152-00011-13	PLATE, Main	1
14	76123	RST-AB-A	59556	152-00011-14	RIVET	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-70. AIR HORNS

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

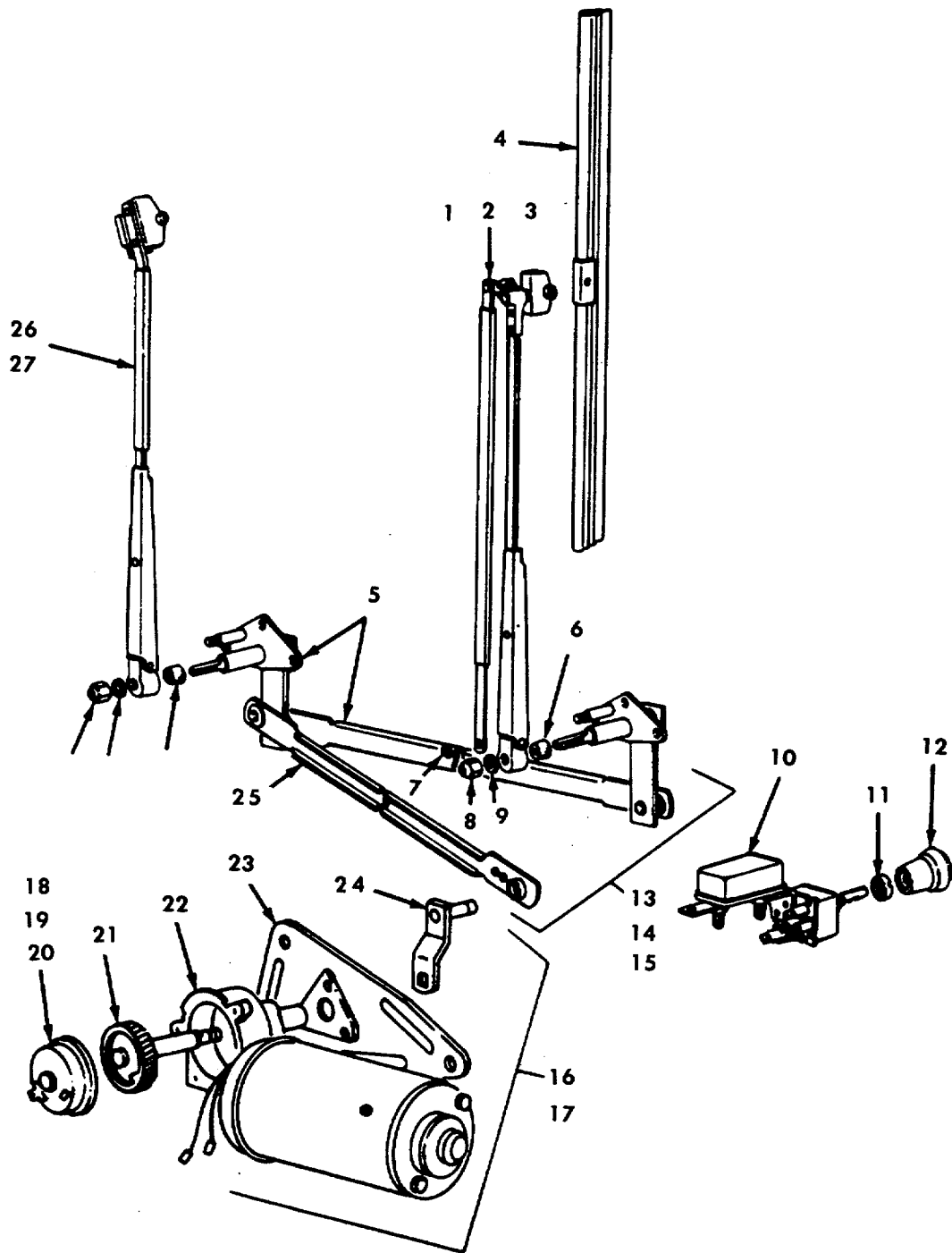
Figure E-70. Air Horns

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	417196C2	59556	080-90016-451	HORN ASSEMBLY, Mounting Dual Air TUBING, 1/4 Outside Diameter, 65 inches Long	1
2	89346	30773V	59556	080-90016-452	NUT, 1/4 inch, Spherical Sleeve	4
3	89346	30774V	59556	080-90016-453	SLEEVE, Tubing, 1/4 inch	4
4	89346	414504C2	59556	080-90016-454	INSERT, Tubing, 1/4 inch	4
5	89346	30775VX	59556	080-90016-455	CONNECTOR, Tubing, 1/4 x 7/16 inch	2
6	89346	422054C1	59556	080-90016-456	SHIELD, Slow Air Horn	2
7	89346	244283R91	59556	080-90016-457	HORN, Air Dual	1
8	89346	682506R91	59556	080-90016-458	VALVE, Air Horn, Cab Mounted	1
9	89346	417196C2	59556	080-90016-459	TUBING, 1/4 Outside Diameter, 15 inches Long	1
10	89346	27162R1	59556	080-90016-460	SCREW, Pan Head, No. 10-24 x 1-1/2 Type D	2
11	89346	3/16R	59556	MS35338-43	WASHER, Lock, No. 10	2
12	89346	141966H	59556	080-90016-462	ELBOW, Tubing, 1/4 x 1/8 inch	1
13	89346	308607C1	59556	080-90016-463	LEVER, Horn Valve, Operating	1
14	89346	384629C1	59556	080-90016-464	CABLE, Horn, V-Pull	1
15	89346	1/8x3/4P	59556	080-90016-465	PIN, Cotter, 1/8 x 3/4 inch Long	1
16	89346	403405C1	59556	080-90016-466	BRACKET, Mounting Air Horn Valve	1
17	89346	30499R1	59556	080-90016-467	RING, Retaining	1
18	89346	27004R1	59556	080-90016-468	SCREW, Pan Head, No. 10-24 x 1/2 inch, Type D	2
19	89346	3/16R	59556	MS35338-43	WASHER, Locking, No. 10	2
20	89346	466776C1	59556	080-90016-470	COVER, Air Horn Valve	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-70. Air Horns

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	166991	59556	080-90016-471	SCREW, Pan Head, No. 6-32 x 3/8 inch, Type D	2
22	89346	25519R1	59556	080-90016-472	NUT, Hex, 1/4-20	1
23	89346	53007H	59556	080-90016-473	REINFORCEMENT, Air Horn, Front Mounting	1
24	89346	1/4R	59556	MS35338-44	WASHER, Locking, 1/4 inch	1
25	89346	453481C1	59556	080-90016-475	SEAL, Pedestal	1
26	89346	784231C1	59556	080-90016-476	PEDESTAL	1
27	89346	26959R1	59556	080-90016-477	SCREW, Pan Head Cross, 1/4-20 x 1 inch, Stainless Steel	1
28	89346	25519R1	59556	080-90016-478	NUT, Hex, 1/4-20	3
29	89346	25707R1	59556	080-90016-479	WASHER, Plain, 1/4 inch	3
30	89346	1/4R	59556	MS35338-44	WASHER, Locking, 1/4 inch	3
31	89346	144585	59556	080-90016-481	NIPPLE, Pipe, 1/8 x 1-3/8 inch	1
32	89346	91913R1	59556	080-90016-482	ELBOW, Tubing, 1/4 x 1/8 inch	1
33	89346	30775VX	59556	080-90016-483	CONNECTOR, Tubing, 1/4 x 7/16 inch	2
34	89346	272009C1	59556	080-90016-484	PAD, Dual Air Horn, Rear Mounting	1
35	89346	27227R1	59556	080-90016-485	SCREW, Pan Head Cross, 1/4-20 x 1-1/2 inch SST	3
36	89346	24392R1	59556	080-90016-486	SCREW, Pan Head Cross, No. 10-16 x 1/2 inch, Type AB	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-71. WINDSHIELD WIPERS AND MOTOR

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

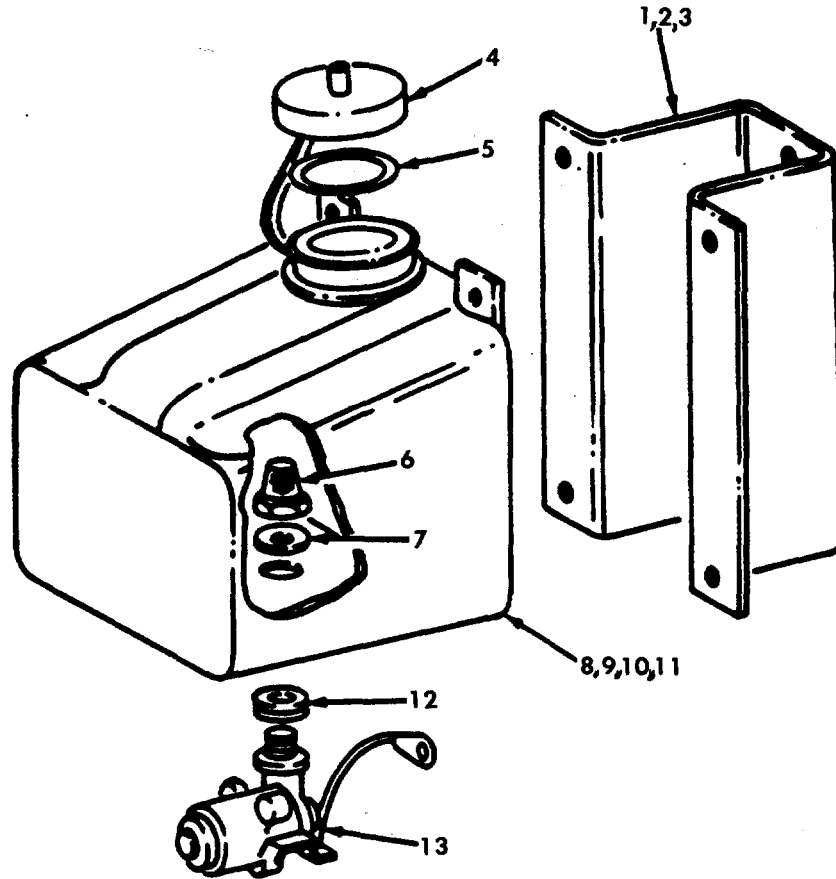
Figure E-71. Windshield Wipers and Motor

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	475923C91	59556	080-90016-185	WIPER ASSEMBLY	1
2	89346	582528C1	59556	080-90016-186	ARM, Wiper Left, W/O Latch-Lock NOZZLE, Wiper Left, W/Left Hand Drive	1
3	89346	494729C1	59556	080-90016-187	CLIP, Lock, On Auxiliary Arm Blade, Wiper	1
4	89346	475925C1	59556	080-90016-188	BLADE, Wiper	2
5	89346	508914C1	59556	080-90016-189	ARM, Pivot, W/Left Hand Drive	1
6	89346	966782R1	59556	080-90016-190	DRIVER, Knurled Arm, Pivot	2
7	89346	148194R1	59556	080-90016-191	CLIP, Wiper Body Pivot Arm, Wiper Left	1
8	89346	339544C1	59556	080-90016-192	NUT, Cap	2
9	89346	138542	59556	080-90016-193	WASHER, Lock	2
10	89346	470249C91	59556	080-90016-194	SWITCH, W/S Wiper	1
11	89346	363423C1	59556	080-90016-195	NUT, Mounting	1
12	89346	469858C1	59556	080-90016-196	KNOB, Switch	1
13	89346	508916C91	59556	080-90016-197	BODY, W/O Latch-Lock Feature	1
14	89346	25752R1	59556	080-90016-198	BOLT, Hex Head, 1/4 NF x 1/2 inch	6
15	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	6
16	89346	471496C12	59556	080-90016-200	MOTOR, W/S Wiper, Electrode	1
17	89346	25228R1	59556	080-90016-201	WASHER, Lock, 5/16 inch	3
18	89346	571276C1	59556	080-90016-202	COVER, W/Spring And Terminal	1
19	89346	26000R1	59556	080-90016-203	SCREW, Hex Head, No. 8-32 x 3/8 inch	3

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-71. Windshield Wipers and Motor

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	131015	59556	080-90016-204	WASHER, Flange, No. 10	3
21	89346	588811C1	59556	080-90016-205	GEAR	1
22		NSS			MOTOR	1
23		NSS			BRACKET	1
24	89346	491673C1	59556	080-90016-208	LEVER, Drive	1
25	89346	508915C1	59556	080-90016-209	ARM, Connector Drive, W/ Left Hand Drive	1
26	89346	475924C91	59556	080-90016-210	ARM, Wiper Right	1
27	89346	582529C1	59556	080-90016-211	NOZZLE, Wiper Right	1



GROUP 12. CAB ASEMBLY, LIGHTS, SWITCHES, GAUGES,  
CONTROLS, AND INDICATORS

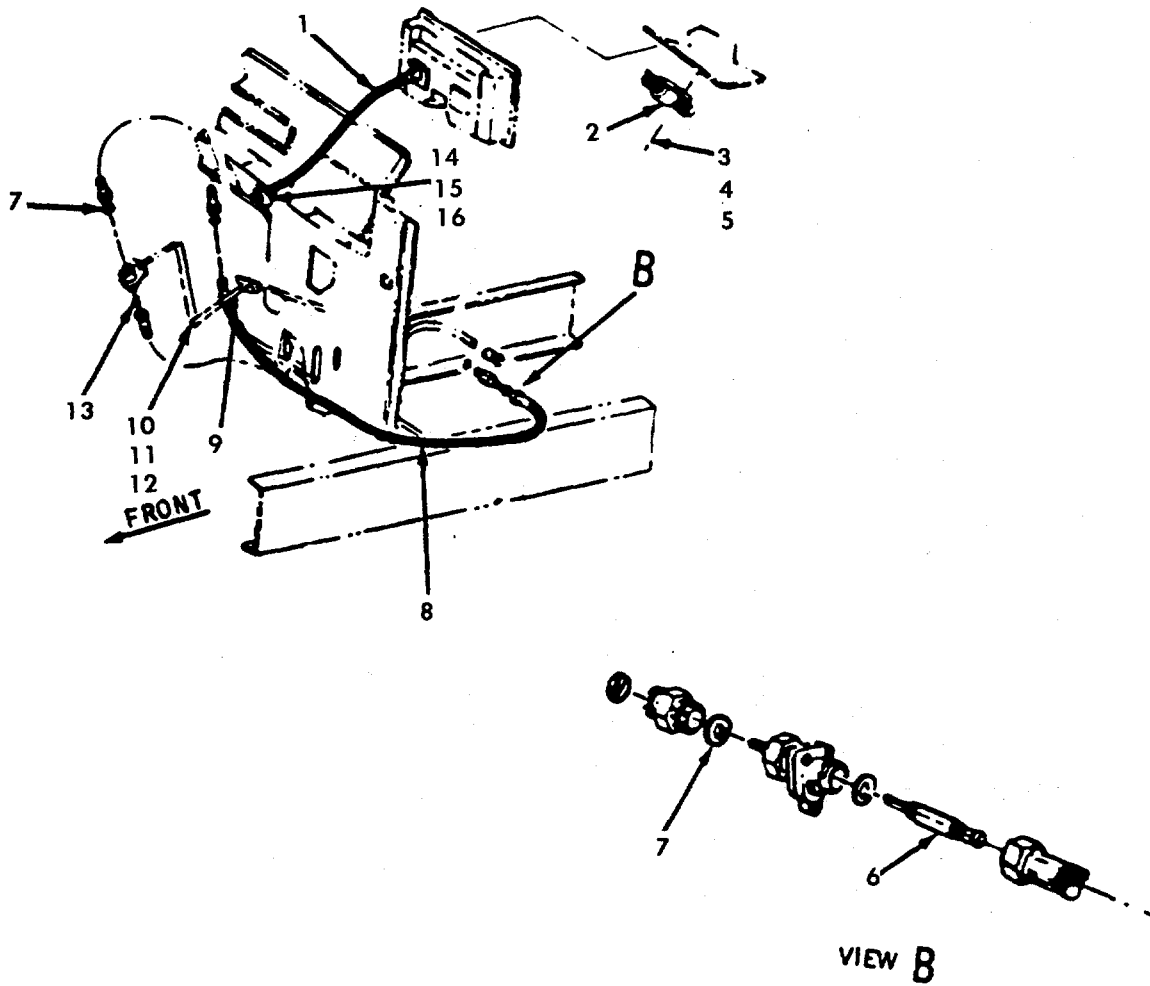
FIGURE E-72. WINDSHIELD WASHER



Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-72. Windshield Washers

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	488737C1	59556	080-90016-487	WASHER ASSEMBLY, Windshield	1
2	89346	25228R1	59556	080-90016-488	BRACKET, Washer Bottle	1
3	89346	5/16R	59556	MS35338-45	BOLT, Hex Head, 5/16 NC x 3/4 inch	2
4	89346	312690C91	59556	080-90016-490	WASHER, Locking, 5/16 inch	2
5	89346	404619C1	59556	080-90016-491	CAP, Reservoir	1
6	89346	404621C1	59556	080-90016-492	GASKET, Cap	1
7	89346	404620C1	59556	080-90016-493	FILTER, Tank	1
8	89346	394120C91	59556	080-90016-494	WASHER, Nylon	1
9	89346	167263	59556	080-90016-495	Tank, With Pump	1
10	89346	25707R1	59556	080-90016-496	BOLT, Hex Head, 1/4 NC x 3/4 inch	4
11	89346	1/4R	59556	MS35338-44	WASHER, Flat, 1/4 inch	4
12	89346	404617C1	59556	080-90016-498	WASHER, Locking, 1/4 Medium	4
13	89346	404618C1	59556	080-90016-499	GROMMET, Tank	1
					PUMP, Windshield Washer	1



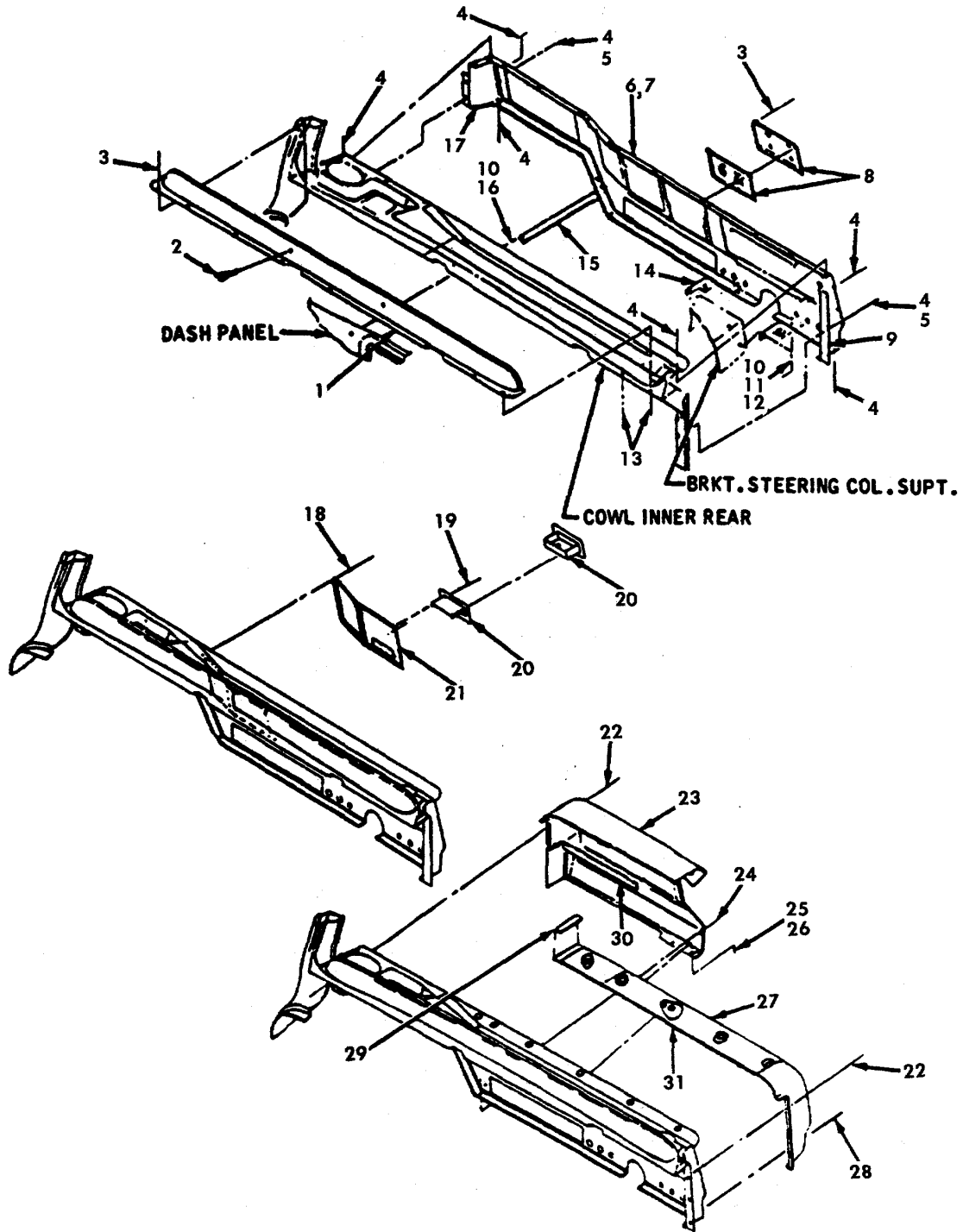
GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-73. SPEEDOMETER CABLE ASSEMBLY

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-73. Speedometer Cable Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	577729C91	59556	080-90016-500	CABLE, Speedometer Drive Assembly CABLE AND CORE, Speedometer, Type I, 25 inches	REF 1
2	89346	406381C1	59556	080-90016-501	CLAMP	1
3	89346	25222R1	59556	080-90016-502	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
4	89346	25519R1	59556	080-90016-503	NUT, Hex, 1/4-20 UNC	1
5	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 Medium	1
6	89346	343361C1	59556	080-90016-505	END, Cable, Floating Tip, .103 Square-Lower End, .126 Square-Upper End	AR
7	89346	491323C1	59556	080-90016-506	GASKET, Speedometer Cable	4
8	89346	385083C91	59556	080-90016-507	CABLE AND CORE, Speedometer, Type II, 60 inches	1
9	89346	406381C1	59556	080-90016-508	CLAMP	1
10	89346	25222R1	59556	080-90016-509	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
11	89346	25519R1	59556	080-90016-510	NUT, Hex, 1/4-20 UNC	1
12	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 Medium	1
13	89346	492816C1	59556	080-90016-512	GASKET, Speedometer Cable	1
14	89346	163303	59556	080-90016-513	SCREW, Pan Head, Cross-Recessed Tap 1/4-14 x 1/2 Type B	2
15	89346	480686C2	59556	080-90016-514	GROMMET, Speedometer Cable	1
16	89346	481366C1	59556	080-90016-515	RETAINER, Grommet	2



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-74. INSTRUMENT PANEL ASSEMBLY

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

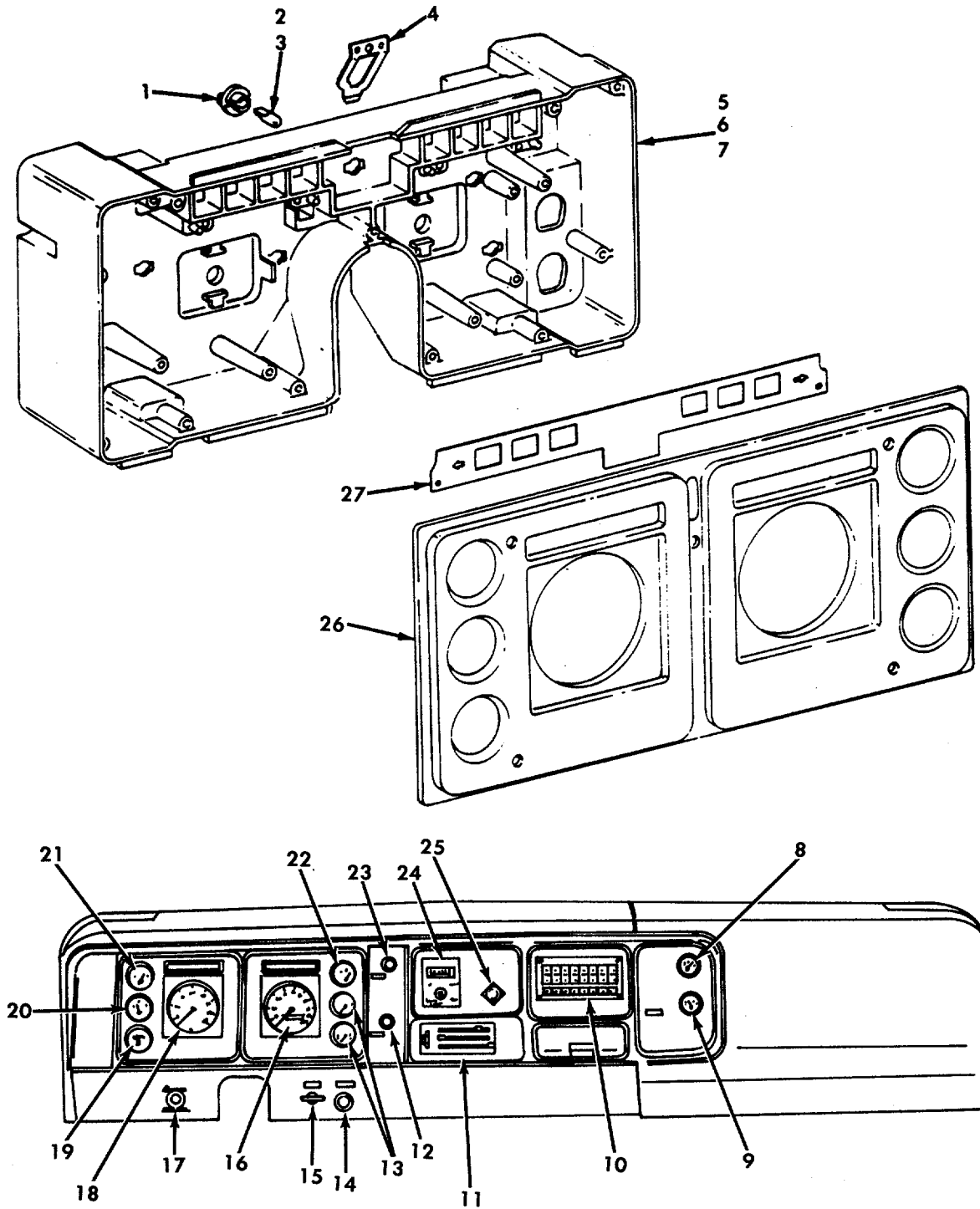
Figure E-74. Instrument Panel Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	452588C2	59556	080-90016-516	INSTRUMENT PANEL ASSEMBLY	1
2	89346	193176R1	59556	080-90016-517	PANEL, Defroster Duct	2
3	89346	24379R1	59556	080-90016-518	BUMPER, Windshield Retention	11
4	89346	24390R1	59556	080-90016-519	SCREW, Pan Head Cross, No.8-18 x 1/2 inch	31
5	89346	120391	59556	080-90016-520	SCREW, Pan Head Cross, No.10-16 x 1/2 inch	5
6	89346	489489C1	59556	080-90016-521	WASHER, Flat, No.10	1
7	89346	452944C1	59556	080-90016-522	FRAME, Instrument Panel	1
8	89346	451497C1	59556	080-90016-523	BRACE, Instrument Panel	1
9	59556		59556	080-90016-524	PANEL, C1uster	1
10	89346	1/4R	59556	MS35338-44	BRACKET, Instrument Panel, Left	6
11	89346	25707R1	59556	080-90016-526	WASHER, Locking, 1/4 inch	4
12	89346	25222R1	59556	080-90016-527	WASHER, Flat, 1/4 inch	4
13	89346	437693C1	59556	080-90016-528	BOLT, 1/4-20 x 3/4 inch	2
14	59556	080-90016-529	59556	080-90016-529	CAP, Tube	2
15	89346	466223C1	59556	080-90016-530	BRACE, Instrument Panel To Pedal Support	1
16	89346	25222R1	59556	080-90016-531	BRACE, Instrument Panel To Dash	2
17	59556		59556	080-90016-532	BOLT, 1/4-20 x 3/4 inch	1
18	89346	24379R1	59556	080-90016-533	BRACKET, Instrument Panel, Right	6
19	89346	27573R1	59556	080-90016-534	SCREW, Pan Head Cross, No.8-18 x 1/2 inch	3
					SCREW, Oval Head Cross Recessed, No. 6-20 x 1/2 inch	

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-74. Instrument Panel Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	481384C91	59556	080-90016-535	TRAY, Ash	1
21	89346	451498C1	59556	080-90016-536	PANEL, C1uster	1
22	89346	143309C1	59556	080-90016-537	SCREW, Pan Head Cross, Self Drive No. 10-16 x 1/2 inch	5
23	89346	490702C1	59556	080-90016-538	COVER, Instrument Panel, Right, Chestnut	1
24	89346	592559C1	59556	080-90016-539	SCREW, Self Drive, Tapping, No.10-16 x 3/4 inch	2
25	89346	120391	59556	080-90016-540	WASHER, Flat, No.10	1
26	89346	143309C1	59556	080-90016-541	SCREW, Pan Head Cross, Self Drive, No.10-16 x 1/2 inch	1
27	89346	490700C1	59556	080-90016-542	COVER, Instrument Panel, Left Chestnut	1
28	89346	27069R1	59556	080-90016-543	SCREW, Oval Cross Recessed Head, No.8-18 x 1 inch	2
29	89346	452885C1	59556	080-90016-544	SEAL, Instrument Panel	1
30	89346	996998R1	59556	080-90016-545	SEAL, Cover To Rear Cowl	1
31	89346	143309C1	59556	080-90016-546	SCREW, Pan Head Cross, Self Drive No.10-16 x 1/2 inch	8



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES,  
CONTROLS, AND INDICATORS

FIGURE E-75. INSTRUMENT CLUSTER

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-75. Instrument Cluster

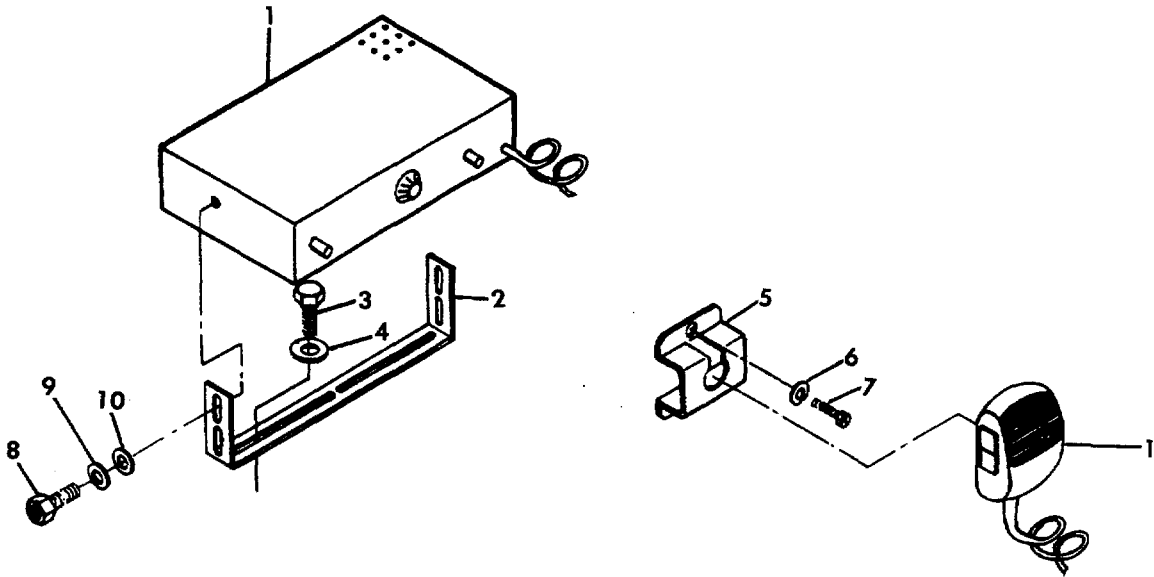
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	500724C1	59556	080-90016-212	INSTRUMENT PANEL CLUSTER ASSEMBLY	15
2	89346	20627R1	59556	080-90016-213	SOCKET, Lamp	9
3	89346	26617R1	59556	080-90016-214	LAMP, No.194	6
4	89346	478683C1	59556	080-90016-215	LAMP, No.168	1
5	89346	597617C91	59556	080-90016-216	CLIP, Speedometer And Tachometer	1
6	89346	571229C1	59556	080-90016-217	HOUSING, W/Electric Tachometer	1
7	89346	501811C1	59556	080-90016-218	CIRCUIT PRINTED	1
8	85925	15402	59556	086-00006	CLIP, Gauge Terminal	11
9	89346	486091C91	59556	086-00006	AMMETER	1
10	59556	410239	59556	080-90016-577	GAUGE, Transmission Temperature	1
11	59556	150-90002-0	59556	123-00047	SWITCH, Rocker Control Panel	1
12	89346	469858C1	59556	150-90002-0	CONTROL ASSEMBLY, Heater	REF
13	89346	478679C1	59556	080-90016-219	KNOB, Wiper/Washer	1
14	89346	490712C1	59556	080-90016-220	GAUGE, Air Pressure	2
15	89346	217555R92	59556	080-90016-221	KNOB, Vent Control	1
16	89346	534083C92	59556	080-90016-222	SWITCH, Engine Stop	1
17	89346	463032C91	59556	080-90016-223	SPEEDOMETER	1
18	89346	547866C91	59556	080-90016-224	SWITCH, Ignition	1
19	89346	478677C1	59556	080-90016-225	TACHOMETER	1
20	89346	478675C1	59556	080-90016-226	GAUGE, Volt Meter	1
21	89346	478676C1	59556	080-90016-227	GAUGE, Oil Pressure	1
				080-90016-571	GAUGE, Temperature	1



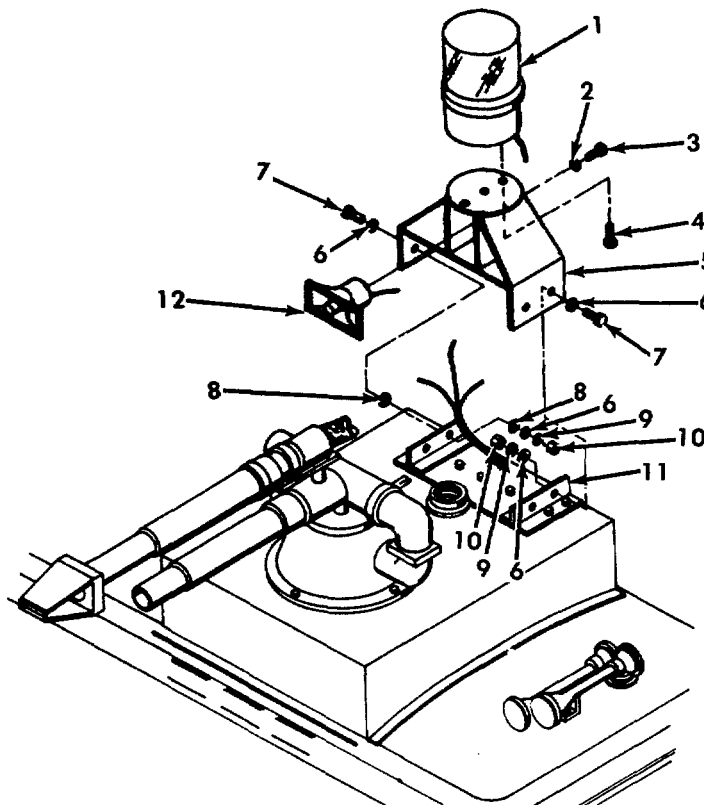
Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-75. Instrument Cluster

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	478678C1	59556	080-90016-572	GAUGE, Fuel	1
23	89346	393442C1	59556	080-90016-573	SWITCH, Headlight	1
24	57054	4-202	59556	123-00049	REMOTE, Inverter	1
25	89346	295417C91	59556	080-90016-574	SWITCH, Brake	1
26	89346	579618C1	59556	080-90016-575	BEZEL, Instrument Cluster	1
27	89346	504433C1	59556	080-90016-576	MASK	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-76. SIREN/PA SYSTEM



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-77. EXTERNAL SPEAKER INSTALLATION

group 12. cab assembly, lights, switches, gauges, controls, and indicators

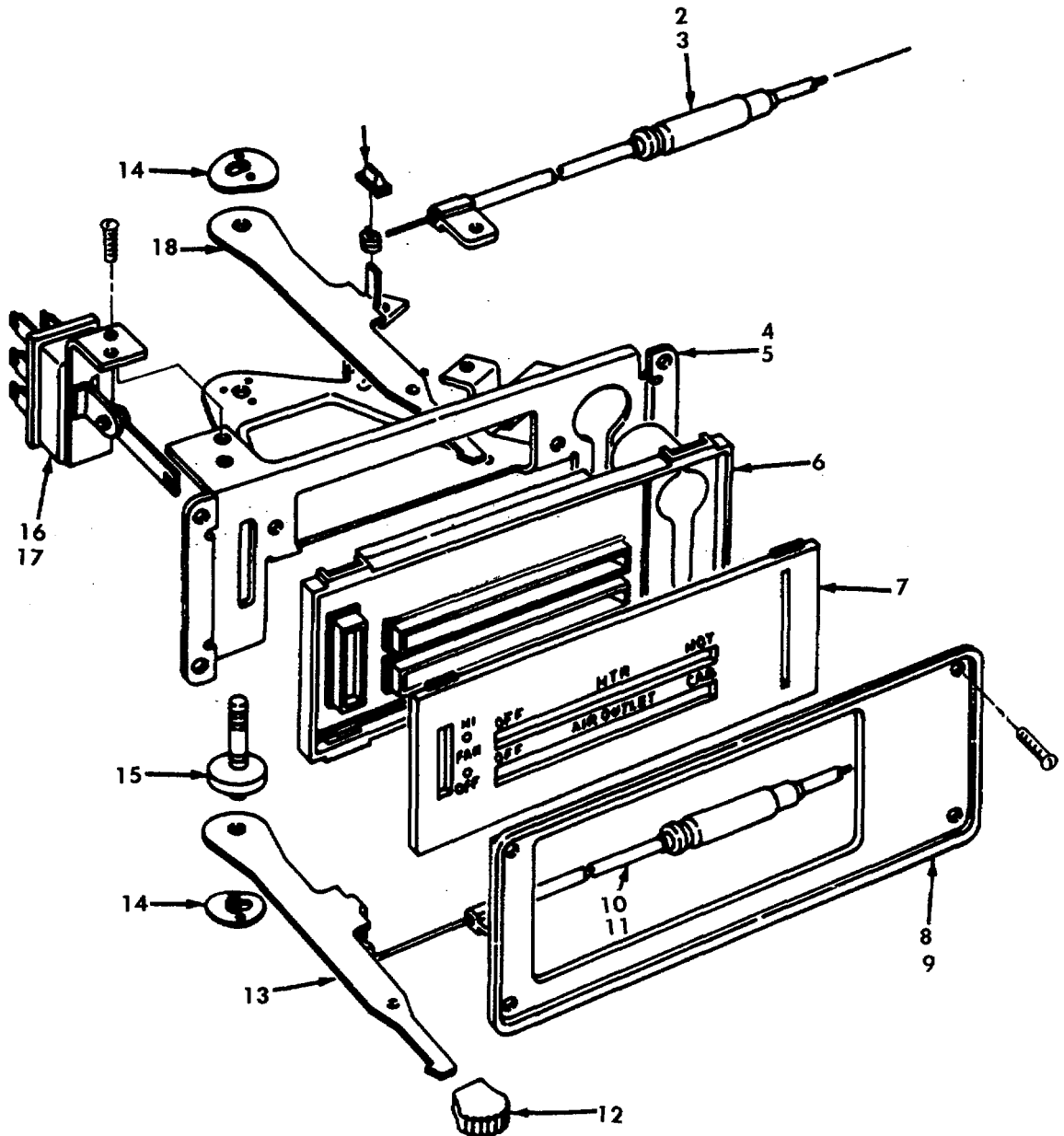
Figure E-76. Siren/PA System  
 Figure E-77. External Speaker Installation

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-76					SIREN/PA SYSTEM	REF
1	66461	3691	59556	125-00009	SIREN/PA SYSTEM ASSEMBLY	1
2	66461	S95003	59556	125-00009-1	BRACKET, Control Unit	1
3	----	COML			SCREW, Cap, 1/4-20 x 1 inch	2
4	----	COML			WASHER, Flat, 1/4 inch	2
5	----	COML			SCREW, 10-32 x 1/2 inch	2
6	----	COML			LOCKWASHER, 10-32	2
7	66461	T00631	59556	125-00009-2	BRACKET, Microphone	1
8	----	COML			BOLT, 1/4-20 x 1/2 inch	2
9	----	COML			LOCKWASHER	2
10	----	COML			WASHER, Flat	2
E-77					EXTERNAL SPEAKER	REF
1	76123	SW2-RC	59556	152-00011	LIGHT ASSEMBLY, Rotating	REF
2	----	COML			WASHER, Lock, 1/4 inch	1
3	----	COML			BOLT, 1/4 x 1/2 inch, Long	1
4	----	COML			BOLT, 1/2 x 2-1/4 inches Long	2
5	59556	KFT-007	59556	KFT-007	BRACKET, Light Mounting	1
6	----	COML			WASHER, Flat, 5/16 inch	8
7	----	COML			BOLT, 5/16 x 1 inch Long	4
8	----	COML			WASHER, Star, 5/16 inch	2
9	----	COML			WASHER, Lock, 5/16 inch	4

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-76. Siren/PA System  
 Figure E-77. External Speaker Installation

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
10	-----	COML				4
11	59556	125-90001	59556	125-90001	NUT, Hex, 5/16 inch	1
12	66461	PSE-58	59556	125-00010	BASE, Bracket SPEAKER, External	REF



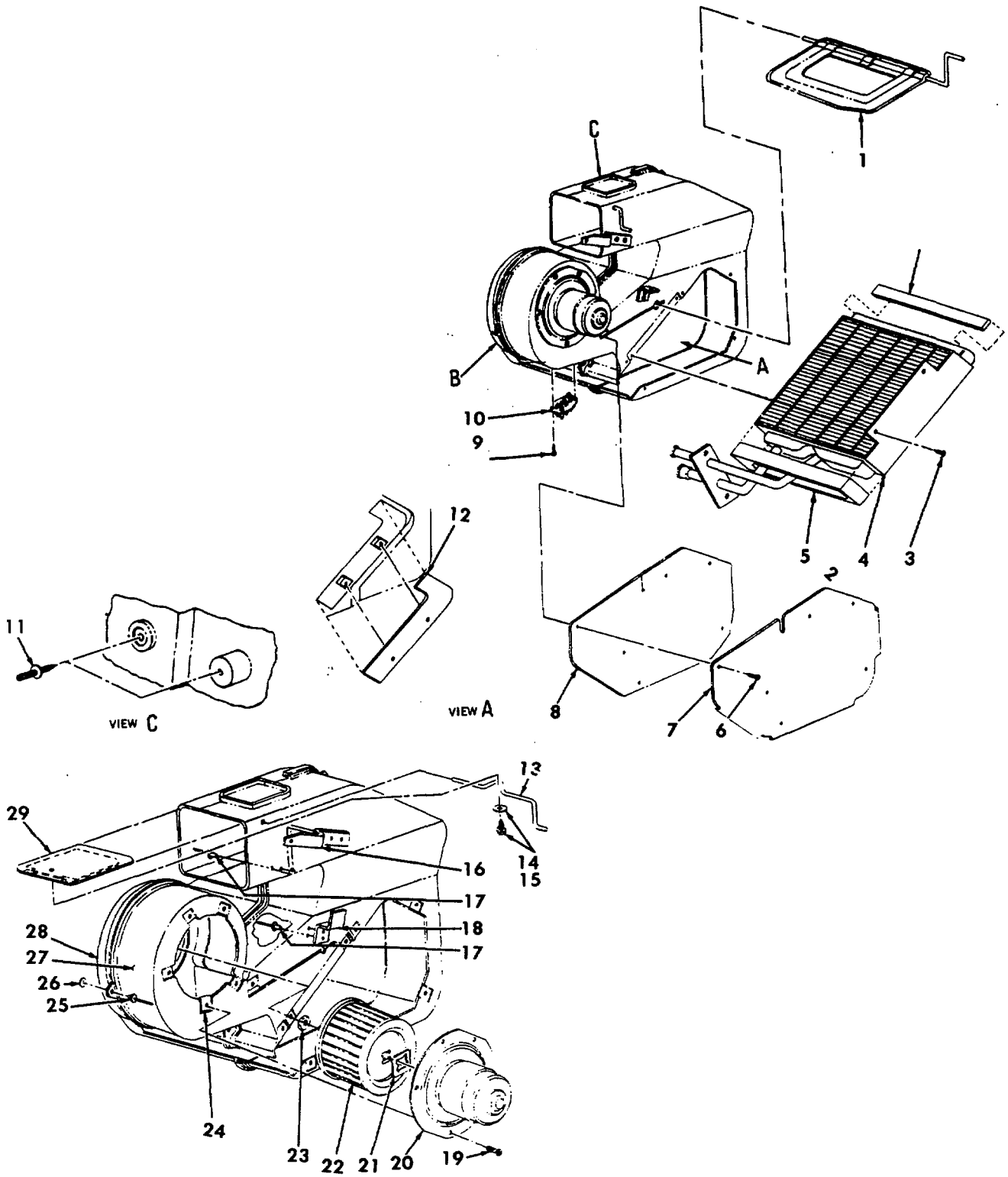
GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
 FIGURE E-78. HEATER CONTROL ASSEMBLY

(E-247 Blank)/ E-248

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-78. Heater Control Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	59556	150-90002-0	59556	150-90002-0	CONTROL ASSEMBLY, HEATER	2
2	89346	472236C1	59556	150-90002-1	NUT, Retaining	1
3	89346	24390R2	59556	150-90002-2	SCREW, Tap, Pan Cross Recessed Head No. 10-16 x 1/2 inch	1
4	89346	581717C1	59556	150-90002-3	CLIP, Cable Link	1
5	89346	472248C1	59556	150-90002-4	SUPPORT, Control	1
6	89346	24390R1	59556	150-90002-5	SCREW, Tap Pan Cross Recessed Head No. 10-16 x 1/2 inch	2
7	89346	472246C1	59556	150-90002-6	MASK, Light Reflector, W/Heater	1
8	89346	472241C1	59556	150-90002-7	PLATE, Light Diffuser, W/Heater	1
9	89346	472245C2	59556	150-90002-8	BEZEL, Control	1
10	89346	24379R1	59556	150-90002-9	SCREW, Tap Pan Cross Recessed Head No. 8-18 x 1/2 inch	4
11	89346	24390R1	59556	150-90002-10	SCREW, Tap Pan Cross Recessed Head No. 10-16 x 1/2 inch	1
12	89346	582727C1	59556	150-90002-11	CLIP, Cable Link	1
13	89346	474087C1	59556	150-90002-12	KNOB, Control Lever, Left Hand	2
14	89346	472219C1	59556	150-90002-13	LEVER, Air	1
15	89346	472244C1	59556	150-90002-14	CLIP, Spring Lever Retainer	2
16	89346	472240C1	59556	150-90002-15	PIN, Control Lever	1
17	89346	472253C1	59556	150-90002-16	SWITCH, Fan	1
18	89346	24390R1	59556	150-90002-10	SCREW, Tap Pan Cross Recessed Head No. 10-16 x 1/2 inch	2
	89346	472237C1	59556	150-90002-18	LEVER, Heater	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
 FIGURE E-79. HEATER ASSEMBLY

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-79. Heater Assembly

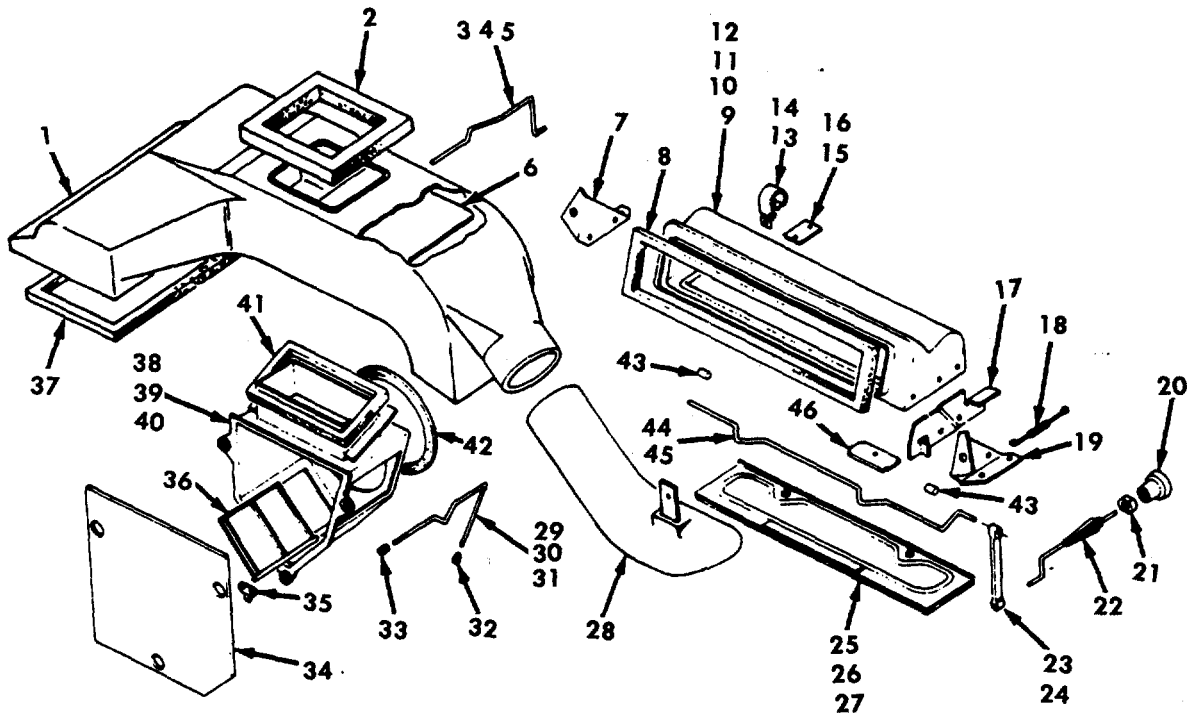
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	581699C1	59556	150-90002-19	HEATER ASSEMBLY	1
2	89346	2643342R1	59556	150-90002-20	DOOR, Blend Air	1
3	89346	24304R1	59556	150-90002-21	SEAL, Heater Core Top, 0.38 x 0.75 x 7.9 inches Long	4
4	89346	581702C1	59556	150-90002-22	SCREW, No.10-16 x 0.75	1
5	89346	480796C2	59556	150-90002-23	CORE, Heater	1
6	89346	24304R1	59556	150-90002-21	SEAL, Heater Core Bottom	6
7	89346	581-716C1	59556	150-90002-25	SCREW, No. 10-16 x 0.75	1
8	89346	581715C1	59556	150-90002-26	COVER, Access	1
9	89346	473146C1	59556	150-90002-27	SEAL, Heater Cover	2
10	89346	469458C1	59556	150-90002-28	SCREW, Hi-Lo, No. 10-16 x 1/2 inch	1
11	89346	454184C1	59556	150-90002-29	RESISTOR	4
12	89346	581712C1	59556	150-90002-30	STUD, Double End Hi-Lo	1
13	89346	585956C1	59556	150-90002-31	SEAL, Heater Core, Front	1
14	89346	24392R1	59556	015-90005-30	ROD, Defroster, Door	1
15	89346	25707R1	59556	039-00013-51	SCREW, Pan Head Cross Recessed, No. 10-16 x 0.50 Type AB	1
16	89346	581701C1	59556	150-90002-34	WASHER, Plain, 1/4 x 5/8 inch	1
17	89346	403061C1	59556	080-90016-61	BRACKET, Defroster, Door Control	4
18	89346	581700C1	59556	150-90002-36	RIVET, Pop, 0.188 Diameter x 0.25 inches Long	1
19	89346	24304R1	59556	150-90002-21	BRACKET, Blend Door Control	5
20	89346	469455C1	59556	150-90002-38	SCREW, No. 10-16 x 0.75	1
					MOTOR, Blower	



Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-79. Heater Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	469453C1	59556	150-90002-39	SPACER, Blower Wheel	1
22	89346	465502C1	59556	150-90002-40	BLOWER, Wheel	1
23	89346	144562	59556	150-90002-41	NUT, No. 10-32	1
24	89346	445424C1	59556	150-90002-42	U-NUT, No. 10-16	15
25	89346	359182C1	59556	150-90002-43	RIVET, Pop, 0.125 Diameter x 0.63 Long	8
26	89346	578917C1	59556	150-90002-44	WASHER, FLAT	7
27	89346	581723C1	59556	150-90002-45	CASE, Rear	1
28	89346	581722C1	59556	150-90002-46	CASE, Front	1
29	89346	452234C1	59556	150-90002-47	DOOR, Defroster	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-80. HEATER DUCT ASSEMBLY

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-80. Heater Duct Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	501107C91	59556	150-90002-48	HEATER DUCT ASSEMBLY	1
2	89346	501040C1	59556	150-90002-49	DUCT, Heater, Right	1
3	89346	452231C1	59556	150-90002-50	SEAL, Heater To Defroster Chamber	1
4	89346	26304R1	59556	150-90002-51	ROD, Door	1
5	89346	25707R1	59556	150-90002-51	SCREW, Pan Cross Recessed Head, No. 10-16 x 3/4 inch	1
6	89346	452234C1	59556	039-00013-51	WASHER, Plain, 1/4 x 5/8 inch	1
7	89346	453002C1	59556	150-90002-47	DOOR, Defroster	1
8		NSS	59556	150-90002-54	BRACKET, Mounting	1
9	89346	472220C2	59556	150-90002-56	SEAL	1
10	89346	403061C1	59556	080-90002-61	DUCT, Upper	1
11	89346	25520R1	59556	080-90016-61	RIVET, Dome Head, 3/8 inch	6
12	89346	5/16R	59556	030-00008-02	NUT, Hex, 5/16 NC	2
13	89346	469968C1	59556	MS35338-45	WASHER, Locking, 5/16 Regular	2
14	89346	403061C1	59556	150-90002-60	CLAMP, Cable	2
15		NSS	59556	080-90016-61	RIVET, Dome Head, 3/8 inch	2
16	89346	403061C1	59556	080-90016-61	RIVET, Dome Head, 3/8 inch	2
17	89346	476141C2	59556	150-90002-64	BRACKET, Spring	1
18	89346	476140C1	59556	150-90002-65	SPRING, Fresh Air Door	1
19	89346	571723C2	59556	150-90002-66	BRACKET, Mounting	1
20	89346	492518C1	59556	150-90002-67	KNOB	1
21	89346	472280C1	59556	150-90002-68	NUT, Control	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

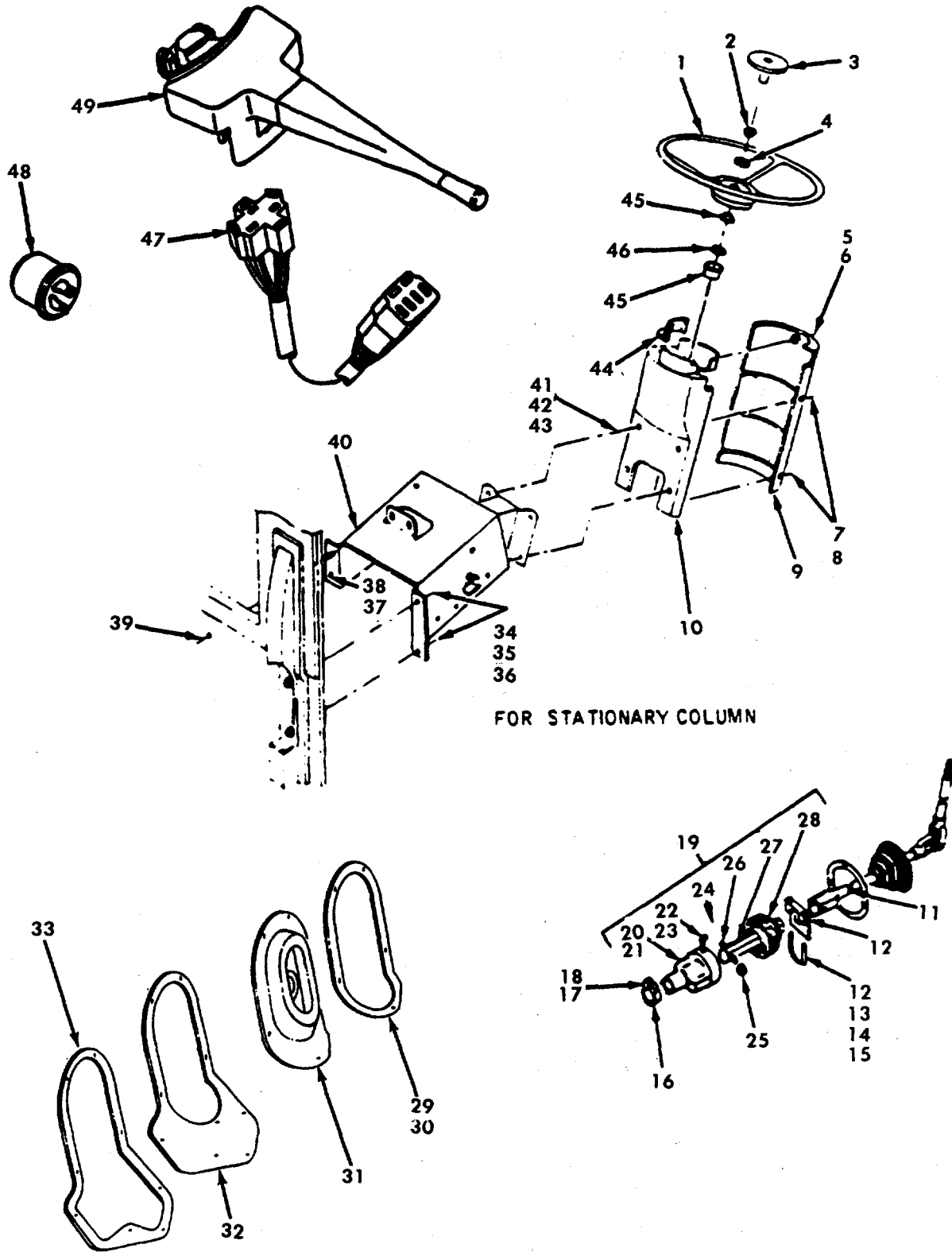
Figure E-80. Heater Duct Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	472219C1	59556	150-90002-69	CONTROL, Vent	1
23	89346	472271C1	59556	150-90002-70	LINK, Door Vent	1
24	89346	146327R1	59556	150-90002-71	CLIP, Pedal Link	2
25	89346	571724C91	59556	150-90002-72	DOOR, Fresh Air	1
26	89346	19910R1	59556	123-90006-16	NUT, Hex Locking, No. 10	2
27	89346	120391	59556	123-90006-63	WASHER, Flat, No. 10	2
28	89346	501072C1	59556	150-90002-75	DUCT, Lower Center	1
29	89346	474017C1	59556	150-90002-76	ROD, Duct	1
30	89346	19910R1	59556	123-90006-16	NUT, Hex Locking, No. 10	1
31	89346	120391	59556	123-90006-63	WASHER, Flat No. 10	2
32		NSS			TIP	1
33	89346	239870R1	59556	150-90002-80	SPRING, Duct, Door	1
34		NSS			SEAL	1
35	89346	469503C1	59556	150-90002-82	PIVOT, Door	2
36	89346	469512C92	59556	150-90002-83	DOOR	3
37		NSS			SEAL	1
38	89346	474039C1	59556	150-90002-85	DUCT, Air Intake	1
39	89346	160562	59556	150-90002-86	SCREW, Pan Cross Recessed Head, 1/4 NC x 1 inch	3
40	89346	25707R1	59556	039-00013-51	WASHER, Plain, 1/4 inch	3
41	89346	469510C1	59556	150-90002-88	SEAL, Air Intake, Upper	1
42	89346	469502C1	59556	150-90002-89	SEAL, Air Intake, Lower	1
43		NSS			SPACER	2

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-80. Heater Duct Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
44	89346	466315C1	59556	150-90002-91	ROD, Door Air	1
45	89346	189093R1	59556	150-90002-92	NUT, Push-On	1
46	89346	466313C1	59556	150-90002-93	RETAINER, Door Rod	2



FOR STATIONARY COLUMN

GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
 FIGURE E-81. STEERING WHEEL AND COLUMN

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-81. Steering Wheel and Column

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	469902C3	59556	016-90005-1	COLUMN ASSEMBLY	REF
2	89346	373522R1	59556	016-90005-2	WHEEL, Steering	1
3	89346	470062C92	59556	016-90005-3	RING, Retaining	1
4	89346	384725C1	59556	016-90005-4	BUTTON, Horn	1
5	89346	27328R1	59556	016-90005-5	NUT, Special, 13/16-20 UNF	1
6	89346	121841	59556	016-90005-6	SCREW, Machine Pan Head, Corrosion Resistant, No.8-32 UNC x 12	1
7	89346	26281R1	59556	016-90005-7	WASHER, Lock, No.8	4
8	89346	121841	59556	016-90005-6	SCREW, Machine Pan Head, Cross Recess No. 8-32 UNC x 3/4 inch	4
9	89346	474663C3	59556	016-90005-9	WASHER, Lock, No. 8	1
10	89346	474661C2	59556	016-90005-10	HOUSING, Steering Column	1
11	89346	489574C91	59556	016-90005-11	HOUSING, Steering Column	1
12	89346	681971R1	59556	016-90005-12	SHAFT, W/Universal Joint Steering Column	2
13	89346	25523R1	59556	016-90005-13	CLAMP	1
14	89346	892738R1	59556	016-90005-14	NUT, Hex, 3/8 NF PHC Type 8	1
15	89346	3/8R	59556	MS35338-46	U-BOLT	2
16	89346	509134C1	59556	016-90005-16	WASHER, Lock, 3/8 Medium	AR
17	89346	592637C1	59556	016-90005-17	CLAMP, Steering, 13/16	1
18	89346	24842R1	59556	016-90005-18	NUT, Hex Head, 3/8-16 UNC	1
19	89346	252577C91	59556	016-90005-19	BOLT, Hex Head, 3/8-16 UNC x 1-3/4 inch	1
					KIT, U-Joint Steering Gear (Includes Nos. 20,21,22.23.24,25.26.27.28)	1

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-81. Steering Wheel and Column

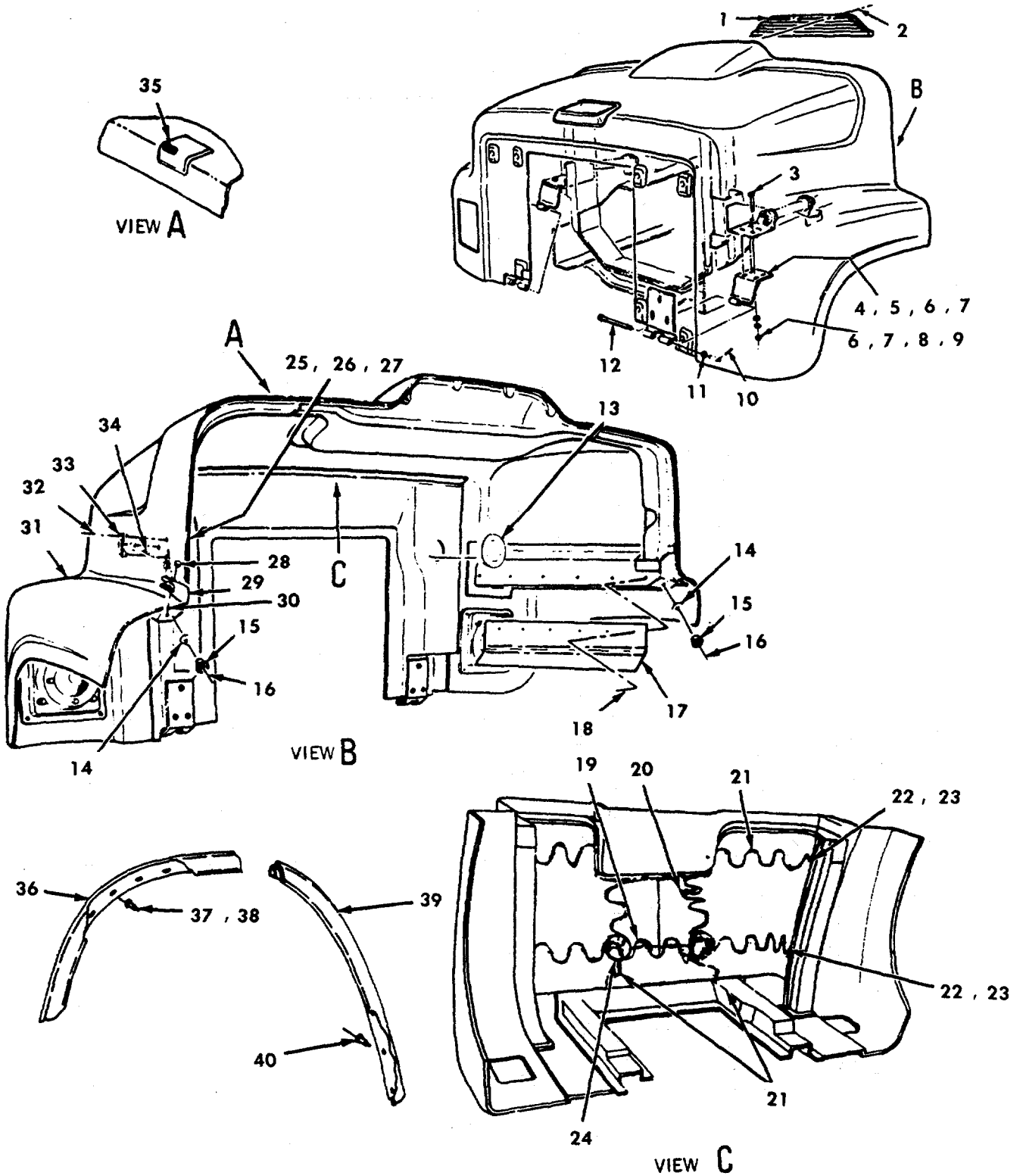
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	584021C91	59556	016-90005-20	SHELL, Steering	1
21	89346	172558	59556	016-90005-21	PLUG, Expansion	1
22	89346	27248R1	59556	016-90005-22	BOLT, Hex Head, 1/4 NF x 3/8 inch	2
23	89346	227110R1	59556	016-90005-23	WASHER, Star Lock	2
24	89346	270288C1	59556	016-90005-24	BUTTON, Flex Coupling	2
25	89346	225218R1	59556	016-90005-25	WASHER, Flex Coupling	2
26	89346	225217R1	59556	016-90005-26	PIN, Steering Column Shift	1
27	89346	489571C1	59556	016-90005-27	SHAFT, Steering Drive, Lower	1
28	89346	892759R1	59556	016-90005-28	BOOT, Steering Gear Coupling	1
29	89346	491294C1	59556	016-90005-155	RETAINER, Steering Column Seal	1
30	89346	408941C1	59556	016-90005-156	SCREW, Oval Cross Recessed Head No. 10-16 x 3/4 inch	5
31	89346	491180C3	59556	016-90005-157	SEAL, Steering Column Boot	1
32	89346	491540C1	59556	016-90005-158	COVER, Steering Column Opening	1
33	89346	490972C1	59556	016-90005-159	SEAL, Steering Column Cover	1
34	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	2
35	89346	433351C1	59556	016-90005-30	BOLT, Special, 3/8 x 1-1/4 inch	2
36	89346	9413979	59556	006-90002-170	NUT, Lock, 3/8-16, Deafration Tank	2
37	89346	433351C1	59556	016-90005-30	BOLT, Special, 3/8-16 x 1-1/4 inch	1
38	89346	9413979	59556	006-90002-170	NUT, Lock, 3/8-16	1
39	89346	9413979	59556	006-90002-170	NUT, Lock Hex, 3/8-16 UNC	1
40	89346	581858C2	59556	016-90005-35	BRACKET, Steering Coil Support	1
41	89346	24840R1	59556	016-90005-36	BOLT, Hex Head, 3/8-16 UNC x 1 inch	4



Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-81. Steering Wheel and Column

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
42	89346	9413979	59556	006-90002-170	NUT, Lock Hex, 3/8-16 UNC	4
43	89346	140483H	59556	016-90005-38	BOLT, Hex Head, 3/8-16 UNC x 1 inch	4
44	89346	478243R1	59556	016-90005-39	COVER, Housing Steering Column	1
45	89346	469878C1	59556	016-90005-40	BUSHING, Steering Column	3
46	89346	468796C1	59556	016-90005-41	WASHER, Steering Column, Nylon	2
47	89346	586653C91	59556	080-90016-450	HARNES, Turn Signal Switch	1
48	89346	27328R1	59556	016-90005-5	SCREW, Pan Cross Recess Head No.8 NF x 1/2 inch	2
49	89346	470069C1	59556	080-90016-449	FLASHER, Turn Signal and Hazard Light	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
 FIGURE E-82. HOOD ASSEMBLY

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

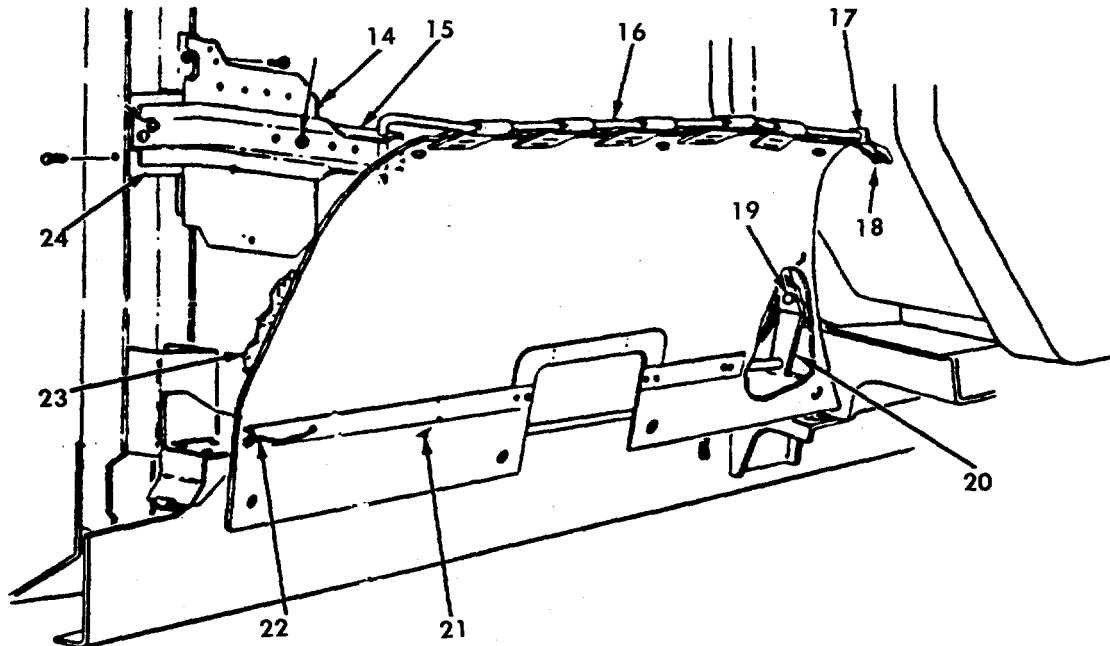
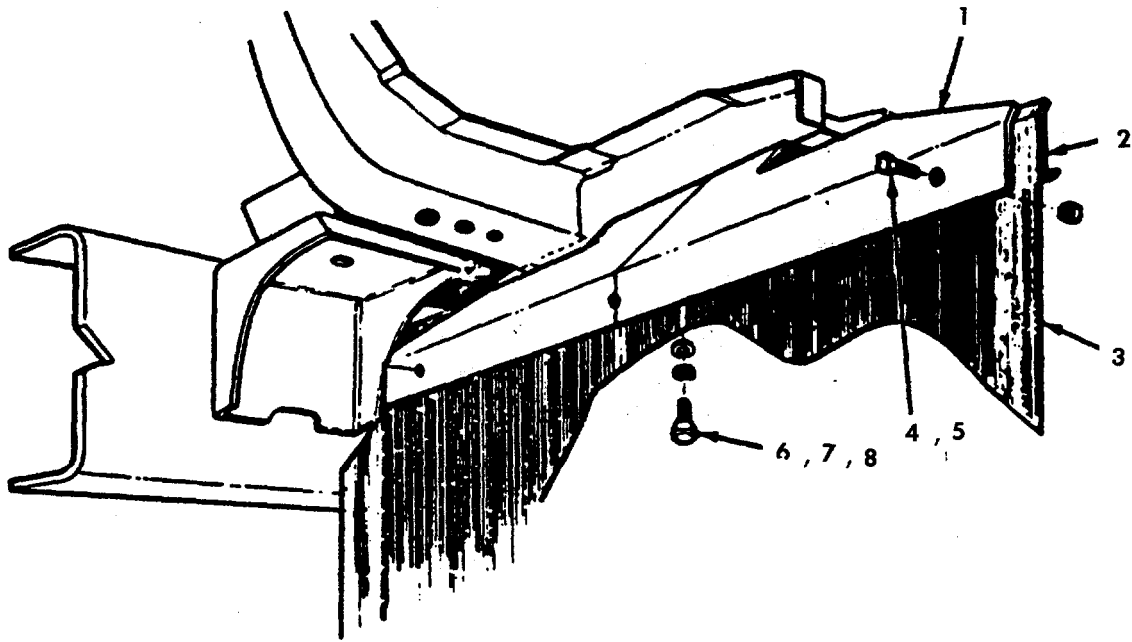
Figure E-82. Hood Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	578196C2	59556	080-90016-42	HOOD AND GRILLE ASSEMBLY	REF
2	89346	335062C1	59556	080-90016-144	GRILLE	1
3	89346	25751R1	59556	030-00008-13	SCREW, Pan Head, 8-18x1/2 inch	4
4	89346	483996C3	59556	080-90016-45	BOLT, Hex Head, 5/16-18x1-1/4 inch	8
5	89346	393014C91	59556	080-90016-104	LEAF, Support	2
6	89346	25708R1	59556	015-90005-21	SCREW, Hex Head, 5/16-18x3/4 inch	2
7	89346	25520R1	59556	030-00008-02	WASHER, Flat, 5/16	18
8	89346	25552R1	59556	080-90016-48	NUT, Hex, 5/16-18	10
9	89346	5/16R	59556	MS35338-45	WASHER, Flat, 5/16x1.0 inch	8
10	89346	3/32x3/4	59556	080-90016-49	WASHER, Lock, 5/16	8
11	89346	25846R1	59556	027-90005-02	PIN, Cotter, 3/32x3/4 inch	2
12	89346	27883R1	59556	080-90016-51	WASHER, Flat, 7/16	2
13	89346	497462C1	59556	080-90016-52	PIN, Hood Hinge, 7/16x4 inch	2
14	89346	23043R1	59556	080-90016-53	SEAL, Air Intake	1
15	89346	472698C1	59556	080-90016-54	WASHER, Flat	2
16	89346	411431C2	59556	080-90016-55	GUIDE, Hood Locator	2
17	89346	487168C1	59556	080-90016-56	BOLT, Hex Head	2
18	89346	575362C1	59556	080-90016-57	SEAL, Splash Panel	2
19	89346	580561C1	59556	080-90016-58	FASTENER, Push	12
20	89346	580560C1	59556	080-90016-59	SPRING, Hood Retainer	1
21	89346	580562C1	59556	080-90016-60	INSULATOR, Sound-Hood	1
22	89346	403061C1	59556	080-90016-61	SPRING, Hood Retainer	4
					RIVET, Pop	10

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-82. Hood Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	89346	299398C1	59556	080-90016-62	CLAMP, Single-Coated	10
24	89346	869707C1	59556	080-90016-63	STRAP, Lock, Cable	2
25	89346	27298R1	59556	080-90016-64	NUT, Hex, 1/4-20	6
26	89346	27303R1	59556	080-90016-65	WASHER, Lock, 1/4	6
27	89346	178474	59556	080-90016-550	WASHER, Flat, 1/4	6
28	89346	500274C1	59556	080-90016-67	NUT, Push-On	2
29	89346	500269C1	59556	080-90016-68	HANDLE, Hood Latch	2
30	89346	500273C2	59556	080-90016-69	PIN, Hood Latch	2
31	89346	487787C3	59556	080-90016-70	HOOD, Tilt	1
32	89346	26959R1	59556	080-90016-71	SCREW, Pan Head, 1/4-20x1 inch	6
33	89346	500270C1	59556	080-90016-72	RETAINER, Hood Latch	2
34	89346	499523C2	59556	080-90016-73	STRAP, Hood Latch	2
35	89346	583267C1	59556	080-90016-74	MOULDING, Rubber Grab	1
36	89346	492657C1	59556	080-90016-75	EXTENSION, Fender Front, Left	1
	89346	492658C1	59556	080-90016-76	EXTENSION, Fender Front, Right	1
37	89346	492490C2	59556	080-90016-77	RIVET, Pop Open Face, 3/4 inch	18
38	89346	27306R1	59556	080-90016-143	WASHER	18
39	89346	492654C91	59556	080-90016-79	EXTENSION, Fender Rear, Left	1
	89346	492656C91	59556	080-90016-80	EXTENSION, Fender Rear, Right	1
40	89346	492490C2	59556	080-90016-77	RIVET, Pop Open Face, 3/4	14



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-83. SPLASH GUARD AND STONE DEFLECTOR

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

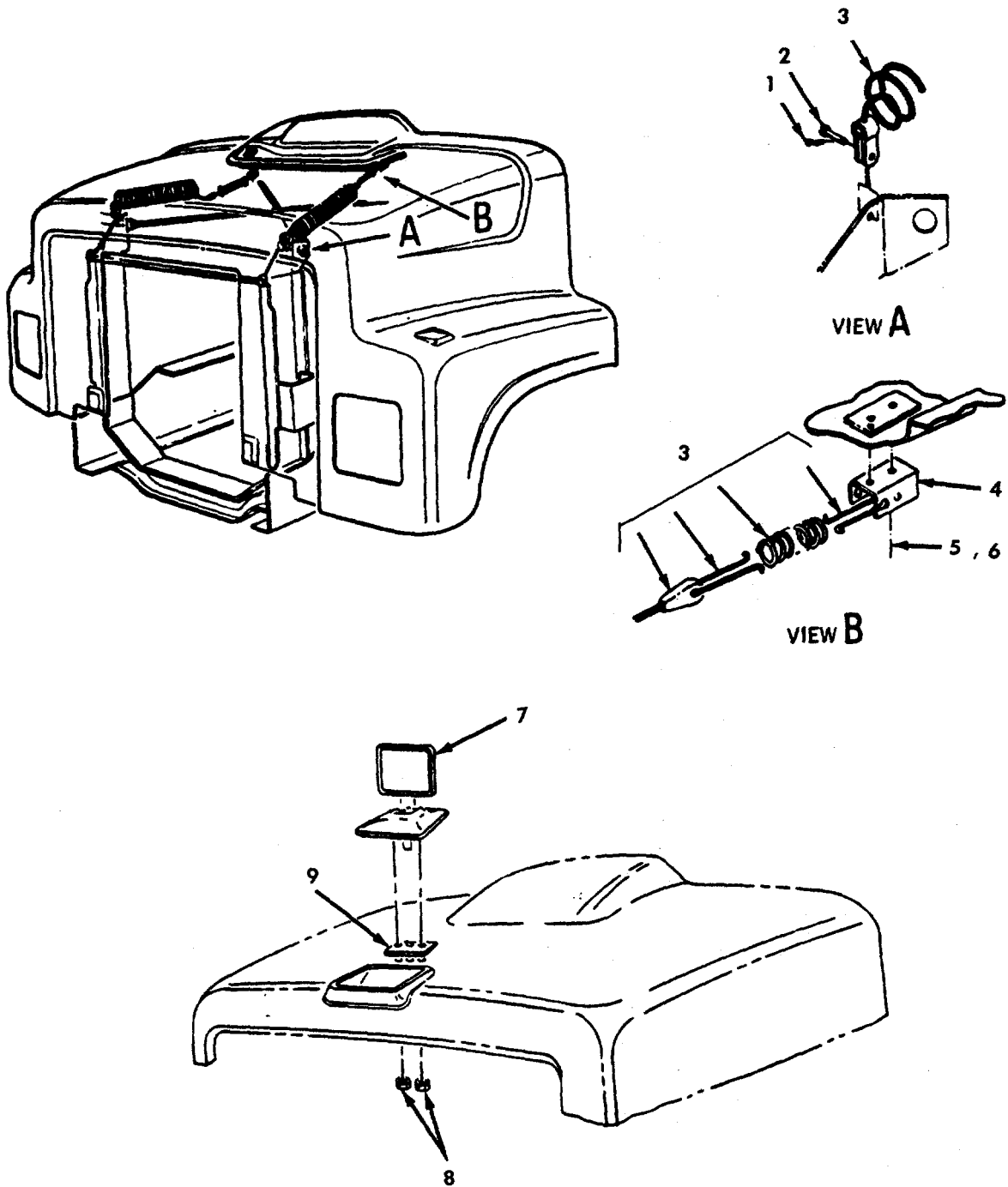
Figure E-83. Splash Guard and Stone Deflector

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	506023C1	59556	080-90016-10	SPLASH GUARD AND STONE DEFLECTOR ASSY	REF
	89346	506024C1	59556	080-90016-11	BRACKET, Deflector, Left	1
2	59556	080-90016-12	59556	080-90016-11	BRACKET, Deflector, Right	1
3	59556	080-90016-13	59556	080-90016-12	REINFORCEMENT	2
4	89346	25483R1	59556	080-90016-13	DEFLECTOR, Stone	2
5	89346	26110R1	59556	019-90004-971	BOLT, Hex Head, 1/4-20x1 inch	6
6	89346	24861R1	59556	030-00008-24	NUT, Lock, 1/4-20	6
7	89346	25710R1	59556	039-00013-29	BOLT, Hex Head, 1/2-13x1-1/4 inch	4
8	89346	1/2R	59556	080-90016-17	WASHER, Flat, 1/2 inch	4
9	89346	25228R1	59556	MS35338-48	WASHER, Lock, 1/2 inch	4
10	89346	5/16R	59556	016-90005-59	BOLT, Hex Head, 5/16-18x3/4 inch	17
11	89346	25708R1	59556	MS35338-45	WASHER, Lock, 5/16	AR
12	89346	24839R1	59556	015-90005-21	WASHER, Flat, 5/16	AR
13	89346	9413979	59556	015-90005-30	BOLT, Hex Head, 3/8-16x3/4 inch	AR
14	89346	489885C6	59556	006-90002-170	NUT, Lock, Hex, 3/8-16	AR
	89346	489887C5	59556	080-90016-24	FILLER, Splash Shield, Left	1
15	89346	491507C2	59556	080-90016-25	FILLER, Splash Shield, Right	1
16	89346	488743C1	59556	080-90016-26	SUPPORT, Splash Shield	2
	89346	488744C1	59556	080-90016-27	ROD, Hanger Splash Guard, Right	1
17	89346	494300C1	59556	080-90016-28	ROD, Hanger Splash Guard, Left	1
	89346	494301C1	59556	080-90016-29	BRACKET, Mounting, Left	1
	89346	172463	59556	080-90016-30	BRACKET, Mounting Right	1
	89346		59556	080-90016-31	SCREW, Tapping, 5/16-18x1 inch	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-83. Splash Guard and Stone Deflector

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	89346	5/16R	59556	MS35338-46	WASHER, Lock, 5/16 inch	2
20	89346	494298C2	59556	080-90016-32	BRACKET, Splash Shield, Left	1
	89346	494299C1	59556	080-90016-33	BRACKET, Splash Shield, Right	1
21	89346	498550C3	59556	080-90016-34	GUARD, Splash, Left	1
	89346	498551C3	59556	080-90016-35	GUARD, Splash, Right	1
22	89346	494295C1	59556	080-90016-36	PIN, Wire	2
23	89346	505334C1	59556	080-90016-37	INSULATOR, Left	1
	89346	505335C1	59556	080-90016-38	INSULATOR, Right	1
24	89346	492577C3	59556	080-90016-39	CHANNEL, Support Mounting	2



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-84. HOOD CABLE AND EMBLEM

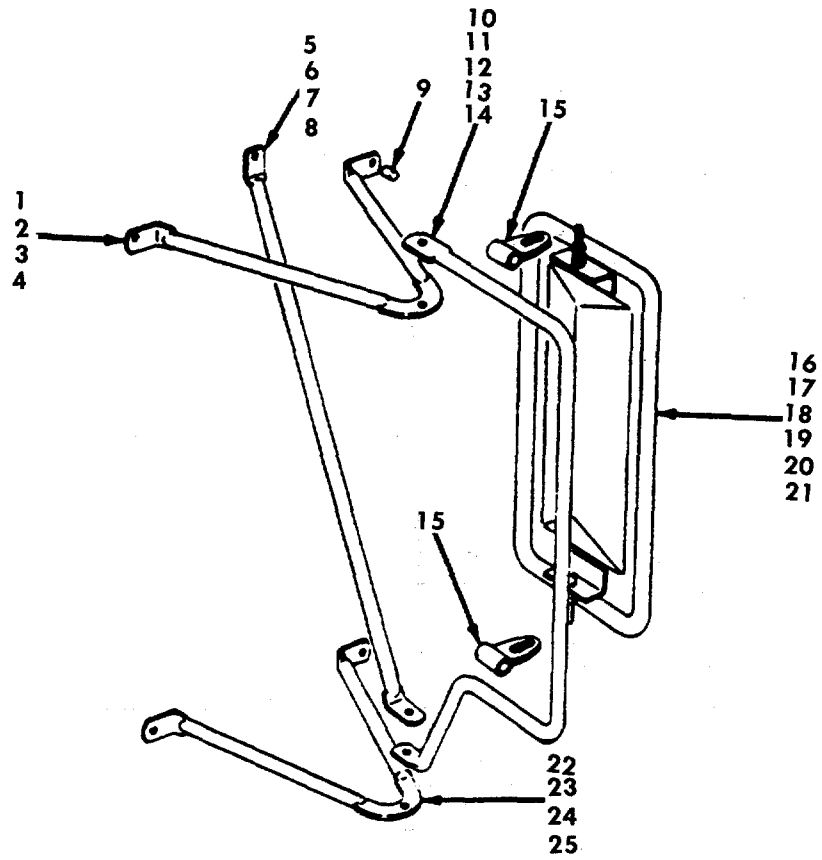
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Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-84. Hood Cable and Emblem

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	549899R1	59556	080-90016-1	HOOD CABLE ASSEMBLY	REF
2	89346	20155R1	59556	080-90016-2	PIN, Wire	2
3	89346	500827C1	59556	080-90016-3	PIN, C1evis, 3/16x.719 inch	2
4	89346	484240C2	59556	080-90016-4	CABLE, Hood Safety	2
5	89346	25333R1	59556	080-90016-5	BRACKET, Anchor	2
6	89346	1/4R	59556	MS35338-44	BOLT, 1/4x3/4 inch PHC Type 8	4
7	89346	506910C91	59556	080-90016-7	WASHER, Lock, 1/4 inch	4
8	89346	506897C1	59556	080-90016-8	EMBLEM, Hood	1
9	89346	507919C1	59556	080-90016-9	NUT, Self-Thread	2
					SPACER, Hood Ornament	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-85. MIRROR ASSEMBLY

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

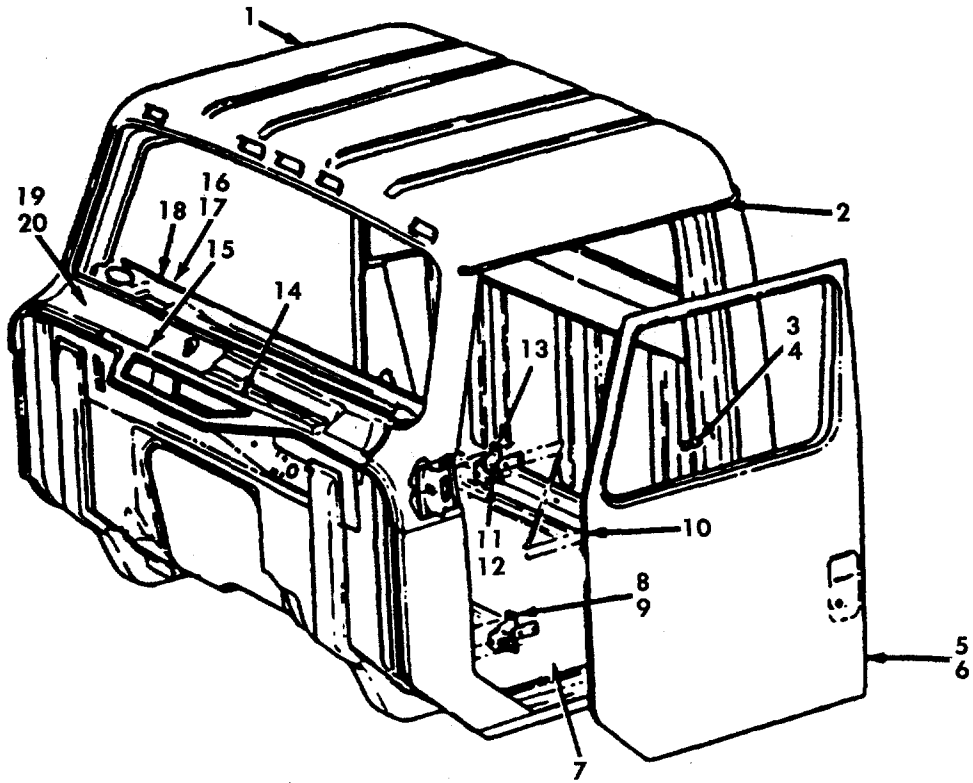
Figure E-85. Mirror Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	482238C91	59556	080-90016-6	MIRROR ASSEMBLY, With Arm, Brace, Bracket And Head Stand Only	
1	89346	480714C1	59556	080-90016-547	BRACKET, Upper Mounting	1
2	89346	22470R1	59556	080-90016-548	BOLT, Hex Head, 1/4 NC x 3/4 inch	3
3	89346	453074C1	59556	080-90016-549	NUT, Hex Locking, 1/4 NC	3
4	89346	178474	59556	080-90016-550	WASHER, Locking, 1/4 inch	3
5	89346	480716C1	59556	080-90016-551	BRACE, Diagonal	1
6	89346	22470R1	59556	080-90016-548	BOLT, Hex Head, 1/4 NC x 3/4 inch	1
7	89346	453074C1	59556	080-90016-549	NUT, Hex, Locking, 1/4 NC	1
8	89346	178474	59556	080-90016-550	WASHER, Locking, 1/4 inch	1
9	89346	480895C1	59556	080-90016-555	NUT, 1/4 inch Plastic Dome	3
10	89346	480705C1	59556	080-90016-556	ARM, Mirror Support	1
11	89346	22732R1	59556	080-90016-557	BOLT, Hex Head, 5/16 NC x 1-1/4 inch	2
12	89346	27299R1	59556	080-90016-558	NUT, Hex, 5/16 NC	2
13	89346	28027R1	59556	080-90016-559	WASHER, Locking, 5/16 EXTERNAL/ INTERNAL	2
14	89346	27309R1	59556	080-90016-560	WASHER, Flat, 5/16 inch	2
15	89346	480897C1	59556	080-90016-561	CLAMP, Mirror Arm	2
16	89346	480701C91	59556	080-90016-562	HEAD, With Glass, Without Duplex Mirror	1
17	-----	COML			BOLT, T-Head, 5/16 NC x 2 inches	2
18	89346	27299R1	59556	080-90016-558	NUT, Hex, 5/16 NC	6
19	89346	27309R1	59556	080-90016-560	WASHER, Flat 5/16 inch	4
20	89346	480896C1	59556	080-90016-565	NUT, 5/16 Plastic Dome	2

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-84. Mirror Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	996687R1	59556	080-90016-566	GLASS, Mirror, C1ear	1
22	89346	480715C1	59556	080-90016-567	BRACKET, Lower Mounting	1
23	89346	27231R1	59556	080-90016-101	SCREW, Pan Cross Recessed Head 5/16-18 x 3/4 inch	2
24	89346	27304R1	59556	080-90016-102	WASHER, Locking, 5/16 inch	2
25	89346	27309R1	59556	080-90016-560	WASHER, Flat, 5/16 inch	2

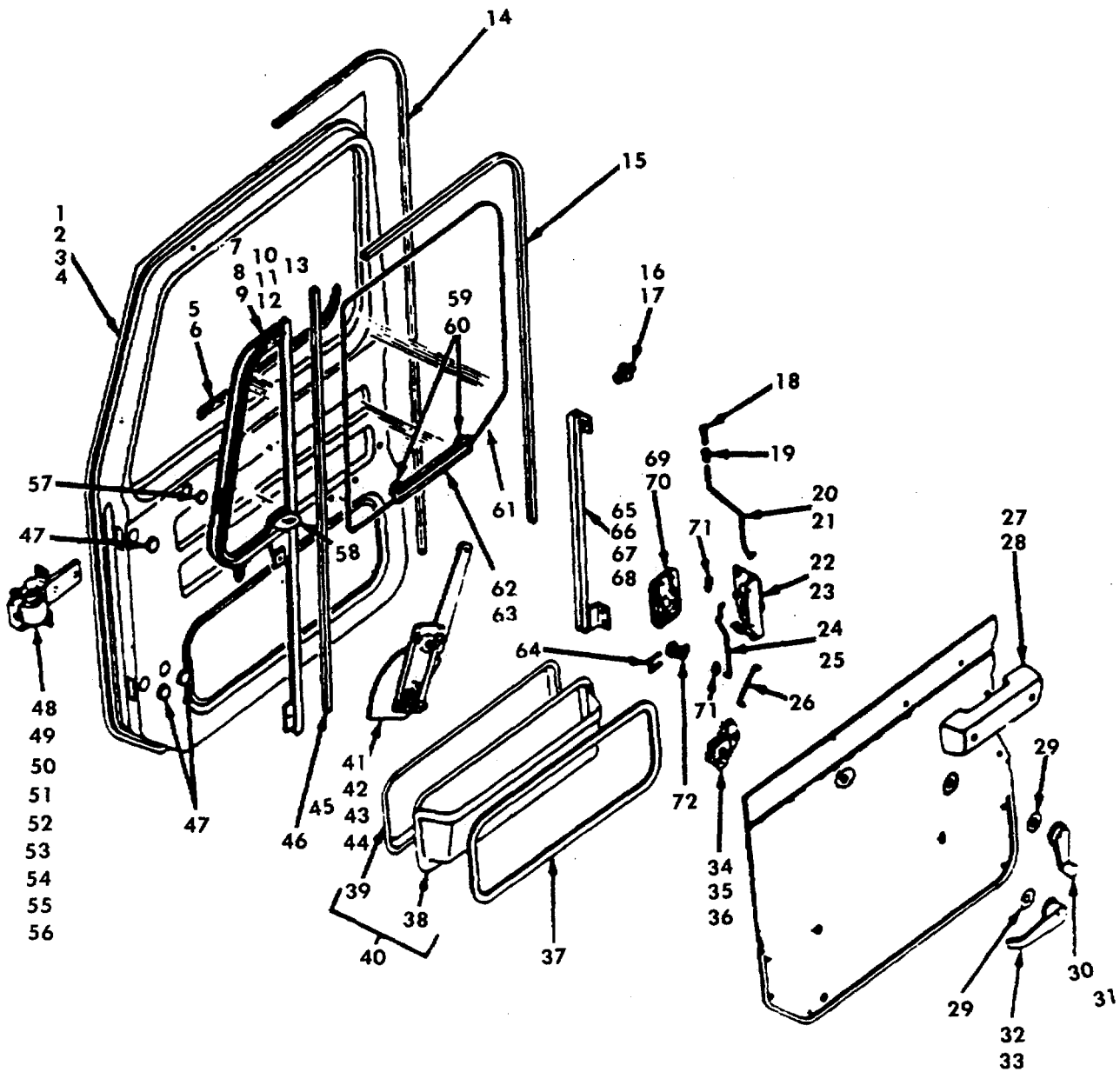


GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS  
FIGURE E-86. DOOR INSTALLATION

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-86. Door Installation

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	443974C1	59556	080-90016-428	ROOF PANEL AND COWL ASSEMBLY	1
2	89346	444034C2	59556	080-90016-429	PANEL, Roof, Outer	2
3	89346	454216C3	59556	080-90016-430	CLIP, Drip Moulding	2
4	89346	492082C1	59556	080-90016-372	PIN, Latch Striker	AR
5	89346	487999C91	59556	080-90016-356	SHIM, Washer Latch Striker Pin	1
6	89346	488000C91	59556	080-90016-357	DOOR, Left (See Figure E-87 For Separate Breakdown)	1
7	89346	990693C1	59556	080-90016-434	DOOR, Right (See Figure E-87 For Separate Breakdown)	AR
8	89346	475342C91	59556	080-90016-405	MAT, Sound Deadener, Bulk	1
9	89346	475343C91	59556	080-90016-406	HINGE, Lower Left	1
10	89346	472683C1	59556	080-90016-407	HINGE, Lower Right	8
11	89346	475340C91	59556	080-90016-403	SCREW, 3/16-16 x 1-1/4 inch	1
12	89346	475341C91	59556	080-90016-404	HINGE, Upper Left	1
13	89346	586627C1	59556	080-90016-440	HINGE, Upper Right	12
14	89346	444042C2	59556	080-90016-441	SCREW, 5/16-18 x 1-1/4 inch	1
15	89346	572094C2	59556	080-90016-340	PANEL, Cowl, Top Inner	1
16	89346	462522C6	59556	080-90016-443	SEAL, Cowl To Hood	1
17	89346	771854C1	59556	080-90016-444	INSULATOR, Dash	AR
18	89346	444043C2	59556	080-90016-445	RETAINER, Dash Insulator	1
19	89346	444007C2	59556	080-90016-446	PANEL, Cowl, Rear	1
20	89346	27204R1	59556	080-90016-145	PANEL, Cowl, Top Insert	3
					SCREW, Oval, Cross-Recessed Head, No. 8-18 x 1/2 inch	



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-87. DOOR ASSEMBLY

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-87. Door Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	487999C91	59556	080-90016-356	CAB DOOR ASSEMBLY DOOR, Left	1
2	89346	488000C91	59556	080-90016-357	DOOR, Right	1
3	89346	443983C1	59556	080-90016-358	PANEL, Door Outer Left	1
4	89346	443984C1	59556	080-90016-359	PANEL, Door Outer Right	1
5	89346	449681C2	59556	080-90016-360	SEAL, Window Left	1
6	89346	449682C2	59556	080-90016-361	SEAL, Window Right	1
7	89346	454199C91	59556	080-90016-362	VENT, Window Left	1
8	89346	454200C91	59556	080-90016-363	VENT, Window Right	1
9	93395	2724T	59556	080-90016-364	GLASS, Vent Window	1
10	89346	442807	59556	080-90016-365	SCREW, Pan Slotted Head, No. 10-32 x 1/4 inch	4
11	89346	172431	59556	080-90016-366	SCREW, Tap Hex Head, 1/4 NC x 3/4 inch	4
12	89346	1/4R	59556	MS35338-44	WASHER, Locking, 1/4 inch	4
13	89346	25707R1	59556	039-00013-51	WASHER, Flat, 1/4 inch	4
14	89346	444058C1	59556	080-90016-369	SEAL, Door	2
15	89346	449683C1	59556	080-90016-370	CHANNEL, Glass	2
16	89346	454216C1	59556	080-90016-371	PIN, Latch, Striker	2
17	89346	492082C1	59556	080-90016-372	SHIM, Washer, Latch Striker Pin	AR
18	89346	330411C1	59556	080-90016-373	KNOB, Door Lock	2
19	89346	475926C1	59556	080-90016-374	ESCUTCHEON, Lock Knob	2
20	89346	484299C1	59556	080-90016-375	ROD, Remote Door Lock Left	1
21	89346	484300C1	59556	080-90016-376	ROD, Remote Door Lock Right	1



## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-87. Door Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	477257C94	59556	080-90016-377	LATCH, Door Left	1
23	89346	477258C94	59556	080-90016-378	LATCH, Door Right	1
24	89346	477024C3	59556	080-90016-379	ROD, Door Lock Key Cylinder Left	1
25	89346	477025C3	59556	080-90016-380	ROD, Door Lock Key Cylinder Right	1
26	89346	477023C1	59556	080-90016-381	ROD, Remote Door Lock Handle	2
27	89346	490768C91	59556	080-90016-382	REST, Arm, Standard, Chestnut	2
28	89346	160544	59556	080-90016-383	Screw, Pan Cross Recessed Head 1/4 NC x 3/4 inch	4
29	89346	286578C1	59556	080-90016-384	WASHER, Door Inside Handle	4
30	89346	475196C1	59556	080-90016-385	HANDLE, Regulator	2
31	89346	286565C1	59556	080-90016-386	SCREW, Socket Hex Head, No. 10-24 x 5/8 inch	2
32	89346	454252C1	59556	080-90016-387	HANDLE, Door Remote	2
33	89346	286565C1	59556	080-90016-386	SCREW, Socket Hex Head, No. 10-24 x 5.8 inch	2
34	89346	449768C91	59556	080-90016-389	CONTROL, Remote Left	1
35	89346	449769C91	59556	080-90016-390	CONTROL, Remote Right	1
36	89346	191983	59556	080-90016-391	SCREW, Flat Cross Recessed Head, 1/4 NC x 5/8 inch	16
37	89346	449680C1	59556	080-90016-392	RETAINER, Access Door	2
38		NSS			CASE	1
39	89346	575473C1	59556	080-90016-394	COVER, Access Door Inner Panel	2
40	89346	466717C1	59556	080-90016-395	CASE, Door Dispatch	1
41	89346	449766C93	59556	080-90016-396	REGULATOR, Window Left	1

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

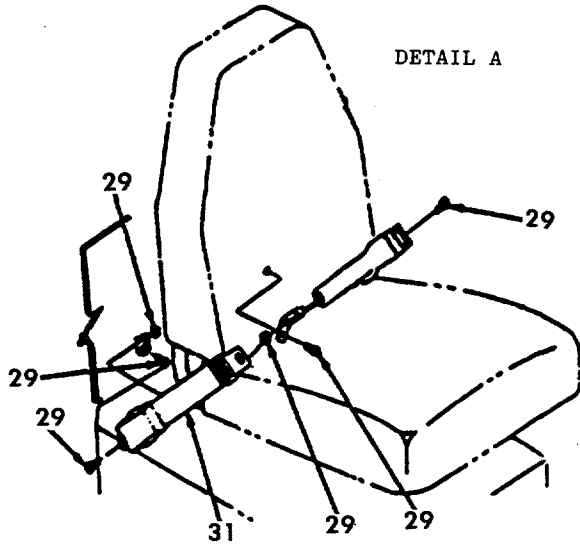
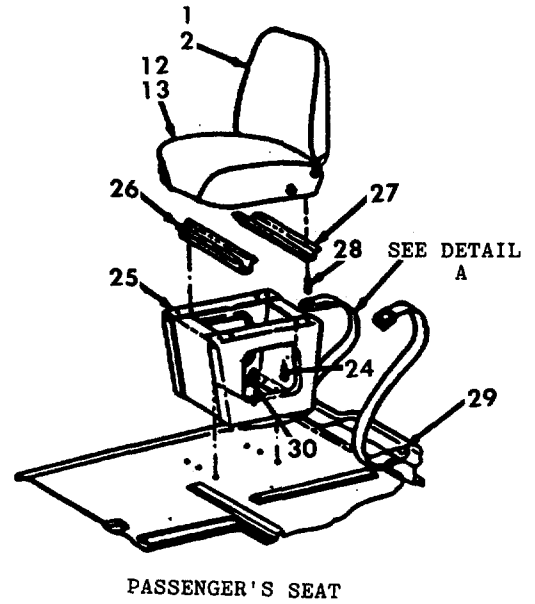
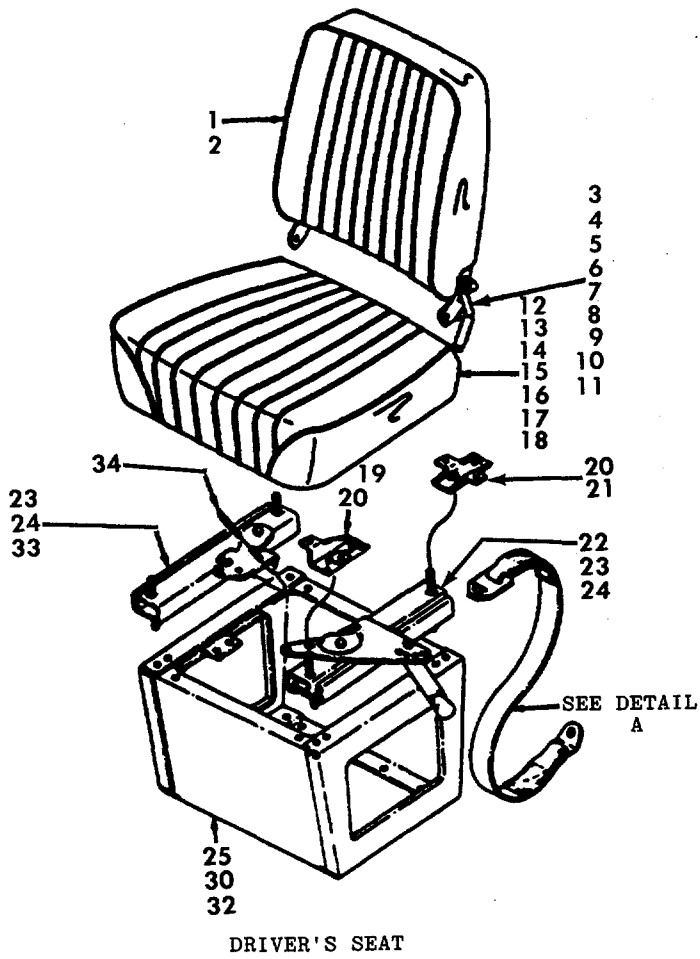
Figure E-87. Door Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
42	89346	449767C93	59556	080-90016-397	REGULATOR, Window Right	1
43	89346	160221	59556	080-90016-398	SCREW, Pan Head Cross, No. 10-24 x 1/2 inch	4
44	89346	412283C1	59556	080-90016-399	BOLT, Hex Head, No. 10-24 x ½ inch	4
45	89346	125774	59556	080-90016-400	WASHER, Locking	8
46	89346	454229C1	59556	080-90016-401	CHANNEL, Glass Run	1
47	89346	475212C1	59556	080-90016-402	PLUG, Button	20
48	89346	475340C91	59556	080-90016-403	HINGE, Door Upper Left	1
49	89346	475341C91	59556	080-90016-404	HINGE, Door Upper Right	1
50	89346	475342C91	59556	080-90016-405	HINGE, Door Lower Left	1
51	89346	475343C91	59556	080-90016-406	HINGE, Door Lower Right	1
52	89346	472683C1	59556	080-90016-407	SCREW, 3/8-16 x 1-1/4 inch	8
53	89346	393014C91	59556	080-90016-104	SCREW, Hex Head, 5/16 NC x 3/4 inch	12
54	89346	133322R1	59556	016-90005-61	WASHER, Flat, 11/32 x 1 x 3/16 inch	12
55	89346	449700C1	59556	080-90016-410	BRACKET, Upper Hinge Reinforcing, Left	1
56	89346	449701C1	59556	080-90016-411	BRACKET, Upper Hinge Reinforcing, Right	1
57	89346	406391C1	59556	080-90016-412	PLUG, Button	2
58	89346	162300R1	59556	080-90016-413	HANDLE, Vent	2
59	89346	480900C1	59556	080-90016-414	FASTENER, Door Glass	4
60	89346	480901C1	59556	080-90016-415	RETAINER, Fastener	4
61	93395	4647T	59556	080-90016-416	GLASS, Door Window	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-87. Door Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
62	89346	454215C1	59556	080-90016-417	GUIDE, Door Window	2
63	89346	23769R1	59556	080-90016-418	SCREW, Pan Cross Recessed Head, 1/4-20 x 5/8 inch W/Lockwasher	4
64	89346	423745C1	59556	080-90016-419	RETAINER, Cylinder Housing Lock	2
65	89346	466753C1	59556	080-90016-420	RETAINER, With Brackets, Glass Run Channel Left	1
66	89346	466754C1	59556	080-90016-421	RETAINER, With Brackets, Glass Run Channel Right	1
67	89346	444075C1	59556	080-90016-422	RETAINER, Glass Run Channel	2
68	89346	512550C1	59556	080-90016-423	SCREW, Hex Head, 1/4-20 x 7/8 inch	6
69	89346	475930C92	59556	080-90016-424	HANDLE, Door Outer	2
70	89346	428075C1	59556	080-90016-425	NUT, Hex No. 10-24, Lockwasher	8
71	89346	482755C91	59556	080-90016-426	CLIP, Rod End	4
72	89346	474621C1	59556	080-90016-427	LOCK, Cylinder	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-88. SEATS AND SEATBELTS

(E-283 Blank)/E-284

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

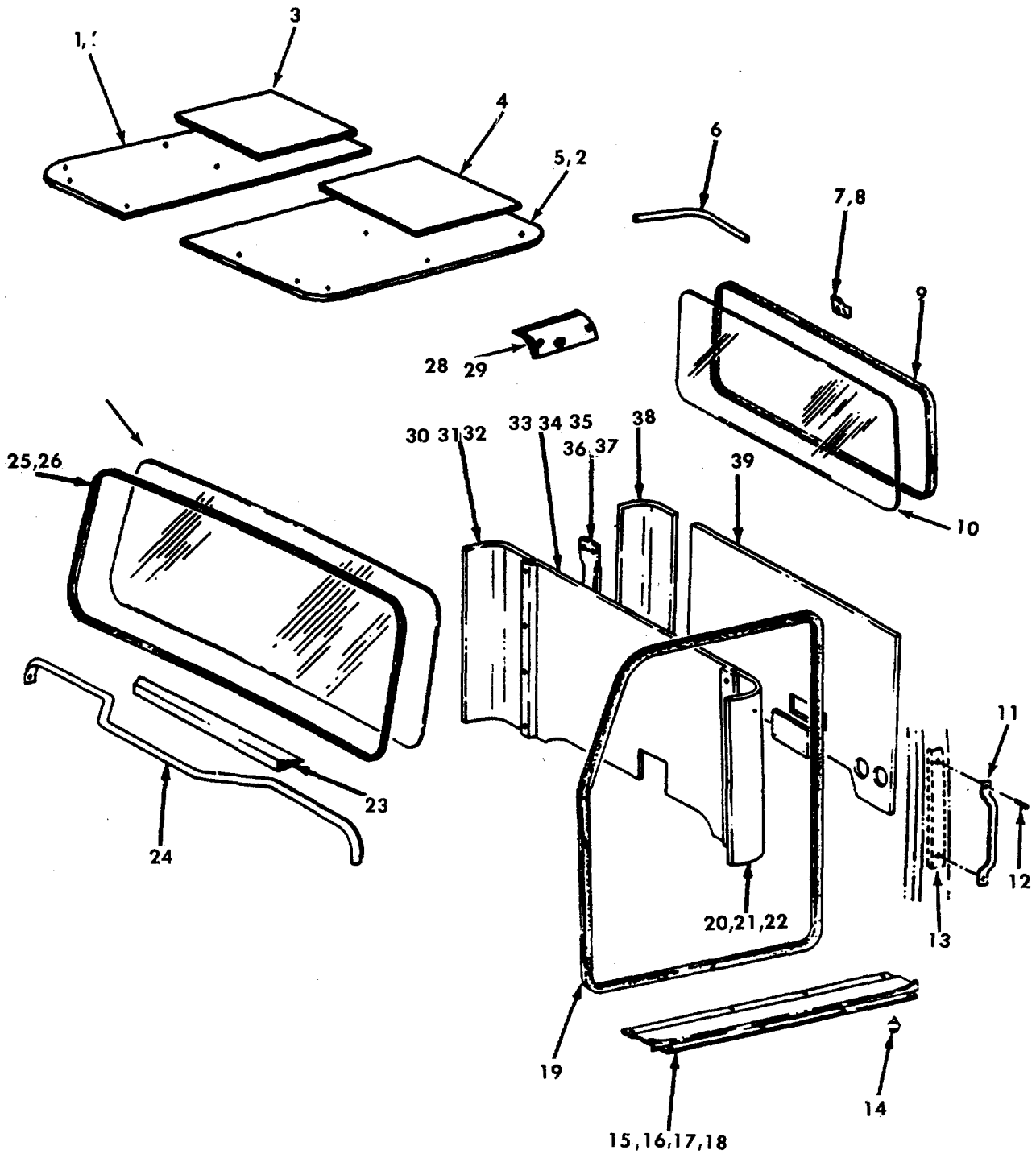
Figure E-88. Seats and Seatbelts

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
			59556		SEATS AND SEAT BELTS ASSEMBLY	REF
1	89346	489908C91	59556	080-90016-81	CUSHION, Back, Chestnut	2
2	89346	490661C1	59556	080-90016-82	COVER, Back Cushion	2
3	89346	467458C1	59556	080-90016-83	ROD, Adjusting Back	1
4	89346	467462C1	59556	080-90016-84	PAWL, Back Cushion Adjusting	2
5	89346	467455C1	59556	080-90016-85	HANDLE, Seat Back Adjusting	1
6	89346	467463C1	59556	080-90016-86	SPRING, Latch, Left	1
	89346	467464C1	59556	080-90016-87	SPRING, Latch, Right	1
7	89346	467428C1	59556	080-90016-88	SPACER, Latch	1
8	89346	48193K	59556	080-90016-89	SPACER, 1/2x3/4 inch	1
9	89346	27576R1	59556	080-90016-90	NUT, Low Crown, 1/2-13	1
10	89346	467414C1	59556	080-90016-91	WASHER, Latch	2
11	89346	1/2R	59556	MS35338-48	WASHER, Lock, 1/2 inch	1
12	89346	489906C92	59556	080-90016-92	CUSHION, Seat, Chestnut	1
13	89346	490662C1	59556	080-90016-93	COVER, Seat Cushion	1
14	89346	467415C1	59556	080-90016-94	BOLT, Shoulder, 5/16 NC x 7/16 inch	2
15	89346	411431C2	59556	080-90016-55	BOLT, Hex Head, 5/16 NC x 1-1/2 inch	2
16	89346	286578C1	59556	080-90016-384	WASHER, Flat, Plastic, 5/16 inch	2
17	89346	487657C1	59556	080-90016-97	WASHER, Plastic	2
18	89346	467455C1	59556	080-90016-85	HANDLE, Seat Adjusting	1
19	89346	467880C1	59556	080-90016-86	BRACKET, Support, Rear	1
20	89346	474774C1	59556	080-90016-87	SCREW, Hex Head, 5/16 NC x 1/2 inch	4
21	89346	467879C1	59556	080-90016-88	BRACKET, Support, Front	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-88. Seats and Seatbelts.

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	494536C1	59556	080-90016-89	ADJUSTER, Seat, Left	1
23	89346	5/16X	59556	MS35650-3312	NUT, Hex, 5/16 NF	6
24	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	10
25	89346	449743C3	59556	080-90016-91	RISER, Seat	2
26	89346	474279C1	59556	080-90016-92	CHANNEL, Seat Mounting, Front	1
27	89346	474287C1	59556	080-90016-93	CHANNEL, Seat Mounting, Rear	1
28	89346	474773C1	59556	080-90016-94	SCREW, Taptite, 1/4-20x.75 inch	8
29	89346	409480C1	59556	080-90016-95	BOLT, Hex Head, 1/2-13	AR
30	89346	504554C1	59556	080-90016-96	BOLT, Hex Head, 5/16x18x1-1/8 inch	12
31	89346	1647775C1	59556	080-90016-97	SEAT BELT ASSEMBLY	2
32	89346	133322R1	59556	016-90005-61	WASHER, Flat, 5/16 inch	6
33	89346	494552C1	59556	080-90016-99	ADJUSTER, Seat, Right	1
34	89346	467845C1	59556	080-90016-100	WIRE, Seat Release	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-89. CAB GLASS

(E-287 Blank)/E-288

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-89. Cab Glass.

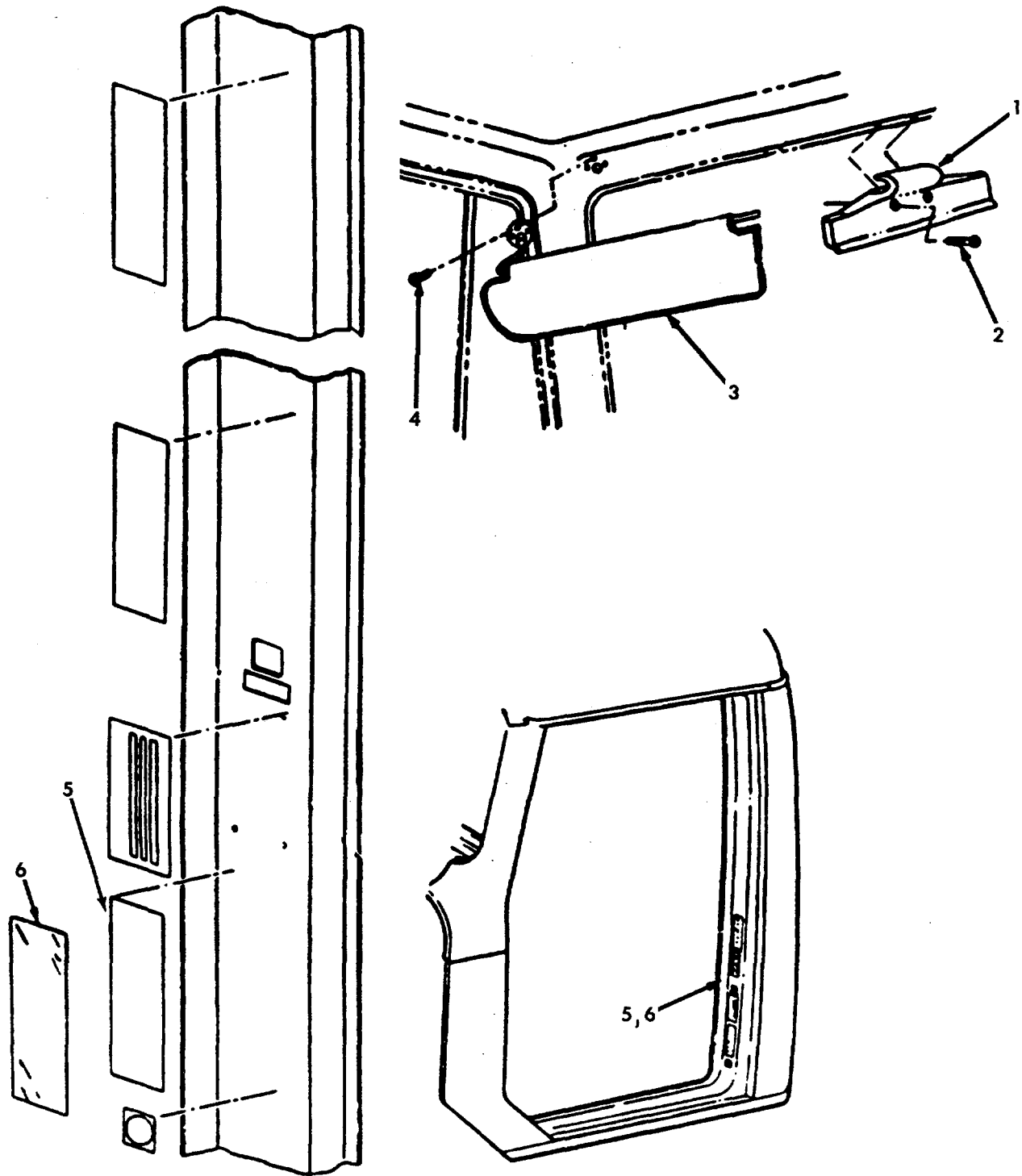
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1		NSS			INTERIOR TRIM AND WINDOW GUARD ASSEMBLY	1
2	89346	584700C1	59556	080-90016-318	HEADLINER, Cab Roof Right	16
3		NSS			RETAINER, Headliner	1
4		NSS			INSULATOR, Roof Panel Right	1
5		NSS			INSULATOR, Roof Panel Left	1
6	89346	490707C1	59556	080-90016-322	HEADLINER, Cab Roof Left	2
7	89346	412567C1	59556	080-90016-323	MOULDING, Inner Corner Trim	1
8	89346	27210R1	59556	080-90016-324	HOOK, Coat	1
9	89346	495419C4	59556	080-90016-325	SCREW, Oval Cross Recessed Head, No. 10-16 x 1 inch	1
10	93395	1156T	59556	080-90016-326	RETAINER, Rear Glass	1
11	89346	506891C1	59556	080-90016-327	GLASS, Rear Window	1
12	89346	27231R1	59556	080-90016-101	HANDLE, Grab	2
13	89346	538105C1	59556	080-90016-329	SCREW, Pan Head, Stainless Steel, 5/16-18 x 3/4 inch	1
14	89346	456394C1	59556	080-90016-330	REINFORCEMENT, Grab Handle	4
15	89346	471847C1	59556	980-90016-142	VALVE, Drain Seal	2
16	89346	27204R1	59556	080-90016-145	PLATE, Scuff	16
17	89346	456297C1	59556	380-90016-333	SCREW, Pan Cross Recessed Head, No. 8-18 x 3/4 inch	8
18	89346	27306R1	59556	080-90016-143	WASHER, Finish No. 8	8
19	89346	449765C1	59556	080-90026-335	WASHER, Flat, No. 8	2
					TRIM, Cab Door Opening	



## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-89. Cab Glass.

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	489684C6	59556	080-90016-336	PANEL, Inner Trim Left, Chestnut	1
21	89346	27888R1	59556	080-90016-337	SCREW, Oval Cross Recessed Head, No. 10-16 c 5/8 inch	5
22	89346	439743C1	59556	080-90016-338	WASHER, Finish No. 10	5
23	89346	572094C1	59556	080-90016-339	SEAL, Hood To Cowl	1
24	89346	572094C2	59556	080-90016-340	SEAL, Cowl To Hood	1
25	89346	454269C3	59556	080-90016-341	RETAINER, Windshield,	1
26	89346	476222C1	59556	080-90016-342	MOULDING, Weather Seal	1
27	93395	4645T	59556	080-90016-343	GLASS, Windshield	1
28	89346	466776C1	59556	080-90016-344	COVER, Airhorn Valve Opening	1
29	89346	166991	59556	080-90016-345	SCREW, Pan Head Cross, No. 6-32 x 3/9 inch	2
30	89346	489690C6	59556	080-90016-346	PANEL, Inner Trim Right, Chestnut	1
31	89346	27888R1	59556	080-90016-337	SCREW, Oval Cross Recessed Head, No. 10-16 x 5/8 inch	5
32	89346	439743C1	59556	080-90016-338	WASHER, Finish No. 10	5
33	89346	489687C4	59556	080-90016-349	PANEL, Inner Trim Center, Chestnut	1
34	89346	27888R1	59556	080-90016-337	SCREW, Oval Cross Recessed Head, No. 10-16 x 5/8 inches	11
35	89346	439743C1	59556	080-90016-338	WASHER, Finish No. 10	11
36	89346	482557C1	59556	080-90016-352	RETAINER, Back Panel Trim	2
37	89346	163162	59556	080-90016-353	SCREW, Pan Cross Recessed Head, No. 8-18 x 1/2 inch	4
38	89346	270081C91	59556	080-90016-354	INSULATOR, Back Panel Corner	2
39	89346	270081C91	59556	080-90016-354	INSULATOR, Back Panel Center	1



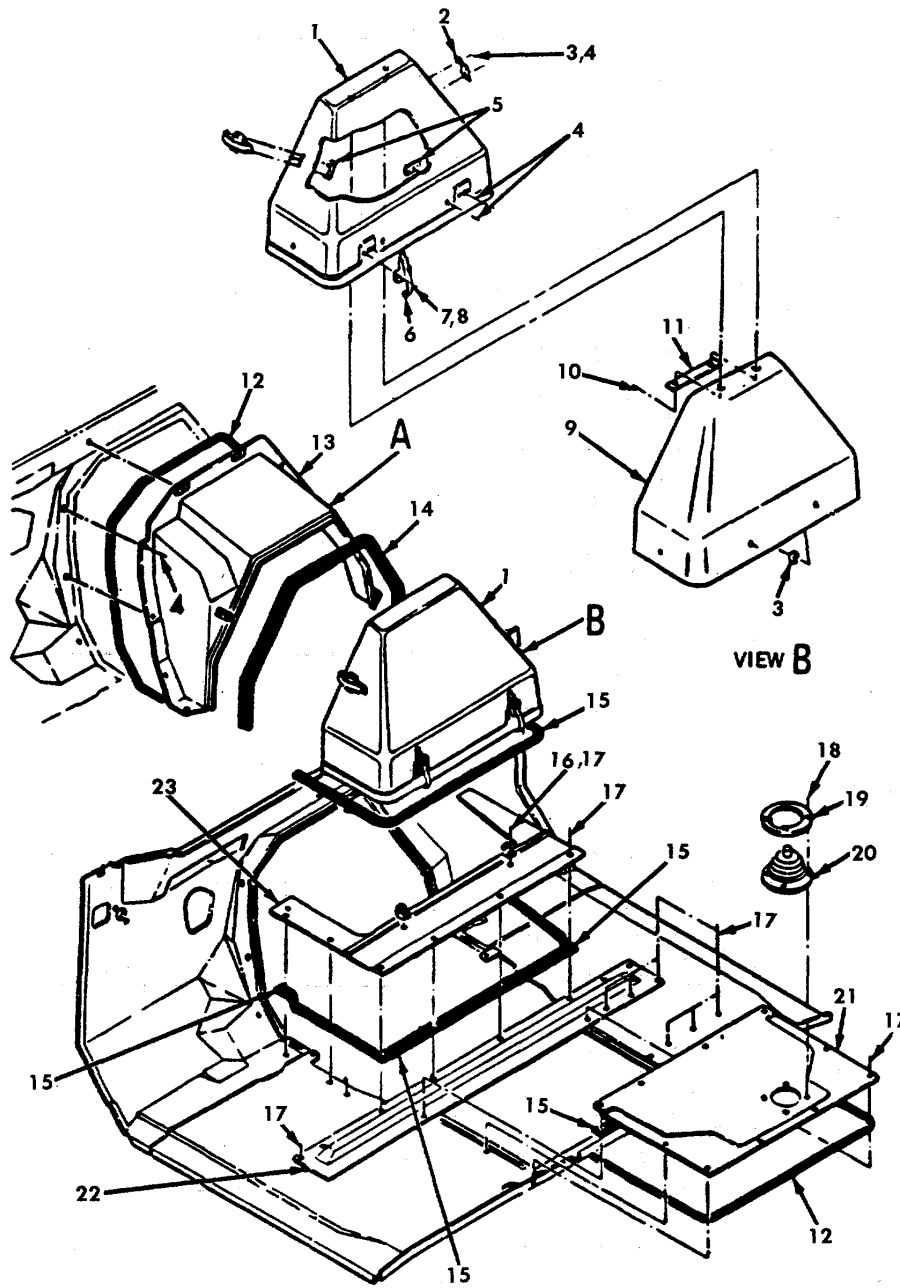
GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-90. SUN VISOR AND PRODUCT GRAPHIC

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-90. Sun Visor and Product Graphic

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	579900C1	59556	080-90016-311	VISOR ASSEMBLY, Sun	1
2	89346	26627R1	59556	015-90005-12	BRACKET, Sun Visor	2
3	89346	490686C91	59556	080-90016-313	SCREW, No.10-16 x 3/4 inch Plain	2
4	89346	495764C1	59556	080-90016-314	VISOR, Sun, Standard-Chestnut	6
5	89346	421197C2	59556	080-90016-315	SCREW, Special, No.10-32 x 3/4 inch	1
6	89346	435654C1	59556	080-90016-316	PRODUCT GRAPHIC, Safety Compliance Certificate COVER, Protective	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-91. ENGINE AND TRANSMISSION COVER

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

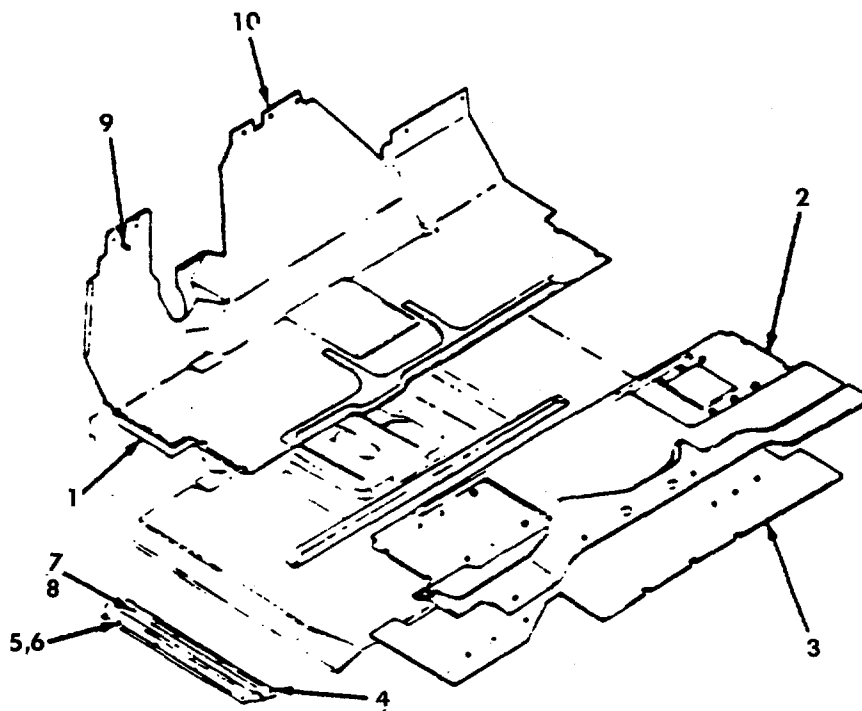
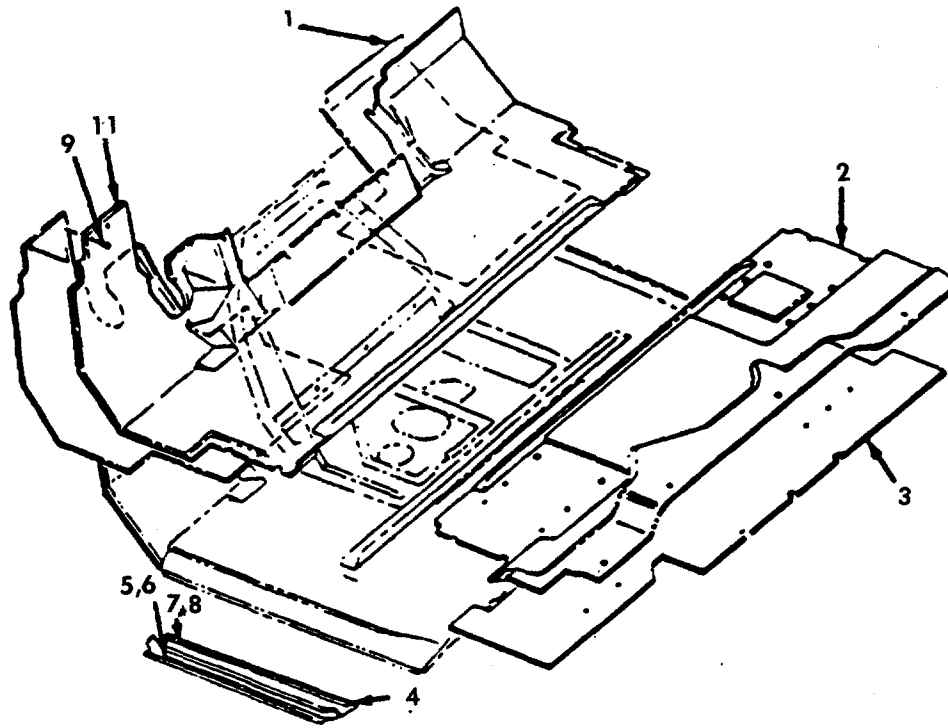
Figure E-91. Engine and Transmission Cover

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					ENGINE AND TRANSMISSION COVER ASSEMBLY	REF
1	89346	493430C91	59556	080-90016-117	COVER, Engine Rear, Chestnut	1
2	89346	480502C1	59556	080-90016-118	BRACKET, Engine Cover	1
3	89346	477461C1	59556	080-90016-119	WASHER, Cup	12
4	89346	575359C1	59556	080-90016-120	RIVET, Blind	7
5	59556	080-90016-121	59556	080-90016-121	STRIP, Reinforcing, Cover Latch	3
6	89346	669184R1	59556	080-90016-122	LATCH, Clamp Type	1
7	89346	27216R1	59556	080-90016-123	SCREW, Pan Head, 10-24x1/2 inch	6
8	89346	3/16R	59556	M835338-43	WASHER, Lock, 3/16 inch	6
9	89346	489539C1	59556	080-90016-125	INSULATOR, Engine Cover Rear	1
10	59556	MS35206-263	59556	MS35206-263	SCREW, Pan Head, 10-18x1/2 inch	2
11	59556	080-90016-126	59556	080-90016-126	REINFORCEMENT, Insulator Mounting	1
12	59556	080-90016-127	59556	080-90016-127	TAPE, Sealing	1
13	89346	493428C91	59556	080-90016-128	COVER, Engine Front, Chestnut	1
14	89346	480509C1	59556	080-90016-129	SEAL, Engine Cover	1
15	89346	118147C1	59556	080-90016-130	SEAL	5
16	89346	480503C1	59556	080-90016-131	BRACKET, Latch Retaining	2
17	89346	403810C91	59556	019-90004-232	SCREW, Hex Head, 5/16-18x1 inch	AR
18	89346	27198R1	59556	080-90016-133	SCREW, Pan Head, 10-18x1/2 inch	6
19	89346	79444R1	59556	080-90016-134	RETAINER, Shift Seal	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-91. Engine and Transmission Cover

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	79445R1	59556	080-90016-135	SEAL, Shift Lever	1
21	89346	489507C1	59556	080-90016-136	COVER, Transmission Rear	1
22	89346	473961C2	59556	080-90016-137	REINFORCEMENT, Center Crossmember	1
23	89346	489478C3	59556	080-90016-138	SHIELD, Engine Cover	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES,  
CONTROLS, AND INDICATORS

FIGURE E-92. FLOOR MAT

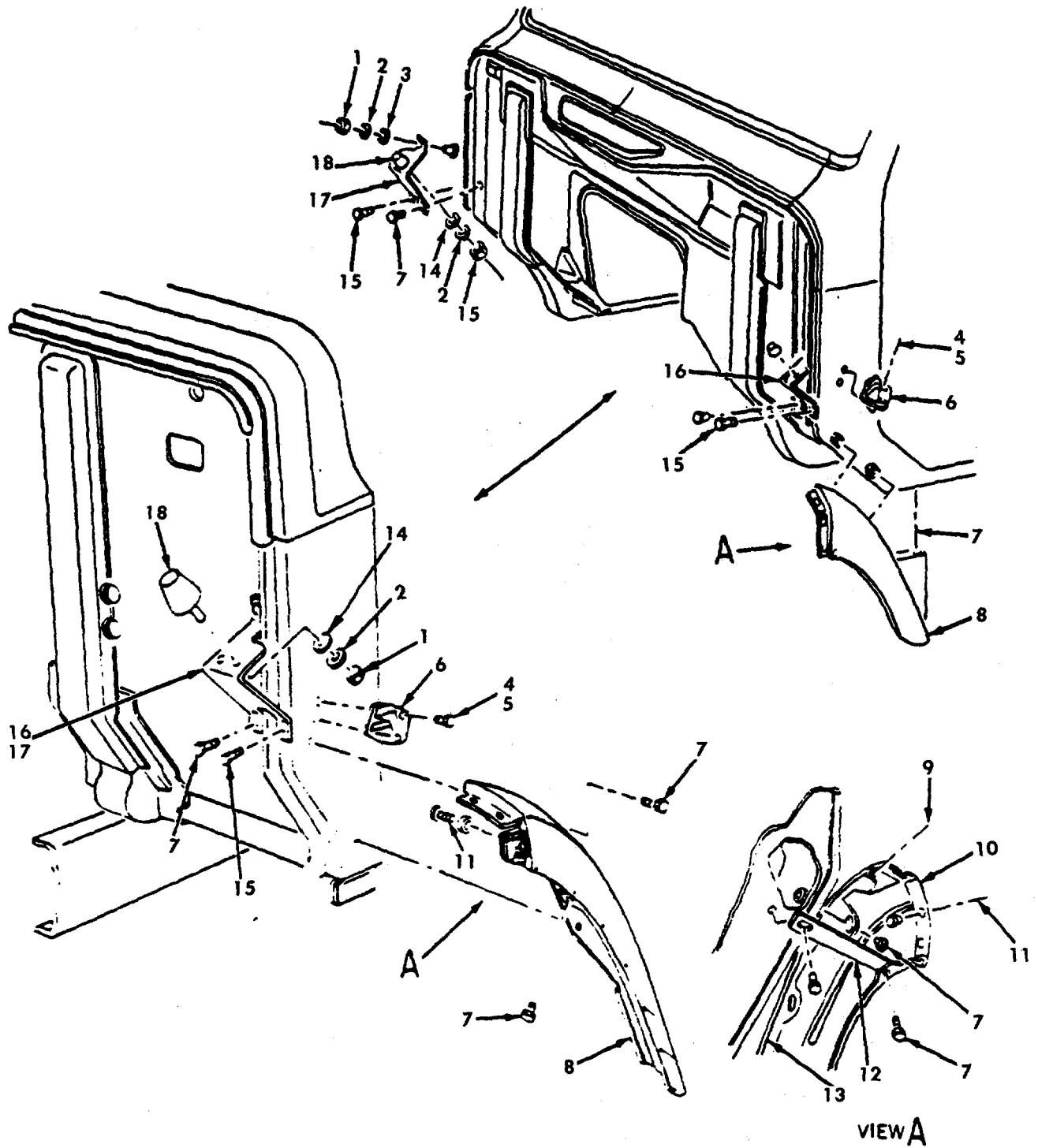
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Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-92. Floor Mat

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	990692C1	59556	080-90016-139	MAT ASSEMBLY, Floor INSULATOR, Sound Deadner Mat, Front One Piece	REF 1
2	89346	489484C1	59556	080-90016-140	MAT, Floor, Rear	1
3	89346	990692C1	59556	080-90016-139	INSULATOR, Sound Deadner	1
4	89346	471847C1	59556	080-90016-142	PLATE, Scuff	2
5	89346	27306R1	59556	080-90016-143	WASHER, Flange, No.8	8
6	89346	335062C1	59556	080-90016-144	SCREW, Pan Head Cross, No.8-18 x 1/2 inch	8
7	89346	27204R1	59556	080-90016-145	SCREW, Oval Head Cross, No.8-18 x 3/4 inch	AR
8	89346	140259	59556	080-90016-146	WASHER, Finish No.8	AR
9	89346	435292C1	59556	080-90016-147	FASTENER, Mat	8
10	89346	489930C1	59556	080-90016-148	MAT, Floor, Front	1
11	89346	489360C1	59556	080-90016-149	MAT, Floor, Front, One Piece	1





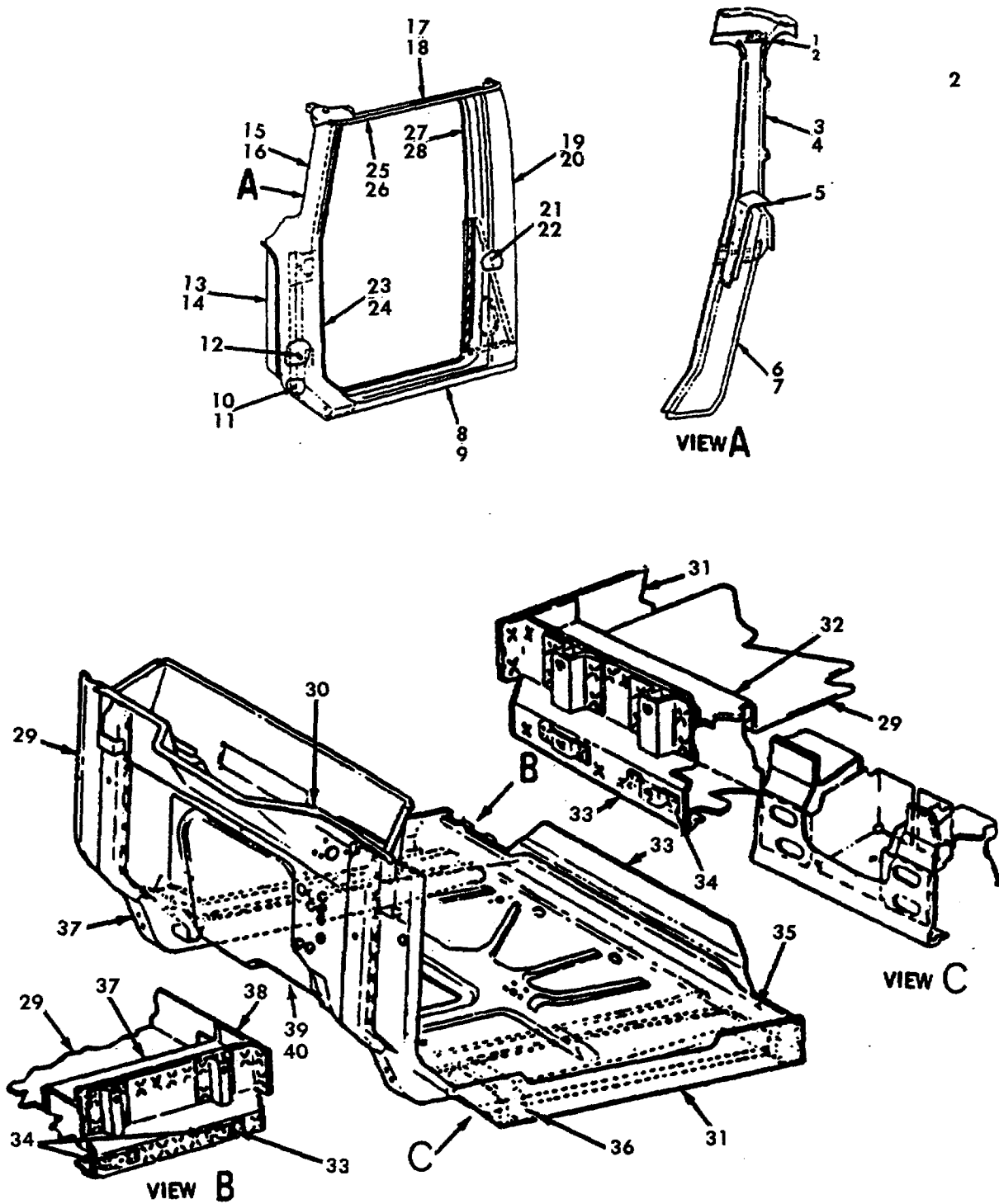
GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-93. FRONT SHEET METAL

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-93. Front Sheet Metal

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					FRONT SHEET METAL ASSEMBLY	REF
1	89346	25520R1	59556	030-00008-02	NUT, Hex, 5/16-18	4
2	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	6
3	89346	25708R1	59556	015-90005-21	WASHER, Flat, 5/16 inch	2
4	89346	27231R1	59556	080-90016-101	SCREW, Pan Head, 5/16-18x3/4 inch	4
5	89346	27304R1	59556	080-90016-102	WASHER, Lock, 5/16 inch	4
6	89346	500271C1	59556	080-90016-103	CATCH, Hood Latch	2
7	89346	393014C91	59556	080-90016-104	BOLT, Hex Head, 5/16-18x3/4 inch	AR
8	89346	456334C1	59556	080-90016-105	PANEL, Fender Extension, Left	1
	89346	456335C1	59556	080-90016-106	PANEL, Fender Extension, Right	1
9	89346	328388C1	59556	080-90016-107	SCREW, Pan Head, #10-16x1/2 inch	2
10	89346	474651C2	59556	080-90016-108	SEAL, Fender Extension	2
11	89346	486149C2	59556	080-90016-109	RIVET, 3/16 inch	6
12	59556	080-90016-110	59556	080-90016-110	BRACE, Fender Extension	2
13	89346	264308R1	59556	080-90016-111	SEALER, String Butyl, 1/8 inch	AR
14	89346	668569R1-	59556	080-90016-112	WASHER, Flat, 5/16 inch	4
15	89346	26520R1	59556	080-90016-113	SCREW, Pan Head, 1/4-14x3/4 inch	4
16	89346	488994C3	59556	080-90016-114	BRACKET, Hood Stop. Left	1
17	89346	488995C3	59556	080-90016-115	BRACKET, Hood Stop, Right	1
18	89346	472697C1	59556	080-90016-116	BUMPER, Hood Locator	2



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-94. CAB UNDERBODY AND SIDE PANEL

## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

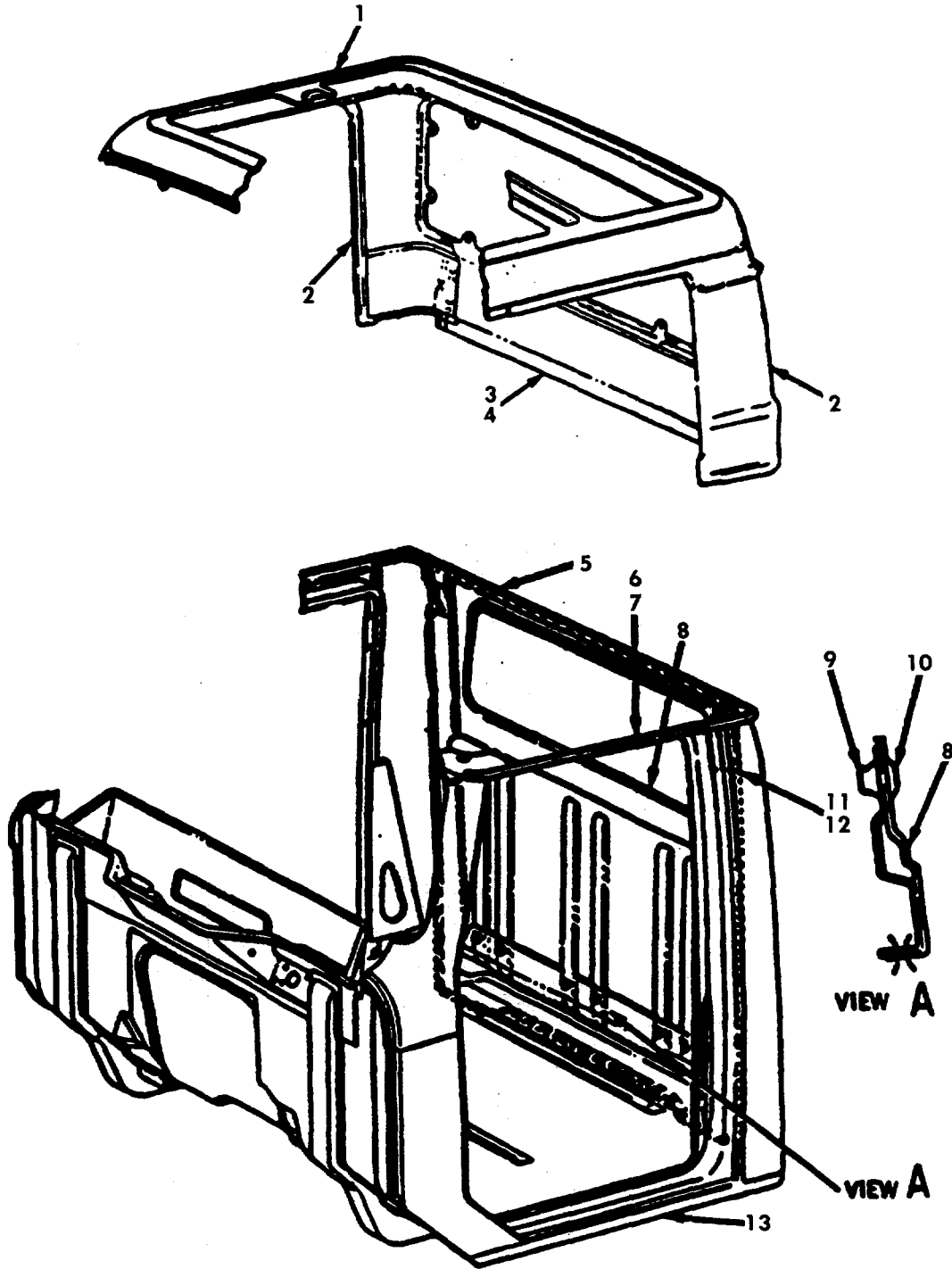
Figure E-94. Cab Underbody and Side Panel.

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	449678C2	59556	080-90016-271	PANEL ASSEMBLY, Side PANEL, Side Inner, With Side Opening Upper Left	1
2	89346	449679C2	59556	080-90016-272	PANEL, Side Inner, With Side Opening Upper Right	1
3	89346	449684C2	59556	080-90016-273	PANEL, Side Inner, With Side Opening Left	1
4	89346	449685C2	59556	080-90016-274	PANEL, Side Inner, With Side Opening Right	1
5		NSS			BRACKET, Cowl Rear	2
6	89346	444046C1	59556	080-90016-276	PANEL, Side Inner, Lower Left	1
7	89346	444047C1	59556	080-90016-277	PANEL, Side Inner, Lower Right	1
8	89346	443976C1	59556	080-90016-278	PANEL, Rocker, Side Outer, Left	1
9	89346	443977C1	59556	080-90016-279	PANEL, Rocker, Side Outer, Right	1
10	89346	444039C2	59556	080-90016-280	PILLAR, Body Hinge, Left	1
11	89346	444040C2	59556	080-90016-281	PILLAR, Body Hinge, Right	1
12	89346	344724C1	59556	080-90016-282	WELDNUT, 5/16-18	2
13	89346	489877C2	59556	080-90016-283	PANEL, Dash Filler, Left	1
14	89346	489878C2	59556	080-90016-284	PANEL, Dash Filler, Right	1
15	89346	443987C2	59556	080-90016-285	PANEL, Side Outer, With Side Opening Left	1
16	89346	444988C2	59556	080-90016-286	PANEL, Side Outer, With Side Opening Right	1
17	89346	475737C2	59556	080-90016-233	PANEL, Side Welded, Left	1
18	89346	475738C2	59556	080-90016-288	PANEL, Side Welded, Right	1

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-94. Cab Underbody and Side Panel

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	89346	443972C1	59556	080-90016-289	PANEL, Corner Rear Outer, Left	1
20	89346	443973C1	59556	080-90016-290	PANEL, Corner Rear Outer, Right	1
21	89346	449694C1	59556	080-90016-291	REINFORCEMENT, Lock Pillar, Left	1
22	89346	449695C1	59556	080-90016-292	REINFORCEMENT, Lock Pillar, Right	1
23	89346	443979C2	59556	080-90016-293	PANEL, Cowl, Side Outer, Left	1
24	89346	443980C2	59556	080-90016-294	PANEL, Cowl, Side Outer, Right	1
25	89346	443991C2	59556	080-90016-295	MOULDING, Dripside, Left	1
26	89346	443992C2	59556	080-90016-296	MOULDING, Dripside, Right	1
27	89346	444026C2	59556	080-90016-297	FRAME, Door Opening, Left	1
28	89346	444027C2	59556	080-90016-298	FRAME, Door Opening, Right	1
29		NSS			PANEL, Dash and Floor	1
30	89346	444052C1	59556	080-90016-299	PANEL, Air Intake	1
31	89346	444044C1	59556	080-90016-300	SILL, Side Inner Left	1
32	89346	489994C5	59556	080-90016-301	SILL, Underbody Left	1
33	89346	489497C1	59556	080-90016-302	REINFORCEMENT, Rear Sill	1
34	89346	473865C1	59556	080-90016-303	BRACKET, Accessories, Mounting	AR
35	89346	443998C2	59556	080-90016-304	SILL, Rear	1
36	89346	257926C1	59556	080-90016-239	WELDNUT, 5/16-18	2
37	89346	489995C4	59556	080-90016-306	SILL, Underbody Right	1
38	89346	444045C1	59556	080-90016-307	SILL, Side Inner Right	1
39	89346	444077C2	59556	080-90016-308	PANEL FLOOR, Engine Opening Left	1
40	89346	444078C2	59556	080-90016-309	PANEL FLOOR, Engine Opening Right	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES,  
CONTROLS, AND INDICATORS

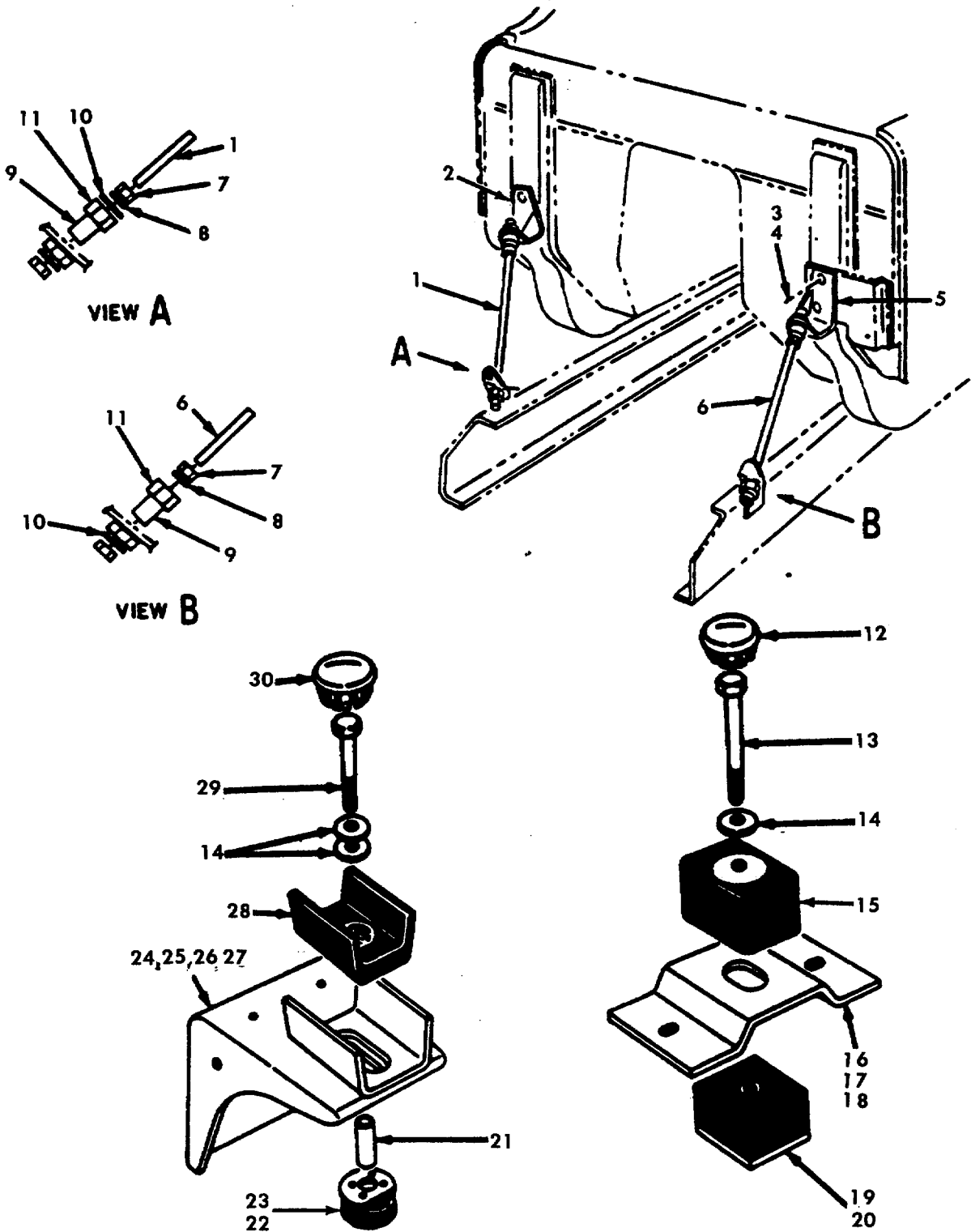
FIGURE E-95. ROOF PANEL

(E-305 Blank)/E-306

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-95. Roof Panel

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	498387C2	59556	080-90016-228	PANEL, Roof Inner	1
2	89346	444068C3	59556	080-90016-229	PANEL, Back Inner	1
3	89346	444073C3	59556	080-90016-230	PANEL, Inner Corner, Left	1
4	89346	444074C3	59556	080-90016-231	PANEL, Inner Corner, Right	1
5	89346	443993C2	59556	080-90016-232	MOULDING, Drip, Rear	1
6	89346	475737C2	59556	080-90016-233	PANEL, Side Left	1
7	89346	47738C2	59556	080-90016-234	PANEL, Side Right	1
8	89346	443978C1	59556	080-90016-235	PANEL, Back Outer	1
9	89346	472307C1	59556	080-90016-236	RIVET, Collar	6
10	89346	456382C1	59556	080-90016-237	FASTENER, Back Panel Lower	6
11	89346	579514C91	59556	080-90016-238	REINFORCEMENT, Corner, Muffler	AR
12	89346	257926C1	59556	080-90016-239	WELDNUT, 5/16-18	2
13		NSS			UNDERBODY	1



GROUP 12. CAB ASSEMBLY, LIGHTS, SWITCHES, GAUGES, CONTROLS, AND INDICATORS

FIGURE E-96. CAB STAY RODS AND MOUNTING



## Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

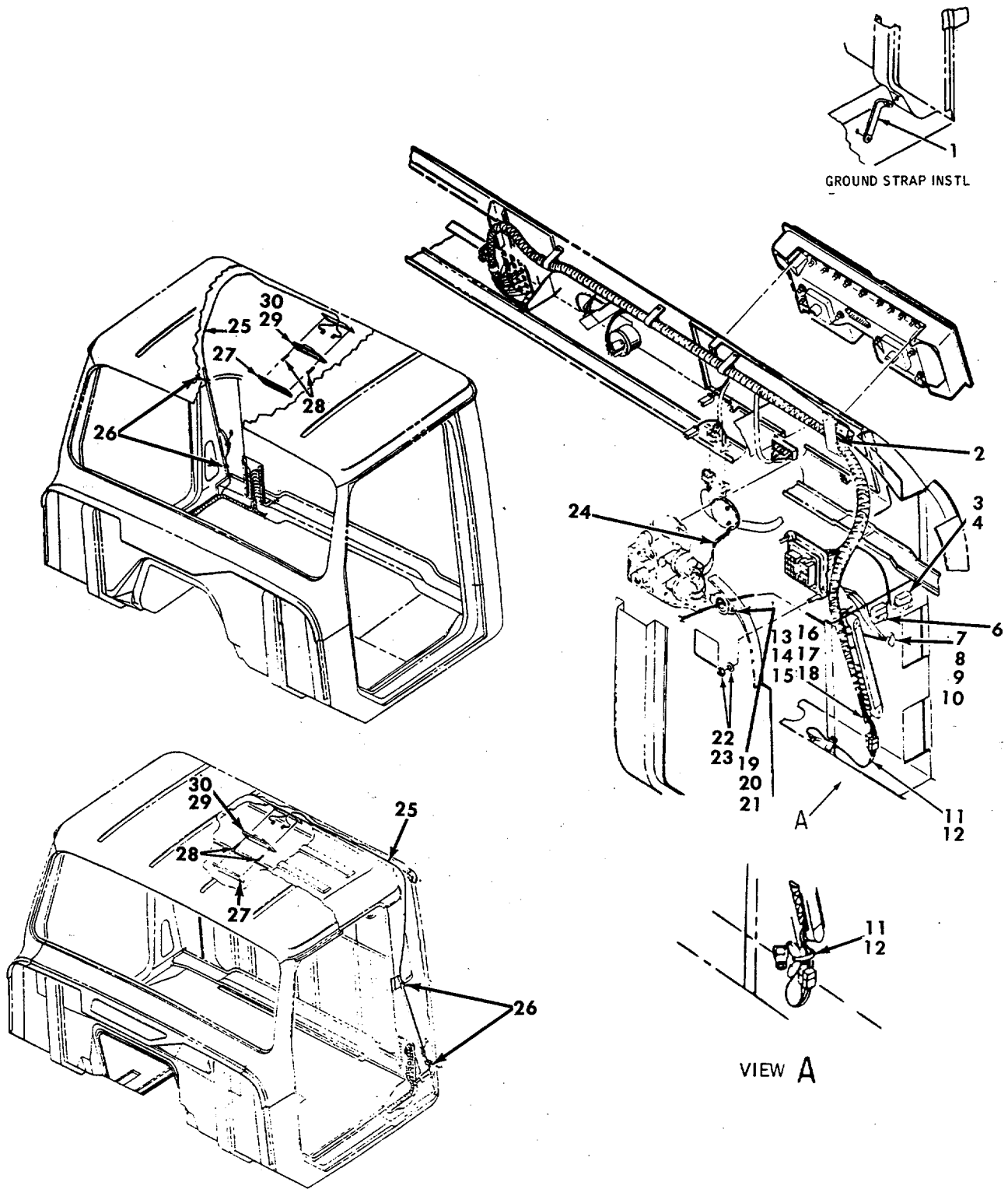
Figure E-96. Cab Stay Rods and Mounting

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					ROD, CAB STAY AND CAB MOUNTING ASSEMBLY	
1	89346	483929C2	59556	080-90016-241	ROD, Cab Stay Right	1
2	89346	483922C2	59556	080-90016-242	BRACKET, Stay Rod Mounting, Right	1
3	89346	24840R1	59556	080-90016-243	BOLT, Hex Head, 3/8-UNC x 1 inch	4
4	89346	3/8R	59556	MS35338-46	WASHER, Locking, 3/8 inch	4
5	89346	483920C2	59556	080-90016-245	BRACKET, Stay Rod Mounting, Left	1
6	89346	490711C2	59556	080-90016-246	ROD, Cab Stay Left	1
7	89346	25528R1	59556	039-90013-19	NUT, Hex, 5/8-11 UNC	8
8	89346	5/8R	59556	MS35338-50	WASHER, Locking, 5/8 inch	8
9	89346	474923C1	59556	080-90016-249	SPACER, Stay Rod	4
10	89346	5/8T	59556	MS27183-21	WASHER, Flat, 5/8 inch	8
11	89346	299338C1	59556	080-90016-251	INSULATOR, Stay Rod	8
12	89346	432564	59556	080-90016-252	PLUG, Button	4
13	89346	25507R1	59556	016-90005-36	BOLT, Hex Head, 1/2 NC x 3-3/4 inch	8
14	89346	474211C1	59556	080-90016-254	WASHER, Flat, 17/32 inch	6
15	89346	475941C1	59556	080-90016-255	INSULATOR, Body Mounting	2
16	89346	477525C1	59556	080-90016-256	BRACKET, Cab Rear Mounting	2
17	89346	414052C1	59556	009-90006-54	BOLT, Flange Hex Head, 1/2 NF x 1-1/2 inch	4
18	89346	414087C1	59556	006-90002-150	NUT, Locking, 1/2 NF	4
19	89346	473935C1	59556	080-90016-259	INSULATOR, Cab Rear Mounting	2
20	89346	9412230	59556	006-90002-159	NUT, Locking, 1/2-13	2

Group 12. Cab Assembly, Lights, Switches, Gauges, Controls, And Indicators

Figure E-96. Cab Stay Rods and Mounting

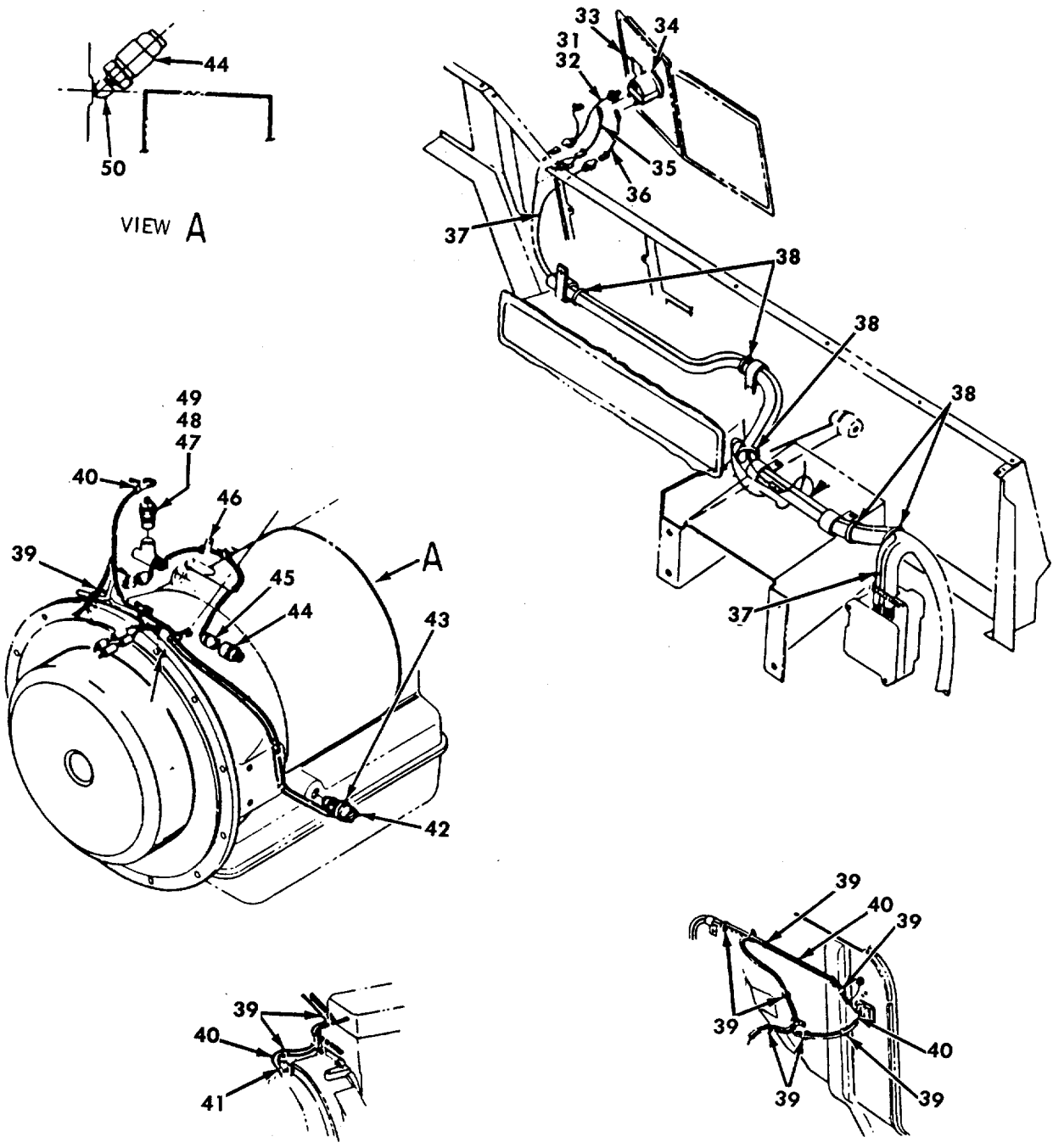
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	59556	080-90016-261	59556	080-90016-261	BUSHING	2
22	89346	473987C3	59556	080-90016-262	INSULATOR, Cab Mounting	2
23	89346	9412230	59556	006-90002-159	NUT, Locking, 1/2 inch	2
24	89346	468781C1	59556	080-90016-264	BRACKET, Cab Front Mounting Left	1
25	89346	480219C1	59556	080-90016-265	BRACKET, Cab Front Mounting Right	1
26	89346	414052C1	59556	009-90006-54	BOLT, Hex Head Flange, 1/2 NF x 1-3/4 inch	8
27	89346	414087C1	59556	006-90002-150	NUT, Flange Locking, 1/2 MF	8
28	89346	449713C2	59556	080-90016-268	INSULATOR, Cab Front Mounting	2
29	89346	25285R1	59556	080-90016-269	BOLT, Hex Head, 1/2 NC x 3-1/4 inch	2
30	89346	432449	59556	080-90016-270	PLUG, Button, 1-1/2 Diameter	4



GROUP 13. ELECTRICAL SYSTEM

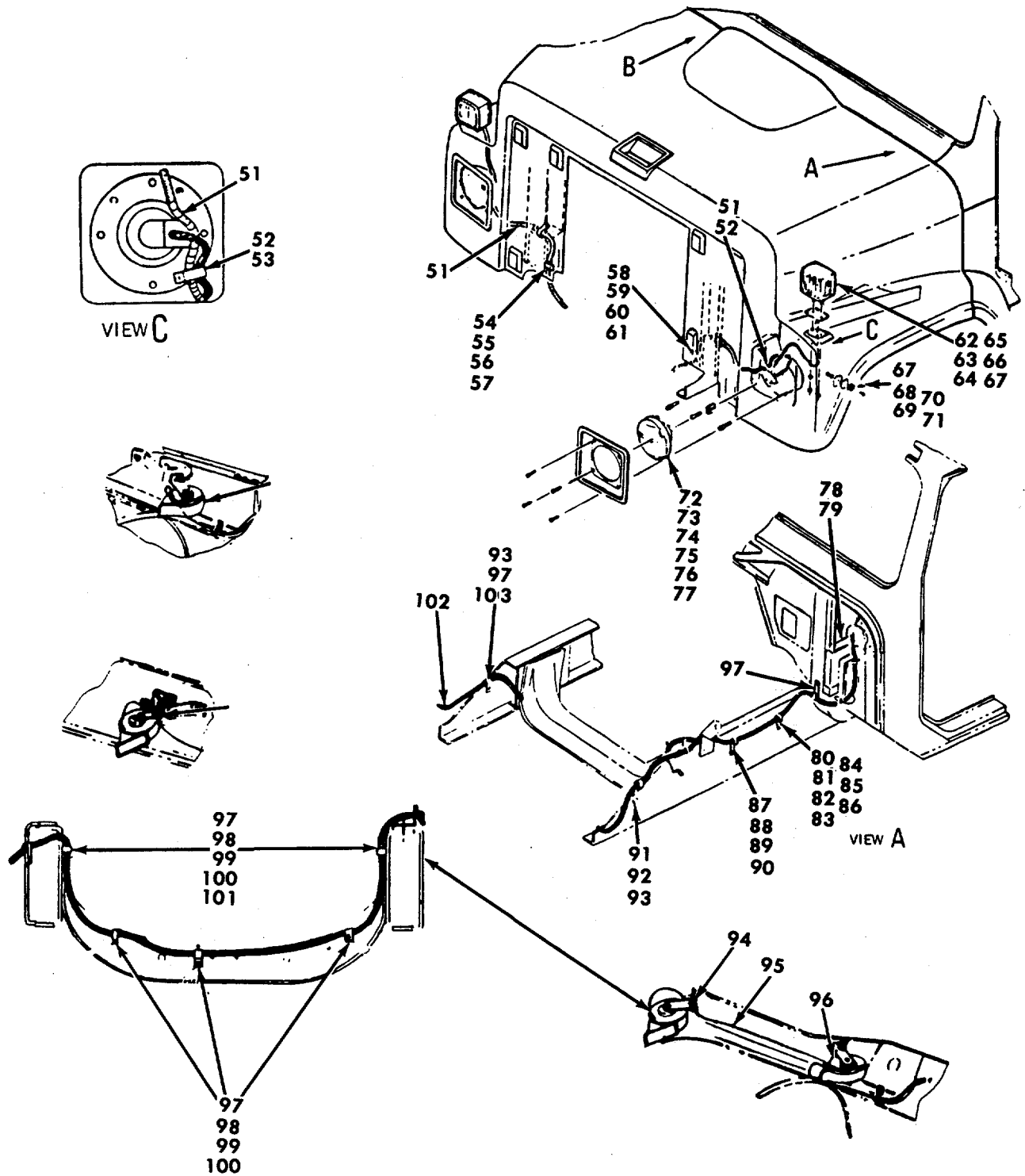
FIGURE E-97. CAB ELECTRICAL SYSTEMS (SHEET 1 OF 3)

(E-311 Blank)/E-312



GROUP 13. ELECTRICAL SYSTEM

FIGURE E-97. CAB ELECTRICAL SYSTEM (SHEET 2)



GROUP 13. ELECTRICAL SYSTEM

FIGURE E-97. CAB ELECTRICAL SYSTEM (SHEET 3)

## Group 13. Electrical System

Figure E-97. Cab Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	57040R91	59556	123-90006-1	ELECTRICAL SYSTEM STRAP, Ground	1
2	89346	314249C91	59556	123-90006-2	CLIP, J	1
3	89346	241120R91	59556	123-90006-3	RELAY, Horn	1
4	89346	26958R1	59556	123-90006-4	SCREW, Pan Head Cross Recessed Tap 1/4-14 x 3/4, Type B-SST-	2
5	89346	268690C91	59556	123-90006-5	BUZZER, Air	1
6	89346	26958R1	59556	123-90006-4	SCREW, Pan Head Cross Recessed Tap 1/4-14 x 3/4, Type B-SST-	2
7	89346	365628C1	59556	123-90006-7	BLOCK, Junction	1
8	89346	25709R1	59556	006-90002-168	WASHER, Flange, 3/8 inch	2
9	89346	124829	59556	123-90006-9	NUT, Jam, 3/8-16	2
10	89346	24392R1	59556	123-90006-10	SCREW, Pan Head Cross Recessed Tap, No.10-16 x 1/2, Type AB	2
11	89346	470271C91	59556	123-90006-11	SWITCH, Dimmer	1
12	89346	26328R1	59556	123-90006-12	SCREW, Pan Head Cross Recessed Tap, 1/4-14 x 1/2, Type B	2
13	89346	365054C1	59556	123-90006-13	EXTENSION, Cover Mounting	2
14	89346	24414R1	59556	123-90006-14	SCREW, Pan Head Cross Recessed Tap, 1/4-14 x 1-1/2 Type AB	2
15	89346	25707R1	59556	039-00013-51	WASHER, Flange, 1/4 inch	2
16	89346	19910R1	59556	123-90006-16	NUT, Hex Lock, No.10-24	12
17	89346	364991C1	59556	123-90006-17	COVER, Junction Block	1
18	89346	587055C1	59556	123-90006-18	PRODUCT GRAPHIC	1

Group 13. Electrical System

Figure E-97. Cab Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	89346	481366C1	59556	123-90006-19	RETAINER, Grommet	2
20	89346	480686C2	59556	123-90006-20	GROMMET	1
21	89346	163303	59556	123-90006-21	SCREW, Pan Head Cross Recessed, 1/4-14 x 1/2 inch, Type B	2
22	89346	25519R1	59556	019-90004-276	NUT, Hex, 1/4-20	2
23	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	2
24	89346	586937C91	59556	123-90006-23	HARNESS	1
25		NSS			HARNESS	1
26	89346	240765R1	59556	123-90006-24	CLIP, Push-On	2
27	89346	296446C1	59556	123-90006-25	LENS, Dome Lamp	1
28	89346	26282R1	59556	123-90006-26	SCREW, Pan Head Cross Recessed Tap No.6-20 x 3/4 inch	2
29	89346	463179C1	59556	123-90006-27	BASE, Dome Lamp	1
30	89346	294436C1	59556	123-90006-28	LAMP, 12V-12CP	1
31	89346	486092C91	59556	123-90006-29	HARNESS	1
32	89346	131282	59556	123-90006-30	LAMP, 1CP No.53	1
33	89346	436080C1	59556	123-90006-31	PRODUCT GRAPHIC	1
34	89346	486191C91	59556	080-90016-577	GAUGE, Temperature	1
35	89346	509292C91	59556	123-90006-33	CABLE	1
36	89346	509294C91	59556	123-90006-34	CABLE	1
37	89346	509291C91	59556	123-90006-35	CABLE, Red	1
38		NSS			TAPE, Plastic 3/4 inch Wide	AR
39	89346	289862C1	59556	123-90006-36	STRAP, Cable Lock	AR

## Group 13. Electrical System

Figure E-97. Cab Electrical System

ITEM NO	FSCM	OEM PART	FSCM	TRUE VENDOR	DESCRIPTION	QTY
40	89346	474745C92	59556	123-90006-37	CABLE	1
41	89346	406381C1	59556	123-90006-38	CLAMP	1
42	89346	439853C1	59556	123-90006-39	SWITCH, Neutral Safety	1
43	89346	289862C1	59556	123-90006-40	STRAP, Cable Lock	1
44	89346	416372C1	59556	123-90006-41	SWITCH, Back-Up Light	1
45	89346	468360C91	59556	123-90006-42	CABLE	1
46	89346	24848R1	59556	123-90006-43	BOLT, Hex Head, 7/16-14 UNC x 3/4 inch	1
47	89346	479758C1	59556	123-90006-44	GAUGE, Temperature Sender	1
48	89346	155999	59556	123-90006-45	NUT, Hex NO.10-32 UNF	1
49	89346	3/16R	59556	MS35338-43	WASHER, Lock, No.10	1
50	89346	9409927	59556	123-90006-46	ELBOW, 45° Degree, Brass, 1/8-27 NPTF	1
51	89346	571013C91	59556	123-90006-47	HARNESS, Front End Hood	2
52	89346	365215C1	59556	123-90006-48	CLAMP	2
53	89346	473148C1	59556	123-90006-49	SCREW, Pan Head Cross Recessed, 9/32-16 x 1/2 inch	2
54	89346	299566C1	59556	019-90004-404	CLAMP	1
55	89346	160544	59556	080-90016-383	SCREW, Pan Head Cross Recessed, 1/4-20D x 3/4 inch	1
56	89346	462457C1	59556	123-90006-52	NUT, C1inch, 1/4-20 UNC	1
57	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
58	89346	299566C1	59556	019-90004-404	CLAMP	1



## Group 13. Electrical System

Figure E-97. Cab Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
59	89346	160544	59556	080-90016-383	SCREW, Pan Head Cross Recessed, 1/4-20 x 3/4 inch	1
60	89346	462457C1	59556	123-90006-52	NUT, C1inch, 1/4-20 UNC	1
61	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
62	89346	449038C1	59556	123-90006-56	PAD, Turn Signal Light Mounting	2
63	89346	517263C91	59556	080-90016-165	Light, Turn Signal, (See Figure E-64 For Separate Breakdown)	2
64	89346	299407C1	59556	123-90006-56	CLAMP	2
65	89346	411597R1	59556	123-90006-57	NUT, Hex Lock, 5/16-18 UNC	4
66	89346	25708R1	59556	015-90005-21	WASHER, Flat, 5/16	4
67	89346	479666C1	59556	123-90006-59	REFLECTOR	2
68	89346	492897C1	59556	123-90006-60	PAD, Reflector Mounting, Left	1
	89346	492898C1	59556	123-90006-61	PAD, Reflector Mounting, Right	1
69	89346	27218R1	59556	123-90006-62	SCREW, Pan Head Cross Recessed Machine, No.10-24 UNC x 1.0	2
70	89346	120391	59556	123-90006-63	WASHER, Flat, No.10-24 UNC	2
71	89346	19910R1	59556	123-90006-16	NUT, Hex Lock, No.10-24 UNC	2
72	89346	465940C2	59556	123-90006-65	SCREW, Grommet, Headlight Adjustment	4
73	89346	450157C2	59556	123-90006-66	SPRING, Headlamp	2
74	89346	153789	59556	123-90006-67	SCREW, Filler Head Cross Recessed, 1/4-20 UNC x 3/4 inch	2
75	89346	465458C91	59556	080-90016-150	HEADLAMP, (See Figure E-62 For Separate Breakdown)	1
76	89346	576296C1	59556	123-90006-68	BEZEL, Headlamp	2

Group 13. Electrical System

Figure E-97. Cab Electrical System

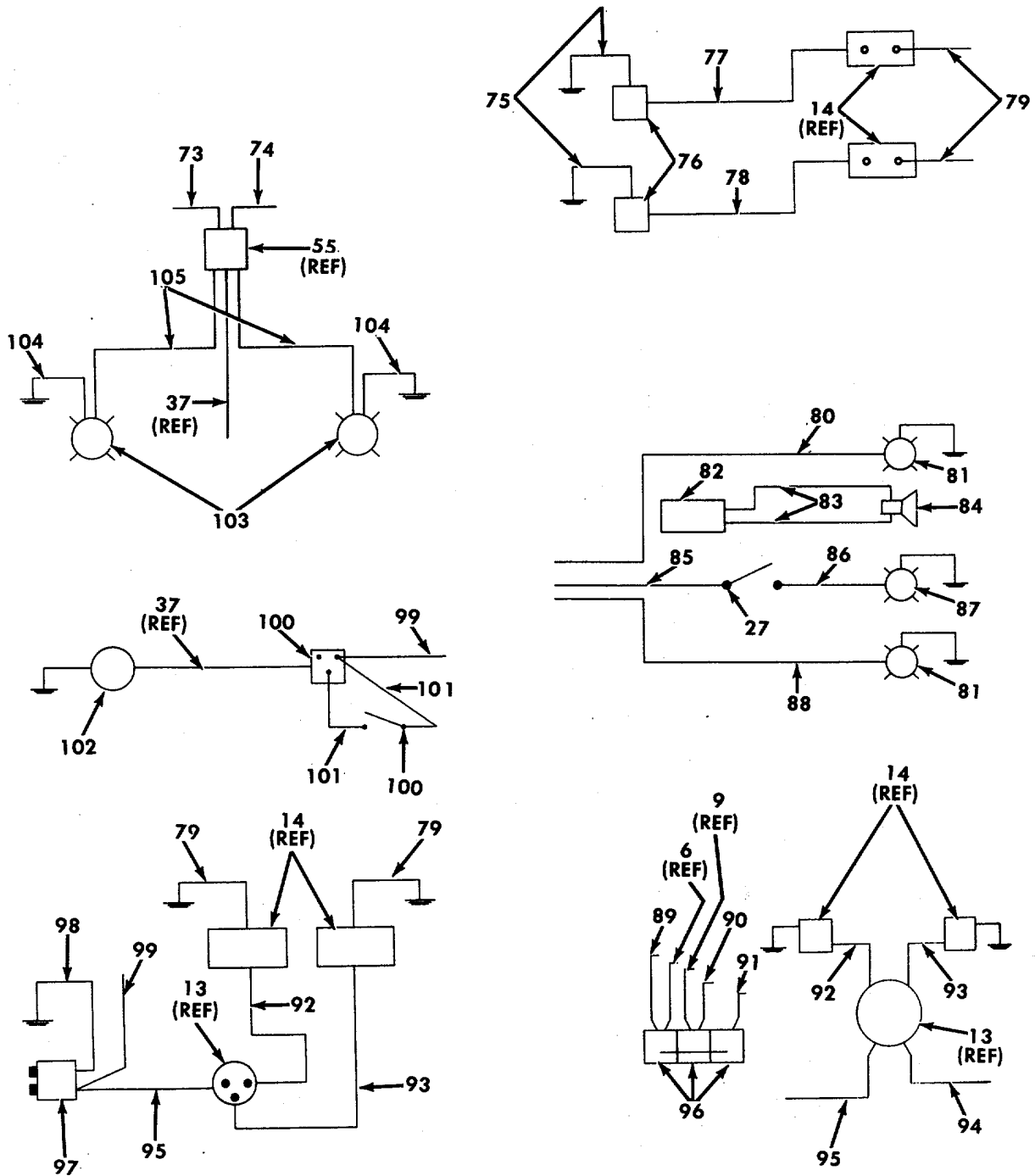
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
77	89346	473147C1	59556	123-90006-69	SCREW, Oval Cross Recessed Head, No.10-16 UNC x 3.4 inch	8
78	89346	25487R1	59556	123-90006-70	BOLT, Hex Head, 1/4-20 UNC x 1-1/2 inch	1
79	8934.6	25707R1	59556	039-00013-51	WASHER, Flat, 1/4 inch	1
80	89346	314249C91	59556	123-90006-2	CLAMP	1
81	89346	25222R1	59556	019-90004-277	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	1
82	89346	25519R1	59556	019-90004-276	NUT, Hex, 1/4-20 UNC	1
83	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
84	89346	275182C1	59556	123-90006-75	EXTENSION, C1ip	1
85	89346	25493R1	59556	015-90005-19	BOLT, Hex Head, 5/16-18 UNC x 1 inch	1
86	89346	9413977	59556	015-90005-20	NUT, Hex Lock, 5/16-18 UNC	1
87	89346	314249C91	59556	123-90006-2	CLAMP	1
88	89346	532434C1	59556	123-90006-79	BOLT, Special, 1/4-20 x 1.5	1
89	89346	25519R1	59556	019-90004-276	NUT, 1/4-20 Regular	1
90	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	1
91	89346	299566C1	59556	019-90004-404	CLAMP	1
92	89346	140483H	59556	016-90005-38	BOLT, Hex Head, 3/8-16 UNC x 1-1/4 inch	1
93	89346	9413979	59556	006-90002-170	NUT, Hex Lock, 3/8-16 UNC	1
94	89346	289862C1	59556	123-90006-36	STRAP, Cable Lock	AR
95	89346	291207C1	59556	039-00013-47	STRAP, Cable Lock	1

Group 13. Electrical System

Figure E-97. Cab Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
96	89346	191455R91	59556	123-90006-86	HORN, High Note	1
97	89346	299566CJ	59556	019-90004-404	CLAMP	5
98	89346	25222R1	59556	019-90004-277	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	5
99	89346	25519R1	59556	019-90004-276	NUT, Hex, 1/4-20 UNC	10
100	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	5
101	89346	25707R1	59556	123-90006-87	WASHER, Flat, 1/4 inch	2
102	89346	586967C91	59556	123-90006-88	HARNESS, Front End, Dash	1
103	89346	140483H	59556	123-90006-89	BOLT, Hex Head, 3/8-16 UNC x 1-1/4 inch	1





GROUP 13. ELECTRICAL SYSTEM  
 FIGURE E-98. BODY ELECTRICAL SYSTEM (SHEET 2)

Group 13. Electrical System

Figure E-98. Body Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	12662	M-393	59556	156-00001	COMPARTMENT LIGHT ASSEMBLY	REF
2	70418	052-00-722	59556	270-00004	LIGHT, C1earance	REF
3	59556	124-90001-1	59556	124-90001-1	WIRE, oil, Harness "L"	1
4	59556	124-90001-2	59556	124-90001-2	WIRE, 06L, Harness "L"	1
5	59556	124-90001-3	59556	124-90001-3	WIRE, 05L, Harness "L"	1
6	59556	124-90001-4	59556	124-90001-4	WIRE, 05c, Harness "C"	1
7	59556	124-90001-5	59556	124-90001-5	WIRE, 01D, Harness "D"	1
8	13445	4721-PB	59556	123-00052	BLOCK, Terminal	2
9	59556	124-90001-6	59556	124-90001-6	WIRE, 06c, Harness "C"	1
10	59556	124-90001-7	59556	124-90001-7	WIRE, 05M, Harness "M"	1
11	59556	124-90001-8	59556	124-90001-8	WIRE, 06M, Harness "M"	1
12	59556	124-90001-9	59556	124-90001-9	WIRE, 01M, Harness "M"	1
13	13445	M-705	59556	123-00046	BATTERY DISCONNECT SWITCH	REF
14	20038	COM-80	59556	123-00044	BATTERY	REF
15	57054	4-202	59556	123-00049	REMOTE	REF
16	59556	124-90001-10	59556	124-90001-10	CABLE, Remote To Inverter	1
17	57054	A40120	59556	123-00038	INVERTER	REF
18	59556	124-90001-11	59556	124-90001-11	WIRE, White	1
19	59556	124-90001-12	59556	124-90001-12	WIRE, 012, Harness "R"	1
20	59556	123-90005	59556	123-90005	RECEPTACLE ASSEMBLY, 110 VAC	REF
21	59556	124-90001-13	59556	124-90001-13	WIRE, 014, Harness "R"	1
22	59556	124-90001-14	59556	124-90001-14	WIRE, 016, Harness "R"	1

## Group 13. Electrical System

Figure E-98. Body Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	59556	124-90001-15	59556	124-90001-15	WIRE, 007, Harness "R"	1
24	7F200	305-500	59556	138-90005	FLOODLIGHT, Quartz Rear, 110 VAC	REF
25	7F200	305	59556	002-90002-1	FLOODLIGHT, Quartz Front, 110 VAC	REF
26	59556	124-90001-16	59556	124-90001-16	WIRE, 009, Harness "R"	1
27	59556	410239	59556	123-00047	SWITCH, Rocker Control Panel	REF
28	59556	124-90001-17	59556	124-90001-17	WIRE, 010, Harness "R"	1
29	59556	124-90001-18	59556	124-90001-18	WIRE, 008, Harness "R"	1
30	59556	124-90001-19	59556	124-90001-19	WIRE, 006, Harness, "R"	1
31	59556	124-90001-20	59556	124-90001-20	WIRE, 004, Harness "R"	1
32	13445	30056-30	59556	123-00053-7	BREAKER, Circuit, 30 AMP	2
33	59556	124-90001-21	59556	124-90001-21	WIRE, 015, Harness "R"	2
34	59556	124-90001-22	59556	124-90001-22	WIRE, 005, Harness "R"	1
35	59556	124-90001-23	59556	124-90001-23	WIRE, 011, Harness "R"	1
36	59556	124-90001-24	59556	124-90001-24	WIRE, 013, Harness "R"	1
37	59556	124-90001-25	59556	124-90001-25	WIRE, Black	4
37A	59556	124-90001-26	59556	124-90001-26	WIRE, Black, 4 Gauge, Harness "T"	1
38	59556	124-90001-27	59556	124-90001-27	CHASSIS WIRING	1
39	89346	463032C91	59556	080-90016-224	SWITCH, Ignition	REF
40	59556	124-90001-28	59556	124-90001-28	WIRE, 020	1
41	59556	124-90001-29	59556	124-90001-29	WIRE, 17	1
42	31211	9-18	59556	123-00048	REVERSE POLARITY PROTECTION SOLENOID	1
43	85925	85-102-05	59556	086-00020	AMMETER, Shunt W/Kit	1
44	59556	124-90001-30	59556	124-90001-30	WIRE, Orange, Harness "T"	1

Group 13. Electrical System

Figure E-98. Body Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
45	59556	124-90001-31	59556	124-90001-31	WIRE, 019	1
46	59556	124-90001-32	59556	124-90001-32	WIRE, 018	1
47	59556	124-90001-33	59556	124-90001-33	WIRE, Brown, Harness "T"	1
48	59556	124-90001-34	59556	124-90001-34	WIRE, Blue, Harness "T"	1
49	59556	124-90001-35	59556	124-90001-35	WIRE, Red/Black, 4 Gauge, Harness "T"	2
50	59556	124-90001-36	59556	124-90001-36	WIRE, Green/Black 4 Gauge, Harness "T"	1
51	59556	124-90001-37	59556	124-90001-37	WIRE, 021	1
52	59556	124-90001-38	59556	124-90001-38	WIRE, 022	1
53	35510	A0018050AB	59556	257-00010	ALTERNATOR	REF
54	59556	124-90001-39	59556	124-90001-39	WIRE, 017, harness "U"	1
55	57054	4-7211	59556	123-00057	RELAY, High Amperage By-Pass	1
56	59556	124-90001-40	59556	124-90001-40	WIRE, 16, Harness "U"	1
57	59556	123-00054	59556	123-00054	SWITCH, Safety Neutral	REF
58	59556	124-90001-41	59556	124-90001-41	WIRE, White/Red	1
59	57054	4-311	59556	123-00050	INVERTER THROTTLE	REF
60	89346	295417C91	59556	080-90016-574	SWITCH, Brake	REF
61	59556	123-90007	59556	123-90007	BLOCKING DOIDE	1
62	89346	470069C1	59556	080-90016-449	SWITCH, Turn Signal	REF
63	77977	CE-650-ST	59556	124-00004	LIGHT, Stop, Turn, Tail	REF
64	70418	057-00-712	59556	270-00002	LIGHT, Clearance, Red	REF
65	78977	AG-R-4413	59556	152-00003	SPOTLIGHT, Rear	REF
66	59556	124-90001-42	59556	124-90001-42	WIRE, 04, Harness "H"	1



## Group 13. Electrical System

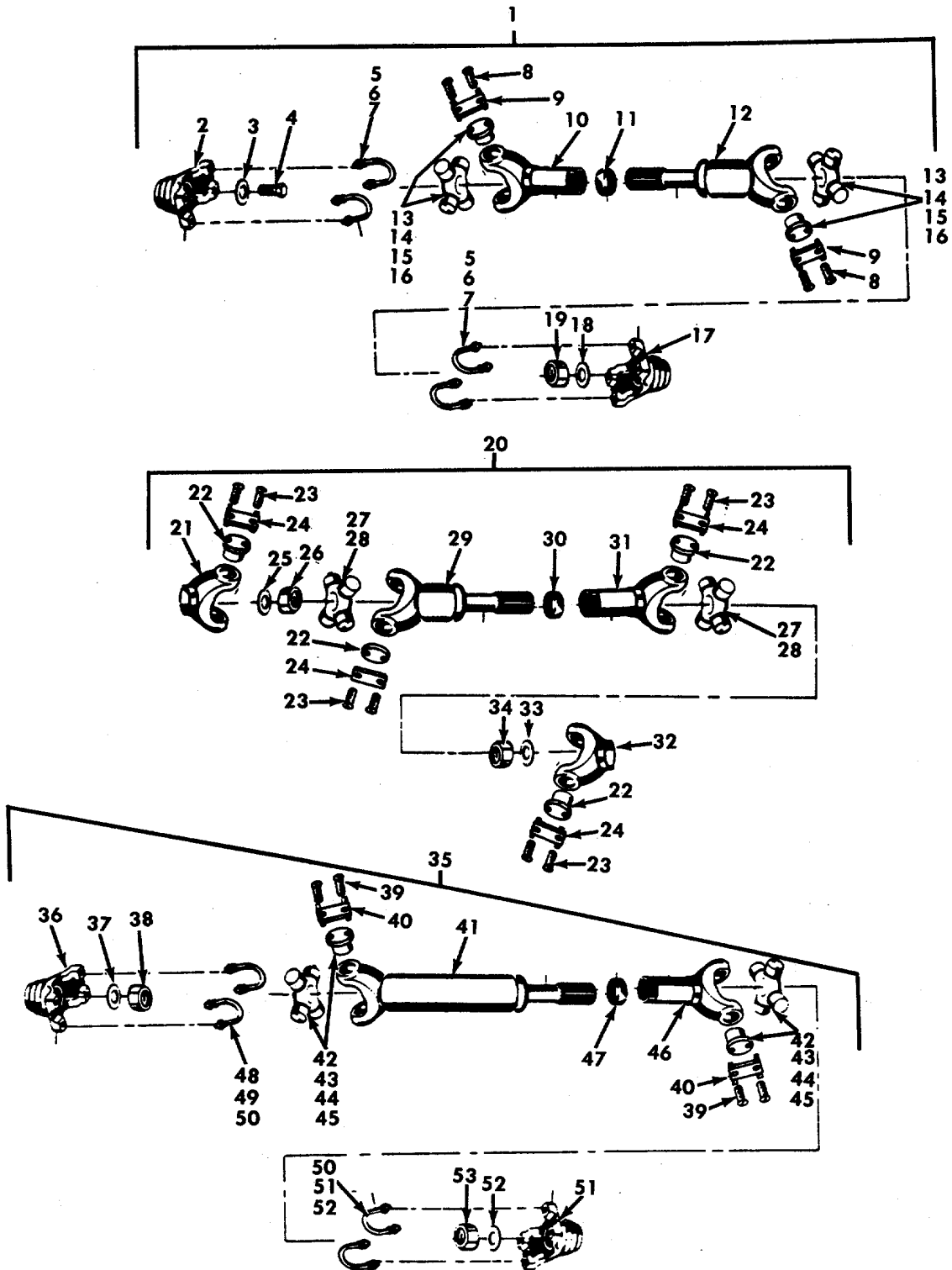
Figure E-98. Body Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
67	59556	124-90001-43	59556	124-90001-43	WIRE, 01S, Harness "S"	1
68	59556	124-90001-44	59556	124-90001-44	WIRE, 01H, Harness "H"	1
69	59556	124-90001-45	59556	124-90001-45	WIRE, 02H, Harness "H"	1
70	77977	2693W	59556	270-00001	LIGHT, Back-Up	REF
71	59556	124-90001-46	59556	124-90001-46	WIRE, 021, Harness "I"	1
72	59556	124-90001-47	59556	124-90001-47	WIRE, 02H, Harness "H"	1
73	59556	124-90001-48	59556	124-90001-48	WIRE, 017, Red	1
74	59556	124-90001-49	59556	124-90001-49	WIRE, 018, Black	1
75	59556	124-90001-50	59556	124-90001-50	WIRE, 12, Harness "G"	1
76	74545	5369C	59556	123-00039	PLUG, Charging	1
77	59556	124-90001-51	59556	124-90001-51	WIRE, 10, Harness "F"	1
78	59556	124-90001-52	59556	124-90001-52	WIRE, 11, Harness "F"	1
79	59556	124-90001-53	59556	124-90001-53	CABLE, Ground, 21, Harness "P"	1
80	59556	124-90001-54	59556	124-90001-54	wire, 09b, Harness "B"	1
81	79877	225B	59556	151-00007	SPOTLIGHT ASSEMBLY	REF
82	66461	3691	59556	125-00009	SIREN/PA CONTROL	REF
83	59556	124-90001-55	59556	124-90001-55	WIRE, 09a, Harness "B"	1
84	66461	PSE-58	59556	125-00010	SPEAKER, External	REF
85	59556	124-90001-56	59556	124-90001-56	WIRE, 07, Harness "B"	1
86	59556	124-90001-57	59556	124-90001-57	WIRE, 08, Harness "B"	1
87	76123	SW-24C	59556	152-00011	ROOF WARNING LIGHT ASSEMBLY	REF
88	59556	124-90001-58	59556	124-90001-58	WIRE, 09c, Harness "B"	1

Group 13. Electrical System

Figure E-98. Body Electrical System

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
89	59556	124-90001-59	59556	124-90001-59	WIRE, 08, Harness "B"	1
90	59556	124-90001-60	59556	124-90001-60	WIRE, 07, Harness "B"	1
91	59556	124-90001-61	59556	124-90001-61	WIRE, 25	1
92	59556	124-90001-62	59556	124-90001-62	WIRE, 19, harness "N"	1
93	59556	124-90001-63	59556	124-90001-63	WIRE, 20, Harness "O"	1
94	59556	124-90001-64	59556	124-90001-64	WIRE, Starter	1
95	59556	124-90001-65	59556	124-90001-65	WIRE, 14, Harness "J"	1
96	13445	30056-20	59556	123-0005305	CIRCUIT BREAKER, 20 AMP	4
97	59556	124-90001-66	59556	124-90001-66	PLUG, Jumper	1
98	59556	124-90001-67	59556	124-90001-67	WIRE, 13, Harness "K"	1
99	59556	124-90001-68	59556	124-90001-68	WIRE, 15, Harness "E"	1
100	38205	101516C001	59556	138-90004-06	SWITCH AND RELAY ASSEMBLY	REF
101	59556	124-90001-69	59556	124-90001-69	WIRE	1
102	38205	370023	59556	138-90004-138	MOTOR, Hose Reel	REF
103	12662	391	59556	156-00002	LIGHT COMPARTMENT, Engine	REF
104	59556	124-90001-70	59556	124-90001-70	WIRE, 24	1
105	59556	124-90001-71	59556	124-90001-71	WIRE, 18, Harness "A"	1



GROUP 14. PROPELLER SHAFT ASSEMBLY  
 FIGURE E-99. PROPELLER SHAFT ASSEMBLY

## Group 14. Propeller Shaft Assembly

Figure E-99. Propeller Shaft Assembly

ITEM NO	FSCM	OEM PART	FSCM	TRUE VENDOR	DESCRIPTION	QTY
1	89346	2557801124	59556	045-90003-1	PROPELLOR SHAFT ASSEMBLY, 12.4 inch Shaft	1
2	89346	500736C91	59556	045-90003-2	REAR OUTPUT FLANGE/YOKE	1
3	89346	9411417	59556	039-90008-242	WASHER	1
4	89346	23014159	59556	039-90008-249	BOLT	1
5	89346	204138R1	59556	045-90003-5	U-BOLT	4
6	89346	120383	59556	045-90003-6	WASHER	4
7	89346	25525R1	59556	045-90003-7	NUT	4
8	89346	118823R1	59556	045-90003-8	BOLTS	8
9	89346	865849R1	59556	045-90003-9	LOCKSTRAP	4
10	89346	890154R91	59556	045-90003-10	SLIP YOKE	1
11	89346	54554H	59556	045-90003-11	DUST SHIELD	1
12	89346	2557213124	59556	045-90003-12	SERVICE TUBE ASSEMBLY	1
13		NSS			CROSS	2
14		NSS			CAP BEARING	8
15		NSS			SNAP RING	8
16		NSS			GREASE FITTING	2
17	89346	200990R1	59556	045-90003-13	FORWARD INPUT FLANGE/YOKE	1
18	89346	504224C1	59556	045-90003-14	WASHER	1
19	89346	19990R1	59556	045-90003-15	NUT	1
	89346	213882R91	59556	045-90003-16	U-JOINT REPAIR KIT, (Includes Items, (1) No.13, (4) No.14, (4) No.15, (1) No.16)	1

Group 14. Propeller Shaft Assembly

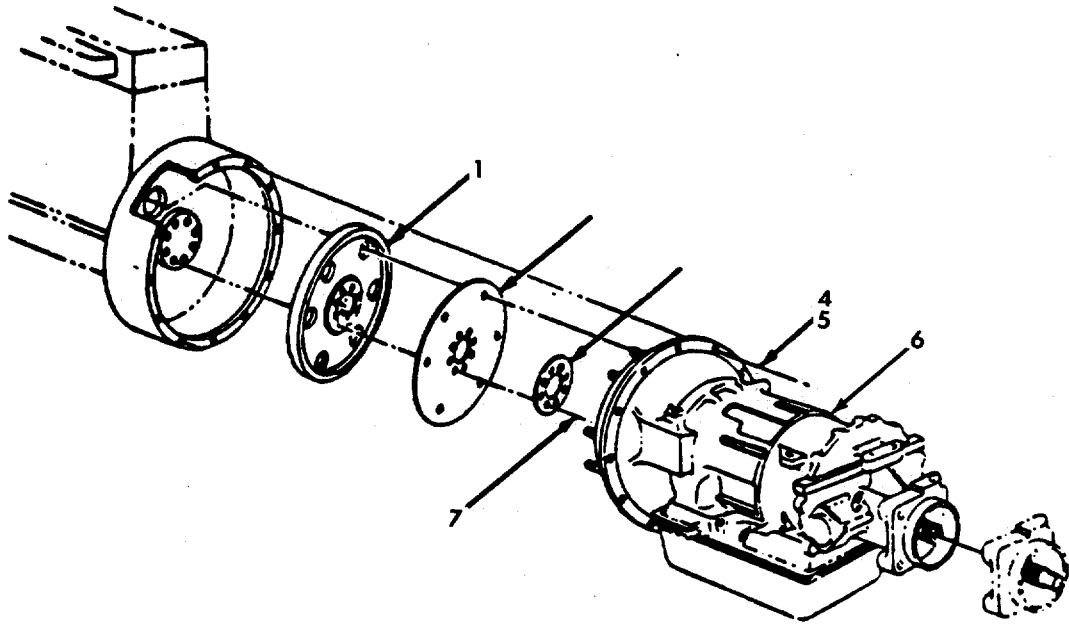
Figure E-99. Propeller Shaft Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	2607803330	59556	045-90004-1	PROPELLOR SHAFT ASSEMBLY, 33 inch Shaft Length	1
21	89346	1649785C91	59556	045-90004-2	REAR AXLE INPUT FLANGE/YOKE	1
22		NSS			CAP BEARING	8
23	89346	118823R1	59556	045-90003-8	BOLTS	16
24	89346	865849R1	59556	045-90003-9	LOCKSTRAP	8
25	89346	390362R1	59556	045-90004-3	WASHER	1
26	89346	578881C1	59556	045-90004-4	NUT	1
27		NSS			CROSS	2
28		NSS			LUBE FITTING	2
29	89346	2607321330	59556	045-90004-5	SERVICE TUBE ASSEMBLY	1
30	89346	54554H	59556	045-90003-11	DUST SHIELD	1
31	89346	363080C91	59556	045-90004-6	SLIP YOKE	1
32	89346	916891R1	59556	045-90004-7	REAR OUTPUT FLANGE/YOKE	1
33	89346	504224C1	59556	045-90003-14	WASHER	1
34	89346	19990R1	59556	045-90003-15	NUT	1
	89346	121684R92	59556	045-90004-8	U-JOINT REPAIR KIT, (Includes Items, (4) No.24, (8) No.23, (4) No.24, (1) No.27, (1) No.28)	1
35	89346	2487802636	59556	045-90005-1	PROPELLER SHAFT ASSEMBLY, 63.6 Shaft Length	1
36	89346	200991R1	59556	045-90005-2	FORWARD INPUT FLANGE/YOKE	1
37	89346	54557H	59556	045-90003-11	WASHER	1
38	89346	117804H	59556	045-90005-4	NUT	1

## Group 14. Propeller Shaft Assembly

Figure E-99. Propeller Shaft Assembly

ITEM NO	FSCM	OEM PART	FSCM	TRUE VENDOR	DESCRIPTION	QTY
39	89346	118823R1	59556	045-90003-8	BOLTS	8
40	89346	865849R1	59556	045-90003-9	LOCKSTRAP	4
41	89346	2488017636	59556	045-90005-5	SERVICE TUBE ASSEMBLY	1
42		NSS			CROSS	2
43		NSS			CAP BEARING	8
44		NSS			SNAP RING	8
45		NSS			GREASE FITTING	2
46	89346	240468R91	59556	045-90005-6	SLIP YOKE	1
47	89346	54554H	59556	045-90003-11	DUST SHIELD	1
48	89346	204138R1	59556	045-90003-5	U-BOLT	4
49	89346	120383	59556	045-90003-6	WASHER	4
50	89346	25525R1	59556	045-90003-7	NUT	4
51	89346	494524C1	59556	045-90005-7	FORWARD OUTPUT FLANGE/YOKE	1
52	89346	504224C1	59556	045-90003-14	WASHER	1
53	89346	19990R1	59556	045-90003-15	NUT	1
--	89346	913774R91	59556	045-90005-8	U-JOINT REPAIR KIT, (Includes Items (1) No.42, (4) No.43, (4) No.44, (1) No.45)	1



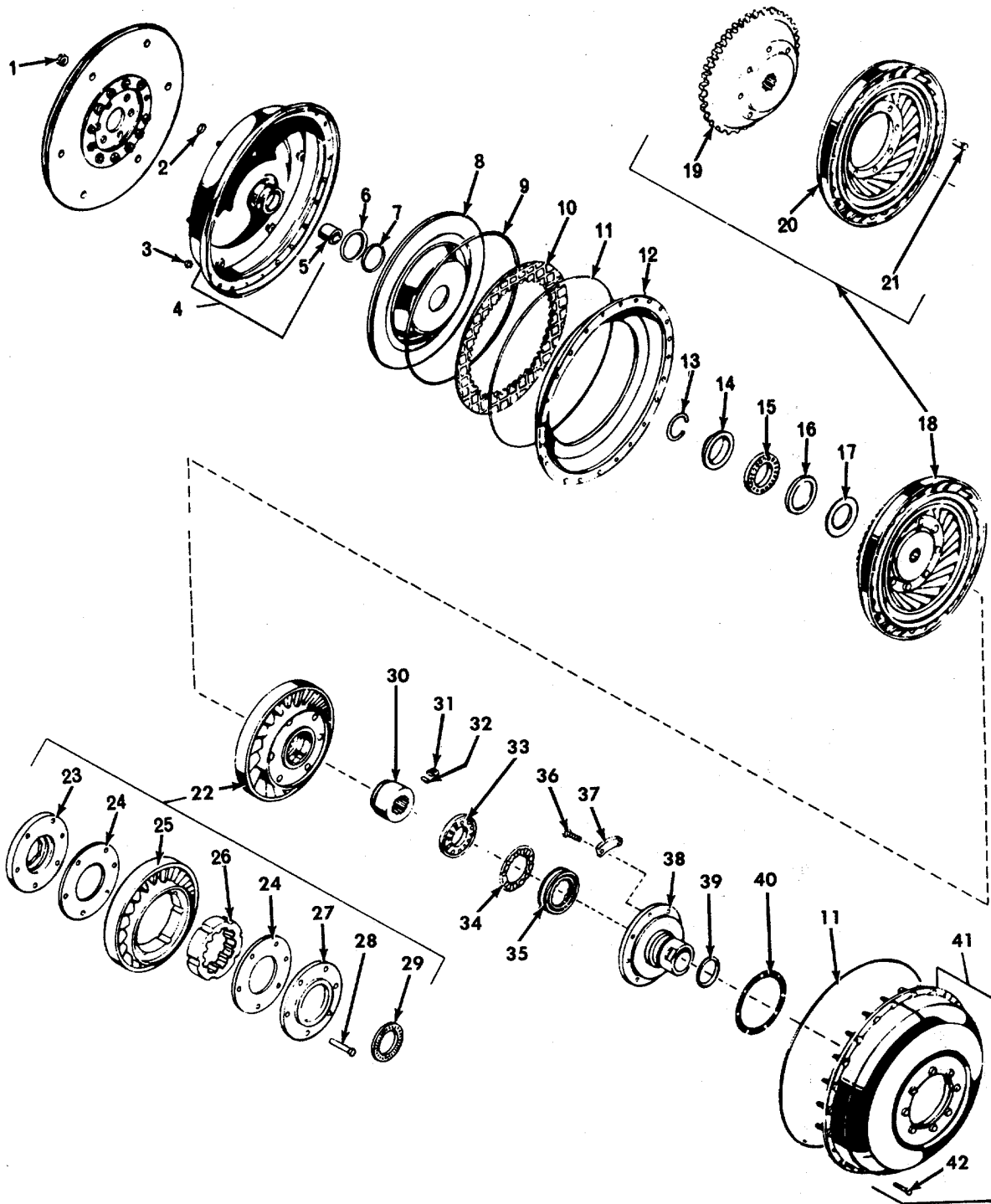
GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-100. TRANSMISSION INSTALLATION

Group 15. Transmission Installation

Figure E-100. Transmission Installation

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	683961C91	59556	039-90013-1	ADAPTER ASSEMBLY	REF
2	89346	467037C1	59556	039-90013-2	FLYWHEEL	REF
3	89346	467036C1	59556	039-90013-3	PLATE, Input Drive	1
4	89346	24841R1	59556	019-90004-880	RING, Reinforcing	1
5	89346	25709R1	59556	006-90002-168	BOLT, Hex Head, 3/8 UNC x 1.5 inch	12
6	73342	23014313 (MT643)	59556	O39-90008	WASHER, Hardened, Flat, 3/8 inch	12
7	89346	25279R1	59556	039-90013-6	TRANSMISSION	1
					BOLT, Hex Head, 1/2 UNF x 2.0 inch	8





9980H

GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-101. TORQUE CONVERTER AND COVER ASSEMBLY

Group 15. Transmission Installation

Figure E-101. Torque Converter and Cover Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					CONVERTER COVER AND TORQUE CONVERTER ASSEMBLY	REF
1	73342	23014462	59556	039-90008-1	KIT, Flex Disk Nut	1
2	73342	23014015	59556	039-90008-2	SPACER	6
3	73342	190139	59556	039-90008-3	NUT, Lock, 5/16-24	24
4	73342	6837210	59556	039-90008-4	COVER ASSEMBLY, Torque Converter	1
5	73342	6756782	59556	039-90008-5	BUSHING	1
6	73342	6770822	59556	039-90008-6	RETAINER, Sealing	1
7	73342	6770820	59556	039-90008-7	RING, Inner Seal	1
8	73342	6770845	59556	039-90008-8	PISTON, Lockup C1utch	1
9	73342	6758036	59556	039-90008-9	RING, Outer Seal	1
10	73342	6833906	59556	039-90008-10	PLATE, Lockup C1utch	1
11	73342	23016564	59556	039-90008-11	RING, Seal	2
12	73342	6756778	59556	039-90008-12	PLATE, Backing	1
13	73342	6836676	59556	039-90008-13	RING, Snap	1
14	73342	9428137	59556	039-90008-14	RACE, Bearing	1
15	73342	9428135	59556	039-90008-15	BEARING ASSEMBLY, Roller	1
16	73342	9433344	59556	039-90008-16	RACE, Bearing	1
17	73342	6837429	59556	039-90008-17	SPACER, 0.015, Gold	AR
	73342	6837430	59556	039-90008-18	SPACER, 0.030, Silver	AR
	73342	6837431	59556	039-90008-19	SPACER, 0.042, Plain	AR
	73342	6837432	59556	039-90008-20	SPACER, 0.060, Black	AR
	73342	6837433	59556	039-90008-21	SPACER, 0.075, Copper	AR

## Group 15. Transmission Installation

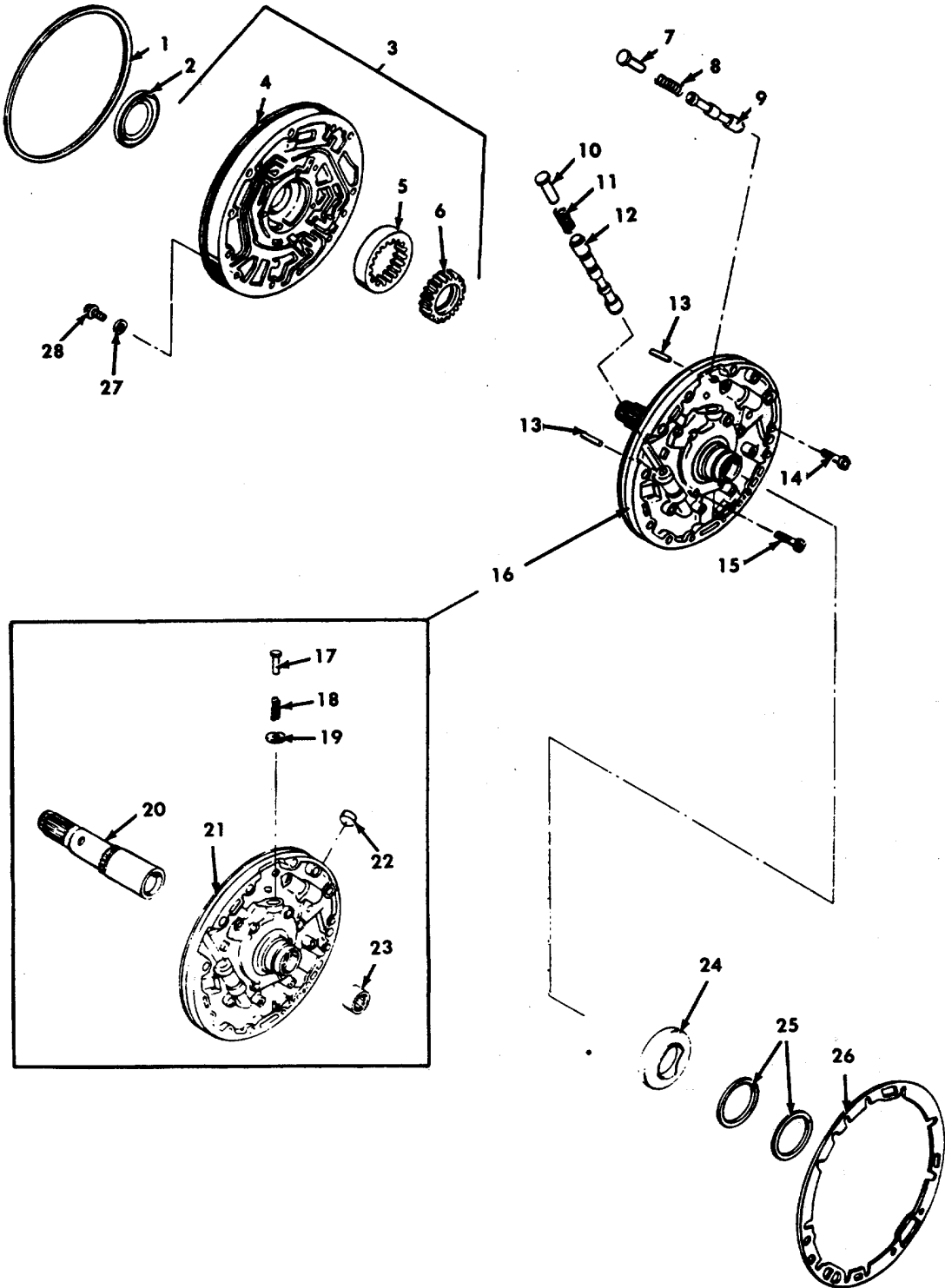
Figure E-101. Torque Converter and Cover Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
18	73342	6837379	59556	039-90008-22	TURBINE ASSEMBLY	1
19	73342	6837207	59556	039-90008-23	HUB, Turbine	1
20		NSS			TURBINE	1
21	73342	118062	59556	039-90008-24	RIVET	8
22	73342	6836585	59556	039-90008-25	STATOR ASSEMBLY	1
23	73342	23017445	59556	039-90008-26	WASHER, Thrust	1
24	73342	6774958	59556	039-90008-27	WASHER, Cam	2
25		NSS			STATOR	1
26		NSS			CAM	1
27	73342	23017444	59556	039-90008-28	WASHER, Side Plate	1
28	73342	6759959	59556	039-90008-29	RIVET	6
29	73342	23016866	59556	039-90008-30	BEARING ASSEMBLY, Needle Roller	1
30	73342	6837206	59556	039-90008-31	RACE, Roller	1
31	73342	6774966	59556	039-90008-32	SPRING, Roller	10
32	73342	6774968	59556	039-90008-33	ROLLER	10
33	73342	9432554	59556	039-90008-34	BEARING ASSEMBLY, Needle Roller	1
34	73342	23013907	59556	039-90008-35	RACE, Bearing	1
35	73342	7455739	59556	039-90008-36	BEARING, Roller	1
36	73342	6773679	59556	039-90008-37	BOLT, Hex Head, 1/4-20x5/8 inch	8
37	73342	6769631	59556	039-90008-38	STRIP, Locking	4
38	73342	23013906	59556	039-90008-39	HUB, Converter Pump	1
39	73342	6830187	59556	039-90008-40	RING, Seal, Hook Type	1
40	73342	6759971	59556	039-90008-41	GASKET, Hub	1

Group 15. Transmission Installation

Figure E-101. Torque Converter and Cover Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
41 42	73342 73342	6779599 23014542	59556 59556	039-90008-42 039-90008-43	PUMP ASSEMBLY BOLT, Special, 5/16-24x1.36 inch	1 24



GROUP 15. TRANSMISSION INSTALLATION  
 FIGURE E-102.. OIL PUMP AND FRONT SUPPORT

## Group 15. Transmission Installation

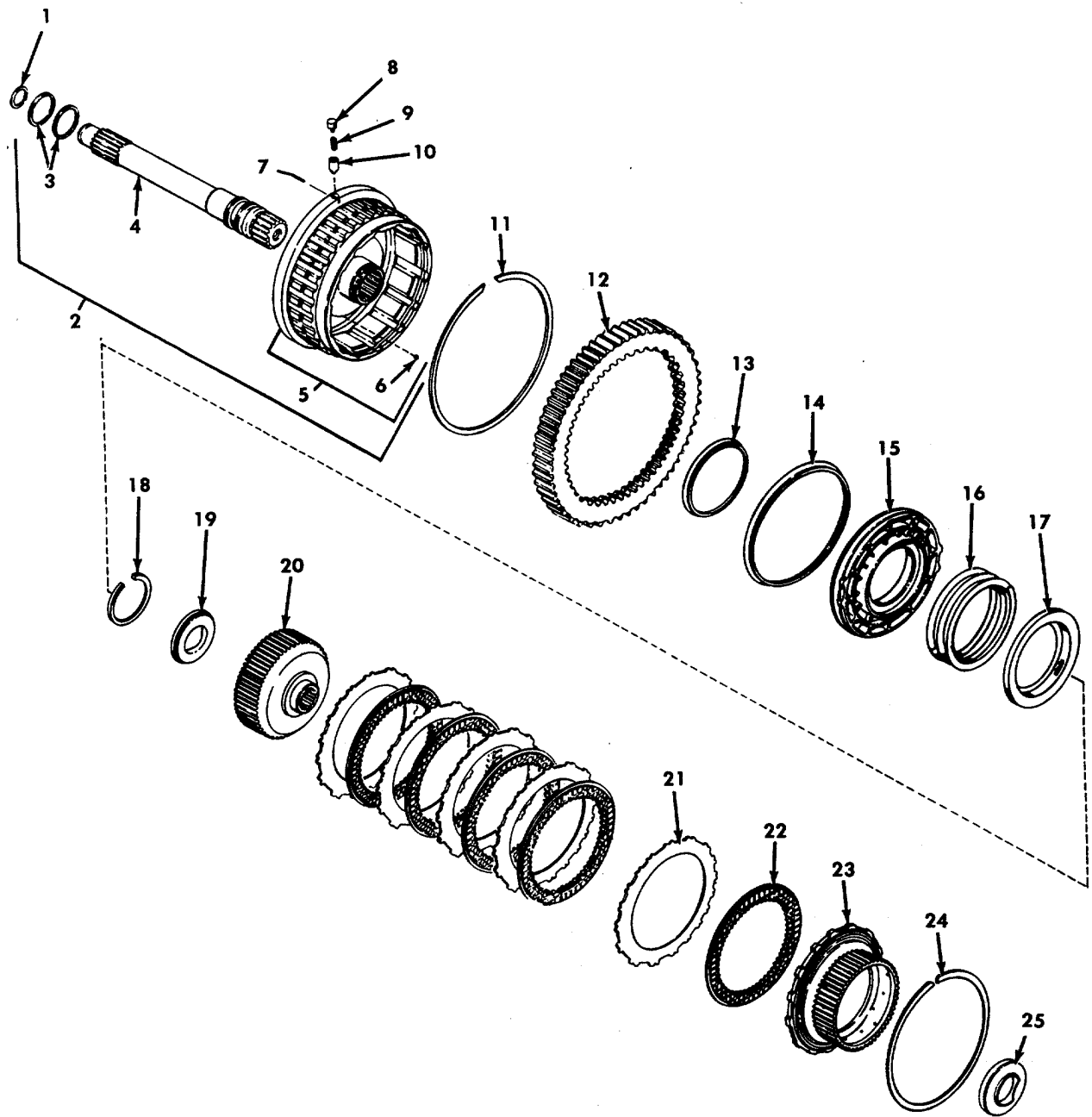
Figure E-102. Oil Pump and Front Support

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					OIL PUMP AND FRONT SUPPORT ASSEMBLY	REF
1	73342	23016347	59556	039-90008-44	RING, Seal	1
2	73342	23016643	59556	039-90008-45	SEAL, Oil	1
3	73342	6881598	59556	039-90008-46	BODY AND GEAR ASSEMBLY. Oil Pump	1
4		NSS			BODY	1
5	73342	6772576	59556	039-90008-47	GEAR, Driven	1
6	73342	23015391	59556	039-90008-48	GEAR, Drive, 0.6835-0.6840 Thick	AR
	73342	23015392	59556	039-90008-49	GEAR, Drive, 0.6840-0.6845 Thick	AR
	73342	23015393	59556	039-90008-50	GEAR, Drive, 0.6845-0.6850 Thick	AR
	73342	23015394	59556	039-90008-51	GEAR, Drive, 0.6850-0.6855 Thick	AR
7	73342	6834413	59556	039-90008-52	STOP, Valve	1
8	73342	6836277	59556	039-90008-53	SPRING, Lockup (Code-Yellow)	1
9	73342	6834414	59556	039-90008-54	VALVE, Lockup	1
10	73342	6834412	59556	039-90008-55	STOP, Valve	1
11	73342	6880552	59556	039-90008-56	SPRING, Valve (Code-White)	1
12	73342	6834411	59556	039-90008-57	VALVE	1
13	73342	9418910	59556	039-90008-58	PIN	2
14	73342	9409231	59556	039-90008-59	BOLT, Hex Head, 3/8-16x1-1/2 inch	2
15	73342	9409225	59556	039-90008-60	BOLT, Hex Head, 5/16-18x1-3/4 inch	12
16	73342	23015871	59556	039-90008-61	SUPPORT ASSEMBLY	1
17	73342	6834410	59556	039-90008-62	GUIDE, Valve	1
18	73342	6773551	59556	039-90008-63	SPRING	11
						1

Group 15. Transmission Installation

Figure E-102. Oil Pump and Front Support

ITEM NO	FSCM	OEM PART	FSCM	TRUE VENDOR	DESCRIPTION	QTY
19	73342	6836202	59556	039-90008-64	VALVE	1
20	73342	23014527	59556	039-90008-65	KIT, Ground Sleeve	1
21		NSS			SUPPORT, Front	1
22	73342	6762187	59556	039-90008-66	PLUG	1
23	73342	9438017	59556	039-90008-67	BEARING ASSEMBLY, Roller	1
24	73342	23019782	59556	039-90008-109	KIT, Bearing	1
25	73342	23014632	59556	039-90008-69	KIT, Sealring	1
26	73342	23014221	59556	039-90008-70	GASKET	1
27	73342	6834908	59556	039-90008-71	WASHER, Plain	12
28	73342	179397	59556	039-90008-72	BOLT, Hex Head, 3/8-16x3-3/8 inch	12



GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-103. FORWARD CLUTCH AND TURBINE SHAFT

(E-341 Blank)/E-342



## Group 15. Transmission Installation

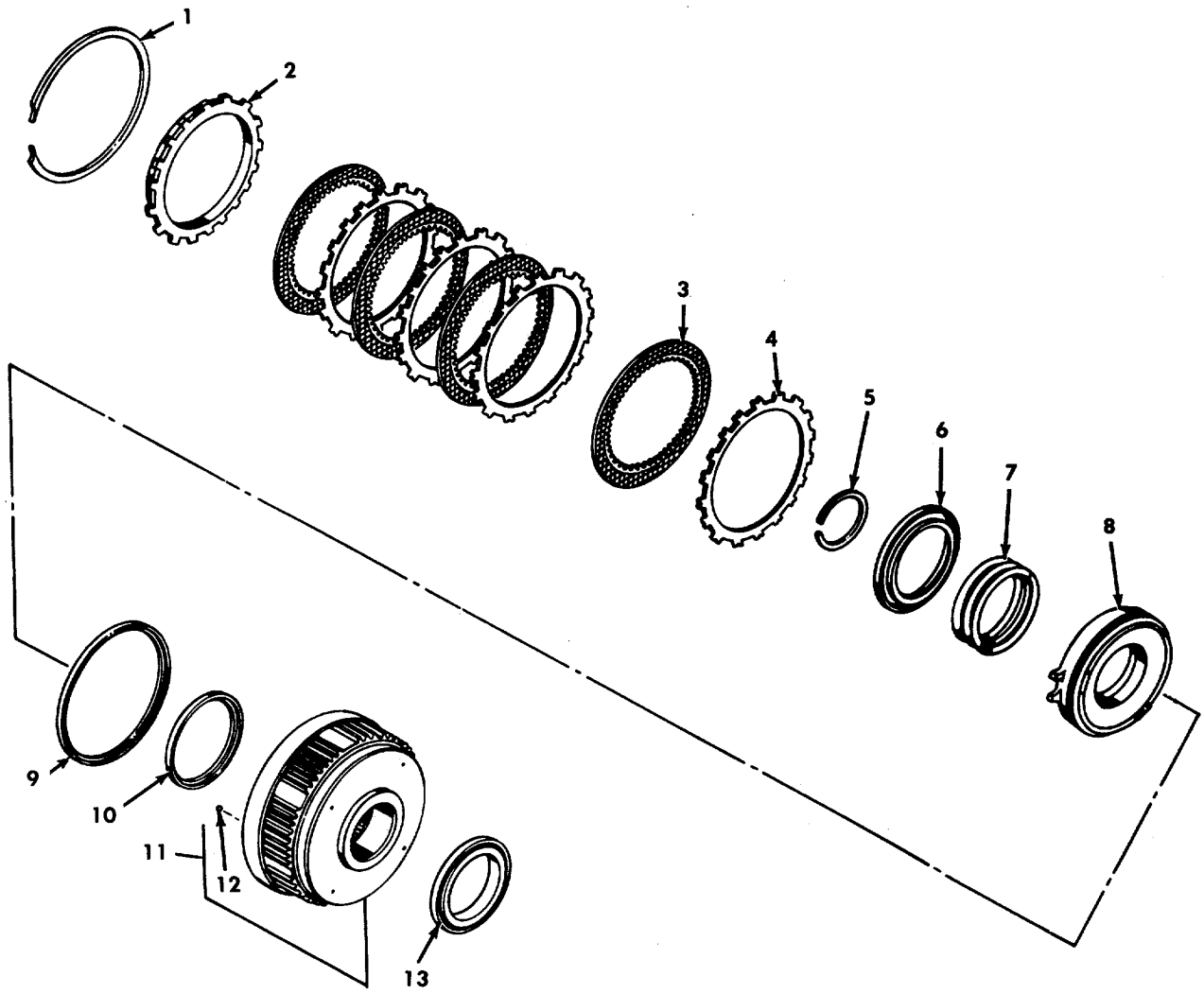
Figure E-103. Forward Clutch and Turbine Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					FORWARD CLUTCH AND TURBINE SHAFT ASSEMBLY	REF
1	73342	6839163	59556	039-90008-73	RING, Seal, Hook Type	1
2	73342	23017174	59556	039-90008-74	HOUSING ASSEMBLY	1
3	73342	6833999	59556	039-90008-75	RING, Seal, Hook Type	2
4	73342	23012785	59556	039-90008-76	KIT, Turbine Shaft	1
5		NSS			HOUSING, Forward Clutch	1
6	73342	8622757	59556	039-90008-77	BALL, Check	2
7	73342	8622757	59556	039-90008-78	PIN	1
8	73342	6882638	59556	039-90008-79	PLUG, Valve (Code-White)	1
9	73342	6882639	59556	039-90008-80	SPRING, (Code-White)	1
10	73342	23010017	59556	039-90008-81	VALVE, Centrifugal (Code-White)	1
11	73342	6838364	59556	039-90008-82	RING, Snap, External	1
12	73342	6885146	59556	039-90008-83	GEAR, PTO Drive	1
13	73342	23015880	59556	039-90008-107	RING, Seal, Lip Type	1
14	73342	6833981	59556	039-90008-106	RING, Seal, Lip Type	1
15	73342	6834669	59556	039-90008-86	PISTON, 0.995-1.005 Thick (Code A)	AR
	73342	6834668	59556	039-90008-87	PISTON, 1/020-1.030 Thick (Code B)	AR
	73342	6834219	59556	039-90008-88	PISTON, 1.045-1.055 Thick (Code C)	AR
16	73342	6836773	59556	039-90008-105	SPRING, Return	1
17	73342	6834369	59556	039-90008-104	RETAINER, Spring	1
18	73342	6885156	59556	039-90008-103	RING, Snap, External	1
19	73342	23015799	59556	039-90008-92	BEARING ASSEMBLY, Thrust	1

Group 15. Transmission Installation

Figure E-103. Forward C1utch and Turbine Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	73342	6834222	59556	039-90008-93	HUB, Forward C1utch	1
21	73342	23016610	59556	039-90008-102	PLATE, External Tanged	5
22	73342	6834370	59556	039-90008-101	PLATE, Internal Splined	5
23	73342	6834221	59556	039-90008-96	HUB, Driving	1
24	73342	23018867	59556	039-90008-97	RING, Snap, Internal	1
25	73342	23015799	59556	039-90008-92	BEARING ASSEMBLY, Thrust	1

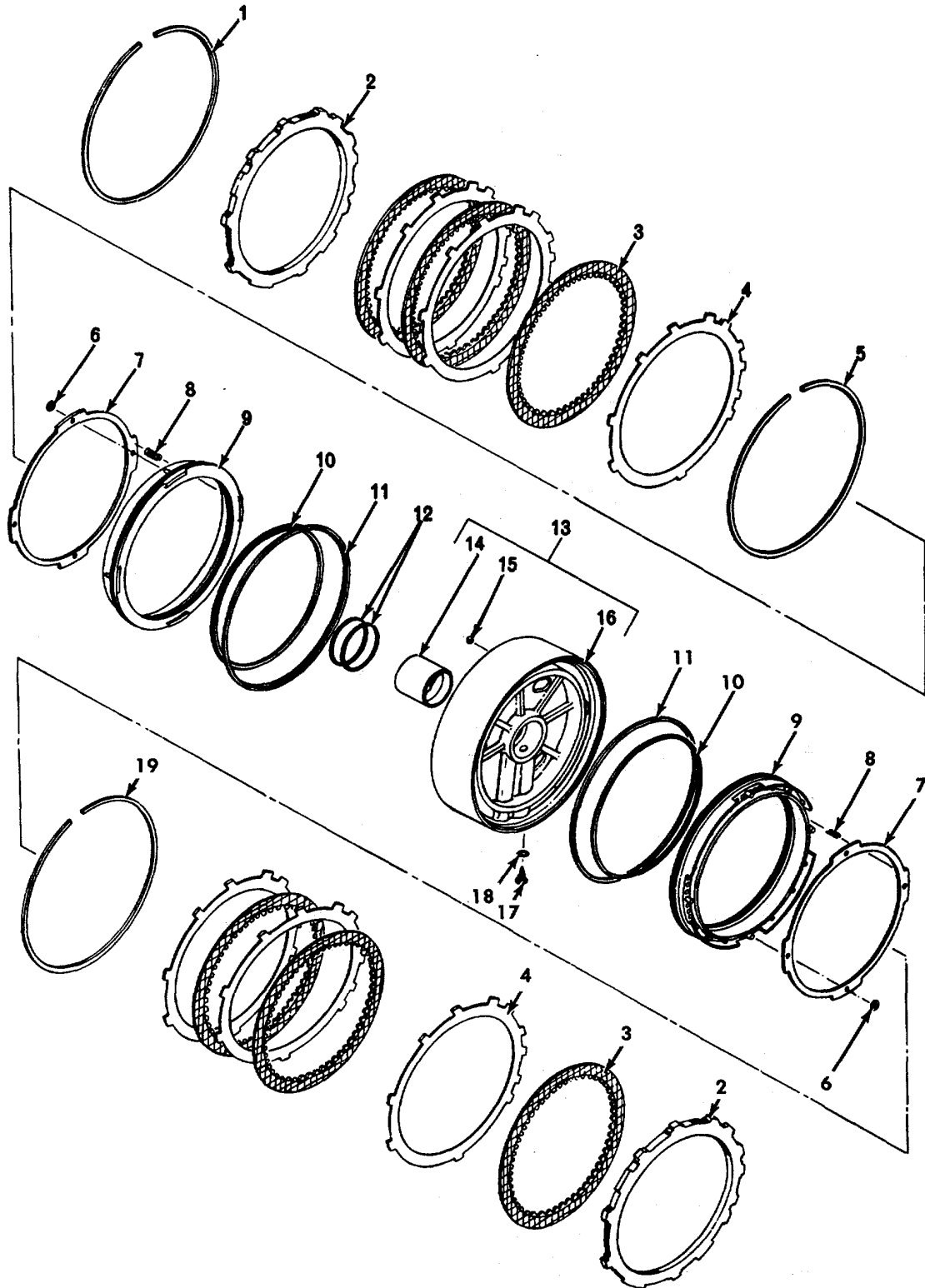


GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-104. FOURTH CLUTCH

## Group 15. Transmission Installation

Figure E-104. Fourth C1utch

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					FOURTH CLUTCH ASSEMBLY	REF
1	73342	23018867	59556	039-90008-97	RING, Snap, Internal	1
2	73342	23017264	59556	039-90008-100	PLATE, Backing	1
3	73342	6834370	59556	039-90008-101	PLATE, Internal Splined	4
4	73342	23016610	59556	039-90008-102	PLATE, External Tanged	4
5	73342	6885156	59556	039-90008-103	RING, Snap, External	1
6	73342	6834369	59556	039-90008-104	RETAINER, Spring	1
7	73342	6836773	59556	039-90008-105	SPRING, Return	1
8	73342	6834669	59556	039-90008-86	PISTON, 0.995-1.005 Thick (Code A)	AR
	73342	6834668	59556	039-90008-87	PISTON, 1.020-1.030 Thick (Code B)	AR
9	73342	6833981	59556	039-90008-106	RING, Seal, Lip Type	1
10	73342	23015880	59556	039-90008-107	RING, Seal, Lip Type	1
11	73342	23011825	59556	039-90008-108	HOUSING ASSEMBLY	1
12	73342	8622757	59556	039-90008-77	BALL, Check	4
13	73342	23019782	59556	039-90008-109	KIT, Bearing	1



GROUP 15. TRANSMISSION INSTALLATION  
 FIGURE E-105. THIRD CLUTCH, CENTER SUPPORT, AND SECOND CLUTCH

## Group 15. Transmission Installation

Figure E-105. Third Clutch, Center Support, and Second Clutch

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					THIRD CLUTCH, CENTER SUPPORT AND SECOND CLUTCH ASSEMBLY	REF
1	73342	6836267	59556	039-90008-110	RING, Snap, Internal	1
2	73342	6834229	59556	039-90008-111	PLATE, 0.476-0.486 Thick (Code 1)	AR
	73342	6834670	59556	039-90008-112	PLATE, 0.450-0.460 Thick (Code 2)	AR
3	73342	6835720	59556	039-90008-113	PLATE, Internal Splined	6
4	73342	23016608	59556	039-90008-114	PLATE, External Tanged	6
5	73342	6836265	59556	039-90008-115	RING, Snap, 0.148-0.150 Thick (White)	AR
	73342	6836266	59556	039-90008-116	RING, Snap, 0.152-0.154 Thick (Yellow)	AR
	73342	6836367	59556	039-90008-117	RING, Snap, 0.155-0.157 Thick (Green)	AR
	73342	6836268	59556	039-90008-118	RING, Snap, 0.158-0.160 Thick (Red)	AR
6	73342	3909063	59556	039-90008-119	NUT, Push-On	8
7	73342	6834354	59556	039-90008-120	RING, Retaining	2
8	73342	6831656	59556	039-90008-121	SPRING, Return	40
9	73342	6834230	59556	039-90008-122	PISTON	2
10	73342	6833986	59556	039-90008-123	RING, Seal, Lip Type	2
11	73342	6883035	59556	039-90008-124	RING, Seal, Lip Type	2
12	73342	23014632	59556	039-90008-69	KIT, Sealring	1
13	73342	23018593	59556	039-90008-125	SUPPORT ASSEMBLY	1
14	73342	23011924	59556	039-90008-126	BUSHING	1
15	73342	453570	59556	039-90008-127	BALL, Check	1
16		NSS			SUPPORT	1

Group 15. Transmission Installation

Figure E-105. Third C1utch, Center Support, and Second C1utch

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
17	73342	23010654	59556	039-90008-128	FILTER, Oil	1
18	73342	6761244	59556	039-90008-129	RING, Seal	1
19	73342	6836267	59556	039-90008-110	RING, Snap, Internal	1





## Group 15. Transmission Installation

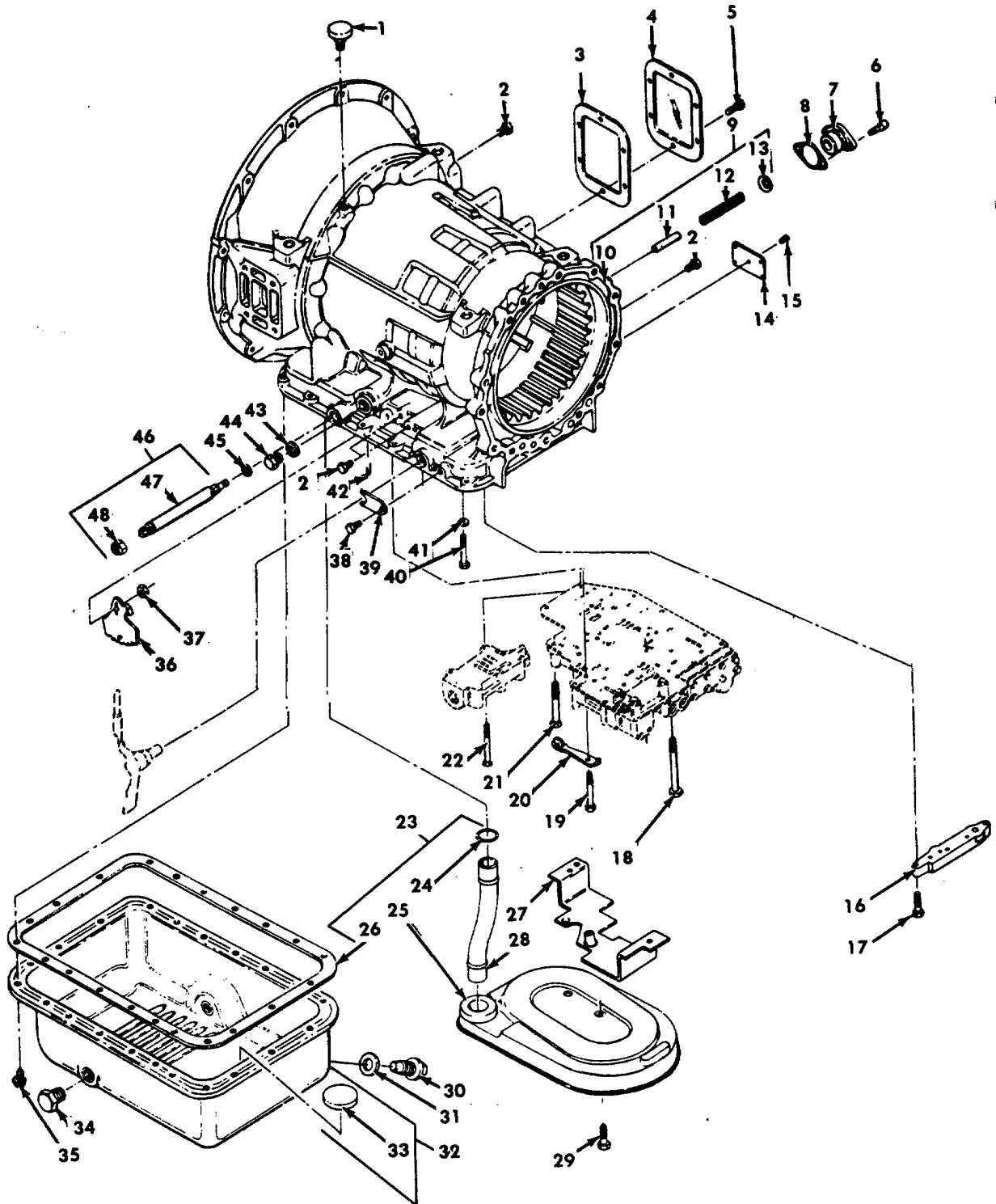
Figure E-106. Gear Unit and Main Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					GEAR UNIT AND MAIN SHAFT ASSEMBLY	REF
1	73342	6839364	59556	039-90008-131	WASHER, Thrust	1
2	73342	6835574	59556	039-90008-132	GEAR, Front Sun	1
3	73342	6835386	59556	039-90008-133	WASHER, Thrust	1
4	73342	6882565	59556	039-90008-134	CARRIER ASSEMBLY, Front	1
5	73342	6834309	59556	039-90008-135	PIN, Planetary Pinion	6
6	73342	6839514	59556	039-90008-136	WASHER, Thrust (Bronze)	12
7	73342	6833991	59556	039-90008-137	WASHER, Thrust (Steel)	12
8	73342	6882827	59556	039-90008-138	PINION SET	1
9	73342	9426919	59556	039-90008-139	ROLLER	120
10	73342	6882564	59556	039-90008-140	FLANGE AND CARRIER ASSEMBLY	1
11	73342	6835385	59556	039-90008-141	BUSHING	1
12	73342	6834389	59556	039-90008-142	WASHER, Thrust	1
13	73342	6834512	59556	039-90008-143	RING, Snap, Internal	2
14	73342	6835560	59556	039-90008-144	GEAR, Ring, Front	1
15	73342	6835562	59556	039-90008-145	CARRIER ASSEMBLY, Center	1
16	73342	6835567	59556	039-90008-146	PIN, Planetary Pinion	8
17	73342	6835563	59556	039-90008-147	CARRIER	1
18	73342	6839375	59556	039-90008-148	WASHER, Thrust (Bronze)	16
19	73342	23018960	59556	039-90008-149	WASHER, Thrust (Steel)	16
20	73342	6882804	59556	039-90008-150	PINION SET	2
21	73342	6834915	59556	039-90008-151	ROLLER	144
22	73342	6838099	59556	039-90008-152	SHAFT ASSEMBLY, Center Sun Gear	1
23	73342	6834940	59556	039-90008-153	PIN. Spring	2

## Group 15. Transmission Installation

Figure E-106. Gear Unit and Main Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
24		NSS			SHAFT AND BUSHING ASSEMBLY	1
25	73342	6834503	59556	039-90008-154	BUSHING	2
26		NSS			SHAFT	1
27	73342	9432513	59556	039-90008-155	BEARING ASSEMBLY, Needle Roller	1
28	73342	9432512	59556	039-90008-156	RACE, Roller Bearing	1
29	73342	6835570	59556	039-90008-157	DRUM, Planetary Connecting	1
30	73342	6769319	59556	039-90008-158	RING, Snap, External	1
31	73342	6835561	59556	039-90008-159	GEAR, Ring, Center	1
32	73342	23013456	59556	039-90008-160	SHAFT ASSEMBLY, Main	1
33	73342	6883707	59556	039-90008-161	PLUG, Lube Orifice	1
34		NSS			SHAFT	1
35	73342	6834359	59556	039-90008-162	WASHER, Thrust	1
36	73342	6883901	59556	039-90008-163	GEAR, Sun, Rear Planetary	1
37	73342	6834583	59556	039-90008-164	RING, Snap, External	1
38	73342	6836599	59556	039-90008-165	RING, Snap, External	1
39	73342	6835564	59556	039-90008-166	CARRIER ASSEMBLY. Rear	1
40	73342	6835565	59556	039-90008-167	CARRIER	1
41	73342	903009	59556	039-90008-168	BEARING, Ball	1
42	73342	23016857	59556	039-90008-169	SHAFT ASSEMBLY. Output	1
43	73342	23016859	59556	039-90008-170	BUSHING	1
44	73342	8623484	59556	039-90008-171	PLUG, Cup	1
45	73342	454512	59556	039-90008-172	PIN, Spring	1
46		NSS			SHAFT	1



GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-107 TRANSMISSION HOUSING, OIL FILTER, AND OIL PAN

(E-355 Blank)/E-356

## Group 15. Transmission Installation

Figure E-107. Transmission Housing, Oil Filter, and Oil Pan

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					TRANSMISSION HOUSING, OIL FILTER AND OIL PAN ASSEMBLY	REF
1	73342	6882757	59556	039-90008-173	VENT ASSEMBLY	1
2	73342	23012036	59556	039-90008-174	PLUG, Pipe, 1/8 NPTF	4
3	73342	23016683	59556	039-90008-175	GASKET, Cover, PTO	1
4	73342	6774322	59556	039-90008-176	COVER, PTO	1
5	73342	23017737	59556	039-90008-177	BOLT, Hex Head, 3/8-16x0.74 inch	6
6	73342	6882586	59556	039-90008-178	BOLT, Hex Socket Head, 1/4-20x7/8 inch	2
7	73342	6881227	59556	039-90008-179	ADAPTER, Lube Valve	1
8	73342	6884872	59556	039-90008-180	GASKET, Adapter	1
9	73342	23011779	59556	039-90008-181	HOUSING ASSEMBLY, Transmission	1
10		NSS			HOUSING	1
11	73342	23045085	59556	039-90008-182	TUBE, Valve Guide	1
12	73342	6830180	59556	039-90008-183	SPRING, Lube Valve	1
13	73342	6834624	59556	039-90008-184	VALVE, Lube	1
14	73342	6838494	59556	039-90008-185	PLATE, Name	1
15	73342	8622361	59556	039-90008-186	SCREW, Drive	1
16	73342	6835816	59556	039-90008-187	ADAPTER, Tube	1
17	73342	186601	59556	039-90008-188	BOLT, Hex Head, 1/4-20x1-1/4 inch	4
18	73342	23016247	59556	039-90008-189	BOLT, Hex Head, 1/4-20x3 inch	2
19	73342	445567	59556	039-90008-190	BOLT, Hex Head, 1/4-20x1-3/4 inch	1
20	73342	8625431	59556	039-90008-191	ROLLER AND SPRING ASSEMBLY	1
21	73342	445568	59556	039-90008-192	BOLT, Hex Head, 1/4-20x2-1/4 inch	16

## Group 15. Transmission Installation

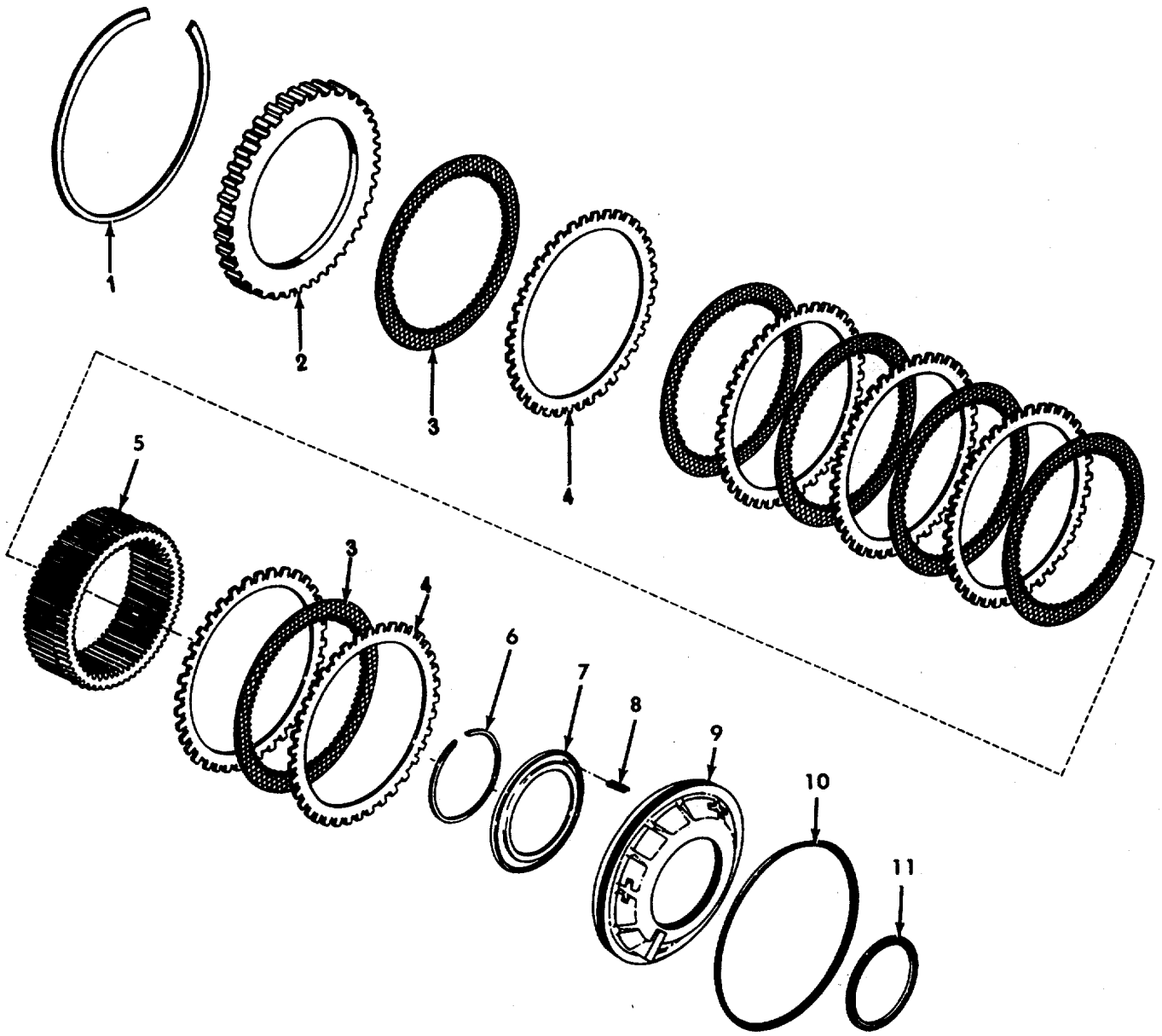
Figure E-107. Transmission Housing, Oil Filter, and Oil Pan

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	73342	186602	59556	039-90008-193	BOLT, Hex Head, 1/4-20x2 inch	3
23	73342	23019201	59556	039-90008-194	KIT, Transmission Oil Filter	1
24	73342	6762127	59556	039-90008-195	RING, Seal	1
25		NSS			FILTER, Oil	1
26	73342	23016682	59556	039-90008-196	GASKET, Oil Pan	1
27	73342	23017781	59556	039-90008-197	SPACER, Oil Filter	1
28	73342	6883046	59556	039-90008-198	TUBE, Oil Filter	1
29	73342	23045044	59556	039-90008-199	SCREW, Hex Washer Head, 5/16-18x1-1/4 inch	1
30	73342	3921988	59556	039-90008-200	PLUG, Drain Oil Pan	1
31	73342	3921989	59556	039-90008-201	WASHER, Drain Plug	1
32	73342	23018884	59556	039-90008-202	PAN ASSEMBLY, Oil Transmission	1
33	73342	6775703	59556	039-90008-203	MAGNET	1
34	73342	9436642	59556	039-90008-204	PLUG, Tube, Inverted Flared	1
35	73342	3829139	59556	039-90008-205	SCREW, Hex Washer Head	21
36	73342	6834105	59556	039-90008-206	LEVER, Inside Detent	1
37	73342	117212	59556	039-90008-207	NUT, Hex, 3/8-24	1
38	73342	179816	59556	039-90008-208	BOLT, Hex Head, 5/16-18x3/4 inch	1
39	73342	8627650	59556	039-90008-209	RETAINER	1
40	73342	23045343	59556	039-90008-210	BOLT, Locking, 3/8-16x3 inch	1
41	73342	23013841	59556	039-90008-211	WASHER, Flat-Hardened	1
42	73342	6831774	59556	039-90008-212	PIN, Retainer	1
43	73342	6839761	59556	039-90008-213	WASHER, Aluminum	1
44	73342	445090	59556	039-90008-214	PLUG, 3/4-16	1

Group 15. Transmission Installation

Figure E-107. Transmission Housing, Oil Filter, and Oil Pan

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
45	73342	23010610	59556	039-90008-215	SEAL, Selector Shaft	1
46	73342	6885213	59556	039-90008-216	KIT, Selector Shaft And Nut	1
47		NSS			SHAFT, Selector, Manual	1
48	73342	11501033	59556	039-90008-217	NUT (W/Metric Thread)	1



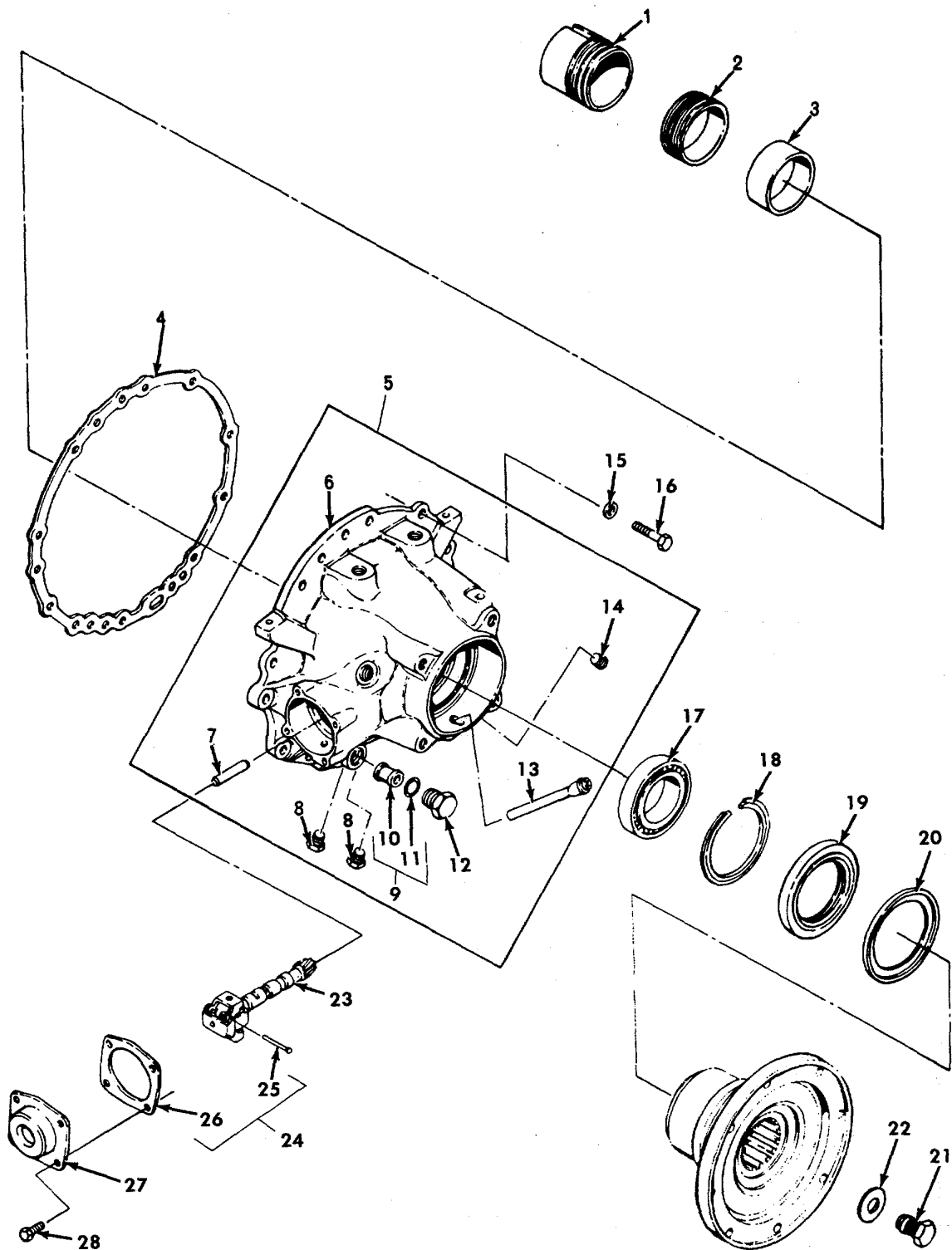
GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-108. FIRST CLUTCH

Group 15. Transmission Installation

Figure E-108. First C1utch

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					FIRST CLUTCH ASSEMBLY	REF
1	73342	6884275	59556	039-90008-218	RING, Snap, Internal	1
2	73342	6835571	59556	039-90008-219	PLATE, 0.702-0.712 Thick (Code 1)	AR
	73342	6835572	59556	039-90008-220	PLATE, 0.671-0.681 Thick (Code 2)	AR
	73342	6835573	59556	039-90008-221	PLATE, 0.640-0.650 Thick (Code 3)	AR
3	73342	6835687	59556	039-90008-222	PLATE, Internal Splined	6
4	73342	23016606	59556	039-90008-223	PLATE, External Tanged	6
5	73342	6835568	59556	039-90008-224	GEAR, Ring, First C1utch	1
6	73342	6833993	59556	039-90008-225	RING, Snap, External	1
7	73342	6834339	59556	039-90008-226	RETAINER, Spring	1
8	73342	6880251	59556	039-90008-227	SPRING, Release	26
9	73342	23011665	59556	039-90008-228	PISTON, First C1utch	1
10	73342	6883033	59556	039-90008-229	RING, Seal, Lip Type, External	1
11	73342	6883031	59556	039-90008-230	RING, Seal, Lip Type, External	1





GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-109. REAR COVER

## Group 15. Transmission Installation

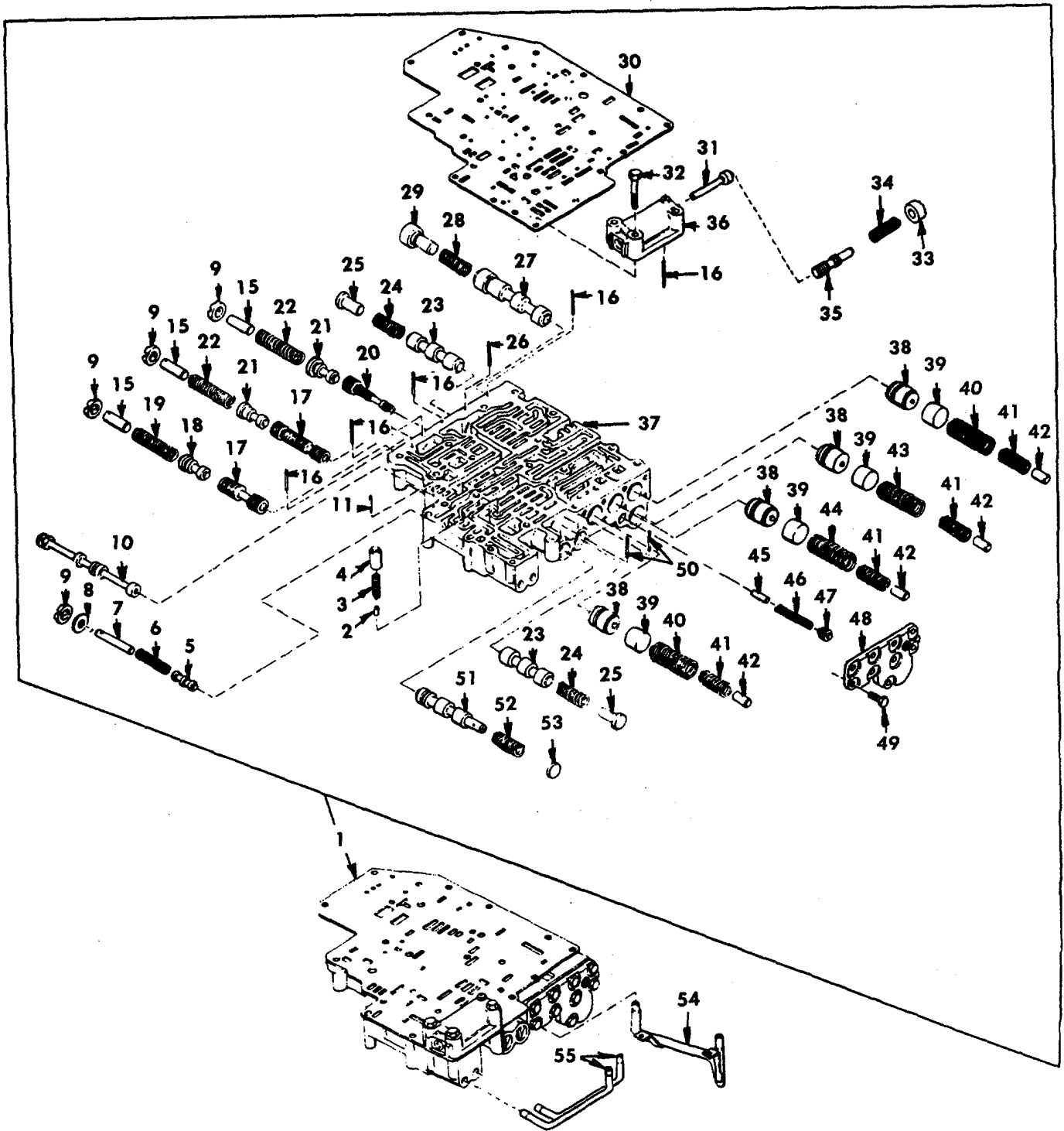
Figure E-109. Rear Cover

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					REAR COVER ASSEMBLY	REF
1	73342	23017188	59556	039-90008-231	GEAR, Governor Drive	1
2	73342	6831716	59556	039-90008-232	GEAR, Speeometer Drive (W/5 Teeth)	1
3	73342	23017125	59556	039-90008-233	SPACER, Sleeve	1
4	73342	6837442	59556	039-90008-234	GASKET, Rear Cover	1
5	73342	23018825	59556	039-90008-235	COVER ASSEMBLY, Rear	1
6		NSS			COVER	1
7	73342	23016140	59556	039-90008-236	PIN, Dowel	1
8	73342	23012036	59556	039-90008-174	PLUG, Pipe, 1/8 NPTF	2
9	73342	6884749	59556	039-90008-237	KIT, Governor Filter	1
10		NSS			FILTER, Governor	1
11	73342	6882689	59556	039-90008-238	SEAL, O-Ring	1
12	73342	9410360	59556	039-90008-239	PLUG, 7/8-14	1
13	73342	6883974	59556	039-90008-240	TUBE, Drain	1
14	73342	23014163	59556	039-90008-241	PLUG, Pipe, 3/8 NPTF	1
15	73342	9411417	59556	039-90008-242	WASHER, Flat, 1/2 inch	14
16	73342	9409053	59556	039-90008-243	BOLT, Hex Head, 1/2-13x1-1/2 inch	14
17	73342	903209	59556	039-90008-244	BEARING, Ball	1
18	73342	9418788	59556	039-90008-245	RING, Snap, Internal	1
19	73342	6778050	59556	039-90008-246	SEAL, Oil	1
20	73342	23016017	59556	039-90008-247	SHIELD, Dust	1
21	73342	9411417	59556	039-90008-242	WASHER, Output Flange	1
22	73342	23014159	59556	039-90008-249	BOLT, HEX HEAD, 1/2-20x1-1/2 inch	1

Group 15. Transmission Installation

Figure E-109. Rear Cover

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	73342	6885570	59556	039-90008-250	GOVERNOR ASSEMBLY (No.461)	1
24	73342	6880353	59556	039-90008-251	KIT, Governor Service	1
25		NSS			PIN, Weight	2
26	73342	23018625	59556	039-90008-252	GASKET, Cover	1
27	73342	8623262	59556	039-90008-252	COVER, Governor	1
28	73342	115658	59556	039-90008-254	BOLT, Hex Head, 5/16-18x9/16 inch	4



GROUP 15. TRANSMISSION INSTALLATION  
 FIGURE E-110. CONTROL VALVE

(E-365 Blank)/E-366

## Group 15. Transmission Installation

Figure E-110. Control Valve

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	73342	23019548	59556	039-90008-255	KIT, Valve Assemblies and Governor	1
2	73342	6838429	59556	039-90008-256	PIN, Valve Stop	1
3	73342	6835729	59556	039-90008-257	SPRING, Priority Valve	1
4	73342	6835929	59556	039-90008-258	VALVE, Priority	1
5	73342	6831737	59556	039-90008-259	VALVE, Hold Regulator	1
6	73342	6837541	59556	039-90008-260	SPRING, Hold Regulator Valve	1
7	73342	6884905	59556	039-90008-261	PIN, Valve Stop	1
8	73342	6833949	59556	039-90008-262	WASHER	1
9	73342	6833891	59556	039-90008-263	RING, Spring Adjusting	4
10	73342	23013501	59556	039-90008-264	VALVE, Range Selector	1
11	73342	9426920	59556	039-90008-265	PIN, Retainer	1
12	73342	6880463	59556	039-90008-266	VALVE, 1-2 Shift	1
13	73342	6836390	59556	039-90008-267	VALVE, 1-2 Modulator	1
14	73342	23017044	59556	039-90008-268	SPRING, 1-2 Shift Valve	1
15	73342	6833896	59556	039-90008-269	STOP, Valve	3
16	73342	9428493	59556	039-90008-270	PIN, Retainer	5
17	73342	6837618	59556	039-90008-271	VALVE, 2-3 Shift	1
18	73342	6883148	59556	039-90008-272	VALVE, 2-3 Modulator	1
19	73342	23013272	59556	039-90008-273	SPRING, 2-3 Shift Valve	1
20	73342	6882294	59556	039-90008-274	VALVE, 3-4 Shift	1
21	73342	6881033	59556	039-90008-275	VALVE, 3-4 Modulator	1
22	73342	23013271	59556	039-90008-276	SPRING, 3-4 Shift Valve	1
23	73342	6833888	59556	039-90008-277	VALVE, 3-4 Relay	2

## Group 15. Transmission Installation

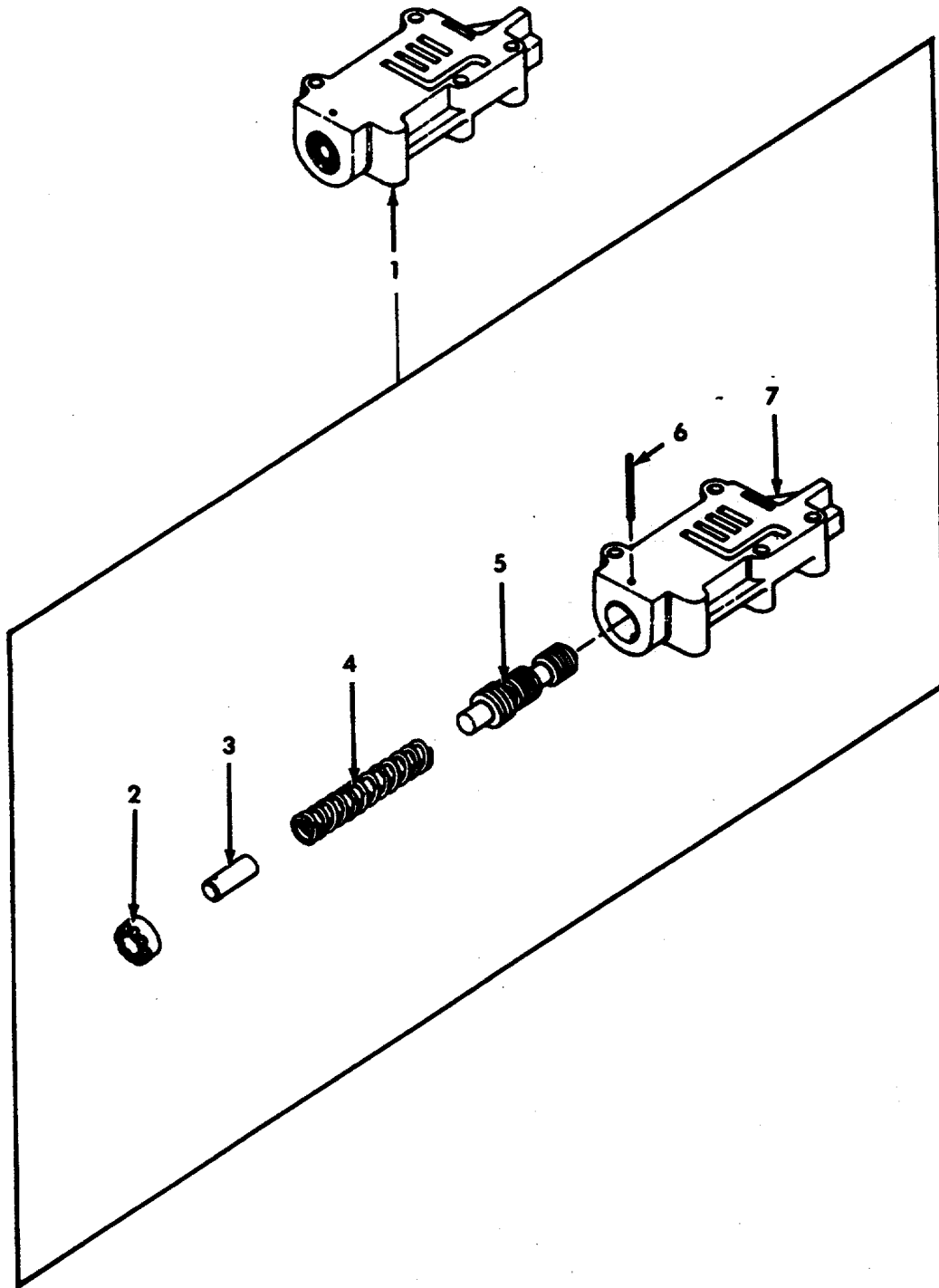
Figure E-110. Control Valve

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
24	73342	6832462	59556	039-90008-278	SPRING, 3-4 Relay Valve	2
25	73342	6839829	59556	039-90008-279	STOP, Valve	2
26	73342	6883864	59556	039-90008-280	PIN, Retainer	1
27	73342	23017751	59556	039-90008-281	VALVE, Trimmer Regulator	1
28	73342	23018423	59556	039-90008-282	SPRING, Valve	1
29	73342	23017752	59556	039-90008-283	STOP, Valve	1
30	73342	23019543	59556	039-90008-284	KIT, Separator Plate	1
31	73342	445567	59556	039-90008-190	BOLT, Hex Head, 1/4-20x1-3/4 inch	3
32	73342	6839085	59556	039-90008-286	PIN, Actuator	1
33	73342	23014098	59556	039-90008-287	RING, Spring Adjusting	1
34	73342	23012948	59556	039-90008-288	SPRING, Modulator Valve	1
35	73342	23013764	59556	039-90008-289	VALVE, Modulator	1
36	73342	23015348	59556	039-90008-290	BODY, Modulator Valve	1
37	73342	23017820	59556	039-90008-291	BODY, Control Valve	1
38	73342	23014097	59556	039-90008-292	VALVE, Trimmer	4
39	73342	6835921	59556	039-90008-293	PLUG, Trimmer	4
40	73342	6880045	59556	039-90008-294	SPRING, Outer	2
41	73342	6885166	59556	039-90008-295	SPRING, Inner	4
42	73342	6839122	59556	039-90008-296	STOP, Valve	4
43	73342	23012937	59556	039-90008-297	SPRING, Outer	1
44	73342	6837692	59556	039-90008-298	SPRING, Outer	1
45	73342	141223	59556	039-90008-299	STOP, Valve	1
46	73342	23013054	59556	039-90008-300	SPRING, Accumulator Valve	1

Group 15. Transmission Installation

Figure E-110. Control Valve

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
47	73342	23013053	59556	039-90008-301	VALVE, Fourth C1utch Trimmer	1
48	73342	23013052	59556	039-90008-302	COVER, Trimmer Valve	1
49	73342	443603	59556	039-90008-303	BOLT, Hex Head, 1/4-20x3/4 inch	9
50	73342	6703169	59556	039-90008-304	PIN, Retainer	2
51	73342	6835928	59556	039-90008-305	VALVE, 1-2 Relay	1
52	73342	6834528	59556	039-90008-306	SPRING, 1-2 Relay Valve	1
53	73342	6835930	59556	039-90008-307	SPACER	1
54	73342	23013056	59556	039-90008-308	TUBE, First C1utch	1
55	73342	6835817	59556	039-90008-309	TUBE, Governor	2



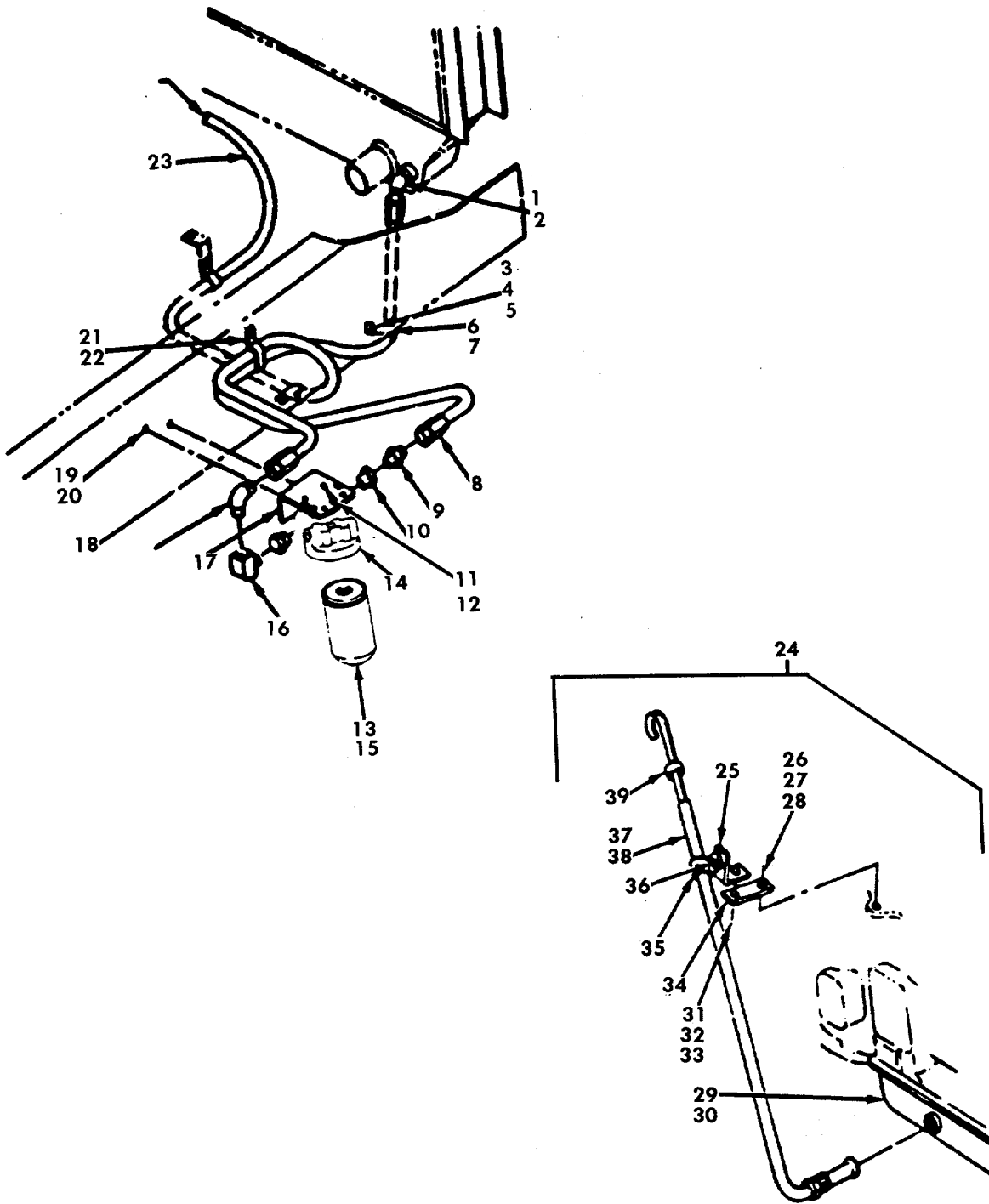
GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-111. MODULATED LOCKUP VALVE



Group 15. Transmission Installation

Figure E-111. Modulated Lockup Valve

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	73342	23016397	59556	039-90008-311	VALVE ASSEMBLY, Modulated Lockup	1
2	73342	6833891	59556	039-90008-263	RING, Spring Adjusting	1
3	73342	6833896	59556	039-90008-269	STOP	1
4	73342	23017029	59556	039-90008-314	SPRING, Valve	1
5	73342	6882819	59556	039-90008-315	VALVE, Modulated Lockup	1
6	73342	9428493	59556	039-90008-270	PIN	1
7	73342	6882818	59556	039-90008-317	BODY, Valve	1



GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-112. OIL COOLER PIPING AND OIL LEVEL GAUGE

## Group 15. Transmission Installation

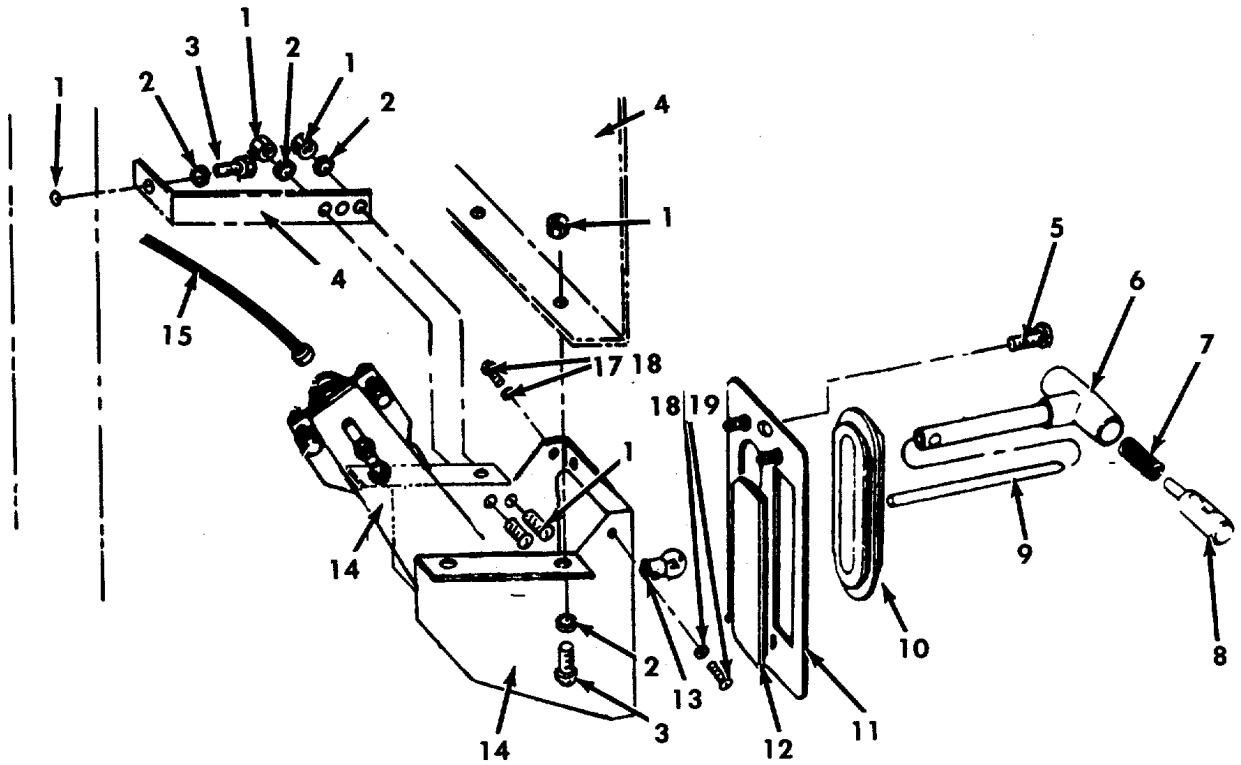
Figure E-112. Oil Cooler Piping and Oil Level Gauge

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					OIL COOLER PIPING ASSEMBLY	REF
1	89346	759431C1	59556	039-00013-27	CONNECTOR, 3/4 MPT x 1-1/16-14 ST	1
2	89346	782080C1	59556	039-00013-28	ELBOW, 45° Degree, 3/4 MPT x 1-1/16-14 ST	1
3	89346	24861R1	59556	039-00013-29	BOLT, Hex Head, 1/2-13x1-1/4 inch	1
4	89346	25526R1	59556	039-00013-30	NUT, Hex Head, 1/2-13	1
5	89346	203790C1	59556	039-00013-31	WASHER, Lock, 1/2 inch	1
6	89346	44406	59556	039-00013-32	ELBOW, 90° Degree, 3/4 NPT x 3/4 NPT	1
7	89346	782080C1	59556	039-00013-28	ELBOW, 45° Degree, 3/4 NPT x 1-1/16-14	1
8	89346	A120300000	59556	039-00013-34	HOSE, Radiator To Filter	1
9	89346	110288	59556	039-00013-35	UNION, 1-1/16-14 x 1-1/16-14	1
10	89346	117219	59556	039-00013-36	ADAPTER, Reducer, 1 NPT x 3/4 NPT	2
11	89346	24839R1	59556	015-90005-30	BOLT, Hex Head, 3/8-16 x 3/4 inch	2
12	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	2
13	89346	475605C91	59556	039-00013-39	FILTER, Oil Assembly	1
14		NSS			HEAD, Oil Filter	1
15	89346	PER 20	59556	039-00013-41	FILTER, Oil	1
16	89346	444046	59556	039-00013-42	ELBOW, 3/4 Street	1
17	89346	501727C2	59556	039-00013-43	BRACKET, Mounting	1
18	89346	865458C1	59556	039-00013-44	ELBOW, 90° Degree, 3/4-16 NPT 1-1/16-14	1
19	89346	414053C1	59556	009-90006-48	BOLT, Flange, Hex Head, 1/2-20 UNRF x 1-3/4 inch	2

## Group 15. Transmission Installation

Figure E-112. Oil Cooler Piping and Oil Level Gauge

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	414087C1	59556	039-00013-46	NUT, Flange, Hex Head, 1/2-20 UNF	2
21	89346	291207C1	59556	039-00013-47	STRAP, Lock, Nylon	1
22	89346	445138C1	59556	039-00013-48	CLAMP, 1-1/8x1-1/8 inch	1
23	89346	A120390000	59556	039-00013-49	HOSE, Filter To Pipe	1
24	59556	039-00013-1	59556	039-00013-1	OIL LEVEL GAUGE ASSEMBLY	1
25		NSS			EXTENSION, C1ip	1
26	89346	24842R1	59556	016-90005-18	BOLE, Hex Head, 3/8-16 x 1-3/4 inch	1
27	89346	9413979	59556	006-90002-170	NUT, Hex Locking, 3/6-16	1
28	89346	25709R1	59556	006-90002-168	WASHER, Flat, 3/8 inch	2
29	89346	589615C1	59556	039-00013-5	PAN, Oil	1
30	89346	501911C1	59556	039-00013-6	GASKET, Oil Pan	1
31	89346	25222R1	59556	019-90004-277	BOLT, Hex Head, 1/4-20 x 3/4 inch	1
32	89346	25519R1	59556	019-90004-276	NUT, Hex, 1/4-20	2
33	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 Regular	2
34		NSS			EXTENSION	1
35	89346	299566C1	59556	019-90004-404	CLAMP	1
36	89346	25485R1	59556	039-00013-10	BOLT, Hex Head, 1/4-20 x 1-1/4 inch	1
37	89346	576278C3	59556	039-00013-11	TUBE, Fill Transmission	1
38	89346	190236	59556	039-00013-12	NUT, Tube, 1-1/16 x 3 inch, Inverted Flare	1
39	89346	576277C2	59556	039-00013-13	GAUGE, Transmission Oil Level	1



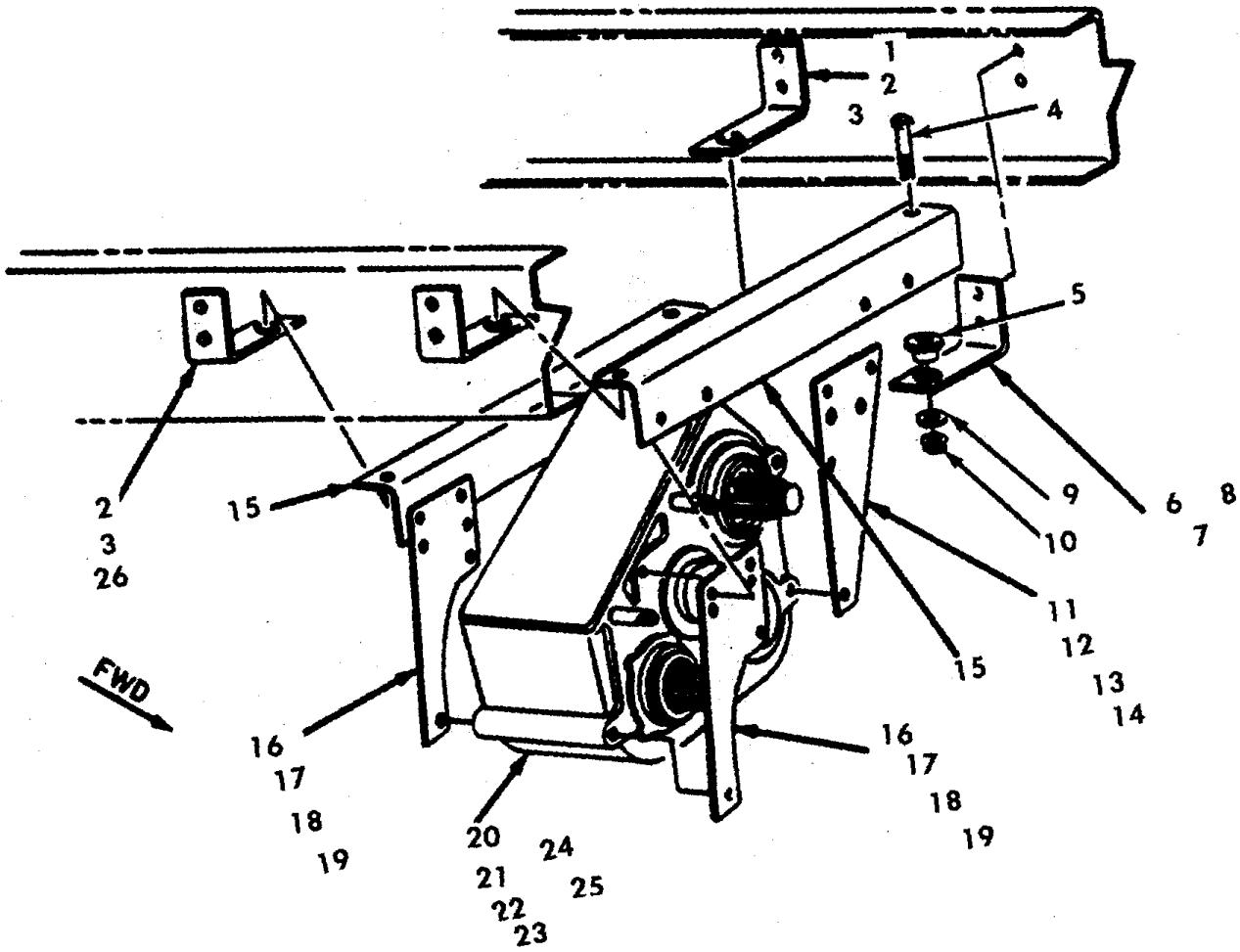
GROUP 15. TRANSMISSION INSTALLATION  
FIGURE E-113. TRANSMISSION SHIFT CONTROL

(E-375 Blank)/E-376

Group 15. Transmission Installation

Figure E-113. Transmission Shift Control

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					CONTROL LEVER ASSEMBLY, Automatic Transmission	
1	89346	26110R1	59556	030-00008-24	NUT, Hex, 1/4-20 UNC	5
2	89346	25707R1	59556	039-00013-51	WASHER, Flat, 1/4 inch	5
3	89346	25222R1	59556	019-90004-277	BOLT, Hex Head, 1/4-20 UNC x 3/4 inch	5
4	89346			039-00013-53	DASHBOARD	REF
5	89346	440055	59556	039-00013-54	SCREW, 1/4-28 x 1/2 Flat Head	2
6	89346	505641C1	59556	039-00013-55	LEVER, T-Bar	1
7		NSS			SPRING, Control Lever Plunger	1
8		NSS			PLUNGER, Control Lever	1
9		NSS			ROD, Control Lever Push	1
10	89346	483330C1	59556	039-00013-56	BOOT, Control Lever	1
11	89346	581047C1	59556	039-00013-57	GATE, Plate	1
12	89346	581040C1	59556	039-00013-58	LENS, Shift Indicator Light	1
13	89346	193067	59556	039-00013-59	LAMP	1
14		NSS			HOUSING, Control	1
15	89346	463510C1	59556	039-00013-60	CABLE	1
16	89346	480883C2	59556	039-00013-61	BRACKET, Shift Control Support	1
17	89346	25220R1	59556	039-00013-62	BOLT, Hex Head, 1/4-20 x 3/8 Long	2
18	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 inch	6
19	89346	25752R1	59556	039-00013-63	BOLT, Hex Head, 1/4-20 UNC x 1/2 inch	4



GROUP 16. TRANSFER CASE ASSEMBLY  
FIGURE E-114. TRANSFER CASE INSTALLATION

Group 16. Transmission Installation

Figure E-114. Transfer Case Installation

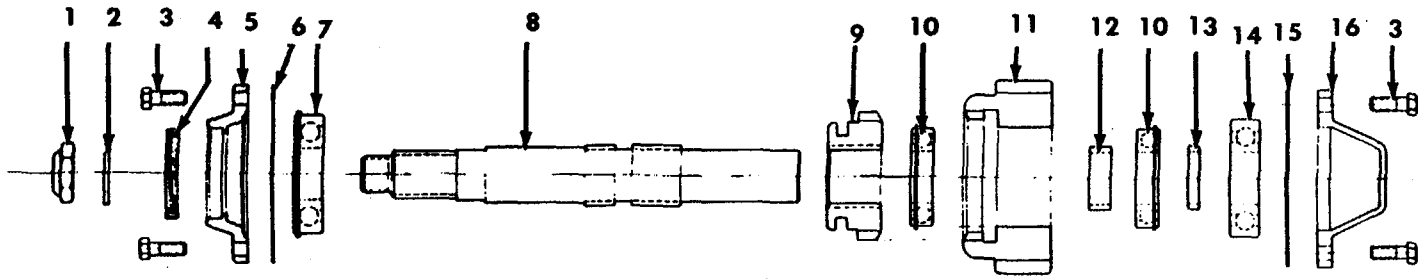
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					TRANSFER CASE MOUNTING ANGLE ASSEMBLY	REF
1	89346	585547C1	59556	039-90013-7	BRACKET, Frame, Rear, Left	1
2	89346	414053C1	59556	009-90006-48	BOLT, Flange, Hex Head	4
3	89346	414087C1	59556	006-90002-150	NUT, Flange, Hex	4
4	89346	414082C1	59556	039-90013-10	BOLT, Flange, Hex Head	4
5	89346	470031C2	59556	039-90013-11	INSULATOR	4
6	89346	584492C1	59556	039-90013-12	BRACKET, Frame	2
7	89346	414053C1	59556	009-90006-48	BOLT, Flange, Hex Head	4
8	89346	414087C1	59556	006-90002-150	NUT, Flange, Hex	4
9	89346	107813R1	59556	039-90013-15	WASHER	4
10	89346	414089C1	59556	039-90013-16	NUT, Flange, Hex	4
11	89346	584490C1	59556	039-90013-17	BRACKET, Transfer Case, Front And Rear	2
12	89346	24874R1	59556	039-90013-18	BOLT, Hex Head	4
13	89346	25528R1	59556	039-90013-19	NUT, Hex	4
14	89346	5/8R	59556	MS35338-50	WASHER, Lock	4
15	89346	584489C2	59556	039-90013-21	SUPPORT	2
16		NSS			BRACKET, Transfer Case	2
17	89346	25528R1	59556	039-90013-19	NUT, Hex	
18	89346	5/8R	59556	MS35338-50	WASHER, Lock	4
19	89346	24874R1	59556	039-90013-18	BOLT, Hex Head	4
20	21292	872165005	59556	039-90009	TRANSFER CASE, (See Figures E-115 Thru E-121 For Detailed Breakdown)	1



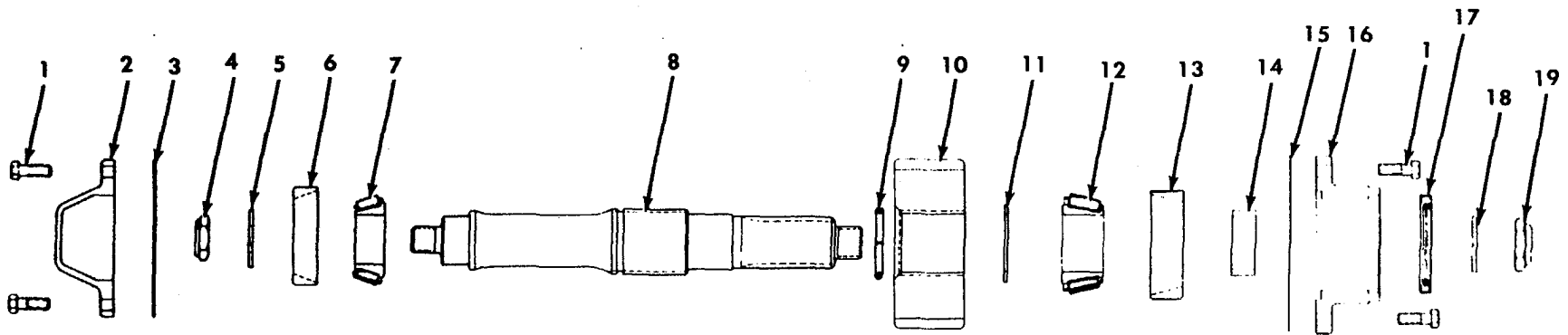
Group 16. Transmission Installation

Figure E-114. Transfer Case Installation

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
21	89346	24874R1	59556	039-90013-18	BOLT, Hex Head	4
22	89346	24873R1	59556	039-90013-28	BOLT, Hex Head	4
23	89346	4872R1	59556	039-90013-29	BOLT, Hex Head	4
24	89346	5/8R	59556	MS35338-50	WASHER, Lock	8
25		NSS			SPACER, Transfer Case	4
26	89346	585548C1	59556	039-90013-32	BRACKET, Frame, Rear, Right	1



GROUP 16. TRANSFER CASE ASSEMBLY  
FIGURE E-115. FRONT OUTPUT SHAFT



GROUP 16. TRANSFER CASE ASSEMBLY  
FIGURE E-116. REAR OUTPUT SHAFT

(E-381 Blank)/E-382

Group 16. Transfer Case Assembly

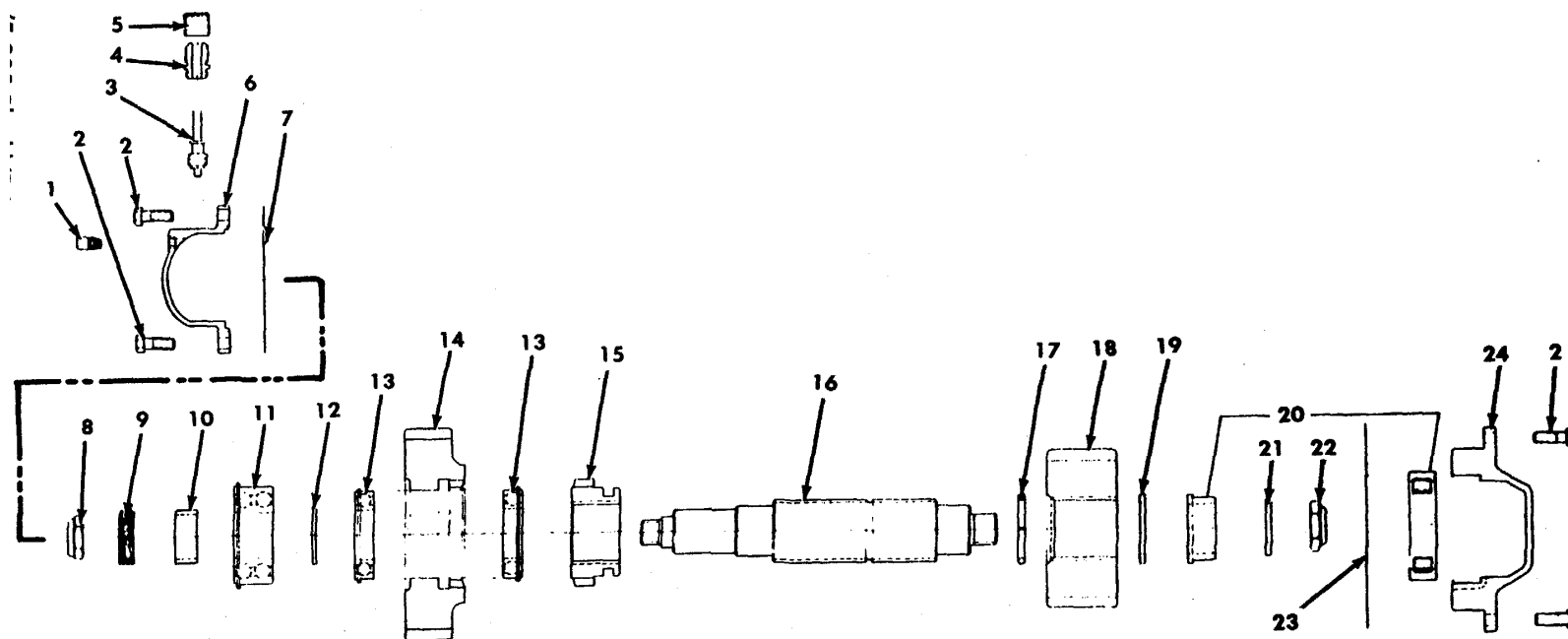
Figure E-115. Front Output Shaft

Figure E-116. Rear Output Shaft

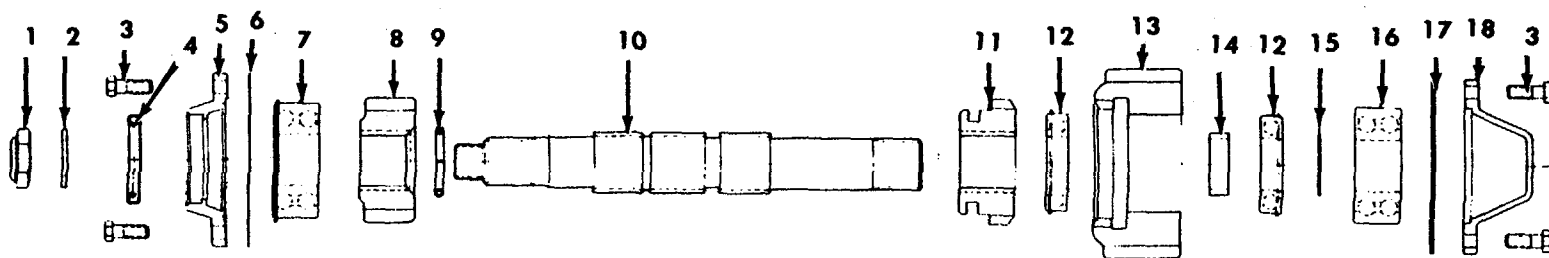
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E--115					FRONT OUTPUT SHAFT ASSEMBLY	REF
1	21292	688-633	59556	039-90009-1	NUT, Lock, Nylon, 1-1/4-18	1
2	21292	927-775-004	59556	039-90009-2	WASHER, 1-5/16 I.D.	1
3	21292	265-238	59556	039-90009-3	SCREW, Cap, 7/16-14x1-1/4 inch	12
4	21292	732-246	59556	039-90009-4	SEAL	1
5	21292	237-435	59556	039-90009-5	CARRIER, Oil Seal	1
6	21292	427-339	59556	039-90009-6	GASKET	1
7	21292	232-252	59556	039-90009-7	BEARING	1
8	21292	769-277	59556	039-90009-8	SHAFT, Front Output	1
9	21292	432-236	59556	039-90009-9	CLUTCH	1
10	21292	232-234	59556	039-90009-10	BEARING	2
11	21292	432-237	59556	039-90009-11	GEAR	1
12	21292	736-235	59556	039-90009-12	RING, Spacer	1
13	21292	736-948	59556	039-90009-13	RING, Spacer	1
14	21292	232-229	59556	039-90009-14	BEARING	1
15	21292	7441322	59556	039-90009-15	SHIM, Coral .031	AR
	21292	7442322	59556	039-90009-16	SHIM, Pink .016	AR
	21292	7443322	59556	039-90009-17	SHIM, Blue .005	AR
16	21292	235-484	59556	039-90009-18	COVER, Front Output Shaft	1

Group 16. Transfer Case Assembly  
 Figure E-115. Front Output Shaft  
 Figure E-116. Rear Output Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-116					REAR OUTPUT SHAFT ASSEMBLY	REF
1	21292	265-238	59556	039-90009-3	SCREW, Cap, 7/16-14x1-1/4 inch	12
2	21292	235-484	59556	039-90009-18	COVER, Rear Output Shaft Front	1
3	21292	7441322	59556	039-90009-15	SHIM, Coral .031	AR
	21292	7442322	59556	039-90009-16	SHIM, Pink .016	AR
	21292	7443322	59556	039-90009-17	SHIM, Blue .005	AR
4	21292	688-634	59556	039-90009-19	NUT, Lock, Nylon, 1-20	1
5	21292	927-775-001	59556	039-90009-20	WASHER, 1-1/16 I.D.	1
6	21292	233-456	59556	039-90009-21	CUP, Bearing	1
7	21292	233-455	59556	039-90009-22	CONE, Bearing	1
8	21292	769-276	59556	039-90009-23	SHAFT, Rear Output	1
9	21292	762-292	59556	039-90009-24	RING, Split	1
10	21292	432-554	59556	039-90009-25	GEAR, Rear Output	1
11	21292	927-758	59556	039-90009-26	WASHER, Bearing Spacer	1
12	21292	233-457	59556	039-90009-27	CONE, Bearing	1
13	21292	233-458	59556	039-90009-28	CUP, Bearing	1
14	21292	736-949	59556	039-90009-29	RING, Spacer	1
15	21292	427-466	59556	039-90009-30	GASKET	1
16	21292	237-434	59556	039-90009-31	CARRIER, Rear Output Shaft	1
17	21292	732-372	59556	039-90009-32	SEAL, Rear Output Shaft	1
18	21292	688-633	59556	039-90009-1	NUT, Lock, Nylon, 1-1/4-18	1
19	21292	927-775-004	59556	039-90009-2	WASHER, 1-5/16 I.D.	1



GROUP 16. TRANSFER CASE ASSEMBLY  
FIGURE E-117. INTERMEDIATE SHAFT



GROUP 16. TRANSFER CASE ASSEMBLY  
FIGURE E-118. INPUT SHAFT

## Group 16. Transfer Case Assembly

Figure E-117. Intermediate Shaft

Figure E-118. Input Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-117					INTERMEDIATE SHAFT ASSEMBLY	REF
1	21292	836-222	59556	039-90009-33	VENT	1
2	21292	265-238	59556	039-90009-3	SCREW, Cap, 7/16-14x1-1/4 inch	13
3	21292	432-235	59556	039-90009-34	GEAR, Speedo Driven	1
4	21292	883-473	59556	039-90009-35	CONNECTOR, Speedo	1
5	21292	235-529	59556	039-90009-36	CAP, Plastic	1
6	21292	235-446	59556	039-90009-37	CAP, Speedo	1
7	21292	427-338	59556	039-90009-38	GASKET	1
8	21292	688-634	59556	039-90009-19	NUT, Lock Nylon, 1-20	1
9	21292	432-234	59556	039-90009-39	GEAR, Speedo Drive	1
10	21292	736-229	59556	039-90009-40	RING, Spacer	1
11	21292	232-245	59556	039-90009-41	BEARING	1
12	21292	927-756	59556	039-90009-42	WASHER, Bearing Spacer	1
13	21292	232-388	59556	039-90009-43	BEARING	2
14	21292	432-559	59556	039-90009-44	GEAR, Underdrive 41T	1
15	21292	432-556	59556	039-90009-45	CLUTCH GEAR, Intermediate Shaft	1
16	21292	769-275	59556	039-90009-46	SHAFT, Intermediate	1
17	21292	762-292	59556	039-90009-24	RING, Split	1
18	21292	432-558	59556	039-90009-47	GEAR, 34T	1
19	21292	927-757	59556	039-90009-48	WASHER, Spacer	1
20	21292	233-454	59556	039-90009-49	BEARING ASSEMBLY, Roller	1
21	21292	927-775-003	59556	039-90009-50	WASHER, 1-1/4 I.D.	1
22	21292	688-633	59556	039-90009-1	NUT, Lock, Nylon, 1-1/4-18	1

Group 16. Transfer Case Assembly

Figure E-117. Intermediate Shaft

Figure E-118. Input Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	21292	427-465	59556	039-90009-51	GASKET	1
24	21292	235-487	59556	039-90009-52	CAP, Intermediate Shaft Rear	1
E-118					INPUT SHAFT ASSEMBLY	
1	21292	688-633	59556	039-90009-1	NUT, Lock Mylon, 1-1/4-18	1
2	21292	927-775-004	59556	039-90009-2	WASHER, 1-5/16 I.D.	1
3	21292	265-238	59556	039-90009-3	SCREW, Cap, 7/16-14 x 1-1/4 inch	12
4	21292	732-246	59556	039-90009-4	SEAL	1
5	21292	237-435	59556	039-90009-5	CARRIER, Oil Seal	1
6	21292	427-339	59556	039-90009-6	GASKET	1
7	21292	232-245	59556	039-90009-41	BEARING	1
8	21292	432-478	59556	039-90009-53	GEAR, 19T	1
9	21292	736-833	59556	039-90009-54	RING, Split	1
10	21292	769-279	59556	039-90009-55	SHAFT, Input	1
11	21292	432-236	59556	039-90009-9	CLUTCH	1
12	21292	232-234	59556	039-90009-10	BEARING	2
13	21292	432-557	59556	039-90009-56	GEAR, 35T	1
14	21292	736-235	59556	039-90009-12	RING, Spacer	1
15	21292	927-224	59556	039-90009-57	WASHER	1
16	21292	232-238	59556	039-90009-58	BEARING	1
17	59556	7441322	59556	039-90009-15	SHIM, Coral .031	AR

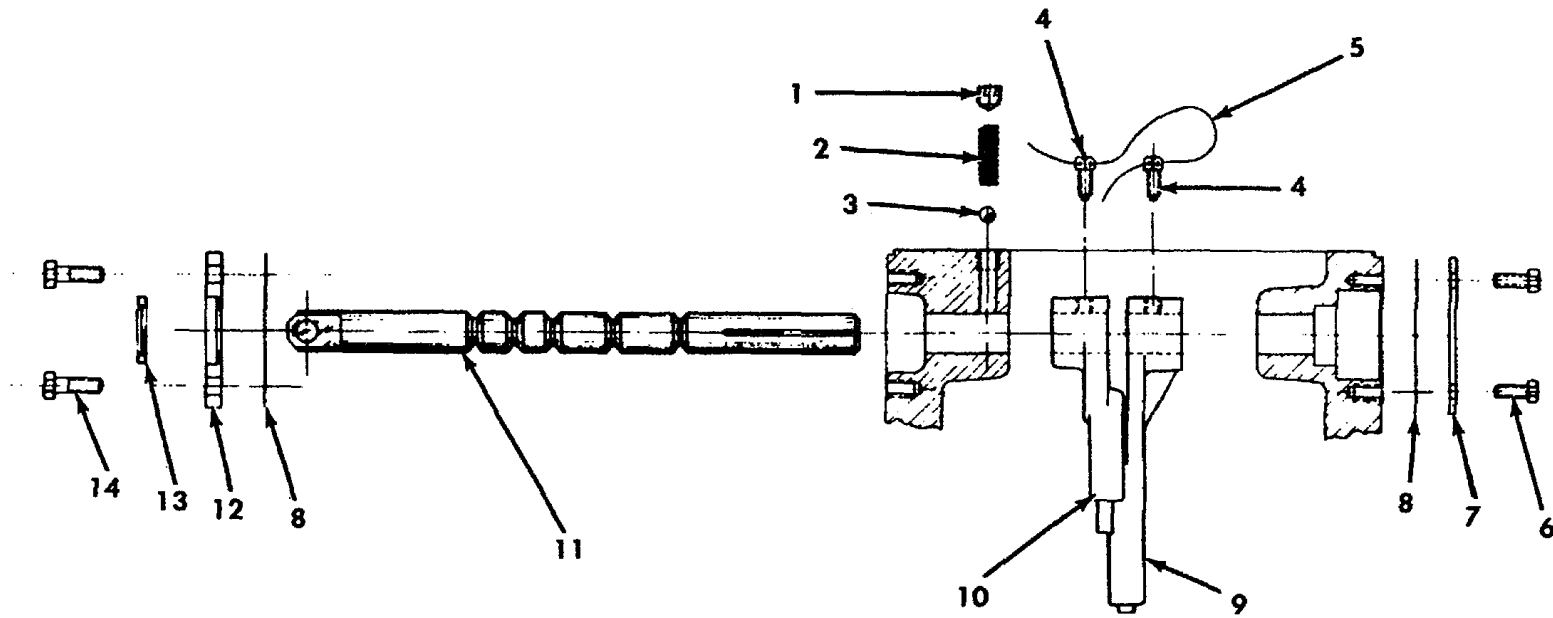
Group 16. Transfer Case Assembly

Figure E-117. Intermediate Shaft

Figure E-118. Input Shaft

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
18	21292	7442322	59556	039-90009-16	SHIM, Pink .016	AR
	21292	7443322	59556	039-90009-17	SHIM, Blue .005	AR
	21292	235-485	59556	039-90009-59	CAP, Input Shaft Rear	1





GROUP 16. TRANSFER CASE ASSEMBLY

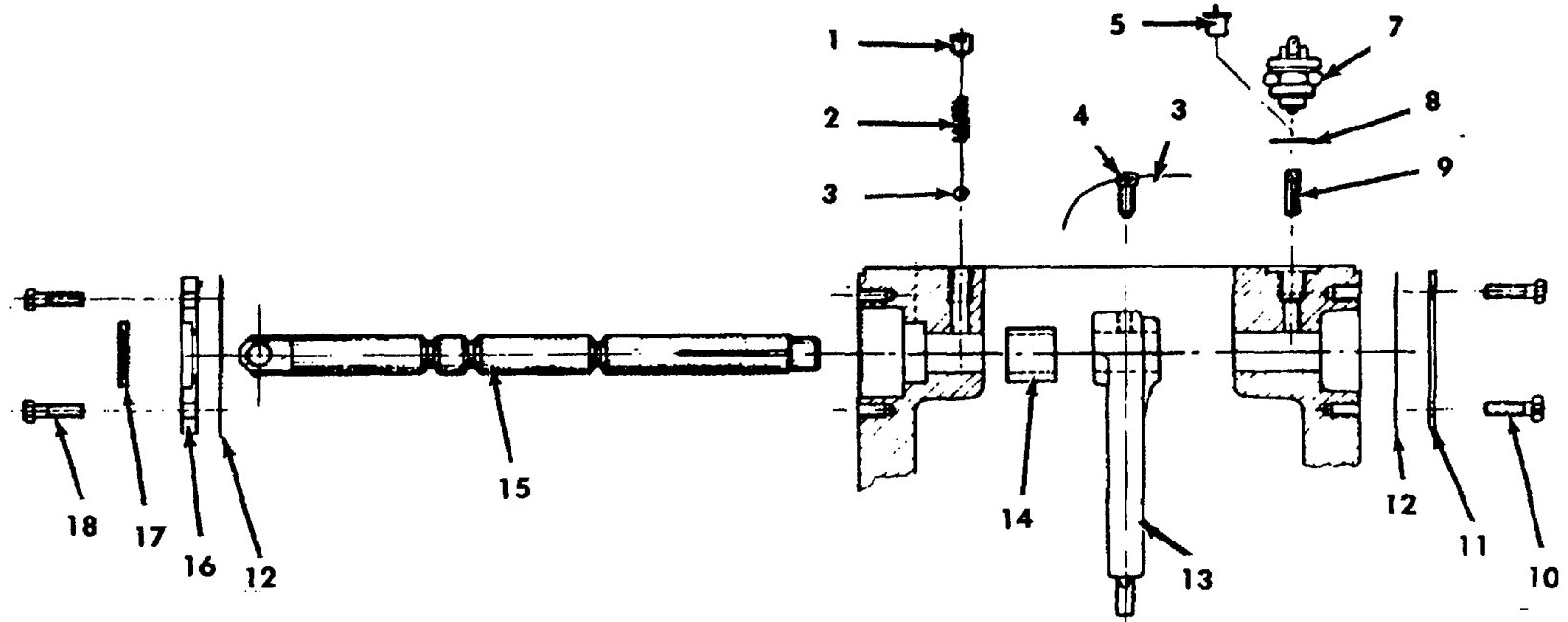
FIGURE E-119. MANUAL SHIFT

E-390

Group 16. Transfer Case Assembly

Figure E-119. Manual Shift

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					MANUAL H-N-U SHIFT ASSEMBLY	REF
1	21292	724-585	59556	039-90009-60	SCREW, Set, Nylock	1
2	21292	777-225	59556	039-90009-61	SPRING, Detent	1
3	21292	225-222	59556	039-90009-62	BALL, Detent	1
4	21292	724-222	59556	039-90009-63	SCREW, Set	2
5	21292	947-223	59556	039-90009-64	LOCKWIRE	2
6	21292	265-343	59556	039-90009-65	SCREW, Cap, 1/4-20x1/2 inch	4
7	21292	235-372	59556	039-90009-66	CAP, Shift Shaft	1
8	21292	427-399	59556	039-90009-67	GASKET	2
9	21292	367-268	59556	039-90009-68	FORK, Under Drive Shift	1
10	21292	367-259	59556	039-90009-69	FORK, Direct Drive Shift	1
11	21292	742-945	59556	039-90009-70	SHAFT, Mechanical Shift	1
12	21292	237-383	59556	039-90009-71	CARRIER, Seal	1
13	21292	732-357	59556	039-90009-72	SEAL, Shift Shaft	1
14	21292	265-366	59556	039-90009-73	SCREW, Cap, 1/4-20x1 inch	4

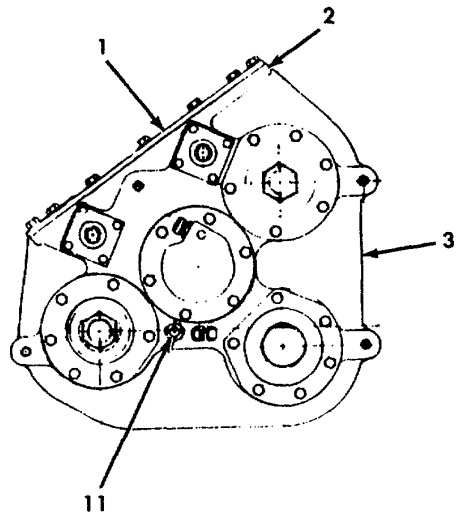


GROUP 16. TRANSFER CASE ASSEMBLY

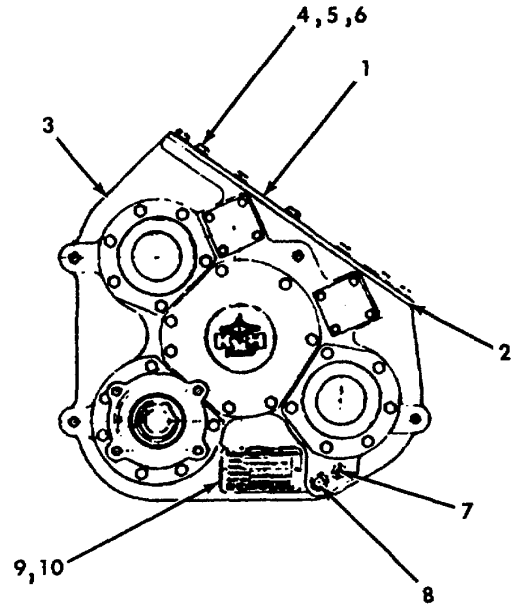
FIGURE E-120. MANUAL FRONT DRIVE DECLUTCH

Group 16. Transfer Case Assembly  
 Figure E-120. Manual Front Drive Declutch

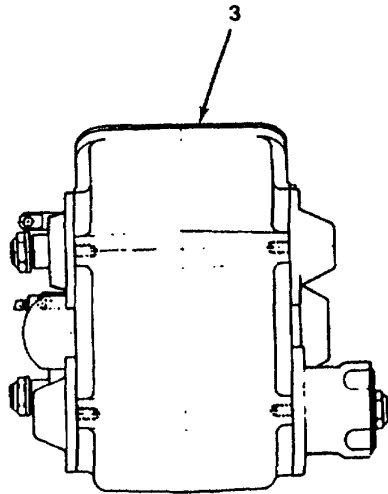
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					MANUAL FRONT DRIVE DECLUTCH ASSEMBLY	REF
1	21292	724-585	59556	039-90009-60	SCREW, Set, Nylon	1
2	21292	777-225	59556	039-90009-61	SPRING, Detent	1
3	21292	225-222	59556	039-90009-62	BALL, Detent	1
4	21292	724-222	59556	039-90009-63	SCREW, Set	1
5	21292	758-364	59556	039-90009-74	PLUG, Plastic	1
6	21292	947-223	59556	039-90009-64	LOCKWIRE	1
7	21292	798-245	59556	039-90009-75	SWITCH, Indicator	1
8	21292	927-427	59556	039-90009-76	WASHER, Copper	1
9	21292	746-678	59556	039-90009-77	DOWEL, Switch Operating	1
10	21292	265-343	59556	039-90009-65	SCREW, Cap, 1/4-20x1/2 inch	4
11	21292	235-372	59556	039-90009-66	CAP, Shift Shaft	1
12	21292	427-399	59556	039-90009-67	GASKET	2
13	21292	367-264	59556	039-90009-78	FORK, Front Drive Shift	1
14	21292	882-982	59556	039-90009-79	TUBE, Front Drive Limit	1
15	21292	769-278	59556	039-90009-80	SHAFT, Shift	1
16	21292	237-383	59556	039-90009-71	CARRIER, Seal	1
17	21292	732-357	59556	039-90009-72	SEAL, Shift Shaft	1
18	21292	265-366	59556	039-90009-73	SCREW, Cap, 1/4-20x1 inch	4



**FRONT VIEW**



**REAR VIEW**

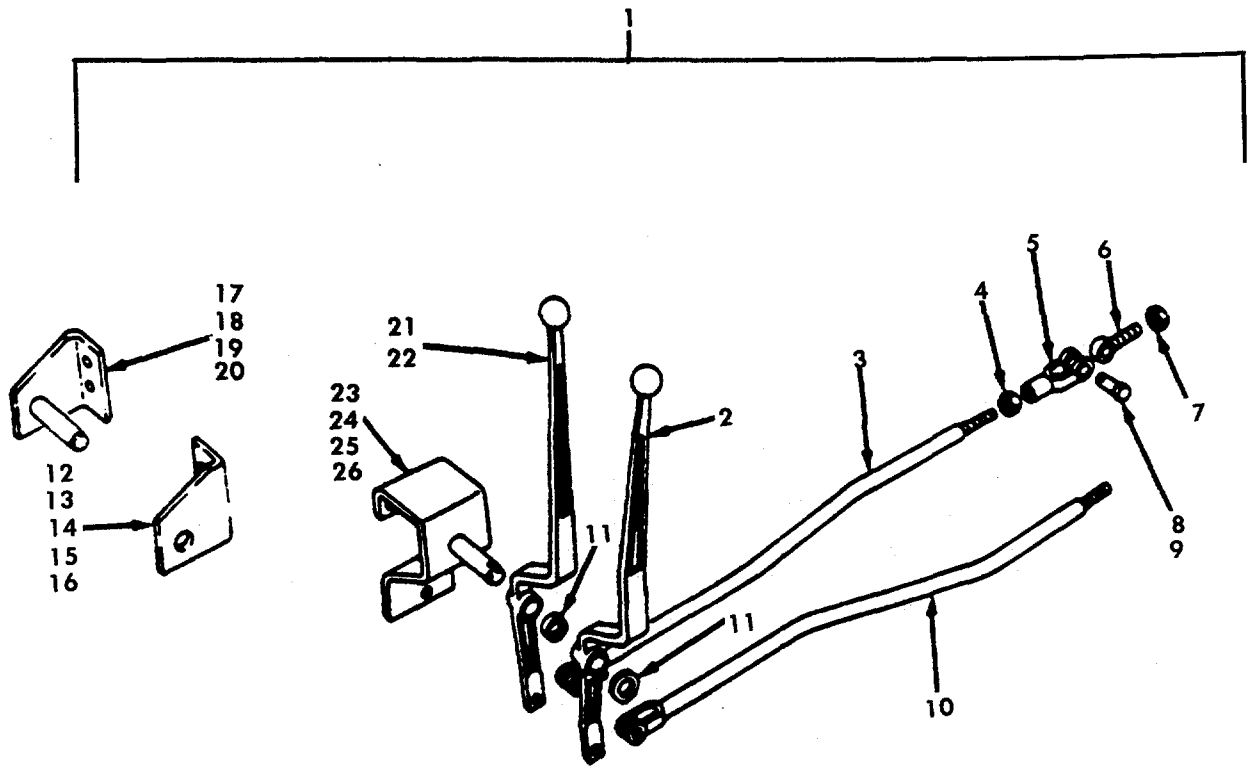


**LEFT SIDE VIEW**

GROUP 16. TRANSFER CASE ASSEMBLY  
FIGURE E-121. TRANSFER CASE HOUSING

Group 16. Transfer Case Assembly  
 Figure E-121. Transfer Case Housing

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	21292	793-377	59556	039-90009-81	TRANSFER CASE HOUSING ASSEMBLY	REF
2	21292	427-464	59556	039-90009-82	COVER, Main Case	1
3	21292	468-896	59556	039-90009-83	GASKET, Main Cover	1
4	21292	265-239	59556	039-90009-84	HOUSING, Main Cover	1
5	21292	265-238	59556	039-90009-84	SCREW, Cap, 7/16-14x1 inch	16
6	21292	927-749	59556	039-90009-3	SCREW, Cap, 7/16-14x1-1/4 inch	2
7	21292	758-293	59556	039-90009-86	WASHER, Lock, 7/16 inch	18
8	21292	758-274	59556	039-90009-87	PLUG, 1/2 NPT	1
9	21292	626-228	59556	039-90009-88	PLUG, 3/4 NPT Drain	1
10	21292	724-276	59556	039-90009-89	LABEL, Serial Plate	1
11	21292	758-229	59556	039-90009-90	SCREW, Drive	2
				039-90009-91	PLUG, 3/4 NPT Fill	1



GROUP 16. TRANSFER CASE ASSEMBLY

FIGURE E-122. TRANSFER CASE SHIFT LEVER AND LINKAGE

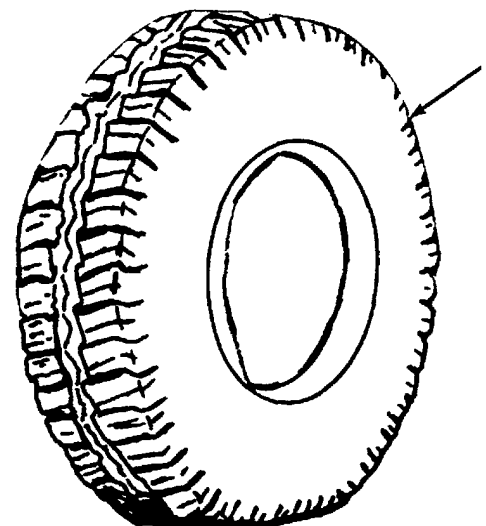
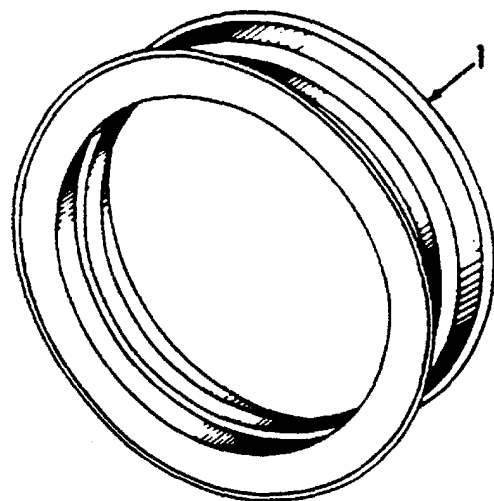
Group 16. Transfer Case Assembly  
 Figure E-122. Transfer Case Shift Lever and Linkage

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	59556	039-00022-1	59556	039-00022-1	CONTROL ASSEMBLY, TRANSFER CASE LEVER	REF
2	89346	581846C91	59556	039-00022-2	LEVER, Transfer Case Control	1
3	89346	585530C1	59556	039-00022-3	ROD, Transfer Case Control	1
4	89346	118627	59556	039-00022-4	NUT, Hex Jam	2
5	89346	144256	59556	039-00022-5	YOKE, Rod End	2
6	89346	93301R1	59556	039-00022-6	EYE, Rod End	2
7	89346	272125	59556	039-00022-7	NUT, Hex Jam	2
8	89346	16619R1	59556	039-00022-8	PIN, C1evis	4
9	89346	1/8x1P	59556	039-00022-9	PIN, Cotter	4
10	89346	584499C91	59556	039-00022-10	ROD, Transfer Case Control	1
11		NSS			SPACER, Pipe	2
12	89346	584500C1	59556	039-00022-11	BRACKET, Lever Mounting	1
13	89346	140483H	59556	016-90005-38	BOLT, Hex Head	2
14	89346	25522R1	59556	016-90005-49	NUT, Hex	2
15	89346	3/8R	59556	MS35338-46	WASHER, Lock	2
16	89346	103410	59556	039-00022-14	PIN, Cotter	1
17	89346	584502C2	59556	039-00022-15	BRACKET, Lever Mounting	1
18	89346	140483H	59556	016-90005-38	BOLT, Hex Head	2
19	89346	25522R1	59556	016-90005-49	NUT, Hex	2
20	89346	3/8R	59556	MS35338-46	WASHER, Lock	2
21	89346	581842C91	59556	039-00022-16	LEVER, Transfer Case Control	1
22	89346	298401R1	59556	039-00022-17	BEARING, Sintered	2



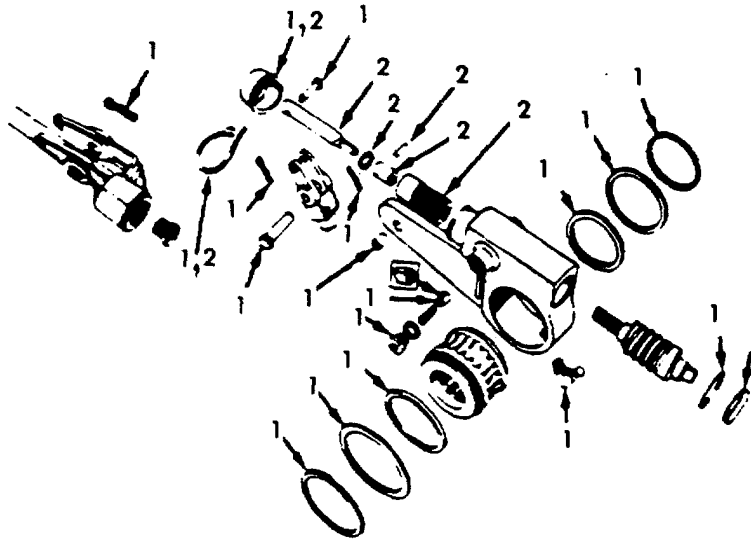
Group 16. Transfer Case Assembly  
 Figure E-122. Transfer Case Shift Lever and Linkage

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	89346	997677C1	59556	039-00022-18	BRACKET, Lever Mounting	1
24	89346	414052C1	59556	009-90006-54	BOLT, Flange, Hex Head	2
25	89346	414055C1	59556	006-90002-161	BOLT, Flange, Hex Head	1
26	89346	414087C1	59556	006-90002-150	NUT, Flange, Hex	3



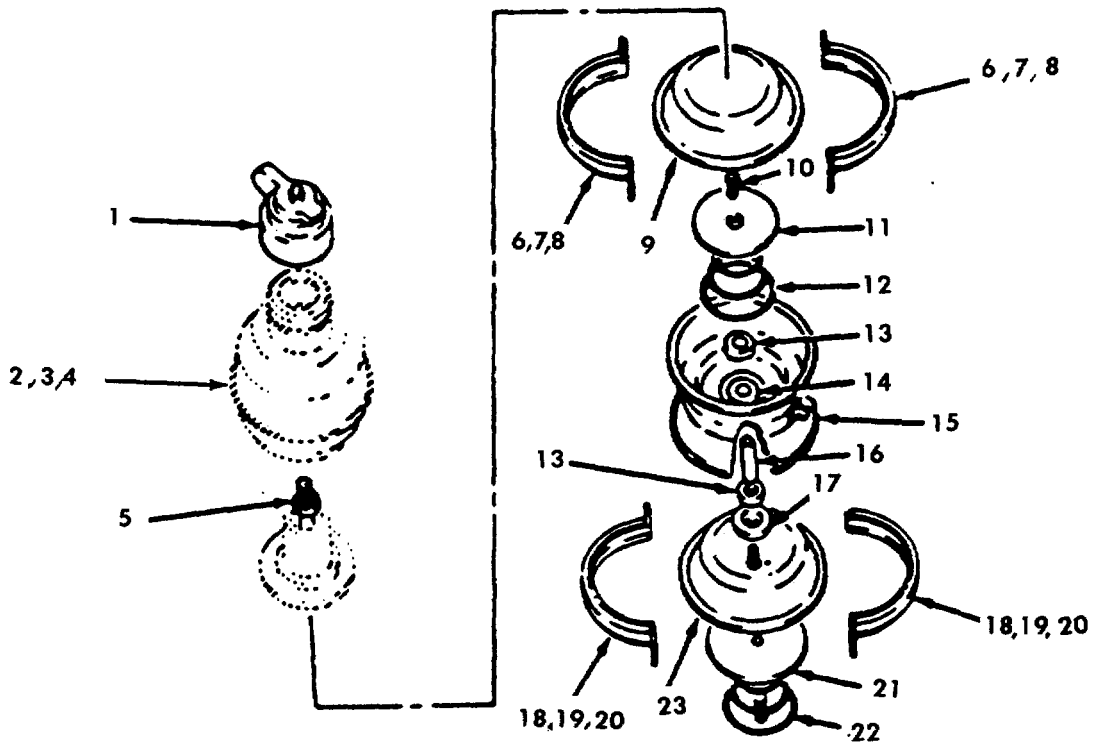
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	494376C1	59556	006-90002-150	RIM, 22.5 x 12.25 DC	4
2	-----	COML			TIRE, 9.00 x 20	4

GROUP 17. TIRE RIM ASSEMBLY  
 FIGURE E-123. TIRES AND RIMS



GROUP 18. AIR BRAKE SYSTEM

FIGURE E-124. SLACK ADJUSTER



GROUP 18. AIR BRAKE SYSTEM

FIGURE E-125. AIR BRAKE CHAMBER

Group 18. Air Brake System

Figure E-124. Slack Adjuster

Figure E-125. Air Brake Chamber

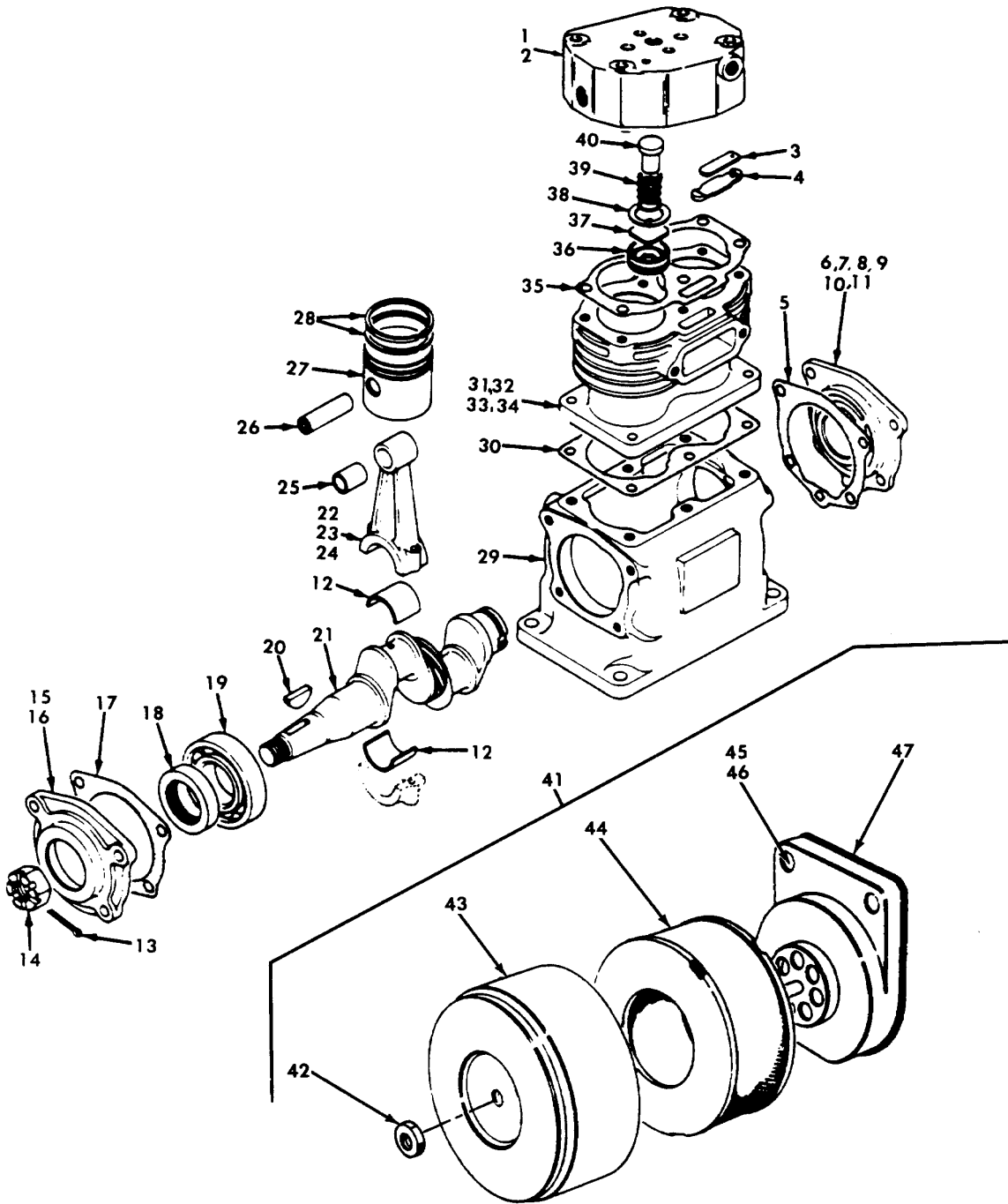
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-124					SLACK ADJUSTER	
1	89346	501293C91	59556	049-90011-46	MINOR REPAIR, R/S 963	1
2	89346	501294C91	59556	049-90011-47	MAJOR REPAIR, R/S 1350	1
E-125					AIR BRAKE CHAMBER	
1	89346	573219C1	59556	049-90011-23	CAP, Brake Chamber	1
2	89346	596003C91	59556	049-90011-24	CHAMBER, Air Brake, Left	1
3	89346	596004C91	59556	049-90011-25	CHAMBER, Air Brake, Right	1
4	89346	573218C91	59556	049-90011-26	CHAMBER, Spring Brake	1
5	89346	472151C1	59556	049-90011-27	NUT, Release Bolt	1
6	89346	683062R91	59556	049-90011-28	CLAMP, Ring	1
7	89346	175570R1	59556	049-90011-29	BOLT, 3/8 NC x 2 inches	2
8	89346	19231R1	59556	049-90011-30	NUT, 3/8 NC	2
9	89346	472153C1	59556	049-90011-31	DIAPHRAGM	1
10	89346	356117C1	59556	049-90011-32	SCREW, Special Push Plate	2
11	89346	352662C1	59556	049-90011-33	PLATE, Push Rod Spring	1
12	89346	464947C1	59556	049-90011-34	SPRING, Piston Return	1
13	89346	418608C1	59556	049-90011-35	BUSHING, Guide	2
14	89346	328235C1	59556	049-90011-36	SEAL, Case	1
15	89346	573216C1	59556	049-90011-37	CASE, Flange	1
16	89346	472149C1	59556	049-90011-38	ROD, Piston Push	1
17	89346	263082C11	59556	049-90011-39	PLATE, Push Rod	1

Group 18. Air Brake System

Figure E-124. Slack Adjuster

Figure E-125. Air Brake Chamber

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
18	89346	683062R91	59556	049-90011-28	CLAMP, Ring	1
19	89346	184791R1	59556	049-90011-41	BOLT, 3/8 NC x 2 inches	2
20	89346	19231R1	59556	049-90011-30	NUT, 3/8 NC	2
21	89346	472152C91	59556	049-90011-43	PISTON, W/Rod	1
22	89346	464947C1	59556	049-90011-44	SPRING, Piston Return	1
23	89346	472153C1	59556	049-90011-45	DIAPHRAGM	1



GROUP 18. AIR BRAKE SYSTEM

FIGURE E-126. AIR COMPRESSOR ASSEMBLY AND FILTER

(E-403 Blank)/E-404

## Group 18. Air Brake System

Figure E-126. Air Compressor Assembly and Filter

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	40342	N-7602-A	59556	049-90011-219	AIR COMPRESSOR ASSEMBLY (Includes Governor and Air Filter Assemblies)	
1	40342	N-21048-M	59556	049-90011-194	HEAD, Cylinder	1
2	40342	3x1311	59556	049-90011-195	BOLT, Cylinder Head	4
3	40342	102634	59556	049-90011-196	VALVE, Air Inlet	1
4	89346	210234R91	59556	049-90011-197	GUARD, W/Pin, Inlet Valve	2
5	40342	102368A	59556	049-90011-198	GASKET, Rear End Cover	1
6	89346	273025C92	59556	049-90011-199	COVER, W/Bushing, Rear End	1
7	40342	012378A	59556	049-90011-200	SEAL	1
8	40342	600399WW	59556	049-90011-201	SPRING	1
9	40342	200921N	59556	049-90011-202	CAP, Bearing Rear	1
10	40342	08W12014	59556	049-90011-203	SCREW, Hex Head	4
11	89346	243119R1	59556	049-90011-204	BOLT, Cover	4
12	40342	102376	59556	049-90011-205	BEARING, Connecting Rod	2
13	40342	38W10820	59556	049-90011-206	PIN, Cotter	1
14	40342	2-X-52	59556	049-90011-207	NUT, Hex	1
15	89346	177665R2	59556	049-90011-208	COVER, Front End	1
16	89346	243119R1	59556	049-90011-204	BOLT, Cover	4
17	89346	177666R1	59556	049-90011-210	GASKET, Front Cover End	1
18	40342	102374A	59556	049-90011-211	SEAL, Crankshaft	1
19	40342	600397	59556	049-90011-212	BEARING, Ball	2
20	40342	48W11616	59556	049-90011-213	KEY, Crankshaft	1
21	40342	N-295-PD	59556	049-90011-214	CRANKSHAFT	1

## Group 18. Air Brake System

Figure E-126. Air Compressor Assembly and Filter

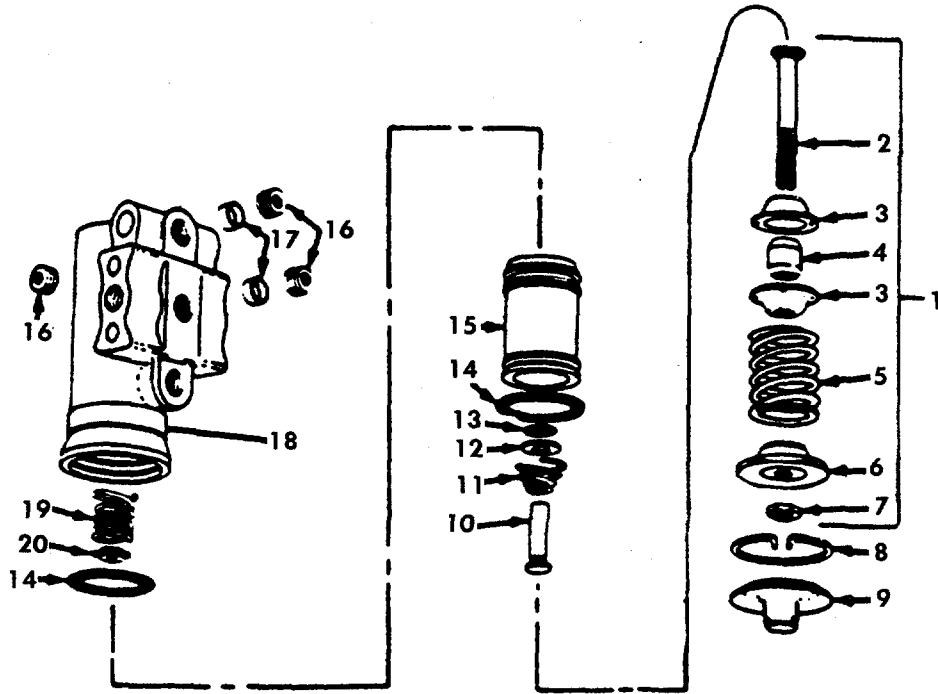
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	291194C92	59556	049-90011-215	ROD, Connecting, W/Cap And Bushing	2
23	89346	298612C1	59556	049-90011-216	BOLT, Bearing Cap	4
24	89346	25736R1	59556	030-00008-20	NUT, Bearing Cap Bolt	4
25	89346	177673R1	59556	049-90011-218	BUSHING, Wrist Pin	2
26		NSS			PIN	1
27	40342	100864AB	59556	049-90011-220	PISTON SET AND ROD ASSEMBLY	1
28	89346	474570C91	59556	049-90011-221	RING SET, Piston	1
29	40342	400145A	59556	049-90011-222	CRANKCASE	1
30	40342	102368P	59556	049-90011-223	GASKET, Cylinder Block	1
31	40342	N-3952-AB	59556	049-90011-224	BLOCK, Cylinder	1
32	89346	177664R1	59556	049-90011-225	STUD, Cylinder Block	4
33	40342	08W12420	59556	049-90011-226	SCREW, Hex	4
34	40342	35W64024	59556	049-90011-227	WASHER, Lock	4
35	40342	N-11007-D	59556	049-90011-228	GASKET, Cylinder Head	2
36	89346	301796C1	59556	049-90011-229	SEAT, Discharge Valve	2
37	89346	301795C1	59556	049-90011-230	VALVE, Discharge	2
38	89346	301797C1	59556	049-90011-231	WASHER, Copper	2
39	89346	177688R1	59556	049-90011-232	SPRING, Discharge Valve	1
40	89346	298559C1	59556	049-90011-233	CAGE, Discharge	2
41	89346	281911C92	59556	049-90011-78	AIR FILTER ASSEMBLY	1
42	89346	110330	59556	049-90011-79	NUT, Hex, 10-32	1
43	89346	290810C1	59556	049-90011-80	COVER, Air Strainer, Wing Nut Type	1



Group 18. Air Brake System

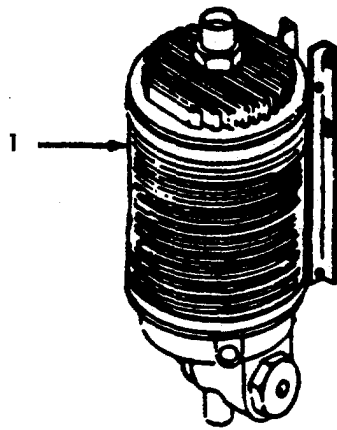
Figure E-126. Air Compressor Assembly and Filter

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
44	89346	290309C91	59556	049-90011-81	ELEMENT, Air Strainer	1
45	89346	25492R1	59556	049-90011-82	BOLT, Hex Head, 5/16 x 7/8 inch	2
46	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 Regular	2
47		NSS			BASE	1



GROUP 18. AIR BRAKE SYSTEM

FIGURE E-127. AIR COMPRESSOR GOVERNOR



GROUP 18. AIR BRAKE SYSTEM

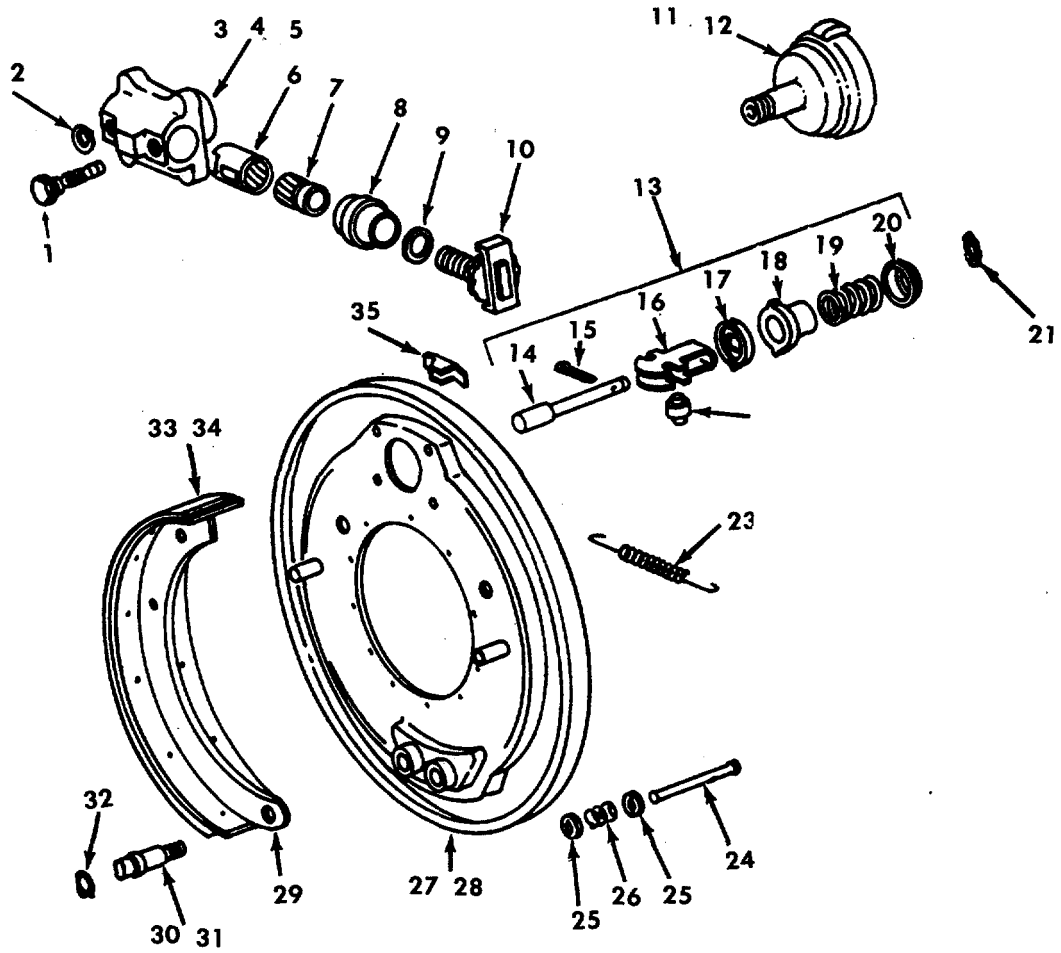
FIGURE E-128. AIR DRYER

Group 18. Air Brake System  
 Figure E-127. Air Compressor Governor  
 Figure E-128. Air Dryer

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-127	89346	410986C92	59556	049-90011-251	GOVERNOR ASSEMBLY, Air Compressor Without Mounting Gasket	REF
1	89346	321740R91	59556	049-90011-234	SPRING KIT, With Screw, Nut, Seats And Guide	1
2	89346	177629H1	59556	049-90011-235	SCREW, Adjuster	1
3	89346	321748R1	59556	049-90011-236	SEAT, Lower Spring Seat	2
4	89346	321749R1	59556	049-90011-237	GUIDE, Valve Spring	1
5	89346	321747R1	59556	049-90011-238	SPRING, Governor Valve, Upper	1
6	89346	177633H1	59556	049-90011-239	SEAT, Upper Spring	1
7	89346	124818	59556	049-90011-240	NUT, Adjusting Screw Jam	1
8	89346	160094R1	59556	049-90011-241	RING, Cover, Snap	1
9	89346	321739R1	59556	049-90011-242	COVER, Governor	1
10	89346	177627H1	59556	049-90011-243	STEM, Exhaust Valve	1
11	89346	321742R1	59556	049-90011-244	SPRING, Exhaust Valve Stem	1
12	89346	177622H1	59556	049-90011-245	WASHER, Exhaust Valve Stem	1
13	89346	3046105R1	59556	049-90011-246	O-RING	1
14	89346	382137R1	59556	049-90011-101	O-RING	2
15	89346	321743R91	59556	049-90011-248	PISTON, With Washer, Grommet And Ring	1
16	89346	444688	59556	049-90011-249	PLUG, Pipe, Hex-Socket, 1/8 inch	4
17	89346	321738R1	59556	049-90011-250	SCREEN, Governor, Strainer	2
18		NSS			BODY, Governor	1
19	89346	321745R1	59556	049-90011-252	SPRING, Governor, Valve, Lower	1

Group 18. Air Brake System  
 Figure E-127. Air Compressor Governor  
 Figure E-128. Air Dryer

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-128 1	89346	321744R1	59556	049-90011-253	VALVE, Air, Governor	1
	89346	631626C91	59556	049-90011-254	KIT, Repair, Governor	1
	89346	531602C92	59556	049-90011-193	AIR DRYER DRYER, Air, Breakmaster	1



GROUP 18. AIR BRAKE SYSTEM

FIGURE E-129. FRONT SERVICE BRAKES

Group 18. Air Brake System

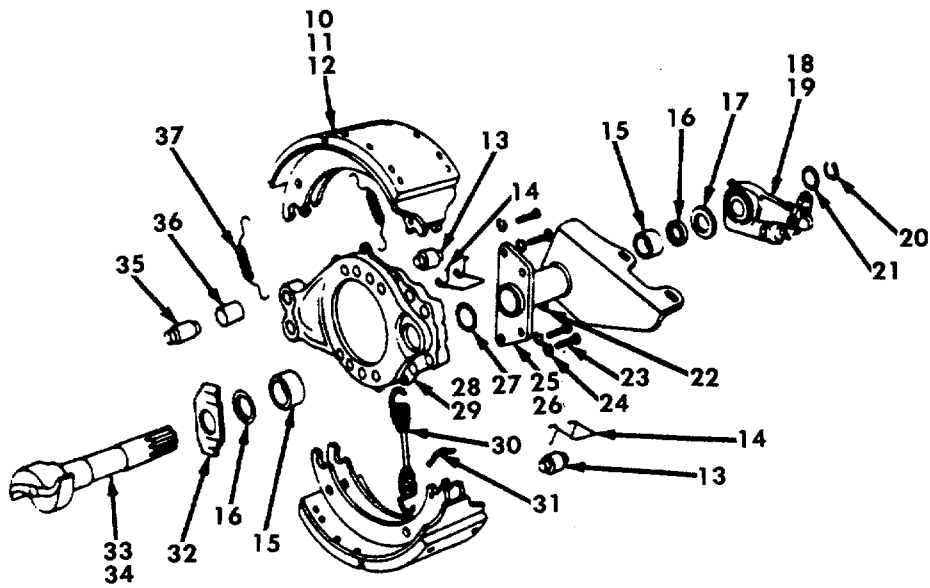
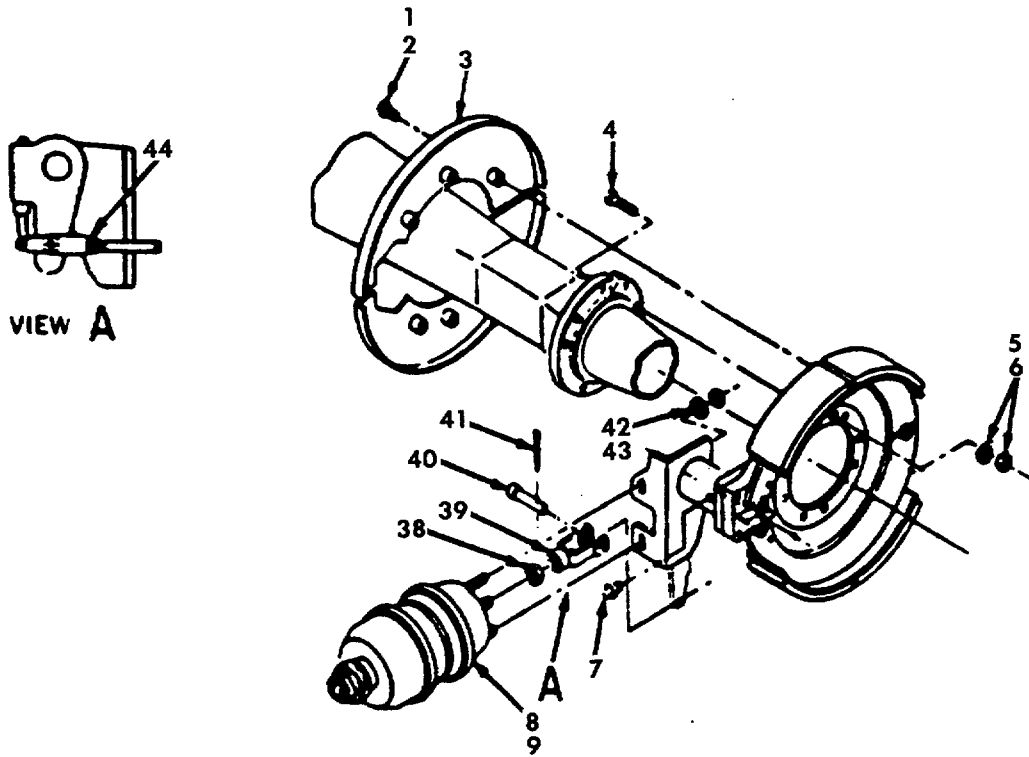
Figure E-129. Front Service Brakes

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	455305C1	59556	049-90011-158	FRONT WHEEL AIR BRAKE ASSEMBLY	4
2	89346	258268C1	59556	049-90011-159	PAWL, Adjusting Gear Guide	4
3	89346	482436C91	59556	049-90011-160	GASKET, Adjusting Gear Guide	2
4	89346	24839R1	59556	015-90005-30	HOUSING, Actuator	8
5	89346	120382	59556	019-90004-86	BOLT, Hex Head, 3/8 NC x 3/4 inch	8
6	89346	487477C1	59556	049-90011-163	WASHER, Locking, 3/8 Regular	4
7	89346	487479C1	59556	049-90011-164	PLUNGER, Brake Shoe, Adjusting	4
8	89346	487478C1	59556	049-90011-165	SLEEVE, Brake Shoe Adjusting Gear	4
9	89346	487471C1	59556	049-90011-166	SEAL, Brake Shoe Plunger	4
10	89346	487480C91	59556	049-90011-167	RING, Locking	4
11	89346	503078C91	59556	049-90011-168	SCREW, Brake Shoe, Adjusting	2
12	89346	13611VA	59556	049-90011-169	CHAMBER, Brake, 9 inch, Assembly	4
13	89346	340210C91	59556	049-90011-170	WASHER, Locking	2
14		NSS			WEDGE, Brake, Assembly, (Includes Item Numbers 14 thru 20 and 22)	2
15	89346	107762	59556	049-90011-172	WEDGE	2
16	89346	340216C1	59556	049-90011-173	PIN, Cotter, 3/32 x 5/8 inch	2
17	89346	340215C1	59556	049-90011-174	CAGE, Roller	2
18	89346	340214C1	59556	049-90011-175	WASHER, Wedge Retainer	2
19	89346	340217C1	59556	049-90011-176	SEAL, Wedge	2
20	89346	340212C1	59556	049-90011-177	SPRING, Wedge	2
21	89346	258009C2	59556	049-90011-178	RETAINER, Wedge	2
					NUT, Spanner	2

Group 18. Air Brake System

Figure E-129. Front Service Brakes

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	258027C1	59556	049-90011-179	ROLLER, Wedge	4
23	89346	482437C1	59556	049-90011-180	SPRING, Shoe Return	2
24	89346	210051H1	59556	049-90011-181	PIN, Hold Down	4
25	89346	264624C1	59556	049-90011-182	CUP, Anti-Rattle Spring	8
26	89346	264623C1	59556	049-90011-183	SPRING, Anti-Rattle	4
27	89346	482435C91	59556	049-90011-184	PLATE, Backing	2
28	89346	498097C1	59556	049-90011-185	GROMMET, Backing Plate	4
29	89346	482433C91	59556	049-90011-186	SHOE, With Lining, Brake	4
30	89346	482438C1	59556	049-90011-187	PIN, Shoe Anchor	4
31	89346	9412368	59556	049-90011-188	NUT, Anchor Pin	4
32	89346	152450R1	59556	049-90011-189	RING, Retaining	4
33	89346	482432C91	59556	049-90011-190	SET, Brake Lining, With Rivets	1
34	89346	974807R1	59556	049-90011-191	RIVET, Brake Lining	56
35	89346	264629C1	59556	049-90011-192	COVER, Adjusting Slot	8



GROUP 18. AIR BRAKE SYSTEM  
FIGURE E-130. REAR SERVICE BRAKES

(E-415 Blank)/E-416



## Group 18. Air Brake System

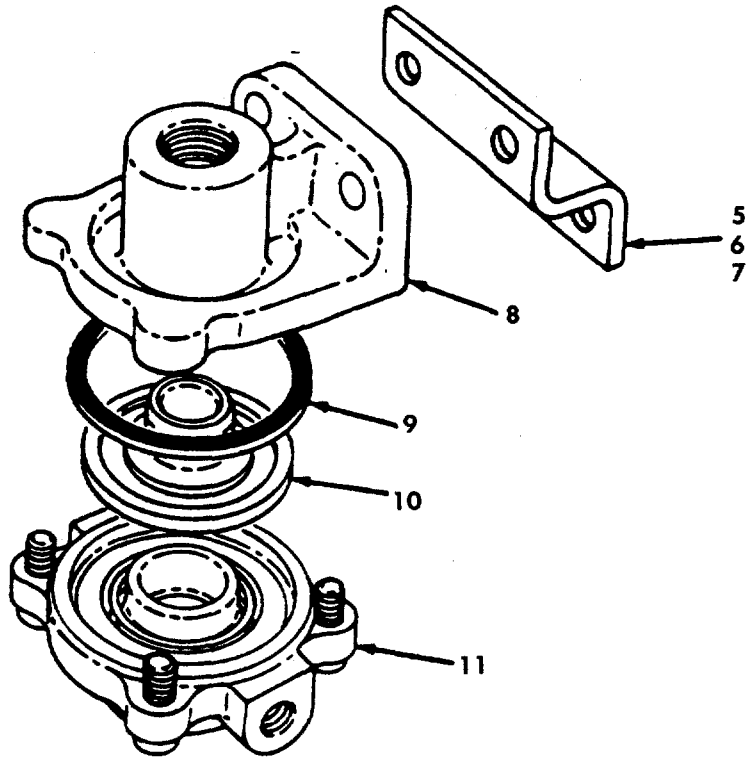
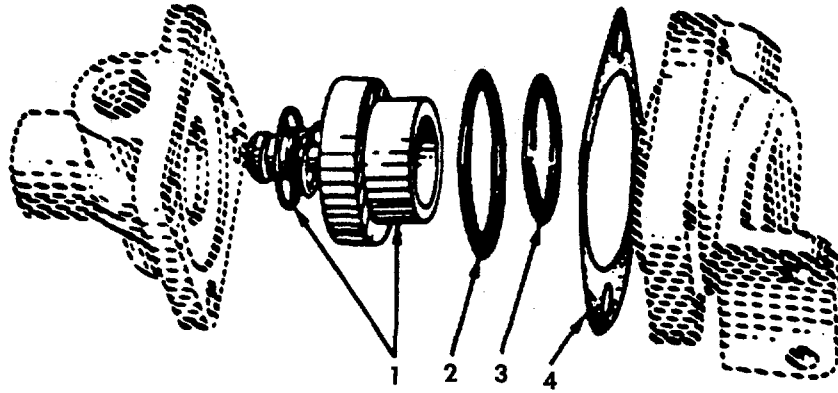
Figure E-130. Rear Service Brakes

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	69480R91	59556	049-90011-1	REAR BRAKE MOUNTING ASSEMBLY	12
2	89346	178551	59556	049-90011-2	BOLT, Hex Head, 3/8 x 1-1/2 inch	AR
3	89346	590006C91	59556	049-90011-3	WASHER, Lock, 3/8 Regular	1
4	89346	25317R1	59556	049-90011-4	BRAKE DUST SHIELD, Set	AR
5	89346	27293R1	59556	049-90011-5	BOLT, 9/16 x 2 inches	AR
6	89346	584488C1	59556	049-90011-6	NUT, Lock, 9/16 inch	AR
7	89346	109461	59556	049-90011-6	WASHER, Flat, 9/16 inch	AR
8	89346	596003C91	59556	006-90002-172	FITTING, 1/8 PTF x Short Lube	2
9	89346	596004C91	59556	049-90011-24	CHAMBER, Air Brake, Left, 30 inches	1
10	89346	580989C92	59556	049-90011-25	CHAMBER, Air Brake, Right, 30 inches	1
11	89346	580990C92	59556	049-90011-10	SHOE, Brake W/Lining, Left	1
12	89346	262365C1	59556	049-90011-11	SHOE, Brake W/Lining, Right	1
13	89346	126404R1	59556	049-90011-12	RIVET, Brake Shoe	48
14	89346	592370C1	59556	049-90011-13	ROLLER	2
15	89346	122407R1	59556	049-90011-14	RETAINER, Roller	2
16	89346	56121R3	59556	049-90011-15	BUSHING, Spider	2
17	89346	574062C1	59556	049-90011-16	SEAL, Spider	2
18	89346	580413C91	59556	049-90011-50	WASHER, Flat	1
19	89346	580412C91	59556	049-90011-51	ADJUSTER, Slack, Automatic, Left	1
20	89346	586797C1	59556	049-90011-52	ADJUSTER, Slack, Automatic, Right	1
21	89346	586796C1	59556	049-90011-53	RING, Snap	1
				049-90011-54	WASHER, Flat	3

Group 18. Air Brake System

Figure E-130. Rear Service Brakes

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	-----	COML			FITTING, Grease	1
23	89346	77013R1	59556	049-90011-55	BOLT, Special	4
24	89346	103323	59556	049-90011-56	WASHER, Lock, 1/2 inch Medium	4
25	89346	596594C91	59556	049-90011-57	BRACKET, Camshaft Left	1
26	89346	596595C91	59556	049-90011-58	BRACKET, Camshaft Right	1
27	89346	417488C1	59556	049-90011-59	SEAL, Spider	1
28	89346	594299C91	59556	049-90011-60	SPIDER, W/Bushing And Seal, Left	1
29	89346	594300C91	59556	049-90011-61	SPIDER, W/Bushing And Seal, Right	1
30	89346	492283C1	59556	049-90011-62	SPRING, Brake Shoe Return	1
31	89346	983622R1	59556	049-90011-63	PIN, Brake Spring	2
32	89346	577654C1	59556	049-90011-64	WASHER, Camhead	1
33	89346	588999C91	59556	049-90011-65	CAMSHAFT, Brake Left	1
34	89346	588998C91	59556	049-90011-66	CAMSHAFT, Brake Right	1
35	89346	577653C1	59556	049-90011-67	PIN, Anchor	2
36	89346	577650C1	59556	049-90011-68	BUSHING, Anchor Pin	2
37	89346	577655C1	59556	049-90011-69	SPRING, Return	2
38	89346	25950R1	59556	049-90011-70	NUT, 5/8 NF PHC Jam Type 8	2
39	89346	379388C1	59556	049-90011-71	YOKE	2
40	89346	259117R1	59556	049-90011-72	PIN, Rod End	2
41	89346	1/8x1-1/4P	59556	049-90011-73	PIN, Cotter, 1/8 x 1-1/4 inch	2
42	89346	9412231	59556	049-90011-74	NUT, 5/8 PHC Lock Type 8	4
43	89346	25711R1	59556	049-90011-75	WASHER, .656 x 1.312 x .150	4
44		NSS			COLLAR	2



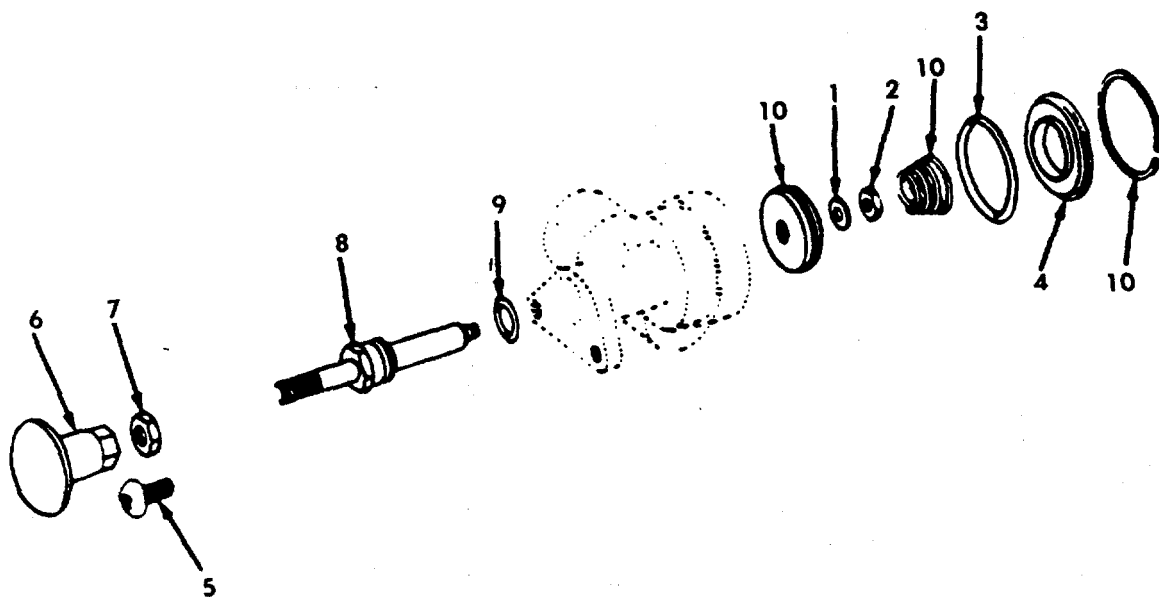
GROUP 18. AIR BRAKE SYSTEM  
FIGURE E-131. LIMITING VALVE AND QUICK RELEASE VALVE

(E-419 Blank)/E-420

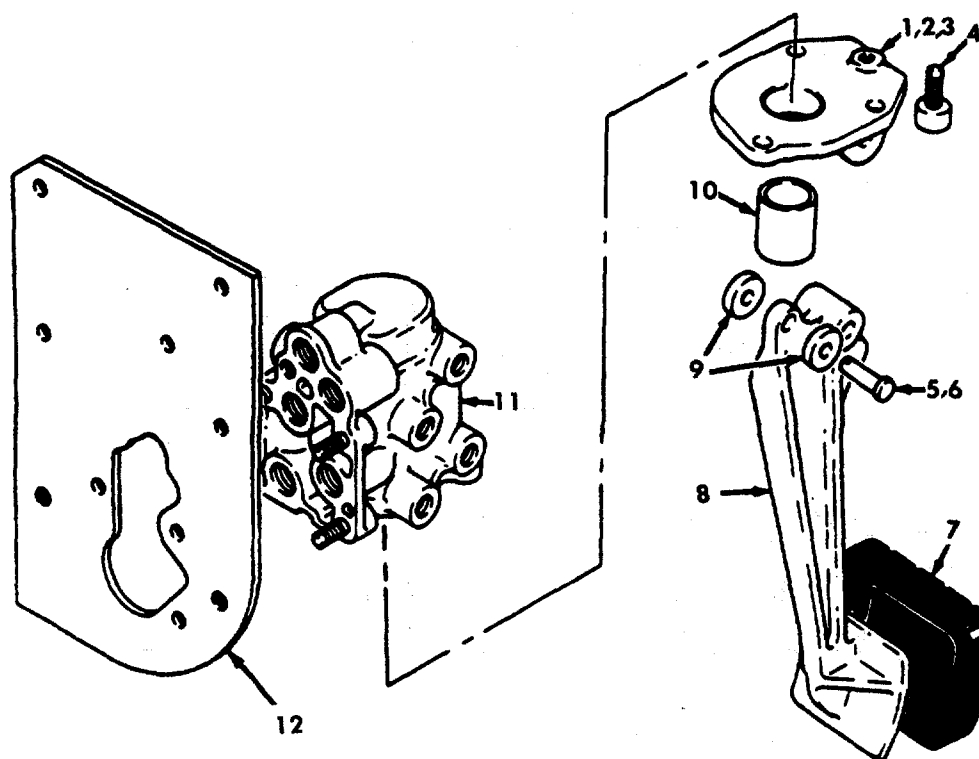
Group 18. Air Brake System

Figure E-131. Limiting Valve and Quick Release Valve

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	471209C91	59556	049-90011-98	VALVE LIMITING ASSEMBLY	REF
	89346	473794C91	59556	049-90011-114	VALVE ASSEMBLY, QUICK RELEASE	REF
1	89346	233787R91	59556	049-90011-99	VALVE, Inlet And Exhaust	1
2	89346	22277R1	59556	049-90011-100	O-RING, Piston, Large	1
3	89346	382137R1	59556	049-90011-101	O-RING, Piston, Small	1
4	89346	895444R1	59556	049-90011-102	SEAL, Cover O-Ring	1
5	89346	475932C1	59556	049-90011-115	BRACKET, Quick Release Valve Mounting	1
6	89346	25654R1	59556	049-90011-116	BOLT, Hex Head, 5/16 NC x 1-1/2 inch	AR
7	89346	9413994	59556	019-90004-113	NUT, Hex Lock, 5/16 NC	AR
8		NSS			BODY	1
9	89346	349962C1	59556	049-90011-118	RING, Gasket	1
10		NSS			DIAPHRAGM, Quick Release Valve	1
11		NSS			COVER	
--	89346	474474C91	59556	049-90022-119	REPAIR KIT, Quick Release Valve (Includes Nos. 5 and 6)	1



GROUP 18. AIR BRAKE SYSTEM  
 FIGURE E-132. PARKING BRAKE CONTROL VALVE



GROUP 18. AIR BRAKE SYSTEM  
 FIGURE E-133. BRAKE PEDAL AND CONTROL VALVE

Group 18. Air Brake System

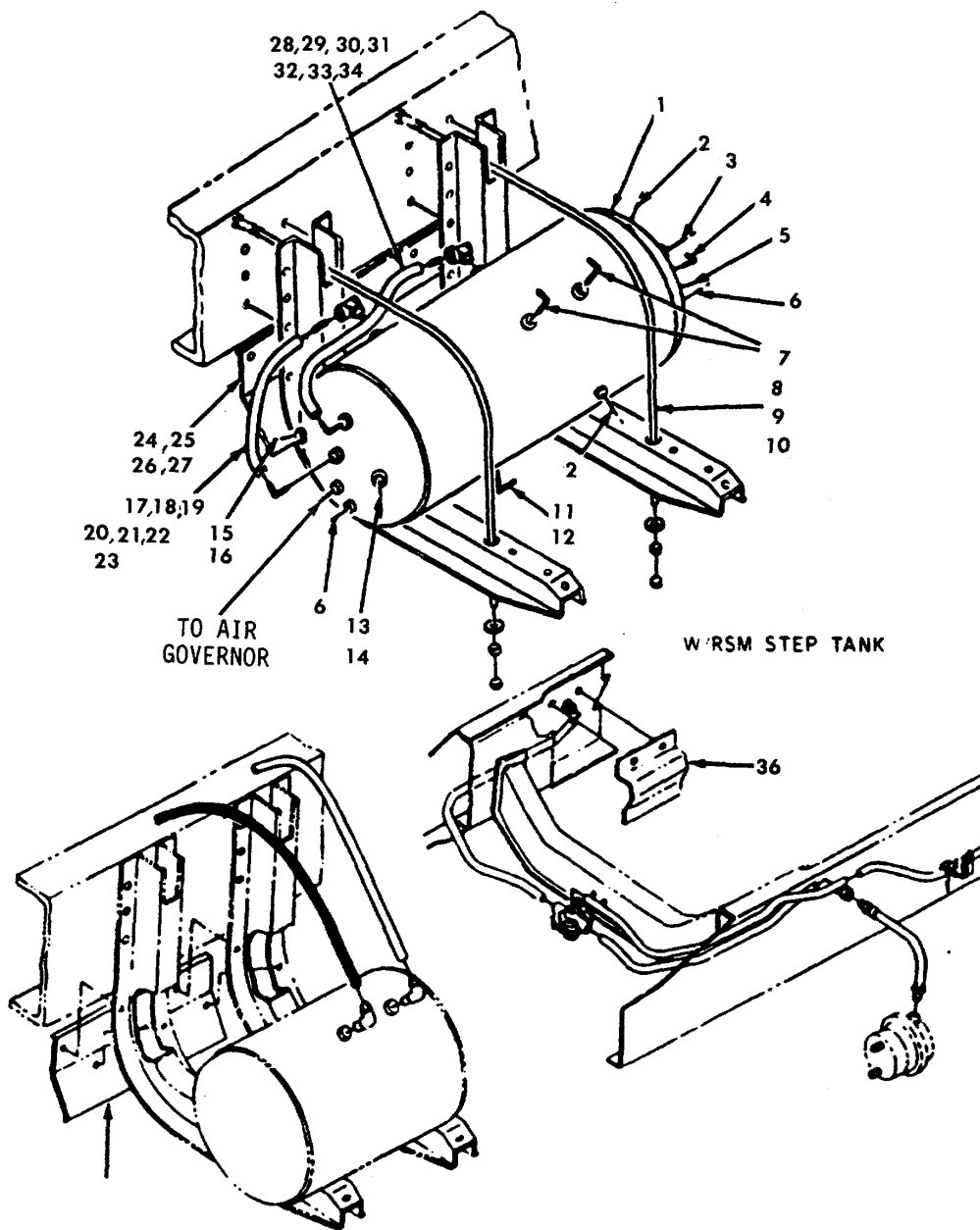
Figure E-132. Parking Brake Control Valve  
 Figure E-133. Brake Pedal and Control Valve

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-132	89346	592699C1	59556	049-90011-103	VALVE ASSEMBLY, PARKING BRAKE CONTROL REF	
1	89346	344029C1	59556	049-90011-104	WASHER, Flange	1
2	89346	79061R1	59556	049-90011-105	NUT, Lock, No.1ONC	1
3	89346	370943R1	59556	049-90011-106	O-RING, End Cap	1
4	89346	344024C1	59556	049-90011-107	CAP, End	1
5	89346	167164	59556	049-90011-108	SCREW, Pan Cross Recess Head, 10-32x1/2 inch	2
6	89346	482528C1	59556	049-90011-109	KNOB, Brake Control Valve	1
7	89346	118623	59556	049-90011-110	NUT, Hex Jam, 1/4 NF	1
8	89346	344025C1	59556	049-90011-111	PISTON, Brake Valve	1
9	89346	355967R1	59556	049-90011-112	O-RING, Piston	1
10	89346	483381C91	59556	049-90011-113	KIT, Brake Valve Repair	1
E-133					VALVE ASSEMBLY, BRAKE PEDAL AND CONTROL	
1	89346	464906C1	59556	049-90011-85	PLATE, Pedal Mounting	1
2	89346	25493R1	59556	015-90005-19	BOLT, Hex Head, 5/16 UNC x 1 inch	3
3	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	3
4	89346	464901C1	59556	049-90011-87	STOP, Break Pedal	1
5	89346	552697R1	59556	049-90011-88	PIN, Fulcrum	1
6	89346	107762	59556	049-90011-172	PIN, Cotter	1
7	89346	382495C1	59556	049-90011-90	PAD, Break Pedal	1

Group 18. Air Brake System

Figure E-132. Parking Brake Control Valve  
 Figure E-133. Brake Pedal and Control Valve

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
8	89346	487432C1	59556	049-90011-91	PEDAL, Break	1
9	89346	464902C1	59556	049-90011-92	ROLLER	1
10	89346	487433C1	59556	049-90011-93	PLUNGER, Break Valve	1
11	89346	579510C91	59556	049-90011-94	VALVE, Break Control	1
12		NSS			PLATE	1
--	89346	501776C91	59556	049-90011-95	VALVE REPAIR KIT	1



GROUP 18. AIR BRAKE SYSTEM

FIGURE E-134. AIR TANK



## Group 18. Air Brake System

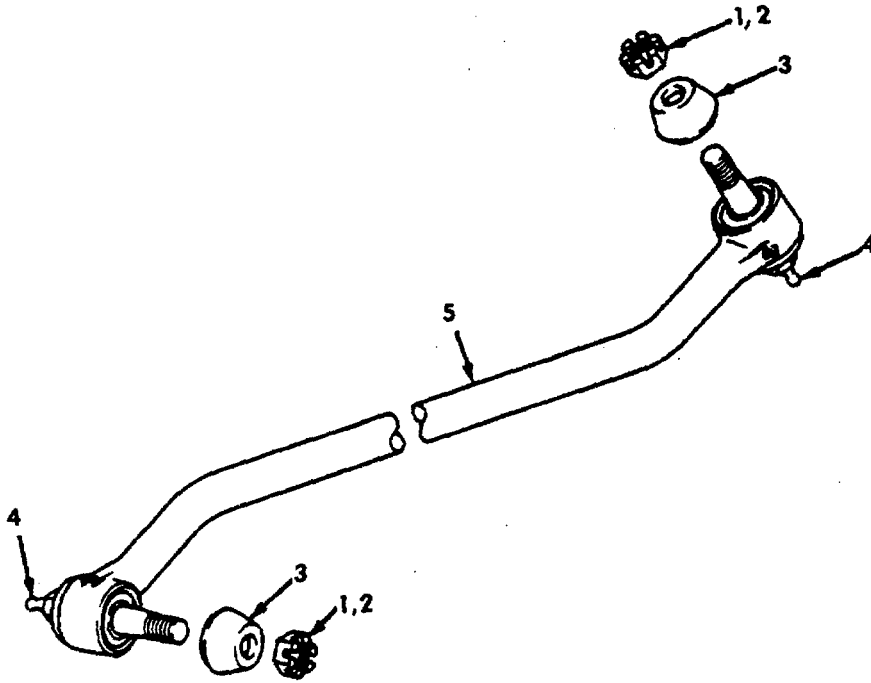
Figure E-134. Air Tank

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
					TANK, MOUNTING AND HOSING, AIR ASSEMBLY	REF
1	89346	483116C1	59556	049-90011-123	TANK, Air	1
2	89346	20988R1	59556	049-90011-124	PLUG, 1/4 MPT	2
3	89346	444632	59556	049-90011-125	PLUG, 1/2 MPT	1
4	89346	30761VX	59556	049-90011-126	ELBOW, 90° Degree, 1/4 MPT, Nylon Tube	1
5	89346	444705	59556	049-90011-127	PLUG, Hex Socket, 1/2 PT	1
6	89346	25450H	59556	049-90011-128	COCK, Drain-	2
7	89346	55916R11	59556	049-90011-129	ELBOW, 90° Degree, 1/2 MPT, Nylon Tube	2
8	89346	484093C1	59556	049-90011-130	CABLE, 889.0 MM/35.0	2
9	89346	114494	59556	049-90011-131	NUT, Hex Jam, 3/8 UNF	4
10	89346	874027R1	59556	049-90011-132	WASHER, Flat, 7/16 inch	2
11	89346	444054	59556	019-90004-433	ELBOW, 45° Degree, 1/4 MPT x 1/4 FPT	1
12	89346	25450H	59556	049-90011-128	COCK, Drain	1
13	89346	444032	59556	049-90011-135	REDUCER, 1/2 MPT x 1/4 MPT	1
14	89346	25450H	59556	049-90011-128	COCK, Drain	1
15	89346	444032	59556	049-90011-135	REDUCER, 1/2 MPT x 1/4 MPT	1
16	89346	386398C91	59556	049-90011-138	VALVE, Safety	1
17	----	COML			TUBE, Nylon, 5/8 OD x 356.0 MM/14.0 inch	1
18	89346	55916R11	59556	049-90011-129	ELBOW, 90° Degree, 1/2 MPT x 5/8 Tube-At Wet Tank	1

## Group 18. Air Brake System

Figure E-134. Air Tank

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
19	89346	698562R91	59556	049-90011-141	CONNECTOR, 1/2 MPT x 5/8 inch Tube-At Secondary Tank	1
20	89346	414508C1	59556	049-90011-142	INSERT, 5/8 inch Tube	2
21	89346	55897R1	59556	049-90011-143	NUT, 5/8 inch Tube	2
22	89346	55896R1	59556	049-90011-144	SLEEVE, 5/8 inch Tube	2
23	89346	483144C91	59556	049-90011-145	VALVE, 90° Degree-At Secondary Tank	1
24	89346	528559C1	59556	049-90011-146	SHIELD, Heat	1
25	89346	25708R1	59556	015-90005-21	WASHER, Flat, 5/16 inch	4
26	89346	25228R1	59556	016-90005-59	BOLT, Hex Head, 5/16-18x3/4 inch	4
27	89346	9413977	59556	015-90005-20	NUT, Hex Locking, 5/16 inch	4
28	-----	COML			TUBE, Nylon, 5/8 OD x 483.0 MM/ 19.0 inch	1
29	89346	55916R11	59556	049-90011-151	ELBOW, 90° Degree, 1/2 MPT x 5/8 Tube-At Wet Tank	1
30	89346	698562R91	59556	049-90011-141	CONNECTOR, 1/2 MPT x 5/8 Tube-At Primary Tank	1
31	89346	414508C1	59556	049-90011-153	INSERT, 5/8 inch Tube	2
32	89346	55897R1	59556	049-90011-143	NUT, 5/8 Tube	2
33	89346	55896R1	59556	049-90011-144	SLEEVE, 5/8 inch Tube	2
34	89346	483144C91	59556	049-90011-145	VALVE, 90° Degree-At Primary Tank	1
	89346	486888C1	59556	049-90011-157	KIT, Repair, Check Valve, For Item Numbers 23 and 34	1
35	89346	528559C1	59556	049-90011-146	SHIELD, Chassis Center Heat	1
36	89346	483140C1	59556	049-90011-49	SHIELD, Chassis Front Heat	2



GROUP 19. STEERING ASSEMBLY

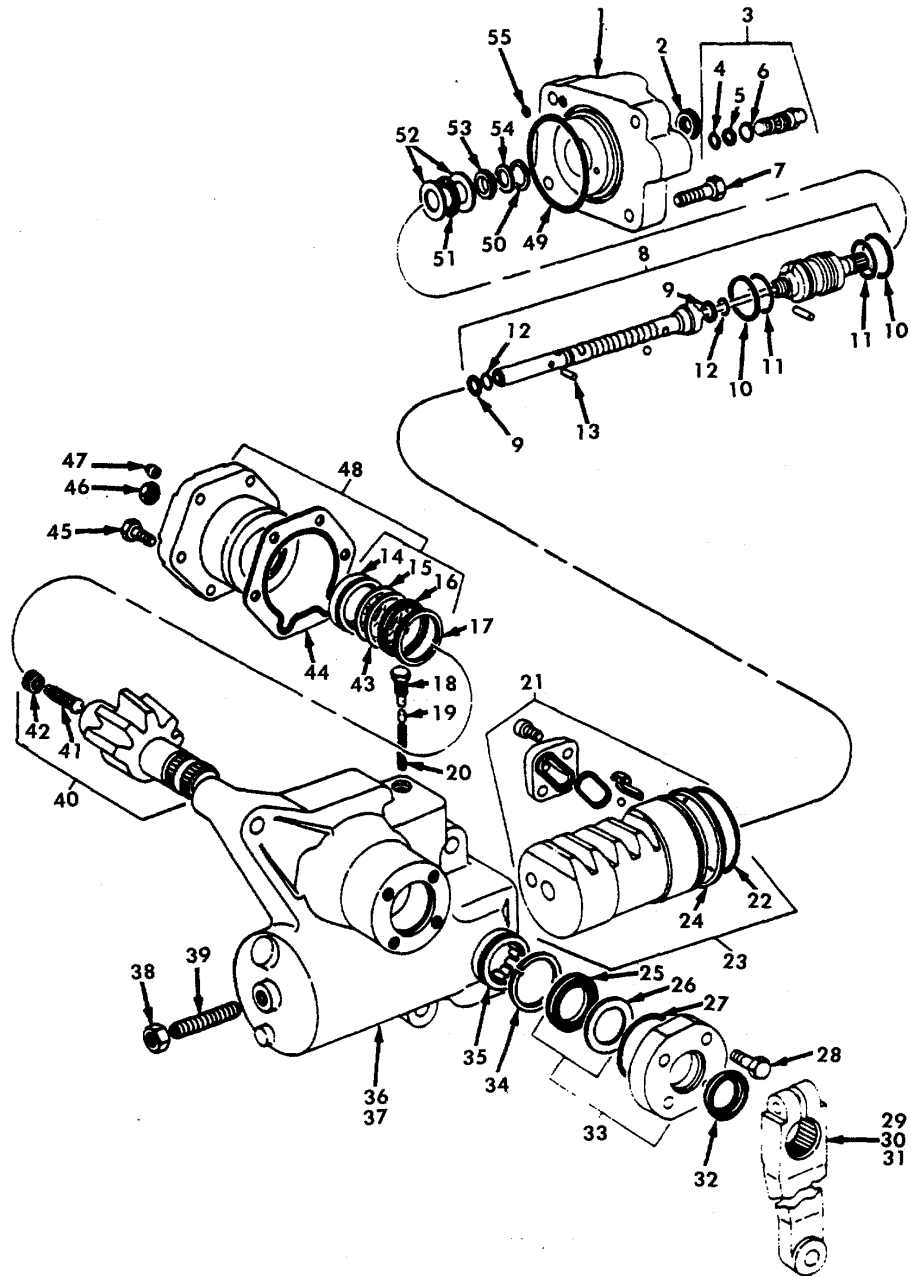
FIGURE E-135. DRAG LINK

(E-429 Blank)/E-430

Group 19. Steering Assembly

Figure E-135. Drag Link

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	427645	59556	016-90005-150	DRAG LINK ASSEMBLY	REF
2	89346	1/8x1-3/4P	59556	009-90006-52	NUT, Slotted, 7/8 NF	2
3	89346	437776C1	59556	016-90005-152	PIN, Cotter, 1/8x1-3/4 inch	2
4	89346	109454	59556	016-90005-153	COVER, Dust	2
5	89346	488703C91	59556	016-90005-154	LUBRICATOR, Straight, 1/4 LINK, Drag	2 1



GROUP 20. POWER STEERING SYSTEM

FIGURE E-136. POWER STEERING GEAR

## Group 20. Power Steering System

Figure E-136. Power Steering Gear

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	491010C92	59556	016-90005-130	STEERING GEAR ASSEMBLY	REF
1	89346	500697C91	59556	016-90005-95	HOUSING, W/Balls and Pin, Valve	1
2	89346	487340C1	59556	016-90005-96	SEAL, Oil Steering Gear Housing	1
3	89346	500683C91	59556	016-90005-97	VALVE, Relief	1
4	89346	887056C1	59556	016-90005-98	SEAL, Oil Ring	1
5	89346	500686C1	59556	016-90005-99	RING, Back-Up	1
6	89346	500684C1	59556	016-90005-100	SEAL, O-Ring	1
7	89346	24864R1	59556	016-90005-101	BOLT, Hex Head, 1/2 NC x 2-1/8 inch	4
8	89346	586693C91	59556	016-90005-102	SHAFT, Straight Gear Actuating	1
9	89346	487325C1	59556	016-90005-103	SEAL, Oil Ring	2
10	89346	487327C1	59556	016-90005-104	SEAL, Oil Ring	2
11	89346	343903R1	59556	016-90005-105	SEAL, O-Ring	2
12	89346	887565C1	59556	016-90005-106	SEAL, O-Ring	2
13	89346	487326C1	59556	016-90005-107	BEARING, Roller Single	1
14	89346	487320C91	59556	016-90005-108	BEARING, Roller	1
15	89346	487346C1	59556	016-90005-109	WASHER, Back-Up	1
16	89346	487347C1	59556	016-90005-110	SEAL, Oil, Upper Housing Cover	1
17	89346	23869R1	59556	016-90005-111	RING, Snap	1
18	89346	487323C1	59556	016-90005-112	BOLT, Special	1
19	89346	487322C1	59556	016-90005-113	BEARING, Roller Single	1
20	89346	487321C1	59556	016-90005-114	SPRING, Power Straight	1
21	89346	583824C91	59556	016-90005-115	KIT, Cap And Ball Guide	1
22	89346	27947R1	59556	016-90005-116	SEAL, Oil Ring	1

## Group 20. Power Steering System

Figure E-136. Power Steering Gear

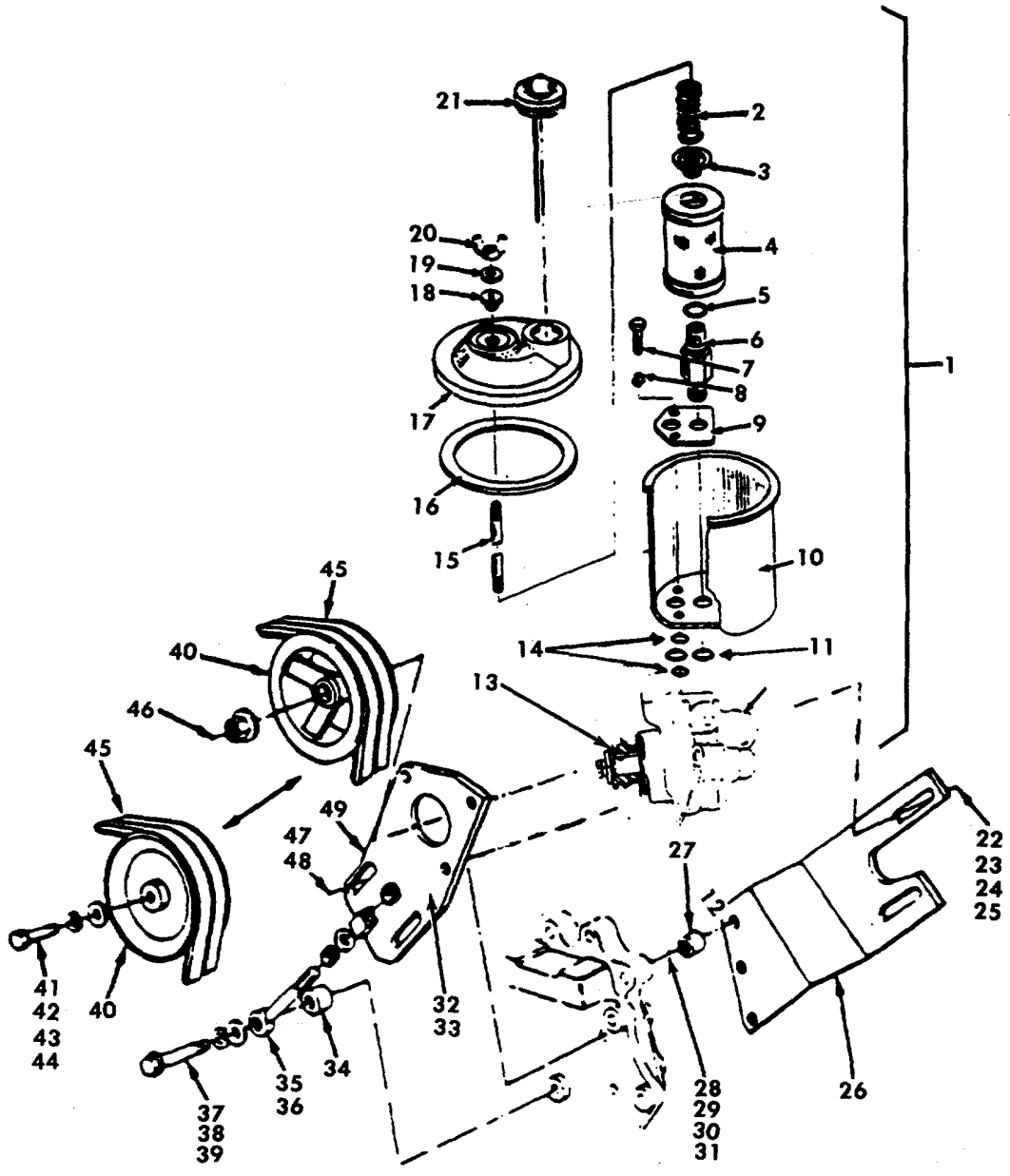
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
23	89346	500695C91	59556	016-90005-117	PISTON, W/Ring And Seal	1
24	89346	487334C1	59556	016-90005-118	RING, Piston	1
25	89346	487351C1	59556	016-90005-119	SEAL, Output Shaft, Inner	1
26	89346	487350C1	59556	016-90005-120	WASHER, Back-Up	1
27	89346	22275R1	59556	016-90005-121	SEAL, Oil Ring	1
28	89346	25493R1	59556	015-90005-19	BOLT, Hex Head, 5/16 NC x 15/16 inch	4
29	89346	488704C1	59556	016-90005-123	ARM, Straight Gear	1
30	89346	416742C1	59556	016-90005-124	BOLT, Hex Flange Head, 3/4 NF x 4 inch	1
31	89346	416743C1	59556	006-90002-185	NUT, Hex Flange Lock, 3/4 NF	1
32	89346	487339C1	59556	016-90005-126	SEAL, Output Shaft, Outside	1
33	89346	487356C91	59556	016-90005-127	COVER, Straight Gear Housing, Lower	1
34	89346	435826C1	59556	016-90005-128	RING, Snap	1
35	89346	487320C91	59556	016-90005-108	BEARING, Roller	1
36		NSS			HOUSING, Straight Gear	1
37	89346	414085C1	59556	016-90005-131	BOLT, Hex Flange Head, 5/8 NF x 3-3/4 inch	2
38	89346	487343C1	59556	016-90005-132	NUT, Sealing	1
39	89346	487342C1	59556	016-90005-133	SCREW, Adjusting	1
40	89346	487344C91	59556	016-90005-134	SHAFT, Straight Gear Output	1
41	89346	866224R1	59556	016-90005-135	SCREW, Adjusting	1
42	89346	346902R1	59556	016-90005-136	RETAINER, Adjusting Screw	1
43	89346	479013C1	59556	016-90005-137	WASHER, Back-Up	1
44	89346	487348C1	59556	016-90005-138	GASKET, Housing Side Cover	1

Group 20. Power Steering System

Figure E-136. Power Steering Gear

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
45	89346	435693C1	59556	016-90005-139	PLUG, Vent	1
46	89346	124934	59556	016-90005-140	NUT, Screw Adjusting	1
47	89346	487349C1	59556	016-90005-141	BOLT, Side Cover	5
48	89346	487345C91	59556	016-90005-142	COVER, W/Bearing, Washers, Seal and Snap Ring, Housing Side	1
49	89346	487338C1	59556	016-90005-143	SEAL, Oil Ring	1
50	89346	327316R1	59556	016-90005-144	RING, Snap	1
51	89346	568142R91	59556	016-90005-145	BEARING, Thrust	1
52	89346	312663C1	59556	016-90005-146	WASHER, Thrust	2
53	89346	487333C1	59556	016-90005-147	SEAL, Oil Upper Housing Cover	1
54	89346	487341C1	59556	016-90005-148	WASHER, Back-Up	1
55	89346	27948R1	59556	016-90005-149	SEAL, Oil Ring	1





GROUP 20. POWER STEERING SYSTEM  
 FIGURE E-137. POWER STEERING PUMP

Group 20. Power Steering System

Figure E-137. Power Steering Pump

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	19954	BB-135R	59556	016-90005-42	PUMP ASSEMBLY, Power Steering	1
2		NSS			SPRING, Filter Cap	1
3		NSS			CAP, Filter	1
4		NSS			FILTER	1
5		NSS			"O" RING, Filter	1
6		NSS			STUD, Reservoir	1
7		NSS			BOLT, HEX Head, 5/16-18	2
8		NSS			WASHER, Lock, 5/16	2
9		NSS			PLATE, Reinforcement	1
10		NSS			RESERVOIR	1
11		NSS			GASKET, Intake	2
12	19954	ER-16481-1	59556	016-90005-43	PUMP, Power Steering	1
13	89346	124543	59556	016-90005-44	KEY, Woodruff, .125 x .50	1
14		NSS			GASKET, Bolt	2
15		NSS			STUD, Mounting	1
16		NSS			GASKET, Cover	1
17		NSS			COVER, Reservoir	1
18		NSS			GASKET, Stud	1
19	----		COML		WASHER, Flat, 5/16 inch	1
20	----		COML		NUT, Wing, 5/16-18	1
--	19954	ERS-28001	59556	016-90005-45	KIT, Service, Filter and Gasket (Includes No. 3, 4, 5, and 26)	1

## Group 20. Power Steering System

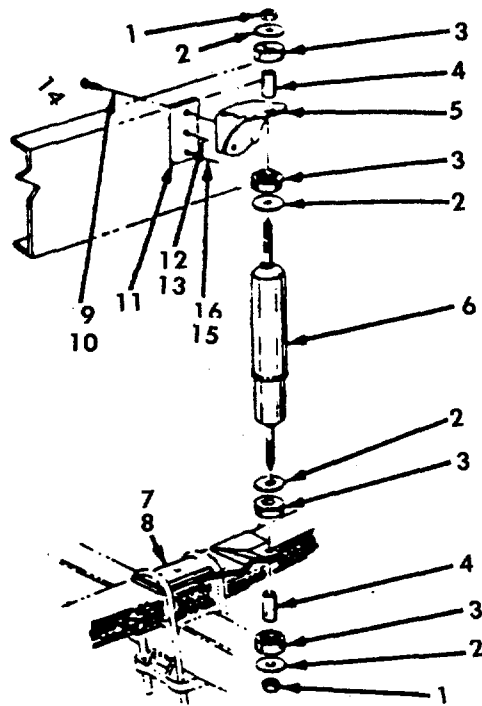
Figure E-137. Power Steering Pump

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	19954	ERS-27839	59556	016-90005-46	KIT, Service, Reservoir (Includes Item No. 3, 4, 5, 11, 22, and 26)	1
21	19954	ER-27784-1	59556	016-90005-47	CAP, Filler, Reservoir	1
22	89346	24840R1	59556	016-90005-36	BOLT, Hex Head, 3/8-16 UNC x 1 inch	2
23	89346	25522R1	59556	016-90005-49	NUT, Hex Head, 3/8-16 UNC	2
24	89346	25709R1	59556	006-90002-168	WASHER, Flange, 3/8 inch	2
25	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	2
26	89346	1801427C1	59556	016-90005-47	BRACKET, Power Steering Pump	1
27	89346	488596C1	59556	016-90005-48	SPACER	1
28	89346	25501R1	59556	016-90005-49	BOLT, Hex Head, 3/8-16 UNC x 3-3/4 inch	1
29	89346	25784R1	59556	016-90005-50	BOLT, Hex Head, 3/8-16 UNC x 4-1/4 inch	1
30	89346	9413979	59556	006-90002-170	NUT, Hex, 3/8-16 UNC	1
31	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	1
32	89346	24804R1	59556	016-90005-52	BOLT, Hex Head, 3/8-16 UNC x 1.0	AR
33	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	AR
34	89346	689366C1	59556	016-90005-53	SPACER	1
35	89346	689362C1	59556	016-90005-54	BOLT, 3/8-16 UNC	1
36	89346	25522R1	59556	016-90005-49	NUT, Hex, 3/8-16 UNC	2
37	89346	24842R1	59556	016-90005-18	BOLT, Hex Head, 3/8-16 UNC x 1-3/4 inch	1
38	89346	25709R1	59556	006-90002-168	WASHER, Flange, 3/8 inch	1
39	89346	3/8R	59556	MS35338-46	WASHER, Lock, 3/8 inch	1

## Group 20. Power Steering System

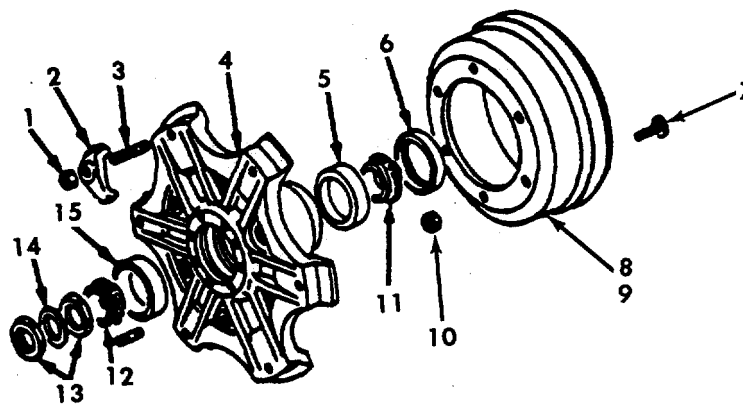
Figure E-137. Power Steering Pump

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
40	89346	480640C1	59556	016-90005-58	PULLEY, Hydraulic Pump	1
41	89346	25228R1	59556	016-90005-59	BOLT, Hex Head, 5/16-18 UNC x 3/4 inch	1
42	89346	414087C1	59556	006-90002-150	NUT, Hex Lock Flange, 1/2-20 UNF	1
43	89346	5/16R	59556	MS35338-45	WASHER, Lock, 5/16 inch	1
44	89346	133322R1	59556	016-90005-61	WASHER, Flange, 5/16 inch	1
45	89346	429274C91	59556	016-90005-62	BELT, Matched Set	1
46	89346	303986C1	59556	016-90005-63	RETAINER, Ring	1
47	89346	24850R1	59556	016-90005-64	BOLT, Hex Head, 7/16-14 UNC x 1-1/2 inch	2
48	89346	7/16R	59556	MS35338-47	WASHER, Lock, 7/16 inch	2
49	89346	689359C1	59556	016-90005-65	BRACKET, Power Steering Pump	1



GROUP 21. FRONT SUSPENSION ASSEMBLY

FIGURE E-138. FRONT SHOCK ABSORBER



GROUP 21. FRONT SUSPENSION ASSEMBLY

FIGURE E-139. FRONT WHEEL ASSEMBLY

## Group 21. Front Suspension Assembly

Figure E-138. Front Shock Absorber

Figure E-139. Front Wheel Assembly

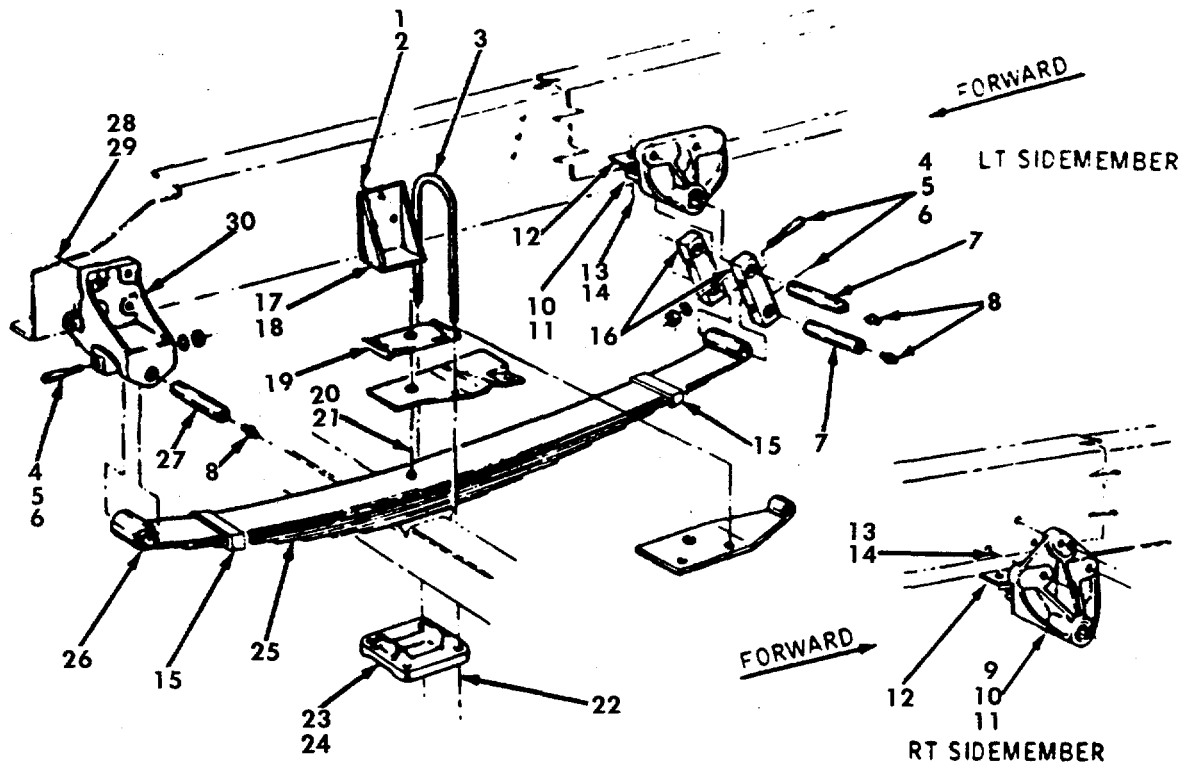
ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-138					FRONT SHOCK ABSORBER	
1	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Lock, 1/2-20 UNF	AR
2	89346	533388C1	59556	006-90002-151	WASHER, Flange, 17/32 I.D. x 2-1/4 O.D. x .182 Thick	AR
3	89346	472368C1	59556	006-90002-152	BUSHING, Shock Absorber	AR
4	89346	617605R1	59556	006-90002-153	SPACER, Pipe, 17/32 I.D. x 3/4 O.D. x 1-1/2 inches	AR
5	89346	471876C1	59556	006-90002-154	BRACKET, Shock Absorber, Upper	2
6	89346	472367C91	59556	006-90002-155	ABSORBER, Shock	2
7	89346	485186C3	59556	006-90002-156	BRACKET, Shock Absorber Lower For Left Hand Drive, Left	1
8	89346	485187C3	59556	006-90002-157	BRACKET, Shock Absorber Lower For Left Hand Drive, Right	1
9	89346	431309C1	59556	006-90002-158	SCREW, Flange Head, 1/2-13 x 1-1/2 inches	2
10	89346	9412230	59556	006-90002-159	NUT, Hex Lock, 1/2-13 UNC	2
11	89346	487703C1	59556	006-90002-160	PLATE, Spacer	2
12	89346	414055C1	59556	006-90002-161	BOLT, Hex Head, 1/2-20 UNRF x 2-1/4 inches	2
13	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Lock, 1/2-20 UNF	2
14	89346	414054C1	59556	006-90002-163	BOLT, Hex Head, 1/2-20 UNRF x 2 inches	2
15	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Lock, 1/2-20 UNF	2

## Group 21. Front Suspension Assembly

Figure E-138. Front Shock Absorber

Figure E-139. Front Wheel Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
E-139					FRONT WHEEL ASSEMBLY	
1	89346	54495R2	59556	006-90002-135	NUT, Rim C1amp Stud	12
2	89346	452010C1	59556	006-90002-136	CLAMP, Rim	12
3	89346	54494R1	59556	006-90002-137	STUD, Rim C1amp	12
4	89346	465525C91	59556	006-90002-138	WHEEL, 6-Spoke, W/Cups and Studs	2
5	89346	13273D	59556	006-90002-139	BEARING, Cup Inner	2
6	89346	402856C1	59556	006-90002-140	SEAL, Oil	2
7	89346	223740	59556	006-90002-141	BOLT, Hex Head, 5/8 NF x 2-1/2 inch	12
8	89346	472278C1	59556	006-90002-142	DRUM, Brake	2
9	89346	476108C1	59556	006-90002-143	SLINGER, Exciter Ring	2
10	89346	274639	59556	006-90002-144	NUT, Hex Locking, 5/8 NF	12
11	89346	13277DC	59556	006-90002-145	BEARING, Cone Inner	2
12	89346	79013R91	59556	006-90002-146	BEARING, Cone Outer	2
13	89346	473015C1	59556	006-90002-147	NUT, Bearing Adjuster	4
14	89346	470422C1	59556	006-90002-148	WASHER, Bearing Adjuster Nut	4
15	89346	ST856	59556	006-90002-149	BEARING, Cup Outer	2
16	89346	494376C1	59556	006-90002-150	RIM, Solid Front Axle	2



GROUP 21. FRONT SUSPENSION ASSEMBLY  
FIGURE E-140. LEAF SPRINGS AND BUSHINGS



Group 21. Front Suspension Assembly

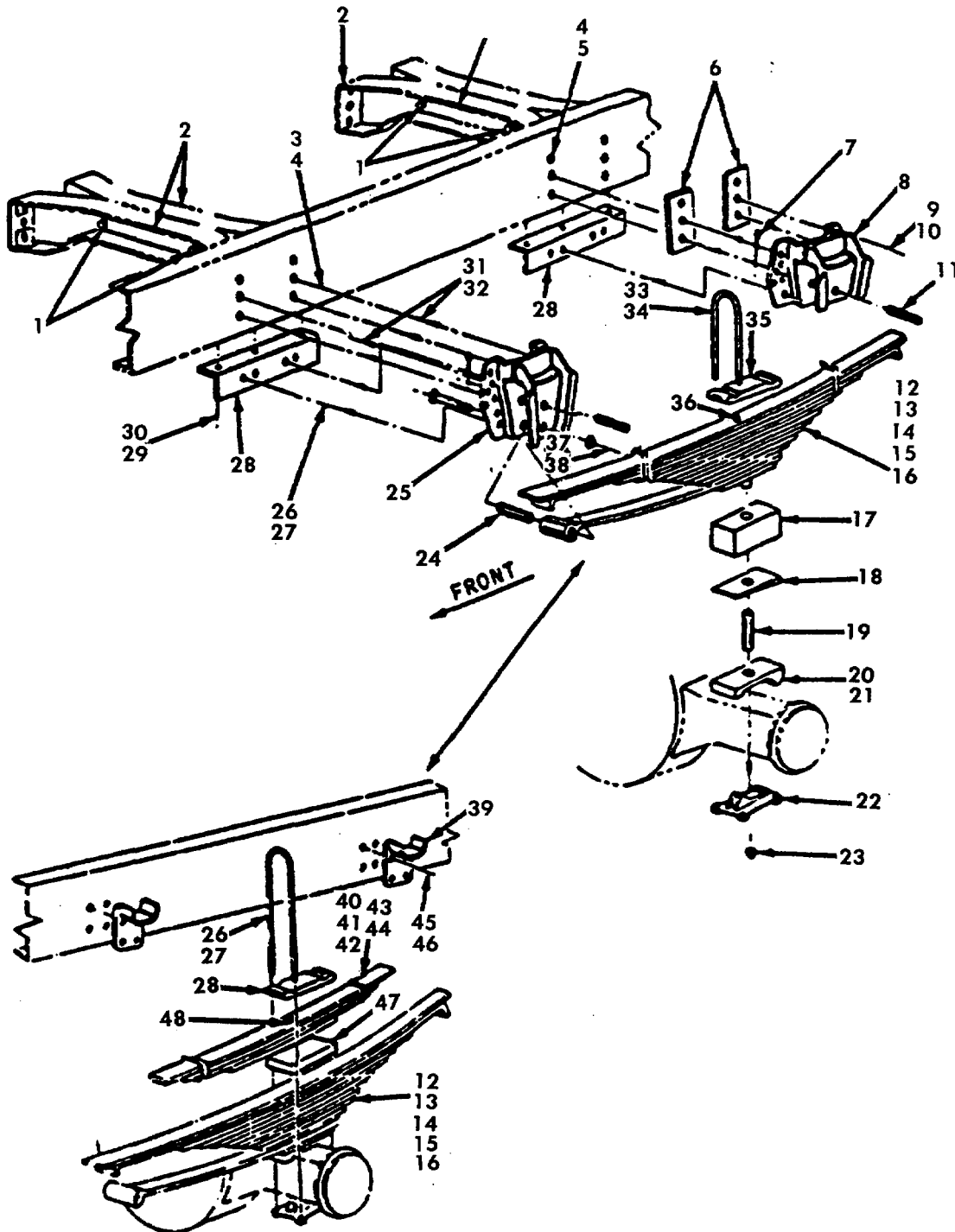
Figure E-140. Leaf Springs and Bushings

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	24862R1	59556	006-90002-165	FRONT SPRING AND MOUNTING ASSEMBLY BOLT, Hex Head, 1/2-13 UNC x 1-1/2 inch	REF 6
2	89346	9412230	59556	006-90002-159	NUT, Hex Lock, 1/2-13 UNC	6
3	89346	465914C11	59556	006-90002-167	U-Bolt, 3/4 x 12 inches Long	4
4	89346	25709R1	59556	006-90002-168	WASHER, Hardened, 3/8 inch	10
5	89346	441246C1	59556	006-90002-169	KEY, Draw	10
6	89346	9413979	59556	006-90002-170	NUT, Hex Lock, 3/8-16 UNC	10
7	89346	8706C2	59556	006-90002-171	PIN, Front Spring Rear Shackle,	4
8	89346	109461	59556	006-90002-172	FITTING, Lubrication, 1/8-27 Point	6
9	89346	484086C91	59556	006-90002-173	BRACKET, Front Spring Rear, Left	1
10	89346	484090C91	59556	006-90002-174	BRACKET, Front Spring Rear, Right	1
11	89346	472479C1	59556	006-90002-175	BUSHING	1
12	89346	495873C1	59556	006-90002-176	SPACER, Front Spring Rear	2
13	89346	414054C1	59556	006-90002-163	BOLT, Flange, Hex Head, 1/2-20 URF x 2 inches	9
14	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Lock, 1/2-20 UNF	9
15	89346	899209R11	59556	006-90002-179	CLIP, Spring	6
16	89346	468699C1	59556	006-90002-180	SHACKLE, Spring	4
17	89346	484203C1	59556	006-90002-181	STOP, Axle, Left	1
18	89346	484205C1	59556	006-90002-182	STOP, Axle, Right	1
19	89346	469893C2	59556	006-90002-183	SEAT, Front Spring, U-Bolt	2
20	89346	268223C1	59556	006-90002-184	BOLT, Center	2
21	89346	7/16X	59556	MS35650-7/16	NUT, Center Bolt	2

## Group 21. Front Suspension Assembly

Figure E-140. Leaf Springs and Bushings

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	416743C1	59556	006-90002-185	NUT, Flange Hex Lock, 3/4-16 UNF	8
23	89346	485025C1	59556	006-90002-186	PLATE, U-Bolt Front Axle, Left	1
24	89346	484492C1	59556	006-90002-187	PLATE, U-Bolt Front Axle, Right	1
25	89346	572359C91	59556	006-90002-188	SPRING, Front	1
	89346	572360C1	59556	006-90002-189	CHASSIS, Leaf, W/Bushing No.1	1
	89346	572361C1	59556	006-90002-190	CHASSIS, Leaf, No.2	1
	89346	572362C1	59556	006-90002-191	CHASSIS, Leaf, No.3	1
26	89346	472479C1	59556	006-90002-192	BUSHING, Spring Eye	4
27	89346	468705C2	59556	006-90002-193	PIN, Front Spring, Front Bracket	2
28	89346	414054C1	59556	006-90002-163	BOLT, Flange Hex Head, 1/2-20 UNRF x 2 inches	8
29	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Lock, 1/2-20 UNF	12
30	89346	484081C1	59556	006-90002-196	BRACKET, Front Spring Front, Left	1



GROUP 22. REAR SUSPENSION ASSEMBLY  
 FIGURE E-141. LEAF SPRINGS AND BUSHINGS

## Group 22. Rear Suspension Assembly

Figure E-141. Leaf Springs and Bushings

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	12014R1	59556	009-90006-46	SUSPENSION, REAR ASSEMBLY	8
2	89346	473369C2	59556	009-90006-47	RIVET, Round Head, 1/2 x 1-1/4 inch	4
3	89346	414053C1	59556	009-90006-48	CROSSMEMBER, Rear Spring	12
4	89346	414087C1	59556	006-90002-150	BOLT, Flange, Hex Head, 1/2-20 UNRF x 1-3/4 inch	20
5	89346	414054C1	59556	006-90002-163	NUT, Flange, Hex Locking, 1/2-20 UNF	8
6	89346	581847C1	59556	009-90006-51	BOLT, Flange, Hex Head, 1/2-20 UNRF x 2 inches	4
7	89346	1/8x1-3/4P	59556	009-90006-52	SHIM, Rear Spring, Rear Bracket	4
8	89346	483612C1	59556	009-90006-53	PIN, Cotter, 1/8 x 1-3/4 inch	2
9	89346	414052C1	59556	009-90006-54	BRACKET, Rear Spring Rear	2
10	89346	414087C1	59556	006-90002-150	BOLT, Flange Hex Head, 1/2-20 UNRF x 1-1/2 inches	2
11	89346	206258R1	59556	009-90006-56	NUT, Flange Hex Locking, 1/2-20 UNF	4
12	89346	471287C91	59556	009-90006-57	PIN, Rebound	2
13	89346	471288C1	59556	009-90006-58	SPRING, Rear, Multileaf	2
14	89346	471289C1	59556	009-90006-59	SPRING, Rear, Leaf No.1	2
15	89346	471290C1	59556	009-90006-60	SPRING, Rear, Leaf No.2	2
16	89346	471291C91	59556	009-90006-61	SPRING, Rear, Leaf No.3	2
17	89346	501923C1	59556	009-90006-62	SPRING, Rear, Leaf W/Bushing	2
18	89346	495364C1	59556	009-90006-63	SPACER, Rear Spring	2
19	89346	19969R1	59556	009-90006-64	WEDGE, Rear Axle	2
					PIN, Rear Spring Seat	2

## Group 22. Rear Suspension Assembly

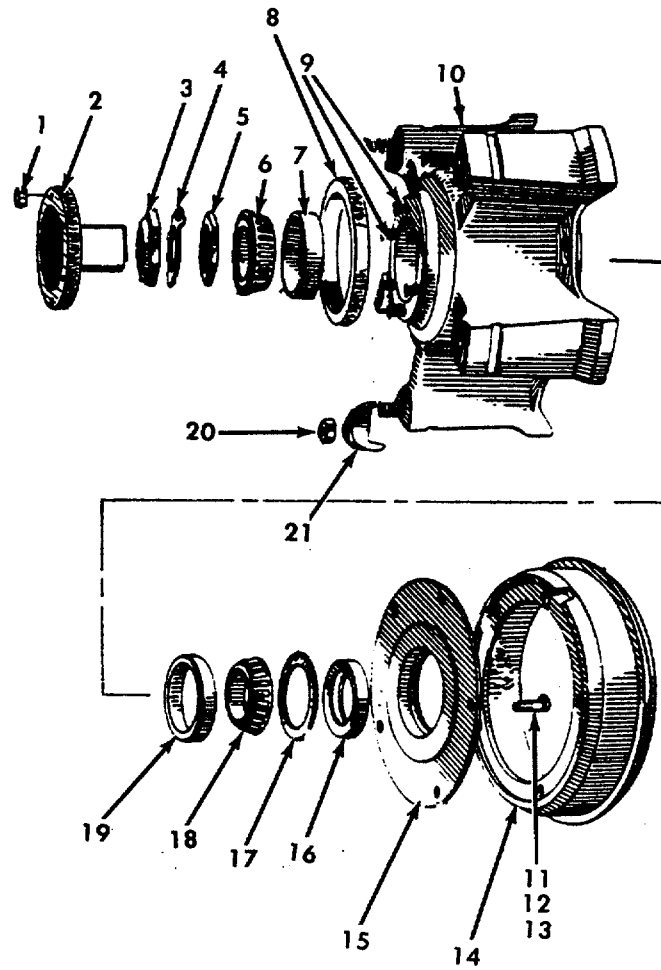
Figure E-141. Leaf Springs and Bushings

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
20	89346	473398C1	59556	009-90006-65	SEAT, Spring Left	1
21	89346	473399C1	59556	009-90006-66	SEAT, Spring Right	1
22	89346	467990C3	59556	009-90006-67	PLATE, U-Bolt	2
23	89346	26070R1	59556	009-90006-68	WASHER, Flat	8
24	89346	471569C2	59556	009-90006-69	SPACER, Rear Spring Bushing	2
25	89346	483611C2	59556	009-90006-70	BRACKET, Rear Spring Front	2
26	89346	414052C1	59556	009-90006-54	BOLT, Flange Hex Head, 1/2-20 UNRF x 1-1/2 inches	6
27	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Locking, 1/2-20 UNF	6
28	89346	501912C1	59556	009-90006-73	SUPPORT, Rear Spring	4
29	89346	414051C1	59556	009-90006-74	BOLT, Flange Hex Head, 1/2-20 UNRF x 1-1/4 inches	12
30	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Locking, 1/2-20 UNF	12
31	89346	414054C1	59556	006-90002-163	BOLT, Flange Hex Head, 1/2-20 UNRF x 2 inches	4
32	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Locking, 1/2-20 UNF	4
33	89346	465915C11	59556	009-90006-78	U-BOLT, 23 inches Long	4
34	83346	416743C1	59556	006-90002-185	NUT, Flange Hex Locking, 3/4 NF	8
35	89346	190287R1	59556	009-90006-80	SEAT, U-Bolt, Top	2
36	89346	58694R1	59556	009-90006-81	BOLT, Center	2
37	89346	460719C1	59556	009-90006-82	BOLT, Hex Head, 1 inch - 8 UNC	2
38	89346	9413986	59556	009-90006-83	NUT, Hex Locking, 1 inch - 8 UNC	2
39	89346	454798C2	59556	009-90006-84	BRACKET, Auxiliary Rear Spring	4

Group 22. Rear Suspension Assembly

Figure E-141. Leaf Springs and Bushings

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
40	89346	473725C91	59556	009-90006-85	SPRING, Auxiliary, Multi-Leaf	2
41	89346	473726C1	59556	009-90006-86	SPRING, Auxiliary, Leaf No.1	2
42	89346	473727C1	59556	009-90006-87	SPRING, Auxiliary, Leaf No.2	2
43	89346	473728C1	59556	009-90006-88	SPRING, Auxiliary, Leaf No,3	2
44	89346	63320H	59556	009-90006-89	BUSHING, Spring Pin	2
45	89346	414052C1	59556	009-90006-54	BOLT, Flange Head, 1/2-20 UNRF x 1-1/2 inches	12
46	89346	414087C1	59556	006-90002-150	NUT, Flange Hex Locking, 1/2-20 UNF	12
47	89346	473411C1	59556	009-90006-92	SPACER, Rear Spring	2
48	89346	53032R1	59556	009-90006-93	NUT, Center Bolt	2



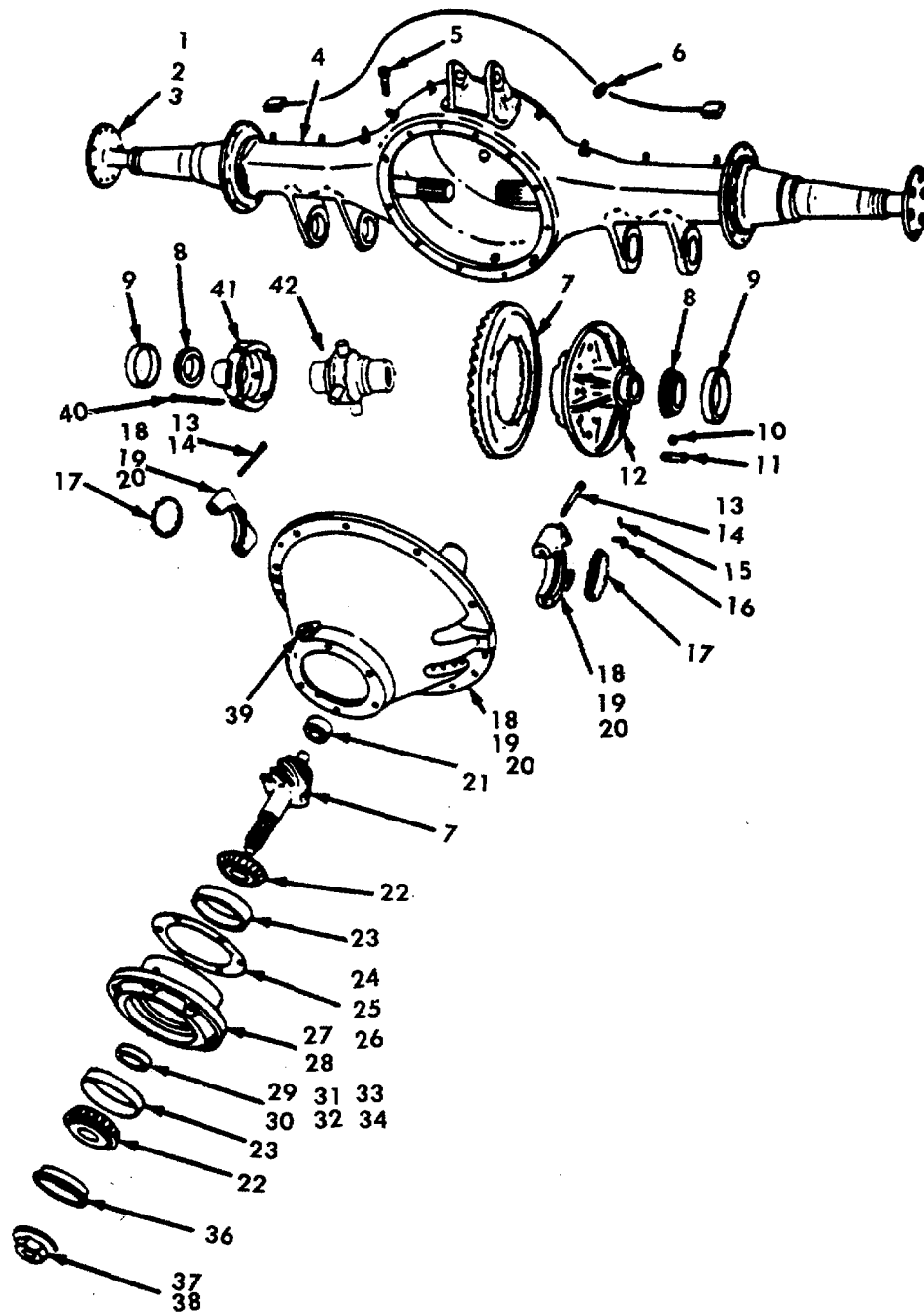
GROUP 23. REAR AXLE ASSEMBLY  
FIGURE E-142. WHEEL ASSEMBLY

## Group 23. Rear Axle Assembly

Figure E-142. Wheel Assembly

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	19632R1	59556	009-90006-4	REAR WHEEL AND DRUM ASSEMBLY	16
2	89346	571348C1	59556	009-90006-2	NUT, Hex Lock, 9/16 NF	2
3	89346	36415HB	59556	009-90006-100	SHAFT, Axle	2
4	89346	36416HB	59556	009-90006-101	NUT, Bearing, Adjusting, Outer	2
5	89346	36415HB	59556	009-90006-102	LOCK, Bearing, Adjusting, Nut	2
6	89346	ST2016A	59556	009-90006-103	NUT, Bearing, Adjusting, Inner	2
7	89346	ST967	59556	009-90006-104	BEARING, Cone Outer	2
8	89346	500016C1	59556	009-90006-105	BEARING, Cup Outer	2
9	89346	54494R1	59556	006-90002-137	GASKET, Axle Shaft Flange	2
10	89346	1648520C91	59556	009-90006-107	STUD, Rim C1amp	10
11	89346	24889R1	59556	009-90006-108	WHEEL, 5 Spoke	2
12	89346	504150C1	59556	009-90006-109	BOLT	10
13	89346	9413983	59556	009-90006-110	WASHER, Flat, Special	10
14	89346	1648515C1	59556	009-90006-111	NUT, Lock	10
15	89346	228291R2	59556	009-90006-112	DRUM, Brake	2
16	89346	337711C92	59556	009-90006-113	GUARD, Grease	2
17	89346	380019C91	59556	009-90006-114	SEAL, Grease	2
18	89346	ST2112	59556	009-90006-115	WASHER, Grease Seal	2
19	89346	ST969	59556	009-90006-116	BEARING, Cone Inner	2
20	89346	54495R2	59556	006-90002-135	BEARING, Cup Inner	2
21	89346	322144C1	59556	009-90006-118	NUT, Rim C1amp Stud	10
					CLAMP, Rim	10





GROUP 23. REAR AXLE ASSEMBLY  
 FIGURE E-143. REAR AXLE

## Group 23. Rear Axle Assembly

Figure E-143. Rear Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	RA00002488D	59556	009-90006-1	REAR AXLE ASSEMBLY	1
2	89346	571348C1	59556	009-90006-2	SHAFT, Axle, 1-7/8 inch x 36 Splines	2
3	89346	500016C1	59556	009-90006-105	GASKET, Axle Shaft Flange	2
4	89346	19632R1	59556	009-90006-4	NUT, Hex Locking, 9/16 NF	16
5	89346	595596C1	59556	009-90006-5	HOUSING, Axle	1
6	89346	91916R91	59556	009-90006-6	BREATHER, Axle Housing	1
7	89346	586049C1	59556	009-90006-7	PLUG, Pipe, Magnetic Drain	1
8	89346	597242C91	59556	009-90006-8	GEAR SET, Ring And Pinion	1
9	89346	ST2162	59556	009-90006-9	BEARING, Differential Cone	2
10	89346	ST2161	59556	009-90006-10	BEARING, Differential Cup	2
11	89346	274638	59556	009-90006-11	NUT, Differential Case	8
12	89346	157490R1	59556	009-90006-12	RIVET, Ring Gear To Differential Case	12
13		NSS			CASE, Differential Flange Half	1
14	89346	24895R1	59556	009-90006-14	BOLT, Bearing Cap	4
15	89346	25712R1	59556	009-90006-15	WASHER, Bearing Cap	4
16	89346	3/16x1P	59556	009-90006-16	PIN, Cotter, 3/16x1 inch	2
17	89346	157491R2	59556	009-90006-17	LOCK, Bearing, Adjuster	2
18	89346	69208R1	59556	009-90006-18	ADJUSTER, Bearing	2
19	89346	161019R93	59556	009-90006-19	CARRIER, With Caps, Differential	1
20	89346	583158C1	59556	009-90006-20	BOLT, Hex Head, 5/8 NC x 1-3/4 inch	12
21	89346	5/8R	59556	MS35338-50	WASHER, Locking, 5/8 Regular	12
22	89346	91082R91	59556	009-90006-22	BEARING, Pinion, Rear	1

## Group 23. Rear Axle Assembly

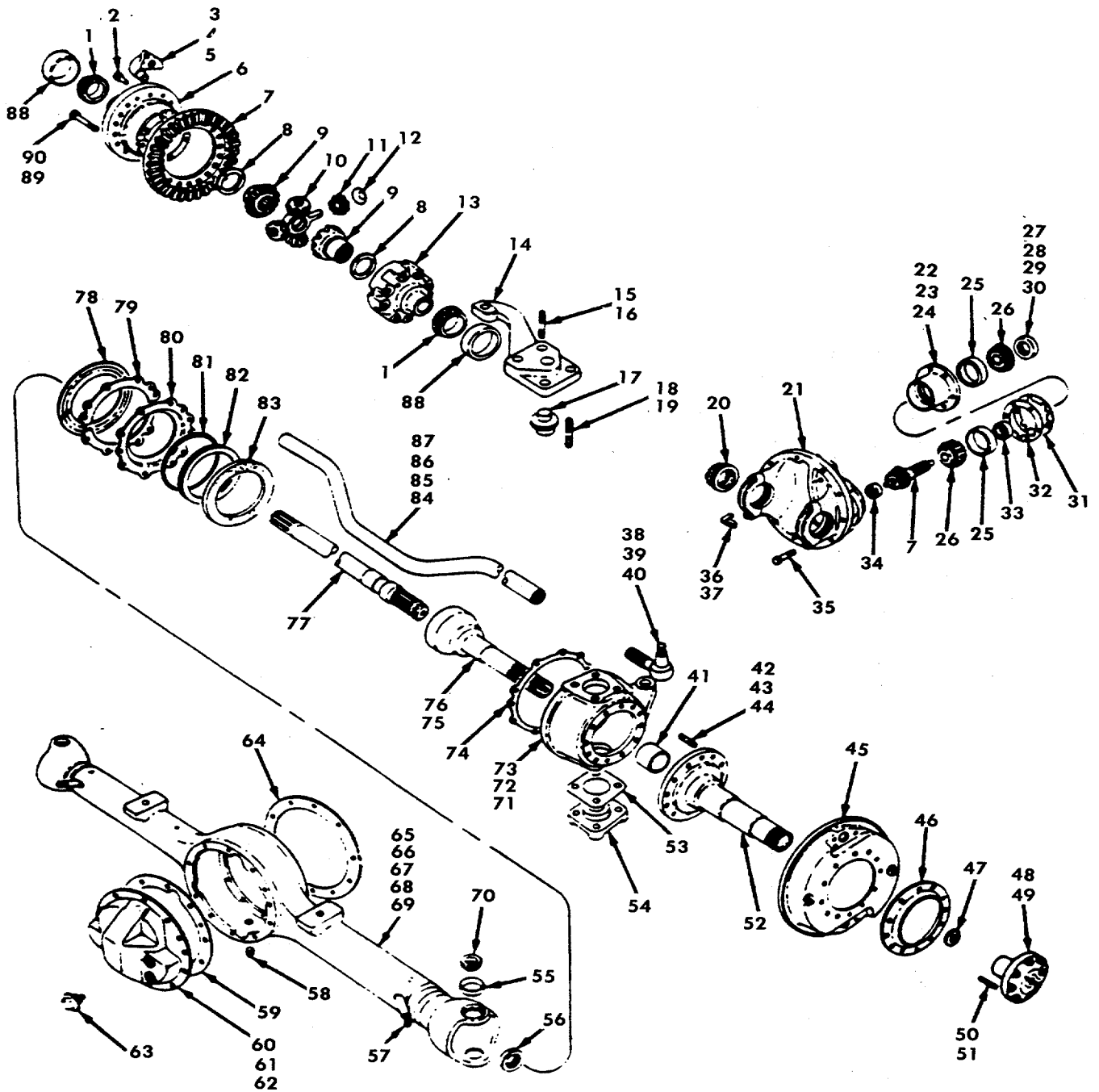
Figure E-143. Rear Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
22	89346	356161C91	59556	009-90006-23	BEARING, Pinion, Cone	2
23	89346	356162C1	59556	009-90006-24	BEARING, Pinion, Cup	2
24	89346	896612R1	59556	009-90006-25	SHIM, Pinion Bearing Cage, .005 Thick	AR
25	89346	157566R1	59556	009-90006-26	SHIM, Pinion Bearing Cage, .010 Thick	AR
26	89346	157567R1	59556	009-90006-27	SHIM, Pinion Bearing Cage, .030 Thick	AR
27	89346	454719C91	59556	009-90006-28	CAGE, With Cups, Pinion Bearing	1
28	89346	584255C1	59556	009-90006-29	BOLT, Cage To Carrier	6
29	89346	360453C1	59556	009-90006-30	SPACER, Pinion Bearing, .718 Thick	AR
30	89346	360457C1	59556	009-90006-31	SPACER, Pinion Bearing, .722 Thick	AR
31	89346	360461C1	59556	009-90006-32	SPACER, Pinion Bearing, .726 Thick	AR
32	89346	360465C1	59556	009-90006-33	SPACER, Pinion Bearing, .730 Thick	AR
33	89346	360469C1	59556	009-90006-34	SPACER, Pinion Bearing, .734 Thick	AR
34	89346	393975C1	59556	009-90006-35	SPACER, Pinion Bearing, .738 Thick	AR
35	89346	393979C1	59556	009-90006-36	SPACER, Pinion Bearing, .742 Thick	AR
36	89346	464244C2	59556	009-90006-37	SEAL, Pinion Oil	1
37	89346	578881C1	59556	009-90006-38	NUT, Companion Flange	1
38	89346	390362R1	59556	009-90006-39	WASHER, Companion Flange	1
39	89346	586045C1	59556	009-90006-40	PLUG, Pipe Countersink, 3/4 Filler	1
40	89346	157493R1	59556	009-90006-41	BOLT, Differential Case	8
41		NSS			CASE, Differential Plain Half	1

Group 23. Rear Axle Assembly

Figure E-143. Rear Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
42	89346	590770C91	59556	009-90006-43	DIFFERENTIAL, No Spin, 5.38-1 Ratio KIT, Differential Bearing And Seal (Included Item Numbers 8,9,21,22, 23, and 36) KIT, Differential Case, With Bolts (Includes Item Numbers 10, 12,40, and 41).	1
--	89346	499686C92	59556	009-90006-44		1
--	89346	493205C91	59556	009-90006-45		1



GROUP 24. FRONT AXLE ASSEMBLY  
FIGURE E-144. FRONT AXLE

## Group 24. Front Axle Assembly

Figure E-144. Front Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	584220C91	59556	006-90002-24	FRONT AXLE ASSEMBLY	1
2	89346	ST2007A	59556	006-90002-25	BEARING, Differential Case, Cone	2
	89346	69017R1	59556	006-90002-26	RIVET, Differential Case To Ring Gear	4
3	89346	83420R91	59556	006-90002-27	SCOOP, Differential Case, Oil	1
4	89346	25752R1	59556	006-90002-28	BOLT, Hex Head, 1/4 NC x 1/2 inch	1
5	89346	1/4R	59556	MS35338-44	WASHER, Lock, 1/4 Regular	1
6		NSS			CASE, Differential, Flange Half	1
7	89346	587893C91	59556	006-90002-29	GEAR SET, Ring and Pinion, 5.38-1 Ratio	1
8	89346	86233H	59556	006-90002-30	WASHER, Differential Side Gear, Thrust	2
9		NSS			GEAR, Differential Side	2
10		NSS			SPIDER, Differential	1
11		NSS			GEAR, Differential Pinion	4
12	89346	88015H	59556	006-90002-31	WASHER, Differential Pinion Gear, Thrust	4
13		NSS			CASE, Differential, Plain Half	1
14	89346	503096C1	59556	006-90002-32	ARM, Steering, Left	1
	89346	504868C1	59556	006-90002-33	ARM, Steering, Right	1
15	89346	473071C1	59556	006-90002-34	STUD, Steering Arm To Knuckle, 1/2 x 3 inches	2
16	9-346	9411648	59556	006-90002-35	NUT, Hex Lock, 1/2 NF	2
17	89346	503084C1	59556	006-90002-36	PIN, Trunnion	1

Group 24. Front Axle Assembly

Figure E-144. Front Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
18	89346	973390R2	59556	006-90002-37	STUD, Trunnion To Knuckle	14
19	89346	9411648	59556	006-90002-38	NUT, Hex Lock, 1/2 NF	14
20	89346	54528HA	59556	006-90002-39	ADJUSTER, Differential Bearing	2
21	89346	584216C91	59556	006-90002-40	CARRIER, W/Caps, Differential, 5.38-1 Ratio	1
22	89346	454711C91	59556	006-90002-41	CAGE, Pinion Bearing	1
23	89346	584255C1	59556	006-90002-42	BOLT, Hex Head, 9/16 NC x 1-1/2 inch	6
24	89346	138498	59556	006-90002-43	WASHER, Lock, 9/16 inch	6
25	89346	917217R1	59556	006-90002-44	BEARING, Pinion, Front Cup	2
26	89346	306276C91	59556	006-90002-45	BEARING, Pinion, Front Cone	2
27	89346	454755C1	59556	006-90002-46	SEAL, Oil Pinion	1
28	89346	54557H	59556	006-90002-47	WASHER, Companion Flange Nut	1
29	89346	117904H	59556	006-90002-48	NUT, Companion Flange	1
30	89346	1/8x1-3/4P	59556	006-90002-49	PIN, Cotter, 18 x 1-3/4 inch	1
31	89346	52773HA	59556	006-90002-50	SHIM, Pinion Bearing Cage, Upper	1
	89346	52774H	59556	006-90002-51	SHIM, Pinion Bearing Cage, Lower	1
32	89346	683264R1	59556	006-90002-52	SHIM, Pinion Bearing Cage, .005 Thick	AR
	89346	52748HA	59556	006-90002-53	SHIM, Pinion Bearing Cage, .010 Thick	AR
	89346	49749HA	59556	006-90002-54	SHIM, Pinion Bearing Cage, .030 Thick	AR
33	89346	49415HA	59556	006-90002-55	SPACER, Pinion Bearing, .525 Thick	AR
	89346	49416HA	59556	006-90002-56	SPACER, Pinion Bearing, .528 Thick	AR

## Group 24. Front Axle Assembly

Figure E-144. Front Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
	89346	49417HA	59556	006-90002-57	SPACER, Pinion Bearing, .531 Thick	AR
	89346	49418HA	59556	006-90002-58	SPACER, Pinion Bearing, .534 Thick	AR
34	89346	69023R1	59556	006-90002-59	BEARING, Pinion Rear	1
35	89346	69018R1	59556	006-90002-60	BOLT, Bearing Cap	4
36	89346	116163H	59556	006-90002-61	LOCK, Differential Bearing Adjusting	2
37	89346	3/16x1P	59556	006-90002-62	PIN, Cotter, 3/16 x 1	2
38	89346	503100C91	59556	006-90002-63	SOCKET	2
39	89346	26577R1	59556	006-90002-64	NUT, Hex Head, 1-1/8 NC	2
40	89346	1/8x1-1/2P	59556	006-90002-65	PIN, Cotter, 1/8 x 1-1/2 inch	2
41	89346	504870C1	59556	006-90002-66	BUSHING, Spindle	2
42	89346	78817C1	59556	006-90002-67	STUD, Spindle To Knuckle	24
43	89346	19632R1	59556	006-90002-68	NUT, Lock Spindle Stud, 7/16 NF	24
44	89346	573310C1	59556	006-90002-69	WASHER, Flat, 7/16 inch	24
45	89346	482435C91	59556	006-90002-70	PLATE, Backing	1
46	89346	491212C1	59556	006-90002-71	DEFLECTOR, Oil	2
47	89346	472987C1	59556	006-90002-72	WASHER, Retaining	2
48	89346	504869C1	59556	006-90002-73	FLANGE, Drive	2
49	89346	464305C1	59556	006-90002-74	BOLT, Hex Socket Head, 7/16 x 1 inch	2
50	89346	473072C1	59556	006-90002-75	STUD, Drive Flange, 7/16 inch	16
51	89346	19632R1	59556	006-90002-76	NUT, Hex Locking, 7/16 NF	16
52	89346	503086C91	59556	006-90002-77	SPINDLE, W/Bushing	2



## Group 24. Front Axle Assembly

Figure E-144. Front Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
53	89346	473001C1	59556	006-90002-78	SHIM, .005 Thick	AR
	89346	1646973C1	59556	006-90002-79	SHIM, .030 Thick	AR
54	89346	503087C1	59556	006-90002-80	CAP, King Pin, Lower Left, Lower Right	2
	89346	503095C91	59556	006-90002-81	CAP, King Pin, Upper Right	1
55	89346	871245R1	59556	006-90002-82	BEARING, Front Axle Bearing Cup	4
56	89346	473084C1	59556	006-90002-83	SEAL, Oil Axle Shaft	2
57	89346	7/16V	59556	006-90002-84	NUT, Front Axle Stop Screw, 7/16 NC	2
58	89346	50057K	59556	006-90002-85	PLUG, Magnetic Drain, 1/2 NC	1
59	89346	549918C2	59556	006-90002-86	GASKET, Eliminator, 24CC Tube	1
60	89346	491210C91	59556	006-90002-87	COVER, Anle Housing	1
61	89346	25796R1	59556	006-90002-88	BOLT, Hex Head, 7/16 NC x 1 inch	10
62	89346	7/16R	59556	MS35338-47	WASHER, Lock, 7/16 Regulator Arm, Steering	16
63	89346	586045C1	59556	006-90002-89	PLUG, Filler	2
64	89346	69177R1	59556	006-90002-90	GASKET, Differential Carrier To Housing	1
65	89346	503088C2	59556	006-90002-91	HOUSING, Axle	1
66	89346	968936R1	59556	006-90002-92	BREATHER	1
67	89346	25961DA	59556	006-90002-93	FITTING, Lubrication, 1/8 Straight	2
68	89346	143993	59556	006-90002-94	PLUG, Grease, 3/8 Slotted	1
69	89346	593119C91	59556	006-90002-95	SEAL, Oil, Axle Shaft W/1-7/8 x 36 Splines	2
70	89346	503098C91	59556	006-90002-96	BEARING, Front Axle, Cone	4

## Group 24. Front Axle Assembly

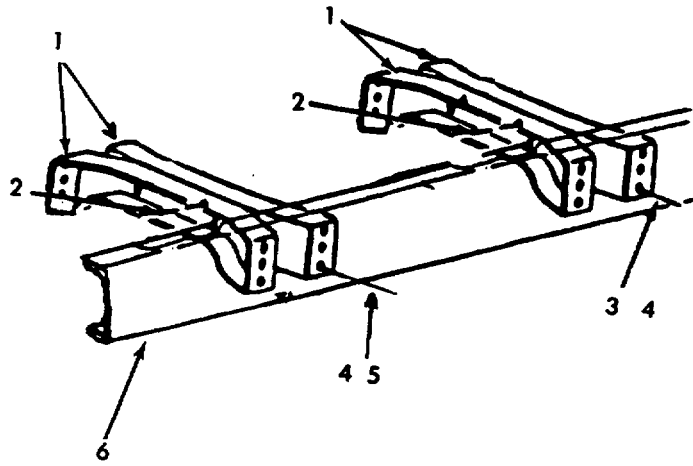
Figure E-144. Front Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
71	89346	503089C1	59556	006-90002-97	KNUCKLE, Steering Left	1
	89346	503090C1	59556	006-90002-98	KNUCKLE, Steering Right	1
72	89346	25653R1	59556	006-90002-99	BOLT, Hex Head, 5/16 NC x 1/2 inch	24
73	89346	473080C1	59556	006-90002-100	DOWEL, Taper	4
74	89346	473016C1	59556	006-90002-101	GASKET, Retainer To Knuckle	2
75	89346	503092C1	59556	006-90002-102	SHAFT, W/Joint Axle Outer	2
76	89346	473014C1	59556	006-90002-103	RING, Snap	2
77	89346	587413C91	59556	006-90002-104	SHAFT, Inner Axle, Involute Spline Left	1
	89346	587414C91	59556	006-90002-105	SHAFT, Inner Axle, Involute Spline Right	1
78	89346	503091C1	59556	006-90002-106	RETAINER, Split Ring	2
79	89346	503080C1	59556	006-90002-107	RETAINER, Half Ring	4
80	89346	503081C1	59556	006-90002-108	RETAINER, Oil Seal	2
81	89346	503079C1	59556	006-90002-109	SPRING, Oil Seal	2
82	89346	503082C1	59556	006-90002-110	SEAL, Front Axle Oil	2
83	89346	503083C1	59556	006-90002-111	SEAL, Dust	2
84	89346	574877C1	59556	006-90002-112	ROD, Tie	1
85	89346	574878C1	59556	006-90002-113	END, Tie Rod	1
86	89346	574879C1	59556	006-90002-114	NUT, Tie Rod End	1
87	89346	109454	59556	006-90002-115	FITTING, Lubrication	1
88	89346	ST963	59556	006-90002-116	BEARING, Differential Case, Cup	2
89	89346	9412230	59556	006-90002-117	NUT, Hex Locking, 1/2 NC	8

Group 24. Front Axle Assembly

Figure E-144. Front Axle

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
90	89346	25293R1	59556	006-90002-118	BOLT, Differential Case, R/S 10 x 1042	8
--	89346	585702C91	59556	006-90002-119	KIT, Gear Set, Differential Side And Pinion, Involute Splines (Includes Item Nos. 8,9,10,11, and 12)	1
--	89346	493202C91	59556	006-90002-120	KIT, Case, Differential W/Bolts (Includes Item Nos. 6,13,89,and 90)	1
--	89346	504266C92	59556	006-90002-121	KIT, Differential Bearing And Seal (Includes Item Nos. 1,25,26,27,34, and 88)	1
			59556	006-90002-122	KIT, Differential, Repair, (Includes Following: (1) Involute Spline 584216C91 5.38-1 Ratio (2) Screw, Front Axle 102909 Stop, 7/16 NC x 1-1/2 Square Head Set (2) Screw, Front Axle 578206C1 Stop, 1/2 NC x 2-1/2 Square Head Set 362C (2) Contact, Plug 386025C1 (2) Plug, Pipe Recessed Dr. 273469	1



GROUP 25. FRAME ASSEMBLY  
FIGURE E-145. CROSSMEMBERS AND FRAME RAILS

Group 25. Frame Assembly

Figure E-145. Crossmembers and Frame Rails

ITEM NO	FSCM	OEM PART NO.	FSCM	TRUE VENDOR PART NO.	DESCRIPTION	QTY
1	89346	473369C2	59556	001-90010-1	CROSSMEMBER	4
2	89346	12014R1	59556	001-90010-2	RIVET, Round Head, 1/2 x 1-1/4 inch	8
3	89346	414054C1	59556	001-90010-3	BOLT, Flange, Hex Head, 1/2-20 UNRF x 2 inches	8
4	89346	414087C1	59556	001-90010-4	NUT, Flange, Hex Locking, 1/2-20 UNF	20
5	89346	414053C1	59556	001-90010-5	BOLT, Flange, Hex Head, 1/2-20 UNRF x 1-3/4 inches	12
6	89346	491922C4	59556	001-90010-6	FRAME RAIL, Left	1
	89346	491923C4	59556	001-90010-7	FRAME RAIL, Right	1

**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.

<b>BOLTS AND NUTS</b>		<b>STUDS</b>	
<b>THREAD DIAMETER</b>	<b>FT LBS</b>	<b>THREAD DIAMETER</b>	<b>FT LBS</b>
1/4	9±3	1/4	5±2
5/16	18±5	5/16	10±3
3/8	32±5	3/8	20±3
7/16	50±10	7/16	30±5
1/2	75±10	1/2	40±5
9/16	110±15	9/16	60±10
5/8	150±20	5/8	75±10
3/4	265±35	3/4	110±15
7/8	420±60	7/8	170±20
1	640±80	1	260±30
1-1/8	800±100	1-1/8	320±30
1-1/4	1000±120	1-1/4	400±40
1-3/8	1200±150	1-3/8	480±40
1-1/2	1500±300	1-1/2	550±50

**SELF-LOCKING NUT BREAKWAY TORQUE VALUES**

<b>THREAD SIZE</b>	<b>MINIMUM BREAKWAY TORQUE (IN-LBS)</b>	<b>THREAD SIZE</b>	<b>MINIMUM BREAKWAY TORQUE (IN-LBS)</b>
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**

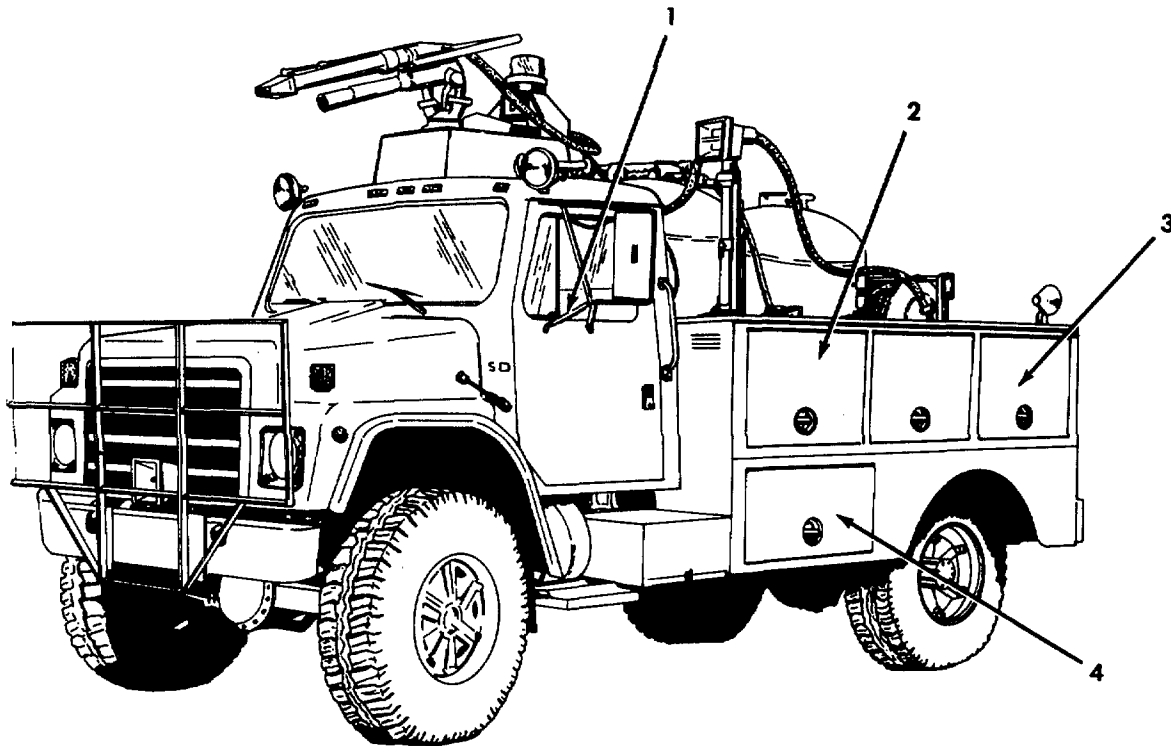
To determine breakway torque, thread nut onto screw or bolt until at least two threads stick out. Nut shall not make contact with a mating part. Stop the nut. Torque necessary to begin turning nut again is the breakway torque. Do not reuse self-locking nuts that do not meet minimum breakway torque.

**APPENDIX G  
STOWAGE GUIDE**

**G-1. SCOPE.**

This appendix shows the locations for stowage of equipment and material required to be carried on the Twin Agent 4x4 Firefighting Truck.

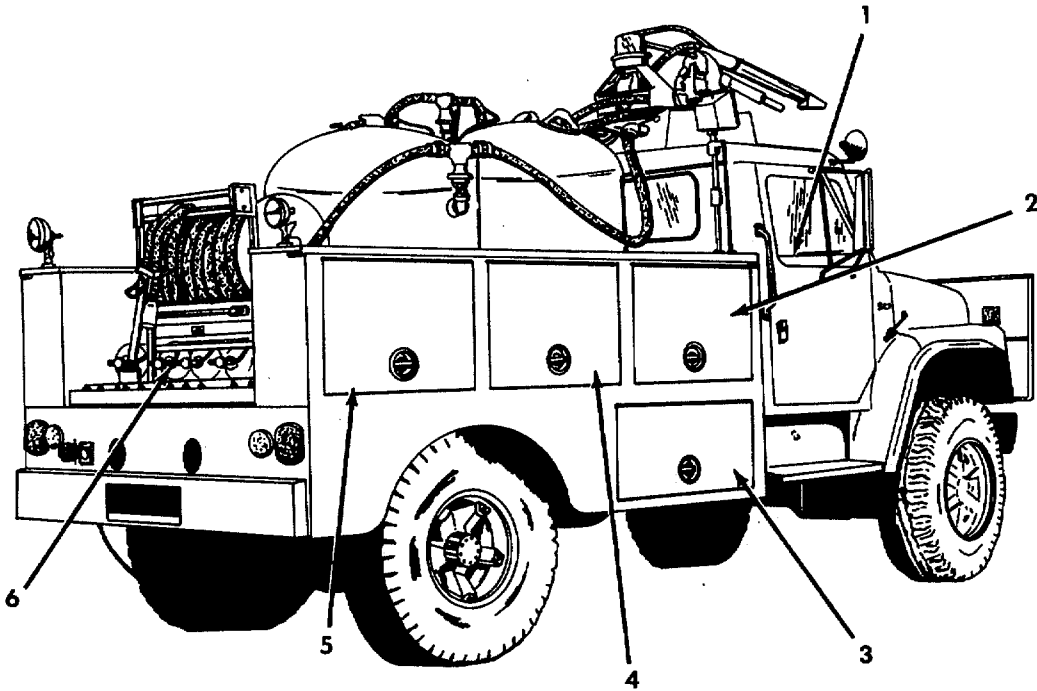
**TWIN AGENT 4x4 FIREFIGHTING TRUCK  
Street Side View**



**LOAD PLAN**

<b><u>NO.</u></b>	<b><u>ITEM</u></b>
1	Manual Override Control Levers (2)
2	Plastic Funnel
3	Aircraft Rescue Tool Kit
4	Hydraulic Rescue Tool

**TWIN AGENT 4x4 FIREFIGHTING TRUCK**  
**Curb Side View**



<u>LOAD PLAN</u>	
<u>NO.</u>	<u>ITEM</u>
1	Steel Funnel
2	Inverter
3	Power Saw
4	10 Ton Hydraulic Rescue Kit
5	Hydraulic Rescue Tool Power Unit
6	Plastic Filler Tube



## ALPHABETICAL INDEX

## Subject, Para.

## Subject, Para.

## A

10 Ton Hydraulic Rescue Kit Maintenance, 4-20  
 Accelerator Pedal Replacement, 4-73  
 AFFF Agent Tank Replacement, 4-30  
 AFFF Vessel Recharge Procedures, 2-24  
 Air Cleaner Replacement, 4-68  
 Air Dryer Repair, 5-21  
 Air Dryer Replacement, 4-168  
 Air Horn Replacement, 4-101  
 Air Lines and Piping Replacement, 4-171  
 Air Tank Replacement, 4-173  
 Aircraft Crash Rescue Tool Kit Replacement, 4-15  
 Alternator Repair, 5-12  
 Alternator Replacement, 4-85

## B

Back Window Replacement, 4-140  
 Back-Up Alarm Replacement, 4-54  
 Back-Up Light Maintenance, 4-52  
 Battery Cable Replacement, 4-84  
 Battery Replacement, 4-83  
 Blower Motor Replacement, 4-112  
 Brake Drum Maintenance, 4-170  
 Brake Pedal Replacement, 4-174  
 Brush Guard Replacement, 4-122

## C

Cab Assembly, Lights, Switches, Gauges,  
 Controls and Indicators Replacement, 5-16  
 Cab Electrical System Replacement, 4-147  
 Cab Panels Repair, 5-18  
 Cab Panels Replacement, 5-17  
 Cab Spotlight Maintenance, 4-97  
 Camshaft and Gear Maintenance, 6-9  
 Chassis Electrical System Replacement, 4-148  
 Clearance Light Maintenance, 4-47  
 Compartment Door Assembly Maintenance, 4-56  
 Compartment Light Maintenance, 4-55  
 Compressor Repair, 5-20  
 Compressor Replacement, 4-167  
 Control Knobs and Indicator  
 Lights Replacement, 4-109  
 Control Switches and Gauges Replacement, 4-108  
 Controls and Gauges Replacement, 4-27  
 Controls and Gauges Replacement, 4-35  
 Crossmember Replacement, 5-26  
 Cylinder Head and Valve Maintenance, 6-6

## D

Deaeration Tank Replacement, 4-59  
 Deck Light Maintenance, 4-46  
 Description and Use of Controls and Indicators, 2-2  
 Destruction of Army Material to  
 Prevent Enemy Use, 1-6  
 Differential Side Gear and Pinion  
 Replacement, 4-196  
 Dipstick and Tube Replacement, 4-91  
 Door Glass Regulator Replacement, 4-142  
 Door Glass Replacement, 4-145  
 Door Glass Seal Replacement, 4-143  
 Door Hinge Replacement, 4-131  
 Door Lock Cylinder Replacement, 4-133  
 Door Lock Replacement, 4-132  
 Door Replacement, 4-130  
 Door Run Channel Replacement, 4-144  
 Door Weatherstrip Replacement, 4-136  
 Drag Link Replacement, 4-178  
 Drive Belt Replacement, 4-62  
 Driving the Vehicle, 2-9  
 Dry Chemical Nozzle Assembly Replacement, 4-34  
 Dry Chemical Vessel Recharge Procedures, 2-25  
 Dual Agent Handline Maintenance, 4-39

## E

Engine and Accessories Repair, 6-4  
 Engine Compartment Light Maintenance, 4-99  
 Engine Cooling System Service, 4-58  
 Engine Mounting Replacement, 5-14  
 Engine Replacement, 5-11  
 Equipment Characteristics, Capabilities  
 and Features, 1-8  
 Equipment Data, 1-10  
 Exhaust Manifold Replacement, 4-89  
 Exhaust Pipes Replacement, 4-79  
 External Speaker Replacement, 4-111

## F

Fan and Clutch Replacement, 4-61  
 Fan Shroud Replacement, 4-60  
 Filler Tube Replacement, 4-14  
 Fire Body Replacement, 4-45  
 Flexible Coupling Replacement, 4-120  
 Flywheel, Crankshaft and Main  
 Bearing Maintenance, 6-13  
 Foam Nozzle Assembly Replacement, 4-33

## ALPHABETICAL INDEX

## Subject, Para.

**F (Continued)**

Frame Rail Replacement, 5-27  
 Front Axle Replacement, 4-200  
 Front Axle Shaft Replacement, 4-201  
 Front Bumper Replacement, 4-203  
 Front Clearance Light Maintenance, 4-95  
 Front Cover Maintenance, 6-8  
 Front Propellor Shaft Replacement, 4-154  
 Front Shock Absorber Replacement, 4-185  
 Front Suspension Leaf Spring and  
 Bushing Replacement, 4-190  
 Front Turn Signal Light Maintenance, 4-96  
 Front Wheel Hub/Drum Replacement, 4-186  
 Fuel Filter Replacement, 4-69  
 Fuel Lines Replacement, 4-71  
 Fuel Pump Replacement, 4-70  
 Fuel Tank Replacement, 4-72

**G**

Grille Replacement, 4-123

**H**

Handrail Replacement, 4-25  
 Headlights Replacement, 4-94  
 Heater Core Maintenance, 4-114  
 Heater Hoses Maintenance, 4-113  
 Heater/Defroster Blower Switch  
 Replacement, 4-116  
 Heater/Defroster Control Assembly  
 Replacement, 4-115  
 Heater/Defroster Resistor Replacement, 4-117  
 Hood Assembly Replacement, 4-124  
 Hood Hinge Replacement, 4-125  
 Hood Latch Replacement, 4-126  
 Hose Reel Assembly Maintenance, 4-37  
 Hose Replacement, 4-40  
 Hose Rollers Replacement, 4-38  
 Hoses and Piping Replacement, 4-63  
 Hub and Drum Assembly Replacement, 4-198  
 Hydraulic Rescue Tool Power Unit  
 Maintenance, 4-19  
 Hydraulic Rescue Tool Power Unit Repair, 5-6  
 Hydraulic Rescue Tool Replacement, 4-18

## Subject, Para.

**I, J, K**

Injection Lines Replacement, 4-75  
 Injection Nozzles Replacement, 4-77  
 Injection Pump Replacement, 4-76  
 Injection Pump/Governor Repair, 5-9  
 Inside Door Handle Replacement, 4-135  
 Intake Manifold Replacement, 4-88  
 Introduction, 4-3  
 Inverter Maintenance, 4-22  
 Inverter Receptacles Replacement, 4-51

**L**

List of Abbreviations, 1-5  
 Location and Description of Major  
 Components, 1-9  
 Lubrication Instructions, 4-9  
 Lubrication, 4-4

**M**

Maintenance Forms and Records, 1-2  
 Maxi-Chamber Replacement, 4-166  
 Mirror Replacement, 4-129  
 Mobile Operation of Twin Agent 4x4  
 Firefighting Truck, 2-7  
 Motor Replacement, 4-41  
 Muffler Replacement, 4-81

**N**

Nitrogen Cylinder Replacement  
 Procedures 2-26  
 Nitrogen Cylinder Replacement, 4-26

**O**

Oil Pan Replacement, 4-92  
 Oil Pump, Filters, and Cooler Maintenance, 6-11  
 Operating Procedures, 2-18  
 Operation at High Altitudes, 2-35  
 Operation in Dusty or Sandy Areas, 2-30  
 Operation in Extreme Heat, 2-29  
 Operation in Intermediate Cold  
 (to -25° F), 2-28  
 Operation in Mud, 2-34  
 Operation in Salt Water Areas, 2-32  
 Operation in Snow, 2-33  
 Operation of 10 Ton Hydraulic Rescue Tool, 2-17

## ALPHABETICAL INDEX

## Subject, Para.

## Subject, Para.

**O (Continued)**

Operation of Accessory Firefighting Equipment, 2-11  
 Operation of Hydraulic Rescue Tool, 2-16  
 Operation of Inverter, 2-14  
 Operation of Lighting and Vision Equipment, 2-12  
 Operation of Rear Handline, 2-21  
 Operation of Remote Turret, 2-20  
 Operation of Rescue Saw, 2-15  
 Operation of Siren/Public Address System, 2-13  
 Operation Under Rainy or Humid Conditions, 2-31  
 Operator's PMCS Procedures, 2-4  
 Organizational PMCS Procedures, 4-7  
 Outside Door Handle Replacement, 4-134

**P**

P-K-P Agent Tank Replacement, 4-29  
 Piping, Valves, Fittings and Regulator Replacement, 4-28  
 Piston and Connecting Rod Maintenance, 6-12  
 Pitman Arm Replacement, 4-176  
 Pitman Shaft Seal Replacement, 4-182  
 Polyethylene Funnel Replacement, 4-13  
 Post Operational Procedures, 2-22  
 Power Steering Gear Repair, 5-23  
 Power Steering Gear Replacement, 4-181  
 Power Steering Pump Repair, 5-24  
 Power Steering Pump Replacement, 4-183  
 Power Steering System Service, 4-180  
 Preparation for Storage or Shipment, 1-7  
 Preparing Vehicle for Shipment or Storage, 4-207  
 Propellor Shaft Assembly Service, 4-150

**Q**

Quartz Flood Light Maintenance, 4-98

**R**

Radiator Replacement, 4-66  
 Radiator Support Replacement, 4-128  
 Rear Axle Assembly Replacement, 4-197  
 Rear Bumper Replacement, 4-204  
 Rear Propellor Shaft Replacement, 4-152  
 Rear Quartz Flood Light Maintenance, 4-48  
 Rear Retainer Oil Seal Replacement, 6-16  
 Rear Slave Receptacle Replacement, 4-50  
 Rear Slip Yoke Replacement, 4-153  
 Rear Station Chargers Replacement, 4-49

Rear Suspension Leaf Spring and Bushing Replacement, 4-192  
 Rear Wheel Bearing Replacement, 4-195  
 Remote Manual Twin Agent Turret Assembly Replacement, 4-32  
 Repair Parts, 4-1  
 Repair Parts, 5-1  
 Repair Parts, 6-1  
 Reporting of Equipment Improvement Recommendations, 1-3  
 Rescue Saw Maintenance, 4-21  
 Rescue Saw Repair, 5-7  
 Rewind Switch Replacement, 4-43  
 Rocker Arm, Shaft and Push Rod Maintenance, 6-5  
 Roof Warning Light Maintenance, 4-100

**S**

Seat Belt Replacement, 4-138  
 Seat Replacement, 4-137  
 Service Brakes Maintenance, 4-169  
 Servicing Vehicle While in Storage, 4-208  
 Shutdown, 2-10  
 Siren/Public Address System Maintenance, 4-110  
 Slack Adjuster Replacement, 4-165  
 Special Tools, TMDE, and Support Equipment, 4-2  
 Special Tools, TMDE, and Support Equipment, 5-2  
 Special Tools, TMDE, and Support Equipment, 6-2  
 Speedometer Cable Core Replacement, 4-107  
 Speedometer Replacement, 4-106  
 Spindle Replacement, 4-188  
 Splash Guard/Mud Flap Replacement, 4-127  
 Stand-By Mode Procedures, 2-19  
 Starter Repair, 5-13  
 Starter Replacement, 4-86  
 Starting the Engine, 2-8  
 Steel Funnel Replacement, 4-16  
 Steering Column Replacement, 4-119  
 Steering Knuckle and Arm Replacement, 4-189  
 Steering Wheel Replacement, 4-118  
 Swivel Joint/Elbow Replacement, 4-442  
 Symptom Index, 3-2  
 Symptom Index, 4-11  
 Symptom Index, 5-4  
 System Shut-Down After Operation Procedures, 2-23

## ALPHABETICAL INDEX

**Subject, Para.****T**

Tail Pipe Replacement, 4-80  
 Thermostat and Housing Replacement, 4-65  
 Tie Rod Replacement, 4-177  
 Timing and Gear Maintenance, 6-10  
 Tire Replacement, 4-163  
 Tire Rim Assembly Replacement, 4-162  
 Tire Service, 3-4  
 Tow Hooks Replacement, 4-205  
 Transfer Case Assembly Maintenance, 4-159  
 Transfer Case Repair, 6-18  
 Transfer Case Shift Lever Replacement, 4-160  
 Transmission Assembly Maintenance, 4-156  
 Transmission Repair, 6-15  
 Transmission Shift Control Lever  
 Replacement, 4-157  
 Turbocharger Replacement, 4-87  
 Turn and Stop Light Maintenance, 4-53  
 Turn Signal Switch Replacement, 4-121  
 Twin Agent Firefighting System Maintenance, 4-24

**U**

Universal Joints Replacement, 4-151

**V**

Valve Cover Replacement, 4-90  
 Valves and Switches Replacement, 4-172  
 Vent Glass Replacement, 4-141  
 Vibration Damper Maintenance, 6-7  
 Visual Inspection, 4-5

**W, X, Y, Z**

Warranty Information, 1-4  
 Washer Replacement, 4-105  
 Water Pump Replacement, 4-64  
 Wheel Bearing Replacement, 4-187  
 Windshield Replacement, 4-139  
 Windshield Washer/Wiper Assembly Service, 4-102  
 Wiper Motor Replacement, 4-104  
 Wipers Replacement, 4-103

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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 decigrams = .035 ounce  
 1 dekagram = 10 grams = .35 ounce  
 1 hectogram = 10 dekagrams = 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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