

T.O. 34Y1-244-1

TECHNICAL MANUAL

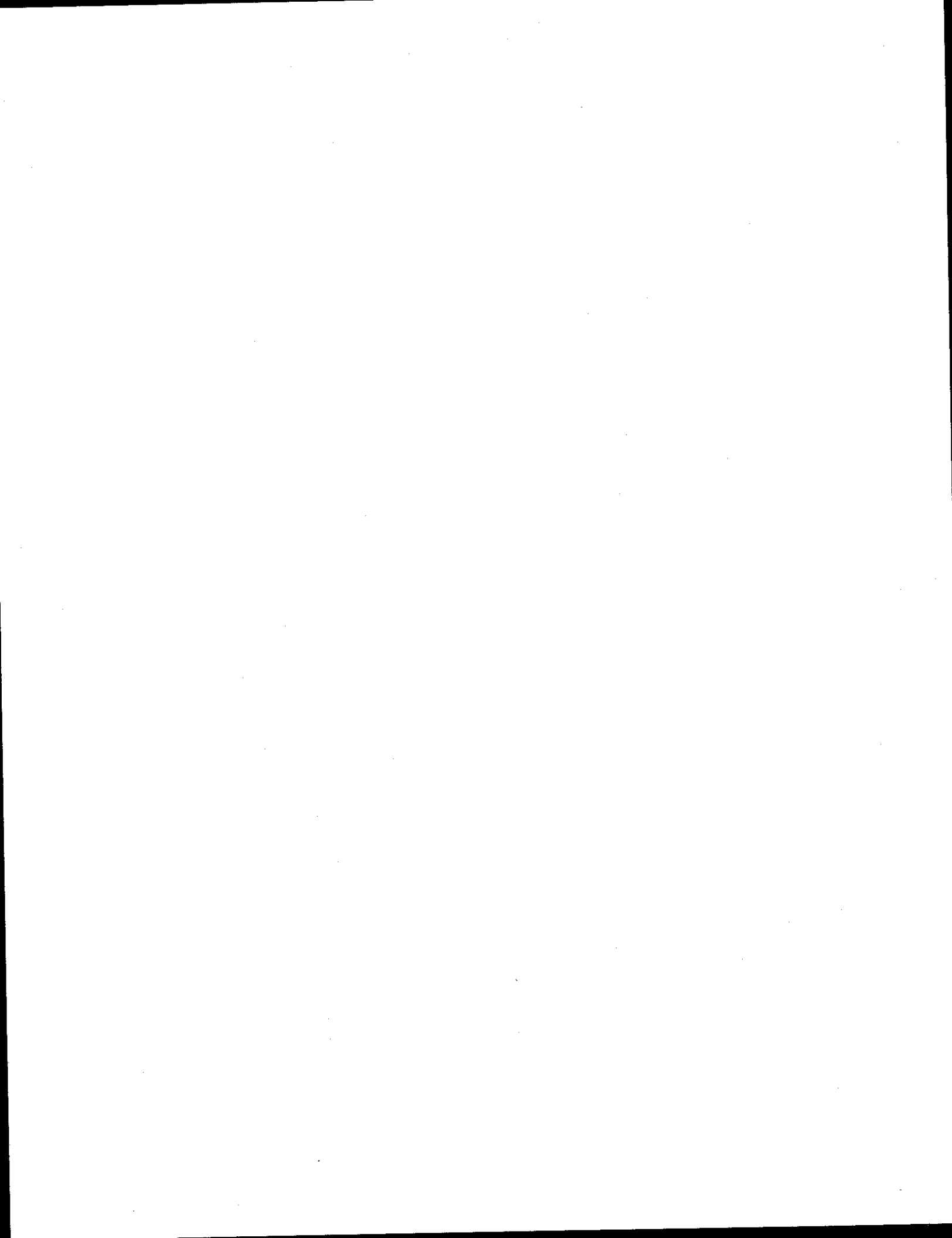
**OPERATION, MAINTENANCE AND REPAIR
INSTRUCTIONS WITH
ILLUSTRATED PARTS BREAKDOWN**

**COMPRESSOR, AIR, ROTARY,
DIESEL ENGINE DRIVEN,
2 WHEEL TRAILER MOUNTED
125 CFM, 100 PSI, TYPE MC-7
MODEL 11M125RPDQ**

**PART NO. 86405
NAS 4310-01-212-8930**

**DAVEY COMPRESSOR CO. (16004)
F09603-85-C-0536
F09603-90-C-0751**

**28 FEBRUARY 1986
CHANGE 7 - 30 OCTOBER 1992**



FORWARD/PREFACE

PURPOSE.

a. This technical manual is issued for the guidance of personnel responsible for operation, maintenance and repair of this equipment.

b. The use of words SHOULD and MAY are used to express provisions that are non-mandatory.

SCOPE.

a. The operation, maintenance and repair instructions contained in this publication are prepared for Organizational and Intermediate Maintenance level.

WARNINGS, CAUTIONS AND NOTES.

a. Warnings and cautions are inserted preceding the text to which they pertain. Warnings are used to place emphasis on procedures which, if not adhered to, could cause bodily harm, injury or death to personnel. Cautions are used to place emphasis on procedures which, if not adhered to could cause damage to or destruction of equipment or loss of mission effectiveness or long term health hazards to personnel.

ABBREVIATIONS.

a. Abbreviations contained throughout the manual are in accordance with Military Standard MIL-STD-12, or are defined at their first appearance in the text.

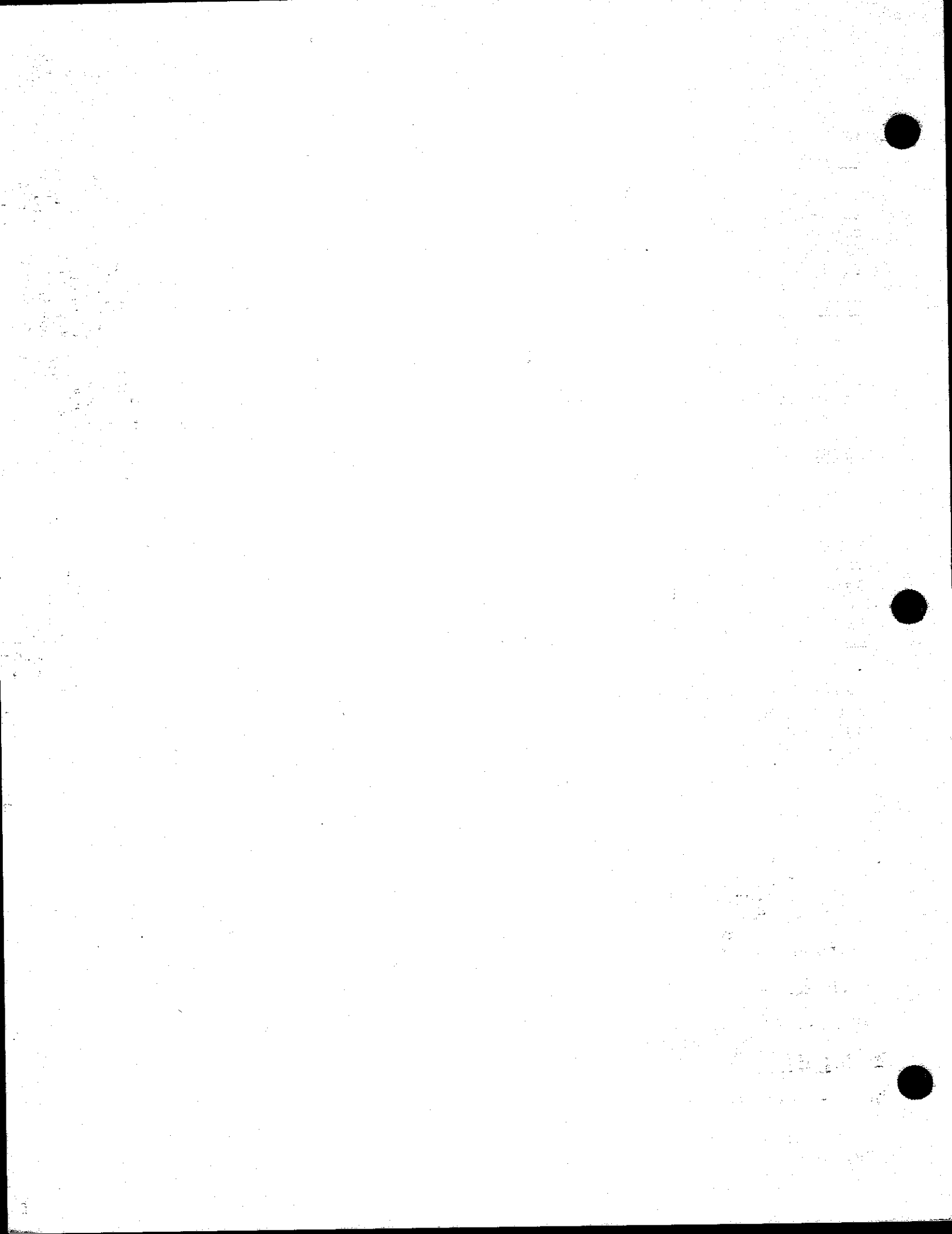
b. Notes are placed either before or after text to which they pertain. A note is an essential operating or maintenance procedure, condition, or statement, which must be highlighted.

USE OF SHALL, WILL, SHOULD AND MAY.

a. Throughout the manual the use of the word SHALL is used to express a provision that is mandatory. The word WILL is used to express a declaration of purpose.

IMPROVEMENTS TO THIS MANUAL.

a. Improvements to this T.O. will be in accordance with T.O. 00-5-1 and submitted to WR-ALC/MMEDT, Robins AFB, Ga. 31098-5609.



SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

DO NOT PLAY WITH COMPRESSED AIR.

Compressed air is dangerous. Do not play with compressed air to avoid injury to personnel such as objects blown into the eyes.

DO NOT OPERATE UNIT WITH SIDE DOORS OPEN.

This unit was designed to operate with the side doors closed to meet Occupational Safety and Health Administration standards. Extended exposure to operation with doors open could cause damage to the hearing of operating personnel.

DO NOT SERVICE, ADJUST, OR PERFORM MAINTENANCE ALONE.

Under no circumstances should any person attempt to service, adjust, or maintain the equipment except in the presence of someone who is capable of rendering aid. Observe good, general shop safety practices when performing overhaul. Use proper tools for the job to be done and wear proper protective clothing and shoes where necessary.

The following Warnings and Cautions appear in the text and are repeated here for emphasis.

WARNINGS:

When using a lifting device for

unloading equipment, or removing components, the device must be of a capacity suitable for the lifting being accomplished.

Wear protective goggles, apron, and rubber gloves when filling battery with electrolyte to prevent eye damage and serious burns.

Do not operate unit in a building or any enclosed area unless exhaust gases are piped outside. Inhalation of exhaust gases can result in serious illness or death.

Do not attempt any repair, removal, or replacement of unit air end components or parts until all air pressure has been relieved from the system to prevent bodily harm. Pressure gauge must read zero.

Destroy a used oil separator element to prevent accidental reuse. Over pollution of metal salts collecting on the element can become a hazardous condition by lowering flash point causing a fire in the oil separator.

Provide adequate ventilation when using cleaning solvent, Federal Specification P-D-680, Type II. Avoid prolonged breathing of vapors and minimize skin contact.

When cleaning or air drying with compressed air, the air pressure must not exceed 30 pounds per square inch at the nozzle to avoid injury.

Provide adequate ventilation when using trichloroethane, or equivalent, to clean electrical components. Avoid prolonged breathing vapors and minimize contact with the skin.

Escaping fuel under pressure can have sufficient force to penetrate the skin causing serious personal injury. When testing fuel injection nozzles always direct tips away from operator. If injured by escaping fuel under pressure, call a doctor at once to prevent serious infection or reaction.

Oil or oil fumes can ignite at temperatures above 380°F (193°C). Use a thermometer and/or controlled heat source when heating any component for parts replacement, such as flywheel ring gear. Do not allow a flame or heating element to be in direct contact with the heating oil. Do not exceed 360°F (182°C). Heat in a well-ventilated area. Plan a safe handling procedure to avoid burns.

CAUTIONS:

Operate cold weather starting aid only when engine is cranking to prevent overloading of engine air intake of priming fuel.

After unloading or moving unit to a new site, always set the parking brake.

Locate the unit in an area as free of dust and dirt as possible. A highly contaminated atmosphere places an abnormal load on the air cleaner, oil filters, and compressor. This can result in an increase in maintenance problems.

Make certain when housing side doors are open that they are secured properly.

If engine oil pressure does not register on control panel pressure gauge within five seconds after starting, release safety override button and determine cause of no oil pressure to prevent engine damage.

Do not allow equipment to operate unattended for prolonged periods. The operator should observe all gauges periodically to be certain unit is operating normally. This precaution can prevent serious damage to the unit.

If a varnish condition (dark brown sticky substance) is in evidence on compressor oil filter element when regular service is performed, the compressor, oil separator, oil cooler, and oil lines must be cleaned.

Do not substitute commercial grade cap screws for oil separator covers special screws. These screws are high tensile to meet ASME standards for pressure vessels.

Do not use inhibitors labeled acid neutralizers in the radiator. Use only a corrosion inhibitor that is compatible with aluminum.

When wire assemblies and wiring harness are removed from gauges and switch terminals, install all hardware back onto terminals from which they were removed to prevent their loss. Also, when gauges or switches are removed, place mounting clamps and hardware back onto gauge or switch to prevent loss or mixing with another component.

Do not use steam or water to clean any electrical components, instruments, wire, etc. Wipe faces of gauges with a clean, lint-free cloth.

When bearing races must be removed by using heat, replace the entire bearing at assembly.

Assemble the air compressor rotor onto rotor shaft with blade slot drain holes on leading edge with

respect to rotation. This should be noted at disassembly.

The alternator bearings are pre-lubricated and sealed. Do not clean in a solvent that will dissolve lubricant.

Do not use a screwdriver or pry to remove injection nozzles. If nozzle cannot be removed easily, use an appropriate nozzle puller, such as John Deere Nozzle Puller JDE-38. or equivalent.

Do not scrape or otherwise damage coating on fuel injection nozzle body above carbon seal groove. Do not use a motor-driven brush to clean nozzle body or tip. Do not

attempt to clean nozzles without proper service tools.

When servicing injection nozzles, work area must be clean. Be careful not to mix parts of one nozzle with any other.

When servicing fuel injection pump, work area must be clean. Only experienced personnel should service injection pumps. Proper service tools and instruments shall be used to prevent damage to pump parts.

Always use correct tools and test equipment specified in text to prevent damage to any component part.

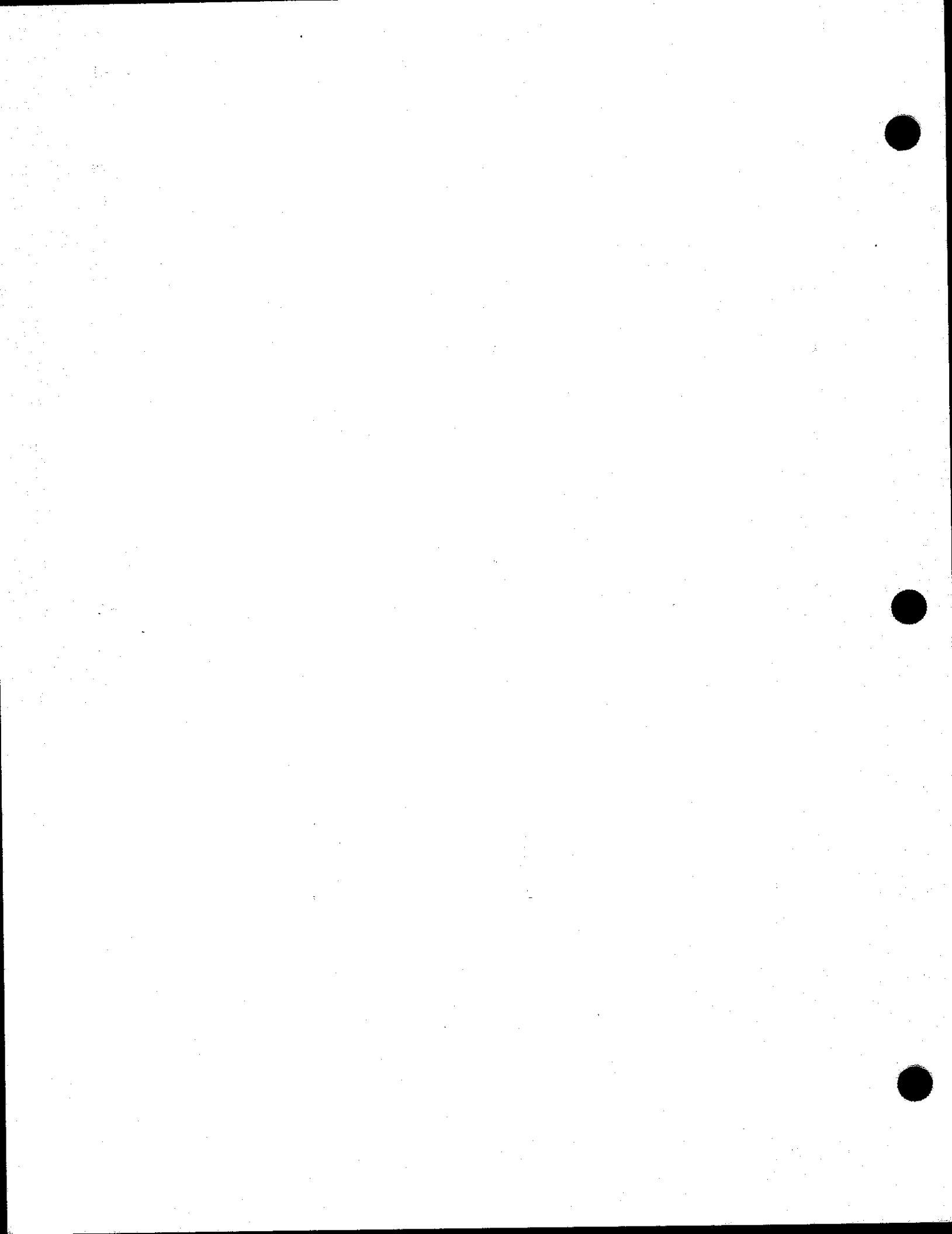


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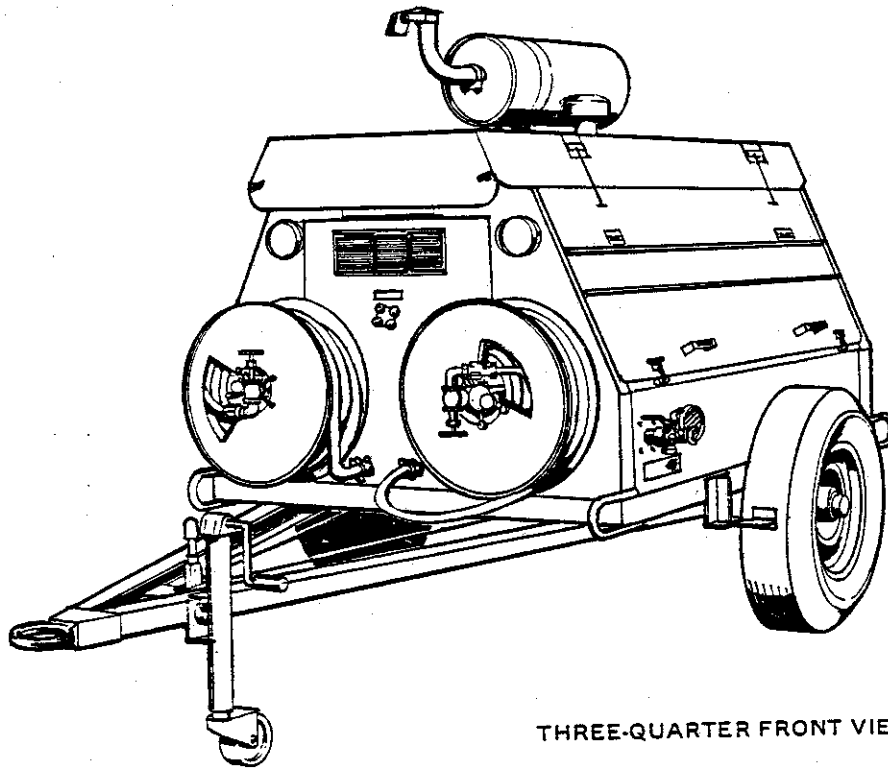
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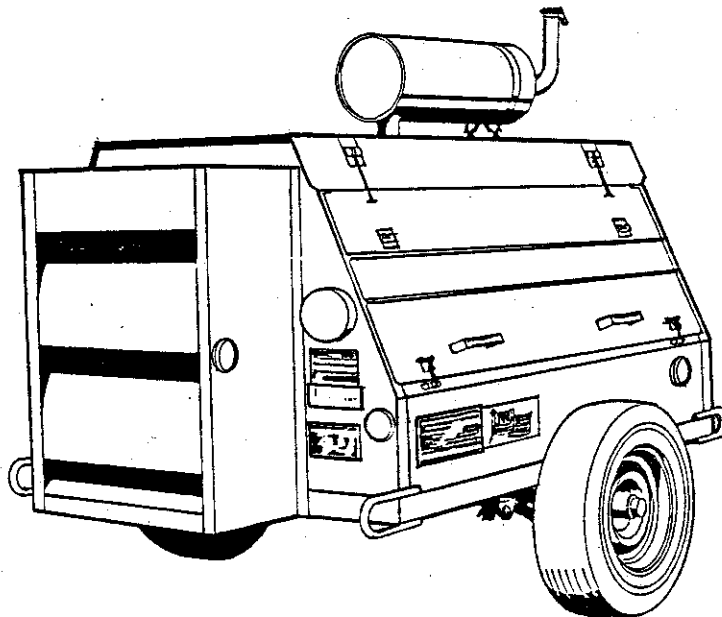
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THREE-QUARTER FRONT VIEW



THREE-QUARTER REAR VIEW

Figure 1-1. Rotary Air Compressor Unit, Type MC-7, Model 11M125RPDQ

SECTION I

INTRODUCTION AND GENERAL INFORMATION

1-1 INTRODUCTION.

a. This technical manual covers the operation, maintenance, and repair instructions with illustrated parts breakdown for the Type MC-7, 2 Wheel Trailer Mounted, Diesel Engine Driven, 125 CFM (3.54 m³/min), 100 PSI (7.0 kg/cm²).

b. The unit is manufactured by Davey Compressor Company, Cincinnati, Ohio 45242. Model number 11M125RPDQ and part number 86405 have been assigned to this unit. Instructions in this manual are for the guidance of personnel responsible for operation, maintenance and repair of this equipment. Refer to figure 1-1 for identifying views.

1-2 GENERAL INFORMATION.

a. This air compressor unit is a trailer mounted, two-wheel pneumatic tired, diesel engine driven, sliding blade type, rotary air compressor. The unit supplies 125 cubic feet of air per minute (CFM) [3.54 cubic meters per minute (m³/min)] at a discharge pressure of 100 pounds per square inch (PSI) [7.0 kilograms per centimeter squared (kg/cm²)]. The unit is enclosed in a sheet metal housing fastened to a frame and axle combination. The trailer unit is equipped with a hand operated parking brake. The compressor unit is self-contained and capable of continuous operation, under normal conditions, for a period of eight hours without refueling.

b. The unit is designed to supply compressed air for use in general construction work in con-

junction with pneumatic tools and other equipment. A general description of the components which comprise this unit is outlined in the following paragraphs. A tabulated listing of Leading Particulars is found in Table 1-1.

1-3 DESCRIPTION OF COMPONENTS.

1-3.1 Housing Group (1, Figure 1-2). The engine, compressor, control panel, and other controls are enclosed in a sheet metal housing. Doors are provided for access to these components. In addition to the doors, the housing group consists of side and end panels, heater ducts with covers, tool box, and roof. Data and instruction plates are attached to components of the housing.

1-3.2 Hose Reel and Service Valves (10,7, Figure 1-2). Two revolving hose reels (10) with locking devices are provided. Each hose reel has a capacity of 50-foot length of 3/4 inch inside diameter hose. Each hose reel is provided with a shutoff valve. The air discharge line is equipped with two individually controlled service outlets with hose couplings (7). These outlets are 3/4 inch size.

1-3.3 Control Panel Assembly (Figure 1-3). All of the operating controls and instruments are mounted on a sheet metal control panel. The controls and instruments can be categorized into three groups: operating indicating group, control group, and safety group. The operation indicating group consists of gauges that indicate oil temperature, oil pressure, hourmeter, ammeter,

Table 1-1. Leading Particulars

Rotary Air Compressor

Manufacturer: Davey Compressor Co
 Model.....11M125RPDQ
 Type: Sliding Blade, Air, Rotary
 Part Number.....86405
 Air Volume..125 CFM (3.54m³/min)
 Air Pressure:100 PSI (7.0kg/cm²)
 Stages.....One
 Prime Mover.....Diesel Engine
 Mounting: Trailer Mounted, 2 wheel,
 Retractable Third Wheel
 Brakes....Mechanical Hand Brake
 Tire Size.....7.75 x 14, 4 Ply
 (Third Wheel) Caster Type
 Tire Pressure.....32 PSI
 Turning Angle.....35 Degrees
 Towing Speeds.....Highway 45 MPH
 (72.4kms/h)
 Off Road-10 MPH
 (16.1kms/h)
 Electrical System.....12VDC

Diesel Engine:

Manufacturer.....John Deere
 Model...3179DF Spec No. FD16694E
 Type.....3 Cylinder, 4 cycle
 Bore.....4.19 in. (106 mm)
 Stroke.....4.33 in. (109.98 mm)
 Basic Weight:695 lb (315.25 kgs)
 Displacement.....179 cu. in.
 (2940 cm³)
 Firing Order.....1-2-3
 Fuel:Fuel Oil,Diesel (VV-F-173),
 Jet Fuel-JP-4 and JP-5
 (MIL-J-5624)
 Governed Speed.....2200 RPM
 Idle1250 RPM⁺50 RPM

Engine Accessories:

Starting Motor:
 Manufacturer.....Delco Remy
 Part Number.....1998367
 Rating.....12VDC
 Alternator:
 Manufacturer..Motorola (France)
 Part Number2940090A
 Rating...35 AMP,14 Volt,12 Pole
 Oil Filter:
 Manufacturer.....John Deere
 Element Number.....T19044
 Fuel Filter:
 Manufacturer.....John Deere
 Element Number.....AR50041
 Air Cleaner (Compressor & Engine)
 Manufacture..Donaldson Co., Inc.
 Model Number.....FWG08-0023
 Element Number.....P10-1246
 Oil Filter (Compressor):
 Manufacturer....Purolator Prod-
 ucts Inc.
 Element Number.....PER-1A

Capacities:

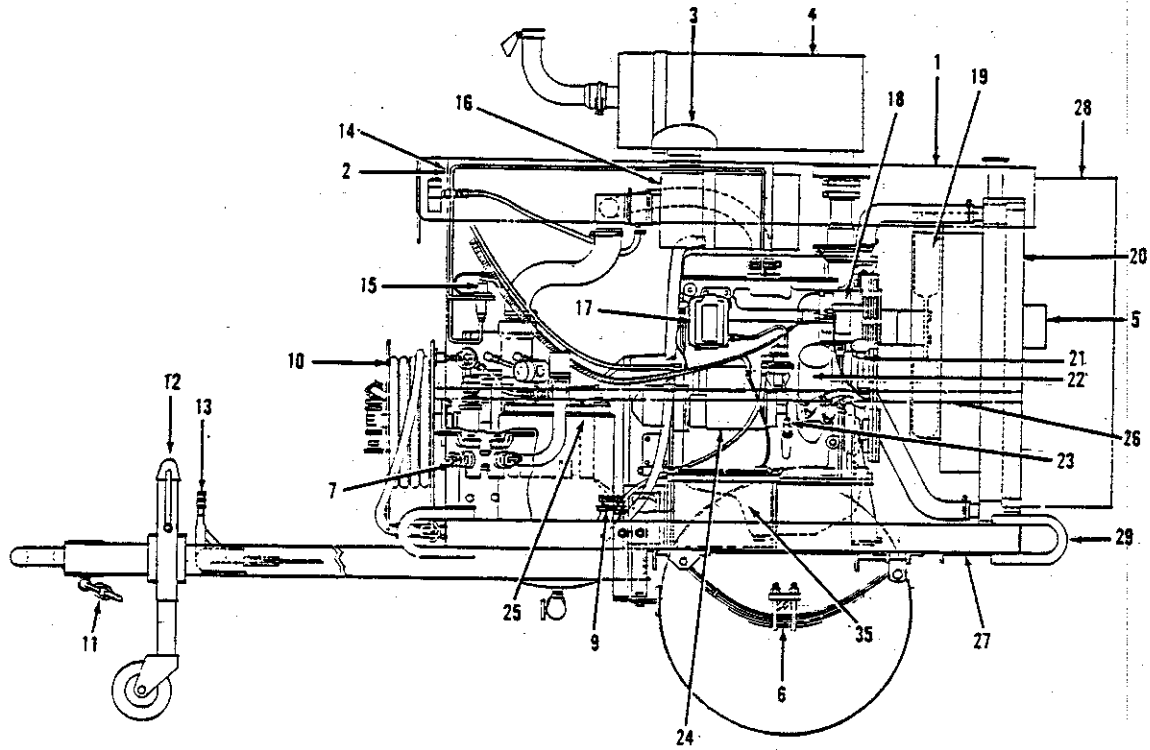
Fuel Tank...25.25 gal. (95.6 l)
 Engine Crankcase:9 qts.(8.52 l)
 Engine Cooling System...18 qts.
 (17.03 l)
 Compressor Oil Separator:20 qts.
 (18.93 l)

Overall Dimensions & Weights:

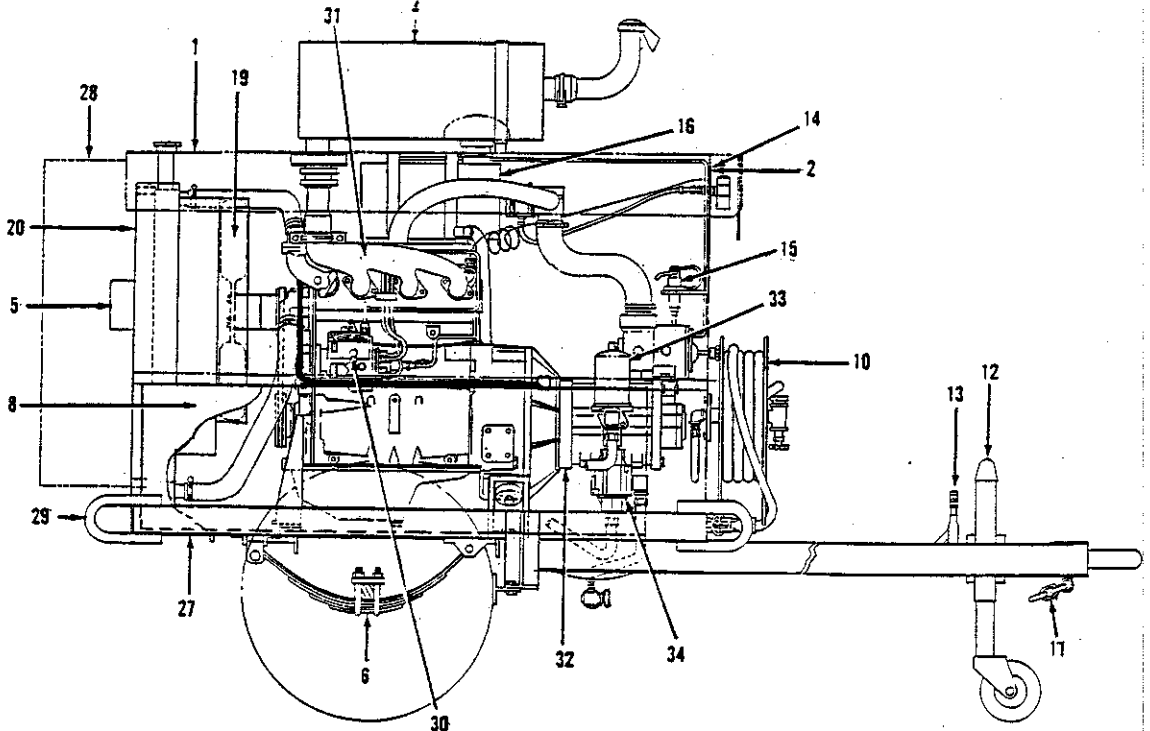
Overall Length:125 in.(317.5cm)
 Overall Width..71 in.(180.34cm)
 Overall Height:74 in.(187.96cm)
 Shipping Volume.....381 cu.ft.
 (10.79m³)
 Shipping Weight.....2182 lbs.
 (989.75 kgs)

Legend for figure 1-2.

- | | | | |
|-------------------------|---------------------------------|-----------------------------|-----------------------------|
| 1. Housing group | 10. Hose reels | 19. Cooling fan | 28. Cooling air baffle |
| 2. Control panel | 11. Safety chains | 20. Radiator and oil cooler | 29. Lifting-tiedown eyes |
| 3. Air cleaner cap | 12. Landing wheel | 21. Engine oil filler | 30. Fuel injection pump |
| 4. Exhaust muffler | 13. Handbrake lever | 22. Engine oil filter | 31. Engine assembly |
| 5. Heater duct cover | 14. Tachometer-overspeed switch | 23. Engine oil dipstick | 32. Air compressor assembly |
| 6. Axle assembly | 15. Cold weather starting aid | 24. Starter | 33. Compressor oil filter |
| 7. Air service valves | 16. Air cleaner | 25. Oil separator | 34. Thermal bypass |
| 8. Fuel tank | 17. Fuel filter | 26. Tool box | 35. Battery |
| 9. Separator oil filler | 18. Alternator | 27. Unit frame | |



LEFTHAND SIDE



RIGHTHAND SIDE

Figure 1-2. Major Components of the Type MC-7

water temperature, air pressure, tachometer-overspeed switch, and restriction indicator (air cleaner). The control group consists of the ignition switch, start push button, safety override button, compressor unloader and idle control, and panel lamp. The safety group consists of an oil pressure switch which shuts down the engine when oil pressure drops below four psi, engine high water temperature shutdown switch gauge, compressor high oil temperature shutdown switch gauge and air pressure switch which prevents starting with air in the system. Also provided is an engine overspeed shutdown switch built into the tachometer and manual reset relay switch.

1-3.4 Cooling System (20,19, Figure 1-2). The air compressor unit cooling system consists of a radiator and oil cooler assembly, fan drive and fan assembly, coolant lines, hoses, and fittings. The engine has a pressure cooling system. An impeller-type water pump circulates the coolant through the engine components and the radiator. Coolant temperature is reduced by ambient air being drawn through the radiator core by the suction-type fan. The engine coolant temperature regulator controls the flow of coolant through the engine. The ambient air drawn through the radiator also passes over the oil cooler cores which reduces the temperature of the compressor oil. A thermal bypass valve (34) is mounted on the side of the compressor to direct part or all of the compressor system oil through the oil cooler. When oil temperature reaches approximately 150° F (66°C), the valve begins to open, mixing hot and cool oil to maintain a relatively constant minimum operating temperature.

1-3.5 Air Cleaner (16, Figure 1-2). An air cleaner is provided to accommodate the engine intake air and compressor intake air. The air cleaner is two-stage with dry-type reusable element. The cleaner is equipped with a rain-cap on the inlet tube. The restriction indicator, mounted on the control panel, is connected by a hose to the clean air side of the air cleaner. The restriction indicator provides the operator with a visual indication of the need for air cleaner service.

1-3.6 Air Compressor System (32, 25, Figure 1-2) The compressor system consists of a single-stage, sliding blade, air-compressor assembly, oil separator assembly, blowdown valve assembly, minimum pressure valve, thermal bypass valve, oil filter, speed control linkage, and air pressure regulator. Free air is drawn through the air cleaner into the compressor intake control. A valve in the intake control opens and closes to allow air to pass into the compressor stator according to the discharge air demand. When the intake valve is completely closed, the compressor is running unloaded. When the compressor is stopped, this valve closes to prevent oil and air in the stator from being vented to the atmosphere. The speed control linkage is connected to the intake control valve and moves the engine throttle to increase or decrease RPM as required to maintain the rated output. The single-stage rotor-stator assembly develops an output of 125 CFM (3.54 m³/min) at a discharge pressure of 100 PSI (7.0 kg/cm²). During the compressor cycle oil is introduced into the rotor-stator assembly for sealing, cooling, and lubrication. The air-oil mixture passes from the rotor-stator assem-

bly to the oil separator assembly. The oil separator assembly contains a labyrinth and filter arrangement which separates the oil from the air before the air passes through the minimum pressure valve. The minimum pressure valve consists of a valve, spring, and piston which maintains a minimum air pressure (60 PSI) (4.2 kg/cm²) within the oil separator when the compressor is running. This minimum air pressure is necessary to produce proper oil circulation in the system and efficient air-oil separation. The valve is held closed until air pressure reaches design opening pressure, at which time the force of the air moves the valve open and the piston upward, allowing compressed air to flow to the air discharge service valves. When air pressure drops below this pressure, the force of the spring overcomes the separator air pressure and moves the piston downward closing the valve. A blow-down valve automatically relieves air pressure from the system immediately after compressor shutdown. A safety valve on the separator tank opens automatically if the air pressure should become excessive. A pressure regulator is connected between the oil separator and the intake-control. As the air load demand increases, the regulator controls a flow of air into the intake-control to open the valve. This action increases air input and engine speed. As the air pressure reaches the rated value, the pressure regulator causes the valve to close and the engine to return to the low idle speed.

1-3.7 Fuel System (8,17,30 Figure 1-2) The fuel system consists of a fuel tank, flexible fuel lines and the engine fuel system. The engine fuel system consists of a fuel filter, fuel injection pump

nozzles, hand primer (located at the base of the fuel-transfer pump), and fuel transfer pump.

1-3.8 Electrical System (18,24,35, Figure 1-2) The 12 volt electrical system consists of an alternator, starting motor and a 12 volt battery. The alternator restores electrical energy to the battery and supplies electrical power to meet load demands of the engine and accessories when the unit is operating. The battery supplies power to the starting motor and to the electrical accessories when the unit is being started. The alternator regulator opens and closes the field circuit, prevents damaging high voltage in the system, prevents overcharging of the battery, and maintains the alternator output within its rated limits. Refer to Figure 1-4.

1-3.9 Compressor Unit Electrical Group. The unit electrical group consists of the control panel wiring, safety shutdown circuit and ignition circuit, refer to Figure 1-4.

1-3.10 Engine Assembly (31, Figure 1-2) The engine is a four-stroke cycle, three-cylinder, valve in head, diesel engine. The diesel engine is used to drive the air compressor, which is directly coupled to the engine. In the diesel fuel system, fuel is sprayed directly into the engine combustion chamber where it mixes with hot compressed air and ignites. The lubrication system uses a crankshaft driven positive gear pump to feed oil under pressure to vital parts of the engine. The engine is liquid cooled with a centrifugal pump that circulates water in a jacket around the cylinder and cylinder head. In cold weather, anti-freeze solutions are added to the water to prevent freezing.

1-3.11 Chassis and Running Gear (6,12,13,27,29, Figure 1-2). The welded steel frame chassis, on which all major components are mounted is supported by a two-wheel trailer type running gear. The chassis is provided with a lifting tiedown eye at each corner. These lifting tiedown eyes permit attachment of cables for hoisting the complete unit vertically without damage and may be used as tiedown eyes to secure the unit to a carrier during transportation. The running gear is equipped with leaf spring suspension and pneumatic tires. A towbar is an integral part of the chassis frame and has a retractable and adjustable landing wheel. A hand operated parking brake lever is located on the towbar. The towbar is equipped with a lunette eye for attachment to the towing vehicle.

1-3.12 Cold Weather Starting Aid (15, Figure 1-2).

CAUTION

Operate cold weather starting aid only when engine is cranking.

A cold weather starting aid is provided to aid in starting the engine when operating in cool weather, below 40°F (4.4°C). The aid consists of a manually operated pressure primer discharge in which a pressure primer cartridge containing primer fuel pressurized with gas (ethyl ether) is punctured and discharged into the engine air intake manifold. The ethyl ether travels via tubing from the pressure primer discharge to a fitting on the engine intake manifold. The pressure primer discharge is mounted on a bracket on the backside of the right hand side panel, front, inside the housing.

1-4 CONSUMABLE MATERIALS.

a. Consumable materials and expendable items, required to accomplish prescribed maintenance are listed in Table 1-2.

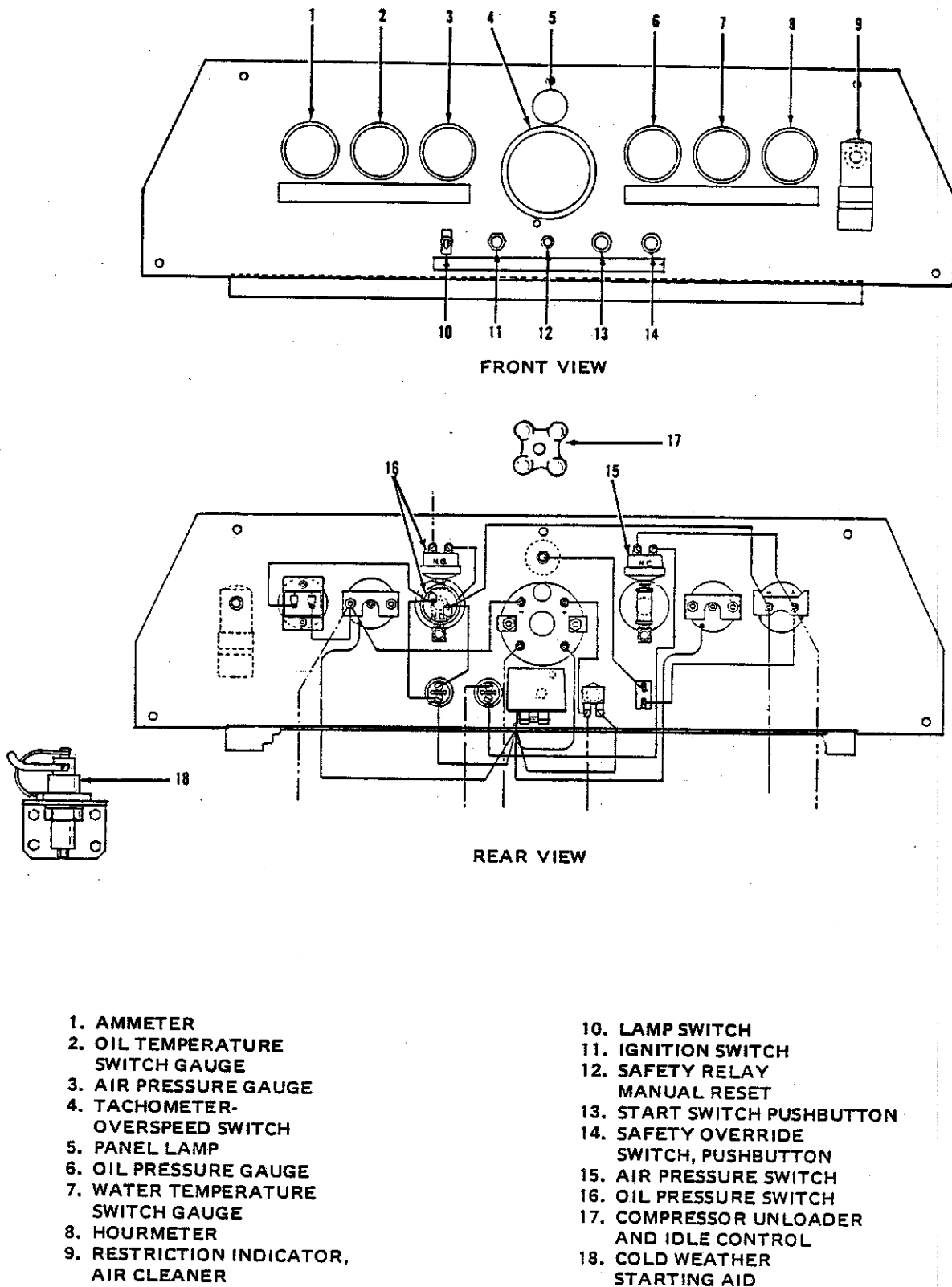


Figure 1-3. Instruments and Controls Group

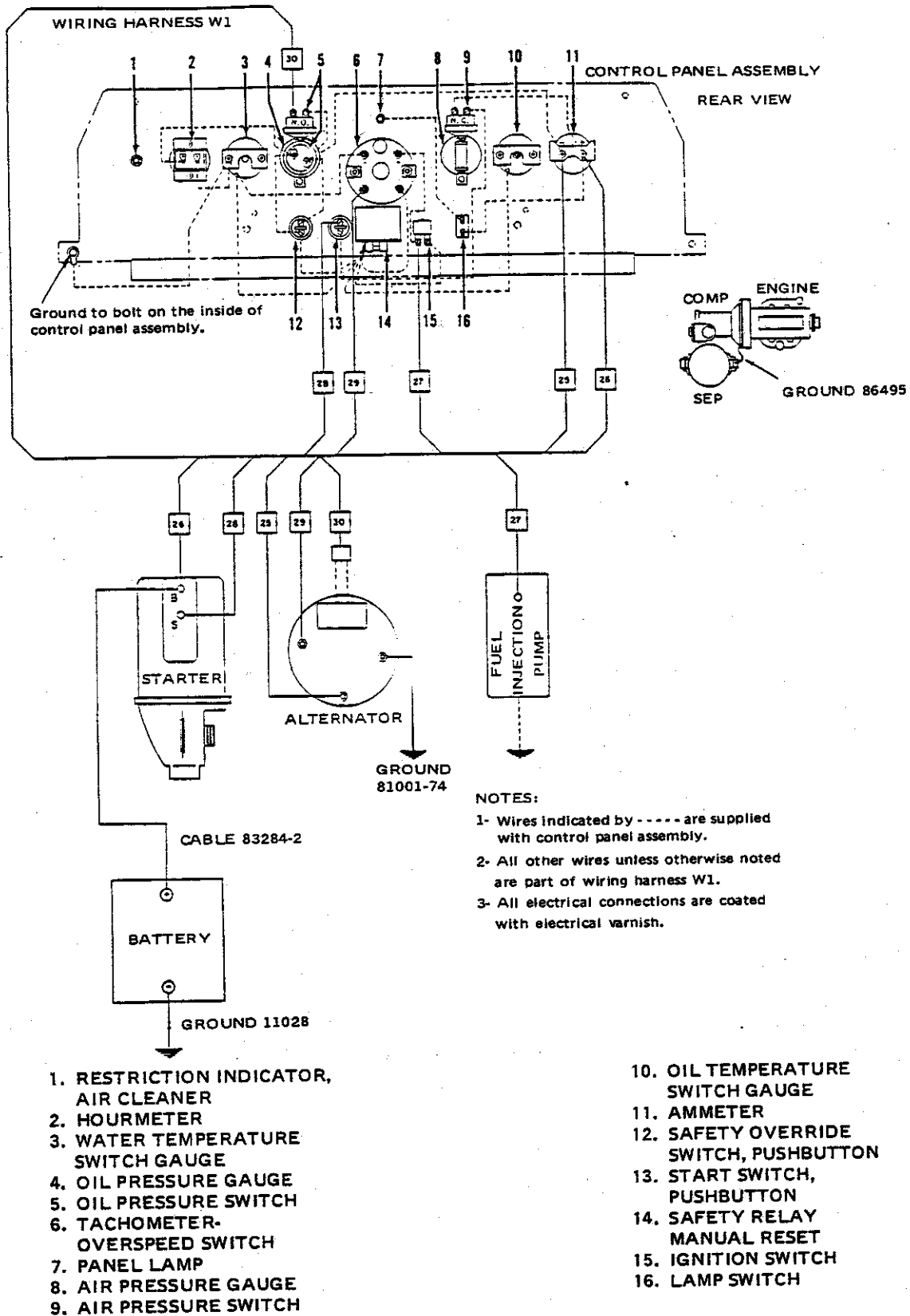


Figure 1-4. Wiring Diagram

Table 1-2. Consumable Materials

Nomenclature	Material	Specification number	Government standard no.	Part number
Oil separator tank	Oil, lubricating compress or Arctic	MIL-L-2104	OE/HDO 30 (Above 40°F)	
		MIL-L-46167	OE/HDO 10 (Below 40°F)	
Oil separator tank (cleaning)	Thermo Solve concentrate detergent			FSCM 24844 Stock no. 7212 (16004 P/N 62853)
Engine crankcase	Oil, lubricating, engine Arctic	MIL-L-2104	OE/HDO 30 (Above 40°F)	
		MIL-L-46167	OE/HDO 10 (Below 40°F)	
Lubrication fittings and wheel bearings	Grease, lubricating, (lead soap base)	MIL-G-81322A		
Fuel tank	Diesel fuel Turbine fuel, aviation	VV-F-800		
		MIL-T-5624 Grades JP-4 and JP-5		
Radiator	Antifreeze, arctic type Antifreeze, ethylene glycol, inhibited	MIL-C-11755		
		O-A-548A		
Battery	Electrolyte		MIL-STD-605	OS801
Air cleaner	Element			P10-1246
Engine oil filter	Element			T19044
Fuel filter	Element			AR50041
Oil separator	Element			48772
Noise dampening material	Adhesive non-flammable			Bostic No. 1600 (16004 P/N64115)
Cleaning	Solvent	P-D-680, Type II		

Table 1-2. Consumable Materials-CONT.

Nomenclature	Material	Specification number	Government standard no.	Part number
Cleaning	Solvent, electrical equipment	Trichloroethane O-T-620		
Air cleaner (processing)	Barrier material	MIL-B-121		
Battery cables and tray (processing)	Tape, pressure-sensitive	MIL-T-22085		
Pulley grooves (processing)	Primer, coating	TT-P-664		
Compressor (processing)	Tape, pressure-sensitive	MIL-T-22085		
	Varnish, insulating, electrical	MIL-V-173		
Engine (processing)	Diesel fuel Oil, lubricating	VV-F-800 MIL-L-21260, Type P-10		

SECTION II

SPECIAL TOOLS AND TEST EQUIPMENT

2-1 SPECIAL TOOLS AND TEST EQUIPMENT.

a. There are no special tools

and test equipment required for the operation and service of the air compressor unit.

SECTION III

PREPARATION FOR USE AND SHIPMENT

3-1 PREPARATION FOR USE.

a. The air compressor unit is shipped by the manufacturer as a completely assembled two-wheel, trailer mounted unit. Lifting, and tie-down, provisions are incorporated on the unit as shown on Figure 3-1 and on the Shipping Data Plate.

3-1.1 Unloading. The air compressor unit can be unloaded from the carrier by a lifting device or towed as outlined below.

WARNING

When a lifting device is used, it must be capable of lifting a minimum of 6,000 pounds (2722kgs).

a. If a lifting device is used, connect the device to the unit as shown in Figure 3-1.

b. Remove all blocks and tie downs that secure the unit to the carrier. Release the parking brakes.

CAUTION

After unloading and parking the unit, be sure to set parking brakes.

c. Tow or lift the air compressor unit off the carrier.

3-1.2 Unpacking. When the unit is received and unloaded from the carrier, the following unpacking must be accomplished before the unit can be operated.

1. Remove all crating, blocking, and protective material from compressor unit.

WARNING

Wear goggles to prevent electrolyte from coming into contact with eyes. To prevent serious burns wear rubber gloves and apron when filling battery.

2. Fill each battery cell with electrolyte to a level of 1/4 to 1/2-inch above the top of the battery plates. Using a hydrometer, check the battery cells for a specific gravity of 1.250 or higher.

3. To deprocess the compressor unit, refer to Technical Manual, Processing and Inspection of Aerospace Ground Equipment for Storage and Shipment T.O. 35-1-4.

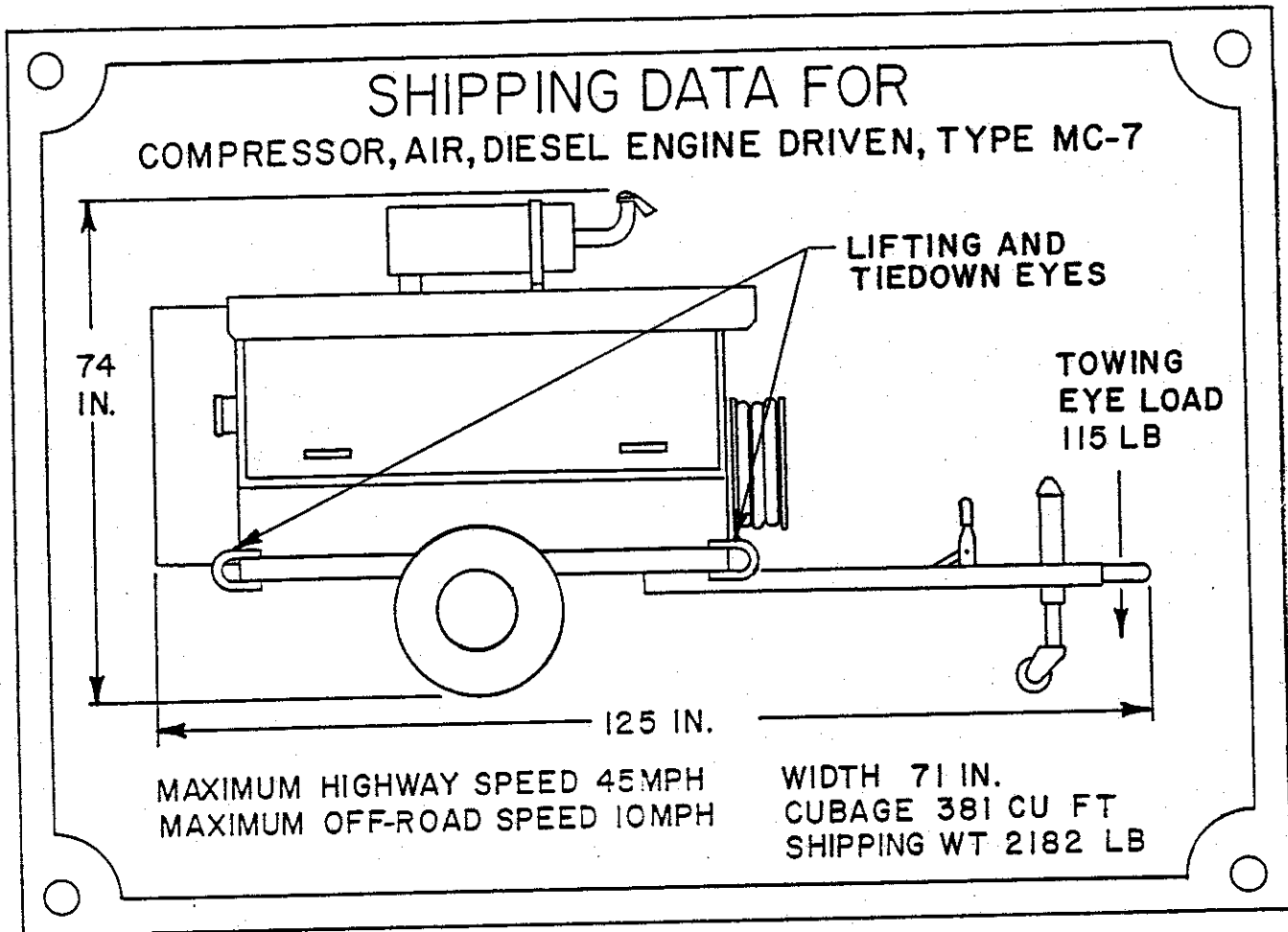


Figure 3-1. Tiedown and Lifting Diagram

4. Inspect unit for any damaged gauges, loose connections or mountings, loose or missing hardware, frayed insulation on wiring or any other damage. Check all piping, air tubing and hoses for firm connections and any damage.
5. Check tire pressure, refer to Table 1-1.
6. Connect the battery cables, refer to Figure 1-4.
7. Remove the fuel tank filler cap and fill fuel tank. Refer to Table 1-1 for capacity and recommended fuel. Install filler cap.
8. Remove radiator filler cap and check level of coolant.
9. Perform the procedures contained in paragraph 4-2 and paragraph 5-3, refer to Table 5-1.

3-2 PREPARATION FOR STORAGE AND SHIPMENT

a. Preparation for storage or shipment of the air compressor unit shall be in accordance with Technical Manual, Processing and Inspection of Aerospace Ground Equipment for Storage and Shipment, T.O. 35-1-4.

NOTE

The following instructions are recommended by the compressor manufacturer. For any conflicting procedures in storage, T.O. 35-1-4 will take precedence.

3-2.1 Liquid Cooling System.

Check radiator coolant for proper level prior to operating the engine and compressor.

3-2.2 Engine Lubrication System.

Drain engine crankcase and fill to operation level with oil, Specification MIL-I-21260, Type P-10.

3-2.3 Rotary Compressor. Drain compressor oil separator assembly and fill reservoir to operation level with oil, Specification MIL-I-21260, Type P-10. Remove air cleaner inlet hose to compressor. Operate compressor at slow idle for two minutes and spray approximately four ounces of MIL-L-21260, Type P-10 into compressor intake. Reinstall air cleaner inlet hose to the compressor.

3-2.4 Engine Fuel System. Prior to starting engine, close the compressor intake unloader and open the separator service valve. Start engine and allow to run on preservative MIL-L-21260, Type P-10 for five minutes. Also, during this run, spray MIL-L-21260, Type P-10 into the engine air intake until oil appears at the end of exhaust pipe. Spray all exterior surfaces of the engine with MIL-L-21260, Type P-10.

3-2.5 Cooling System. The cooling system shall be drained and the drain cocks left in the open position.

3-2.6 Engine Combustion Chamber. Remove rocker arm cover and the intake exhaust manifold.

NOTE

The engine throttle shall be completely closed.

1. Manually press each intake valve and while the valve is held open, spray one ounce of MIL-L-21260, Type P-10 through valve to each cylinder.
2. Manually press each exhaust valve and while the valve is held open, spray one ounce of MIL-L-21260, Type P-10 through valve to each cylinder.
3. Using the starter motor, rotate the crankshaft at least two complete revolutions.
4. Repeat steps one and two, DO NOT ROTATE CRANKSHAFT.
5. Spray rocker-arm assemblies, valves, springs and inside of the rocker-arm cover with MIL-L-21260, Type P-10.
6. Check each push-rod to make sure it is secured in place, before reinstalling rocker-arm cover.
7. Reinstall rocker-arm cover.
8. Before installing the intake and exhaust manifolds make sure all gasket surfaces are clean. Place new gaskets on the attaching studs and assemble manifolds. Torque manifold 35 lb-ft (47 N.m).

3-2.7 Fuel Tank. Drain fuel tank. Fog inside of fuel tank with MIL-L-21260, Type P-10 assuring coverage of interior surfaces of tank on unit.

3-2.8 Drive Belts and Pulleys. Release tension on drive belts. Spray pulley grooves with primer, Specification TT-P-664.

3-2.9 Tires. For Shipment by common carrier, tires shall be inflated to 10 PSI (69 kPa) above recommended pressure for maximum load.

3-2.10 Grease Fitting. Lubricate grease fittings in accordance with table 5-2.

1. Seal all openings with tape conforming to specification MIL-T-22085, such as breather pipe, dipstick, air intake and exhaust, relief valve, service valve, etc.
2. Seal all openings of alternator, starter, instruments, switches, and control panel with barrier material, Specification MIL-B-121 and secure with tape, Specification MIL-V-173.
3. Dry charge battery installed in carrier and filler caps sealed with tape, Specification MIL-T-20085.

SECTION IV

OPERATION INSTRUCTIONS

4-1 THEORY OF OPERATION.

a. This trailer mounted rotary air compressor unit is diesel engine driven through a direct connected coupling arrangement. The air compressor is designed to deliver 125 CFM ($3.54\text{m}^3/\text{min}$) free air at a discharge pressure of 100 PSI (7.0 kg/cm^2).

b. When the unit is in the stopped configuration, the oil separator air discharge port and the compressor air intake valves are closed. When the engine is started, the compressor starts, momentarily unloaded, creating a vacuum in the intake housing. This vacuum opens the intake control valve and air is drawn in through the air cleaner. The incoming air enters the stator bore through ports in the end covers at a point where the sliding rotor blades are extended the maximum distance within the eccentric stator bore creating a pocket of maximum volume. As the rotor turns within the eccentric stator bore, the rotor blades are forced inward into the rotor slots decreasing the volume of the pocket, thereby compressing the trapped air.

c. At a point near midway in the compression cycle, oil is injected into the pocket. The injected oil serves three functions: (1) seals the pockets at the blade edges, (2) absorbs heat from the compressing air; (3) lubricates the moving parts of the compressor.

d. The mixture of compressed air and oil is discharged from the stator through ports near the bottom of the stator at a point

where the air pocket volume reaches near zero. The compressed air-oil mixture passes then to the oil separator where the oil is removed from the air. This removal is accomplished in three stages: (1) through a labyrinth where most of the oil is removed; (2) through a filter element; (3) by impingement on the filter elements exterior metal screen. Oil removed from the air passing through the labyrinth falls to the bottom of the separator tank. Oil removed by the filter element is removed from element base by a scavenger tube and returned to the compressor via the intake control.

e. When air pressure within the oil separator tank reaches approximately 60 PSI (4.2 kg/cm^2) the minimum pressure valve opens allowing the filtered air to flow through the service valves, and hose reel valves.

f. When the air pressure in the separator tank builds up to approximately 100 PSI (7.0 kg/cm^2) the intake control valve closes. The intake control assembly, and engine speed, is regulated by the discharge air demand by means of a pressure regulator. When discharge air pressure opens the pressure regulator valve, air enters the intake control between the cover and a diaphragm and forces the intake valve closed. As the intake valve closes, control linkages to the engine decreases engine speed. As long as air pressure is held at 100 PSI (7.0 kg/cm^2), the intake valve remains closed and the engine will run at idle speed. When air demand reduces pressure, the air pressure regulator valve closes allowing the intake control va-

live to open and engine speed to increase.

g. If air demand is excessive, causing separator tank pressure to drop to 60 PSI (4.2 kg/cm²), the minimum pressure valve closes until this minimum tank pressure is again attained. This minimum separator tank pressure prevents any oil carryout with the discharge air.

h. The compressor system oil supply in the separator tank is circulated by air pressure differential. The oil flows from the separator tank through a thermal bypass and full flow oil filter prior to being injected into the compressor. When the oil reaches operating temperature, the thermal bypass directs part or all of the oil to flow through the oil cooler before entering the oil filter. This provides for rapid warming of compressor oil at initial start and maintains a relatively constant minimum operating temperature.

i. When the unit is shut down, a blowdown valve releases the air pressure from the system to atmosphere. The separator tank is provided with a safety valve which opens automatically if the air pressure should exceed 125 PSI (8.8 kg/cm²).

4-2 OPERATION INSTRUCTIONS.

a. Prior to operating the air compressor unit, the following procedures should be followed.

CAUTION

The unit should be located in an area as free of dust and dirt as possible. A highly contami-

nated atmosphere places an abnormal load on the air cleaner, oil filters, and compressor, and can result in an increase in maintenance problems.

1. Tow the compressor trailer unit to worksite and select a location as near level as possible. Out-of-level shall not exceed 10 degrees in any direction.
2. Set the parking brakes.

CAUTION

When housing side doors are open, make certain that they are secured properly.

3. During normal operation, the housing side doors should remain closed to meet sound level requirements.
4. Connect hose reel hoses, or additional air hoses to air service valves, and attach to air tools or system for work to be performed.
5. Perform all of the Before Operation maintenance check and services, refer to Table 5-1.

WARNING

Do not operate the unit in a building or any enclosed area unless exhaust gases are piped outside. Inhalation of exhaust gases can result in serious illness or death.

6. Setup of the compressor unit for indoor operation is the same as described in paragraphs 4-2.a.1 through 4-2.a.5 and observe the above warning.

4-3 OPERATING CONTROLS AND INSTRUMENTS.

a. Before operating, the operator should be familiar with all of the controls and instruments supplied on the unit. Following are descriptions and functions of these components.

4-3.1 Compressor Oil Temperature Switch Gauge (2, Figure 1-3). This switch gauge indicates the temperature of the compressor system oil. Normal operating range is 170° to 220°F (77° to 104°C). The high temperature safety switch is set at 230°F (110°C) and will shut off the fuel supply to the engine if this temperature is reached. The safety relay manual reset button must be pressed after the temperature has dropped before unit can be restarted.

4-3.2 Oil Pressure Gauge (6, Figure 1-3). This gauge indicates the engine lubricating oil pressure. Normal reading is 60 to 100 psi (4.2 to 7.0 kg/cm²).

4-3.3 Hourmeter (8, Figure 1-3) The hourmeter indicates the length of time the unit has been operating. Inspection and servicing periods may be recorded and scheduled from the reading of the hourmeter. The operating time is recorded in hours and tenths of hours.

4-3.4 Ammeter (1, Figure 1-3). The ammeter indicates the charging (+) or discharging (-) rate of the battery.

4-3.5 Water Temperature Switch

Gauge (7, Figure 1-3). This switch gauge indicates the temperature of the engine coolant. Normal operating range is 180° to 200°F (82° to 93°C). The high temperature safety switch is set at 220°F (104°C) and will shut off the fuel supply to the engine if this temperature is reached. The safety relay manual reset button must be pressed after the temperature has dropped before unit can be restarted.

4-3.6 Air Pressure Gauge (3, Figure 1-3). This gauge indicates the air pressure in the oil separator tank. Normal operating range is 100 psi (7.0 kg/cm²) when compressor is running loaded and 115 psi (8.1 kg/cm²) when running unloaded.

4-3.7 Tachometer-Overspeed Switch (4, Figure 1-3). Indicates engine speed in revolutions per minute (RPM). Operation range is 1250 RPM \pm 50 RPM idle to 2200 RPM full load. The overspeed switch is set at 2350 RPM. To reset the overspeed switch press reset button (12, Figure 1-3).

4-3.8 Panel Lamp and Lamp Switch (5, 10, Figure 1-3). The switch controls illuminating and extinguishing of the instrument panel lamp. The switch is a toggle type switch with an indicator plate marked ON and OFF.

4-3.9 Restriction Indicator, Air Cleaner (9, Figure 1-3). This indicator monitors the air pressure drop through the compressor and the engine air cleaner. When pressure drop through the air cleaner is not excessive, the indicator shows green. When the air is restricted to an unsatisfactory degree by dirt or any other reason, the indicator will show red. After restriction is cleaned reset indicator by pressing down

on reset cap on top of indicator until indicator again shows green.

4-3.10 Unloader and Idle Control (17, Figure 1-3). This manually operated control is turned clockwise to close the compressor intake valve and move engine fuel injection pump control lever to idle position. This action permits starting the engine with compressor in unloaded mode. After engine warmup period, turn unloader and idle control counterclockwise to allow compressor to begin normal load mode. Again, turn the knob clockwise to idle engine prior to shutdown.

4-3.11 Ignition Switch (11, Figure 1-3). This switch is used to make or break the unit electrical circuit for starting and stopping. The switch is pulled outward (ON) for starting and remains in this position during operation. Pushing the switch inward (OFF) opens the circuit thereby stopping the unit.

4-3.12 Safety Relay Manual Reset (12, Figure 1-3). The safety relay is wired from compressor oil temperature switch gauge, engine water temperature switch gauge, and tachometer-overspeed switch to the fuel injection pump electrical shutdown terminal. The manual reset button must be pressed to reset relay after any high temperature or overspeed safety shutdown.

4-3.13 Start Switch (13, Figure 1-3). The switch is pressed simultaneously with safety override switch to energize the starting motor solenoid for cranking the engine.

4-3.14 Safety Override Switch (14, Figure 1-3). This pushbutton type switch is pressed simultaneously with the start switch dur-

ing starting. It is used to override the engine oil pressure safety switch during starting. The switch must be held until oil pressure is greater than 10 psi (0.7 kg/cm²); then, release switch.

4-4 SAFETY CIRCUIT SWITCHES.

a. The unit is equipped with safety devices which automatically stop the engine when an adverse condition exists. These devices are explained in following paragraphs.

4-4.1 Engine Oil Pressure Switch (16, Figure 1-3). An electrical pressure switch is connected in series with the ignition switch. At any time the engine oil pressure drops below 4 PSI (0.3 kg/cm²), the oil pressure switch is deactivated, breaking the ignition electrical circuit. Thus, the fuel solenoid closes and stops fuel to the engine. The safety pushbutton switch must be pressed when starting to override this switch.

4-4.2 Compressor Oil Temperature Switch Gauge (2, Figure 1-3). The compressor oil temperature switch gauge sensor is located in the compressor discharge elbow. The switch is set at 230°F (100°C). If the compressor oil temperature reaches this temperature the switch will close activating the safety relay shutting off fuel supply to the engine. The manual reset button (12, Figure 1-3) must be pressed after temperature drops to restart engine.

4-4.3 Engine Water Temperature Switch Gauge (7, Figure 1-3). The engine water temperature switch gauge sensor is located in the water jacket of the engine cylinder head. The switch is set at 220°F (104°C). If engine coolant reaches this temperature the switch will close activating the safety relay shutting off fuel supply

to the engine. The manual reset button (12, Figure 1-3) must be pressed after temperature drops to restart engine.

4-4.4 Engine Overspeed Switch (4, Figure 1-3). The overspeed switch built into the tachometer, is a normally open switch. The switch closes and activates the engine shutoff circuit if the engine speed reaches 2350 RPM. The overspeed switch is reset by pressing the manual reset button (12, Figure 1-3) if activated due to engine overspeed.

4-5 STARTING THE EQUIPMENT.

a. When ready to start the equipment, all steps of paragraph 4-2 having been performed, the following procedures shall be followed in sequence.

1. Open air discharge service valves.
2. Turn compressor unloader-idle control handle clockwise to close intake valve to allow engine to start up with the compressor unloaded.
3. With ignition switch in OFF position, press start button to crank the engine for approximately three seconds; then, release start button.

CAUTION

If engine oil pressure does not register within five seconds after starting, release safety override button and determine cause of no engine oil pressure.

4. Place ignition switch in ON position. Press reset button to make certain it is not tripped. Press start button and safety override button. When engine starts, release start button but continue to hold safety override button until engine oil pressure is approximately 10 psi (0.7 kg/cm²), indicated on oil pressure gauge; then, release safety override switch.
5. If weather is cool, below 40°F (4.4°C), place ether capsule in starting aid holder. Operate handle of capsule holder when start switch is pressed as outlined in step 4.
6. After engine starts, allow engine to idle until engine water temperature reaches approximately 140°F (60°C) indicated on water temperature gauge.
7. When the operating temperature is reached, turn the unloader-idle handle counterclockwise to bring the compressor to full load condition. Close the air service valves.
8. Check the readings on all gauges. Normal operating readings are:

Air Pressure Unloaded. 110-120 PSI
(7.7-8.4 kg/cm²)

Engine Oil Pressure....60-100 PSI
(4.2-7.0 kg/cm²)

Engine Water.....180-200°F
Temperature (82-93°C)

Compressor Oil.....170-220°F
Temperature (77-104°C)

CAUTION

Do not allow equipment to operate unattended for prolonged periods. The operator should observe all gauges periodically to be certain unit is operating normally and listen to the unit for abnormal noises. Observance of these precautions can prevent serious damage to the unit.

b. Unit is now ready for use and will cycle through load and unload automatically in relation to air demand. As demand increases, the engine will accelerate and the compressor will replenish compressed air supply in separator tank. As demand decreases, or stops, engine will return to idle and compressor will run in an unloaded condition until demand for air again causes unit to load.

NOTE

This unit is equipped with safety devices to automatically stop the unit in the event of low engine oil pressure, high engine coolant temperature, high compressor oil temperature and engine overspeed. Do not attempt to restart unit until cause for such automatic stop has been determined.

4-6 STOPPING THE EQUIPMENT.

Perform the following procedures in sequence to stop the unit.

1. Close the air discharge service valves. Engine will return to idle and the compressor will operate unloaded. Turn unloader and idle control knob clockwise until it stops.
2. Allow unit to run at idle for five minutes.
3. Push the ignition switch to OFF position.
4. When engine stops, the compressor will automatically blow down air from compressor system. Turn lamp switch OFF.
5. Stow all tools and hoses as necessary.

4-7 EMERGENCY STOPPING.

Perform the following procedures for emergency stopping.

1. Push the ignition switch (11, Figure 1-3) in to the OFF position. Engine will stop and the compressor will automatically blow down air from the system.
2. After unit is stopped, applicable steps of normal stopping procedures (para. 4-6) can be followed.

SECTION V

MAINTENANCE INSTRUCTIONS

5-1 MAINTENANCE INSTRUCTIONS.

a. This section contains instructions essential for the maintenance of the air compressor unit.

b. Instructions contained herein are within the scope of organizational and intermediate maintenance activities.

5-2 OPERATIONAL CHECKOUT.

a. Operational checkout of this unit is limited to actual running of the equipment and observation of the control panel gauges for proper readings. Refer to paragraph 4-5 and all steps thereunder.

b. Following are the only operational adjustments necessary if readings observed indicate unit is not functioning at design requirements.

5-2.1 Speed Control Linkage Adjustment (See Figure 5-1). If the tachometer indicates idle speed higher than 1250 ± 50 rpm, with air discharge valves closed and compressor running unloaded, adjust the speed control rod as follows:

1. Allow unit to operate until operating temperatures are attained.
2. Hold control rod, loosen locknuts and move control rod as required to set engine idle speed at 1250 ± 50 RPM. Observe speed on tachometer. Tighten the locking nuts.
3. Cycle the air compressor

several times by opening and closing the air discharge service valves. Observe tachometer each time to ensure engine idle remains at 1250 ± 50 RPM, with compressor running unloaded. Readjust as described in steps above as necessary. Stop the unit (refer to paragraph 4-6).

5-2.2 Air Pressure Regulator Adjustment (See Figure 5-2). If the air pressure gauge indicates a reading other than 115 psi (8.1 kg/cm²) when unit is running unloaded, and engine idle speed is 1250 ± 50 rpm, make adjustment of air pressure regulator as follows:

1. Allow unit to operate until operating temperatures are attained.
2. With air discharge service valves closed, and engine operating at idle speed of 1250 ± 50 rpm, adjust air pressure regulator to obtain a reading at 115 PSI (8.1 kg/cm²) on air pressure gauge. If air pressure rises above 115 PSI (8.1 kg/cm²), turn adjusting screw counterclockwise to decrease pressure. Bleed off excess air by opening air discharge service valve. After excess air has been discharged, close service valve and readjust air pressure regulator, as necessary to obtain 115 PSI (8.1 kg/cm²).
3. Cycle the air compressor several times by opening and closing the air discharge service valves. Observe air pressure gauge each time to

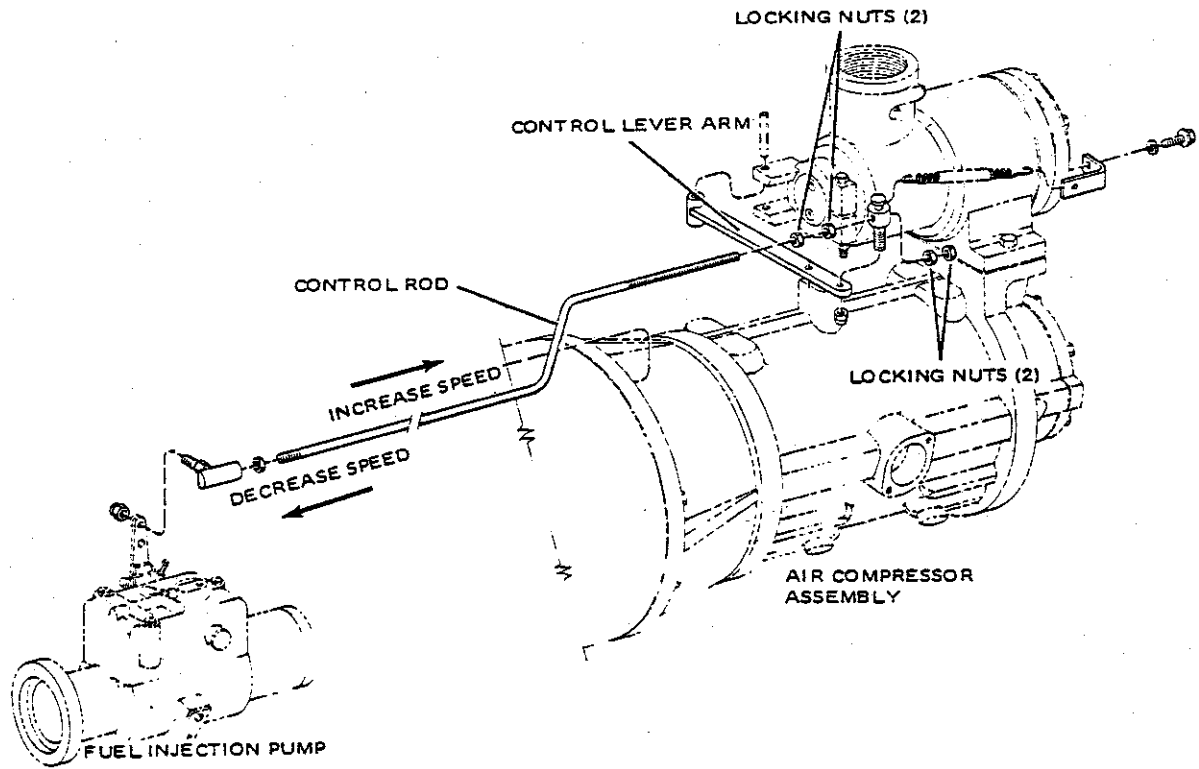


Figure 5-1. Speed Control Linkage Adjustment

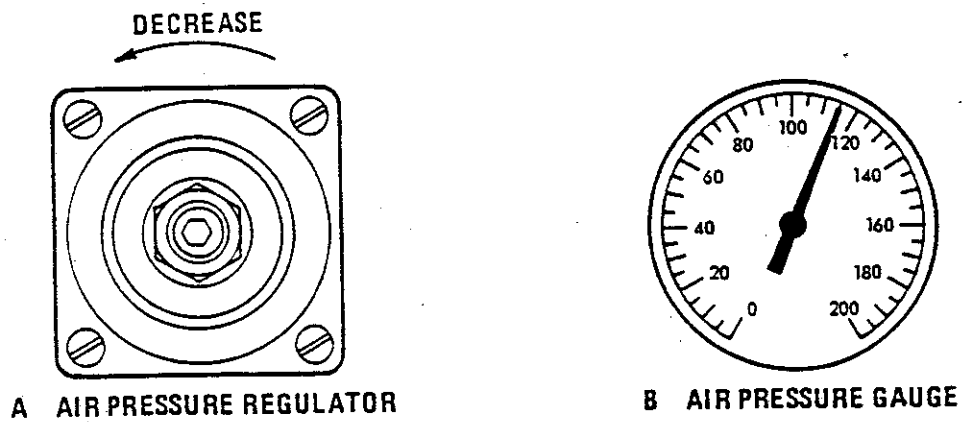


Figure 5-2. Air Pressure Regulator Adjustment

ensure pressure setting remains stable. Stop unit.

5-3 INSPECTION AND PREVENTIVE MAINTENANCE.

a. Inspection and preventive maintenance checks and services within the scope of organization and intermediate maintenance are listed in Table 5-1.

b. The table is prepared in intervals of daily, weekly, monthly and quarterly inspections. If a check, service, or inspection should take place at any other interval, that interval is listed in the procedure column.

5-4 LUBRICATION INSTRUCTIONS.

a. Points of lubrication, type of lubricants, application method and intervals are listed in Table 5-2.

5-5 TROUBLESHOOTING.

WARNING

Do not attempt any repair, removal, or replacement of unit air end components or parts until all air pressure has been relieved from the system.

a. Table 5-3 lists information useful in diagnosing and correcting unsatisfactory operation or failure. The table lists possible troubles, probable causes, and corrective action to be taken to return unit to acceptable operational standards.

b. Corrective action beyond the scope of organizational and intermediate maintenance shall be referred to overhaul personnel.

5-6 COMPONENT MAINTENANCE.

5-6.1 Oil Separator Maintenance (24, Figure 7-1)

CAUTION

If a varnish condition (dark brown sticky substance) is in evidence on compressor oil filter element when regular service is performed, the compressor, oil separator, oil cooler, and oil lines must be cleaned. Refer to Section VI for detailed cleaning procedures; but, first clean the system as follows:

When a varnish condition is in evidence during regular compressor oil filter service, the following is a suggested cleaning method.

1. Mix a super detergent, such as THERMA-SOLVE CONCENTRATE, manufactured by Pennsylvania Refining Company, Cleveland, Ohio, with the compressor oil in the separator in a ratio of one gallon (3.8 liters) of THERMA-SOLVE to each ten gallons (37.9 liters) of oil.
2. Operate the compressor under normal conditions for 40-60 hours allowing the treated oil to dissolve and suspend the varnish.
3. After this period of operation, stop the compressor while running under full load. This procedure will allow maximum air to mix with the oil and force the maximum amount of oil from

Table 5-1. Preventive Maintenance Checks and Services

Interval							B - Before operation D - During operation	A - After operation W - Weekly	M - Monthly Q - Quarterly	
Operator		Org								
Daily		B	D	A	W	M				Q
X									Radiator and oil cooler assembly.	Check engine coolant level. Proper level is 2 inches below filler neck.
					X					Check radiator, hoses, and connections for leaks or defects.
						X				Check antifreeze specific gravity when operating in temperature below +32°F (0°C).
X									Fuel Tank.	Check fuel level.
X									Engine crankcase.	Check oil level. Fill as necessary.
					X					Change oil every 100 service hours.
						X	X			Clean crankcase vent tube every 500 hours.
X									Oil separator.	Check oil level. Fill to overflow, as required.
								X		Change oil every 500 service hours. Change element every 4000 hours.
					X				Engine oil filter.	Change filter element every 200 service hours (every second oil change).
					X	X			Compressor oil filter.	Change element every 100 service hours and each time compressor oil is changed.
								X	Fuel Filter.	Install new filter every 500 hours.
				X						Drain any water and sediment.

Table 5-1. Preventive Maintenance Checks and Services - CONT.

Interval						B - Before operation D - During operation	A - After operation W - Weekly	M - Monthly Q - Quarterly	Item to be inspected	Procedure
Operator		Org								
Daily										
B	D	A	W	M	Q					
X				X	X	Drive belt.			Check for worn, frayed, or cracked belt.	
				X					Check for proper adjustment (tension).	
			X	X	X	Battery			Check battery mountings and cable connections. Check electrolyte level. Correct level is 3/8-inch above plates. Remove corrosion from terminals and lubricate.	
			X						Clean filler cap vent holes. Make hydrometer test. (Table 5-4).	
X									Check general condition.	
X	X				X	Speed control linkage			Check linkage for freedom of movement.	
			X	X	X				Lubricate linkage.	
				X	X				Check adjustment.	
X	X	X	X	X	X	Air cleaner			Check restriction indicator.	
			X	X	X				Clean element and body. Inspect element for damage. Replace element after eight cleanings.	
X	X	X	X	X	X	Controls and instruments.			Check for any damage and loose mounting.	
	X			X	X				Check for proper operation. Normal readings are: Engine oil pressure: 60 to 100 PSI (4.2-7.0 kg/cm ²) Tachometer Idle 1250 [±] 50 RPM Governed speed 2200 RPM	

Table 5-1. Preventive Maintenance Checks and Services - CONT.

Interval						B - Before operation D - During operation	A - After operation W - Weekly	M - Monthly Q - Quarterly
Operator		Org						
Daily						Item to be inspected	Procedure	
B	D	A	W	M	Q			
						Controls and instruments continued.	Water temperature: 180°-200°F (82°-93°C) Oil temperature: 170-220°F (77°-104°C) Air pressure: 100 PSI (loaded) (7.0 kg/cm ²) 115 PSI (unloaded) (8.1 kg/cm ²)	
	X			X	X	Engine assembly.	Check for even running and exhaust smoke for improper combustion.	
					X		Check air intake for leaks.	
	X		X	X	X	Tires.	Check inflation. Proper pressure is 32 PSI (2.3 kg/cm ²). Check for missing valve caps and tire wear.	
			X	X	X	Brake system.	Check parking brake operation and adjustment.	
				X	X		Lubricate parking brake mechanism.	
				X	X	Axle.	Check axle assembly for damaged components. Repair as necessary.	
				X	X	Springs.	Check for broken leaf or mounting hardware. Lubricate springs.	
					X	Wheel bearings.	Remove, clean, inspect, install, and pack with lubricant.	

Table 5-2. Lubrication Instructions

Lubrication point	Lubricant (specification)	Application (or action)	Interval (service hours)
ENGINE:			
Dipstick		Check oil level.	10
Crankcase	*OE/HDO 30-Oil MIL-L-2104	Drain and change oil.	100
Oil filter		Change element.	200
COMPRESSOR:			
Oil filter		Change element.	100
Control linkage	OE/HDO 30-Oil MIL-L-2104	Oil can(sparingly).	100
Service valve	OE/HDO 30-Oil MIL-L-2104	Oil can(sparingly).	100
Oil separator		Check oil level.	10
Separator tank	*OE/HDO 30-Oil MIL-L-2104	Drain and change oil.	500
Separator element		Replace	4000
Hose reels	GAA-Grease MIL-G-81322	Grease gun.	1000
UNDERCARRIAGE			
Parking brake lever & linkage	OE/HDO 30-Oil MIL-L-2104	Oil can(sparingly).	100
Wheel bearings	GAA-Grease MIL-G-81322	Hand pack.	1000
Landing wheel	GAA-Grease MIL-G-81322	Grease gun.	1000

*OE/HDO 30 used in temperatures + 125 to + 40°F (+52 to 10°C)
 OEA MIL-L-46167 for temperatures + 40 to -55°F (+10 to -67°C)

the oil cooler into the separator tank.

4. Place a container under the separator tank drain and while the oil is still hot drain the oil from the separator.

WARNING

Destroy used element to prevent accidental reuse. Over pollution of metal salts collecting on the element can become a hazardous condition by lowering the flash point and causing a fire in the separator.

5. Remove all components necessary to gain access to oil separator cover for removal of separator element. Disconnect and/or remove air lines necessary for removal of cover. Attach suitable lifting device to cover assembly, remove cover attaching hardware (see figure 7-15) and lift cover assembly upward until pipe (44) clears top of separator tank (46). Move cover assembly out of the way; remove and replace separator element (45).

CAUTION

Do not substitute commercial cap screws for special screws (42, Figure 7-15). These special screws are high tensile to meet ASME standards for pressure vessels.

6. Assemble the cover assembly back onto the separator tank (46, Figure 7-15) and secure with hardware removed at disassembly. Do not substitute commercial grade screws for high tensile cover screws (42).
7. Connect all air lines disconnected for removal of separator cover and assemble components removed to gain access to the oil separator.
8. Remove separator oil filler plug (30, Figure 7-15), fill separator with clean oil to overflow and install filler plug (30).

NOTE

As an aid in preventing varnish buildup, THERMA-SOLVE CONCENTRATE may be added to the compressor oil at a ratio of one quart (0.95 liters) of THERMA-SOLVE to each ten gallons (37.9 liters) of oil approximately 40 hours prior to scheduled oil change.

5-6.2 Radiator Maintenance (28, Figure 7-12). At least twice a year the radiator assembly should be drained and flushed thoroughly to remove any rust or sludge. Flush the system as follows:

1. Run the engine until operating temperature is achieved then, stop the engine.
2. Using caution, remove the radiator cap as the engine cooling system is of the pressurized type.
3. Open the radiator drain cock (13) and drain coolant

from radiator. Open the engine crankcase drain cock located on side of crankcase and drain coolant from engine. When flow of coolant stops, close drain cocks.

CAUTION

Do not use inhibitors labeled "acid neutralizers". Use only a corrosion inhibitor that is compatible with aluminum.

4. Fill the system with clean water and a flushing compound that is compatible with aluminum. Flush the system in accordance with instructions furnished with the flushing compound being used.

5. After flushing, rinsing, and completely draining the system of flushing solution fill the system with clean coolant.
6. Fill the system slowly to allow air to escape and system to be filled to maximum capacity. Refer to Table 5-5 for coolant recommendation.
7. Start the engine and run until normal operating temperature is reached; adding coolant as necessary to obtain proper level. After all air has been removed from system and coolant level remains fixed, install the radiator cap.

5-6.3 Compressor Rotor Blade Maintenance (See Figure 5-3).
Remove all component parts nec-

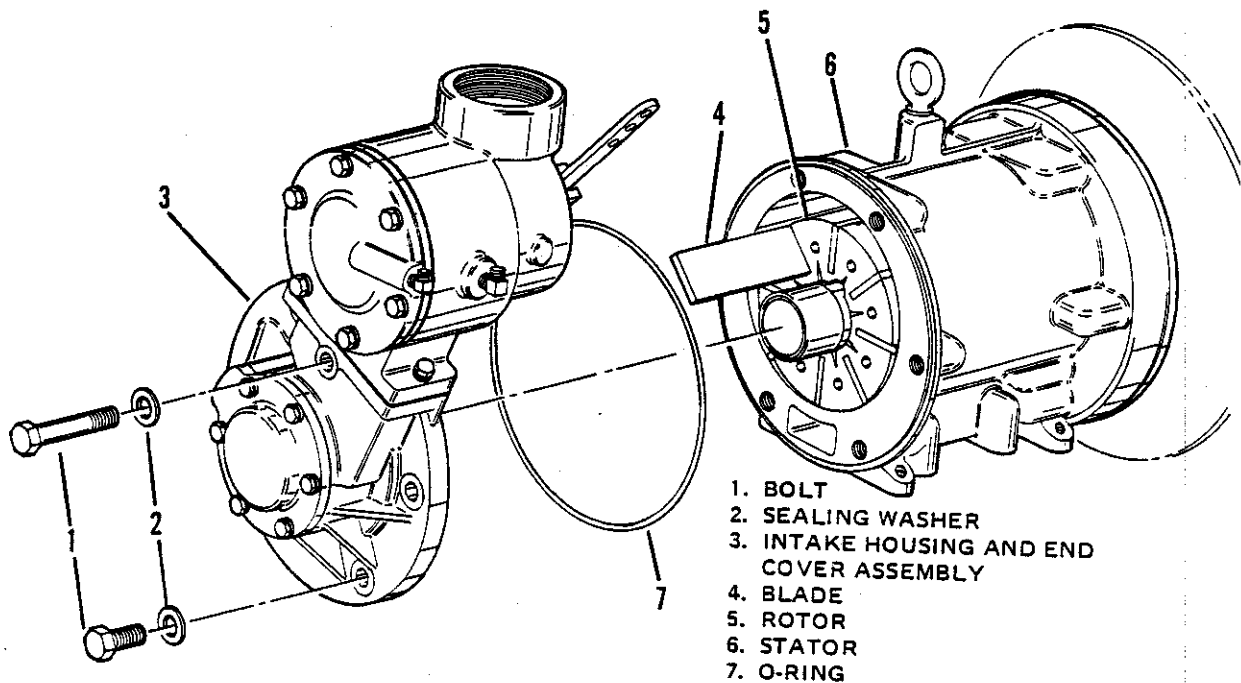


Figure 5-3. Compressor Non-Drive End

essary to gain access to non-drive end of the compressor. Disconnect speed control mechanism and air lines as necessary from compressor intake housing and end cover assembly. (3, figure 5-3). Disassemble as follows:

1. Remove six bolts (1, figure 5-3) and sealing washers (2). Tap intake housing and end cover assembly (3) with a soft mallet while pulling away from stator (6). Remove the assembly (3) and o-ring (7).
2. Use a small wire with one end bent to form a hook and remove the eight rotor blades (4) from rotor (5) slots. To remove blades (4) that are on the bottom of the rotor, press the start switch on instrument panel momentarily to rotate rotor to

bring blades to position where they can be removed.

3. Examine blades for evidence of excessive wear as shown in figure 5-4. Blades are excessively worn when 25 percent of covering, per side, has been worn off and shiny metal is exposed. Blades worn on one side only can be turned around and reused. Replace blades that have been worn 1/16-inch (1.59mm) in height (figure 5-4). Replace blades worn on both sides, chipped, or damaged in any other way.
4. Dip the eight rotor blades (4, Figure 5-3) and o-ring (7) in clean compressor oil. Slide the blades (4) into rotor (5) slots. Place o-ring (7) on end flange of stator (6). Carefully assem-

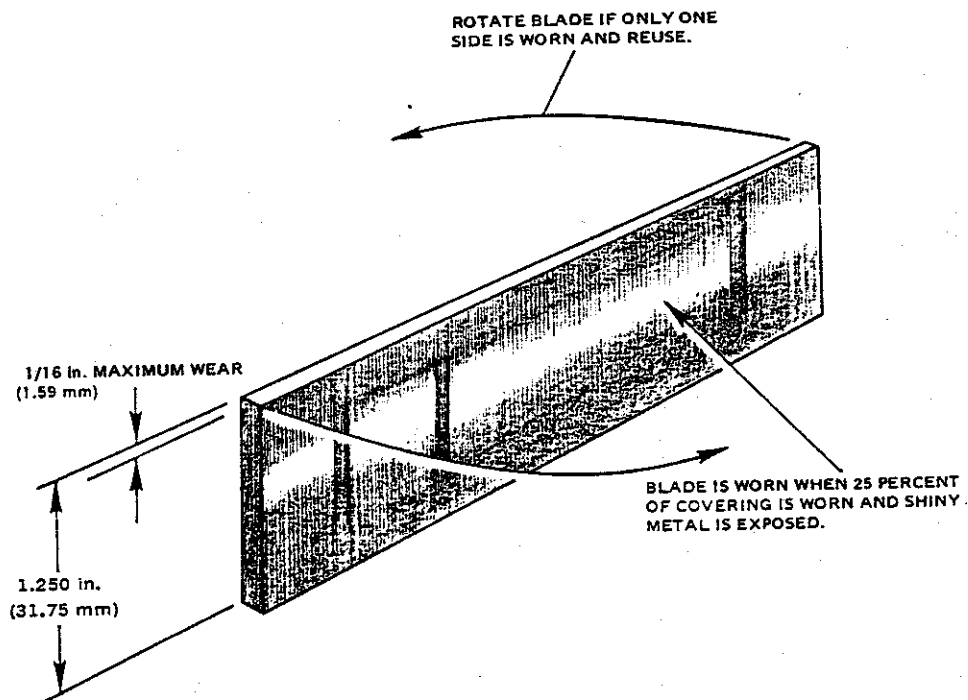


Figure 5-4. Rotor Blade Inspection

ble intake housing and end cover assembly (3) onto stator and secure with sealing washers (2) and bolts (1). The one longer bolt attaches under intake housing.

5. Reconnect air lines, speed control mechanism, and assemble all components removed to gain access to compressor non-drive end.

Table 5-3. Troubleshooting

Trouble	Probable cause	Remedy
Engine will not crank or turn when start switch is pressed.	Air pressure switch open.	Relieve system of air.
	Battery charge too low to crank engine.	Check specific gravity and charge battery as necessary. If electrolyte is low, add to cover battery plates, or replace battery. (See Table 5-4)
	Battery cables loose.	Check and tighten cables as necessary.
	Starting switch inoperative.	Check wiring connections and tighten as necessary. Replace a damaged start switch (para 6-7).
	Starting motor inoperative	Inspect cables and terminals for tightness. Check for tightness of mounting bolts. Inspect commutator for damage (para 6-22).
	Engine oil too heavy.	Use correct grade of lubricating oil (table 5-2).
	Internal seizure.	Turn the engine over by hand. If the engine does not turn easily, seizure due to internal damage, including gear train, pistons, connecting rods, or main bearings, is indicated. Refer to overhaul (para 6-20).
Engine turns but will not start.	Ignition switch not on.	Pull ignition switch to ON position (para 4-5).
	Safety control not being pushed when starting.	Push safety control button simultaneously with START button (para 4-5).

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy
Engine turns but will not start, continued.	Safety relay open due to high temperature of compressor oil, high engine water temperature, or engine over-speed.	Check for cause of relay opening. Add oil to separator assembly, water to radiator, or adjust speed control (para 5-2.1) as necessary. Then, press manual reset button (12, figure 1-3).
	Fuel system faulty. No fuel in tank.	Fill tank with fuel (table 1-1).
	Contaminated fuel.	Drain fuel tank and fuel lines. Fill tank with proper grade of fuel. Prime fuel system (table 1-1).
	Battery charge low and does not turn engine fast enough.	Refer to Battery Testing Chart, Table 5-4.
	Plugged fuel filter.	Install new filter element (para 6-23).
	Injection nozzles dirty or not working properly.	Refer to OVERHAUL (para 6-25).
	Fuel pump primer lever is up.	Push lever down (para 6-23).
	Ignition switch inoperative.	Place a jumper wire across the two ignition switch terminals on the back of switch. Attempt to start engine. If engine starts, the switch is inoperative and must be replaced (para 6-7).
	Defective fuel pump.	Refer to OVERHAUL (para 6-23).
	Air intake or exhaust restricted.	Service the air cleaner. Check intake and exhaust for obstructions (para 6-11).

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy
Engine stops during operation.	Out of fuel.	Fill fuel tank with proper grade of fuel (table 1-1).
	Low engine oil pressure causing oil pressure switch to open.	Check engine oil level. Fill to proper level with recommended grade of oil (table 5-2).
	Engine overheats causing safety circuit to open.	Check coolant level and fill radiator as necessary. Check and tighten fan belt if loose. Clean any debris from radiator fins. Defective thermostat, replace (para 6-20.1.2)
	Clogged fuel or air cleaner filter.	Remove one of the filters at a time. Start and run to eliminate bad filter (para 6-23 and 6-11).
	Compressor air-oil discharge temperature too high causing safety circuit to open.	See "Compressor Overheats" in this table.
	Injection nozzles dirty or faulty.	Refer to OVERHAUL (para 6-25).
Engine does not develop full power.	Plugged air intake.	Clean air cleaner (para 6-11).
	Plugged fuel filter.	Install new filter element (para 6-23).
	Wrong fuel.	Use proper grade fuel (table 1-1).
	Wrong valve clearance.	Refer to OVERHAUL (table 6-1).
	Injection nozzles dirty or faulty.	Refer to OVERHAUL (para 6-25).
	Injection pump out of time.	Refer to OVERHAUL (para 6-26).

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy	
Loss of engine oil pressure.	Low engine oil level.	Add engine oil to proper level (table 5-2).	
	Clogged oil filter.	Change filter element (para 6-20).	
	Engine oil pressure indicator or line defective.	Replace (para 6-7).	
Engine overheats.	Low radiator coolant.	Fill radiator with coolant. Check for leaks and repair or replace hoses, clamps, or defective parts (table 5-5).	
	Fan belt slipping.	Check and adjust fan belt tension (table 6-1).	
	Water pump defective.	Repair or Replace pump (para 6-27).	
	Defective thermostat.	Replace thermostat (para 6-20).	
	Dirt or debris clogging radiator.	Clean between the tube fins with air or water pressure.	
	Cooling system clogged.	Drain and flush cooling system.	
	Lack of lubricating oil.	Fill to proper level with correct grade of oil (table 5-2).	
	Clogged oil filter.	Replace filter element (para 6-20).	
	Battery discharging.	Connections loose.	Tighten connections.
		Short circuits.	Locate shorts and correct cause.
Connections dirty or corroded.		Clean connections.	

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy	
Battery discharge continued.	Defective alternator.	Test and replace if necessary (para 6-21).	
	Defective battery (cracked).	Replace battery (para 6-14).	
Alternator not charging.	Loose drive belt.	Adjust belt tension.	
	Defective voltage regulator.	Replace voltage regulator (para 6-21).	
	Defective alternator.	Replace alternator (para 6-21).	
Engine coolant temperature too low.	Thermostat not working properly.	Remove and check thermostat. Replace if necessary (para 6-20).	
Engine coolant temperature too high.	Low coolant level.	Fill radiator to correct level. Check radiator and hoses for loose connections and leaks (table 5-5).	
	Fan belt loose.	Tighten or install new belt.	
	Dirty radiator core.	Clean radiator core.	
	Cooling system needs flushing.	Drain and flush (para 6-15).	
	Defective thermostat.	Replace thermostat (para 6-20).	
	Temperature gauge not working correctly.	Check coolant temperature with thermostat. Install new gauge if necessary (para 6-7).	
	Engine knocks.	Not enough oil.	Add correct oil (table 5-2).
		Injection pump out of time.	Refer to OVERHAUL (para 6-26).
Engine uses too much fuel.	Wrong fuel.	Check for proper grade (table 1-1).	

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy	
Engine uses too much fuel continued.	Plugged or dirty air cleaner.	Clean air cleaner (para 6-11).	
	Injection nozzles dirty.	Refer to OVERHAUL (para 6-25).	
	Injection pump out of time.	Refer to OVERHAUL (para 6-26).	
	Engine not at correct temperature.	Check thermostat (para 6-20).	
Engine uses too much oil.	Crankcase oil too light.	Use correct oil (table 5-2).	
	Oil leaks.	Check for leaks in lines, around gaskets and drain plug.	
	Coolant temperature too high.	See "Coolant Temperature Too High"	
Starter not working.	Loose or corroded connections.	Clean and tighten connections.	
	Low battery power.	Check specific gravity and electrolyte level (table 5-4).	
	Electrical system ground wire not grounded properly.	Repair or install new ground wire.	
	Battery cable too small.	Replace battery cable (para 6-14).	
	Crankcase oil too heavy.	Drain and fill with correct oil (table 5-2).	
	Compressor overheats	Separator oil level too low.	Fill separator to overflow with proper grade of oil (table 5-2).
		Dirty compressor oil filter element.	Service compressor oil filter (para 6-12).
Dust or dirt collected on oil cooler core.		Blow off all dirt and dust.	

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy
Compressor overheats continued.	Faulty thermal bypass valve.	Replace thermal bypass valve (para 6-12).
Compressor operation is noisy.	Low separator oil level.	Fill separator to overflow with proper grade of oil (table 5-2).
	Air pressure regulator defective or out of adjustment.	Adjust air pressure regulator or repair as necessary (para 5-2.2).
Compressor not operating to full capacity or pressure.	Air pressure regulator assembly defective or out of adjustment.	Adjust or replace air pressure regulator assembly (para 5-2.2).
	Leaks in air hoses, piping, or connections.	Check all air hoses, piping and connections for leaks while unit is operating. Use soapy water solution on areas. Tighten or replace as required.
	Air cleaner dirty or clogged.	Service air cleaner (para 6-11).
	Safety valve on oil separator leaking.	Replace safety valve (para 6-18).
	Air service valve leaking.	Replace defective air service valves (para 6-9).
Compressor fails to load or unload.	Dirt buildup on intake unloader valve seat.	Clean the intake-unloader valve and seat (para 6-19).
	Unloading pressure set too high or too low.	Adjust air pressure regulator assembly (para 5-2.2).
	Control air hoses damaged or leaking.	Tighten connection and replace damaged hoses.
	Ruptured diaphragm in intake-control.	Replace damaged diaphragm (para 6-19).
	Moisture in control hose assemblies.	Disconnect hose assemblies, clean, and reconnect.

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy
Compressor unloads but engine will not idle.	Speed control linkage out of adjustment.	Adjust speed control linkage and replace any damaged parts (para 5-2.1).
Engine returns to idle, compressor does not unload.	Faulty compressor intake control.	Check for defective diaphragm, sticking intake valve, damaged or plugged hose assemblies to intake control (para 6-19).
Excessive compressor oil consumption.	Leak in oil system.	Check and repair oil lines and connections.
	Low separator pressure.	Defective minimum pressure valve spring or pressure regulator. Replace all defective minimum pressure control components (para 6-19).
	Clogged line from separator to intake orifice or clogged orifice.	Remove line and orifice, clean, and reassemble.
	Ruptured oil separator element.	Replace element (para 6-18).
Condensate and/or emulsion in oil in oil separator.	Usually low temperature and high humidity.	If this is a climatic condition, change separator oil to proper grade for operating condition (table 5-2).
	Faulty thermal bypass valve.	Replace thermal bypass valve (para 6-12).
Engine stalls at idle.	Idle speed set too low.	Adjust idle to 1250 RPM \pm 50 RPM (para 5-2.1).
	Speed control linkage out of adjustment.	Adjust linkage, Replace defective parts (para 5-2.1).
Compressor output too low.	Intake-control valve sticking or worn.	Inspect valve, clean, or replace if worn (para 6-19).

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy
Compressor output too low continued.	Speed control out of adjustment. Damaged rotor blades.	Adjust speed control to correct operating speed (para 5-2.1). Replace damaged blades (para 5-6.3).
Excessive oil in air discharge.	Clogged oil return hose or saturated oil separator element. Minimum pressure valve assembly and/or pressure regulator on oil separator faulty causing separator pressure to drop. Drop in separator pressure will allow blowout when service air demand exceeds separator pressure.	Remove, clean, and install oil return hose. Should this not remedy the condition, replace separator element (para 6-18). Inspect minimum pressure valve assembly components and pressure regulator. Replace all defective parts (para 6-18).
Wheel wobbles.	Wheel bent. Wheel loose on hub. Wheel bearing defective.	Replace wheel (para 6-35) Tighten nuts. Replace wheel bearing (para 6-35).
Wheel bearing overheats.	Wheel bearing defective. Lack of lubrication.	Replace bearing (para 6-35). Pack wheel bearings (table 5-2).
Tire wear abnormal.	Wheel loose on hub. Improper tire inflation.	Tighten nuts. Inflate tires to proper pressure (table 1-1).
Parking brake does not hold.	Parking brake actuating mechanism not adjusted properly. Broken actuating mechanism.	Adjust mechanism (para 6-36). Replace defective parts (para 6-34).

Table 5-3. Troubleshooting - CONT.

Trouble	Probable cause	Remedy
Parking brake does not hold continued.	Brakes out of adjustment	Adjust brakes (para 6-36).
Brakes will not release.	Brakes out of adjustment	Adjust brakes (para 6-36).
	Parking brake actuator defective or out of adjustment.	Adjust parking brake or repair actuating mechanism (para 6-36 and 6-34).

Table 5-4. Battery Testing Chart

Hydrometer test (80°F) (see note A below)	Condition	Remedy
A. 1.250 to 1.280 Specific Gravity	Charged	No remedy is required if variation among the cells is not over 0.015 Sp. Gr. If variation is much more than 0.015 Sp. Gr., give high rate discharge test. If cells test O.K., recharge and adjust gravity of all cell uniformly.
B. 1.225 to 1.250 Specific Gravity	Fair	Advisable to recharge, especially in cold weather. Adjust gravity of cells if not uniform. Check operation and setting of generator regulator. On adjustable third brush generators, increase the charging rate. Make a thorough check of the electrical system for short circuits, loose connections, and corroded terminals.
C. Less than 1.225 Specific Gravity	Poor	Battery should be recharged. Adjust gravity of cells if not uniform. Proceed as outlined in "B".
D. Cells show more than 25 points (0.025 Sp. Gr.) variation in gravity. Look for:	<ol style="list-style-type: none"> 1. Short circuit in low cell. 2. Loss of electrolyte by leakage or excessive overcharge. 3. Improper addition of acid or "dopes." 4. Natural or premature failure. 	Recharge battery at rate of one ampere for each positive plate in one cell until gravity readings show no rise in three consecutive readings when taken one hour apart. Cell voltages on charge should also be fairly uniform. Adjust gravity of cells to 1.280-1.290 at 80°F (27°C) by addition of water to lower, or 1.400 Sp. Gr. acid to raise the gravity of the acid. Make high rate discharge test after not less than 12 hours and not more than 96 hours standing on open circuit; and check discharge voltages on each cell; if more than 0.15 volt between cells is shown on discharge, the battery may be considered to be no longer serviceable.

NOTE: "A" - Electrolyte level should be ¼ to ½ inch above the separators. Do not take the reading soon after adding water. Hydrometer readings should be corrected for temperature if temperature is extremely low or high.

Voltmeter test	Condition	Remedy
E. If the voltage drop is more than 0.2 volt (2-10) between the cranking motor cable and the frame while cranking, look for:	Poor contact between terminal and frame or between clamp terminal and battery post:	Locate the high resistance repair or replace.
F. While operating the cranking motor, without ignition turned on, check the voltages of all cells. (This test can also be done on the high rate tester.) If the voltage varies more than 0.15 volt between cells, look for:	Defective cell or cells.	Compare voltage readings with hydrometer readings - low voltage is usually accompanied by low gravity. Apply remedy given for "D".

The presence of short circuits in the wiring can be determined by switching off all electrical equipment and, with the ground strap connected, tapping the other cable terminal against its battery post. Sparking will be produced if there is substantial short circuit in the wiring. To detect a very slight short circuit, place a low reading ammeter in the circuit.

Table 5-5. Freezing Points, Composition, and Specific Gravities of Military Antifreeze Materials

LOWEST EXPECTED AMBIENT TEMP.		INHIBITED GLYCOL PER GALLON (3.8 l) OF COOLANT ¹		COMPOUND, ANTIFREEZE ARCTIC ²	ETHYLENE GLYCOL SOLUTION SPECIFIC GRAVITY AT 68°F (20°C) ³
°F	°C	PINTS	LITERS		
+20	- 7	1-1/2	0.71	Issued full strength and ready mixed for 0° to -65°F (-18° to -54°C) temperatures for both initial installation and replenishment of losses.	1.022
+10	-12	2	0.95		1.036
0	-18	2-3/4	1.30		1.047
-10	-23	3-1/4	1.54		1.055
-20	-29	3-1/2	1.66		1.062
-30	-34	4	1.89		1.067
-40	-40	4-1/4	2.01		1.073
-50	-46	Arctic Antifreeze preferred			DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE
-60	-51				
-75	-59				

¹ Maximum protection is obtained at 60 percent by volume (4.8 pints [2.3 l] of ethylene glycol per gallon [3.8 l] of solution).

² Military Specification MIL-C-11755 Arctic type, nonvolatile antifreeze compound is intended for use in the cooling system of liquid-cooled internal combustion engines. It is used for protection against freezing primarily in Arctic regions where ambient temperature remains for extended periods close to -40°F (-40°C) or drops below, to as low as -90°F (-68°C).

³ Use an accurate hydrometer. To test hydrometer, use 1 part ethylene glycol antifreeze to 2 parts water. This should produce a hydrometer reading 0°F (-17.8°C).

NOTE: Fasten a tag near the radiator filler cap indicating the type antifreeze.



SECTION VI
REPAIR INSTRUCTIONS

6-1 INTRODUCTION.

a. This section contains repair and overhaul instructions for the entire air compressor unit. The instructions are designed to enable personnel to repair or replace defective parts to bring unit back to new equipment standards.

b. Included are procedures for disassembly, cleaning, inspection, repair or replacement and assembly of detailed parts into sub-assemblies, subassemblies into assemblies, and the final assembly to form a complete unit. Also included, where applicable is testing of components and the end item after assembly.

6-2 PRELIMINARY PROCEDURES.

a. In general, it is not necessary to completely disassemble the air compressor unit. Operational checkout (para. (5-2) and troubleshooting (para. 5-5) will indicate the required degree of disassembly necessary and assemblies which require repair or replacement.

b. Prior to disassembly of the air compressor unit the following procedures shall be completed:

1. Lower the retractable third wheel and secure in position.
2. Set the parking brake by actuating the parking brake hand lever.

WARNING

Do not attempt any air system component removal or repair with air pressure in the system. Observe the air pressure gauge. After shutdown, allow time for compressor to bleed down air before attempting any disassembly. Air pressure gauge must read zero to indicate compressor internal pressure has been relieved.

3. Open the air service valve to make certain that the air pressure is relieved from the system.
4. Remove the battery cables from the battery.
5. Remove the battery from the compressor unit and store in a heated area.
6. Place a container under the engine oil drain, remove the oil drain plug and drain lubricating oil from engine. Install drain plug.
7. Place a container under the oil separator tank, remove oil separator drain plug and drain compressor lubricating oil from tank. Install drain plug.

8. Place a container under the fuel tank drain, loosen fuel filter cap, remove fuel tank drain plug, and drain fuel from the tank. Install drain plug.
9. Place a container under the radiator drain, loosen the radiator cap, open radiator drain and drain the coolant from the radiator. Open the engine block drain and drain coolant from the engine.
10. At time of removal of any component that forms part of the electrical system, disconnect the electrical lead wires involved at their terminal ends. Identify the electrical components and lead wires with respect to their positions. This will insure reassembly in the same relative position. At time of removal of any tube assembly, tag each end as to its relative position in the unit. This will aid in reassembly.

6-3 GENERAL INSTRUCTIONS.

a. General good shop practice standards and safety precautions for repair and overhaul shall be followed on all assemblies.

b. General cleaning, inspection, and repair or replacement standards to be followed throughout this section are described in following paragraphs and are not repeated but referenced in detailed paragraphs.

6-3.1 General Cleaning.

WARNING

Provide adequate ventilation when using cleaning solvent (Federal Specification P-D-680, Type II). Avoid prolonged breathing of vapors and minimize skin contact.

Clean all metal parts with solvent, Fed Spec P-D-680, Type II. Wipe nonmetallic parts, such as hoses, with a clean, lint-free cloth moistened slightly with solvent and air dry thoroughly. Specific cleaning of subassembly components is contained in detailed paragraphs for that component. Refer to T.O.35-1-12, Cleaning of Aerospace Equipment.

NOTE

Do not allow parts to remain in cleaning solvent for extended periods of time or rust spots may form. If parts are not to be inspected immediately after cleaning, dip them in engine oil per Military Specification MIL-L-2104C or equivalent. Do not immerse electrical parts in cleaning solvent.

6-3.2 General Inspection. In general inspect as follows:

a. Inspect for visible wear, damage, distortion, cracks, breaks, and corrosion. Replace all o-rings, gaskets and seals.

b. Inspect threaded parts for stripped threads, cross-threading and for nicks and burrs.

c. Inspect hoses and tubing for evidence of leaks, cracks, pinching, damaged connecting nuts and similar defects.

d. Examine all electrical wiring for broken insulation, evidence of burning (indicating a short), loose connections and damaged terminals.

e. Inspect painted surfaces for chipping, peeling or discolored paint.

6-3.3 General Repair or Replacement. For the most part, repair of this equipment will be made by replacement of worn or damaged parts. Detailed repair and replacement procedures for specific parts are found in the following subassembly paragraphs.

NOTE

Many repair parts for this equipment are provided in the form of kits. Refer to Section VII, Illustrated Parts Breakdown for details. Activities shall replace all parts (regardless of condition) which are removed in the process of disassembly with all like parts furnished in kits. Therefore, instructions for cleaning, inspecting and repair of used parts found in the kit have been omitted from this manual. If any kit parts must be cleaned, inspected, or tested prior to installation, instructions for performing these requirements are

included at the appropriate detailed instruction location. An installed part which is not defective need not be removed solely for the purpose of replacement by a corresponding kitted part. Residue from kits and removed parts in this category shall be administratively condemned.

6-4 DISASSEMBLY OF MAJOR COMPONENTS.

a. Limit disassembly of major components from the unit to the extent necessary to repair or replace a given assembly.

b. All major components are covered in the following paragraphs. Refer to Figure 7-1, sheets 1 and 2 for major components and their attaching hardware.

WARNING

Do not attempt to lift any of the major components such as engine assembly and compressor assembly by hand. Provide a suitable lifting device when removing heavy components and handle with care using adequate hoist chains, or straps to avoid injury to personnel and damage to equipment.

NOTE

Unless otherwise specified, all figures referenced in this section will be found in Section VII, Illustrated Parts Breakdown.

6-5 HOSE REEL AND MOUNTING GROUP.

6-5.1 Removal. To remove the hose reel and mounting group (1, figure 7-1) from the unit, disconnect air hoses (1,2, figure 7-6) and remove three adapters (4), two elbows (5), tee (6), and nipple (7). Disconnect end of service hose assemblies (1, figure 7-2) from dummy spud couplings on end of frame. Loosen brake knob (14) and pull service hose assembly (1) off reel assembly (3). Disconnect hose (1) from coupling (2). Support hose reel assembly (3) and remove four lock nuts (4) and cap screws (5). Remove reel assembly (3) from unit.

6-5.2 Disassembly. Disassemble hose reel assembly (3), figure 7-2) as follows:

1. Unscrew and remove coupling (2), street elbow (6), globe valve (7), and pipe nipple (8). Unscrew six lock nuts (11), cap screws (12), and flat washers (13), and separate hose reel ends (9,10) from body (22).
2. Unscrew and remove brake lock knobs (14), and brake lock (15). Remove two cap screws (17), lock washers (18), and retainer (16). Pull spindle (19) out of body (22), and remove two o-rings (20), from body (22). As necessary remove lubrication fitting (21).

6-5.3 Cleaning. Refer to para. 6-3.1 for general cleaning. Clean all parts except hose (1, figure 7-2) and o-rings (20) with solvent, Fed Spec P-D-680, Type II.

Wipe hose and o-rings with a clean cloth moistened slightly with solvent and wipe dry.

6-5.4 Inspection. Refer to para. 6-3.2 for general inspection. Inspect hose assembly (1, figure 7-2) for frayed or cut covering. Test as necessary, and at least once a year, in accordance with T.O.34Y1-1-171 and T.O.00-25-223.

6-5.5 Repair or Replacement. Replace all damaged parts. Replace o-rings (20, figure 7-2).

6-5.6 Assembly. Assemble hose reel assembly (3, figure 7-2) as follows:

1. If fitting (21) was removed, install in body (22). Coat o-rings (20) with clean engine oil and insert into body (22): Place hose reel ends (9, 10) on body (22) and secure with six each flat washers (13), bolts (12), and locknuts (11).
2. Carefully insert spindle (19) into body (22) with a twisting motion so that o-rings (20) are not damaged. Assemble retainer (16), two lock washers (18) and screws (17). Position brake lock (15) on retainer and body. Secure with brake knob (14).
3. Screw nipple (8) into body (22). Screw globe valve (7) onto nipple (8), elbow (6) into globe valve (7) and coupling (2) into elbow (6). If coupling seal was removed install a new seal.

6-5.7 Installation. Locate the hose reel assemblies on front

housing and secure each with four cap screws (5) and lock nuts (4). Place end of service hose assembly (1) through hose reel end (10) as shown on figure 7-2 and attach to coupling (2). Loosen brake knob (14), rotate reel assembly (3) winding hose onto reel. Tighten brake knob (14). Assemble nipple (7, figure 7-6), tee (6), two elbows (5), three adapters (4) and connect air hoses (2,1) that were disconnected in para. 6-5.1. Lubricate the hose reel assembly, see table 5-2. Attach service hose assembly ends to dummy couplings on front of frame.

6-6 FUEL TANK GROUP.

6-6.1 Disassembly. Remove and disassemble fuel tank group (2, figure 7-1) as follows:

1. Disconnect fuel hose (5 figure 7-3) from engine fuel transfer pump elbow. Disconnect fuel hose (6) from adapter on fuel leak-off line. Remove hose clamp securing fuel hose to front of engine.
2. Remove two nuts (1) and lock washers (2) from end of tank straps (3) on the engine side (under frame). Move straps (3) out of the way and lift fuel tank assembly out of unit.
3. Disconnect and remove fuel hose assemblies (5, 6). As necessary, remove two elbows (7) and pipe plug (9). Remove cap assembly (10) and unscrew level gauge (8) from tank (11).
4. Remove two nuts (1) and lock washers (2) secur-

ing straps (3) to frame. Remove the straps (3). Webbing (4) need not be removed except for replacement. Decal (12) need not be removed.

6-6.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Wipe fuel hose assemblies (5,6, figure 7-3) with a clean cloth moistened with solvent and wipe dry.

6-6.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect hose assemblies (5,6, figure 7-3) for frayed or cut covering. Test as necessary and at least once a year, in accordance with T.O.34Y1-1-171 and T.O.00-25-223. Inspect fuel level gauge (8) for broken face and operation of float.

6-6.4 Repair or Replacement. Refer to paragraph 6-3.3 for general repair or replacement instructions.

6-6.5 Assembly. If decal (12, figure 7-3) was removed, replace with new decal. If webbing (4) was removed, assemble webbing onto straps (3) with an adhesive. Assemble fuel tank group into unit as follows:

1. Assemble tank straps (3) to outboard side of frame and attach with two lock washers (2) and nuts(1).
2. Install cap assembly (10) pipe plug (9), level gauge (8) and two elbows (7) in tank (11). Connect fuel hose assemblies (6,5) to elbows (7). Assemble the fuel tank assembly into unit with drain plug (9) centered

above drain hole provided in bottom of frame.

3. Bend fuel tank straps (3) around tank (11) and secure ends of straps to frame with two lock washers(2) and nuts(1).
4. Connect fuel return hose (6) to adapter on end of engine fuel leak-off line. Secure hose (6) to front of engine with hose clamp removed in paragraph 6-6.1.1. Connect fuel pick-up hose (5) to elbow on engine fuel pump.

6-7 CONTROL PANEL ASSEMBLY.

6-7.1 Disassembly. Disconnect wiring harness (9, figure 7-1) leads from back of control panel assembly (3). Remove engine water temperature sensor bulb from engine cylinder head water jacket. Remove compressor oil temperature sensor bulb from discharge elbow on bottom of compressor assembly. Disconnect restriction indicator hose (1, figure 7-8) from rear of control panel. Disconnect engine oil pressure tube (8, figure 7-1) from rear of control panel. Disconnect air pressure tube (5, figure 7-15) from rear of control panel. Coil and tape temperature sensor cables. Remove five nuts and screws securing control panel (3, figure 7-1) to unit and remove the control panel assembly. Refer to figure 7-4 and disassemble as follows:

NOTE

Tag or mark all wire assemblies, hose assemblies, and/or control cables at disassembly for assembly reference.

Make note of locations and attachment of wire ties and tubing clamps when disassembly requires their removal. Assemble ties and clamps in their relative positions when components are assembled.

CAUTION

When wire assemblies are removed from gauges and switch terminals, install all washers, nuts, and/or screws back onto terminals from which they were removed to prevent their loss. Also, when gauges are removed, place mounting clamps and mounting hardware back onto gauges to prevent their loss and mixing with other gauges.

1. Disconnect and tag all wire assemblies from rear of control panel for assembly reference. (Wires are numbered 1 thru 10 and 14 thru 21).
2. Unscrew and remove two pressure switches (17) and pressure switch (20). Remove elbows (18), pipe cross (19) and pipe tee (21).
3. Remove the lamp (7). As necessary, remove cover and lens from lamp to replace lamp bulb. Remove lamp switch (15) and switch plate (16).
4. Remove mounting hardware and clamps and remove

tachometer-overspeed gauge (6), air pressure gauge (5), water temperature gauge (9), ammeter (3), hourmeter (10), oil pressure gauge (8), and oil temperature gauge (4). As each gauge is removed, place mounting clamps and hardware back onto the gauge to prevent loss.

5. Remove service indicator (11), ignition switch (14), relay box (12), and two pushbutton switches (13). Decals (25, 26 and 27) should not be removed from panel (24) except for replacement.

6-7.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

CAUTION

Do not use steam or water to clean any electrical components, instruments, wires, etc. Wipe faces of gauges with a clean lint-free cloth.

6-7.3 Inspection. refer to paragraph 6-3.2 for general inspection. Inspect all gauge faces for cracks, cables for breaks and kinks that would effect operation and all switch terminals for evidence of shorts and burning. Examine all wires for broken insulation and evidence of shorts or burning.

6-7.4 Repair or Replacement. All damaged parts shall be replaced without exception.

6-7.5 Assembly. Refer to figure 7-4 and assemble control panel assembly as follows:

1. If decals (25, 26 and 27) were removed, install in positions shown on figure 7-4.
2. Assemble two pushbuttons (13) and ignition switch (14) onto panel (24). Install service indicator (11). Install relay box. Assemble oil temperature gauge (4), oil pressure gauge (8), hourmeter (10), ammeter (3), water temperature gauge (9), air pressure gauge (5), and tachometer overspeed gauge (6) onto panel (24) using mounting clamps and hardware supplied with gauge.
3. Assemble lamp switch plate (16) and lamp switch (15). Install the panel lamp (7).
4. Screw pipe tee (21) onto air pressure gauge (5) and install elbow (18) and pressure switch (20). Screw pipe cross (19) onto oil pressure gauge (8) and install elbow (18) and two pressure switches (17).
5. Install wire assemblies (numbered 1 thru 10 and 14 thru 21) to gauges and switches attaching to terminals as marked at disassembly. Refer to wiring reference on figure 7-4.
6. Assemble the instrument panel assembly (3, figure 7-1) onto unit and attach with five cap

screws and lock nuts. Connect air cleaner service indicator hose to indicator (11, figure 7-4). Connect air pressure hose to elbow (18). Install water temperature and oil temperature sensing bulbs into engine and compressor. Connect wiring harness leads on to back of instrument panel assembly. Refer to wiring reference on figure 7-4 or wiring diagram figure 1-4.

6-8 COLD WEATHER STARTING AID GROUP.

6-8.1 Disassembly. Disassemble the cold weather starting aid (4, figure 7-1) as follows:

1. Unscrew two connectors (5, figure 7-5) and remove the tube assembly and connector (4,5). Remove four nuts (2) and screws (3); remove cold weather starting aid kit (1) from unit.
2. Remove nozzle (6) from reducing bushing (17) and remove the bushing (17) from engine air intake.
3. To disassemble the kit (1), unscrew and remove top of body cap (7) and remove fuel cartridge (8). Remove fuel cartridge neck screw (9), neck washer (10) and piercing pin (11). Unscrew and remove body screen assembly (12). Remove body nut (14) and washer (15) freeing discharger body (13) and cap (7) from mounting bracket (16).

4. Decal (18) need not be removed except for replacement.

6-8.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-8.3 Inspection. Refer to paragraph 6-3.2 for general inspection. Inspect tubing assembly (4, figure 7-5) for collapsed or pinched tube and for clogging of tube. Examine nozzle (6) for clogging. Inspect piercing pin (11) for wear and body screen assembly (12) for clogging.

6-8.4 Repair or Replacement. Replace all damaged parts.

6-8.5 Assembly. If cold weather starting aid kit (1, figure 7-5) was disassembled, assemble kit and install on unit as follows:

1. Place lower portion of cap (7) on discharger body (13). Place body (13) through mounting bracket (16) hole and secure body to bracket with washer (15) and nut (14). Install screen assembly (12) in body (13). Assemble piercing pin (11), neck washer (10), and neck screw (9). Install cartridge (8) and screw top portion of cap (7) onto body (13).
2. Assemble kit (1) to unit with four screws (3) and nuts (2). Install reducing bushing (17) in engine air intake. Install nozzle (6) in bushing (17).
3. Assemble tube assembly (4) to nozzle (6) and body screen assembly (12) with connectors (5).

4. If decal (18) was removed, install a new decal (18).

6-9 AIR SERVICE GROUP.

6-9.1 Disassembly. To disassemble air service group (5, figure 7-1) refer to figure 7-6 and proceed as follows:

1. Disconnect and remove three hose assemblies (1, 2, and 3). Remove four hose adapters (4) and three elbows (5). Unscrew and remove pipe tee (6) and pipe nipple (7). Remove hose adapter (8) and pipe tee (9).
2. Unscrew and remove two hose couplings (10) from service valves (11). Coupling seals need not be removed except for replacement. Unscrew service valve (1) from service valve pipe (12). Remove four nuts (13) and four cap screws (14). Do not remove decal (15) except to replace the decal.

6-9.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Wipe hose assemblies (1, 2, 3, figure 7-6) with cloth moistened with solvent. Wipe dry.

6-9.3 Inspection. Refer to paragraph 6-3.2 for general inspection. Inspect hose assemblies (1, 2, 3, figure 7-6) for frayed or cut covering. Test as necessary, and at least once a year, in accordance with T.O.34Y1-1-171 and T.O.00-25-223.

6-9.4 Repair or Replacement. Replace all defective parts.

6-9.5 Assembly. If decal (15, figure 7-6) was removed, install a new decal (15) on housing side panel. Assemble air service group as follows:

1. Assemble service valve pipe (12) to side panel with long end of pipe to the outside. Attach with four screws (14) and nuts (13). Assemble discharge valve (11) onto pipe and install two hose coupling (10). If coupling seals were removed, install new seals.
2. Assemble reducing pipe tee (9) and hose adapter (8). Install nipple (7), tee (6), and assemble three elbows (5) and four hose adapters (4). Install hose assemblies (3, 2, 1).

6-10 EXHAUST AND MUFFLER GROUP.

6-10.1 Disassembly. To disassemble the exhaust and muffler group (6, figure 7-1) refer to figure 7-7 and proceed as follows:

1. Loosen clamping hardware and remove rain cap (1). Loosen nuts of muffler clamp (3), remove exhaust elbow (2) and clamp (3).
2. Loosen nuts of mounting clamps (14). Remove two lock nuts (5), cap screws (6), washers (7), spring guides (8) and springs (9). Remove muffler (10) and mounting band (4).
3. Remove mounting clamps (14) escutcheon (11), sound insulation (12), and exhaust flange (13). Remove lock nuts (17), cap screws (18), clamps

(16), exhaust stack (15), and gasket (19).

6-10.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-10.3 Inspection. Refer to paragraph 6-3.2 for general inspection.

6-10.4 Repair or Replacement. Replace all defective parts.

6-10.5 Assembly. Assemble the exhaust and muffler group (6, figure 7-1) as follows:

1. Install exhaust gasket (19, figure 7-7) and exhaust stack (15) on engine. Secure with two clamps (16), cap screws (18), and lock nuts (17).
2. Assemble exhaust flange (13), insulation (12) and escutcheon (11). Install two mounting clamps (14) but do not tighten clamps until muffler is installed. Position muffler (10) with mounting band (4) on top of roof. Secure band (4) to roof with two springs (9), spring guides (8), washers (7), cap screws (6), and lock nuts (5). Then, tighten nuts of mounting clamps (14).
3. Assemble muffler clamp (3), exhaust elbow (2), and rain cap (1). Tighten nuts of clamp (3) and mounting hardware of rain cap (1).

6-11 AIR INTAKE AND CLEANER GROUP.

6-11.1 Disassembly. To disassem-

ble the air intake and cleaner group (7, figure 7-1), refer to figure 7-8 and proceed as follows:

1. Loosen hose clamp (2, figure 7-8) and disconnect service indicator hose assembly (1). Loosen hose clamps (4,7,9) and remove compressor intake hose (3), engine intake hose (6), manifold hose assembly (8) and manifold (10). Remove hose clamps (4,7,9) as necessary. As required, remove air intake pipe (5).
2. Remove air cleaner cap (11). Remove four cap screws (14), lock washers (15) and flat washers (16) and remove air cleaner assembly (13) from unit. Remove grommet (12).
3. To disassemble air cleaner assembly (13), loosen cup clamp (18) and remove cup (17), baffle (19), and clamp (18). Remove wing nut (21), gasket (22) and pull element (20) out of body (23). It is not necessary to remove mounting bands (24) or decal (25) except for replacement.

6-11.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning. Specific cleaning of air cleaner assembly (13, figure 7-8) is as follows:

1. Wipe accumulated dirt from cup (17, figure 7-8), baffle (19), and from inside of body (23) with a clean, lint-free cloth moistened with solvent.

CAUTION

Element (20, figure 7-8), should be replaced after six cleanings.

2. To clean element (20) with compressed air, direct air flow from inside of element moving air nozzle up and down while rotating element. Maximum air pressure shall not exceed 30 psi (2.1 kg/cm²).
3. To clean element (20) with water, soak the element in a container of water and detergent solution. Rinse thoroughly with clean water until rinse water shows no evidence of dirt or detergent. Air dry. Do not use compressed air.

6-11.3 Inspection. Refer to paragraph 6-3.1 for general inspection. Inspect air cleaner assembly (13, figure 7-8) as follows:

1. Inspect baffle (19, figure 7-8) for cuts and deterioration. Inspect cup (17), clamp (18), and body (23) in area of clamp register for any dents that would prevent clamp (18) from clamping all around body.
2. Inspect element (20) for holes and rupture by placing a bright light in element center cavity and rotate the element. If light shows through a hole or rupture, replace the element.

6-11.4 Repair or Replacement. Replace all damaged parts. Re-

place air cleaner element (20, figure 7-8) after six cleanings.

6-11.5 Assembly. If decal (25, figure 7-8) and mounting bands (24) were removed from air cleaner body (23), install mounting bands and attach new decal. Assemble air intake and cleaner group as follows:

1. Assemble air cleaner element (20, figure 7-8) into body (23) and secure with gasket (22) and wing nut (21). Position clamp (18) on end of body (23), install baffle (19) into cup (17) and assemble cup onto body (23). Tighten clamp (18) making certain clamp is seated on cup and body bead evenly all the way around.
2. Assemble grommet (12) in hole in roof, position air cleaner assembly (13) under roof and attach to roof with four each flat washers (16), lock washers (15), and cap screws (14). Install air cleaner cap (11).
3. Assemble hose clamps (9, 7, and 4) on hoses (8, 6, 3) respectively. Attach hose assembly (8) on end of air cleaner (13) install manifold (10) and tighten hose clamps (9). Assemble hose (6) on manifold (10) and engine air intake. Tighten hose clamps (7). If compressor air intake pipe (5) was removed, install the pipe. Assemble hose (3) onto manifold (10) and intake pipe (5); tighten hose clamps (4).

4. Assemble hose clamp (2) on end of hose assembly (1). Attach hose to stem on hose assembly (8) and tighten hose clamp (2). Attach other end of hose assembly (1) to restriction indicator on back of control panel.

6-12 OIL FILTER AND BYPASS ASSEMBLY.

6-12.1 Disassembly. Disassembly of oil filter and bypass assembly (15, figure 7-1) is as follows:

1. Disconnect oil hose assembly (14, figure 7-1) coming from oil separator assembly and two oil cooler hose assemblies (9, figure 7-12) from oil filter and bypass assembly. Remove two socket head cap screws and lock washers securing assembly to air compressor. Remove the assembly and gasket.
2. Unscrew and remove oil filter (1, figure 7-9). Only when necessary for replacement, remove adapter (2). Unscrew and remove tube elbow (3) from bypass connection (4) and connection (4) from male connector (5). Unscrew and remove connector (5) and o-ring (6) from thermal bypass assembly (9).
3. Unscrew and remove elbow (7) and adapter (8) from thermal bypass assembly (9).

6-12.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning. Do not clean oil filter (1, figure 7-9). Replace the oil filter.

Wipe o-ring (6) and o-rings on elbow (7) and adapter (8) with clean cloth moistened with solvent and wipe dry.

6-12.3 Inspection. Refer to paragraph 6-3.2 for general inspection. To inspect thermal bypass assembly (9, figure 7-9) check operation as follows:

1. Place thermal bypass assembly (9) in a controlled heat test tank of clean engine oil or water so that thermostat may be viewed through the inlet port.
2. Observe thermostat as temperature of test fluid is increased. Thermostat should begin to open at 160°F (71°C) and be fully open at 185°F (85°C).

6-12.4 Repair or Replacement. Refer to paragraph 6-3.3 for general repair or replacement. Replace thermal bypass assembly (9, figure 7-9) if inspection indicates malfunction. Replace oil filter (1) every 100 service hours and each time compressor oil is changed.

6-12.5 Assembly. Assemble the oil filter and bypass assembly as follows:

1. Assemble adapter (8, figure 7-9) into (Cooler Port) of thermal bypass assembly (9). Assemble elbow (7) into (Inlet Port) of thermal bypass assembly (9) with hose connection facing down as shown in figure 7-9. Assemble o-ring (6) and male connector (5) into

- (Tank Port) of thermal bypass assembly (9).
2. Assemble bypass connection (4) onto connector (5) with mounting face at 90° to elbow (7) as shown in figure 7-9. Assemble tube elbow (3) into bypass connection (4) with hose connection facing down. If removed, install adapter (2). Screw oil filter (1) onto adapter (2) hand tight until gasket seats fully on top of connection (4); then, tighten 3/4 turn more.
 3. Assemble oil filter and bypass assembly (15, figure 7-1) onto compressor using a new gasket and secure with two lock washers and socket head cap screws removed in paragraph 6-12.1.1. Connect hose assembly (14, figure 7-1) to inlet port elbow (7, figure 7-9) and the two oil cooler hose assemblies to adapter (8) and elbow (3).
1. Turn heat duct cover (1, figure 7-10) counterclockwise to disengage pins from slots on flange assembly (2). The cover chain anchor is attached to housing with nut and screw attaching baffle (3) to the end of side panel (20,21). Remove this nut and screw to remove cover (1) from unit. There are two covers (1) and flange assemblies (2). Each is removed in the same manner. Remove four lock nuts and screws securing flange assembly (2) and remove the flange assembly. Remove remaining eight nuts and screws securing air baffle (3) and remove the baffle. Reflectors (4) need not be removed except for replacement.
 2. Remove eight nuts and screws attaching the four door hinge plates (5), two plates per door, remove the hinge plates (5) and two doors (6).

NOTE

Noise dampener insulation is attached to doors (6), roof (12), back panel (14) and front panel (15) with adhesive and should not be removed except for replacement. Removing the insulation will destroy the part requiring replacement with new parts. Removal of the noise dampeners is not covered in these steps. Refer to Maintenance Parts List, Section VII, for replacement numbers of noise dampeners parts.

6-13 HOUSING GROUP.

6-13.1 Disassembly. Disassemble the housing group (19, figure 7-1) as follows:

NOTE

Disassemble housing group only to extent necessary to replace a damaged housing part or to gain access to a component or part that requires repair or replacement. Complete disassembly is covered in following paragraphs.

3. Door latches (7) are attached with rivets and should not be removed unless replacement is necessary. As necessary, remove thirty two nuts and screws attaching four door holders (8), eight per door holder, and remove the door holders. Remove four nuts, flat washers, and truss head screws attaching control panel access door (9) to roof (12). Remove two splitting retainers securing wing head studs (10) to access door, remove the studs and the two fastener receptacles (11).
4. Refer to paragraph 6-7 and remove control panel assembly. Refer to paragraph 6-8 and remove cold weather starting aid group. Refer to paragraph 6-9 and remove air service group. Refer to paragraph 6-10 and remove exhaust and muffler group. Refer to paragraph 6-11 and remove air intake and cleaner group. Refer to paragraph 6-5 and remove hose reels and mounting group. Refer to paragraph 6-6 and remove fuel tank group. Loosen setscrew securing unloader knob (18, figure 7-1) and remove the knob.
5. Remove six nuts and screws attaching roof (12, figure 7-10) and remove the roof. Door bumper (13) need not be removed except for replacement. Remove two nuts and screws and remove the tool box back

panel (14). Remove six screws and housing front panel (15). Decal (16) and operation plate (17) need not be removed from panel (15) except for replacement.

6. Reflectors (18) and caged nuts (19) need not be removed except for replacement. Remove two 1/4-inch nuts and screws and seven 3/8-inch lock nuts and screws, and fourteen flat washers; remove road side panel (20). Remove two 1/4-inch nuts and screws and seven 3/8-inch lock nuts and screws, and fourteen flat washers; remove curb side panel (21). The plates (22 thru 25) and decal (26) need not be removed except for replacement.

6-13.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning. Clean painted surfaces by spraying with hot water and detergent solution per Federal Specification P-D-220. Parts to be repainted may be steam cleaned. After cleaning, refinish affected painted areas where required in accordance with T.O.35-1-3.

6-13.3 Inspection. Refer to paragraph 6-3.2 for general inspection. Examine reflectors (4, 18, figure 7-10) for broken faces. Examine noise dampening insulation on doors (6), roof (12), back panel (14), and front panel (15) for tears and general condition. Inspect door latches (7) for general condition.

6-13.4 Repair or Replacement. Sheet metal housing components may be repaired by pounding out dents, welding breaks or cracks;

then, clean and refinish painted surfaces in accordance with T.O. 35-1-3. Housing components damaged beyond this repair shall be replaced. When replacing damaged noise dampening insulation use a suitable adhesive to attach replaced part to the housing component.

6-13.5 Assembly. Refer to figure 7-10 and assemble the housing group as follows:

1. If decal (26) or identification plates (22 thru 25) were removed at disassembly, assemble onto curb side panel (21). Attach curb side panel to frame with seven 3/8-inch cap screws, fourteen flat washers, seven 3/8-inch lock nuts, and two 1/4-inch cap screws and nuts. If removed, install two reflectors (18) on front and side of panel and one reflector (4) on rear of panel with two nuts and screws each. If removed install the door latches (7) on side panels (21,20) and on doors (6) with blind rivets.
2. Assemble road side panel (20) onto frame with seven 3/8-inch cap screws, fourteen flat washers, seven 3/8-inch lock nuts, and two 1/4-inch cap screws and nuts. If removed, install two reflectors (18) on front and side of panel and one reflector (4) on rear of panel with two screws and nuts each. If removed, install six caged nuts (19), three in each panel (21,20).

3. As necessary, attach noise dampening insulation to inside surfaces of front panel (15), tool box back panel (14) roof (12) and the two doors (6) using a non-flammable adhesive, such as Bostic No. 1600, or equivalent. Refer to Maintenance Parts List for figure 7-10 for replacement insulation part numbers. If removed install operating instruction plate (17) and attach with four self-tapping screws. Install decal (16). Attach front panel (15) to side panels (20,21) with six screws threaded into caged nuts (19).

NOTE

If new noise dampening material was installed, push unloader control rod through insulation and panel (15) center slot when assembling panel (15) to side panels (20,21).

4. Assemble tool box back panel (14) with panel clips over edge of frame and attach to ends of side panel (20) with two screws and nuts. Assemble roof (12) onto the side panels (20,21) and attach with six screws and nuts. If door bumper (13) was removed, install a new bumper (13).
5. Refer to paragraph 6-6 and assemble fuel tank group. Refer to paragraph 6-5 and assemble hose reels and mounting

group. Refer to paragraph 6-11 and assemble air intake and cleaner group. Refer to paragraph 6-10 and assemble exhaust and muffler group. Refer to paragraph 6-9 and assemble air service group. Refer to paragraph 6-8 and assemble cold weather starting aid group. Refer to paragraph 6-7 and assemble control panel assembly. Assemble unloader control knob (18, figure 7-1) and tighten set-screw.

6. Assemble two fastener receptacles (11, figure 7-10) on end of roof flange over holes provided. Assemble two wing head studs (10) on access door panel (9) and secure with split-ring retainers. Assemble access door (9) to roof (12) with four truss head screws, flat washers, and nuts. If removed, assemble door holders (8) onto roof (12) and two doors (6) with thirty-two screws and nuts, eight each for the four doors.

7. Place four hinge plates (5), two each door, on hinge pins of door (6). Attach hinge plates (5) to ends of side panels (20,21) with eight screws and nuts, two each hinge plate. Adjust hinge plates up or down in screw slots for proper door fit; then, tighten hinge plate hardware.

8. If reflectors (4) were removed from baffle (3), attach reflectors with two screws and nuts each. Assemble two flange assemblies (2) to ends of side panels (20,21) attaching with four screws and lock nuts each. Assemble air baffle (3) to end of unit attaching with ten screws and nuts. Use center nut and screw to attach chain anchor of heat duct cover assembly (1) on each side of air baffle. Assemble cover assembly (1) onto flange assembly (2).

6-14 BATTERY AND MOUNTING GROUP.

6-14.1 Disassembly. Disassemble battery and mounting group (20, figure 7-1) as follows:

1. Remove the battery terminal shields (1, figure 7-11) (red from positive terminal, black from negative terminal). Disconnect battery ground strap (3) and move away from battery. Disconnect positive battery cable (2) from battery and starting motor.

WARNING

To prevent serious burns when handling or filling battery, take precautions against spilling electrolyte on clothing or allowing to come in contact with skin or eyes. Use rubber gloves, protective clothing, and face shield.

2. Remove two wingnuts (5) flat washers (6) and battery holddown (4). Move J-bolts (7) out of your way and lift out battery (8).

6-14.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. To clean battery (8, figure 7-11) seal the vent caps to prevent cleaning solution from entering battery cells. Clean battery (8) with a brush dipped in ammonia or soda solution. When foaming stops, flush off battery with clean water. Unseal the vent caps. Brighten the terminals with steel wool or wire brush. Coat terminals with petroleum jelly. Clean battery hold-down (4) and frame area in the same manner. Clean terminal ends of ground strap (1) and cable (2) with steel wool or wire brush and coat with petroleum jelly.

6-14.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect battery (8, figure 7-11) for missing filler caps, cracks around terminals, and case cracks. Inspect cable (2) for hardened or broken insulating cover. Inspect ground strap (3) for breaks. Examine frame area and holddown (4) for excessive corrosion and damage. Also refer to table 5-4.

6-14.4 Repair or Replacement. Replace all defective parts.

6-14.5 Assembly. Place battery (8, figure 7-11) in position on frame and assemble as follows:

1. Insert two J-bolts (7) through holes in frame and assemble holddown (4) onto J-bolts (7). Secure with two flat

washers (6) and wingnuts (5).

2. Connect and tighten positive battery cable (2) to positive terminal on battery (8) and other end to starter motor solenoid. Connect and tighten battery ground strap (3) to negative terminal on battery. Install terminal shields (1) (red on positive terminal, black on negative terminal).

6-15 RADIATOR AND OIL COOLER GROUP.

6-15.1 Disassembly. Disassemble the radiator and oil cooler group (21, figure 7-1) as follows:

1. Remove housing group (paragraph 6-13) to extent necessary to gain access to radiator and oil cooler group. Loosen hose clamps and remove upper radiator hose (17, figure 7-1) and lower radiator hose (16) from the radiator.

WARNING

The radiator, cooler, and supports is heavy. Use suitable slings and hoist to remove from unit.

2. Attach lifting device to radiator, cooler and supports. Remove eight nuts (17, figure 7-12) and screws (18) and separate fan shroud (16) from supports (20, 21). Remove two nuts (1),

lock washers (2), cap screws (3) and flat washers (4). Remove two nuts (5), lock washers (6), cap screws (7), and flat washers (8). Disconnect two hose assemblies (9) from oil filter and bypass assembly (15, figure 7-1). Carefully lift assembly off unit.

3. Disconnect hose assemblies (9, figure 7-12) from adapters (10), remove adapters (10), elbows (11) and nipples (12). Remove drain cock (13), coupling (14) and nipples (15). Remove tubing clips (19) from drain hose. Remove four nuts (22), lock washers (27), cap screws (23), flat washers (24), and oil cooler (29).
4. Remove six cap screws (25), lock washers (27), and flat washers (26). Separate supports (20, 21) from radiator (28). Only when necessary, remove sponge strips (30), decals (32), and shroud noise dampener (31).

6-15.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning.

WARNING

When cleaning or air drying with compressed air, the air pressure must not exceed 30 psi (2.1 kg/cm²) at air nozzle to avoid injury.

Clean the oil cooler (29, figure

7-12) and radiator assembly (28) core area of accumulated dirt and debris using compressed air blown through in opposite direction of normal air flow. Move air nozzle back and forth as well as up and down. Flush both cooler and radiator with suitable solvent to remove any rust, dirt, or sludge that may have accumulated inside.

6-15.3 Inspection. refer to paragraph 6-3.2 for general inspection. Specific inspection is as follows:

1. Inspect noise dampener (31, figure 7-12) and foam strip (30) for tears, cuts, and other damage.
2. Inspect oil cooler (29) for leaks. Plug outlet connection with a 3/4 NPT pipe plug. Apply air pressure of 30 psi (2.1 kg/cm²) maximum to inlet port. With cooler submerged in water, check for leaks indicated by air bubbles in the water. Remove cooler from water, mark each leak detected; relieve air pressure. Repair leaks by soldering or brazing. Recheck after repair in this same manner. When leaks cannot be repaired, cooler shall be replaced.
3. Inspect radiator assembly (28) for leaks. Plug or cap inlet and outlet opening and the overflow opening. Remove radiator cap and apply air pressure of from 4 to 10 psi (0.3 to 0.7 kg/cm²) at the filler opening. Check for

leaks, mark any detected; relieve air pressure. Repair leaks by soldering or brazing. Recheck with air pressure as before. If leaks cannot be repaired, replace the radiator.

6-15.4 Repair or Replacement.

Refer to paragraph 6-3.3 for general repair or replacement. Repair of oil cooler and radiator (29,28, figure 7-12) is covered in paragraph 6-15.3.2 and 6-15.3.3. above.

6-15.5 Assembly. Assemble the radiator group (figure 7-12) as follows:

1. If fan shroud noise dampener (31) or foam strips (30) were removed, install using non-flammable adhesive, Bostic No. 1600, or equivalent. Install two decals (32), one each side of fan shroud.
2. Assemble oil cooler (29) between supports (20,21) and secure with four flat washers (24) cap screws (23) lock washers (27) and nuts (22). Assemble radiator (28) between supports (20,21) and secure with six flat washers (26), lock washers (27) and cap screws (25).
3. Assemble nipple (15), coupling (14) and drain cock (13). Assemble two nipples (12), elbows (11), adapters (10) and connect hose assemblies (9). Place fan shroud (16) on unit over fan to be attached

after assembly is mounted on unit. Attach lifting device to assembly and carefully lift and install on frame. Attach with two flat washers (8), cap screws (7), lock washers (6) and nuts (5). Assemble two flat washers (4), cap screws (3), lock washers (2) and nuts.

4. Assemble two tubing clips (19) on radiator overflow hose. Attach fan shroud (16) to support (20,21) with eight cap screws (18) and nuts (17) using two of this hardware to attach tubing clips (19). Center fan shroud (16) about fan by moving in mounting slots; then, tighten hardware (17,18). Connect hose assemblies (9) to oil filter and bypass assembly (15, figure 7-1). Connect upper radiator hose (17) and lower radiator hose (16); tighten hose clamps. Assemble housing components removed to gain access to radiator and oil cooler group.

6-16 SPEED CONTROL GROUP.

6-16.1 Disassembly. Disassemble the speed control group (22, figure 7-1) as follows:

1. Disconnect and remove return spring (1, figure 7-13) from control stop block (6) and compressor bracket. Remove two nuts (3) from end of control rod (2). Remove lock nut (4) and disconnect ball joint (5) from in-

jection pump lever. Loosen nut (3) next to ball joint (5) and unscrew ball joint (5).

2. As required, remove three nuts (3) from control rod (2). Unscrew and remove lock nut (7) and stop block (6). It is not necessary to remove arm assembly (8) from compressor unless replacement is necessary.

6-16.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-16.3 Inspection. Refer to paragraph 6-3.2 for general inspection. Inspect return spring (1, figure 7-13) for broken coils and resiliency.

6-16.4 Repair or Replacement. Replace all damaged parts.

6-16.5 Assembly. Refer to figure 7-13 and assemble speed control group as follows:

1. If speed control arm assembly (8) was removed from compressor, assemble with pivot pin. Assemble stop block (6) to arm assembly (8) and secure with lock nut (7). Assemble three nuts (3) onto control rod (2) as shown in figure 7-13. Assemble ball joint (5) on end of rod (2) and lock in place with one nut (3).
2. Place end of control rod (2) through hole in stop block (6). Connect ball joint (5) to injection pump lever and secure ball joint

(5) with lock nut (4). Assemble two nuts (3) on end of control rod (2) and connect return spring (1) to stop block (6) and bracket on compressor.

3. Refer to paragraph 5-2.1 and adjust speed control linkage.

6-17 AIR PRESSURE REGULATOR GROUP.

6-17.1 Disassembly. Disassemble air pressure regulator group (23, figure 7-1) as follows:

1. Unscrew two tubing nuts (2, figure 7-14) securing tube (1) to connector (5) and elbow on top of oil separator assembly. Remove nuts (2), ferrules (3), sleeves (4), and tubing (1).
2. Unscrew and remove connectors (5) from pressure regulator (7). Unscrew and remove pressure regulator (7) from nipple (6). Remove the nipple (6) from compressor control housing.

6-17.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Wipe pressure regulator (7, figure 7-14) with a clean cloth moistened with solvent and wipe dry.

6-17.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Examine tube (1, figure 7-14) for cracking, cuts, or tears. Inspect pressure regulator (7) for any evidence of cracks or other damage.

6-17.4 Repair or Replacement. Replace all damaged parts.

6-17.5 Assembly. Refer to figure 7-14 and assemble the air pressure regulator group as follows:

1. Assemble nipple (6) into compressor control housing. Assemble connector (5) into air pressure regulator (7); assemble regulator (7) onto nipple (6).
2. Assemble sleeves (4) into each end of tube (1). Assemble ferrules (3) and nuts (2). Attach the assembly to connectors (5) and the other end to elbow on top of separator assembly.
3. Refer to paragraph 5-2.2 for air pressure regulator adjustment.

6-18 AIR LINES AND OIL SEPARATOR GROUP.

6-18.1 Disassembly. Disconnect hose assembly (14, figure 7-1) from elbow on bottom of separator tank. Disconnect air service hose (3, figure 7-6) from adapter on minimum pressure valve assembly. Disconnect tube assembly (1, figure 7-14) from elbow on top of separator assembly. Loosen hose clamps (2, figure 7-15) and disconnect hose (1) from adapters (3,40). Disconnect tubing (4,5) from elbows (8). Attach lifting device to oil separator assembly (24, figure 7-1), remove four lock nuts, eight flat washers, and four cap screws securing oil separator assembly to frame. Lift separator assembly out and away from unit. Disassemble separator assembly as follows:

1. Support the assembly securely in an upright position. Disconnect and

remove tubing (6, figure 7-15) and disassemble nuts, ferrules, and sleeves from tubing as necessary. Remove connector (7) from the tank cover (41).

2. Unscrew and remove four tubing elbows (8). Remove line strainer (9), orifice nipple (10), tee (11), nipple (12), blow-down valve assembly (13), nipple (14), pipe cross (15), and nipple (16). Unscrew and remove hose adapter (17).
3. Unscrew and remove minimum pressure valve assembly (18) from nipple (26). Remove cap screws (20) and lock washers (21); separate cover (19) from body (25). Remove spring (22), piston (23); remove o-ring (24) from piston (23). Unscrew and remove nipple (26).
4. Remove safety valve (27), reducing bushing (28) and elbow (29). Remove filler cap (30), remove o-ring (31) from cap (30). Unscrew and remove adapter (32) and elbow (33). Pipe plug (34) need not be removed from tank.
5. Remove pipe plug (35), globe valve (36), nipple (37), elbow (38) and tube elbow (39). Unscrew and remove hose adapter (40).
6. Remove eight cap screws (42) and lock washers (43). Lift cover (41) straight up so that

drain pipe (44) is not damaged. Unscrew and remove the pipe (44). Lift element (45) out of separator tank (46). Decals (47,48) need not be removed except for replacement.

6-18.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. When a varnish condition is in evidence, or was detected during compressor oil filter replacement (paragraph 6-12) refer to paragraph 5-6.1 for special cleaning procedure.

CAUTION

Do not attempt to clean element (45, figure 7-15) in any other manner than described for system cleaning with THERMO-SOLVE (para. 5-6.1). When element is removed for regular maintenance replacement, destroy old element to prevent accidental reuse. Do not reuse because of clean appearance.

6-18.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect element (45, figure 7-15) for rupture. Inspect tubing (4,5,6) for cracks, plugging, and rupture. Inspect safety valve (27) for proper operation.

6-18.4 Repair or Replacement. Replace all damaged parts.

6-18.5 Assembly. Refer to figure 7-15 and assemble the air lines and oil separator group as follows:

1. If decals (48,47) were removed from tank (46), install new decals. Carefully place element (45) into separator tank (46). Assemble element drain pipe (44) in bottom of cover (41). Carefully lower cover (41) into top of tank (46) so that pipe (44) does not damage element (45). Secure cover (41) to tank (46) with eight lock washers (43) and cap screws (42), cover positioned as shown on figure 7-15.
2. Assemble hose adapter (40), tube elbow (39), pipe elbow (38), nipple (37), globe valve (36) and pipe plug (35).
3. Assemble elbow (33) into tank with opening facing upward as shown in figure 7-15. Assemble adapter (32) into elbow (33) install o-ring (31) on filler cap (30) and screw the cap (30) into adapter (32). Assemble elbow (29) into tank with opening facing upward as shown, install reducing bushing (28) and safety valve (27).
4. Install nipple (26) in cover (41). Place o-ring (24) on piston (23). Lubricate the o-ring and piston (24,23) with clean engine oil. Assemble piston with o-ring into body (25) with a turning motion to avoid damage to o-ring. Assemble spring (22) in cover (19); attach cover (19) to body (25) with lock

washers (21) and cap screws (20). Assemble minimum pressure valve assembly (18) onto nipple (26). Install hose adapter (17).

5. Assemble nipple (16) into cover (41). Assemble pipe cross (15), nipple (14), blowdown valve (13), nipple (12), pipe tee (11), orifice nipple (10) and line strainer (9). Assemble four tubing elbows (8). Install connector (7) and connect tubing assembly (6) as shown on figure 7-15.
6. Attach lifting device to separator assembly and lift into mounting position on frame. Secure to frame with four cap screws, eight flat washers, and four lock nuts removed at disassembly.
7. Connect tubing (4,5) and tube assembly (1, figure 7-14) to elbows (8, figure 7-15). Install hose clamps (2, figure 7-15) onto hose (1). Assemble hose (1) onto hose adapter (3), located on compressor discharge elbow, and hose adapter (40). Tighten hose clamps (2).
8. Attach air service hose (3, figure 7-6) to adapter (17, figure 7-15). Connect hose assembly (14, figure 7-1) to elbow (39, figure 7-15).

6-19 AIR COMPRESSOR ASSEMBLY.

6-19.1 Disassembly. To remove and disassemble the air compressor assembly (26, figure 7-1),

disconnect air tube assembly from separator assembly at compressor intake housing. Remove wiring harness wire ties as necessary. Disconnect compressor oil sensor bulb from discharge elbow. Remove two cap screws and lock washers attaching compressor discharge elbow (25, figure 7-1), remove the elbow (25) and o-ring. Attach lifting device to eyebolt on top of compressor. Remove twelve cap screws and lock washers attaching compressor to engine flywheel housing. Carefully move compressor assembly back away from engine to disengage drive coupling from pins. Place air compressor assembly (26, figure 7-1) on a work bench and remove lifting device. Refer to figure 7-16 and disassemble as follows:

1. Remove six cap screws (2, figure 7-16) and lock washers (3) and the spring bracket (4). Separate cover (1) from housing. Remove unloader piston (5) from unloader rod (6). Unscrew and remove rod (6) from cover (1). Remove diaphragm (7), intake cylinder (8) and gasket (9). Remove lock nut (10), piston (11), spring (12), and stem (13) from cylinder (8). Remove spring (14) and intake valve (15).
2. Loosen lock nut (17) and remove pivot clamp (16) from guide (20). As necessary, remove nut (17), cap screw (18) and pivot pin (19). Remove two screws (21), lock washers (22), push rod guide (20) and gasket (23). Remove bushing (24) and o-ring (25) from guide (20). Remove push rod

(26) from body (31). Re-relief plug (27), o-ring (28), relief spring (29) and ball (30) from body (31). Remove three cap screws (32) and lock washers (33); separate body (31) from end cover (43) and remove gasket (34).

3. Remove six cap screws (36) and lock washers (37), remove bearing cover (35) and gasket (38). Remove cap screw (40), lock washer (41) and bearing retainer (39). Remove five cap screws (44), one cap screw (45), six seal washers (46), pull off end cover (43) and remove outer race of bearing (42). Inner race of bearing remains on end of rotor shaft (74). As necessary, remove pipe plug (47). Remove o-ring (48).
4. Remove bolt (50), lock washer (51) and retainer (49). Remove drive coupling (53), two gripsprings (52) and coupling shaft key (54). Remove six cap screws (56) and seal washers (57) and separate engine adapter (55) from end cover (73); remove gasket (58). Remove six cap screws (60) and lock washers (61), remove oil seal cover (59) and gasket (62). Remove oil seal (63), o-ring (64), sealing sleeve (65), oil seal sleeve (66), and o-ring (67). Remove eight rotor blades (68).

5. Carefully slide rotor, shaft, and cover assembly (69) out of stator (85). Remove ball (75) from stator, remove o-ring (76) and as necessary remove tube connector (77), two drive pins (79) and serial number plate (78).

CAUTION

Since excessive heat causes softening of metal, a bearing inner race heated for removal must be discarded and entire bearing replaced.

6. When necessary to disassemble the assembly (69), use a gear puller, or equivalent, to remove inner race of bearing (42) from end of shaft (74). If inner race cannot be removed with puller, heat the race evenly with a torch and pull race off the shaft as quickly as possible.

NOTE

Make note of drain holes in the rotor (70), blade slots. These holes shall be on the leading edge when rotor is installed. Mark as needed for assembly reference.

7. Remove rotor (70) from shaft (74); remove key (71). Pull end cover (73) off shaft (74). Remove

the three piece bearing (72). Remove inner race of the bearing (72) as described for bearing (42) in step 6 above. Observe the caution preceding step 6.

8. Remove the two drain valve plugs (80), O-ring (81), springs (82), and drain valves (83). As necessary, remove eyebolt (84) from stator (85).

6-19.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-19.3 Inspection. Refer to paragraph 6-3.2 for general inspection. Refer to Table 6-1, Table of Limits for specific inspection.

6-19.4 Repair or Replacement. Refer to paragraph 6-3.3 for general repair or replacement. Replace all defective parts and those not within limits given in table 6-1.

6-19.5 Assembly. Refer to figure 7-16 and assemble air compressor assembly as follows:

1. If eyebolt (84) was removed, install eyebolt (84) in stator (85). Assemble two each drain valves (83), springs (82), o-ring (81), and drain valve plugs (80).
2. Press inner race of bearing (72) onto end of rotor shaft (74) until it bottoms against shoulder on the shaft. Assemble end cover (73) onto shaft (74); install outer race of bearing (72). Place key (71) in

keyway on shaft and slide rotor (70) onto shaft (74).

CAUTION

Assemble rotor (70) onto shaft (74) with blade slot drain holes on rotation leading edge as noted at disassembly.

3. Press inner race of bearing (42) onto end of rotor shaft (74) until it bottoms on shaft shoulder. Place steel ball (75) into stator (85). Coat o-ring (76) with petroleum jelly and install on stator (85). Carefully assemble rotor, shaft, and cover assembly (69) into stator (85). Place facing washer of bearing (72) over end of shaft (74) against the outer race. Coat the engine rotor blades (68) liberally with clean compressor oil and install in rotor (70) slots. If removed, install serial number plate (78) with two drive pins (79) and install tube connector (77).
4. Coat o-rings (67, 64) with petroleum jelly. Assemble o-ring (67), oil seal sleeve (66), sealing sleeve (65), o-ring (64), press oil seal (63) into cover (59) with sealing lip of seal facing compressor, install gasket (62), cover (59) and secure with six lock washers (61) and cap screws (60).

Assemble gasket (58), engine adapter (55) and secure with six seal washers (57) and cap screws (56).

5. Install gripsprings (52), key (54), drive coupling (53), retainer (49), lock washer (51), and retainer bolt (50) as shown in figure 6-1.

1. DRIVE COUPLING
2. ROTOR SHAFT
3. SMALL GRIPSRING (OUTSIDE TAPER)
4. LARGE GRIPSRING (INSIDE TAPER)
5. LOCK WASHER
6. RETAINER BOLT
7. GRIPSRING RETAINER
8. COUPLING KEY

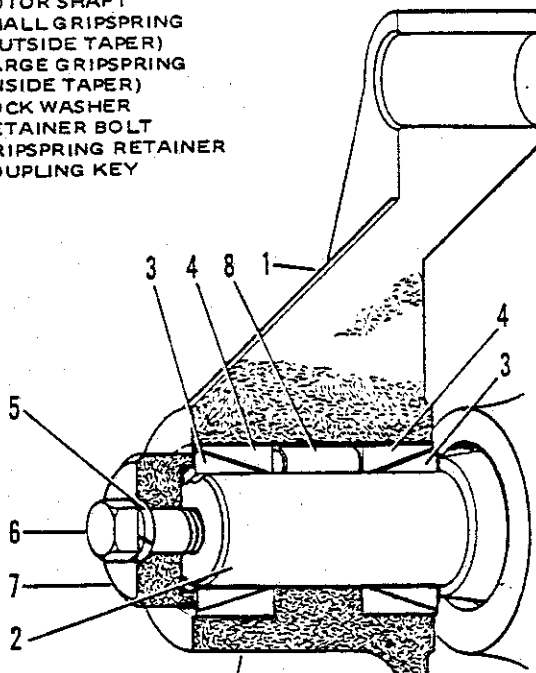


Figure 6-1. Gripspring Installation

6. Coat o-ring (48) with petroleum jelly and assemble onto stator (85). If removed, install pipe plug (47) into end cover (43). Assemble intake end cover (43) and secure to stator with one cap screw (45), five cap screws (44) and six seal washers (46). Assemble outer race of bearing (42) and re-

tainer (39). Secure with lock washer (41) and cap screw (40). Assemble gasket (38), bearing cover (35) and secure with six lock washers (37) and cap screws (36).

7. Assemble steel ball (30) spring (29), o-ring (28) and relief plug (27) into body (31). Place gasket (34) on end cover (43); assemble body (31) to end cover and secure with three lock washers (33) and cap screws (32).
8. Assemble push rod (26) into body (31). Install o-ring (25) and bushing (24) into guide (20). Assemble gasket (23), guide (20), and secure with lockwashers (22) and screws (21). If removed, install pivot pin (19). Place pivot clamp (16) over guide (20), insert cap screw (18), install and tighten lock nut (17).
9. Assemble intake valve assembly (15), and spring (14). Assemble stem (13) into cylinder (8) and assemble spring (12), piston (11); secure with lock nut (10). Screw unloader rod (6) through cover (1). Place stub shaft of unloader piston (5) into rod (6). Assemble gasket (9), cylinder (8), diaphragm (7), cover (1), and spring bracket (4) to body (31), securing with six lock washers (3) and cap screws (2).

10. Attach lifting device to eyebolt (84) and assemble air compressor assembly back into unit. Align drive bushing on engine flywheel adapter ring with holes in drive coupling (53, figure 7-16). Attach engine adapter (55) to engine flywheel housing with twelve lock washers and cap screws removed at disassembly. Remove lifting device.

11. Assemble o-ring and discharge elbow (25, figure 7-1) and secure with two lock washers and cap screws. Connect compressor oil temperature sensor bulb in discharge elbow. Connect air tube assembly from separator assembly to compressor intake housing. Install any wiring harness wire ties removed at disassembly.

6-20 ENGINE ASSEMBLY.

6-20.1 Disassembly. To remove and disassemble the engine assembly (33, figure 7-1), remove four cap screws and lock washers (28), fan blade (27) and fan spacer (29). Remove two drive bushings (30) and drive pins (31). Remove eight cap screws and lock washers attaching drive adapter ring (32) and remove the adapter ring. Remove engine water temperature sensor from cylinder head. As necessary remove wiring harness wire ties and disconnect wiring harness (9) from alternator, starting motor, and fuel injection pump. Remove wire assembly (11). Loosen hose clamps and disconnect upper radiator hose (17) and lower radiator hose (16). Disconnect

fuel pick-up hose from fuel transfer pump and remove elbow and adapter (13). Disconnect battery cable from starter. Disconnect engine oil pressure tube (8) and remove elbow. Disconnect fuel return hose from fuel leak-off line and remove hose clamp. Disconnect speed control rod from injection pump lever. Disconnect cold weather starting aid line from engine air intake. Attach lifting device to engine straps. Remove four lock nuts (35) and cap screws (36) securing rear engine mounts (34) to frame. Remove lock nut, snubbing spacer, cap screw, flat washer, and front vibration mount (42). Lift engine out and away from unit. Remove cap screws (38), lock washers (39) snubbing spacers (40) and rear vibration mounts (37) freeing the two rear engine mounts (34). Remove two lock nuts, four cap screws, and two lock washers freeing front engine mount (41) from engine. Refer to figure 7-17 and disassemble engine as follows:

1. Pull dipstick (1) with o-ring (2) out of threaded nipple (3). It is not necessary to remove the nipple (3) and jam nut (4). Unscrew and remove oil filter (5) and when necessary the threaded nipple (6).
2. Remove two attaching bolts and air intake (7) and gasket (8). Turn and remove oil filler cap (9) and gasket. Remove two attaching cap screws and filler neck (10) and gasket (11). Remove cap screw, washer, two hose clamps and disconnect head cover vent hose (12) from vent fitting (13). Remove fitting (13) and

its o-ring. Loosen two hose clamps and remove water bypass hose (14) and the hose fitting. Remove two cap screws, thermostat cover (15), cover gasket, and lift out water thermostat (16). Remove two cap screws, thermostat housing (17) and gasket. It is not necessary to remove pipe plug from housing (17).

3. Remove six cap screws, washers, and exhaust manifold (18). Remove the three manifold gaskets. Remove the alternator and mounting group (19). Refer to paragraph 6-21 and figure 7-18 for details.
 4. Remove nut, cap screw, and two lock washers attaching starting motor assembly (20, figure 7-17). Remove the assembly and mounting gasket. It is not necessary to remove mounting stud. Refer to paragraph 6-22 and figure 7-19 for details.
 5. Remove fuel filter and transfer pump group (21, figure 7-17). Refer to paragraph 6-23 and figure 7-20 for details.
 6. Remove fan belt (22, figure 7-17) and the oil cooler group (23). Refer to paragraph 6-24 and figure 7-21 for oil cooler group details. Remove fuel injection system and nozzle group (24, figure 7-17). Refer to paragraph 6-25 and figure 7-22 for details.
 7. Remove three each nuts, lock washers, flat washers and the fuel injection pump assembly (25, figure 7-17). Remove the mounting gasket and as necessary, the three mounting studs. Refer to paragraph 6-26 and figure 7-23 for injection pump details.
 8. Remove the water pump group (26, figure 7-17). Refer to paragraph 6-27 and figure 7-24 for details. Remove flywheel and housing group (27, figure 7-17). Refer to paragraph 6-28 and figure 7-25 for details.
 9. Remove rocker arm cover, rocker arms, valves, and cylinder head group (28, figure 7-17). Refer to paragraph 6-29 and figure 7-26 for details.
 10. Remove the oil pan and oil pump group (29, figure 7-17). Refer to paragraph 6-30 and figure 7-27 for details. Remove pistons and connecting rods group (30, figure 7-17). Refer to paragraph 6-31 and figure 7-28 for details.
 11. Remove gear cover and end plate group (31, figure 7-17). Refer to paragraph 6-32 and figure 7-29 for details.
 12. Remove crankshaft and cylinder block group (32, figure 7-17). Refer to paragraph 6-33 and figure 7-30 for details.
- 6-20.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning

instructions. The complete engine assembly, less starting motor assembly (20, figure 7-17) and alternator (19), may be steam cleaned. Cleaning instructions for components of the engine are contained in the cleaning subparagraph for that component.

6-20.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspection of components is found in the detailed paragraphs and in table 6-1, Table of Limits.

6-20.4 Repair or Replacement. In general, defective parts shall be replaced. Detailed repair or replacement where applicable, for components is covered in detailed paragraphs for that component.

6-20.5 Assembly. After engine components have been repaired, as necessary (paragraphs 6-21 through 6-33), assemble the engine as follows:

1. Refer to paragraph 6-32.5 and assemble the crankshaft and cylinder block group (32, figure 7-17).
2. Refer to paragraph 6-32.5 and assemble the gear cover and end plate group (31, figure 7-17).
3. Refer to paragraph 6-31.5 and assemble piston and connecting rods group (30, figure 7-17).
4. Refer to paragraph 6-30.5 and assemble oil pan and oil pump group (29, figure 7-17).
5. Refer to paragraph 6-29.5 and assemble rocker arm cover, rocker arms, valves, and cylinder head group (28, figure 7-17).
6. Refer to paragraph 6-28.5 and assemble the flywheel and housing group (27, figure 7-17).
7. Refer to paragraph 6-27.5 and assemble the water pump group (26, figure 7-17).
8. Refer to paragraph 6-26.5 and assemble the fuel injection pump assembly (25, figure 7-17). If removed, install three pump mounting studs, install mounting gaskets, assemble fuel injection pump assembly (25) onto studs and secure with three each flat washers, lock washers, and nuts removed at disassembly.
9. Refer to paragraph 6-25.4 and assemble the fuel injection system and nozzle group (24, figure 7-17).
10. Refer to paragraph 6-24.5 and assemble the oil cooler group (23, figure 7-17). Install the fan belt (22).
11. Refer to paragraph 6-23.5 and assemble the fuel filter and transfer pump group (21, figure 7-17).
12. If starting motor assembly mounting stud was removed, install the stud. Refer to paragraph 6-22.5 and assemble the starting motor assembly (20, figure 7-17). Install mounting gasket, assemble the starting motor onto engine and

- secure with lock washers, cap screws, and nut removed at disassembly.
13. Refer to paragraph 6-21.5 and assemble the alternator and mounting group (19, figure 7-17).
 14. Install three exhaust manifold gaskets, assemble exhaust manifold (18, figure 7-17) onto engine and secure with six washers and cap screws.
 15. Install thermostat housing gasket, thermostat housing (17, figure 7-17) and secure with two cap screws. Install engine water thermostat (16). Install thermostat cover gasket, thermostat cover (15), and secure with two cap screws. Assemble water bypass hose fitting, water bypass hose (14) and tighten the two hose clamps.
 16. Assemble head cover vent fitting o-ring and vent fitting (13, figure 7-17). Assemble hose clamps onto vent hose (12), attach hose (12) to fitting (13), tighten hose clamp at fitting and secure other clamp with washer and cap screw removed at disassembly.
 17. Install oil filler neck gasket (11), oil filler neck (10) and attach with two cap screws. If removed, install oil filler cap gasket into cap (9) and install the cap (9) onto filler neck (10).
 18. Install air intake gasket (8), air intake (7) and attach with two bolts. If removed, install threaded nipple (6) and the oil filter (5). If removed, install threaded nipple (3) and jam nut (4). Assemble o-ring (2) on dipstick (1) and install the dipstick (1) into nipple (3).
 19. Attach front engine mount (41, figure 7-1) with two lock washers, four cap screws, and two lock nuts. Attach two rear engine mounts (34) with vibration mounts (37), snubbing spacers (40), lock washers (39) and cap screws (38). Attach lifting device to engine lifting straps and place engine in mounting position on unit frame. Install front vibration mount (42) and assemble flat washers, cap screw, snubbing spacer, and lock nut removed at disassembly. Attach rear engine mounts (34) to frame with four cap screws (36) and lock nuts (35). Remove the lifting device.
 20. Connect cold weather starting aid to engine air intake. Connect speed control rod to fuel injection pump lever. Connect fuel return hose to fuel leak-off line and attach hose clamp to engine. Install

engine oil pressure tube elbow on engine and connect the tube (8). Connect battery cable to starting motor. Install fuel line adapter and elbow (13) in fuel transfer pump and connect fuel pick-up hose. Connect lower radiator hose (16) and upper radiator hose (17); tighten hose clamps. Install alternator ground wire assembly (11). Connect wiring harness leads to fuel injection pump, starting motor, and alternator (refer to figure 1-4, Wiring Diagram). Attach wire ties as necessary. Install engine water temperature sensor in cylinder head. Attach drive adapter ring (32, figure 7-1) with eight lock washers and cap screws. Install drive pins (31) and assemble drive bushings (30) onto pins (31). Assemble fan spacer (29) and fan blade (27); attach with four lock washers and cap screws (28).

6-21 ALTERNATOR AND MOUNTING GROUP.

6-21.1 Disassembly. Refer to figure 7-18 and remove alternator and mounting group from engine and disassemble alternator as follows:

1. Remove cap screw (2), lock washer (3) and flat washer (4). Remove nut (5), three cap screws (7), four lock washers (6), three washers (8),

front support (9), two spacers (10), pulley shield (1), bushing (11), and washer (12). Disconnect and remove connector body (13). Remove the alternator (22) from unit and place on clean work bench.

2. Remove cap screws (15, 19), lock washers (16), flat washers (17, 20), adjusting strap (14), and bracket (18).
3. Place alternator assembly (22) in a vise with soft jaws, holding on mounting ear of housing (32). Remove pulley nut and washer, remove the pulley (21), fan (23), and remaining parts of retainer kit (24). Remove screws and washers and the regulator (25).

NOTE

As disassembly progresses, make note of lead connections and carefully disconnect leads as necessary to remove components.

4. Remove screws and washers and the brush holder (26). Remove screws and stator hood (27). Remove screws and washers and the stator (28). Remove screws and washers and connector (29). Remove nuts, washers, insulation, negative terminal (30) and positive cap screw (31).

CAUTION

Pay particular attention to location of insulation washers and sleeves during disassembly to avoid grounding and as an aid in assembly of the parts.

5. Remove four housing screw kits (33) and separate bearing housing (32) from stator housing (39). Remove bearing retainer kit (34) and bearing (35). Remove rotor assembly (36) with spacer (37) and bearing (38). Only when necessary separate stator (40) from housing (39). Decal (41) need be removed only for replacement.

6-21.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Clean the electrical components as follows:

WARNING

Provide adequate ventilation when using trichloroethane, or equivalent, to clean electrical components. Avoid prolonged breathing of vapors and minimize contact with skin.

CAUTION

Do not use steam or water to clean any electrical component. Bearings (35,38, figure 7-18) are sealed and contain lubrica-

tion for the life of the bearing. Do not clean bearings in solvent that might dissolve lubricant.

1. Use trichloroethane, or equivalent to clean electrical components of alternator assembly. Dry thoroughly before testing or reassembly.
2. Clean nonelectrical components, such as pulley (21), fan (23), and the like using solvent, Fed Spec P-D-680, Type II.

6-21.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Specific inspection is as follows:

1. Inspect the brushes in brush holder (26, figure 7-18). They shall be at least 3/16 inch (4.76mm) long, free of cracks, and should not be oil soaked.
2. Inspect stator winding (40) for discoloration of winding insulating enamel. Discoloration indicates overheating that may result in shorting or grounding of windings.
3. Use a multimeter and check each stator circuit winding for continuity. Check for infinite resistance from each winding lead to laminated stator.
4. Inspect rotor assembly (36) for stripped threads on shaft, worn key slot, worn or dry bearings (35,38). Clean

rotor slip ring assembly brush contacting surfaces with a fine crocus cloth per Federal Specification P-C-458, or equivalent. Wipe away residue and inspect for wear beyond this restoration.

5. Inspect housings (32,39) for cracks or broken castings, stripped threads, and evidence of severe wear in bearing bores due to worn or damaged bearings.
6. Inspect all parts for cracks, breaks, damaged screw threads, or any other defect.

6-21.4 Repair or Replacement.
Refer to paragraph 6-3.3 for general repair or replacement instructions. Replace all parts that show mechanical or electrical defects.

6-21.5 Assembly. Refer to figure 7-18 and assemble the alternator and mounting group as follows:

1. If stator (40) was separated from housing (39) assemble the stator (40) into housing (39) positioned as it was prior to disassembly. Press bearing (38) onto rotor (36) shaft. Press bearing (35) into housing (32) and install bearing retainer kit (34).
2. Assemble stator housing (39) with stator (40), rotor assembly (36), housing (32) and install the four housing screw kits (33).

3. Assemble positive cap screw and nut (31), negative terminal (30) and connector (29). Assemble stator (28), stator hood (27) and brush holder (26). Assemble regulator (25).

4. Assemble spacer, washer, fan (23), pulley (21) and remaining parts of fan retainer kit (24) to complete assembly of alternator assembly (22).

5. Attach bracket (18) to engine with flat washers (20), lock washers (16) and cap screws (19). Attach adjusting strap (14) to engine with flat washer (17), lock washer (16) and cap screw (15). Connect the connector body (13). (See paragraph 6-21.6 for bench test).

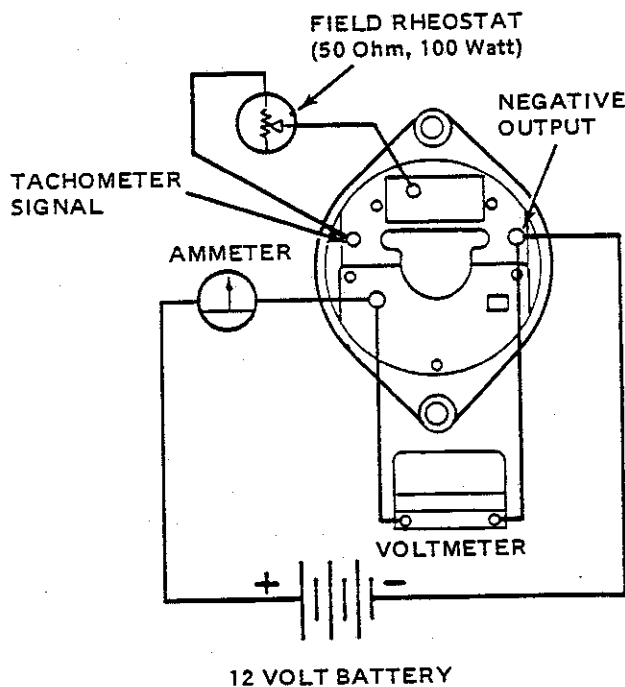
6. Assemble alternator assembly (22) onto engine with washers (12) and bushing (11) in place. Assemble shield (1), spacers (10), front support (9) and secure with flat washers (8), lock washers (6), cap screws (7), and nut (5). Assemble flat washer (4), lock washers (3) and cap screw (2). If decal (41) was removed, install a new decal (41).

6-21.6 Alternator Bench Test.
Before assembly of alternator (22, figure 7-18) onto engine paragraph 6-21.5.6, bench test as follows:

1. With regulator removed mount the alternator on a test bench and make electrical connections as shown on figure 6-2. Set rheostat at maximum resistance. Operate the alternator, in proper direction of rotation, at 3000 to 4000 rpm.
2. Gradually reduce resistance of rheostat and observe that charging starts. Reduce resistance until output of

35 amperes is obtained. Stop test immediately after reaching 35 amperes output.

3. Replace the alternator if output is not at least 25 amperes.
4. Assemble the regulator back onto alternator and assemble the good alternator onto engine, paragraph 6-21.5.4. thru 6-21.5.6.



ALTERNATOR TEST EQUIPMENT REQUIRED		
Nomenclature	Part Number	National Stock Number
Multimeter	AN/PSM-6	6625-00-643-1686
Carbon Pile Load	BST-11 (Mfd by 82386)	
Voltmeter	622 (Mfd by 65092)	6625-00-193-6944
Resistor, Series, 0.25 ohm, 100 Watts	None	
Rheostat, Wirewound, 0-50 Ohms, 100 Watts	None	

Figure 6-2. Alternator Charging Test

6-22 STARTING MOTOR ASSEMBLY.

a. After removal of starting motor assembly, paragraph 6-20.1.4, perform the following tests to determine repair requirements.

- (1) Solenoid. Disconnect all leads from the solenoid and isolate leads carefully. Make test connections as shown in figure 6-3 to solenoid switch (S) terminal and to ground (G). Use the carbon pile across the battery to decrease battery voltage to 10 volts. Ammeter reading should be 75 to 175 amps. A higher reading indicates a shorted or grounded hold-in winding, and a lower reading excessive resistance. To check the pull-in winding, connect from solenoid switch terminal (S), and to the solenoid motor (M) terminal.

NOTE

If needed to reduce voltage to 10 volts, connect the carbon pile between the battery and (M) terminal as shown in dotted lines of figure 6-3 instead of across the battery as shown in solid lines. If not needed, connect a jumper directly from the battery to the (M) terminal.

CAUTION

To prevent overheating, do not allow pull-in

winding to be energized more than 15 seconds. The current draw will decrease as the winding temperature increases.

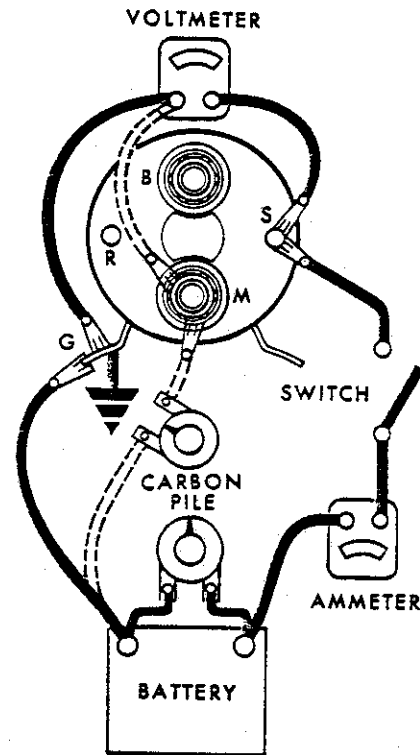


Figure 6-3. Checking Starter Solenoid

- (2) No-Load Testing. Make test as shown in figure 6-4. Connect a voltmeter from the motor terminal to the motor frame, and use an r.p.m. indicator to measure armature speed. Connect the motor and an ammeter in series with a fully charged 12 volt battery and a

switch in the open position from the solenoid battery terminal to the solenoid switch terminal. Close the switch and compare the r.p.m. current, and voltage readings. Readings should be 6900-14900 r.p.m., 75-175 amps (included solenoid), and 10 volts. Adjust voltage by varying the carbon pile. It is not necessary to obtain the exact voltage specified, as an accurate interpretation can be made by recognizing that if the voltage is slightly higher the r.p.m. will be proportionately higher, with the current remaining essentially unchanged. However, if the exact voltage is desired, a carbon pile connected across the battery can be used to reduce the voltage to the specified value. Make disconnections only with the switch open.

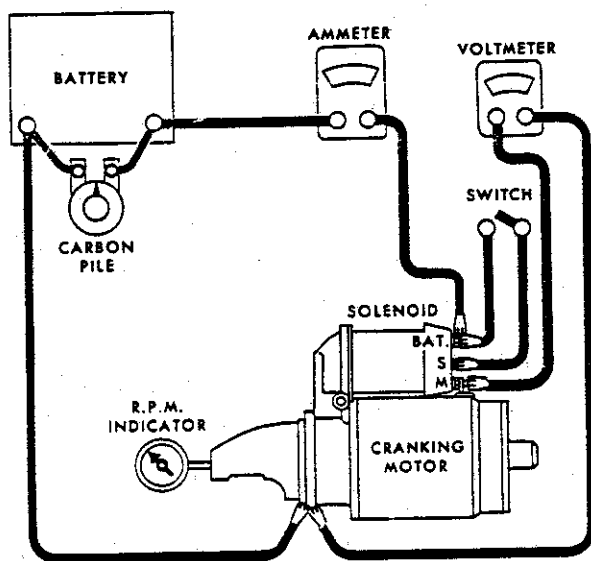


Figure 6-4. No-Load Test Setup

b. Interpret the test results as follows:

- (1) Rated current draw and no-load speed indicates normal conditions of cranking motor.
- (2) Low free speed and high current draw indicates:
 - (a) Too much friction - tight, dirty, or worn bearings, bent shaft or loose pole shoes allowing armature to drag;
 - (b) Shorted armature. Can be further checked with growler after disassembly; (c) Grounded armature or fields. Check further after disassembly.
- (3) Failure to operate with high current draw indicates: (a) A direct ground in the terminal or field; (b) Frozen bearings (should have been determined by turning armature by hand).
- (4) Failure to operate with no current draw indicates: (a) Open field circuit. Can be checked after disassembly by inspecting internal connections and tracing circuit with a test lamp; (b) Open armature coils. Inspect armature after disassembly; (c) Broken brush springs, worn brushes, high insulation between commutator bars or other causes which would prevent good contact between brushes and commutator.
- (5) Low no-load speed and low current draw indi-

cates: (a) High internal resistance due to poor connections, defective leads, dirty commutator and causes listed in interpretation (4) above.

- (6) High free speed and high current draw indicates shorted fields. If shorted fields are suspected, replace field coil assembly and check for improved performance.

6-22.1 Disassembly. Mark positioning of drive housing (12, figure 7-19) field frame (51), and commutator end frame (22) to aid in alignment at assembly. Refer to figure 7-19 and disassemble as follows:

1. Remove screws (2,3) and disconnect field coil connection (1) from solenoid switch (4). Remove screws (5), lock washers (6) and solenoid switch (4). Remove gasket (7), spring (8) and contact assembly (9). Press out lever pin (11) and remove plunger (10).
2. Remove through bolts (13) and separate drive housing (12) from field frame (51). As necessary remove bushing (14), wick plug (15) and wick (16). It is not necessary to remove dowel pin (21) unless replacement is required. Remove nut (18), lock washer (19), lever stud (20) and shift lever (17).
3. Separate end frame (22) from field frame (51). Remove bushing (23) and

wick (24). Separate armature (33) and drive assembly (29). Remove thrust collar (32) and brake washer (34). Refer to figure 6-5 and remove drive assembly (29) from armature (33) by sliding a cylinder shaped tool onto armature shaft so it butts against pinion stop. Tap cylinder with a hammer driving stop collar (30) toward armature and off of the retaining ring (31). Remove the retaining ring (31), stop collar (30), drive assembly (29) and washer (28).

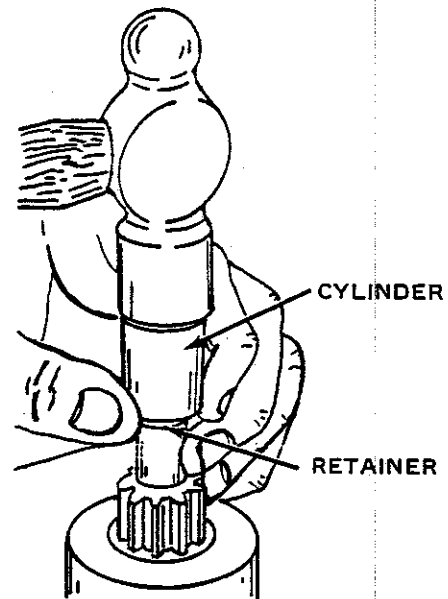


Figure 6-5. Removing Retainer from Snap Ring

4. Remove screws (27), center bearing plate (26) and bushing (25). Remove brush screws (36,37) and brushes (35). Remove brush holders (38,39) and brush springs (40). To disassemble support

package (41), remove leads (42), nuts (44), lock washers (45), screws (43) and remove support pins (46).

5. Remove pole shoe screw (48), pole shoes (47), grommet (49) and field coil assembly (50) from field frame (51). Decal (52) need not be removed unless replacement is required.

6-22.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Remove copper chips, solder, or foreign matter from armature (33, figure 7-19) with soft brush. Remove foreign matter from coil assembly (50) and field frame (51) by blowing dry, filtered, low-pressure air through the assemblies.

CAUTION

Do not use steam or water to clean any electrical component.

6-22.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect specific components as follows:

1. Make certain brush holders (38, 39, figure 7-19) are clean and that brushes (35) are not binding in holders. Check brush (35) wear compared to new brush. If worn excessively, replace brushes (35). The full brush surface should ride on the commutator to give proper performance.

Check brush springs (40) by hand to make sure the springs are giving firm contact between brushes and commutator. If springs (40) are distorted or discolored, replace springs.

2. Inspect commutator end of armature (33) for excessive wear, dirt, out-of-round, and high insulation. Do not turn the commutator in a lathe or undercut insulation on this armature. Use number 240 grit, or equivalent emery paper to clean commutator. If commutator cannot be cleaned in this manner, replace the armature (33). Inspect armature for short circuits, opens, and grounds as follows:
 - a. Short circuits are located by rotating the armature in a growler with a steel strip such as a hacksaw blade held on the armature. The steel strip will vibrate on the area of the short circuit. Shorts between bars are sometimes produced by brush dust or copper between the bars.
 - b. Opens may be located by inspecting the points where the conductors are joined to the

commutator for loose connections. Poor connections cause arching and burning of the commutator. If the bars are not badly burned, leads originally soldered to the riser bars can be resoldered.

- c. Grounds in the armature can be detected by the use of a test lamp. If the lamp lights when one test prod is placed on the commutator and the other test prod on the armature core or shaft, the armature is grounded.

3. The field coils (50, figure 7-19) should be inspected for grounds and opens using a test lamp as follows:

- a. Grounds — Disconnect field coil ground connections. Connect one test prod to the field frame and the other to the field connector. If the lamp lights, the field coils are grounded and must be repaired or replaced. This check cannot be made if the ground connection cannot be disconnected.
- b. Opens — Connect test lamp prods to the end of field

coils. If lamp does not light the field coils are open.

If the field coils need to be removed for repair or replacement, a pole shoe spreader and pole shoe screwdriver should be used. Care should be exercised in replacing the field coils to prevent grounding or shorting them as they are tightened into place. Where the pole shoe has a long lip on the side, it should be assembled in the direction of armature rotation.

4. Inspect drive housing bushing (14, figure 7-19) and commutator end bushing (22) for excessive wear. Refer to table 6-1.
5. Inspect drive assembly (29, figure 7-19) for broken or cracked teeth on pinion. Pinion should turn smoothly with slight drag in the overrunning direction and lock in the opposite direction. If it does not, replace the assembly.

6-22.4 Repair or Replacement.

Replace all parts found defective during inspection. If inspection indicates bushings (14,23, figure 7-19) are worn or dry (no lubricant) they must be replaced as follows:

1. Remove bushings (14, 23) from their respective housings (12, 22) using a press or puller as

required. Remove oil wick plug (15), oil wick (16) and oil wick (24).

2. Soak the wicks (16, 24) and bushings (14, 23) with a non-detergent SAE No. 20 oil, or equivalent. Install wick (24) and press a new bushing (23) into commutator end frame (22). Use a thin-walled tube to press in new bushing (14) into drive housing (12) as shown in figure 6-6. Install oil wick (16) and plug (15).

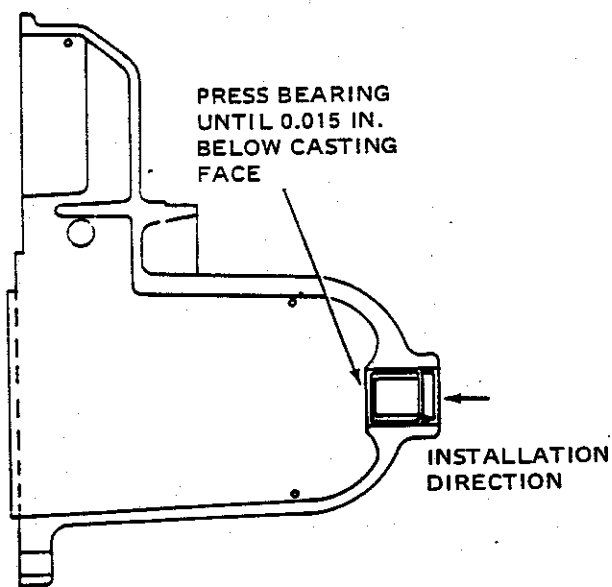


Figure 6-6. Replacing Drive Housing Bushing

6-22.5 Assembly. Refer to figure 7-19 and assemble the starting motor as follows:

1. Lubricate splines and drive end of armature (33) shaft with clean engine oil, SAE 10, or equivalent. Heavier oil may cause failure of pinion to mesh with drive gear at low temperatures.

Place center bushing (25), bearing plate (26), center washer (28) and drive assembly (29) on armature (33) shaft.

2. Place stop collar (30) on armature shaft with cupped surface facing the retaining ring groove. Place the retaining ring (31) on end of shaft. With a piece of wood on ring (31), force it over the shaft with a light hammer blow as shown in figure 6-7. Then, slide retaining ring (31) down into shaft groove. Place a washer over the shaft and squeeze stop collar and washer together with pliers as shown in figure 6-7. Remove the washer. Install thrust collar (32, figure 7-19).

3. Assemble shift lever (17, figure 7-19) into drive housing (12) and attach with stud (20), lock washer (19) and nut (18). If dowel pin (21) was removed, install the pin. Refer to paragraph 6-22.4.1 and 6-22.4.2 for assembly of bushings (23, 16) and plug (15).

4. If disassembled, assemble field coil assembly (50) into field frame (51), assemble pole shoes (47) and attach with pole shoe screws (48). Install grommet (49) and connect coil connector (1) with screw (2). If disassembled, attach support package (41) holders with pins (46), screws (43), lock washers (45), nuts (44), and leads (42).

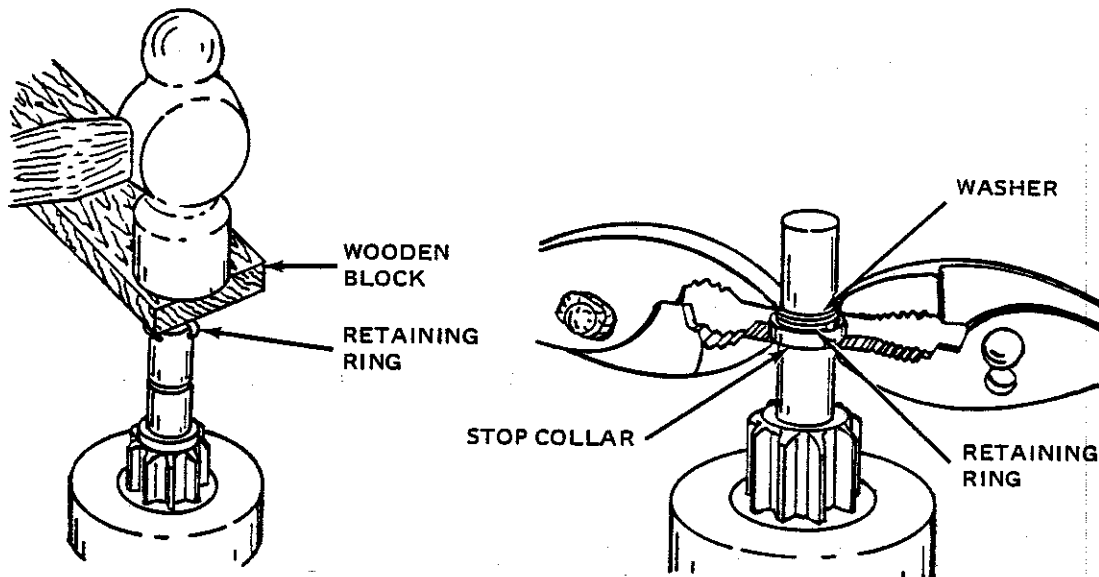


Figure 6-7. Forcing Retaining Ring Over Shaft and Retainer Over Ring

- Assemble brush springs (40), brush holders (39, 38), brushes (35) and screws (37,36).
5. Assemble armature (33) assembly into drive housing (12), attach bearing plate (26) with screws (27). Place brake washer (34) on armature shaft end. Place armature in field frame with drive housing (12) aligned with marking made at disassembly. Assemble end frame (22) aligned with marking and install through bolts (13).
 6. Assemble plunger (10) to lever (17) with lever pin (11). Assemble contact assembly (9), spring (8), gasket (7) and attach solenoid switch (4) with lock washers (6) and screws (5). Attach connector (1) with screw (3). If removed, install new decal (52).
 7. The pinion clearance cannot be adjusted but should be checked after assembly. Improper clearance indicates worn parts. Refer to figure 6-8 and check as follows:
 - a. Disconnect the motor field coil connector (1, figure 7-19) from the solenoid motor terminal and INSULATE IT CAREFULLY.
 - b. Connect a 12 volt battery from the solenoid switch terminal to the solenoid frame (figure 6-8).
 - c. Momentarily flash a jumper lead from the solenoid motor terminal to the solenoid frame. This will shift the pinion into cranking position and will remain in

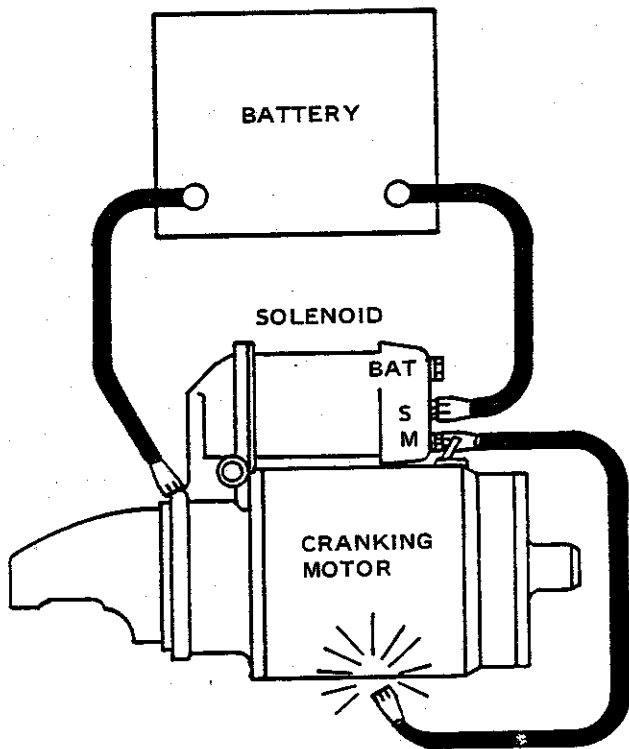
this position until battery is disconnected.

- d. Push the pinion back towards the commutator end to eliminate slack movement.
- e. Measure the distance between pinion and pinion stop as shown in figure 6-8. If clearance exceeds 0.160 in. (4.06mm), check for worn parts and replace as necessary.

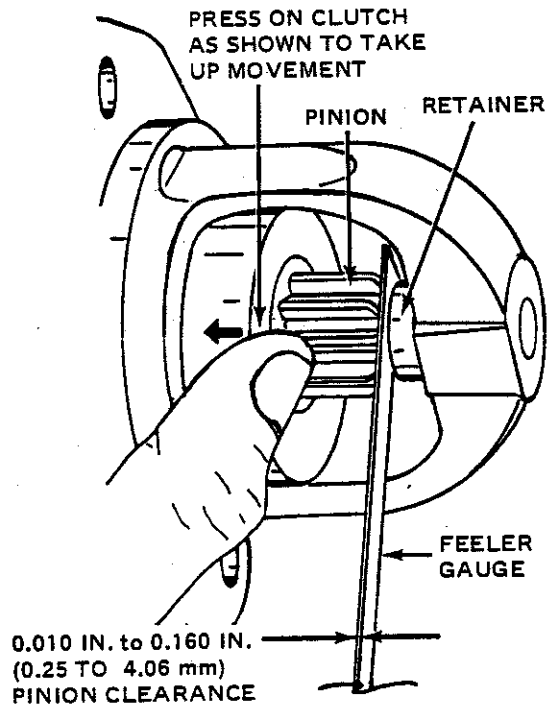
6-23 FUEL FILTER AND TRANSFER PUMP GROUP.

6-23.1 Disassembly. Refer to figure 7-20 and disassemble this group as follows:

1. Disconnect and remove fuel lines (1,2). Remove fitting (23) and o-ring (24) from injection pump. Remove fuel line elbows (4,21), adapter (22) and fitting (3).
2. Remove fuel filter clamp (5) and filter element (6). Remove drain plugs (7), drain plug washers (8) and pipe plug (9). Remove nuts (11), cap



CIRCUIT FOR CHECKING PINION CLEARANCE



CHECKING PINION CLEARANCE

Figure 6-8. Checking Pinion Clearance

screws (12), washers (13) and fuel filter housing (10). As necessary, remove cap screws (15), lock washers (16) and mounting bracket (14).

3. Remove cap screws (18), washers (19), fuel transfer pump assembly (17) and gasket (20).

6-23.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-23.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect filter element (6, figure 7-20) for cracked cover, damaged sealing surface and clogged element. Inspect for free action of transfer pump (17), rocker arm lever and priming lever.

6-23.4 Repair and Replacement. Replace all defective parts.

6-23.5 Assembly. Refer to figure 7-20 and assemble as follows:

1. Install gasket (20) and attach fuel transfer pump (17) to engine with washers (19) and cap screws (18). Assemble elbows (21,4) and adapter (22) into transfer pump (17).
2. If removed from engine, attach mounting bracket (14) with lock washers (16) and cap screws (15). Attach fuel filter housing (10) to bracket (14) with cap screws (12), washers (13) and nuts (11). Install pipe plug (9), two drain plug washers (8) and drain plug (7). Assemble fuel

filter element (6) and clamps (5).

3. Install elbow (4) and fitting (3) into housing (10). Install o-ring (24) and fitting (23) into fuel injection pump. Assemble the fuel lines (2,1).

6-24 OIL COOLER GROUP.

6-24.1 Disassembly. Refer to figure 7-21 and disassemble oil cooler group as follows:

1. Loosen the eight hose clamps (4). Remove hoses (1,2) and two hoses (3) and the clamps (4).
2. Remove cap screw (8), washer (9), tube clamp (7) and washer (10). Remove oil tubes (5,6).
3. Unscrew and remove threaded nipple (11) and lift off oil cooler assembly (12). Remove drain plug (14), washer (15) and relief valve (13). Remove oil cooler washer (16).

6-24.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-24.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect relief valve (13, figure 7-21) and spring for any damage. Examine oil tubes (5,6) for collapse and cracks. Inspect hoses (1, 2,3) for cracks, cuts and fraying.

6-24.4 Repair and Replacement. Replace all defective parts.

6-24.5 Assembly. Refer to figure 7-21 and assemble oil cooler group as follows:

1. Assemble washer (15), drain plug (14) and relief valve (13) into oil cooler assembly (12). Place washer (16) on engine, install oil cooler assembly (12) and threaded nipple (11). Torque nipple (11) to 20-25 pound-feet (3.0 to 3.5 kg-m).
2. Attach oil tubes (5,6) to engine with washer (10), clamp (7), washer (9) and cap screw (8). Assemble hose clamps (4) onto hoses (3,2,1).
3. Assemble two hoses (3) between tubes (5,6) and oil cooler assembly (12); tighten hose clamps (4). Assemble hoses (1,2) between tubes (5,6) and water pump; tighten hose clamps (4).

6-25 FUEL INJECTION SYSTEM AND NOZZLE GROUP.

6-25.1 Disassembly. Refer to figure 7-22 and disassemble this group as follows:

WARNING

Escaping diesel fuel under pressure can have sufficient force to penetrate the skin causing serious personal injury. If injured by escaping fuel, see a doctor at once to prevent serious infection or reaction.

1. To relieve high pressure in the fuel system, loosen fuel injection line connections slightly at each injection nozzle with two wrenches. Clean injection nozzle areas of expelled fuel and dirt.
2. Loosen tubing nut (2) and sleeve (3) and remove fuel return line (1). Remove the two tubing clamps (6,7). Disconnect and remove fuel lines (8,9,10). Tag these lines for assembly reference. Remove fitting (4).
3. To remove the two leak-off tubes (5), remove rivet (13), disconnect and remove five nuts (2), sleeves (3) and two leak-off tubes (5). Loosen three nozzle nuts (15) and sleeves (16), remove three leak-off caps (14). Remove three injection nozzle clamps (18) and clamp spacers (19).

CAUTION

Do not use screwdriver or pry bar to remove injection nozzles (17). If nozzle cannot be easily removed, use John Deere Nozzle Puller JDE-38, or equivalent.

4. Remove injection nozzles (17) from cylinder head. Remove carbon seal (31) and seal washer (30) from nozzle tube (29).

CAUTION

Do not scrape or otherwise damage the Teflon coating on the nozzle body above the carbon stop seal groove. This coating will become discolored during normal service but this is not harmful. Do not use a motor-driven brush to clean up nozzle body or tip.

5. Soak the nozzle in clean solvent or diesel fuel. Clean spray tip with a brass wire brush.

NOTE

Before disassembly of injection nozzle (17) it should first be determined if disassembly is necessary by checking nozzle assembly with a nozzle tester as described below.

WARNING

The nozzle tip should always be directed away from the operator. Fuel from the spray orifices can penetrate clothing and skin causing serious personal injury. Enclosing the nozzle in a transparent cover is recommended. Before applying pressure to nozzle tester, be sure that all connect-

ions are tight, and that the fittings are not damaged. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands to search for suspected leaks. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

CAUTION

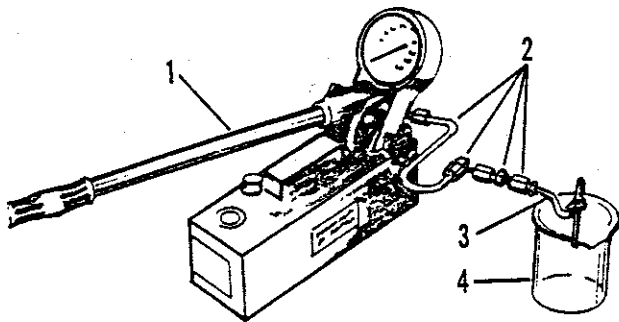
Do not attempt to test or disassemble nozzles unless the proper service tools are available. To obtain a true check of nozzle performance, a nozzle tester must be used. Always use clean diesel fuel as dirty fuel will severely damage the precision parts of the nozzle.

NOTE

Test Equipment referenced in nozzle test paragraphs are engine manufacturers (John Deere) part numbers and recommendations. Use these referenced components or their equivalent.

6. Use connectors from OTC universal connecting kit Y910 in conjunction with OTC nozzle tester Y900 to test nozzle. Refer to figure 6-9.

7. Position the tip of the nozzle below the top of beaker and back out 30 degrees from the vertical. This is necessary to contain all the spray in the beaker, because the spray pattern is at an angle to the centerline of the nozzle. Check all connections for leakage that could cause false pressure readings.



1 - Y900 NOZZLE TESTER
 2 - NOZZLE TESTER CONNECTORS
 3 - INJECTION NOZZLE
 4 - TRANSPARENT COVER (BEAKER)

Figure 6-9. Nozzle Connected to Tester

8. Flushing. Isolate test pump gauge by closing valve and flush nozzle by operating test pump rapidly.
9. Chatter test and Spray Pattern. Operate the test pump at 60 strokes per minute and observe the spray pattern. The fuel should be finely atomized. A distinct chatter should be heard as the pump is operated. Failure to chatter properly can be caused by a bent valve or binding of the valve in its guide due to lacquer deposit.

This condition can only be corrected by disassembling the nozzle. Check for clogged or partially clogged orifices. The spray cone, although usually inclined from the centerline of the nozzle, should be evenly distributed. A partially clogged or eroded orifice will usually cause the spray to deviate from the correct angle and be streaky rather than finely atomized. Poor spray pattern or chatter require nozzle disassembly for cleaning or reconditioning.

10. Opening Pressure Test. Actuate the tester pump rapidly several times to allow the valve to seat properly. Pump the pressure up to the point where the pressure gauge needle falls rapidly. This point is the nozzle valve opening pressure. The pressure should be 2475 to 2525 psi (174 to 177 kg/cm²) on new nozzles and 2275 to 2325 psi (160 to 163 kg/cm²) on used nozzles.
11. Checking Valve Seat. Position nozzle on the hand tester with nozzle tip down. Operate the test pump rapidly to seat the valve firmly. Dry the nozzle tip thoroughly. Raise pressure at the nozzle to approximately 200 to 300 psi (14 to 21 kg/cm²) under opening pressure. Slight dampness is permissible but no drop of fuel should form within 10

seconds. If the valve leaks, the nozzle must be disassembled for servicing.

12. Checking Valve Stem and Guide Wear. Position the nozzle with the tip slightly above the horizontal plane and covered. Raise pressure on the test gauge to 1500 psi (105 kg/cm²). Observe leakage from the return end of nozzle. After one drop, leakage should be 3 to 10 drops in 30 seconds (using No. 2 diesel fuel or equivalent viscosity of test oil at 65° to 75°F (18° to 24°C) temperature. If spray pattern, leakage test, and leak-off test are good but the opening pressure is incorrect, adjust the opening pressure as described in "Adjustment" paragraph.

NOTE

If the nozzle performs properly in all the tests, no further service is necessary and it can be installed in the engine. Nozzles which do not operate properly must be disassembled for cleaning or reconditioning. Disassembly of these nozzles is not recommended un-

less servicing is indicated by nozzle operation and testing.

CAUTION

Before disassembling nozzles be sure to have a clean working area available. Dirt is the prime enemy of injection nozzles. Use care not to scratch nozzle parts. Place all parts upon disassembly in a pan of clean diesel fuel. When servicing is complete, rinse all parts in a separate pan of clean diesel fuel before assembling.

13. To disassemble nozzle assembly (17, figure 7-22), place the nozzle body in holding fixture no. 17787, or equivalent, and secure fixture in a vise.
14. Loosen the lock nut (20) back out the pressure adjusting screw (22) and lift assembly. Invert the nozzle body (29) and allow the pressure adjusting spring guide (26) and adjusting assembly to fall into your hand. Do not bend stem during removal. As Valve (27) slides out of the body, handle it carefully by its stem, to avoid bending the valve.

CAUTION

When servicing several nozzles, be careful not to mix valves (27) and bodies (29) of different nozzle assemblies together. Always return the same valve to the nozzle body from which it was removed.

15. If the valve (27) does not slide freely from the body (29), use Retractor No. 16481 to remove valve. To prevent bending of the valve, it should be pushed all the way into the nozzle body with the retractor. The retractor may then be secured to the top of the valve by pushing down on the retractor body. Turn the knurled nut on retractor counterclockwise to secure the valve to the retractor. Withdraw the retractor and valve. See figure 6-10.

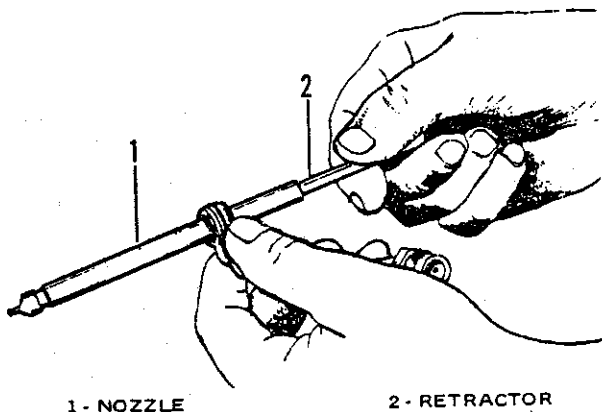


Figure 6-10. Using Nozzle Valve Retractor

16. Remove locating clamp (28) from nozzle upper body.
17. To remove fuel injection pump (34, figure 7-22 and 25, figure 7-17), position crankshaft so that number one piston is at top dead center on compressor stroke. Disconnect throttle linkage and wire throttle lever in high idle position. Disconnect wire assembly from solenoid terminal. Disconnect fuel line from fuel filter at the injection pump. Remove nuts (35, figure 7-22), lock washers (36), and flat washers (37). Slide injection pump (34) in a straight line away from front plate. Drive gear and shaft will remain on front plate. Remove studs (38) only when necessary. Remove gasket (39). Refer to paragraph 6-26 for fuel injection pump details.

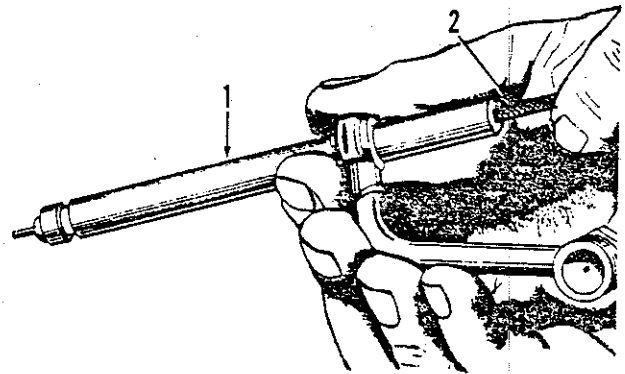
CAUTION

Do not scrape or otherwise damage Teflon coating of nozzle body (29, figure 7-22) above carbon seal (31) groove. This coating will become discolored during service, discoloration is not harmful. Do not use a motor-driven brush to clean nozzles.

6-25.2 Cleaning and Inspection.
Refer to paragraph 6-3.1 for gen-

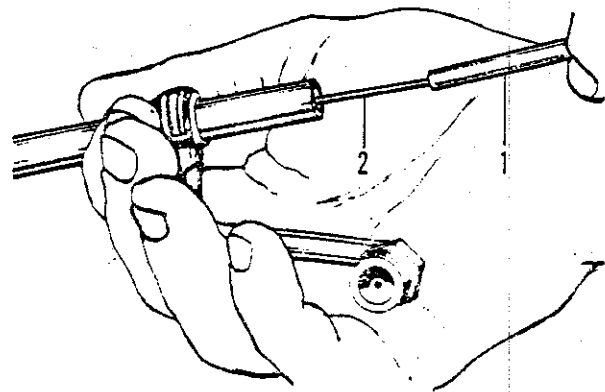
eral cleaning and paragraph 6-3.2 for general inspection. Specific cleaning and inspection is as follows:

1. Nozzle Body (29, figure 7-22). The carbon stop groove and tip may be cleaned with a brass wire brush. Inspect the tip for cracks, and the spray orifices for chipping and erosion. To clean carbon from spray orifices, start with a cleaning wire 0.003 to 0.004 inch (0.076 to 0.102mm) smaller than the nominal orifice size [0.011 in. (0.28mm)] and secure in a pin vise (NO. 16483) with no more than 1/32 inch (0.79mm) of wire protruding. A large length wire will easily break off in the orifice and is very difficult to remove. Burrs from cutting the wire should be removed with an emery stone before use. Stoning the wire to provide a flat surface on one side will help in reaming carbon from a clogged hole. Insert the cleaning wire into each orifice and rotate wire.



1 - NOZZLE BODY
2 - SCRAPER

Figure 6-11. Cleaning Nozzle Valve Seat Area



1 - VALVE RETRACTOR
2 - SAC HOLE DRILL

Figure 6-12. Using Sac Hole Drill

2. Use scraper No. 17712 as illustrated in figure 6-11 to clean deposits from the valve seating area.
3. Insert sac hole drill No. 16476 (figure 6-12) into the nozzle body and rotate it to ream carbon and deposits from the sac hole.
4. As a final cleaning procedure, select a cleaning wire 0.001 inch smaller than nominal orifice size [0.011 in. (0.28mm)] and stone wire to provide flat surface on one side. Turn wire in each of the orifices until it turns freely.

CAUTION

Never use a steel wire brush on nozzle parts.

5. The nozzle valve (27, figure 7-22) may be cleaned with a BRASS wire brush No. 16488 to remove deposits from the seating area on the tip. Use a felt pad to remove varnish deposits. Inspect the guide area of the valve for scratches which would cause sticking. This area will generally be polished on one side during operation and visible vertical marks are normal.

6. A nozzle which during testing had spotty chatter or showed definite signs of sticking accompanied by low return leakage, may be corrected by polishing the valve guide area as follows:

- a. Place a small amount of No. 16489 lapping compound on the valve in the guide area only. Do not use any other compound for this purpose.
- b. Slide the valve into the body.

CAUTION

Never attempt to rotate the valve in a motor driven chuck.

- c. Grip the top of the valve with retractor No. 16481 (figure 6-13) and rotate the valve in the guide by turning the retractor. The amount of lapping required can be accomplished in 10-20 turns by hand. The valve should be raised and lowered in the guide every 3-4 revolutions and the direction of rotation changed for best results.

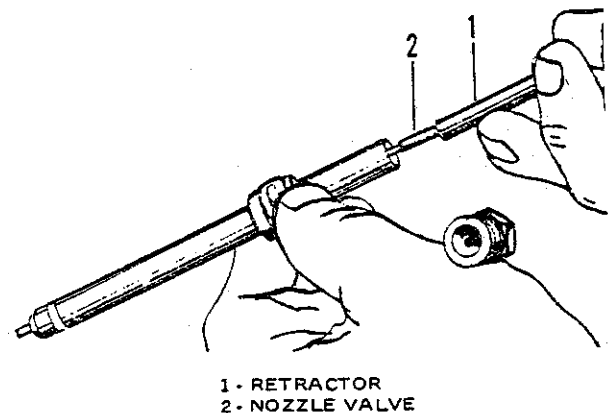


Figure 6-13. Polishing Valve Guide Area

- d. Wash the nozzle body and valve thoroughly before reassembly. Seat leakage may be caused by dirt, carbon, or fuel deposits in the seat area, sticky operation of the valve due to bending, or tightness in the guide. If these conditions have been eliminated,

ted as seat leakage causes, inspect the valve seat. Clean valve seat with lapping compound No. 16489. Place a small amount of compound on the valve tip and insert the valve into the nozzle body. Use retractor No. 16481 to rotate the valve by hand in lapping it to the body seat. Only a very slight polishing (3-5 revolutions by hand) is necessary to clean up the seat. excessive lapping will decrease the interference angle on the valve, preventing chatter and causing poor auto-mization.

7. If valve is worn until nozzle will not chatter, has seal leakage, or has a poor pattern, valve replacement is necessary

CAUTION

Never lap a NEW valve (27, figure 7-22) to the OLD valve body (29) tip seat. The valve is precision ground. If previous lapping with the old valve did not clean up the valve tip seat in the nozzle body, lapping of the new valve will not restore it further and will only destroy the

angle of the new valve. However, if valve return leakage is not correct, use compound No. 16489 between the valve guide area and guide to increase clearance as explained above.

8. All nozzles are marked on the banjo inlet fitting with a code letter. Select the replacement valve which covers the code stamped on the nozzle body. For example, if nozzle body is stamped with an "A", the nozzle valve covering "A" code must be used to determine if an over-size valve is to be used. Check the leakage and chatter and if not acceptable, install next larger valve. Refer to Maintenance Parts List 7-22 for correct valve selection.
9. Inspect lift adjusting screw (21, figure 7-22) for bent condition. If screw is bent or otherwise damaged, replace with new part. Examine adjusting screw (22) for damage. Replace if wear or damage is evident.
10. Inspect pressure adjusting spring (25). If spring is damaged or broken, replace with new spring.
11. Inspect spring guide (26) for wear. Replace if necessary.
12. Examine nozzle locating clamp (28) for bent con-

dition. Replace with new part if necessary.

13. Use nozzle bore cleaning tool, John Deere No. JDE-39, or equivalent, to clean cylinder head nozzle bore. Use compressed air to remove debris from nozzle bore.

6-25.3 Repair or Replacement.
Replace all defective parts. Replace nozzle washer(30, figure 7-22) and carbon seal(31) each time nozzle is removed and overhauled.

6-25.4 Assembly. If removed, install three studs (38, figure 7-22). Make certain number one piston is at top dead center on compression stroke and assemble fuel injection pump and injection system as follows:

1. Remove timing line cover (129, figure 7-23) and install Timing Window, John Deere No. JD-259 (13366), or equivalent, on injection pump timing hole.
2. Rotate injection pump drive shaft until timing lines on cam ring and governor weight retainer are in alignment. Apply a coating of light grease to the drive shaft seals and the area around them.

CAUTION

Do not invert drive shaft seal lips. If resistance is felt, stop and inspect position of seal. If seal has been forced back, replace seal.

3. Use Drive Shaft Seal Compressor, John Deere No. JD-256 (13371), or equivalent, compress seal on drive shaft and slide injection pump (34, figure 7-22) onto drive shaft into position on studs(38). Install flat washers (37), lock washers (36), and nuts (35). Tighten nuts finger tight.
4. Rotate pump counterclockwise (viewed from flywheel end) then in opposite direction until timing lines are aligned. Tighten pump attaching nuts (35).
5. Rotate crankshaft counterclockwise (viewed from front end) approximately 180°. Reverse crankshaft rotation and reposition number one piston at top dead center on compression stroke. Check timing lines on injection pump. If not aligned, retime pump. Remove Timing Window and install injection pump timing hole cover.
6. Assemble injection nozzles (17, figure 7-22) as follows:
 - a. Slip the nozzle locating clamp (28) (if removed) over upper nozzle body with flanges down.
 - b. Wet the valve (27) with fuel or calibrating oil and slide it into the nozzle body. Use care when handling valve.

- c. Thread the lift adjusting screw (21) into the pressure adjusting screw (22) until top just enters screw. Assemble lock nut (23) onto pressure adjusting screw (22) and lock nut (20) onto end of lift adjusting screw (21).
 - d. Invert adjusting screw assembly and assemble the spring guide (26) and spring (25) to the lift adjusting screw (21). Tilt the nozzle body (do not allow valve to slide out) and assemble the spring adjusting screw to the body. Use care not to dislodge the spring or guide during initial assembly. Turn the pressure adjusting screw (27) down by hand, as far as possible (usually ten full turns).
7. Nozzle Adjustment. Connect nozzle assembly to tester shown in figure 6-9.

WARNING

The nozzle tip should always be directed away from the operator. Fuel from the spray orifices can penetrate clothing and skin causing serious personal injury. Enclosing the nozzle in a transparent

cover is recommended. Before applying pressure to the nozzle tester, be sure that all connections are tight, and that the fittings are not damaged. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

8. Opening Pressure. Close the pressure gauge valve and flush the nozzle by operating the test pump rapidly. Open gauge and raise the pressure slowly until the nozzle valve opens. (This gauge reading will drop sharply at this point). Correct opening pressure is 2475 to 2525 psi (174 to 177 kg/cm²) (new) and 2275 to 2325 psi (160 to 163 kg/cm²) (used). If nozzle opening pressure is incorrect, reset as follows:

- a. Remove the nozzle from the tester and secure in holding fixture No. 17787. Loosen the adjusting screw lock nut (23, figure 7-22). Reconnect the nozzle with tip facing downward.

- b. Carefully turn the lift adjusting screw (21) in until it bottoms. Back out the lift adjusting screw (21) far enough to prevent bottoming when the pressure adjusting screw (22) is turned.

NOTE

When setting nozzle opening pressure, it is desirable to adjust the opening pressure toward the high limit rather than toward the low limit.

- c. Turn pressure adjusting screw (22) clockwise to increase, or counterclockwise to decrease opening pressure. Do not tighten lock nut (27) at this time. On new nozzles or when a new spring has been installed, adjust the opening pressure to a higher pressure than a nozzle equipped with a used spring.
9. Valve Lift. While pumping fuel through the nozzle, hold the pressure adjusting screw (22) and slowly turn the lift adjusting screw (21) clockwise so the valve will not open.
- a. Check for bottoming by raising pressure to 200 to 500 psi (14 to 35 kg/cm²) over nozzle opening

pressure. Although some fuel may collect on the tip, a rapid dribble should not be apparent.

- b. Remove nozzle from tester, and place in holding fixture No. 17787. Do not manually bottom the valve with excessive force, as bending of the valve may result. The lift screw (21) should then be backed out 3/4 turn from bottom (0.0135 inch [0.343 mm] nominal) or 1/2 turn from bottom (0.009 inch [0.229 mm] nominal). A tolerance of 1/8 turn is permissible.
- c. Use torque wrench adapter No. 18958 to tighten the pressure adjusting screw lock nut (23) to 70 to 80 lb-in. (7.9 to 9.0 Nm) Torque lift screw lock nut (20) to 35 to 45 lb-in. (4.0 to 5.1 Nm).
- d. The pressure adjusting screw must be held while securing the lock nut. Recheck opening pressure on the tester

NOTE

If after servicing nozzle valve, nozzle chatter is incorrect, valve parts may be misaligned. To correct this, screw the pressure adjusting screw through its range of adjustment several times and reset valve lift. Recheck nozzle for chatter.

- e. Clean nozzle with brass brush No. 16488.
- f. Install a new sealing washer (30, figure 7-22) onto the nozzle body (29). Use No. 16477 pilot tool to install a new carbon stop seal (31). Place the pilot on the spray tip of the nozzle and work the seal down over the pilot onto the nozzle body, then into its groove.
- g. Place protective cap (32) on nozzle tip until ready to install injection nozzle assembly (17) in engine.
10. Assemble injection nozzles (17, figure 7-22) into cylinder head and secure in position with spacers (19) and a clamp and screw (18). Torque screw to 20lb-ft (27 N·m). Install sleeves (16), nuts (15) and leak-off caps (14).
11. Assemble five tube sleeves (3) and nuts (2), two leak-off tubes (5) and rivets (13). Connect fuel lines (10,9,8) to injection nozzles and attach to injection pump. Torque fuel lines to nozzle connectors 35 lb-ft (47 N-m).
12. Attach fuel leak-off tube assembly (1) to connector (4), torque to 20 lb-ft (27 N-m), install and attach sleeve (3) and nut (2). Install tubing clamps (7,6).
13. Connect fuel line from fuel filter to injection pump, torque to 20 lb-ft (27 N-m). Connect wire assembly to injection pump solenoid terminal. Connect throttle linkage to pump lever.
14. Open fuel filter bleed screw (7, figure 7-20) located on upper right side of fuel filter. Actuate fuel transfer pump priming lever until no air flows from bleed screw. Tighten the bleed screw (7). Slightly open fuel supply line connection at injection pump. Actuate transfer pump priming lever until no air flows from connection. Tighten supply line connection to 20 lb-ft (27 N-m). Leave priming lever positioned toward cylinder block.

NOTE

An extra seal washer (30) may be helpful in pushing the seal (31) from the pilot onto the nozzle body.

6-26 FUEL INJECTION PUMP.

6-26.1 Disassembly. Clean the injection pump, fuel lines, and area around the pump with cleaning solvent. Use John Deere tool JD-281 or JD-81-1 Flywheel Turning Tool to position number one piston at top dead center. When the timing pin is inserted in the

flywheel timing hole and injection pump timing mark is visible on the injection pump, the number one piston is at top dead center on the compression stroke.

WARNING

Escaping diesel fuel under pressure can have sufficient force to penetrate the skin causing serious personal injury. If injured by escaping fuel, see a doctor at once to prevent serious infection or reaction.

Relieve high pressure in the fuel system by loosening slightly the injection line connections at each injection nozzle using two wrenches. Disconnect fuel supply line (2, figure 7-20) and remove fitting (22) and o-ring (23) from end of injection pump (11,12 figure 7-22). Disconnect fuel leak-off line (1), injection lines (8,9,10) and remove fitting (4). Plug or cap all openings to prevent dirt from entering injection pump (34). Disconnect speed control linkage from pump lever. Wire throttle lever in full throttle position. Disconnect wire from fuel shut-off terminal. Remove nuts (35), lock washers (36) and flat washers (37). Slide pump in a straight line away from front plate. Drive gear and pump shaft will remain on front plate. To remove injection pump shaft, remove injection pump gear cover (1, figure 7-29) and remove nut (121, figure 7-23) and washer (122) from shaft. Install JD-303

Injection Pump Shaft Removal Tool at timing gear cover. Tighten attaching cap screws securely. Turn center cap screw against pump shaft until drive gear is held firmly against the front plate. Place a tubular type driver over the shaft extension against the gear. Strike the end of the tubular driver with a medium weight hammer. Refer to figure 7-23 and disassemble the fuel injection pump as follows:

CAUTION

Disassembly of the fuel injection pump shall be conducted in a clean work area. Use clean tools and clean hands. Provide a clean deep drawn pan, in which disassembled parts may be placed, with rounded corners to lessen the chance of dirt pockets. Also, have available a similar pan containing clean fuel oil for flushing disassembled parts.

NOTE

All fixture and tool numbers referenced in following paragraphs are those of Stanadyne Diesel Systems Group. Only qualified overhaul personnel shall perform work described hereunder.

1. Mount the pump assembly in holding Fixture No. 19965. Never clamp pump in a vise, always use a fixture. Cut and remove sealing wire (1, figure 7-23). Remove cover screws (3,4), lock washers (5) and cover washers (6). Remove governor control cover (2) assembly and gasket (7). Remove connector (8) and connector seal (9). Remove low idle adjusting screw (10), nut (11), washer (12) and seal (13). Remove terminal lock nuts (14, grounding strap (15), lock washers (16,17), terminal nuts (18), terminal washers (19,20) and separate solenoid frame and arm assembly (21) from cover (2).
2. Rotate throttle lever (23) to full run position and remove retaining clip (22). Place tool No. 20992, with tab beneath the short leg of the retainer clip (22) on the throttle shaft and pry gently, sliding the clip off the shaft. Discard the retainer clip (22).
3. Withdraw the throttle shaft assembly (30) and throttle shaft lever (37) from shut-off shaft (36). To aid assembly, make note of position of throttle shaft lever (37) key in relation to groove in throttle shaft assembly. Unscrew and remove screw (24), spring retainer (25), spring (26), throttle lever (23) and adjusting spacer arm (27). Remove screw (29) and throttle lever spacer (28). Only when necessary, remove adjusting screws (31,32) and nuts (33) from shaft assembly (30). Remove shut-off shaft (36), washers (34) and seals (35).
4. Loosen the guide stud (38). Hold governor spring (40) and retainer (43) firmly between thumb and forefinger. Lift out governor spring components (40,41,42,43, 44) and remove guide stud (38) and seal (39). Separate spring guide (41), idling spring (42) spring retainer (43), spacer (44) and governor control spring (40).
5. Depress metering valve assembly (56), raise governor linkage hook assembly (50), at metering valve end, to clear metering valve arm pin. Pull linkage hook back slightly to disengage from governor arm and place hook assembly (50) over side of housing. Do not disengage spring (55) at this time. (Hook assembly need not be disassembled.) Remove metering valve assembly and, as necessary, disassemble arm (56), shim (57), valve (58) and spring (45).

6. Loosen and remove locking plate screw (114), locking plate (115) and seal (116) from hydraulic head (118). Install end cap plug No. 20549 into end cap. Loosen and remove transfer pump end cap (85), using appropriate end cap wrench. Remove pressure plate (86), inlet filter screen (87), and screen retaining ring (88). Unscrew and remove plug assembly (89), spring (90) and regulating piston (91). Remove transfer pump regulating assembly (92), seal (93) and rollpin (94).
7. Remove four transfer pump blades (96), two springs (97) and liner (98). Remove transfer pump seal (100).
8. Loosen two head locking screws (80) and remove one of the screws. Invert the pump and holding fixture as a unit in a vise. Loosen and remove head locating screw (59) and seals (60). Use tool No. 14490 and remove advance screw hole plug (61) and seal (62). Insert Extractor No. 13301 into the cam advance screw (63) and extract the screw.
9. Loosen and remove the power piston hole plug (64) and spring piston plug (72). Remove piston ring (65), seal (66), power piston (67) and slide washer (68). Remove advance adjusting screw nut (69), seal (70) and advance adjust-

ing screw (71). Remove seals (73,74), spring guide (75), springs (76, 77), spring piston (78) and slide washer (79).

10. Return the pump and holding fixture as a unit to its initial position in the vise with rear of hydraulic head (118) tilted slightly downward. Remove the one remaining head locking screw (80). Grasp the hydraulic head assembly and rotate assembly (118) firmly in both hands and withdraw from housing (136) with a slight rotary motion.

CAUTION

Use caution so as not to drop governor weights (83).

11. Invert the hydraulic head and allow weights (83), thrust sleeve (82) and washer (84) to fall into your hand. Place head and rotor assembly on top of Fixture No. 19965.
12. Loosen and remove one pivot shaft retainer nut (46) and seal (47). Remove governor arm pivot shaft (48), governor arm (49) and hook assembly (50). Remove retaining ring (125), spring washer (126) and thrust washer (127).
13. Use an arbor press, tool No. 13375 and tool No. 20268. Place inner portion of tool No. 13375

onto tool No. 20268 and press the two oil seals (128) from housing (136). Press from the front of the housing. Discard seals as they should not be reused.

14. Remove liner locating ring (95) and rotor retainers (99). Lift the head from rotor and lift cam ring (107) from rotor. Check and record the roller-to-roller (111) dimension as instructed in paragraph 6-26.5.4. Remove the two rollers (111), shoes (112) and plungers (119). Use brass tool No. 13301 to push plungers from their bore.

CAUTION

Handle all parts carefully with clean hands wet with clean fuel oil. Avoid handling the precision ground surface of the rotor.

Use a 5/32 inch hex key to remove leaf spring screw (109); remove leaf spring (108) and shims (110). Remove head seal (113).

15. Remove three head volume screws (117). Remove delivery valve screw (101), stop (102), spring (103) and delivery valve (104). Discard delivery valve stop (102).
16. Remove retaining ring (105) and weight retain-

er assembly (106). Remove vent screw assembly (81), hole plug (134) and seal (135). Remove cover screws (130), cover (129) and gasket (131). As necessary, remove screws (133) and name plate (132).

6-26.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Parts must be washed in a suitable solvent and placed in a clean pan containing clean diesel fuel. Clean and check all bores, grooves, and seal seats for any damage.

6-26.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Discard all o-rings, seals, gaskets, retaining rings, seal wire, and delivery valve stop. Detailed inspection is as follows:

1. Measure distance across flats of tang on drive shaft (124, figure 7-23). Must not be less than 0.430 in. (10.9 mm). Inspect drive shaft diameter in oil seal area. Must be free of nicks and scratches. Moderate shaft wear from seal lips is normal.
2. Check the vent wire in the hydraulic head air bleed passage for freedom of movement. If wire is free, flush head and blow out passages with clean, dry air. If wire is stuck, remove plug and vent wire; replace wire after thorough cleaning of passage.

CAUTION

Do not immerse hydraulic head (118, figure 7-23) in solvent for extended periods. Sealant damage will result.

3. Inspect radii contacted by leaf spring (108) on the distributor rotor and the drive tang slot for excessive wear. Check all slots, charging and discharging ports for chipping of edges and for dirt. Inspect rotor shank for scratches. If damage is observed, rotor and head must be replaced as matched assembly.
4. Inspect delivery valve (58) retraction cuff for chipping or erosion of edges. Edges must be sharp.
5. Hold rotor under clean diesel oil and insert plungers (119) into their bores. With thumb and forefinger over shoe (112) slots, tilt rotor from side to side several times to determine freedom of movement of plungers in bores. Interchange or reverse plunger initial position as necessary, as these are matched parts. Do not force plungers into their bores and do not handle rotor shank.
6. Check each roller (111) in its shoe (112) for freedom of rotation. Inspect top edge of each shoe (112), where retained by leaf spring (108) for chipping or excessive wear.
7. Inspect leaf spring (108) for wear at points where spring contacts the radii on the rotor and along steps that retain roller shoes (112). Check adjusting screw (109) for tightness in the rotor.
8. Inspect cam (107) ground lobes and edges of flat surfaces. If there is evidence of spalling or flaking out, replace with new cam (107).
9. Inspect governor weights (83) at pivot points for excessive wear.
10. Inspect transfer pump blades (96) with utmost care. Check for chipping on any of the edges, including spring (97) bore edges, check for pitting imbedded foreign particles or scoring on rounded ends. Determine blade wear by measuring the length. Minimum length should be 0.538 in. (13.7 mm). Inspect flat surfaces visually for deep scores. If any discrepancies are found replace both blade sets (96) and springs (97).
11. Check metering valve assembly (56,57,58) for its seating in hydraulic head. There should be no radial movement of arm on the valve.

6-26.4 Repair or Replacement.
Replace all defective parts.

6-26.5 Assembly. Refer to figure 7-23 and assemble fuel injection pump as follows:

CAUTION

1. Place pump housing (136) on an arbor press with flange end down. Apply a light coating of lithium base grease to housing seal bore and outside diameter of seals (128). Place a new seal (128), with seal lip facing pressing tool, on the short end of tool No. 20268. Press seal into housing until tool bottoms against housing.

As assembly progresses, refer to Torque Value Chart, Figure 6-14. Correct torque is extremely important to prevent extensive damage to the pump.

NOTE

This seal must not protrude into housing cavity.

Invert the pump housing (136) on arbor press with flange end up. Place a new seal (128), with seal lip facing pressing tool, on the short end of tool No. 20268. Press seal into the flange end of housing until the tool bottoms.

2. Mount the pump housing (136) on holding fixture No. 19965. Never clamp pump housing in a vise. Carefully install drive shaft (124) into housing taking care not to damage seals. Install thrust washer (127), spring washer (126) and retaining ring (125).

3. Attach weight retainer assembly (106) to rotor with retaining ring (105). Rinse rotor thoroughly with clean diesel fuel and place on top of holding fixture No. 19965. Install delivery valve (104) in its bore using extractor tool No. 13383. Make sure valve operates freely in bore. Install delivery valve spring (103), a new delivery valve stop (102) and screw (101). Torque screw (101) per figure 6-14.

4. Remove the rotor from holding fixture and submerge in clean diesel fuel. Install plungers (119) into rotor bores and check for free movement. Assemble shims (110), leaf spring (108) and screws (109) to the rotor. Assemble roller shoes (112) and cam rollers (111). Install fixture No. 19969 in a vise, clamping on the flat so that air inlet hole is not covered by the vise. See figure 6-15. Assemble a 1/4-18

NPT fitting to the air inlet of the fixture. The fitting should be adapted to a supply of clean, filtered, compressed air, regulated to a pressure between 40 and 100 psi (2.8 to 7.0 kg/cm²). Handle the rotor carefully, holding the rollers and shoes (111,112) in their slots. Install the rotor assembly to the fixture on the air inlet side. Rotate the rotor until rollers are pushed to their extreme outward position (shoes [112] bottomed on leaf spring [108]) by the air pressure. Use a 1 in. to 2 in. micrometer and measure roller-to-roller dimension. Dimension should be 1.9625 to 1.9595 inches (49.8485 to 49.7713 mm). To set this dimension, turn leaf spring adjusting screw (109) inward to increase and outward to reduce roller-to-roller dimension. When an adjustment is completed, remove rotor assembly from fixture making sure that rollers (111) and shoes (112) are not dislodged from their slots.

5. Thoroughly rinse rotor in clean diesel fuel and place rotor shank end on top of fixture No. 19965. Place cam ring (107) on top of rotor with direction arrow indicating the OPPOSITE direction of pump rotation. Install three volume head screws (117). Thoroughly rinse

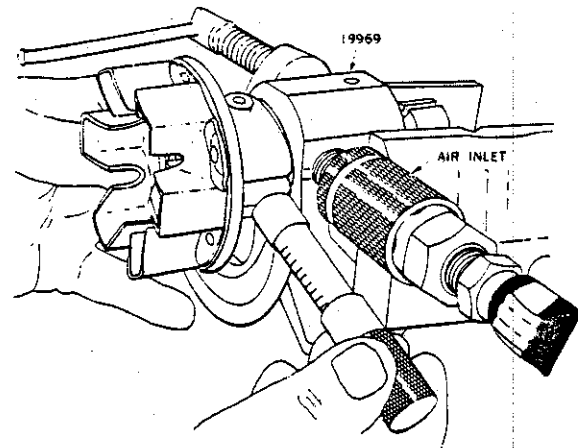


Figure 6-15. Roller-to-Roller Adjustment

hydraulic head in clean diesel fuel. Blow out all head passages and ports with clean, filtered compressed air. Assemble hydraulic head to rotor assembly (118). Install seal (113).

6. Assemble rotor retainer (99) to head and rotor assembly (118) with cut-out portion meeting over rollpin hole in hydraulic head. Place liner locating ring (95) over rotor retainers (99) and bottom retainer against head. Position split of ring 90 degrees from split in retainers. Install the oval cross section seal (100) into the hydraulic head. Insert transfer pump liner (98) so that the slot is in line with the hole which the regulator assembly rollpin (94) will enter. Assemble springs (97) to transfer pump blades (96) and install blades in rotor. Blade springs (97) must be fully compressed as blades are installed.

7. Install rollpin (94) in regulator assembly (92). Place piston seal (93) in groove of regulator. Install piston (91), spring (90) and plug (89) until plug is flush with inlet side of regulator. Assemble regulator assembly (92) to the liner (98). The locating pin must be in correct hole of the regulator for proper pump rotation. This pump rotation is clockwise facing drive end. Assemble filter screen (87) to pressure plate (86) and install screen retaining ring (88). Coat beveled surfaces of pressure plate (86) and threads of outside diameter of end cap (85) with Lubriplate = 630AA, or equivalent. Assemble pressure plate and screen onto regulator assembly. Install end cap (85) and thread into hydraulic head applying slight pressure on top of the end cap. Rotate the cap counterclockwise until a slight click is heard; then, turn cap clockwise by hand until tight.
8. Place governor arm (49) in position in housing with fork for governor linkage hook assembly (50) facing rear of pump. Insert pivot shaft (48) through housing and arm, with knife edge of shaft facing rear of pump. Assemble pivot shaft seals (47) and cap nuts (46). Tighten cap nuts successively to specified torque, figure 6-14.
9. Remove head and rotor assembly (118) from fixture. Position the governor weights (83) into retainer (106) sockets. Insert governor thrust washer (84) and sleeve (82) into lower slots of governor weights by tilting the weights outward slightly. The two deep grooves of the thrust sleeve (82) should face upward. Sight across the tops of the assembled weights. They should all be level and collapsed against the thrust sleeve.
10. Apply a light film of clean grease around inside edge of housing and on seal (113). Tilt housing slightly downward at the rear. Rotate cam ring (107) so that unthreaded hole is in line with head locating screw (59) bore. This will insure proper position of cam ring (107). Turn weight retainer (106) until the drilled hole on the end of the rotor registers with the drilled hole on the drive shaft tang. Grasp hydraulic head firmly in both hands and insert assembly into housing bore with a slight rotary motion. Do not force assembly into housing. If it jams, withdraw and start again. Make sure assembly is inserted past hydraulic head seal (113). Rotate head assembly until head locking screw (80) holes line up with holes in housing. Insert two head locking screws (80) and

- tighten finger tight. Do not tighten with wrench at this time.
11. Assemble metering valve (58), shim (75) and arm (56). Install spring (45) and metering valve assembly into its bore. Depress and rotate arm several times to insure freedom of movement. If valve sticks, clean with clean diesel fuel. Depress metering valve assembly and install guide stud seal (39) and guide stud (38) into housing. Pull back the governor linkage hook (50) stretching the spring (55) just enough to assemble hook correctly to fork on governor arm (49). Position opposite end of hook over pin on metering valve arm (56). Check governor parts for free movement.
 12. Assemble governor control spring (40), spacer (44), retainer (43), idling spring (42), and spring guide (41) on the work bench. Apply a light film of grease on these parts to keep them together while assembling. Install this group of parts onto the guide stud (38) and governor arm (49).
 13. Apply light film of grease to two seals (35). Install seal (35), washer (34) and throttle shaft assembly (30) partially through bore in housing. Slide the throttle shaft lever (37) over shaft (30) so that projection in lever (37) bore engages with rear key way on the shaft. Position forked end of throttle lever (37) straddling guide stud (38). Assemble seal (35), washer (34) and shut off shaft (36). Install retaining clip (22). If removed, install nuts (33) and screws (32,31) onto throttle shaft assembly (30). Rotate throttle shaft assembly (30). Rotating to the rear will cause compression of governor spring (40). Assemble lever spacer (28) in B4-L position, attach with screw (24). Assemble adjusting arm (27), throttle lever assembly (23), spring (26), spring retainer (25) and screw (24).
 14. Invert the pump and holding fixture in the vise. Coat seals (60) with a clean grease. Assemble seals (60) and head locating screw (59). Tighten screw to specified torque, figure 6-14. Assemble advance adjusting screw (71), seal (70) and nut (69) to spring piston plug (72). Install seals (73,74), and assemble slide washers (79), spring piston (78), springs (77,76) and spring guide (75). Install spring piston plug (72). Install piston ring (68), power piston (67) and plug (64). Torque plugs per figure 6-14.
 15. Align advance screw hole in advance piston with

unthreaded hole in cam ring. Insert advance screw (63) into cam ring, ball-end first. It may be necessary to move screw back and forth slightly to facilitate installation. Install new seal (62) and plug (61), tighten plug with tool No. 14490.

16. Invert the pump and fixture in the vise. Install vent screw assembly (81), seal (135) and plug (134). Hold throttle lever (23) in open position and rotate drive shaft in rotation direction until a slight click is heard, as toes of governor arm engage slots in thrust sleeve. With throttle lever in wide open position, use linkage gauge No. 18914 and check clearance between rear of shut-off shaft and the vertical tab on the linkage hook. This dimension should be 0.125 to 0.165 (3.18 to 4.19 mm). Adjust clearance using linkage wrench No. 13379 to change effective length of linkage hook. Loosen adjusting screw (51) and slide linkage to maximum open length. Insert gauge No. 18914 between vertical tab and shut-off shaft; slide linkage hook together from rear until face of tab is flush against gauge. Tighten adjusting screw. Check adjustment and reset if required. Refer to figure 6-16.

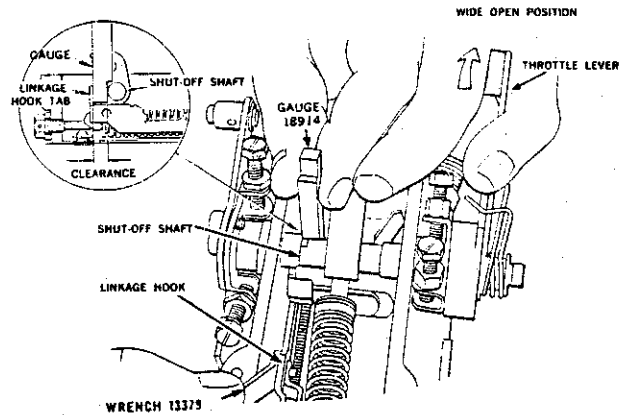
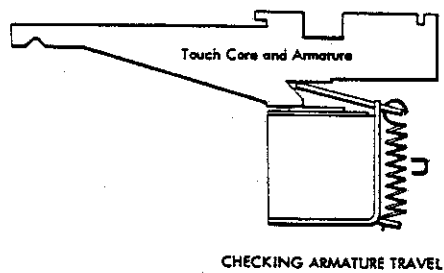


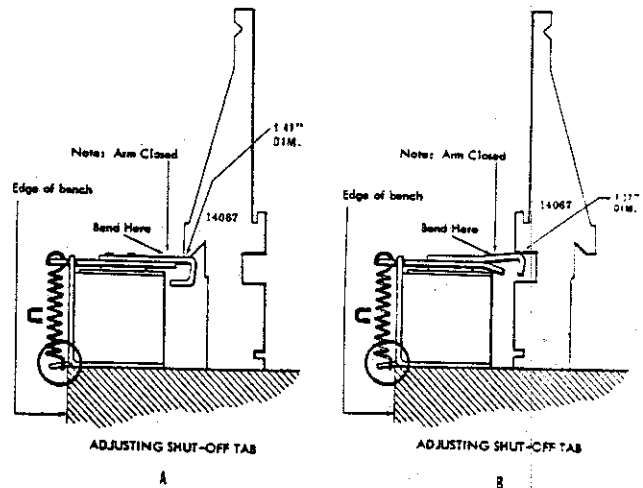
Figure 6-16. Linkage Hook Adjustment

17. Before installation of frame and arm assembly (21, figure 7-23) to cover (2), check and adjust arm travel as shown in figure 6-17. Use tool No. 14067 and 14725.
18. Install insulating tubes on terminal studs of solenoid frame and arm assembly (21, figure 7-23). Assemble to cover (2) and install washers (20,19), nuts (18), washers (17,16), grounding strap (15), and nuts (14). Install seal (13), washers (12), nut (11), and low idle adjusting screw (10). Install seal (9) and fuel connector (8). Install new gasket (7) and attach cover (2) assembly to housing with three washers (6), lock washers (5) and screws (4,3). After speed is set at bench test, install sealing wire (1).
19. Insert end cap plug, No. 20549, in end of transfer pump end cap (85)



CHECKING ARMATURE TRAVEL

ENERGIZED TO RUN

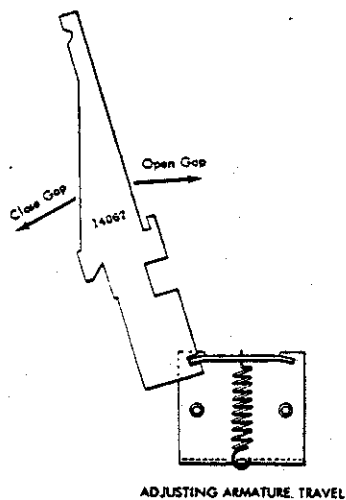


ADJUSTING SHUT-OFF TAB

ADJUSTING SHUT-OFF TAB

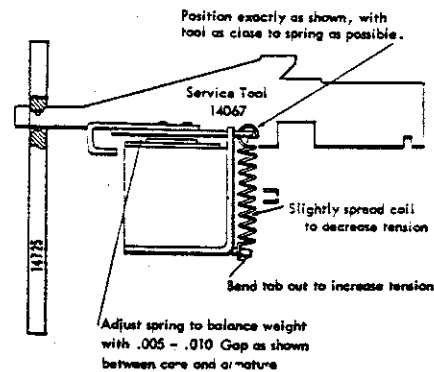
ENERGIZED TO RUN ONLY

(MAKE CERTAIN TAB (CIRCLED) DOES NOT INTERFERE WITH MEASUREMENT)
NOTE: REFER TO PUMP SPECIFICATION FOR CORRECT DIMENSIONS TO USE.



ADJUSTING ARMATURE TRAVEL

ENERGIZED TO RUN



ADJUSTING ARMATURE SPRING TENSION

ENERGIZED TO RUN ONLY

Figure 6-17. Shut-Off Solenoid Adjustment

and tighten end cap to specified torque (figure 6-14) using appropriate end cap wrench. Assemble locking plate seal (116), locking plate (115) and locking plate screw (114). Tighten two head locking screws (80) to specified torque (figure 6-14).

20. If removed, install name plate (132, figure 7-23) and attach with screws

(133). Install cover gasket (131), timing line cover (129) and cover screws (130). Remove pump from fixture.

6-26.6. Injection Pump Bench Test. After overhaul, before installation on engine, bench test the fuel injection pump as follows:

- a. Calibrating Nozzles: DN12SD12 nozzles adjusted to an opening pressure of

2500 psi. (170 ATS). SAE orifice plate calibrating nozzles adjusted to an opening pressure of 3000 psi. (204 ATS) may be employed in place of the DN12SD12 nozzles. Reference proper pump specification for correct holder and orifice plate. The testing techniques for SAE orifice plate calibrating nozzles are outlined in SAE Recommended Practices J968b and J969a. This information is available from:

Society of Automotive Engineers, Inc.
485 Lexington Avenue
New York, N.Y. 10017

or

Association of Diesel Specialist
633 East 63rd Street
Kansas City, Missouri 64110

- b. Injection Lines: Three line sizes have been released to date for service tests. These are .093" (3/32") X 20 long for DN12SD12 nozzles, .062" (1/16") X 25" long and .072" X 25" long for SAE orifice plate calibrating nozzles. Refer to the pump specification for the correct line size. (Pump Model No. DB2335-4531.)
- c. Calibrating Oil. Since engines use No. 2 diesel fuel, it is imperative that bench test of Roosa Master Pumps be conducted with calibrating oil similar viscosity. Reference Stanadyne Diesel Systems Service Bulletin 201 for the factory approved calibrating oil. Calibrating oil should be changed every 3 months or

200 pumps (whichever occurs first).

- d. Calibrating Oil Temperature. The temperature of the oil in the test bench will increase after a few hours of use. Therefore a standard of 110° - 115° F has been established. The test bench should be equipped with a heater and thermostatic control to maintain this temperature. This conforms with the SAE Recommended Practice.
- e. Test Bench: It is extremely important that the test bench drive shaft be checked for parallel and angular alignment prior to testing the pump to avoid serious damage.

The Following procedure for checking parallel and angular alignment should only be used as a guide, as test benches employed may vary.

- f. Parallel Alignment (Figure 6-18). The pump mounting bracket pilot diameter must be held within 0.005 in. Total Indicator Reading with the outboard end of the test stand drive shaft. The mounting bracket should be in the immediate area of the test bench bed where the pump is normally mounted and connected for this measurement. Remove the test stand drive coupling and mount a dial indicator extending directly from the test stand drive shaft to the mounting bracket pilot. Depress indicator approximately 0.010 in. and set to "zero". Rotate the test stand drive shaft 360° by

hand while watching the indicator. Should the measurement exceed 0.005 in., shim the bracket mounting supports as required to correct the alignment. If unable to correct the bracket mounting supports, consult the test stand manufacturer.

- g. Angular Alignment (Figure 6-19). The pump mounting bracket front face must be held within 0.010 in. Total Indicator Reading with the outboard end of the test stand drive shaft. With the same set up as parallel alignment, extend the dial indicator to the front face of the mounting bracket. Depress indicator approximately 0.010 in. and set to "zero". Rotate the test stand drive shaft 360° by hand while watching the indicator. Should the measurement exceed 0.010 in., shim the bracket mounting sup-

ports as required to correct the alignment. If unable to correct the bracket mounting supports, consult the test stand manufacturer.

The drive pump shaft must not be deflected by the test stand drive shaft. There should be 0.001 to 0.005 in. gap between the shaft coupling surfaces.

The test stand coupling should be of the self-aligning, no backlash type; similar to the Thomas Coupling (SAE J969a).

- h. Test Procedure. General test procedure is as follows:

1. Mount the pump securely with appropriate adapters. The drive shaft bearing must be lubricated during test. An effective means of lubrication can be arranged

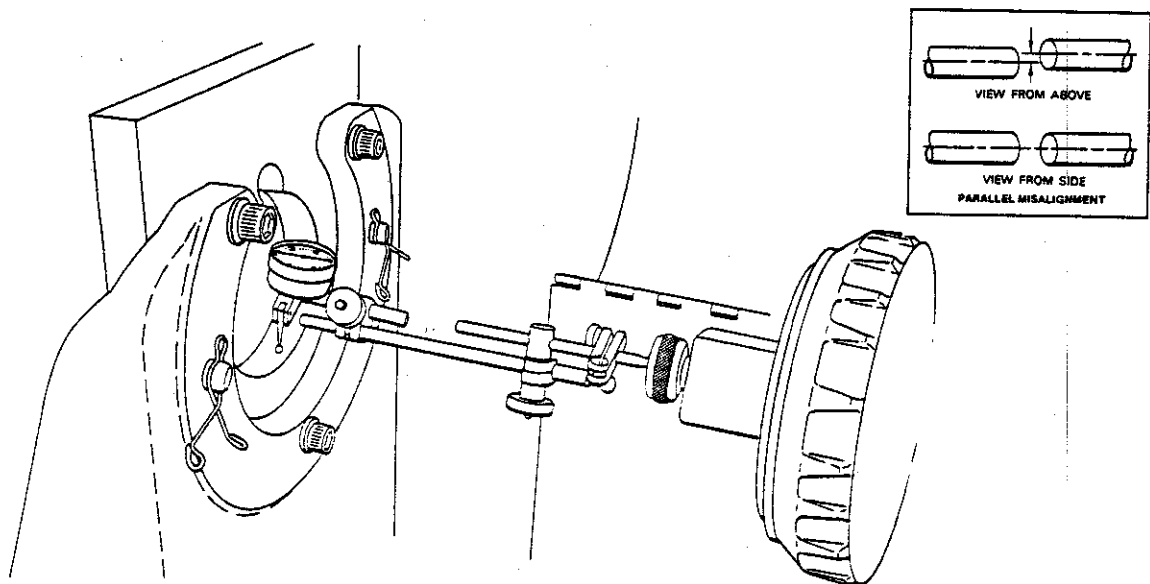
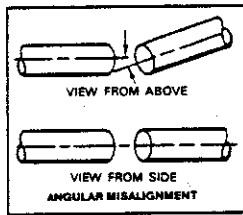


Figure 6-18. Test Bench Parallel Alignment



Refer to specification for correct size high pressure injection lines and install. Leave injection line nuts at the nozzles loose. Install transfer pump inlet connector (No. 19971) and fuel inlet line.

CAUTION

Inlet connector No. 19971 is the only one to be used. Use of other connectors could cause rotor seizure.

Install transfer pump pressure gauge connector (No. 20012) and fuel line to the pressure gauge with a shut-off valve close to the pump. Install the advance test window (No. 19918) in place of the timing line cover on the housing.

2. Determine proper direction of pump under special notes on individual specifications. Rotation is determined as viewed from drive end of pump (figure 6-21).

3. The pump is equipped with an Electric Shut-off device, energize the solenoid before starting the test stand. Start stand at lowest speed. Move pump throttle lever to "full-load" position. When transfer pump is primed, allow fuel to bleed for several seconds from the loosened injection line nuts at the nozzles. Tighten line nuts securely.

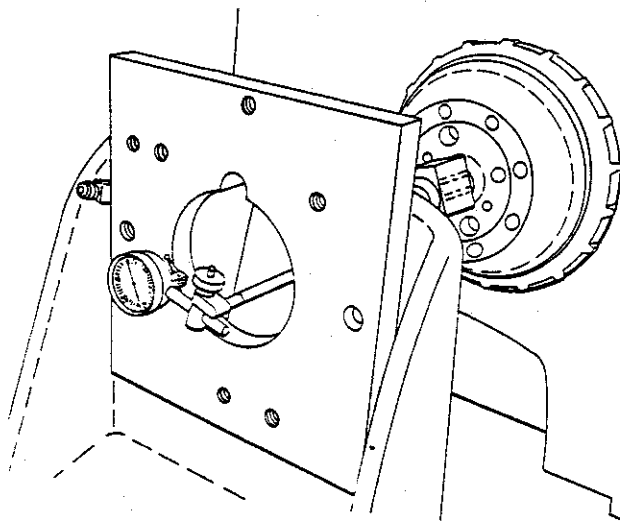


Figure 6-19. Test Bench Angular Alignment

by allowing all of the pump return oil to flow over the front face of the drive shaft bearing and then drain back to the tank thru the test bench bed (figure 6-20).

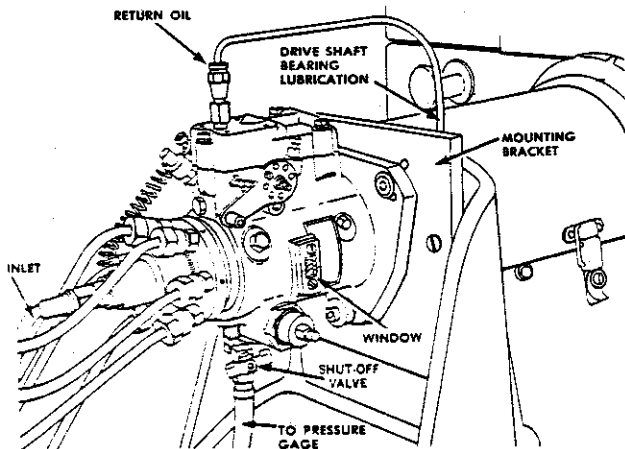


Figure 6-20. Pump Test Setup

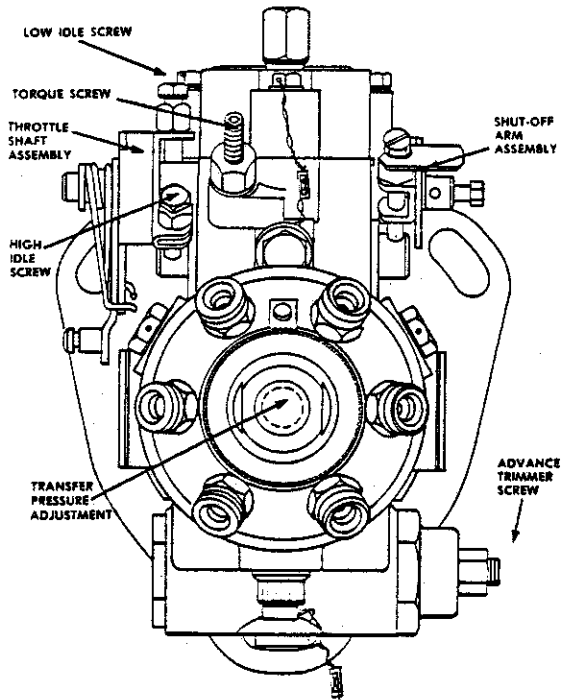


Figure 6-21. Typical Pump End View

NOTE

Roosa Master Injection Pump specifications provide the required delivery for the DN12SD12 nozzles and the SAE orifice plate calibrating nozzles. Since the Roosa Master Pump is factory tested on stands which measure fuel flow in cubic millimeters/stroke, it is necessary to convert the readings on other types of stands whose graduations measure in cubic centimeters (millimeters). The following formula is to assist you in making this conversion.

$$\text{Delivery in CC's} = \frac{\text{mm}^3/\text{stroke} \times \text{No. of strokes}}{1000}$$

Example: The pump specification calls for 72 mm³/stroke. The test stand counter has been set at 500 strokes. Simply substitute these numbers into the formula and calculate as follows:

$$\text{Delivery in CC's} = \frac{72 \times 500}{1000} = 36 \text{ cc's}$$

Remember also that most test stand tachometers register pump speed. All Roosa Master specification test data refers to engine speed (ERPM) which is twice pump speed for four stroke cycle engines.

4. Operate pump at 1000 ERPM (wide open throttle) for ten minutes. Dry pump off completely with compressed air. Observe for leaks and correct as necessary. Back out the high idle adjusting screw.

NOTE

The inlet to the transfer pump must never be pressurized in excess of 10 psi. during bench testing.

5. Vacuum Check: Close valve in fuel supply line. At 400 ERPM transfer pump must be capable of creating vacuum of at least 18 in. of mercury. If it does not, check for air leaks on suction side or malfunction of transfer pump components.

6. Fill graduates to bleed air from test stand and to wet graduates.
7. The return oil is measured by directing the return oil line into an appropriately calibrated graduate for the proper time and pump speed and comparing the results with the specifications.

NOTE

Refer to pump specification for correct sequence of test stand adjustments.

8. Operate at the specified speeds with wide open throttle and observe transfer pump pressure. Adjust pressure regulating spring plug to raise or lower transfer pump pressure.

CAUTION

Under no circumstances should 130 psi. be exceeded. To adjust pressure, remove the line to the transfer pump inlet connector and use a 5/32" hex key wrench to adjust the plug. Clockwise adjustment increases pressure. Do not over-adjust. Re-install fuel inlet line after adjustment.

NOTE

Transfer pump pressure gauge must be isolated by the shut-off valve at the injection pump when checking fuel delivery and advance movement.

9. Check for minimum delivery at cranking speed.
10. Operate at high idle speed and adjust high idle screw to obtain the specified delivery. Recheck transfer pump pressure upon completion of this adjustment.
11. Adjust the low idle screw to the correct low idle delivery.
12. Automatic Advance: Check the cam position at specified points in the speed range. Adjust trimmer screw, as required, to obtain proper advance operation. Each line on the advance gauge (No.19918) equals two pump degrees. After setting the advance, check to see that the cam returns to its initial position at 0 RPM. Recheck transfer pump pressure after setting advance and correct if necessary.
13. Record fuel delivery at check points shown on the pump specification. ROLLER SETTING SHOULD

NOT BE READJUSTED ON TEST BENCH. Experience has proven that micrometer and dial indicator setting provide more consistent, accurate results in performance. Variations in test bench drives, instrumentation, nozzles, lines and fuels in different areas sometimes result in nonconforming flow readings.

14. Recheck delivery at lowest speed checkpoint.
15. Check governor cutoff at specified speed.
16. Check Electric Shut-off at speeds indicated on specification.
17. Remove the pump from the test stand and assemble all sealing wires. Pump is now ready for installation to engine.

6-26.7 Installation. After bench test install fuel injection pump on engine as follows:

1. Remove timing hole cover screws (130, figure 7-23), timing line cover (129) and gasket (131). Install timing window, John Deere No. 19918, on timing hole. Rotate pump drive shaft until timing lines align.
2. Position number one piston at top dead center on compression stroke. Install new gasket (39, figure 7-22) and install pump assembly onto engine. Make sure key (123, figure 7-23) enters keyway on gear (120). In-

stall washer (122) and nut (121). Torque nut (121) to 150 pound-feet (203 N-m).

3. Assemble flat washers (37, figure 7-22), lock washers (36) and nuts (35) finger tight. Rotate injection pump housing counterclockwise (viewed from flywheel end) as far as possible. Rotate crankshaft counterclockwise (viewed from front end) approximately 180 degrees. Reverse rotation and reposition number one piston at top dead center on compression stroke.
4. Rotate injection pump housing clockwise (viewed from flywheel end) until timing lines align. Tighten attaching nuts (35, figure 7-22) to 20 pound-feet (27 N-m). Rotate crankshaft counterclockwise (viewed from front end) approximately 180 degrees. Reverse rotation and reposition number one piston at top dead center on compression stroke. Injection pump timing lines should be aligned. If not, retime the pump.
5. Install o-ring (12, figure 7-22), fitting (11) and fitting (4). Connect fuel supply line to fitting (11). Connect fuel return line (1) to fitting (4). Connect fuel injection lines (8,9,10) to pump. Torque connections to 20 pound-feet (27 N-m). Connect throttle linkage and

fuel shut-off wire. Remove timing window and install timing hole cover.

6. Loosen bleed screw (7, figure 7-20) located on upper right hand side of fuel filter. Pump priming lever on fuel transfer pump (17) until no air flows from bleed screw. Tighten the bleed screw. Loosen fuel supply line connection at fitting (11, figure 7-22) and pump the priming pump lever until no air flows from supply line. Tighten connection to 20 pound-feet (27 N-m). Leave priming pump lever positioned toward cylinder block. Loosen each injection nozzle inlet connector and turn engine until fuel flows from connector. Tighten nozzle inlet connector to 35 pound-feet (47 N-m).

6-27 WATER PUMP GROUP.

6-27.1 Disassembly. Refer to figure 7-24 and disassemble water pump group as follows:

1. Remove cap screw (2,3, 4,5), nut (6), lock washers (7) and water pump assembly (1) from engine. Remove mounting gasket (19). Separate cover (13) and gasket (14) from housing (11).
2. Use puller, John Deere D01200AA, or equivalent, and pull pulley (8) from water pump shaft. Support housing (11) on impeller end and press bearing (18) and impell-

er (15) out of housing with Bearing Driver JD262A, or equivalent.

3. Support impellers (15) from bearing (18) side. Use a 0.5 inch (13mm) drift and press bearing (18) shaft out of impeller (15). Lift insert (16) and seal (17) off bearing (18) shaft. When necessary, remove adapter tubes (12) from housing (11).

6-27.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-27.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect seal (17, figure 7-24) and insert (16) for damage. The lapped surfaces can not be grooved, chipped, cracked, or scratched.

6-27.4 Repair or Replacement. Replace all defective parts. Repair kit is available. Refer to Maintenance Parts List 7-24 for details.

6-27.5 Assembly. Refer to figure 7-24 and assemble water pump group as follows:

CAUTION

Do not push against end of bearing shaft. Push against outer race of bearing only.

1. Press bearing (18) into housing (11) until outer edge of bearing is flush with housing. Use Bearing Drive JD262A, or equivalent. Press on outer race only.

CAUTION

Do not touch lapped surface of seal (17).

2. Coat flange portion of seal (17) sparingly with joint sealing compound. Press seal into housing by hand until flange bottoms on housing. Wipe away excess joint sealing compound.
3. Place ceramic insert in cupped rubber insert (15) with V groove on ceramic insert toward cupped rubber insert. Be sure parts are dry and clean. Dip insert (16) in light oil and install impeller (15) in counterbore with cupped rubber insert against impeller. The sides of both inserts should be a uniform distance all the way around the impeller counterbore. Apply a coating of clean light oil to the lapped surfaces of the seal (17) and the ceramic insert (16).
4. Support pulley end of bearing (18) shaft. Press impeller (15) onto bearing (18) shaft until impeller rear surface is flush with housing rear surface within 0.010 in. (0.25mm).

CAUTION

Press against bearing shaft only. Do not press against impeller.

5. Use a 0.5 in. (13mm) diameter driver and press bearing shaft into pulley (8) until the distance from the impeller end of the housing (11) to the fan mounting surface is 5.47 in. (139mm). Turn pulley (8) to be sure parts are not binding or striking.
6. If adapter tubes (12) were removed, install in housing. Install new gasket (14), install cover (13) and two screws (2). Tighten screws to 35 pound-feet (48 N-m). Install new gasket (19) and assemble water pump (1) to engine with washers (7), screws (3,4,5) and nuts (6). Tighten screws and nuts to 35 pound-feet (47 N-m).

6-28 FLYWHEEL AND HOUSING GROUP.

6-28.1 Disassembly. Refer to figure 7-25 and disassemble the flywheel and housing group as follows:

1. Remove two of the cap screws (2) that hold flywheel (1) to crankshaft. Install two pilot studs into crankshaft through these two holes and tighten studs securely. Remove the other two cap screws (2).

WARNING

Flywheel (1) weighs approximately 85 pounds (39 kg). Plan proper handling to avoid injury.

2. Install two cap screws removed into threaded holes on flywheel. Tighten these cap screws evenly to push flywheel off crankshaft. Do not remove ring gear (3) from flywheel unless replacement is necessary. Refer to paragraph 6-28.4 for repair.

meter overspeed switch. Therefore, the engine mechanical tachometer drive (15 thru 19) is not used but supplied as standard by the engine manufacturer.

5. Remove rear oil seal (20) with Seal Remover JDG-22. Remove special screw (21) and timing hole cover (22).

WARNING

Flywheel housing (4) weighs approximately 76 pounds (34 kg). Plan proper handling to avoid injury.

3. Remove eight 3/8 in. cap screws (8) and lock washers (9). Remove four 5/8 in. cap screws (5,6) and lock washers (7). Tap flywheel housing (4) with a mallet to free from cylinder block. Remove gasket (23).
4. As required, remove dowel pin (10), set-screw (11), adapter (12) pipe plug (13), and drain plug (14). Remove tachometer drive fitting cap (15), washer (16), fitting (17), washer (18), and drive gear (19).

6-28.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-28.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect flywheel ring gear (3, figure 7-25) for chipped or broken teeth. Replace gear if damaged.

6-28.4 Repair or Replacement. Replace all damaged parts. Replace the ring gear (3, figure 7-25) as follows:

1. Place a hardwood block that is slightly smaller than the inside diameter of the gear (3). Lay the flywheel (1), crankshaft side down, on the hardwood block. Use a drift and hammer to drive the gear (3) off the flywheel (1). Move the drift around ring gear often to prevent cocking the gear on the flywheel.

NOTE

This unit incorporates an electronic tachometer

WARNING

Oil or oil fumes can ignite at temperature above 380°F (193°C). Use a thermometer and/or controlled heat source when heating ring gear (3). Do not allow flame or heating element to be in direct contact with the heating oil. Do not exceed 360°F (182°C). Heat in a well-ventilated area. Plan a safe handling procedure to avoid burns.

2. Heat new ring gear (3), evenly in oil (360°F [182°C] maximum) or in an oven (450°F [232°C] maximum). Install ring gear (3), while hot with tooth chamfer toward engine side of flywheel.
3. Drive ring gear (3) onto flywheel (1) until it bottoms all the way around the flywheel shoulder. Allow to cool before assembly on engine.

6-28.5 Assembly. Refer to figure 7-25 and assemble flywheel and housing group as follows:

CAUTION

When removing crankshaft oil seal wear ring, do not score wear ring too deeply as crankshaft surface may be damaged.

1. Cut wear ring off crankshaft. Inspect for nicks or burrs on wear ring surface of crankshaft. Remove nicks and burrs with fine emery cloth.
2. Install two guide studs in cylinder block. Tighten studs securely. Install a new gasket (23), do not use sealing compound on gasket. If removed from flywheel housing (4), install drain plug (14), pipe plug (13), adapter (12), setscrew (11), and dowel pin (10) in housing (4). Place housing (4) on guide studs and push housing against cylinder block making sure gasket seats evenly between housing and block. Install attaching washers (9,7) and cap screws (8,6,5). Remove the two guide studs and install final two washers and cap screws. Tighten 3/8 in. cap screws (8) to 35 pound-feet (47 N-m). Tighten 5/8 in. cap screws (6,5) to 170 pounds-feet (230 N-m).
3. Install timing hole cover (22) and special screw (21). Install tachometer drive gear (19) to bottom on boss in housing. Install washer (18), fitting (17) washer (16) and cap (15). Coat gear pinion with engine oil.
4. Use either Rear Seal and Wear Ring Installer JDE-140 or KCD-10002. Attach guide plate of tool with two cap screws.

Put a thin film of T43513 John Deere LOCTITE Thread Lock and Sealer (high strength), PT502 John Deere Gasket Maker, or an equivalent sealant on the wear ring surface of the crankshaft. Make sure chamfer on wear ring inside diameter and open side of seal (20) are on the same side. Install seal (20) and wear ring on guide plate of tool with open side of seal toward engine. Attach driver and thrust washer of tool to guide plate with cap screw. Tighten cap screw until driver stops moving. Remove cap screw, thrust washer, driver, two cap screws and the guide plate.

5. Install two guide studs in crankshaft rear flange. Tighten studs securely.

WARNING

Flywheel weighs 85 pounds (39 kg). Plan proper handling to avoid injury.

Move flywheel (1) into position on guide studs. Push flywheel (1) against crankshaft.

CAUTION

Install new cap screws (2) each time flywheel (1) is removed.

Install two cap screws (2); tighten evenly. Remove guide studs and install remaining two cap screws (2). Tighten cap screws evenly to 120 pounds-feet (163 N-m).

6-29 ROCKER ARM COVER, ROCKER ARMS, VALVES, AND CYLINDER HEAD GROUP.

6-29.1 Disassembly. Refer to figure 7-26 and disassemble this group as follows:

1. Remove screws and washers (2), rocker arm cover (1) and gasket (3). Remove screws (5) and washers (6) securing rocker arm shaft supports (12) to cylinder head. Lift out rocker arm assembly and place on work bench.

CAUTION

When disassembling rocker arm assembly, mark or identify the parts for assembly in the same relationship as they were before disassembly.

2. Remove plugs (7) from shaft assembly (4) and slide bowed washers (9), rocker arm springs (10), rocker arms (11) and rocker arm supports (12) off rocker arm shaft (8). Lift push rods (13) from their bores in cylinder head and mark them so each can be placed in the same bore at assembly. Use a magnetic valve tappet remover and remove the valve tappets

- (14) marking them for assembly reference as were the push rods (13).
3. Remove valve caps (19). Attach lifting device to lifting straps (15, 16), remove cylinder head cap screws (21) and washers (22) and lift cylinder head assembly (20) off cylinder block. Place the assembly on work bench. Remove and discard cylinder head gasket (31). Only when necessary, remove cap screws (17), lock washers (18) and lifting straps (15,16).
 4. Use a valve spring compressor and compress valve springs (25) far enough to remove lock retainers (23). Remove the retainers (23), spring retainers (24) and springs (25). Remove intake valves (26) and exhaust valves (27). Place the valves (26, 27) in a rack marked for cylinder order from which each was removed for assembly reference. Only when replacement is necessary, remove valve seat inserts (28) and plugs (29) from cylinder head (30).
 5. To remove cam shaft group, first perform following check to determine if removal and repair is necessary.
 - a. Use Timing Tool, John Deere JD-254, or equivalent to align timing mark on camshaft gear. (Rocker arms, push rods, and cam followers removed).
 - b. Position a dial indicator on the camshaft gear. Push camshaft to the rear of the engine as far as possible. Set dial indicator on zero. Using pry bars, move camshaft to front of engine as far as possible. Read dial indicator. Maximum allowable end play is 0.015 inch (0.38mm).
 - c. Position dial indicator against a tooth on the camshaft gear. Hold idler gear securely. Rotate camshaft back-and-forth. Note variation on indicator. Camshaft gear backlash shall be 0.003 to 0.014 inch (0.08 to 0.36 mm).
 6. To remove camshaft, rotate crankshaft until hole in camshaft gear (33, figure 7-26) aligns with one screw (36) and remove the screw. Rotate crankshaft until hole in gear aligns with the second screw and remove the screw and thrust plate (35). Use Timing Tool JD-254, or equivalent, rotate crankshaft until camshaft gear (33) timing mark is again aligned. Remove tachometer drive shaft (37).

CAUTION

Do not allow cam lobes to drag on bearing surfaces when removing camshaft.

7. Turn the engine to a front-up position. Carefully lift camshaft (32) and gear (33) assembly from engine. As necessary, press camshaft gear (33) off camshaft (32) and remove key (34).

6-29.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Remove all gasket material residue. Clean cylinder head (30, figure 7-26) and top of cylinder block of carbon deposits.

6-29.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Specific component inspection is as follows:

1. Camshaft Group. Inspect camshaft gear (33, figure 7-26) for worn or broken teeth. Inspect camshaft (32) lobes for wear or damage. Check outside diameter of camshaft (32) bearing journals for wear. Minimum diameter is 2.199 inches (55.85 mm). Examine tachometer drive shaft (37) for wear and damage. Check thrust plate (35) thickness. Minimum thickness is 0.151 inch (3.84 mm). Measure each camshaft lobe with a micrometer at highest point and at narrowist point. Sub-

tract narrowist dimension from highest dimension to find lobe height. This height should be 0.266 to 0.286 in. (6.76 to 7.27mm). If not within these dimensions, install a new camshaft (32).

2. Intake and Exhaust Valves and Cylinder Head. Check cylinder head deck to valve head distance with valve seated, see table 6-1. Check cylinder head flatness, table 6-1. Inspect valve faces for burning and pitting. Valves (26,27) may be re-faced, see table 6-1. Also, check valve stem oil clearance in valve guide, see table 6-1. Inspect valve spring (25) as specified in table 6-1. Inspect valve seat angle, seat width and run-out as shown in table 6-1.

3. Rocker Arm Group. Check rocker arm (11), rocker arm shaft (8), and rocker arm supports (12) for wear as shown in table 6-1. Inspect springs (10) for broken coils. Inspect push rods (13) for bending. No bending is acceptable. Replace any push rod that is bent.

6-29.4 Repair or Replacement. Replace all defective parts that cannot be repaired as follows:

NOTE

When necessary to replace camshaft (32), also replace the cam followers (14).

1. Cylinder head (30, figure 7-26) may be resurfaced if found to be warped. Maximum material removal is 0.030 inch (0.76 mm).
2. Intake and exhaust valves (26,27) faces may be reground to dimensions shown in table 6-1. Valve guides in cylinder head may be reamed to obtain proper valve stem oil clearance.
3. Valve seats may be reground to dimensions shown in table 6-1.

6-29.5 Assembly. Refer to figure 7-26 and assemble this group as follows:

1. Camshaft Group. Support the camshaft (32) under the first journal, install key (34) and press gear (33) onto end of camshaft with timing mark side of gear away from camshaft. Press gear onto shaft until tight against shaft shoulder. Coat camshaft (32) bearing journals and lobes with high temperature grease. Make certain crankshaft is at top dead center on first cylinder compression stroke.
2. Position thrust plate (35) in its groove in camshaft. While holding thrust plate in position, lower camshaft (32) into cylinder block. Use Timing Tool, JD-254, or equivalent, to position camshaft gear (33) timing mark in time with crankshaft. Rotate crankshaft until hole in gear (33) aligns with thrust plate screw hole and install screw (36). Again rotate crankshaft until second screw (36) can be installed. Torque these screws to 35 lb-ft (47 N-m). Check camshaft end play and backlash as described in paragraphs 6-29.1.5.a thru 6-29.1.5.c. Install tachometer drive shaft.
3. Cylinder Head and Valves Group. If removed, install plugs (29, figure 7-26), lifting straps (16,15), lock washers (18) and screws (17). Lubricate valve stems and guides and assemble intake and exhaust valves (26,27) into cylinder head (30) in same order as removed at disassembly. Assemble valve springs (25) and spring retainers (24), use a spring compressor to compress springs (25) far enough to install retainer locks (23). Install a new cylinder head gasket (31). Lift head (30) and place in position on cylinder block. Dip screws (21) in clean engine oil and install

CAUTION

Do not allow cam lobes to drag on bearing surfaces while installing camshaft (32).

washers (22) and screws (21). Tighten screws (21) evenly in several steps until torqued to 95 lb-ft (129 N-m) in tightening sequence shown in table 6-1.

4. Rocker Arm Group. Install cam followers (14, figure 7-26) and push rods (13) in same order as removed at disassembly. Install valve stem caps (19). Assemble rocker arm supports (12), rocker arm (11), and springs (10) on rocker arm shaft (8) in same order as removed at disassembly. Install bowed washers (9) and plugs (7) on each end of shaft (8). Assemble rocker arm assembly onto head (30) and attach supports (12) with washers (6) and screws (5). Tighten screws (5) to 35 lb.-ft (47 N-m).

5. Valve clearance can be adjusted with engine either hot or cold. Adjust intake valve to 0.014 inch (0.36mm) and exhaust valve to 0.018 inch (0.46mm). Position number one piston at top dead center on compression stroke. Adjust valve clearance on number one and two cylinder exhaust valves and on number one and three cylinder intake valves. Rotate crankshaft 360° and adjust valve clearance on number three cylinder exhaust valve and number two cylinder intake valve. Refer to table 6-1.

6. Cement a new rocker arm cover gasket (3, figure 7-26) to the cover (1). Position cover (1) on cylinder head and secure with screws (2). Torque screws to 20 - 25 lb-in. (2.3 to 2.8 N-m).

6-30 OIL PAN AND OIL PUMP GROUP.

6-30.1 Disassembly. Refer to figure 7-27 and disassemble the oil pan and oil pump group as follows:

1. Remove six cap screws (2), eighteen cap screws (3), twenty four lock washers (4) and straps (5). Remove oil pan (1) and gasket (8). Discard the gasket (8). As necessary, remove drain plug (6) and washer (7).
2. Remove drive gear nut (10) and drive gear (9). Remove two each cap screws (17,19), washers (18,20), lift pump intake (13) and pump assembly (12) off engine. Remove o-ring (14).
3. Pull outlet tube (11) out of cover (16) and remove o-ring (15). Separate cover (16) from housing (24). Remove gear (23) from shaft (25) and remove the pinion assembly (21). Only when necessary remove groove pin (22) freeing gear from shaft and press pin (25) from housing (24).

6-30.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-30.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect components as follows:

1. Use a feeler gauge and check gear tip to housing side clearance. Maximum clearance is 0.007 in. (0.18mm).
2. Use straight edge bar and feeler gauge or a depth micrometer and check gear face to housing end clearance. Maximum clearance is 0.0062 in. (0.16mm).
3. Measure pinion assembly (21) shaft diameter for wear. Minimum diameter is 0.6308 in. (16.02mm). Measure drive shaft housing bore inside diameter. Maximum diameter is 0.6332 (16.08mm).

6-30.4 Repair or Replacement. Replace all defective parts and any that do not measure within specifications.

6-30.5 Assembly. Refer to figure 7-27 and assemble this group as follows:

1. Put clean engine oil on gears (21,23). Install gear (23) onto housing pin (25) and install pinion assembly (21) into housing (24).
2. Install new o-rings (15, 14) into cover (16). Assemble cover (16) to housing (24). Place oil pump in position on engine front plate and attach with lock washers

(20) and cap screws (19). Attach intake (13) to pump with washers (18) and cap screws (17). Install outlet tube (11). Install drive gear (9) and nut (10). Torque nut (10) and cap screws (17,19) to 35 lb-ft (47 N-m). Stake nut (10) to shaft.

3. If removed, install drain plug washer (7) and drain plug (6) in bottom of oil pan (1). Install a new gasket (8) and attach oil pan (1) to cylinder block with twenty four straps (5), lock washers (4), eighteen cap screws (3) and six cap screws (2).

6-31 PISTON AND CONNECTING RODS GROUP.

6-31.1 Disassembly. With cylinder head removed (paragraph 6-29) and oil pan removed (paragraph 6-30), install large flat washers and short cap screws in cylinder block to hold cylinder liners (10, figure 7-28). Remove ridge or carbon from liners (10) with an automotive type ridge reamer. Refer to figure 7-28 and disassemble as follows:

NOTE

Do not use pneumatic wrench to remove connecting rod cap screws (2, figure 7-28).

1. Remove connecting rod cap screws (2) and measure the connecting rod bearing-to-crankshaft

journal clearance, the connecting rod bore, and the oil clearance, refer to table 6-1.

2. Mark the piston (8) and connecting rod assembly (1) in a suitable manner for reference to which bores they were removed, as an aid at assembly. Push the pistons (8) and rod assemblies (1) out top of liners (10).
3. Remove retaining rings (6), push out piston pin (5) separating piston (8) from rod assembly (1). Remove rod bearings (4) and, as necessary, press out pin bushing (3). Keep connecting rod caps with their respective rods.
4. Remove piston ring set (9) from piston (8). Discard ring set (9). Rings are not to be reused.

CAUTION

Services pistons (8) and liners (10) as sets. (See 7, figure 7-28).

5. Examine cylinder liner (10) bores for out-of-round, taper, and scoring, refer to table 6-1. Use John Deere Puller D01062AA or D01073AA, or equivalent, and pull the liners (10). Remove the shims (11) and O-ring kit (12) from liner.

6-31.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Clean components of this group as follows:

WARNING

Do not allow cleaning solution to come in contact with skin or eyes. Use protective clothing, such as rubber apron, gloves, and face shield.

CAUTION

Do not soak pistons more than 60 minutes in cleaning solution. Never clean pistons with wire brush or abrasives.

1. Soak piston (8, figure 7-28) in a solution of 50 percent "Mr. Clean" and water, or equivalent, for 30 to 60 minutes. Do not exceed 60 minutes.
2. Scrub pistons (8) with a stiff bristle brush. Clean ring grooves with a piece of wood or broken piston ring. Rinse pistons in clean water and dry with clean towel.
3. Cylinder liners (10) may be cleaned in the same type of solution.

6-31.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect the connecting rod bearing-to-crankshaft dimensions (refer to

table 6-1). Check piston (8, figure 7-28) top ring groove for wear using John Deere JDE-62, Ring Groove Wear Gauge, or equivalent. If gauge shoulders contact ring land, groove is worn excessively. Check ring groove side clearance with a new ring and feeler gauge. Clearance shall be maximum of 0.008 in. (0.20mm). Check piston pin (5) fit in piston. Pin must fit with thumb press fit. Check connecting rods (1) for straightness.

CAUTION

Do not re-use piston rings. Replace complete ring kit (9, figure 7-28). When cylinder liners (10) are replaced, use new o-ring kit (12).

6-31.4 Repair or Replacement. Replace all defective parts that cannot be repaired as outlined in steps following:

1. Replace piston rings (8, figure 7-28) as a complete set and o-rings (10) as a kit at assembly.
2. If piston pin (5) is not a thumb press fit in piston pin bushing (3), press bushing out of connecting rod with JDE-88, Bushing Remover and Installer. Press in a new bushing with same tool until flush with one side of rod. Make sure oil hole in bushing and hole in rod align. Hone bushing to inside diameter of 1.376 to 1.377 in. (34.95 to 34.98mm).

3. When cylinder liners (10) are replaced, use a wire brush to remove all rust and scale from outside of liners. Make certain there are no nicks or burrs in areas where o-ring kit (12) will seat. Wash liners thoroughly with solvent and dry. Use John Deere, D17004BR Brush, or equivalent, to deglaze each liner. Cross hatch pattern should be approximately 45 degrees. Immediately after deglazing, clean line bore with a waterless hand cleaner soap. Rinse with clean water until rinse water is clear. Dry the liners with clean towel and wipe bore with clean engine oil.

6-31.5 Assembly. Refer to figure 7-28 and assemble the piston and connecting rods as follows:

1. When installing liners (10) in cylinder block, first place liner in bore without o-ring kit (12). Install large flat washers and short cap screws to hold liners securely in place. Use a depth gauge and check height of liner flange above top of cylinder block. Height should be 0.001 to 0.004 in. (0.03 to 0.10mm). Check height in several places around the liner to make sure liner is seated squarely in bore. The maximum difference in liner height between nearest point of two adjacent liners should not exceed 0.001 in. (0.03mm). If liner protrusion is less

than specified, install one 0.002 in. (0.05mm) or one 0.004 in. (0.10mm) shim (11, figure 7-28). Do not use more than one shim for each liner. Remove liners from bore after checking height. Then, install the liners (10) as follows:

- a. Pour Soap Lubricant John Deere AR54749, or equivalent, into a suitable container. Dip each of the new liner packings (12, figure 7-28) in the soap. Do not leave packing in the soap to soak.

NOTE

Do not use oil on packing.

- b. Install the red or white o-ring in the upper o-ring groove in cylinder block. Install black o-ring in lower o-ring groove in cylinder block. Turn liner (10) upside-down and install four sided packing over the outside of the liner. Slide down firmly against second shoulder on liner. Make certain packing is not twisted.
- c. Coat liner packing, seating area of liner, and cylinder block o-rings with AR54749 soap lubricant. Carefully

place liner into cylinder block bore. Do not scuff packing across upper bore. As liner is aligned with pilot bore and lowers into position, use only pressure of both thumbs to press liner into bore until liner drops to point nearly flush at upper flange of liner and cylinder block. Finish seating liners using John Deere KCD-10001.

NOTE

Cylinder liner (10) will protrude over the top of the cylinder block more than normal due to packing and o-rings not being compressed.

CAUTION

If you suspect that a packing may have been sheared or displaced during assembly of liner into block, remove and examine. If no damage is found, resoap packings and reinstall liner assembly.

2. When liners (10, figure 7-28) have been installed in block, use short cap screws and large flat washers to hold in place. Clean the liner bores with waterless hand cleaner and wipe dry with clean towels.

3. Assemble pistons (8) to connecting rods (1) making sure the word "FRONT" on top of piston and side of rod are on the same side. Coat piston pin (5) with clean engine oil, join piston (8) and rod (1) by inserting pin (5) through piston pin bushing (3) installed in rod (1). Install retaining rings (6).

CAUTION

Use correct ring expander so that piston rings (9) will not be damaged.

NOTE

New rings are furnished with correct end gap; therefore, fitting rings in liner is not necessary.

4. Use ring expander, John Deere JDE-85 or JDE-135, or equivalent, and install new ring set (9, figure 7-28). Install oil ring expander in piston bottom ring groove with end gap over either end of piston pin. Install oil control ring over oil ring expander in bottom groove with end gap on opposite side of expander gap.

The rectangular compression ring, center groove, has two pip marks near the gap or word TOP or T on one side. Install

compression ring in center groove with pip marks or word TOP or T toward top of piston with ring gap opposite that of oil control ring.

5. The Keystone compression ring, top ring, has one pip mark or word TOP or a T on one side. Install the Keystone ring in top piston groove with pip mark or word TOP or T toward top of piston with ring gap on opposite side of compression ring gap in second groove.
6. Coat piston rings and cylinder liners with clean engine oil. Use piston ring compressor, John Deere JDE-84, or equivalent, positioned on top of cylinder liner. Insert piston and rod assembly into cylinders from which they were removed with word "FRONT" on rod and piston facing toward front of engine.

NOTE

Rod Caps must be installed on same connecting rod from which they were removed. Dip cap screws (2) in oil before installing. Apply clean engine oil to bearing inserts (4) at installation.

7. Install bearing inserts (4) in connecting rod and cap with small tangs fitting in recesses provided in rod and cap.

Install rod caps so that large slots in cap fits tang on rod.

CAUTION

Do not use pneumatic wrenches to install connecting rod cap screws (2).

8. Install new cap screws (2) and torque to 52 lb-ft (71 N-m) for cap screws colored black or 63 lb-ft (85 N-m) for cap screws with natural steel color.
9. Remove screws and washers holding cylinder liners in block. Refer to paragraph 6-30 and install oil pan. Refer to paragraph 6-29 and install cylinder head.

6-32 GEAR COVER AND END PLATE GROUP.

6-32.1 Disassembly. Refer to figure 7-29 and disassemble this group as follows:

1. Remove screws (2), washers (3), timing cover (1) and gasket (4). Remove oil pressure control valve fitting (5) carefully, as it is spring loaded. Remove washer (6), shims (7), spring (8) and valve (9). Count number of washers (6) and shims (7).
2. Remove ten cap screws (11), two cap screws (12), and twelve washers (13). Remove two nuts (14); studs (15)

need not be removed. Tap gear cover (10) with soft mallet to loosen and remove cover and gasket (16).

3. Remove all gears and shafts necessary to gain access to front plate (17). Remove screws (18), lock washer (19), front plate (17), and as necessary, set-screws (20). Remove gasket (21).

6-32.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Clean all gasket material from mating surfaces.

6-32.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect relief valve spring (8, figure 7-29) free length and resiliency, see table 6-1.

6-32.4 Repair or Replacement. Replace all defective parts.

6-32.5 Assembly. Refer to figure 7-29 and assemble this group as follows:

1. At assembly use all new gaskets (21,16,4). Apply a light coating of grease on gasket (21) to hold in place, position gasket on cylinder block. If set-screws (20) were removed, install the setscrews. Position front plate (17) and install lock washers (19) and screws (18).
2. Apply light coating of grease to gasket (16) to hold in place on cylinder block. If removed, install two studs (15). Assemble all gears and

shafts removed at disassembly. Make sure all gears are timed properly as detailed in paragraphs for those parts.

3. Install gear cover (10) and secure with nuts (14), washers (13) and cap screws (12,11). Assemble gasket (4), timing cover (1), washers (3) and cap screws (2).
4. Place valve (9) in end of spring (8); install in timing gear cover. Place washers (6) onto fitting (5) so that raised center contacts head of fitting. Place shims (7) into fitting (5). Use same number of washers (6) and shims (7) as removed at disassembly. Place fitting (5) over spring (8), compress spring and install fitting (5) in cover (10). Torque fitting to 70 lb-ft (95 N-m).

6-33 CRANKSHAFT AND CYLINDER BLOCK GROUP.

6-33.1 Disassembly. Remove cap screw (2, figure 7-30), washer (3) and pull crankshaft pulley (1) from end of crankshaft with John Deere Puller D01200AA, or equivalent. Remove gear cover (paragraph 6-32); then, disassemble this group as follows:

1. Remove oil slinger (5). Drive the front oil seal (4) out of timing gear cover (10, figure 7-29). Remove bolt (7, figure 7-30), outer thrust washer (8), and upper idler gear (6) from idler gear shaft (10).

When necessary only, press bushing (9) out of idler gear (6).

2. Remove one bolt (14), washer (15), outer thrust washer (16) and lower idler gear (13) from shaft (19). When necessary only, press bushing (18) out of idler gear (13).
3. When necessary to disassemble idler gear shafts (10,19), front plate (17, figure 7-29) must first be removed. Then, press shaft (10, figure 7-30) and remove inner thrust washer (12) and, as necessary, spring pin (11). Remove one bolt (14), washer (15), press shaft (19) out of front plate, remove inner thrust washer (17) and, as necessary, remove spring pin (20).
4. Remove connecting rod caps and push pistons and rods toward cylinder head. Use a center punch and mark main bearing caps (21,22, figure 7-30) to correspond to numbers stamped on oil pan rail. Remove the cap screws (23) and washers (24); remove main bearing caps (21,22), lift crankshaft assembly (27) from cylinder block and remove bearing inserts (25,26) from cylinder block and main bearing caps.
5. Use a gear puller to pull crankshaft gear (28) off and remove key (29). When necessary, remove key (30). Refer to paragraph 6-28 for removal and in-

stallation of rear oil seal (32).

6. Remove drain valve (33) and pipe plug (50) from cylinder block, as necessary. Remove relief valve spring (34) and relief valve (35). Use John Deere Collet 33859 from Blind Hole Puller Set D01061AA to remove oil pressure relief valve seat. Only as necessary, remove dowel pins (37,38,39) and studs (40,41) from block (49). As required, remove plug cap (42), bushing (43), pipe Plugs (44,47,48), piston cooling orifice (45), and threaded nipple (46) from cylinder block (49).

6-33.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. To clean cylinder block (49, figure 7-30), strip the block of all removable parts, gallery plugs, and core hole plugs. Scrape all gasket material from block surfaces. Then, clean as follows:

1. Remove grease by agitating the cylinder block in a hot bath of commercial heavy-duty alkaline solution.
2. Rinse the block in hot water or steam clean to remove alkaline solution.
3. If water passages are heavily scaled, the block can only be cleaned using special equipment as follows:
 - a. Agitate the block in a bath of inhi-

bited commercial pickling acid.

- b. Allow block to remain in the acid bath until bubbling action stops (about 30 minutes).
 - c. Lift block, allow to drain; immerse in same acid solution for 10 minutes.
 - d. Repeat step (c) until all scale is removed.
 - e. Rinse block in clear hot water to remove the acid solution.
 - f. Neutralize the acid clinging to the block casting by immersing in an alkaline bath.
 - g. Rinse block in clean water or steam clean to remove alkaline solution.
4. Make certain that all water passages, oil galleries, and oil holes are thoroughly cleaned. Then, install all gallery plugs and core hole plugs.

6-33.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Specific inspection for components is as follows:

1. Inspect all gears (6,13,28, figure 7-30) for broken or cracked teeth.
2. Inspect bushings (9,18) and shafts (10,19) for excessive wear, see table 6-1.

3. Inspect crankshaft (27) journals for wear, proper clearance, and scoring, see table 6-1.
4. Inspect and test cylinder block (49) for cracks and leaks as outlined below and check top of block for flatness, see table 6-1.

- a. Pressure test block (49, figure 7-30) for cracks and leaks by sealing water openings in block using plates and gaskets. Drill and tap one of the plates to provide connection for an air line.
- b. Immerse block for 15 minutes in a tank of hot water (180° - 200°F) (82° - 93°C).
- c. Apply air pressure to block and observe water in tank for bubbles, indicating cracks or leaks. If a large tank is not available, fill block with water and apply air pressure.
- d. Always replace a cracked cylinder block.

6-33.4 Repair or Replacement.
Replace all damaged or broken parts. Specific repair or replacement for components of figure 7-30 is as follows:

1. Press a new oil relief valve seat into cylin-

der block using John Deere Bushing Driver JD248A, or equivalent. Press in seat until recessed edge of valve seat is flush with bottom of counterbore in block.

CAUTION

Do not use torch or concentrated flame to heat crankshaft gear (28, figure 7-30). Do not overheat gear. Plan safe handling to avoid burns.

2. To replace crankshaft gear (28), heat the gear to 360°F (182°C) in oil or in controlled oven. Install key (29) in crankshaft keyway and drive hot gear onto shaft over key using John Deere Driver, JDH-7, or equivalent.

6-33.5 Assembly. Refer to figure 7-30 and assemble crankshaft and cylinder block group as follows:

1. If removed at disassembly, install threaded nipple (46), three piston cooling orifices (45), torque orifices to 85 - 110 lb-in. (9.6 - 12.4 N-m), pipe plugs (48, 47, 44), bushing (43), and plug cap (42). If removed, install studs (41, 40) and dowel pins (39, 38, 37). Install relief valve (35) and spring (34). Install pipe plug (50) and drain valve (33).
2. Refer to paragraph 6-28 for assembly of rear oil seal (32, figure 7-30)

and replacement of rear crankshaft wear ring. If removed install dowel pin (31). Installation of crankshaft gear (28) is covered in paragraph 6-33.4.2 above.

3. To assemble idler gear shafts (19,10) onto front plate (17, figure 7-29), first, press spring pins (20,11, figure 7-30) into shafts (19,10) to a point where pin height is 0.20 to 0.28 inch (5.1 to 7.1 mm) from front of shaft (away from plate). Assemble the inner thrust washers (17,12), press shaft (19,10) into front plate, secure shaft (19) with one washer (15) and bolt (14). Torque bolt (14) to 95 lb-ft (129 N-M). Refer to paragraph 6-32 and install front plate (17, figure 7-29) onto cylinder block.

NOTE

The main bearings (25, figure 7-30) and rear main bearing (26) are available in undersize sets, as needed. Refer to Maintenance Parts List 7-30 for details. Also, refer to table 6-1.

4. Position bearing inserts (26,25, figure 7-30) in cylinder block and main bearing caps (22,21), with tang on inserts engaged in slots in block and caps. Apply coating of clean engine

oil to surfaces of inserts (26,25). Position crankshaft assembly (27) in cylinder block.

NOTE

Tangs of bearing insert halves in bearing caps (22,21) must be positioned on same side of crankshaft as tangs of insert halves in block.

CAUTION

Do not use pneumatic wrench to install bearing cap screws (23).

5. Install bearing caps (22, 21) in order marked at disassembly. Dip cap screws (23) in clean engine oil, install washers (24) and screws (23) in caps. Before tightening screws (23), align upper and lower thrust faces of main thrust bearings. Use soft-face hammer, tap crankshaft to the rear and then to the front to line up thrust flanges. Rotate crankshaft by hand. Should rotate with little effort. Tighten cap screws (23) in "X" pattern to 85 lb-ft (115N-m).

CAUTION

Do not apply too much pressure on pry bar when checking crankshaft end play as damage to bearings may occur.

6. Use a pry bar and carefully move crankshaft rearward. Position a dial indicator against end of crankshaft and zero the indicator. Use the pry bar to move crankshaft forward. Read dial indicator. End play should be minimum 0.002 inch (0.05 mm), maximum 0.015 inch (0.38 mm).

Install new thrust washers (16,8) to obtain correct end play. Check idler gear backlash; upper idler gear (6), 0.003 to 0.017 inch (0.08 to 0.43 mm); lower idler gear (13), 0.003 to 0.014 inch (0.08 to 0.36 mm) is acceptable.
7. Turn crankshaft to position with crankshaft gear key (29, figure 7-30) at 12 o'clock position with respect to cylinder block (straight up toward cylinder head). Do not turn crankshaft from this position for proper gear timing.
8. Apply clean engine oil to connecting rod inserts and crankshaft journals. Position the rods, install connecting rod caps as outlined in paragraph 6-31.
9. If idler gear bushings (18,9) were removed, press bushings into gears flush with either side of gear. Assemble lower idler gear (13) onto shaft (19), install outer thrust washer (16) and secure with washer (15) and bolt (14). Assemble upper thrust idler gear (6) on shaft (10), install thrust washer (8) and secure with bolt (7). Use a dial indicator to check idler gear end play; minimum 0.001 inch (0.03 mm), maximum 0.015 inch (0.38 mm).
10. Install oil slinger (5, figure 7-30). Install oil seal (4) in timing gear cover (15, figure 7-29). Coat outer surface of seal with non-hardening gasket cement and inner surface with a high temperature grease. Support seal bore area of timing gear cover. Press seal to bottom of bore with spring-loaded lip facing inward. Use John Deere JD-250 Driver or equivalent. Install timing gear cover, see paragraph 6-32.
11. Install crankshaft pulley (1, figure 7-30) and secure with washer (3) and screw (2). Torque screw to 85 lb-ft (115 N-m).
12. Assemble all components removed to gain access to this group.

6-34 BRAKE ACTUATING GROUP.

6-34.1 Disassembly. Refer to figure 7-31 and disassemble brake actuating group as follows:

1. Move actuating lever of brake lever (7) to the off position (up, or vertical).

NOTE

The actuating mechanism is the same on both sides of unit. Disassembly is the same for either wheel.

2. Remove cotter pin (2) and clevis pin (1) from each end of parking brake cable (5). Loosen nuts (4) and remove clevis (3) from each end of cable (5). Remove the nuts (4).
3. Disconnect brake cable link (6) from brake lever (7). Remove nuts (8), lock washers (9), cap screws (10), and brake lever (7).
4. Disconnect and remove arm return spring (11). Remove nuts (13), lock washers (14), cap screws (15), and spring anchor (12).
5. Remove lock nut (17), flat washers (18), cap screws (19), and brake arm (16).
6. Remove lock nuts (21) cap screws (22), and brake arm support (20).

6-34.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions.

6-34.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect spring (11, figure 7-30) for broken coils and resiliency. Inspect brake cables (5) for fraying and breaks.

6-34.4 Repair or Replacement. Replace all damaged parts.

6-34.5 Assembly. Refer to figure 7-31 and assemble brake actuating group as follows:

1. Attach brake arm support (20) to frame with cap screws (22) and lock nuts (21).
2. Attach brake arm (16) to support (20) with cap screw (19), flat washer (18), and lock nut (17).

NOTE

Tighten lock nut (17) only tight enough to draw brake arm (16) to support (20) and turn freely on cap screw (19) as a pivot.

3. Attach spring anchor (12) to frame cross member with cap screws (15), lock washers (14) and nuts (13). Connect arm return spring (11) between anchor (12) and arm (16).
4. Attach brake lever (7) to towbar cross member with cap screws (10), lock washers (9) and nuts (8). Attach brake cable link (6) to brake lever (7) with pin supplied with lever.
5. Place nuts (4) onto threaded ends of brake cable (5). Assemble rod end clevis (3) onto each end of cable (5). Tighten nuts (4) against clevis (3) to lock in place. Connect clevis (3) to

link (6) and arm (16) with clevis pins (1) and install cotter pins (2).

6. Refer to paragraph 6-36 for brake adjustments.

6-35 LANDING WHEEL AND AXLE ASSEMBLY.

6-35.1 Disassembly. Refer to figure 7-32 and disassemble landing wheel and axle assembly as follows:

1. Pull ball lock pin (1) out of hole in towbar, remove cotter pin (2) freeing chain (3) and pin (1). Press out and remove spring pin (5), washer (6) and landing wheel assembly (4). Do not separate pivot arm (8) and landing wheel (7) unless this weldment is to be repaired.
2. Remove wheel nuts (15) pull wheel assembly (14) off wheel studs (26), deflate and remove tire (9). As needed, remove valve stem (10). Pry off dust cap (16), remove cotter pin (17), spindle nut (18), spindle washer (19), and outer bearing cone (20).
3. Pull off hub assembly (23) and remove grease seal (21) and inner bearing cone (22). When necessary, press out wheel studs (26) and outer bearing cup (24) and inner bearing cup (25) from hub (27).
4. Remove lock nuts (12) and cap screws (13)

securing axle assembly to frame. Remove nuts (31), cap screws (32), and front spring brackets (33). Remove cotter pins (28), rivets (29), and rear spring brackets (30).

5. Remove nuts (35), u-bolts (36), and tie plates (37) freeing springs (34) from axle beam assembly (38).

6-35.2 Cleaning. Refer to paragraph 6-3.1 for general cleaning instructions. Do not clean tires (9, figure 7-32) or valve stem (10) with any type of solvent.

6-35.3 Inspection. Refer to paragraph 6-3.2 for general inspection instructions. Inspect tires (9, figure 7-32) for excessive and uneven tread wear and for breaks in side walls. Inspect wheel bearings (20, 24 and 22, 25) for free rotation and any gritty action. Inspect springs (34) for cracked or broken leaves. Inspect axle beam (38) spindles for scoring.

6-35.4 Repair or Replacement. Replace all defective parts.

6-35.5 Assembly. Refer to figure 7-32 and assemble landing wheel and axle assembly as follows:

1. Assemble springs (34) onto axle beam (38) with tie plates (37), u-bolts (36) and nuts (35). Springs (34) are underslung with 48 inch centers.
2. Assemble front spring brackets (33) to springs (34) with cap screws (32) and nuts (31). Assemble rear spring brackets (30) with rivets (29) and cotter pins (28).

3. If removed, press wheel studs (26) and bearing cups (25,24) into hub (27). Fill cavity between bearing cups (25, 24) 1/3 full of grease (table 5-2). Coat inner bearing cone (22) with grease and assemble into hub assembly (23). Press in new seal (21) flush with face of hub, sealing lip facing inward.
4. Assemble hub assembly (23) onto axle beam spindle, be careful not to damage seal (21). Coat outer bearing cone (20) with grease and assemble cone (20), spindle washer (19), nut (18), cotter pin (17), and install grease cap (16).
5. If removed, install valve stem (10) in wheel (14). Mount tire (9) on wheel assembly (14) and inflate tire to 32 psi maximum. Attach axle assembly to frame with cap screws (13) and lock nuts (12). Mount tire and wheel assembly onto wheel studs and secure with wheel nuts (15).
6. Slide landing wheel (4) pivot arm (8) through mounting tube on towbar. Place washer (6) on pivot arm and press in spring pin (5). Attach chain (3) to towbar with cotter pin (2). Install ball lock pin (1).

6-36 BRAKE ADJUSTMENT.

6-36.1 Adjustment. Refer to

figure 7-31 and adjust parking brakes as follows:

1. Remove cotter pins (2) and clevis pins (1). Loosen nuts (4) and adjust rod end clevises (3) on cable (5) so that cables on each side are the same length and brake arms (16) contact tires evenly when handle of brake lever (7) is actuated to on position (down or horizontal).
2. Lock rod end clevises (3) by tightening nuts (4) against clevises (3). Attach clevises (3) with clevis pins (1) and install cotter pin (2).
3. Further adjust brake lever (7) by turning the adjusting handle of the lever in a clockwise direction to increase force applied to brake arms (16) against tires. In like manner, if lever handle cannot be pushed to on position (down), turn adjusting handle in counterclockwise direction to decrease force applied on tires.

6-37 FINAL ASSEMBLY AIR PRESSURE TEST.

6-37.1 Air Pressure Test. After air end overhaul and assembly of components, before unit assembly run-in, perform air pressure test to determine if there are any leaks as follows:

1. Close all air service valves and hose reel discharge valves. Block off discharge port in blowdown valve assembly. Make certain that all

drain valves are closed.

2. Remove the oil filler plug and o-ring packing from the oil separator filler pipe.
3. Install a 1-1/2 NPT to 1/4 NPT reducing bushing onto the oil filler pipe. Install male half of a "quick change" air hose connection in the reducing bushing.
4. Connect a test air supply hose to the "quick change" connection. Test supply air shall be capable of supplying 100 psi (689 kPa). Subject the system to this pressure.
5. Check all tubing, piping, hoses, fittings, and joints with a soap and water solution applied with a brush at all connections. Leaks will be indicated by bubbling of this solution.
6. Repair any leaks found, release air pressure, remove test items, and install the oil filler o-ring packing, and oil filler plug.

6-38 UNIT ASSEMBLY RUN-IN.

6-38.1 Run-In. After overhaul of compressor or engine, the unit shall be run-in for a period of three hours to allow for break-in of compressor or engine and to repair all leaks or malfunctions that may occur. Per-

form this run-in, as necessary, as follows:

1. Select a sight as near level as possible. Out-of-level should not exceed 15 degrees in any direction during operation of the equipment.
2. Set the parking brakes.
3. Check engine coolant level in radiator. Fill as necessary.
4. Fill the fuel tank.
5. Check engine oil level and fill, as necessary.
6. Check compressor oil separator oil level and fill as necessary.
7. Check fan and alternator drive belt tension and adjust as necessary.
8. Check battery electrolyte level. Correct level is 3/8 inch (9.5 mm) above plates. Check battery cables for tightness on terminals.
9. Open air discharge service valves.
10. Turn compressor unloader and idle control knob on front housing panel clockwise until it stops.
11. With ignition switch in OFF position, press start button to crank engine for approximately 3 seconds; then release start button.

CAUTION

If engine oil pressure does not register within 3 seconds after starting, release safety control button and determine cause.

12. Place ignition switch in ON position. Press the start button and safety control button simultaneously. When engine starts, release start button but continue to hold the safety control button until engine oil pressure is indicated on engine oil pressure gauge.
13. Turn compressor unloader and idle control knob on front of housing panel counterclockwise until it stops. Adjust air discharge service valves to maintain approximately 90 psi (6.3 kg/cm²) on air pressure gauge. Allow engine to run until engine coolant temperature reaches 140°F (60°C), indicated on water temperature gauge.
14. Close discharge service valves. When compressor unloads, check readings on all instrument panel gauges. Normal readings are:
 Engine rpm....1200 idle
 2200 full load

Engine oil pressure at 2200 rpm...60 to 100 psi (4.2 to 7.0 kg/cm²)

Engine water temperature180-200°F (82-93°C)

Compressor oil temperature.....170-220°F (77-104°C)

Air pressure..80-105 psi (5.6-7.4 kg/cm²) loaded
 115-120 psi (8.1-8.4kg/cm²) unloaded

NOTE

During operation, testing, and run-in of the unit, troubles that may be encountered, their probable causes, and possible remedies are listed in table 5-3.

15. After run-in period, close all air discharge service valves. Engine will return to idle and the compressor will operate unloaded. Allow to run at idle for five minutes. Turn compressor unloader and idle control knob clockwise until it stops.
16. Place ignition switch in OFF position. When engine stops, the compressor will automatically blow down air from the compressor system.
17. Close and latch the instrument panel door.

Table 6-1. Table of Limits

Engine - Dimensional and torque limits

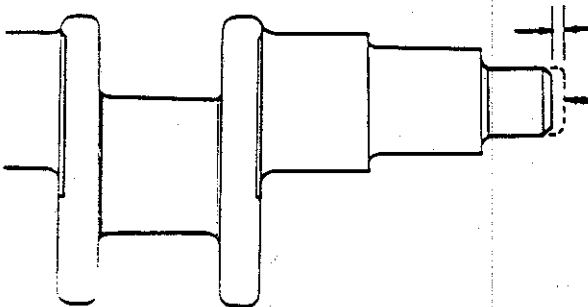
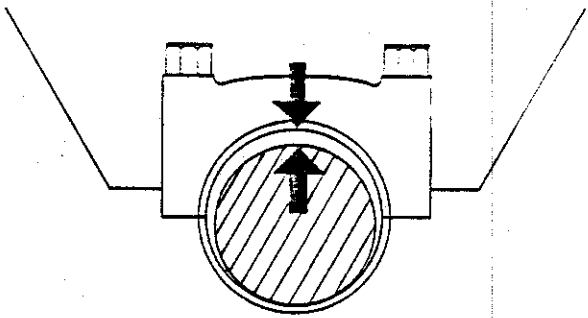
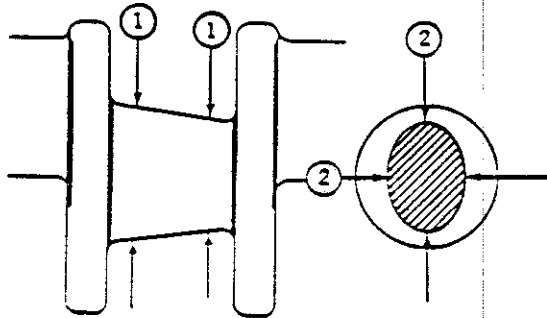
Component	Representative illustration
<p>CRANKSHAFT:</p> <p>End play.....0.002 to 0.008 in. (0.05 to 0.20 mm)</p> <p>Maximum wear end play....0.015 in. (0.38 mm)</p>	
<p>Main journal to main bearing clearance:</p> <p>Journal O.D...3.123 to 3.124 in. (79.32 to 79.35 mm)</p> <p>Bearing bore I.D.....3.325 to 3.326 in. (84.46 to 84.48mm)</p> <p>Assembled bearing I.D.....3.126 to 3.128 in. (79.39 to 79.45mm)</p> <p>Bearing to journal clearance...0.0016 to 0.0046 in. (0.043 to 0.119mm)</p> <p>Max wear clearance0.006 in. (0.15mm)</p> <p>Main bearing cap screw torque.....85 lb-ft (12 kg-m)</p>	
<p>Main journal taper and roundness:</p> <p>① Max. journal taper..... 0.001 in. per 1.00 in. (0.03mm per 25.4mm)</p> <p>② Max. journal out-of-round..... 0.003 in. (0.08mm)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

Component	Representative illustration
<p>VALVES:</p> <p>① Valve lift: Intake 0.460 to 0.490 in. (11.68 to 12.45mm) Exhaust..... 0.456 to 0.482 in. (11.58 to 12.24mm)</p> <p>② Cyl. head to intake valve..... 0.030 to 0.044 in. (0.76 to 1.12mm)</p> <p>③ exhaust valve..... 0.050 to 0.064 in. (1.27 to 1.63mm)</p>	
<p>① Valve stem dia..... 0.372 to 0.373 in. (9.45 to 9.47mm)</p> <p>② Valve guide I.D..... 0.375 to 0.876 in. (9.53 to 9.55mm) Max. wear clearance..... 0.006 in. (0.15mm)</p> <p>③ Face angle, intake and exhaust.. 43.5°</p>	
<p>Valve clearance:</p> <p>Intake.....0.014 in. (0.036mm)</p> <p>Exhaust.....0.018 in. (0.46mm)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

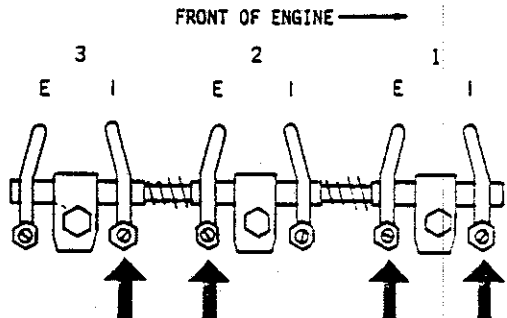
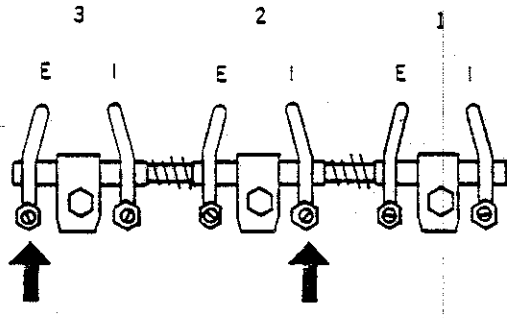
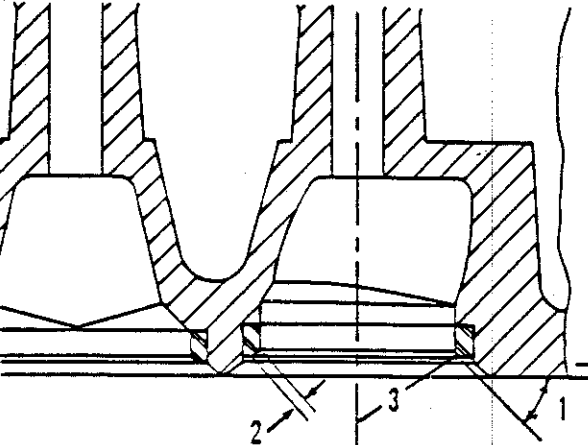
Component	Representative illustration
<p>VALVES-continued:</p> <p>Valve clearance adjustment:</p> <p>No. one piston at top dead center, compression stroke. Adjust valve clearance on no. 1 and 2 cylinders exhaust valves and no. 1 and 3 cylinders intake valves.</p>	 <p style="text-align: center;">FRONT OF ENGINE →</p> <p style="text-align: center;">3 2 1</p> <p style="text-align: center;">E I E I E I</p> <p style="text-align: center;">NO. 1 TDC COMPRESSION STROKE</p>
<p>Rotate crankshaft 360°. Adjust valve clearance on no. 3 cylinder exhaust valve and no. 2 cylinder intake valve.</p>	 <p style="text-align: center;">FRONT OF ENGINE →</p> <p style="text-align: center;">3 2 1</p> <p style="text-align: center;">E I E I E I</p> <p style="text-align: center;">NO. 1 TDC EXHAUST STROKE</p>
<p>VALVE SEATS:</p> <p>1 Seat angle, intake & exhaust. 45°</p> <p>2 Seat width: Intake.....0.06 in. (1.5mm) Exhaust.....0.06 in. (1.5mm)</p> <p>3 Max. seat run-out..... 0.002 in. (0.05mm)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

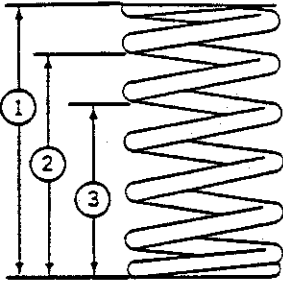
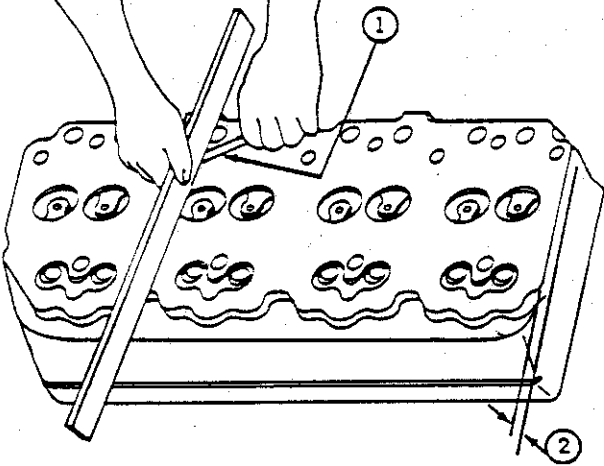
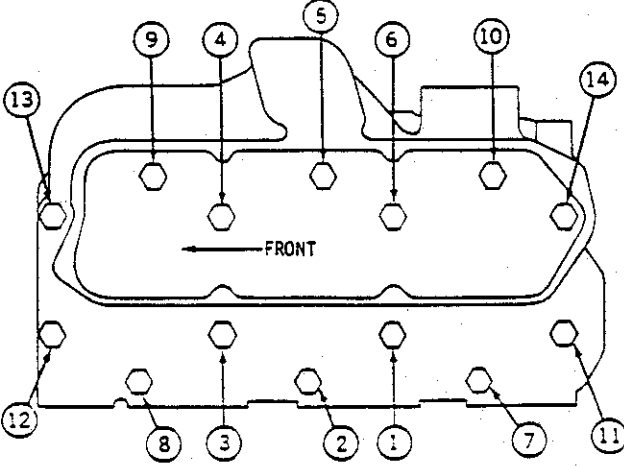
Component	Representative illustration
<p>VALVE SPRINGS:</p> <p>① Free length (approx)..... 2.12 in. (53.8mm)</p> <p>② Compressed with 54-62 lb(24-28kg) 1.81 in. (46.0mm)</p> <p>③ Compressed with 133-153 lb (60-69 kg):...1.36 in. (34.5mm)</p>	
<p>CYLINDER HEAD:</p> <p>① Flatness (max. warp)..... 0.002 in. (0.05mm)</p> <p>② Max material removal..... 0.030 in. (0.76mm)</p>	
<p>Cylinder head torque sequence: Tighten evenly, in several steps, to 95 lb-ft (129 N-m) in numerical sequence shown.</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

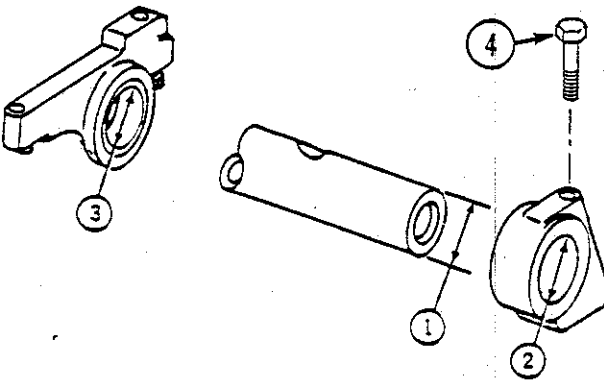
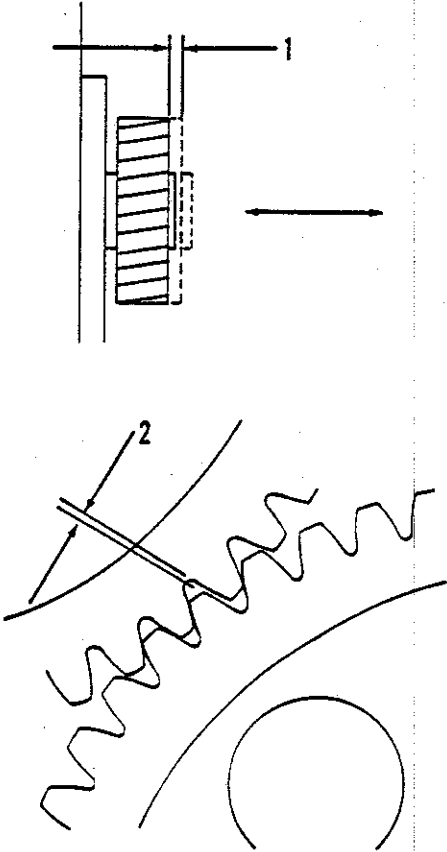
Component	Representative illustration
<p>ROCKER ARM:</p> <p>① Shaft O.D.....0.787 to 0.788 in. (19.99 to 20.01mm) Allowable wear, min..... 0.785 in. (19.94mm)</p> <p>② Shaft support I.D., max..... 0.794 in. (20.17mm)</p> <p>③ Rocker arm I.D..... 0.790 to 0.792 in. (20.07 to 20.12mm) Allowable wear, max..... 0.794 in. (20.17mm)</p> <p>④ Support screw torque..... 35 lb-ft (47 N-m) Rocker arm cover scw torque: 20 to 25 lb-in. (2.3 to 2.8 N-m)</p>	
<p>CAMSHAFT:</p> <p>1 End play.....0.003 to 0.009 in. (0.08 to 0.23mm) Allowable wear, max..... 0.015 in. (0.38mm)</p> <p>2 Gear backlash..0.003 to 0.014 in. (0.08 to 0.36mm)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

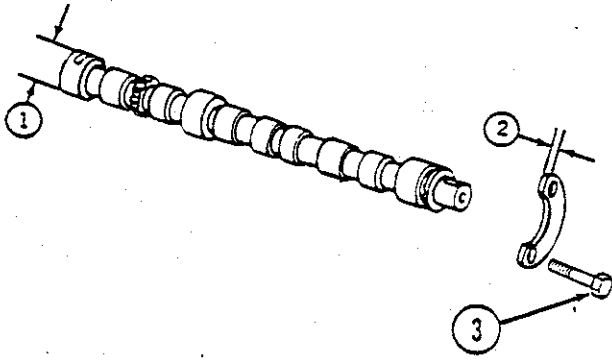
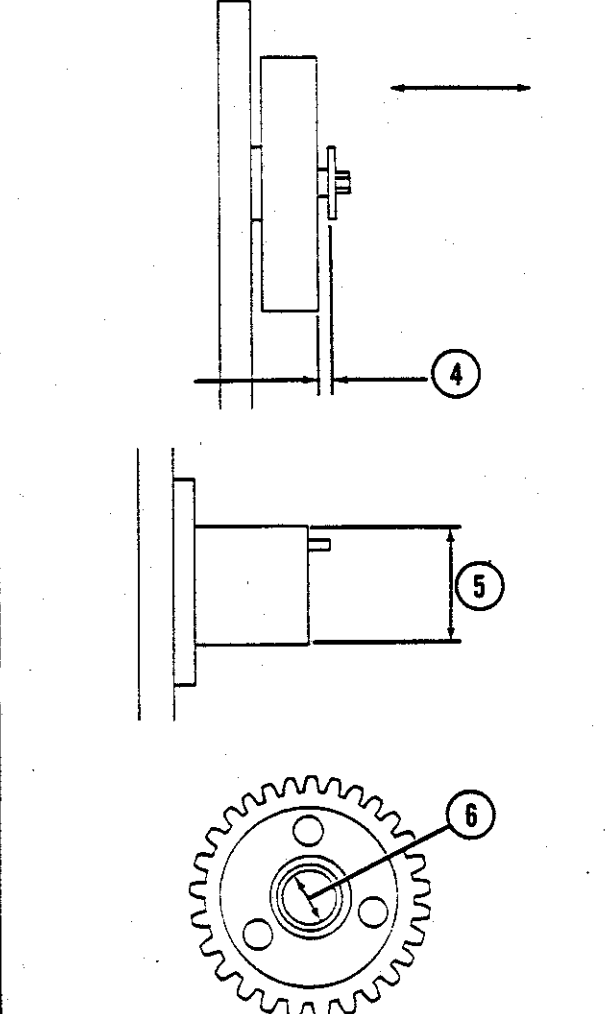
Component	Representative illustration
<p>CAMSHAFT-Continued:</p> <p>① Camshaft bearing journal O.D.... 2.200 to 2.201 in. (55.87 to 55.90mm) Allowable wear, min..... 2.199 in. (55.85mm)</p> <p>② Thrust plate thickness..... 0.156 to 0.158 in. (3.96 to 4.01mm) Thrust plate thickness, min..... 0.151 in. (3.84mm)</p> <p>③ Screw torque 35 lb-ft (47 N-m)</p>	
<p>IDLER GEARS AND SHAFTS:</p> <p>④ Idler gear end play..... 0.001 to 0.007 in. (0.03 to 0.18mm) Allowable wear, max..... 0.015 in. (0.38mm)</p> <p>⑤ Idler gear shaft dia..... 1.750 to 1.751 in. (44.45 to 44.48mm)</p> <p>⑥ Idler gear bushing dia..... 1.752 to 1.753 in. (44.50 to 44.53mm) Oil clearance-shaft to bushing.. 0.002 to 0.004 in. (0.05 to 0.10mm) Allowable wear, oil clearance... 0.006 in. (0.15mm)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

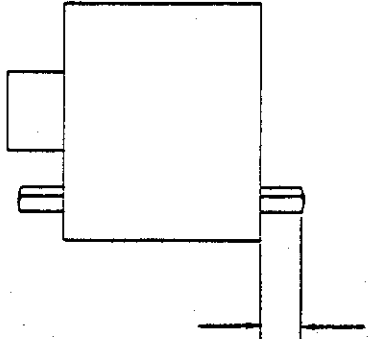
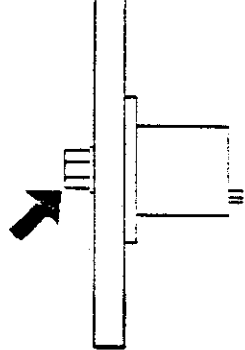
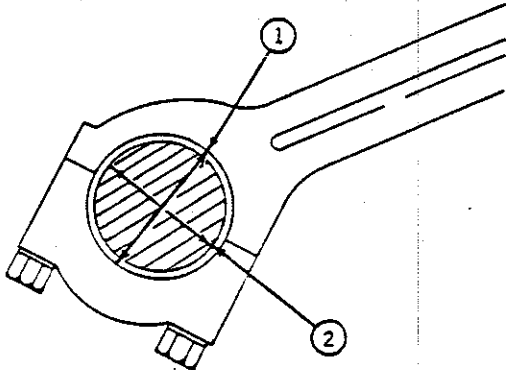
Component	Representative illustration
<p>IDLER GEARS AND SHAFTS-Continued:</p> <p>Gear shaft spring pin height:</p> <p style="padding-left: 100px;">0.20 to 0.28 in. (5.1 to 7.1mm)</p>	 <p>A schematic diagram showing a gear shaft assembly. A rectangular gear housing is mounted on a vertical shaft. A spring pin is inserted through the housing and the shaft to secure the assembly. The pin is shown in a cross-sectional view.</p>
<p>Lower idler gear shaft screw torque.....95 lb-ft (129 N m)</p>	 <p>A schematic diagram of a lower idler gear shaft screw. It shows a vertical shaft with a screw being tightened against a component. An arrow points to the screw head, indicating the location for torque application.</p>
<p>CONNECTING RODS:</p> <p>① Connecting rod bearing assembled I.D...2.750 to 2.752 in. (69.85 to 69.90mm)</p> <p>② Crankshaft rod journal O.D.... 2.748 to 2.749 in. (69.80 to 69.82mm)</p>	 <p>A schematic diagram of a connecting rod. Callout 1 points to the bearing surface on the connecting rod, and callout 2 points to the crankshaft rod journal. The diagram shows the rod in a perspective view, highlighting the contact surfaces.</p>

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

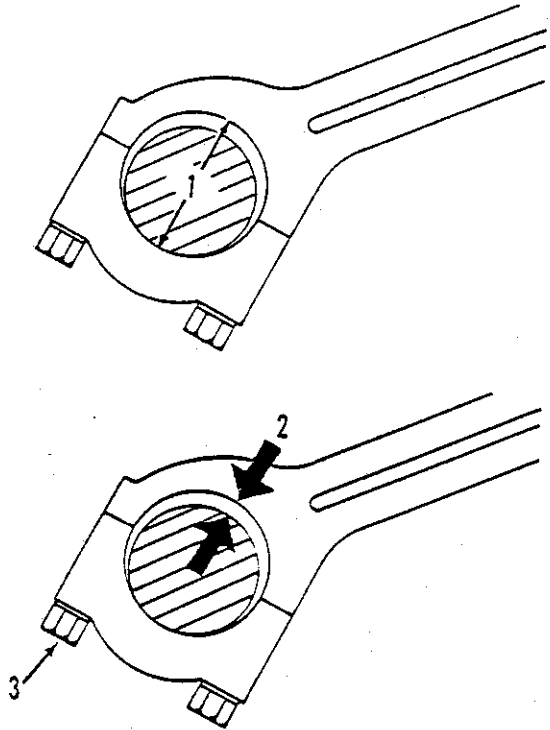
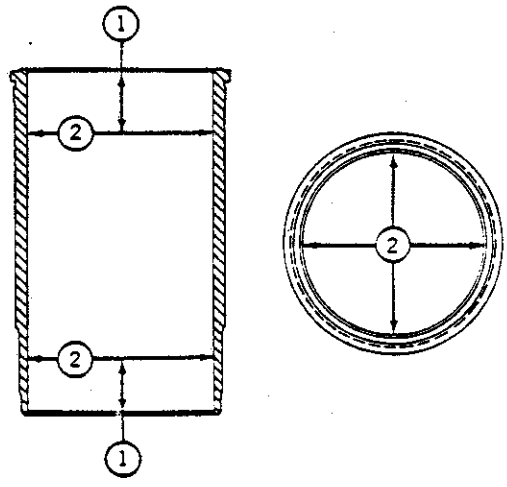
Component	Representative illustration
<p>CONNECTING RODS-Continued:</p> <p>1 Connecting rod bore I.D..... 2.900 to 2.901 in. (73.66 to 73.69mm)</p> <p>2 Rod bearing to crankshaft oil clearance....0.001 to 0.005 in. (0.025 to 0.127mm) Allowable wear, max. oil clear- ance.....0.006 in. (0.152mm)</p> <p>3 Connecting rod cap screw torque:</p> <p>Cap screw colored black..... 52 lb-ft (71 N-m)</p> <p>Cap screw natural steel color. 63 lb-ft (85 N-m)</p>	
<p>CYLINDER LINERS AND PISTONS:</p> <p>① Measure cylinder liner 1 in. (25.4mm) from top and bottom.</p> <p>② Liner taper, max..... 0.002 in. (0.051mm)</p> <p>Liner out-of-round..... 0.002 in. (0.051mm)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

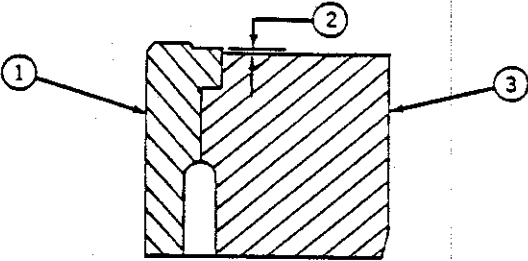
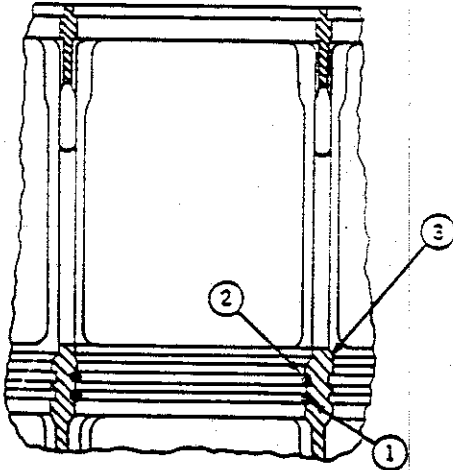
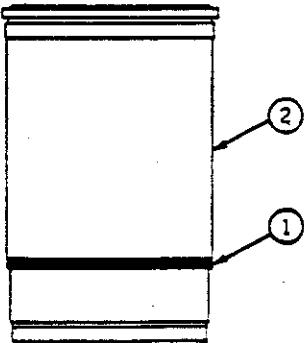
Component	Representative illustration
<p>CYLINDER LINERS AND PISTONS-Continued:</p> <p>① Liner flange protrusion above top of cylinder block: ③</p> <p>② 0.001 to 0.004 in. (0.03 to 0.10mm)</p>	
<p>① Install black o-ring in lower groove in cylinder block. ③</p> <p>② Install red or white o-ring in upper groove in cylinder block. ③</p>	
<p>① Install four-sided packing over outside of cylinder liner. ②</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

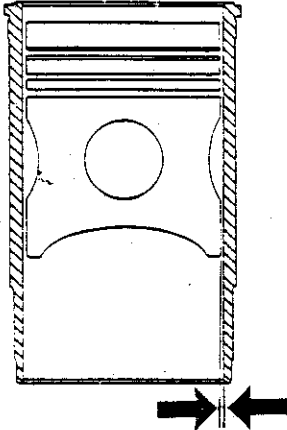
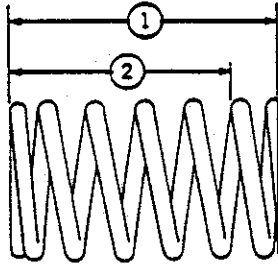
Component	Representative illustration
<p>CYLINDER LINERS AND PISTONS-Continued:</p> <p>Cylinder liner to piston skirt clearance (use ribbon feeler gauge). Max. clearance..... 0.006 in. (0.15mm)</p> <p>Piston ring groove clearance (maximum) 0.008 in. (0.20mm)</p> <p>Piston pin fit in piston pin bore: Thumb press fit.</p>	
<p>OIL PRESSURE CONTROL AND OIL PUMP</p> <p>① Oil pressure control spring: Free length:4.68 in. (119mm) Compressed with 13.5 to 16.5 lb (6.3 to 7.7 kg)..... 1.68 in. (42.5mm)</p> <p>Oil pump mounting screws: Torque to:35 lb-ft(47 N-m)</p> <p>Oil pump gear mounting nut: Torque to..... 35-45 lb-ft (47-61 N-m) (stake nut to shaft)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

Component	Representative illustration
FUEL INJECTION NOZZLES	
Number of orifices.....4	
Orifice size...0.011 in.(0.28mm)	
Nozzle Setting:	
Opening pressure(new)..... 2475-2525 psi (174-178 kg/cm ²)	
Opening pressure(service)..... 2275-2325 psi (160-163 kg/cm ²)	
Return oil leakage: 3 to 10 drops per 30 seconds at 1500 psi (105 kg/cm ²) after first drop (service only).	
Nozzle valve lift: 1/2 ± 1/8 turn from bottom [0.009 in. (0.23mm) nominal]	
1. Pressure adjusting screw-to- nozzle body lock nut torque.... 70-80 lb-in. (7.9-9.0 N-m)	
2. Lift adjusting screw lock nut torque.....35-45 lb-in. (4.0-5.1 N-m)	
Nozzle hold down screw torque: 20 lb-ft (27 N-m)	
Nozzle inlet connector torque: 35 lb-ft (47 N-m)	
ORIGINAL	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

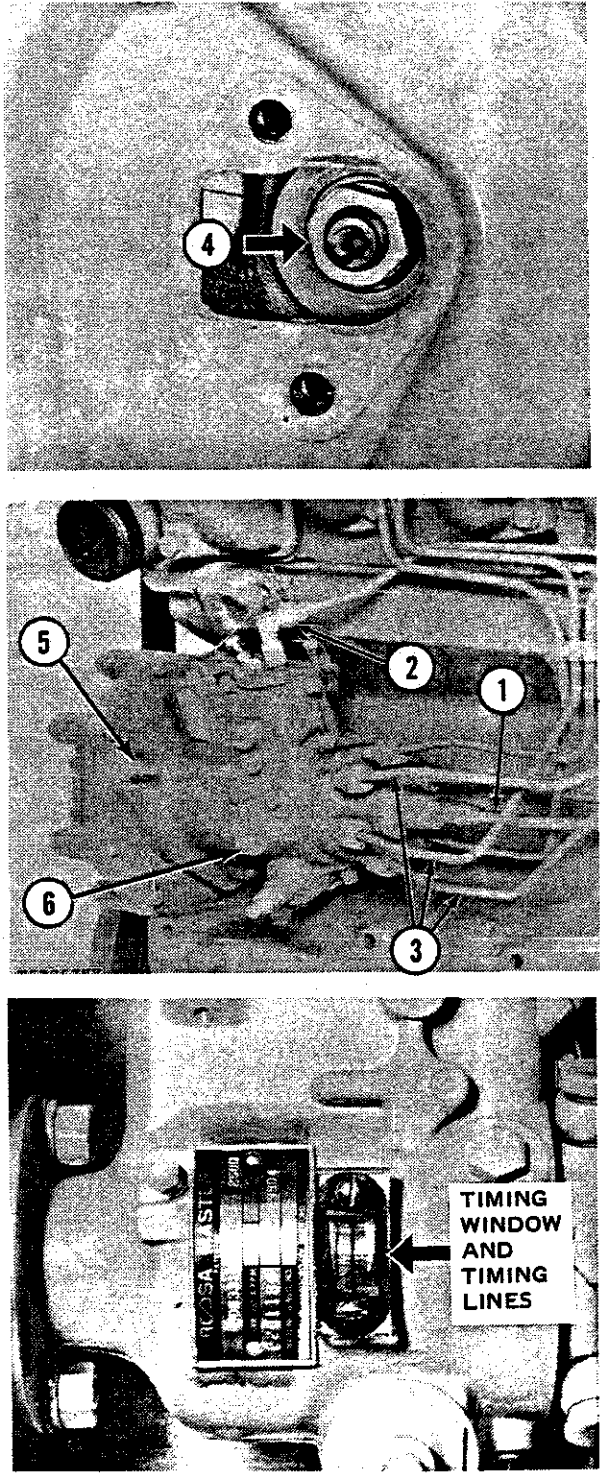
Component	Representative illustration
<p>FUEL INJECTION PUMP</p> <ul style="list-style-type: none"> ④ Drive gear mounting nut torque: 150 lb-ft(203 N-m) ③ Fuel injection lines to pump torque: 20 lb-ft(27N-m) ①② Fuel supply line and return line torque: 20 lb-ft(27N-m) ⑤ Pump to engine attaching nut torque: 20 lb-ft(27N-m) ⑥ Timing cover screw torque: 15-20 lb-in. (1.7-2.3 N-m) 	 <p>The top photograph is a close-up of the drive gear mounting nut, with a callout '4' pointing to it. The middle photograph shows the fuel injection pump assembly with callouts '1', '2', '3', '5', and '6' pointing to various components. The bottom photograph shows the timing window and timing lines, with a callout box labeled 'TIMING WINDOW AND TIMING LINES' pointing to the relevant area.</p>

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

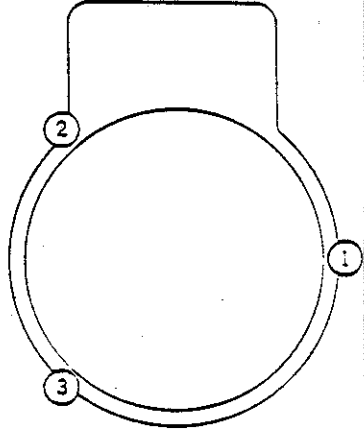
Component	Representative illustration
<p>FUEL INJECTION PUMP-Continued:</p> <p>In order to obtain proper test results, do the following:</p> <p>Use 0.25 in. (6.4mm) O.D. by 0.093 in. (2.36mm) I.D. by 20 in. (508mm) long test lines.</p> <p>Use 12SD12 Robert Bosch Calibrating Nozzles, 2500 psi (176 kg/cm²) opening pressure. Use JDF-2 Test Oil or a test oil equivalent to SAE J967A with a 34 to 36 SUS rating with oil at 100°F (38°C).</p> <p>Test oil should be 100°F (43° to 46°C).</p> <p>Operate pump clockwise (viewed from drive end) at 500 rpm wide open throttle (WOT) for 10 minutes prior to test.</p> <p>Electric shut-off connected to 12-volt D.C. negative (-) ground power source.</p> <p>NOTE: 1 to 3 psi (0.07 to 0.21 kg/cm²) supply pressure required at pump inlet.</p> <p>Transfer pump vacuum (400 rpm) (minimum).....18 in. Hg. (609.5 mbar)</p> <p>Transfer pump pressure (2500 rpm).....85 to 95 psi (6.0 to 6.7 kg/cm²)</p>	 <p>INJECTION LINE CONNECTIONS (VIEWED FROM END PLATE)</p>

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

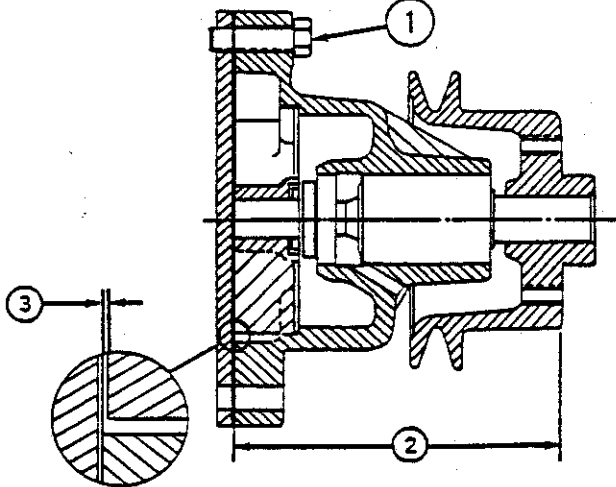
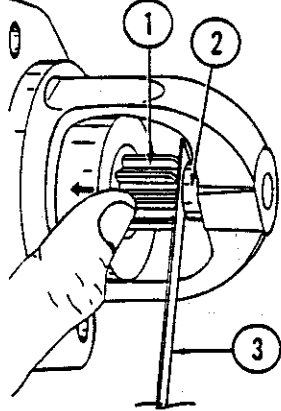
Component	Representative illustration
<p>WATER PUMP:</p> <p>① Cover mounting screw torque: 35 lb-ft(47N-m)</p> <p>③ Impeller position..... 0.000-0.010 in. (0.00-0.25mm)</p> <p>② Pulley position..... 5.47 in.(137.5mm)</p> <p>THERMOSTAT:</p> <p>Opening temperature..... 176° to 183°F (80° to 84°C)</p> <p>Full open temperature..... 203°F(95°C)</p>	
<p>STARTER:</p> <p>Pinion clearance: Measure distance between pinion ① and stop ② with feeler gauge ③ Clearance should be..... 0.010-0.160 in. (0.25-4.06mm)</p> <p>Brush minimum length..... 5/16 in.(7.94mm)</p>	
<p>ALTERNATOR:</p> <p>Belt tension without gauge: 3/4 in.(19mm) flex with 20 lb (9kg) force.</p>	
<p>FLYWHEEL:</p> <p>Attaching screws torque..... 120 lb-ft(163 N-m)</p>	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

Component	Representative illustration
<p>TIMING GEAR TRAIN:</p> <p>Camshaft gear timing: With no. 1 piston at top dead center, position timing mark on camshaft gear under timing tool JD-254.</p> <ul style="list-style-type: none"> ① Timing tool JD-254 ② Camshaft gear ③ Crankshaft gear 	
<p>Fuel injection pump gear timing: With no. 1 piston at top dead center, position timing mark on injection pump gear with timing tool JD-254.</p> <ul style="list-style-type: none"> ① Timing tool JD-254 ② Injection pump gear ③ Crankshaft gear 	
<p>Gear train backlash:</p> <ul style="list-style-type: none"> ① Injection pump gear to upper idler gear..... 0.003-0.014 in. (0.08-0.36mm) ② Crankshaft gear to upper idler gear..... 0.003-0.017 in. (0.08-0.43mm) ③ Crankshaft gear to lower idler gear..... 0.003-0.014 in. (0.08-0.36mm) ④ ⑥ Not applicable this engine ⑤ Oil pump gear to lower idler gear..0.003-0.014 in. (0.08-0.36mm) ⑦ Upper idler gear to camshaft gear: 0.003-0.014 in. (0.08-0.36mm) 	

Table 6-1. Table of Limits - CONT.

Engine - Dimensional and torque limits

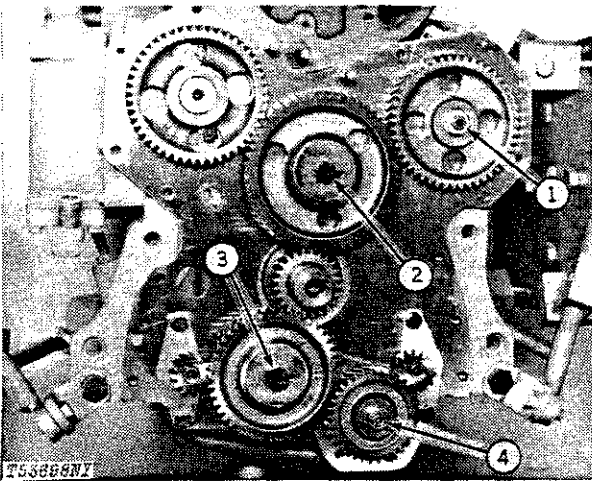
Component	Representative illustration
<p>TIMING GEAR TRAIN-Continued:</p> <p>Gear train torque:</p> <ul style="list-style-type: none"> ① Fuel injection pump gear..... 140-150 lb-ft (190-203 N-m) ② Upper idler gear..... 65 lb-ft (88 N-m) ③ Lower idler gear..... 95 lb-ft (129 N-m) ④ Oil pump gear..... 35-45 lb-ft (47-61 N-m) 	

Table 6-1. Table of Limits - CONT.

Compressor - Dimensional and torque limits

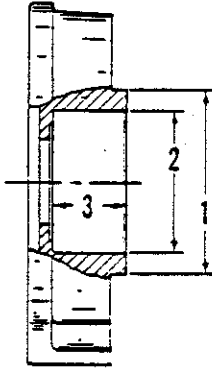
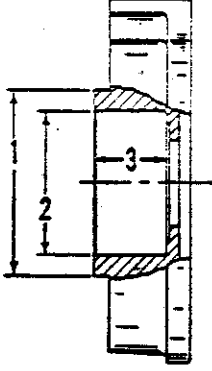
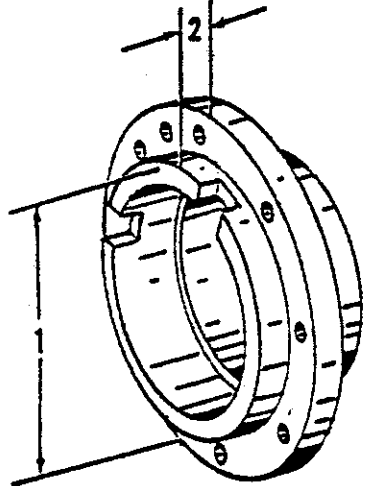
Component	Representative illustration
<p>DRIVE END COVER:</p> <p>1 Mounting register diameter..... 8.5005-8.5025 in. (215.91-215.96mm)</p> <p>2 Bearing bore diameter..... 3.1496-3.1508 in. (79.99-80.03mm)</p> <p>3 Bearing bore depth..... 1.870-1.875 in. (47.50-47.63mm)</p>	 <p>A cross-sectional diagram of the Drive End Cover. Dimension 2 is indicated by a vertical double-headed arrow on the right side, representing the bearing bore diameter. Dimension 3 is indicated by a horizontal double-headed arrow across the center, representing the bearing bore depth.</p>
<p>NON-DRIVE END COVER:</p> <p>1 Mounting register diameter..... 8.5005-8.5025 in. (215.91-215.96mm)</p> <p>2 Bearing bore diameter..... 3.1496-3.1508 in. (79.99-80.03mm)</p> <p>3 Bearing bore depth..... 1.870-1.875 in. (47.50-47.63mm)</p>	 <p>A cross-sectional diagram of the Non-Drive End Cover. Dimension 2 is indicated by a vertical double-headed arrow on the left side, representing the bearing bore diameter. Dimension 3 is indicated by a horizontal double-headed arrow across the center, representing the bearing bore depth.</p>
<p>BEARING COVERS (2)</p> <p>1 Mounting register diameter..... 3.140-3.145 in. (79.76-79.88mm)</p> <p>2 Mounting flange to face (drive end): 0.510-0.515 in. (12.95-13.08mm)</p> <p>3 Mounting flange to face (non-drive end): 0.490-0.495 in. (12.45-12.57mm)</p>	 <p>A 3D perspective diagram of a Bearing Cover. Dimension 2 is indicated by a vertical double-headed arrow at the top, representing the mounting register diameter.</p>

Table 6-1. Table of Limits - CONT.

Compressor - Dimensional and torque limits

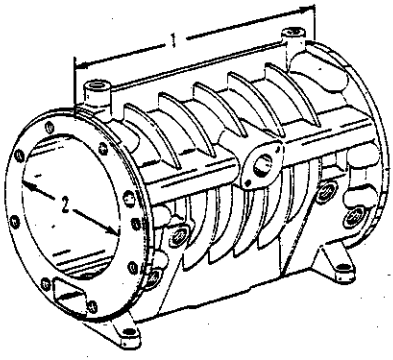
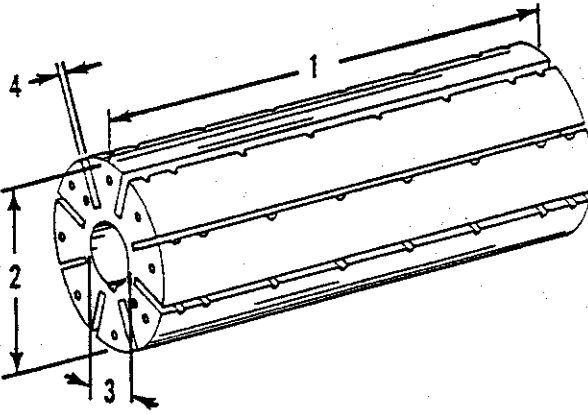
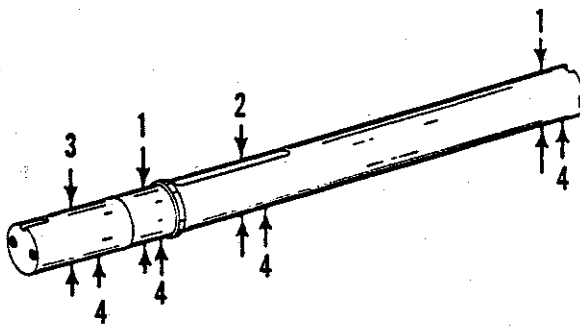
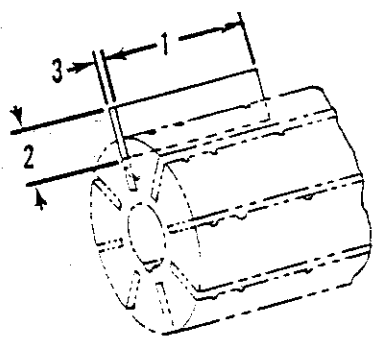
Component	Representative illustration
<p>STATOR:</p> <p>1 Stator length...9.129-9.131 in. (231.88-231.93mm)</p> <p>2 Stator bore.....5.784-5.787 in. (146.91-146.99mm)</p>	 <p>The illustration shows an exploded view of the stator assembly. Dimension line 1 indicates the total length of the stator housing. Dimension line 2 indicates the bore diameter of the stator.</p>
<p>ROTOR:</p> <p>1 Rotor length...9.123-9.125 in. (231.72-231.78mm)</p> <p>2 Outside diameter..... 4.998-5.000 in. (126.95-127.00mm)</p> <p>3 Bore diameter...1.610-1.611 in. (40.89-40.92mm)</p> <p>4 Blade slot width..... 0.1865-0.1885 in. (4.737-4.788mm)</p>	 <p>The illustration shows an exploded view of the rotor assembly. Dimension line 1 indicates the total length of the rotor. Dimension line 2 indicates the outside diameter of the rotor. Dimension line 3 indicates the bore diameter of the rotor. Dimension line 4 indicates the blade slot width.</p>
<p>ROTOR SHAFT:</p> <p>1 Bearing journal dia..... 1.3782-1.3786 in. (35.006-35.016mm)</p> <p>2 Rotor journal dia..... 1.608-1.609 in. (40.84-40.87mm)</p> <p>3 Drive coupling journal dia..... 1.249-1.250 in. (31.73-31.75mm)</p> <p>4 Concentricity (total indicator reading) within 0.001 in. (0.03mm)</p>	 <p>The illustration shows an exploded view of the rotor shaft. Dimension line 1 indicates the diameter of the bearing journal. Dimension line 2 indicates the diameter of the rotor journal. Dimension line 3 indicates the diameter of the drive coupling journal. Dimension line 4 indicates the concentricity (total indicator reading) of the shaft.</p>

Table 6-1. Table of Limits - CONT.

Compressor - Dimensional and torque limits

Component	Representative illustration
<p>BLADES:</p> <p>1 Length.....9.110-9.112 in. (231.39-231.45mm)</p> <p>2 Width.....1.248-1.250 in. (31.70-31.75mm)</p> <p>Allowable wear, max..... 1/16 in. (1.59mm)</p> <p>3 Thickness 0.1841-0.1871 in. (4.68-4.75mm)</p> <p>Ends square with length: within 0.001 in. (0.025mm)</p>	
<p>COMPRESSOR TORQUE LIMITS:</p> <p>Bearing cover screws, each end 11 lb-ft (14.9 N-m)</p> <p>Intake control cover screws 11 lb-ft (14.9 N-m)</p> <p>Non-drive end cover screws 45 lb-ft (61 N-m)</p> <p>Drive end cover screws 45 lb-ft (61 N-m)</p> <p>Drive coupling retainer screw 45 lb-ft (61 N-m)</p>	



SECTION VII ILLUSTRATED PARTS BREAKDOWN

7-1 INTRODUCTION.

This section lists and describes the items necessary for the support of the air compressor.

7-2 MAINTENANCE PARTS LIST.

The Maintenance Parts List contains a breakdown of the equipment into its assemblies, subassemblies and detail parts. Each assembly listed is followed immediately by its component parts properly indented to show their relationship to the assembly. An assembly beginning in column one has its detail parts beginning in column two. If a detail part is in turn an assembly, its detail parts begin in column three, etc. Attaching parts are listed immediately below and at the same indentation as the items which they attach. They are indicated by the symbol (AP) following the description.

All parts of the equipment are listed, except parts which lose their identity by being soldered, brazed, welded, riveted, swaged, cemented, potted, sealed, or otherwise permanently fastened to other parts or assemblies and are not subject to disassembly. In addition, certain bulk items such as insulation, sealant, etc., are not listed.

7-3 EXPLANATION OF COLUMNS USED IN THE MAINTENANCE PARTS LIST.

The seven columns used for the listing of information in the Maintenance Parts List are explained in the following paragraphs.

7-3.1 Figure and Index Number Column. The figure and index numbers key the parts breakdown list to the applicable illustration. The first number is the section number followed by a dash. Second number is figure number within section followed by a dash. The number following the second dash is the index number of a part appearing in the illustration. The index numbers are arranged in sequence and generally reflect the order of disassembly. Their main use is to facilitate the location of a part in the Maintenance Parts List after the part has been found in the Numerical Index.

7-3.2 Part Number Column. This column contains the manufacturer's, vendor's or Government standard (AN, MS, etc.) part number. Part numbers are used to identify all parts, with the exception of parts which do not have a valid part number, in which case NO NUMBER is shown.

7-3.3 FSCM Column. This column lists the Federal Supply code for manufacturers as presented currently in H4-1 and H4-2 catalogs. A numerical listing of these codes and addresses is presented below.

NOTE

Contractor part numbers are identified with the code 16004.

CODE	NAME AND ADDRESS
00624	Aeroquip Corp. Aerospace Div. Jackson Plant 300 S. East Ave. Jackson, MI 49203
01276	Aeroquip Corp. Industrial Div. 1225 W. Main St. Van Wert, OH 45891-3041
01428	Tuthill Corp. Superior Linkage Div. 2110 Summit St. P.O. Box 227 New Haven, IN 46774
02690	Buckeye Rubber and Packing Co. 23940 Mercantile Rd. Cleveland, OH 44122-5083
03479	Murphy Frank W. Mfg., Inc. 3131 S. Sheridan P.O. Box 45248 Tulsa, OK 74145-3823
04618	AMP Products Corp. AMP Special Industries Div. 400 W. Swedesford Rd. Berwyn, PA 19312

CODE	NAME AND ADDRESS	CODE	NAME AND ADDRESS
04845	Automatic Switch Co. 50-60 Hanover Rd. Florham Park, NJ 07932	16764	General Motors Corp. Delco Remy Div. 2401 Columbus Ave. P.O. Box 2439 Anderson, IN 46018
07707	USM Corp. Subdivision Emhart Ind., Inc. USM Fastener Div. 510 River Rd. Shelton, CT 06484	18265	Donaldson Co., Inc. 1400 W. 94th St. P.O. Box 1299 Minneapolis, MN 55440
08484	Breeze-Eastern Corp. Subdivision of Transtechnology Corp. 700 Liberty Ave. Union, NJ 07083	19220	Eberhard Mfg. Co. 21944 Drake Rd. Strongsville, OH 44136
09332	Aerofast, Inc. 360 Gunderson Dr. P.O. Box 324 Wheaton, IL 60187-3451	19328	Del City Wire Co., Inc. 2524 SE. 15th St. P.O. Box 95668 Oklahoma City, OK 73143-3694
09393	Rochester Gauges, Inc. 11616 Harry Hines Blvd. P.O. Box 29242 Dallas, TX 75229	19382	PT Components, Inc. Link-Belt Bearing Div. 7601 Rockville Rd. Indianapolis, IN 46206
09527	Faria Thomas G. Corp. Pink Row P.O. Box 0983 Uncasville, CT 06382	24161	Gates Rubber Co. Div. of Gates Corp. 999 S. Broadway P.O. Box 5887 Denver, CO 80217
13445	Cole-Hersee Co. 20 Old Colony Ave. Boston, MA 02127-3643	24522	Humphrey Products Co. 5070 E. North Ave. P.O. Box 2008 Kalamazoo, MI 49003
13602	Humphrey Products Div. of General Gas Light Co. Replaced by FC 24522	24617	General Motors Corp. General Motors Bldg. 3044 Grand Blvd. W. Detroit, MI 48202
14652	United Brass Works, Inc. S. Main Ext. Randleman, NC 27317	25184	Precision Rubber Products Corp. Hartman Drive Lebanon, TN 37057
15291	Adjustable Bushing Corp. 8330 Lankershim Blvd. P.O. Box 3975 North Hollywood, CA 91605	27193	Eaton Corp. Aerospace Commercial Controls Div. 1127 W. St. Paul Ave. Milwaukee, WI 53233
16004	Davey Compressor Co. 11060 Kenwood Rd. Cincinnati, OH 45242		

CODE	NAME AND ADDRESS	CODE	NAME AND ADDRESS
28520	Heyco Molded Products 750 Boulevard P.O. Box 160 Kenilworth, NJ 07033	73842	Goodyear Tire and Rubber Co. 1144 E. Market Akron, OH 44316-3011
31211	Motorola, Inc. Motorola Automotive Electronics Motorola Ctr. 1299 E. Algonquin Rd. Schaumburg, IL 60196	73912	Jones W.B. Spring Co., Inc. 5509 Fairlane Dr. Cincinnati, OH 45227
33955	Teleflex, Inc. Electrical Systems Div. 1816 57th St. Sarasota, FL 33580	74400	Hobbs Div. Stewart-Warner Corp. Yale Blvd. and Ash St. Springfield, IL 62705
45681	Parker-Hannifin Corp. 17325 Euclid Ave. Cleveland, OH 44112-3494	75160	Deere and Co. John Deere Rd. Moline, IL 61265-5083
56049	Atwood Mobile Products Div. 4750 Hiawatha Dr. Rockford, IL 61101	75272	KMC Stamping Div. of Kickhaefer Mfg. Co. 1221 S. Park St. Port Washington, WI 53074
60038	Timken Co. 1835 Dueber Ave. SW. Canton, OH 44706	75535	Crosby Group, Inc. Subdivision of American Hoist and Derrick Co., Inc. 2801 Dawson Rd. P.O. Box 3128 Tulsa, OK 74101
61349	Ametek, Inc. U.S. Gauge Div. 900 Clymer Ave. Sellersville, PA 18960	76381	Minnesota Mining and Mfg. Co. 3M Center St. Paul, MN 55101
66295	Wittek Microdot Fastening Systems Special Component Div. 1421 Barnsdale Rd. La Grange Park, IL 60525	76385	Minor Rubber Co., Inc. 49 Ackerman St. Bloomfield, NJ 07003
71177	Buckeye Forge, Inc. 5171 E. 71st St. Cleveland, OH 44125	76700	Nelson Division Nelson Industries, Inc. Hwy 51 West P.O. Box 428 Stoughton, WI 53589
71342	Cash A.W. Valve Mfg. Corp. 666 E. Wabash Ave. Decatur, IL 62525	77060	Packard Electric Div. of General Motors Corp. 408 Dana St. NE. P.O. Box 431 Warren, OH 44482
72661	Dixon Valve and Coupling Co. 800 High St. Chestertown, MD 21620	78189	Illinois Tool Works, Inc. Shakeproof Division St. Charles Rd. Elgin, IL 60120
72962	Amerace Corp. Esna Div. 2330 Vauxhall Rd. Union, NJ 07083		

CODE	NAME AND ADDRESS	CODE	NAME AND ADDRESS
78252	Stolper Industries, Inc. Tankcraft Div. Rt. 1 Brickchurch Rd. P.O. Box 928 Walworth, WI 53184	86579	Precision Rubber Products Corp. Dayton, OH Replaced by FC 25184
78553	Eaton Corp. Engineered Fasteners Div. 8700 Brookpark Rd. P.O. Box 6688 Cleveland, OH 44101	91354	National Band and Tag Co. 721 York St. Newport, KY 41072
79470	Weatherhead Div. Dana Corp. 767 Beta Dr. Cleveland, OH 44143	92850	Anchor Industries, Inc. 1725 London Rd. Cleveland, OH 44112
80266	AP Parts Co. Industrial Sales Div. 1 John Goerlich Square P.O. Box 965 Toledo, OH 43694	92867	Orscheln Co. 1177 N. Morley P.O. Box 280 Moberly, MO 65270
80753	Griffin Lamp Co. Highway 61 South Shelby, MS 38774	93029	Anchor Rubber Products, Inc. Replaced by FC 92850
81321	Purolator, Inc. 970 New Brunswick Ave. Rahway, NJ 07065	94222	Southco, Inc. 210 N. Brinton Lake Rd. Concordville, PA 19331
81860	Barry Div. of Barry Wright Corp. 700 Pleasant Watertown, MA 02172	96906	Military Standards Promulgated by Military Departments Under Authority of Defense Standardization Manual 4120-3-M
82654	Standard Products Co. 2130 W. 110 St. Cleveland, OH 44102-3714	99189	John Crane-Houdaille, Inc. Lapmaster Dept. 6400 Oakton St. Morton Groove, IL 60053
82990	Aero-Dri Corp. 1180 S.W. 10th St. Delray Beach, FL 33444		Ludecke, Inc. 1433-FW. Fullerton Ave. P.O. Box 391 Addison, IL 60101
84760	Stanadyne Hartford Div. P.O. Box 1440 Hartford, CT 06102		
85637	Klamath Cedar Co. Seattle, WA		

7-3.4 Description Column. This column identifies the parts being listed by noun name, followed by modifiers. When appropriate, the column also includes descriptive data such as: dimensions, material, applicable Government specifications, reference to approved publications for the article, or to previous listing of "REF" items as explained in paragraph 7-3.5. This column is also used to show the relationship between assemblies, subassemblies and their components by use of the identification method explained in paragraph 7-2.

7-3.5 Units Per Assembly Column. This column indicates the quantity of parts required for the assembly or subassembly in which the part appears. "REF" (reference) is used in this column when the part has been previously listed and illustrated, with proper quantity, and is relisted for reference purposes only. The quantities listed in this column are, in the case of assemblies, the total quantity used at the location indicated. In the case of components of assemblies, the quantities listed indicate the number of parts used in one assembly. The quantities specified are not necessarily the total used in the equipment. The abbreviation "AR" indicates "as required" for oversize and undersize parts and for those parts when quantities are indefinite.

7-3.6 Usable on Code Column. There is only one model air compressor reflected in this technical manual. Part variations within assemblies (if any) are indicated by a letter symbol or combination of symbols appearing in this column. Where this column is left blank, parts listed are applicable to all models covered by this parts breakdown. The Usable on Code explanation appears at the end of the applicable parts list.

7-3.7 SMR Code Column. This manual contains Joint Military Services Uniform SMR Codes only. Definitions of these SMR codes are available in TO 00-25-195.

7-4 NUMERICAL INDEX.

This index contains a numerical listing of all parts that appear in the Maintenance Parts List and is arranged in alpha-numeric order.

7-4.1 Figure and Index Column. This column lists the figure and index number on the parts list on which the part may be found. Standard parts are listed only for the first location at which they appear. When a part has not been assigned an index number, the figure and index number of the preceding part in the parts list is used with the letter "F" before the figure number, such as F7-7-6 (figure 7-7, index 6).

7-5 REPAIR PARTS KITS.

This publication reflects the listing of repair parts kits. Certain replacement parts are stocked only in kits. Standard parts and parts having multi-application are stocked in their appropriate classes and may also be stocked in kits. Kit parts should not be ordered from separate stock to make up a kit. Kit parts are identified by the letter "K" followed by a number (Example: K1, K3). This kit part identification is found in the description column. The corresponding description for the kit itself is listed following the last detail part of the applicable assembly.

7-6 SYMBOLS AND ABBREVIATIONS.

All abbreviations used in the Maintenance Parts List are in accordance with Specification MIL-STD-12, Abbreviations for Use on Drawings, and in Specifications, Standards and Technical Documents.

An equal (=) sign preceding the part number one space to the left identifies the part as an alternate item installed during manufacture or modification. A number (#) sign following the part number identifies the item as a piece of equipment covered by a separate manual. See paragraph 7-7 for explanation of the asterisk (*).

7-7 REQUISITIONING OF MARKINGS.

Markings that require replacement or need to be requisitioned separately are identified by an asterisk (*) following the part number in the Maintenance Parts List. These markings are to be requisitioned in accordance with the requirements of AFR 6-1.

7-8 HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN.

Refer to pages 7-6 and 7-7 on how to use the Illustrated Parts Breakdown.

HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN

IF PART NUMBER IS NOT KNOWN. . . . *Do This*

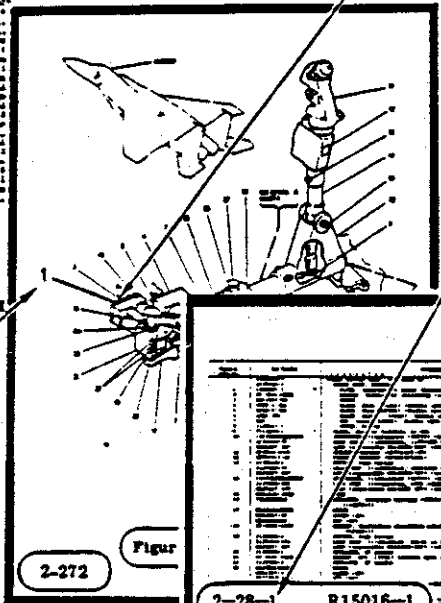
LIST OF ILLUSTRATIONS

Figure No.	Title	Page
2-28	Stick Instl, Pilots Control	2-272
2-272	Stick Instl, Pilots Control	2-272
2-272-1	Stick Instl, Pilots Control	2-272
2-272-2	Stick Instl, Pilots Control	2-272
2-272-3	Stick Instl, Pilots Control	2-272
2-272-4	Stick Instl, Pilots Control	2-272
2-272-5	Stick Instl, Pilots Control	2-272
2-272-6	Stick Instl, Pilots Control	2-272
2-272-7	Stick Instl, Pilots Control	2-272
2-272-8	Stick Instl, Pilots Control	2-272
2-272-9	Stick Instl, Pilots Control	2-272
2-272-10	Stick Instl, Pilots Control	2-272
2-272-11	Stick Instl, Pilots Control	2-272
2-272-12	Stick Instl, Pilots Control	2-272
2-272-13	Stick Instl, Pilots Control	2-272
2-272-14	Stick Instl, Pilots Control	2-272
2-272-15	Stick Instl, Pilots Control	2-272
2-272-16	Stick Instl, Pilots Control	2-272
2-272-17	Stick Instl, Pilots Control	2-272
2-272-18	Stick Instl, Pilots Control	2-272
2-272-19	Stick Instl, Pilots Control	2-272
2-272-20	Stick Instl, Pilots Control	2-272
2-272-21	Stick Instl, Pilots Control	2-272
2-272-22	Stick Instl, Pilots Control	2-272
2-272-23	Stick Instl, Pilots Control	2-272
2-272-24	Stick Instl, Pilots Control	2-272
2-272-25	Stick Instl, Pilots Control	2-272
2-272-26	Stick Instl, Pilots Control	2-272
2-272-27	Stick Instl, Pilots Control	2-272
2-272-28	Stick Instl, Pilots Control	2-272
2-272-29	Stick Instl, Pilots Control	2-272
2-272-30	Stick Instl, Pilots Control	2-272
2-272-31	Stick Instl, Pilots Control	2-272
2-272-32	Stick Instl, Pilots Control	2-272
2-272-33	Stick Instl, Pilots Control	2-272
2-272-34	Stick Instl, Pilots Control	2-272
2-272-35	Stick Instl, Pilots Control	2-272
2-272-36	Stick Instl, Pilots Control	2-272
2-272-37	Stick Instl, Pilots Control	2-272
2-272-38	Stick Instl, Pilots Control	2-272
2-272-39	Stick Instl, Pilots Control	2-272
2-272-40	Stick Instl, Pilots Control	2-272
2-272-41	Stick Instl, Pilots Control	2-272
2-272-42	Stick Instl, Pilots Control	2-272
2-272-43	Stick Instl, Pilots Control	2-272
2-272-44	Stick Instl, Pilots Control	2-272
2-272-45	Stick Instl, Pilots Control	2-272
2-272-46	Stick Instl, Pilots Control	2-272
2-272-47	Stick Instl, Pilots Control	2-272
2-272-48	Stick Instl, Pilots Control	2-272
2-272-49	Stick Instl, Pilots Control	2-272
2-272-50	Stick Instl, Pilots Control	2-272

1. Determine in which system; fuel, oxygen, hydraulic, etc., or structure the part is located. Turn to the TABLE OF CONTENTS of the appropriate volume. From this list, select the illustration most likely to contain the desired part. Note figure number or page number.

2. Refer to figure number or page number of the illustration selected from TABLE OF CONTENTS. Locate the desired part on the illustration. Note index number.

3. Refer to corresponding GROUP ASSEMBLY PARTS LIST. Locate the index number selected from the illustration for part number, nomenclature, etc.



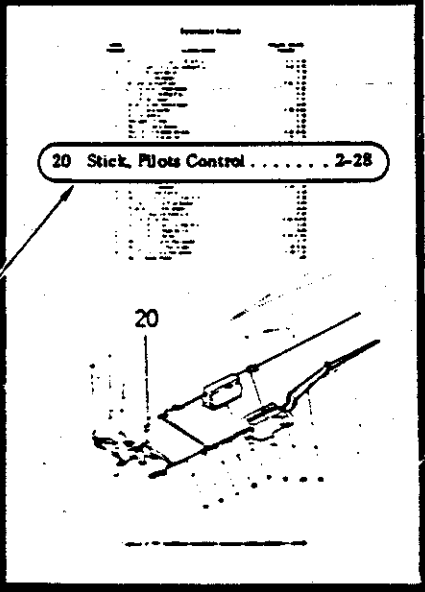
2-28-1 R15016-1

Part No.	Description	Quantity
1	Stick Controller Assembly	1
2	Stick Controller Housing	1
3	Stick Controller Knob	1
4	Stick Controller Spring	1
5	Stick Controller Pin	1
6	Stick Controller Nut	1
7	Stick Controller Washer	1
8	Stick Controller Seal	1
9	Stick Controller Gasket	1
10	Stick Controller O-ring	1
11	Stick Controller Bolt	1
12	Stick Controller Nut	1
13	Stick Controller Washer	1
14	Stick Controller Seal	1
15	Stick Controller Gasket	1
16	Stick Controller O-ring	1
17	Stick Controller Bolt	1
18	Stick Controller Nut	1
19	Stick Controller Washer	1
20	Stick Controller Seal	1
21	Stick Controller Gasket	1
22	Stick Controller O-ring	1
23	Stick Controller Bolt	1
24	Stick Controller Nut	1
25	Stick Controller Washer	1
26	Stick Controller Seal	1
27	Stick Controller Gasket	1
28	Stick Controller O-ring	1
29	Stick Controller Bolt	1
30	Stick Controller Nut	1
31	Stick Controller Washer	1
32	Stick Controller Seal	1
33	Stick Controller Gasket	1
34	Stick Controller O-ring	1
35	Stick Controller Bolt	1
36	Stick Controller Nut	1
37	Stick Controller Washer	1
38	Stick Controller Seal	1
39	Stick Controller Gasket	1
40	Stick Controller O-ring	1
41	Stick Controller Bolt	1
42	Stick Controller Nut	1
43	Stick Controller Washer	1
44	Stick Controller Seal	1
45	Stick Controller Gasket	1
46	Stick Controller O-ring	1
47	Stick Controller Bolt	1
48	Stick Controller Nut	1
49	Stick Controller Washer	1
50	Stick Controller Seal	1
51	Stick Controller Gasket	1
52	Stick Controller O-ring	1
53	Stick Controller Bolt	1
54	Stick Controller Nut	1
55	Stick Controller Washer	1
56	Stick Controller Seal	1
57	Stick Controller Gasket	1
58	Stick Controller O-ring	1
59	Stick Controller Bolt	1
60	Stick Controller Nut	1
61	Stick Controller Washer	1
62	Stick Controller Seal	1
63	Stick Controller Gasket	1
64	Stick Controller O-ring	1
65	Stick Controller Bolt	1
66	Stick Controller Nut	1
67	Stick Controller Washer	1
68	Stick Controller Seal	1
69	Stick Controller Gasket	1
70	Stick Controller O-ring	1
71	Stick Controller Bolt	1
72	Stick Controller Nut	1
73	Stick Controller Washer	1
74	Stick Controller Seal	1
75	Stick Controller Gasket	1
76	Stick Controller O-ring	1
77	Stick Controller Bolt	1
78	Stick Controller Nut	1
79	Stick Controller Washer	1
80	Stick Controller Seal	1
81	Stick Controller Gasket	1
82	Stick Controller O-ring	1
83	Stick Controller Bolt	1
84	Stick Controller Nut	1
85	Stick Controller Washer	1
86	Stick Controller Seal	1
87	Stick Controller Gasket	1
88	Stick Controller O-ring	1
89	Stick Controller Bolt	1
90	Stick Controller Nut	1
91	Stick Controller Washer	1
92	Stick Controller Seal	1
93	Stick Controller Gasket	1
94	Stick Controller O-ring	1
95	Stick Controller Bolt	1
96	Stick Controller Nut	1
97	Stick Controller Washer	1
98	Stick Controller Seal	1
99	Stick Controller Gasket	1
100	Stick Controller O-ring	1

2. Refer to the illustration of the volume and figure number noted on COMPLETE SYSTEM INDEX DRAWING. Locate the part on the illustration and note the index number.

3. Refer to corresponding GROUP ASSEMBLY PARTS LIST. Locate the index number selected from the illustration for the part number, nomenclature, etc.

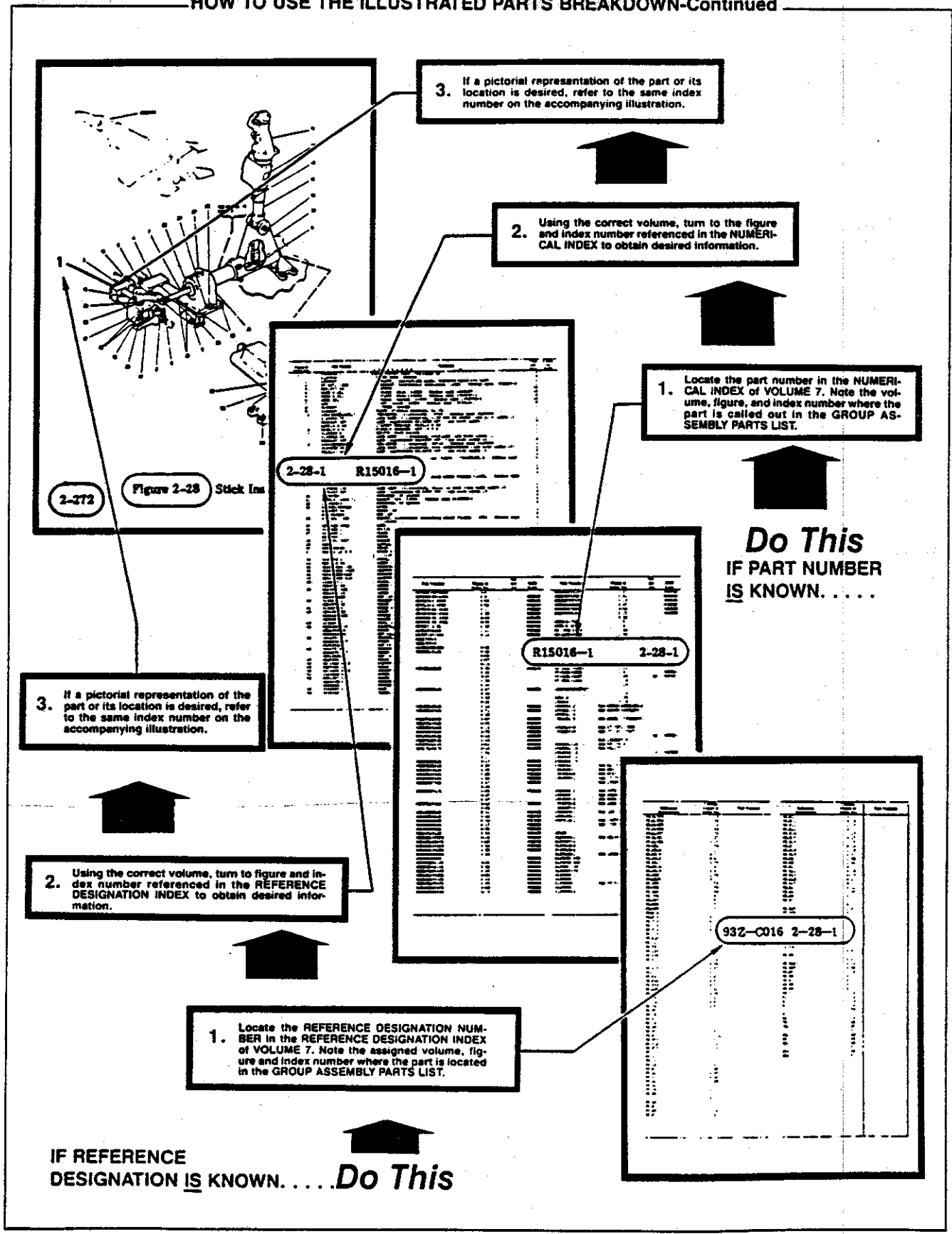
1. Determine in which system; fuel, oxygen, hydraulic, controls, etc., the part is located. Turn to the COMPLETE SYSTEM INDEX DRAWING which appear as the last pages of the appropriate volume. Select the part in question or a part in the area in question of the appropriate SYSTEM INDEX DRAWING. Note volume and figure number.



Do This TO LOCATE THE PART BY SYSTEM INDEX DRAWING

Figure 7-J. How to Use the Illustrated Parts Breakdown (Sheet 1 of 2)

HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN-Continued



IF REFERENCE DESIGNATION IS KNOWN. . . . **Do This**

Figure 7-0. How to Use the Illustrated Parts Breakdown (Sheet 2 of 2)

MAINTENANCE PARTS LIST

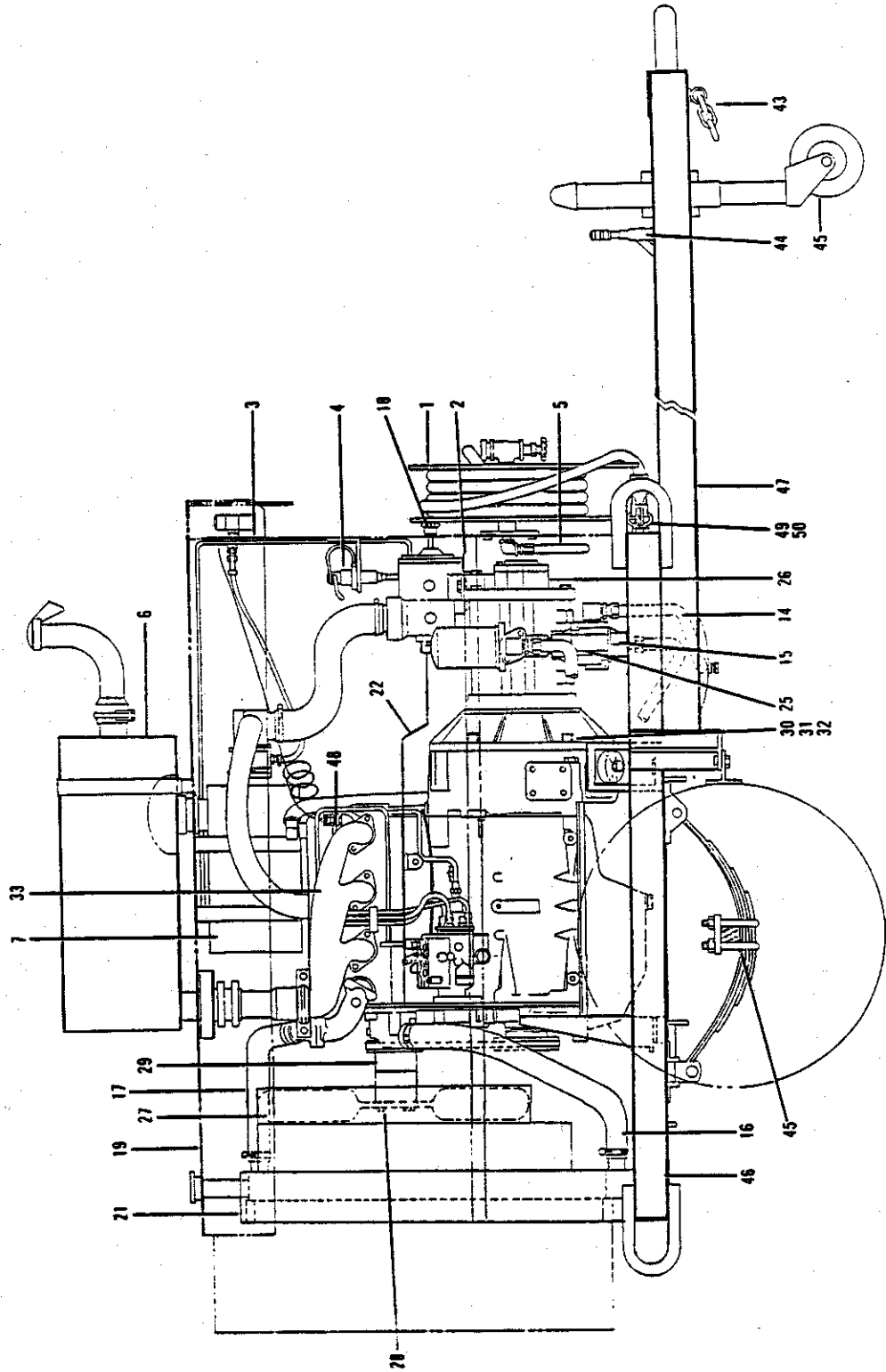
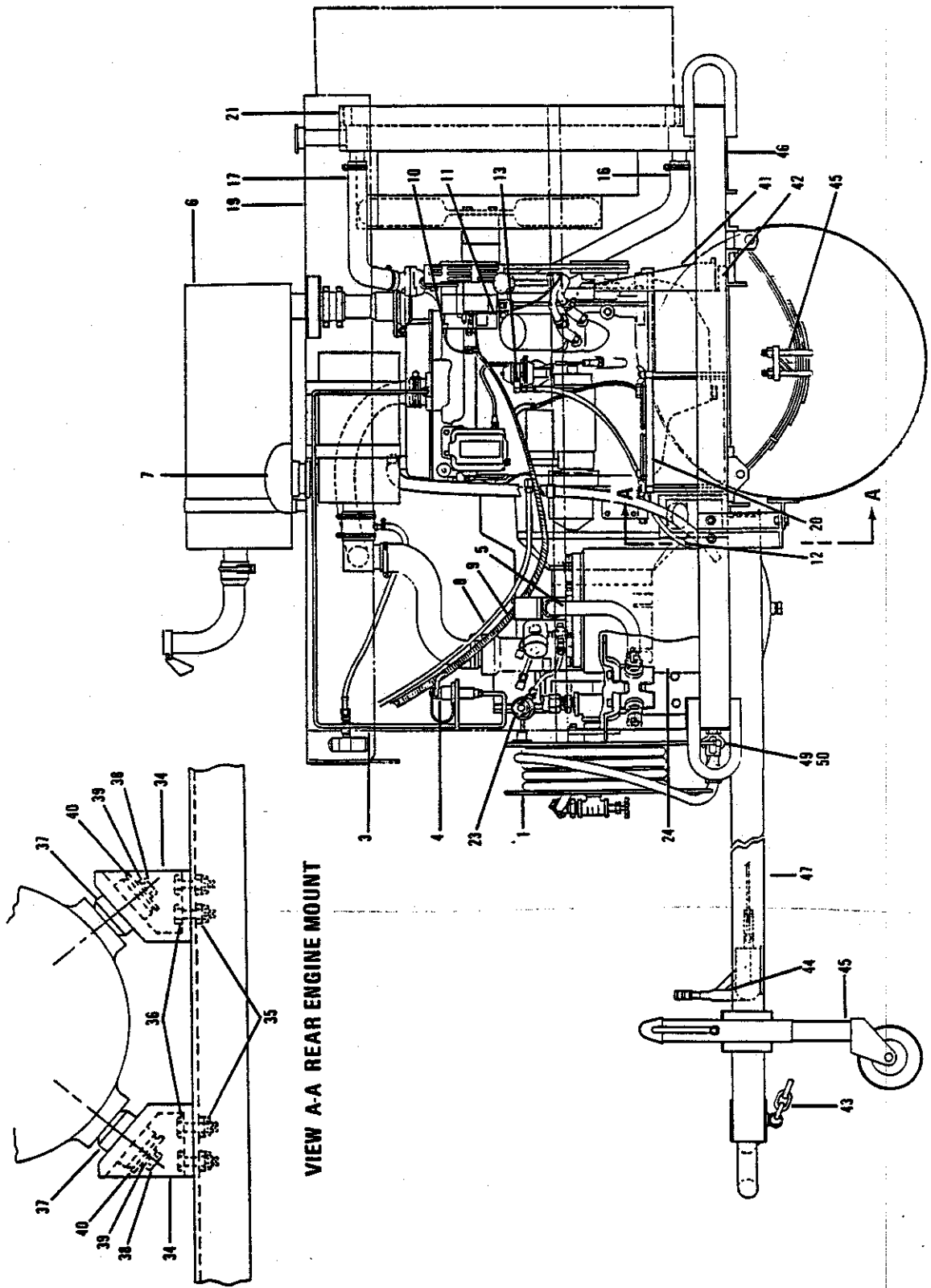


FIGURE 7-1. COMPRESSOR UNIT ASSEMBLY, MODEL 11M125RPDQ (SHEET 1 OF 2)



VIEW A-A REAR ENGINE MOUNT

FIGURE 7-1. COMPRESSOR UNIT ASSEMBLY, MODEL 11M125RPDQ (SHEET 2 OF 2)

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-1-	86405	16004	COMPRESSOR ASSY, AIR, RTRY, TYPE. MC-7, MOD 11M125RPDG, 125 CFM, 100PSI, DENG DRIVEN, TRLR MTD	1		PEFFF
-1	NO NUMBER	16004	HOSE REEL AND MOUNTING GROUP (SEE FIGURE 7-2 FOR DETAILS)	1		
-2	NO NUMBER	16004	FUEL TANK GROUP (SEE FIGURE 7-3 FOR DETAILS)	1		
-3	86437	16004	CONTROL PANEL ASSEMBLY (SEE FIGURE 7-4 FOR DETAILS)	1		AFFZZ
	9416918	16004	NUT, HEX, SERR FLG, 1/4-20NC (AP)	5		PAFZZ
	273771	16004	SCREW, HEX, SERR HD, 1/4-20NC X 1/2 IN. LG (AP)	5		PAFZZ
-4	NO NUMBER	16004	STARTING AID GROUP, COLD WEATHER (SEE FIGURE 7-5 FOR DETAILS)	1		
-5	NO NUMBER	16004	AIR SERVICE GROUP (SEE FIGURE 7-6 FOR DETAILS)	1		
-6	NO NUMBER	16004	EXHAUST AND MUFFLER GROUP (SEE FIGURE 7-7 FOR DETAILS)	1		
-7	NO NUMBER	16004	AIR INTAKE AND CLEANER GROUP (SEE FIGURE 7-8 FOR DETAILS)	1		
-8	83667	16004	TUBE, OIL PRESSURE, ENGINE	1		XBFZZ
	86668	16004	TUBE, OIL RETURN, COMPRESSOR, END COVER TO INTAKE (NOT SHOWN)	1		XBFZZ
	61X5	79470	NUT, TUBING (16004 SPEC CONT NO. 41959)	4		PAFZZ
	60X5	79470	FERRULE, TUBING (16004 SPEC. CONT NO. 41958)	4		PAFZZ
	63PT5-40	93029	SLEEVE, TUBING (16004 SPEC CONT NO. 65211)	4		PAFZZ
	69X5	79470	ELBOW, TUBE (16004 SPEC CONT NO. 41899)	1		PAFZZ
	69X5X4	79470	ELBOW, TUBE (16004 SPEC CONT NO. 44209)	1		PAFZZ
-9	86493	16004	WIRING HARNESS ASSY	1		XBFZZ
-10	86505	16004	NUT, HEX, METRIC (AP)	2		PAFZZ
	11500204	16004	WASHER, LOCK, METRIC (AP)	2		PAFZZ
	69372	16004	NUT, HEX, METRIC (AP)	1		PAFZZ
	11500205	16004	WASHER, LOCK, METRIC (AP)	1		PAFZZ
	MS35649-102	96906	NUT, HEX, NO. 10-24 (AP)	1		PAFZZ
	MS35338-24	96906	WASHER, LOCK, SPLIT, NO. 10 (AP)	1		PAFZZ
	MS3367-1	96906	WIRE TIE, HARNESS	5		PAFZZ
-11	81001-74	16004	WIRE ASSEMBLY, ALTERNATOR, GROUND	1		XBFZZ
-12	86495	16004	CABLE ASSEMBLY, ENGINE GROUND	1		XBFZZ
-13	69X5	79470	ELBOW, TUBE (16004 SPEC CONT NO. 41899)	1		PAFZZ
	3200X2	79470	ADAPTER, FUEL LINE (16004 SPEC CONT NO. 40948)	1		PAFZZ
-14	39368	16004	HOSE ASSEMBLY, SEPARATOR TO BYPASS	1		PAFZZ
-15	86452	16004	OIL FILTER AND BYPASS ASSEMBLY (SEE FIGURE 7-9 FOR DETAILS)	1		AFFZZ
	67724	16004	SCREW, CAP, SCH, 5/16-NC X 4-1/4 IN. LG (AP)	2		PAFZZ
	1218-02	78189	WASHER, LOCK, INTERNAL TOOTH, 5/16 IN (16004 SPEC CONT NO. 28147) (AP)	2		PAFZZ
	44051	16004	GASKET, MOUNTING	1		PAFZZ
-16	83212	16004	HOSE, RADIATOR, LOWER	1		PAFZZ
	900729-12	00624	CLAMP, HOSE, RADIATOR (16004, SPEC CONT NO. 31764) (AP)	1		XBFZZ
	28K	66295	CLAMP, HOSE, RADIATOR (16004, SPEC CONT NO. 61038) (AP)	2		XBFZZ
	900729-21	00624	CLAMP, HOSE, FUEL LINE (16004, SPEC CONT NO. 23681) (AP)	1		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM	1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-1-17	4283-29	24161		HOSE, RADIATOR, UPPER (16004. SPEC CONT NO. 61046)	1		PAFZZ
	28K	66295		CLAMP, HOSE, RADIATOR (16004. SPEC CONT NO. 61038) (AP)	2		XBFZZ
-18	68716	16004		KNOB, UNLOADER	1		PAFZZ
	MS51963-49	96906		SETSCREW, NO. 10-24 X 3/8 IN LG (AP)	1		PAFZZ
-19	NO NUMBER	16004		HOUSING GROUP (SEE FIGURE 7-10 FOR DETAILS)	1		
-20	NO NUMBER	16004		BATTERY AND MOUNTING GROUP. (SEE FIGURE 7-11 FOR DETAILS)	1		
-21	NO NUMBER	16004		RADIATOR AND OIL COOLER GROUP. (SEE FIGURE 7-12 FOR DETAILS)	1		
-22	NO NUMBER	16004		SPEED CONTROL GROUP (SEE FIGURE 7-13 FOR DETAILS)	1		
-23	NO NUMBER	16004		AIR PRESSURE REGULATOR GROUP. (SEE FIGURE 7-14 FOR DETAILS)	1		
-24	NO NUMBER	16004		AIR LINES AND OIL SEPARATOR GROUP (SEE FIGURE 7-15 FOR DETAILS)	1		
	MS51922-33	96906		NUT, LOCK, HEX, 1/2-13NC (AP).	4		PAFZZ
	MS90725-113	96906		SCREW, CAP, HEX HD, 1/2-13NC X 1-1/2 IN LG (AP)	4		PAFZZ
	MS27183-18	96906		WASHER, FLAT, 1/2 IN (AP)	8		PAFZZ
-25	68524	16004		ELBOW, DISCHARGE, COMPRESSOR.	1		PAFZZ
	MS90725-62	96906		SCREW, CAP, HEX HD, 3/8-16NC X 1-1/4 IN. LG (AP)	2		PAFZZ
	MS35338-27	96906		WASHER, LOCK, SPLIT, 3/8 IN. (AP).	2		PAFZZ
	24978	16004		PACKING, PREFORMED, O-RING.	1		PAFZZ
	144039	16004		BUSHING, REDUCING, 1/2 TO 3/8NPT.	1		PAFZZ
-26	86450	16004		AIR COMPRESSOR ASSEMBLY (SEE FIGURE 7-16 FOR DETAILS)	1		PAFFD
	MS90725-64	96906		SCREW, CAP, HEX HD, 3/8-16NC X 1-1/2 IN. LG (AP)	12		PAFZZ
	MS35338-27	96906		WASHER, LOCK, SPLIT, 3/8 IN. (AP).	12		PAFZZ
-27	80569	16004		FAN BLADE, COOLING	1		PAFZZ
-28	MS90725-42	96906		SCREW, CAP, HEX HD, 5/16-18NC X 2-1/2 IN LG (AP)	4		PAFZZ
	MS35338-26	96906		WASHER, LOCK, SPLIT, 5/16 IN. (AP)	4		PAFZZ
-29	80009	16004		SPACER, FAN.	1		XBFZZ
-30	48466	16004		BUSHING, DRIVE	2		PAFZZ
-31	48465	16004		PIN, DRIVE	2		PAFZZ
-32	80163	16004		RING, ADAPTER, ENGINE DRIVE	1		XBFZZ
	MS90725-64	96906		SCREW, CAP, HEX HD, 3/8-16NC X 1-1/2 IN. LG (AP)	8		PAFZZ
	MS35338-27	96906		WASHER, LOCK, SPLIT, 3/8 IN. (AP).	8		PAFZZ
-33	3179D	75160		ENGINE ASSEMBLY, SPEC NO. FD16694E (16004 SPEC CONT NO. 85463) (SEE FIGURE 7-17 FOR DETAILS)	1		PAFDD
-34	86467	16004		ENGINE MOUNT, REAR	2		XBFZZ
-35	MS51922-33	96906		NUT, LOCK, HEX, 1/2-13NC (AP).	4		PAFZZ
-36	MS90725-113	96906		SCREW, CAP, HEX HD, 1/2-13NC X 1-1/2 IN LG (AP)	4		PAFZZ
	MS27183-18	96906		WASHER, FLAT, 1/2 IN (AP)	4		PAFZZ
-37	22003-15	81860		VIBRATION MOUNT, REAR (16004 SPEC CONT NO. 80480)	2		PAFZZ
-38	MS90725-170	96906		SCREW, CAP, HEX HD, 5/8-11NC X 3-1/2 IN. LG (AP)	2		PAFZZ
-39	MS35338-31	96906		WASHER, LOCK, SPLIT, 5/8 IN. (AP).	2		PAFZZ
-40	81038	16004		SPACER, SNUBBING (AP).	2		PAFZZ
-41	86468	16004		ENGINE MOUNT, FRONT.	1		XBFZZ
	MS51922-49	96906		NUT, LOCK, HEX, 5/8-11NC (AP).	3		PAFZZ
	MS90725-163	96906		SCREW, CAP, HEX HD, 5/8-11NC X 2-1/4 IN. LG (AP)	2		PAFZZ
	MS90725-162	96906		SCREW, CAP, HEX HD, 5/8-11NC X 1-1/2 IN. LG (AP)	2		PAFZZ
	MS35338-31	96906		WASHER, LOCK, SPLIT, 5/8 IN. (AP).	2		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-1-42	22003-15	81860	VIBRATION MOUNT, FRONT (16004 SPEC CONT NO. 80480)	1		PAFZZ
	MS90725-172	96906	SCREW, CAP, HEX HD, 5/8-11NC X 4 IN. LG (AP)	1		PAFZZ
	MS27183-21	96906	WASHER, FLAT, 5/8 IN. (AP)	1		PAFZZ
	80138	16004	SPACER, SNUBBING (AP)	1		PAFZZ
-43	83929	16004	CHAIN ASSEMBLY, SAFETY	2		XBFZZ
	MS51967-14	96906	NUT, HEX, 1/2-13NC (AP)	1		PAFZZ
	MS35338-29	96906	WASHER, LOCK, SPLIT, 1/2 IN. (AP)	1		PAFZZ
	3050	71177	EYEBOLT (16004 SPEC CONT NO. 24636)	1		PAFZZ
	S320C-3/4TON	75535	HOOK, SAFETY (16004 SPEC CONT NO. 29021)	1		XBFZZ
	6335	75535	LINK, CONNECTING (16004 SPEC CONT NO. 49497)	2		XBFZZ
	29020	16004	CHAIN, PROOF COIL, 1/4 IN.	36 IN.		XBFZZ
-44	NO NUMBER	16004	BRAKE ACTUATING GROUP (SEE FIGURE 7-31 FOR DETAILS)	1		
-45	NO NUMBER	16004	LANDING WHEEL AND AXLE ASSEMBLY (SEE FIGURE 7-32 FOR DETAILS)	1		
-46	86448	16004	NOISE DAMPENER, PAN.	1		XBFZZ
-47	86383	16004	FRAME, TRAILER	1		XBFZZ
-48	144039	16004	BUSHING, REDUCING, 1/2 TO 3/8NPT.	1		PAFZZ
-49	AM-7	72661	COUPLING, HOSE, MALE (16004 SPEC CONT NO. 24046)	2		PAFZZ
-50	64821	16004	NUT, LOCK, CONDUIT (AP)	2		PAFZZ
	AWR-4	72661	WASHER, COUPLING	2		PAFZZ

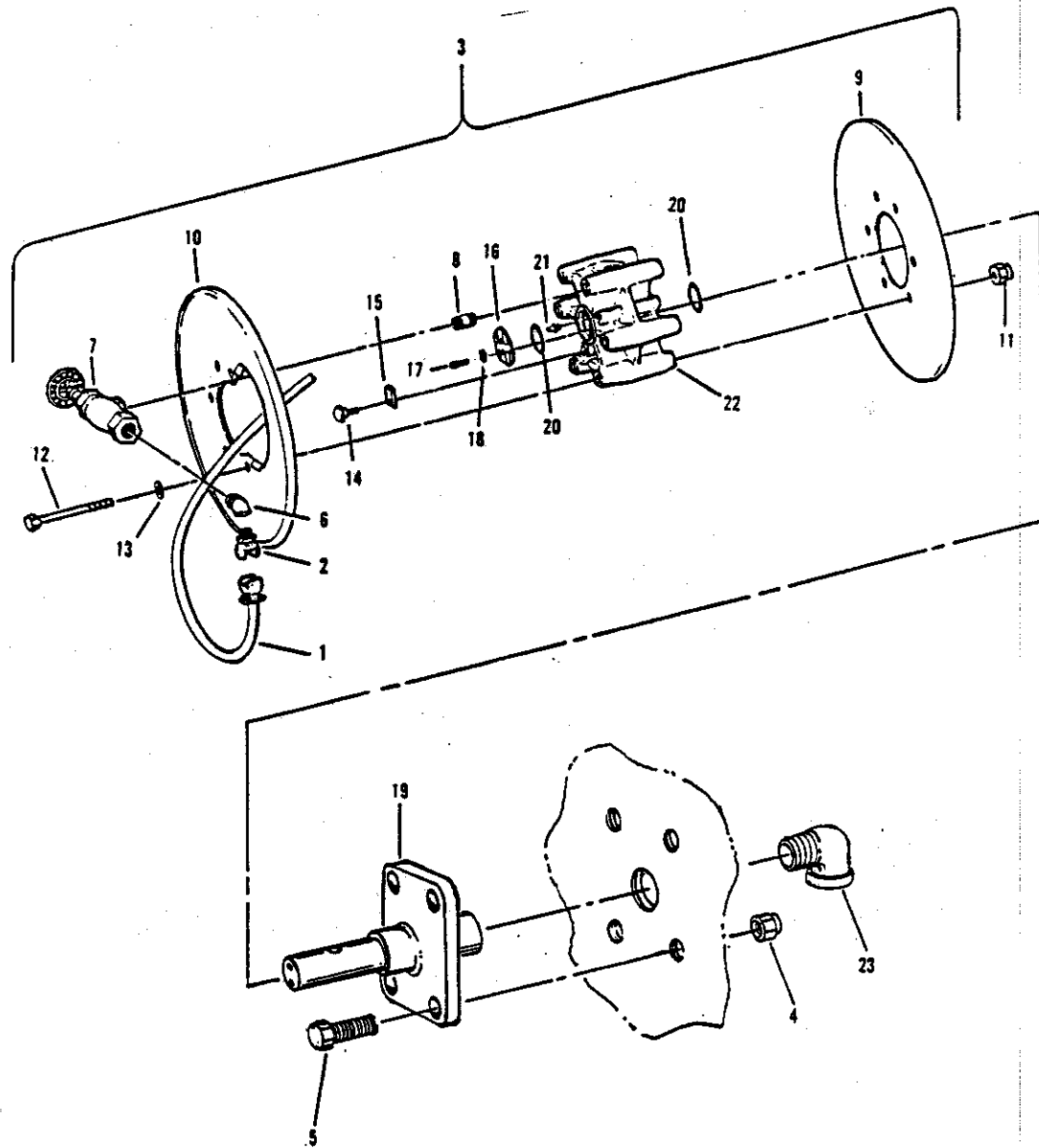


FIGURE 7-2. HOSE REEL AND MOUNTING GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-2-	NO NUMBER	16004	HOSE REEL AND MOUNTING GROUP	REF		
			(SEE FIGURE 7-1-1 FOR NHA)			
-1	62400	16004	HOSE ASSEMBLY, SERVICE	1		PAFZZ
-2	AM-7	72661	COUPLING, HOSE, MALE (16004 SPEC. CONT NO. 24046)	1		PAFZZ
	AWR-4	72661	WASHER, COUPLING.	1		PAFZZ
-3	B6441	16004	HOSE REEL ASSEMBLY.	1		AFFZZ
-4	MS31922-1	96906	NUT, LOCK, HEX. 1/4-20NC (AP).	4		PAFZZ
-5	MS90725-12	96906	SCREW, CAP, HEX HD, 1/4-20NC X 1-1/2 IN. LG (AP)	4		PAFZZ
-6	MS39230-5	96906	ELBOW, PIPE, 3/4NPT, 90 DEG	1		PAFZZ
-7	46T	14652	VALVE, GLOBE, 3/4NPT (16004 SPEC CONT NO. 66426)	1		PAFZZ
-8	MS51953-101	96906	NIPPLE, PIPE, 3/4NPT X 2 IN. LG	1		PAFZZ
-9	B6426	16004	END ASSY, HOSE REEL	1		PAFZZ
-10	B6425	16004	END ASSY, HOSE REEL	1		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-2-11	MS51922-9	96906	.. NUT, LOCK, HEX, 5/16-18NC (AP)	6		PAFZZ
-12	9420811	16004	.. BOLT, HEX HD. 5/16-18NC X 3-1/4 IN. LG (AP)	6		PAFZZ
-13	MS27183-11	96906	.. WASHER, FLAT, 5/16 (AP)	6		PAFZZ
	75000316	82654	.. TRIM, DOUBLE LIP (63 IN EACH REEL END) (16004 SPEC CONT NO. 51437)	126 IN.		XAFZZ
	86420	16004	.. END, HOSE REEL (86426 ASSY)	1		XBFZZ
	86419	16004	.. END, HOSE REEL (86425 ASSY)	1		XBFZZ
-14	66425	16004	.. KNOB, BRAKING	1		PAFZZ
-15	66424	16004	.. BLOCK, BRAKING	1		PAFZZ
-16	66421	16004	.. RETAINER, BODY	1		PAFZZ
-17	MS16997-59	96906	.. SCREW, SCH, 1/4-20NC X 5/8 IN. LG (AP)	2		PAFZZ
-18	MS35338-25	96906	.. WASHER, LOCK, SPLIT, 1/4 IN. (AP)	2		PAFZZ
-19	B6399	16004	.. SPINDLE, HOSE REEL	1		XBFZZ
-20	24936	16004	.. O-RING, PREFORMED PACKING	2		PAFZZ
-21	MS15001-1	96906	.. FITTING, GREASE	1		PAFZZ
-22	66419	16004	.. BODY, HOSE REEL	1		XBFZZ
-23	MS39230-5	96906	.. ELBOW, PIPE, 3/4NPT, 90 DEG. (FIG. 7-6, ITEM 5)	REF		PAFZZ

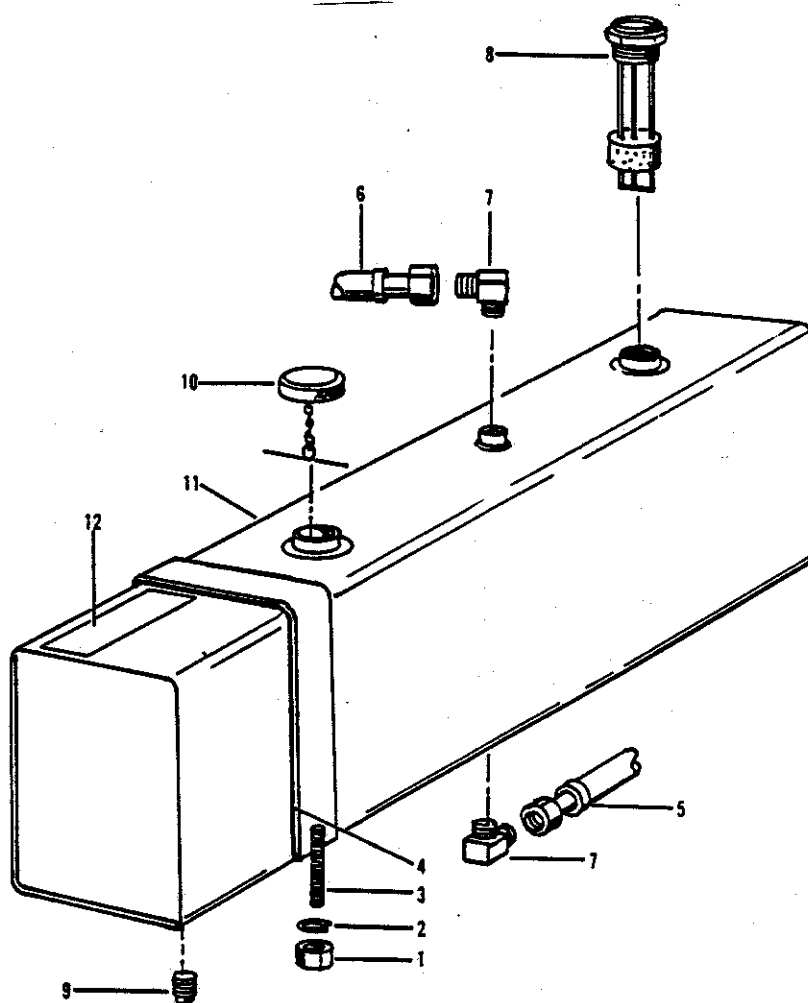
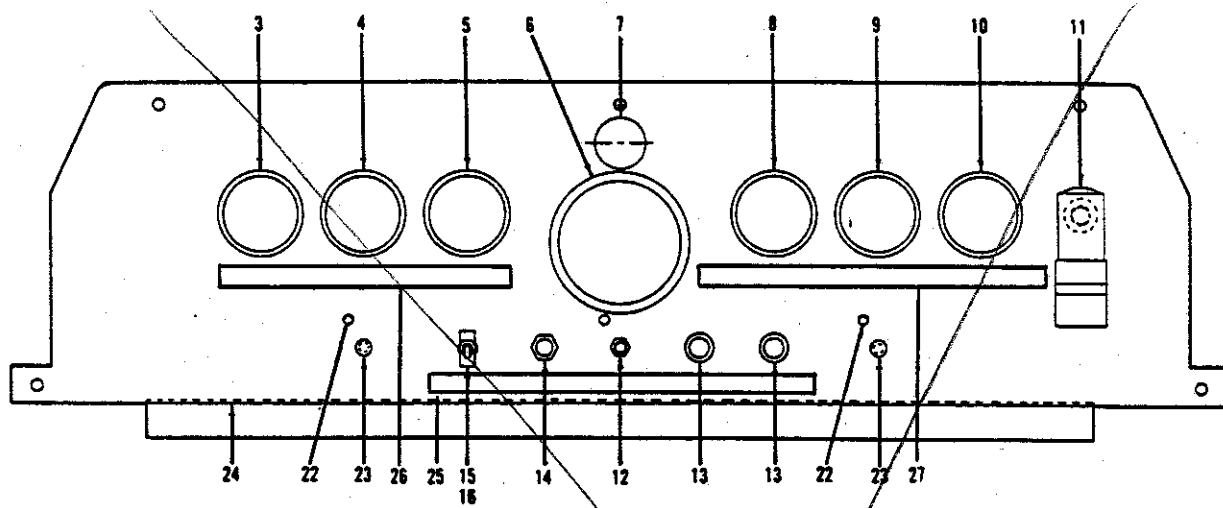
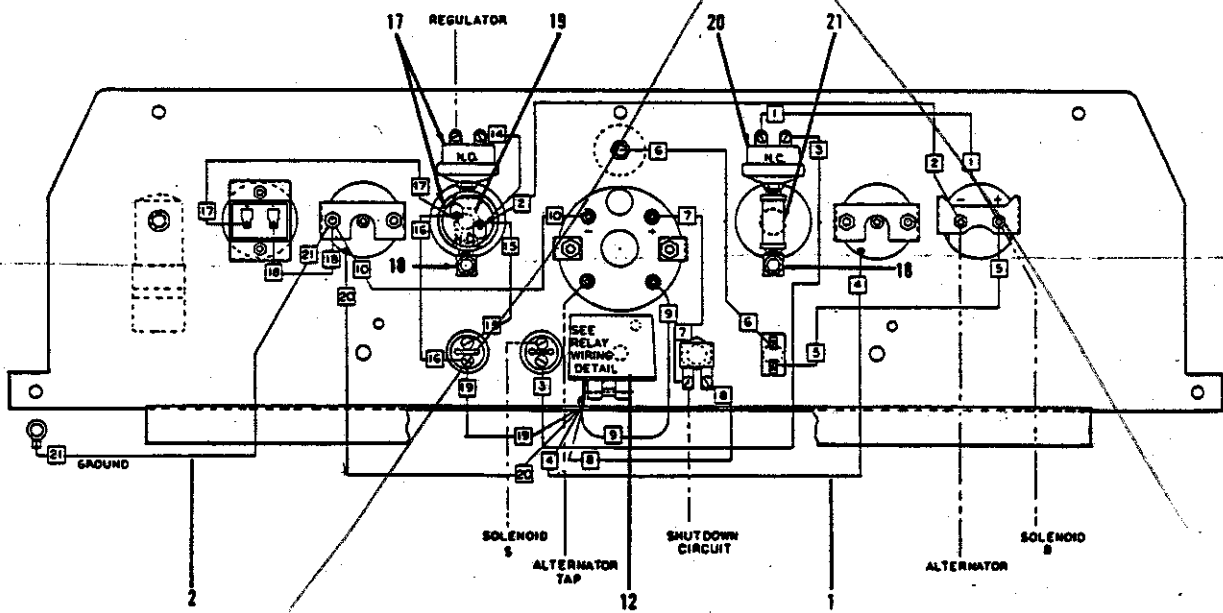


FIGURE 7-3. FUEL TANK GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE		
				PER ASSY.	ON CODE	SMR CODE
7-3-	NO NUMBER	16004	FUEL TANK GROUP. (SEE FIGURE 7-1-2 FOR NHA)		REF	
-1	MS51967-8	96906	. NUT, HEX, 3/8-16NC (AP)	4		PAFZZ
-2	MS35338-27	96906	. WASHER, LOCK, SPLIT, 3/8 IN. (AP).	4		PAFZZ
-3	86466	16004	. STRAP, FUEL TANK (AP).	2		PAFZZ
-4	14048	16004	. WEBBING, STRAP AND TANK.	89 IN.		XBFZZ
	86492	16004	. TANK ASSEMBLY, FUEL.	1		XBFZZ
-5	86170	16004	. HOSE ASSEMBLY, FUEL PICKUP.	1		PAFZZ
-6	44359	16004	. HOSE ASSEMBLY, FUEL RETURN.	1		PAFZZ
-7	69X5X4	79470	. ELBOW, TUBE (16004 SPEC CONT. NO. 44209)	2		PAFZZ
-8	86394	16004	. GAUGE, LIQUID LEVEL	1		PAFZZ
-9	MS20913-38	96906	. PLUG, PIPE, 9G HD, 3/8 NPT.	1		PAFZZ
-10	86491	16004	. CAP ASSEMBLY, FUEL TANK	1		PAFZZ
	86490	16004	. . . ANCHOR, CHAIN.	1		XBFZZ
	27653	16004	. . . CHAIN, CAP ANCHOR.	1		XBFZZ
	MS20606M4T3	96906	. . . RIVET, BLIND (AP).	1		XBFZZ
	2302J022	78252	. . . CAP, FUEL TANK (SUPPLIED WITH TANK)	1		XBFZZ
-11	86385	16004	. . TANK, FUEL.	1		PAFZZ
-12	69289*	16004	. DECAL, FUEL.	1		XBFZZ



FRONT VIEW



REAR VIEW

FIGURE 7-4. CONTROL PANEL ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE PER ON ASSY. CODE	SMR CODE
7-4-	86437	16004	CONTROL PANEL ASSEMBLY (SEE FIGURE 7-1-3 FOR NHA)	REF	AFFZ
-1	27422	16004	WIRE, BLACK, 14 AWG	90 IN.	XBFZZ
-2	14570	16004	WIRE, WHITE, 10 AWG	12 IN.	XBFZZ
	34161	04618	TERMINAL, NO. 10 STUD (NOT SHOWN). (16004 SPEC CONT NO. 24855)	20	PAFZZ
	34158	04618	TERMINAL, NO. 6 STUD (NOT SHOWN). (16004 SPEC CONT NO. 27383)	5	PAFZZ
	31884	04618	TERMINAL, NO. 10 STUD (NOT SHOWN). (16004 SPEC CONT NO. 83875)	4	PAFZZ
	34855	04618	TERMINAL, 1/4 STUD (NOT SHOWN). (16004 SPEC CONT NO. 24861)	1	PAFZZ
	34170	04618	TERMINAL, NO. 10 STUD (NOT SHOWN). (16004 SPEC CONT NO. 24860)	1	PAFZZ
-3	4015-98	09527	AMMETER (16004 SPEC CONT. NO. 48271)	1	PAFZZ
-4	20T4FT TUBE	03479	GAUGE, TEMPERATURE, OIL (16004 SPEC CONT NO. 81668)	1	PAFZZ
-5	148898	61349	GAUGE, PRESSURE, AIR (16004 SPEC CONT NO. 81667)	1	PAFZZ
-6	86436	16004	GAUGE, TACHOMETER-OVERSPEED.	1	PAFZZ
-7	233	80753	LIGHT, PANEL, 12 VOLT (16004 SPEC CONT NO. 80223)	1	PAFZZ
-8	2550-658	09393	GAUGE, PRESSURE, OIL (16004 SPEC CONT NO. 62085)	1	PAFZZ
-9	20T7FT TUBE	03479	GAUGE, TEMPERATURE, WATER (16004 SPEC CONT NO. 81825)	1	PAFZZ
-10	52435-013	33955	HOURLY METER, ELAPSED TIME. (16004 SPEC CONT NO. 60135)	1	PAFZZ
-11	RAX00-2325	18265	INDICATOR, RESTRICTION, AIR CLEANER (16004 SPEC CONT NO. 45899)	1	PAFZZ
-12	117	03479	RELAY BOX, ELECTRICAL (16004 SPEC CONT NO. 81671)	1	PAFZZ
*-12A	9095	13445	SWITCH, PUSHBUTTON (16004 SPEC CONT NO. 14073)	2	PAFZZ
-14	5011	13445	SWITCH, IGNITION (16004 SPEC CONT NO. 46551)	1	PAFZZ
-15	MS35058-22	96906	SWITCH, TOGGLE (16004 SPEC CONT NO. 27670)	1	PAFZZ
-16	30-5632-4	27193	PLATE, INDICATOR, SWITCH. (16004 SPEC CONT NO. 27671)	1	XBFZZ
-17	M4006-4	74400	SWITCH, PRESSURE (16004 SPEC CONT NO. 14439)	2	PAFZZ
-18	69X5	79470	ELBOW, TUBE (16004 SPEC CONT NO. 41899)	2	PAFZZ
-19	144150	16004	CROSS, PIPE, 1/8NPT	1	PAFZZ
-20	M4009-10	74400	SWITCH, PRESSURE (16004 SPEC CONT NO. 37989)	1	PAFZZ
-21	144082	16004	TEE, PIPE, 1/8NPT	1	PAFZZ
-22	2603	28520	PLUG, HOLE (16004 SPEC CONT. NO. 81549-4)	1	XBFZZ
-23	2617	28520	PLUG, HOLE (16004 SPEC CONT. NO. 81549-6)	2	XBFZZ
-24	86434	16004	PANEL, CONTROL	1	XBFZZ
	1631	91354	TAG, WIRE MARKER (NOT SHOWN). (16004 SPEC CONT NO. 86465)	36	XBFZZ
-25	86456-1*	16004	DECAL, SWITCH.	1	XBFZZ
-26	86457*	16004	DECAL, GAUGE	1	XBFZZ
-27	86458*	16004	DECAL, GAUGE	1	XBFZZ
*-12A	SEE 14	71400	FUSE, CARTRIDGE, 32V, 14A	1	PAFZZ

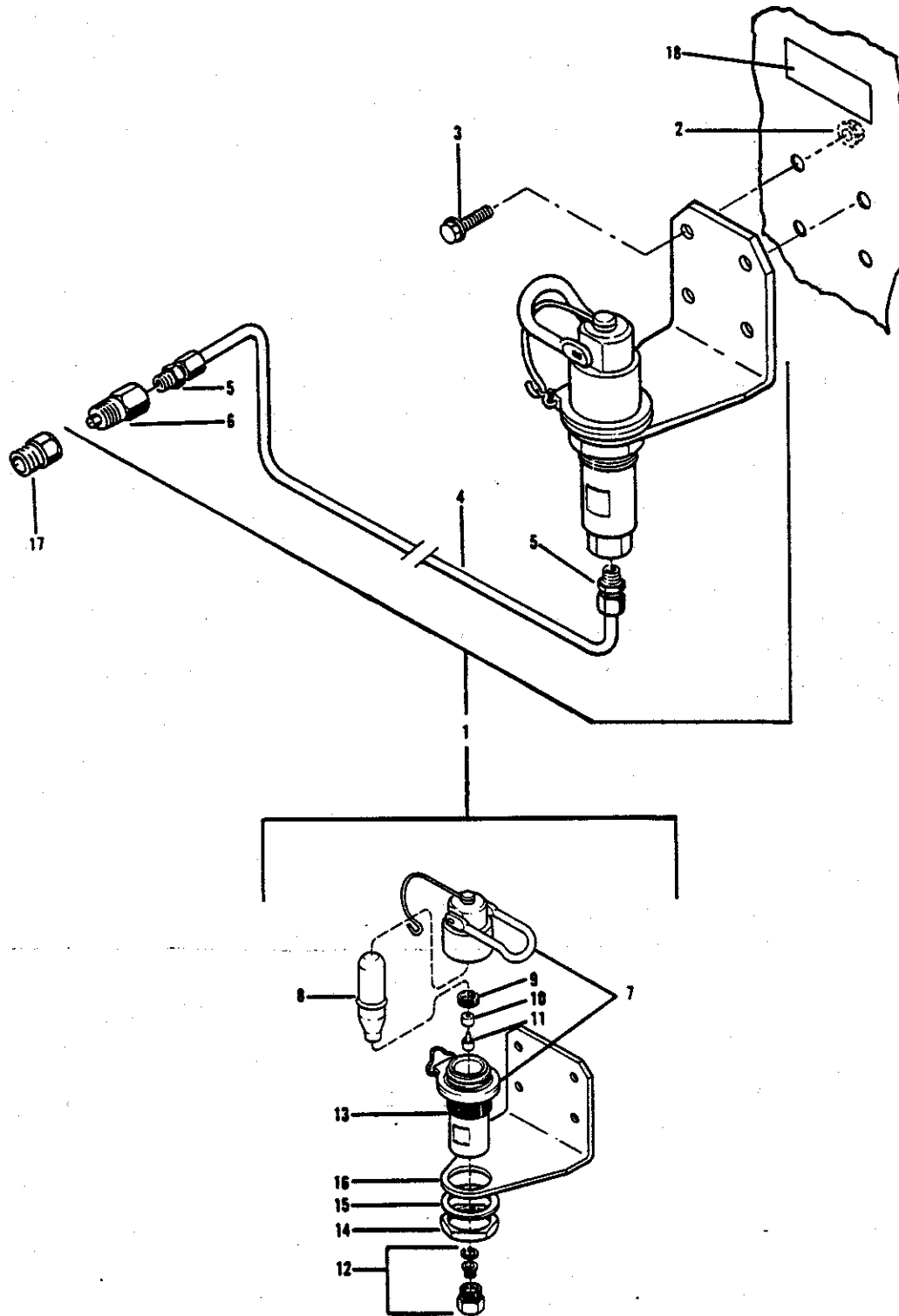


FIGURE 7-5. COLD WEATHER STARTING AID GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE		SMR CODE
				PER ASSY.	ON CODE	
7-5-	NO NUMBER	16004	STARTING AID GROUP, COLD WEATHER (SEE FIGURE 7-1-4 FOR NHA)	REF		
-1	AD20050	82990	. KIT, COLD WEATHER STARTING (16004 SPEC CONT NO. 67816)	1		XBFZZ
-2	9416918	16004	. NUT, HEX, SERR FLG, 1/4-20NC (AP)	4		PAFZZ
-3	274825	16004	. SCREW, HEX, SERR HD, 1/4-20NC X 3/4 IN. LG (AP)	4		PAFZZ
-4	AD20062	82990	. TUBE ASSEMBLY	1		XBFZZ
-5	AD20057	82990	. CONNECTOR, TUBING	2		XBFZZ
-6	AD20058	82990	. NOZZLE, FUEL	1		XBFZZ
-7	AD20052	82990	. CAP, BODY	1		XBFZZ
-8	AD20063	82990	. CARTRIDGE, FUEL	1		XBFZZ
-9	AD20055	82990	. SCREW, CARTRIDGE NECK	1		XBFZZ
-10	AD20054	82990	. WASHER, NECK	1		XBFZZ
-11	AD20053	82990	. PIN, PIERCING	1		XBFZZ
-12	AD20056	82990	. SCREEN ASSEMBLY, BODY	1		XBFZZ
-13	AD20051	82990	. BODY, DISCHARGER	1		XBFZZ
-14	AD20061	82990	. NUT, BODY (AP)	1		XBFZZ
-15	AD20060	82990	. WASHER, BODY (AP)	1		XBFZZ
-16	AD20059	82990	. BRACKET, MOUNTING	1		XBFZZ
-17	116332	16004	. BUSHING, REDUCING, 3/8 TO 1/4NPT	1		PAFZZ
-18	B6460*	16004	. DECAL, COLD WEATHER STARTING AID	1		XBFZZ

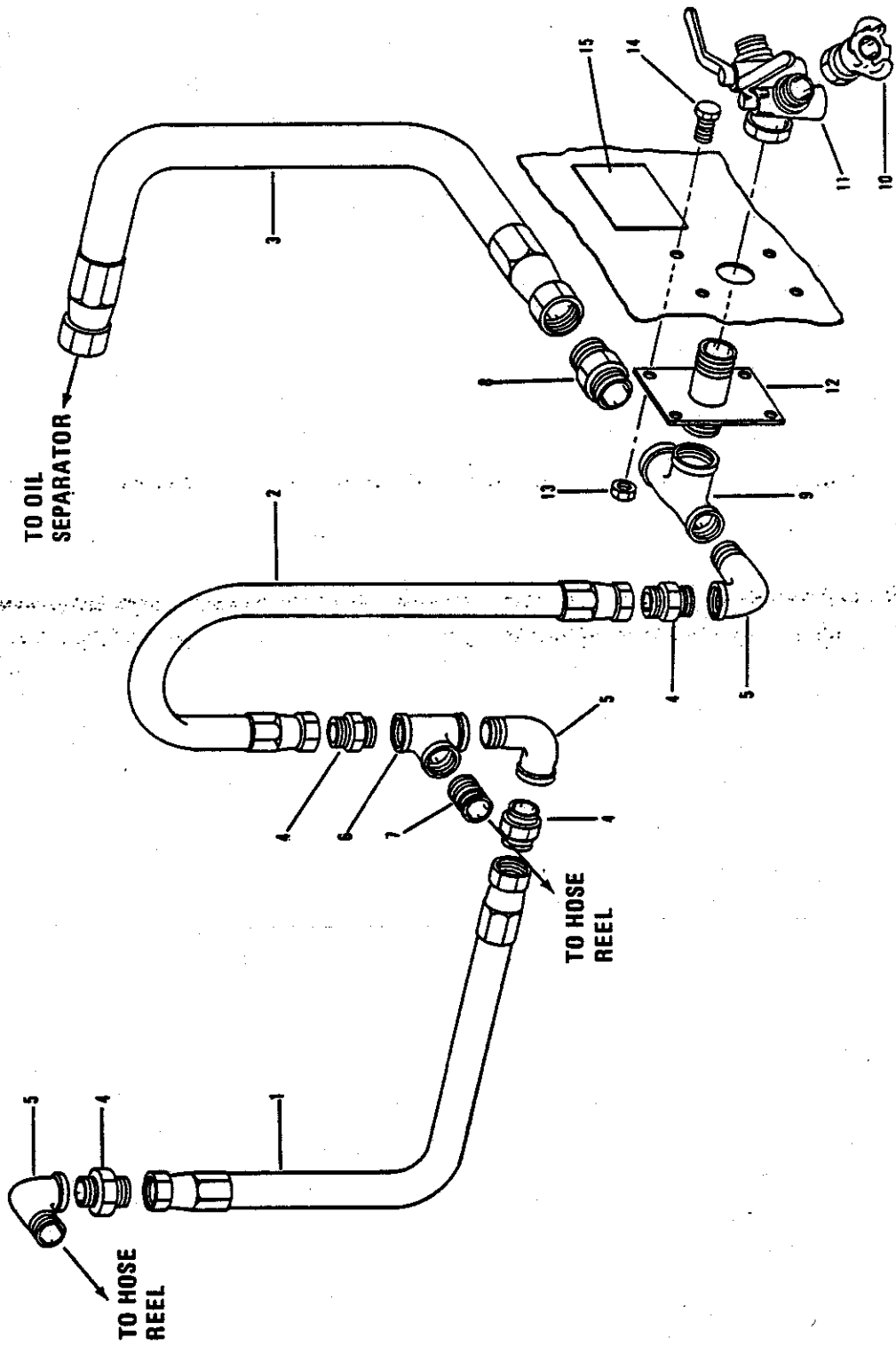


FIGURE 7-6. AIR SERVICE GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-6-	NO NUMBER	16004	AIR SERVICE GROUP. (SEE FIGURE 7-1-5 FOR NHA)	REF		
-1	39367	16004	HOSE ASSEMBLY, AIR	1		PAFZZ
-2	39156	16004	HOSE ASSEMBLY, AIR	1		PAFZZ
-3	66745	16004	HOSE ASSEMBLY, AIR	1		PAFZZ
-4	2021-12-12S	00624	ADAPTER, HOSE.	4		PAFZZ
-5	MS39230-5	96906	ELBOW, STREET, 3/4NPT (16004 SPEC CONT NO. 144113)	3		PAFZZ
-6	144086	16004	TEE, PIPE, 3/4NPT	1		PAFZZ
-7	MS51953-97	96906	NIPPLE, PIPE, CLOSE, 3/4NPT. (16004 SPEC CONT NO. 192470)	1		PAFZZ
-8	2021-16-16	00624	ADAPTER, HOSE (16004 SPEC CONT NO. 23341)	1		PAFZZ
-9	179623	16004	TEE, PIPE, REDUCING. 1 X 3/4 X 1NPT	1		PAFZZ
-10	AM-8	72661	COUPLING, HOSE (16004 SPEC CONT NO. 24045)	2		PAFZZ
	AWR-4	72661	WASHER, HOSE COUPLING	2		PAFZZ
-11	DHA10		VALVE, DISCHARGE (16004 SPEC CONT NO. 81626) (LUDECKE, INC.)	1		PAFZZ
-12	81796	16004	PIPE, SERVICE VALVE.	1		PAFZZ
-13	9416918	16004	NUT, HEX, SERR FLG, 1/4-20NC (AP).	4		PAFZZ
-14	274473	16004	SCREW, HEX, SERR HD. 1/4-20NC X 5/8 IN LG (AP)	4		PAFZZ
-15	85423*	16004	DECAL, WARNING, BREATHING AIR	1		XBFZZ

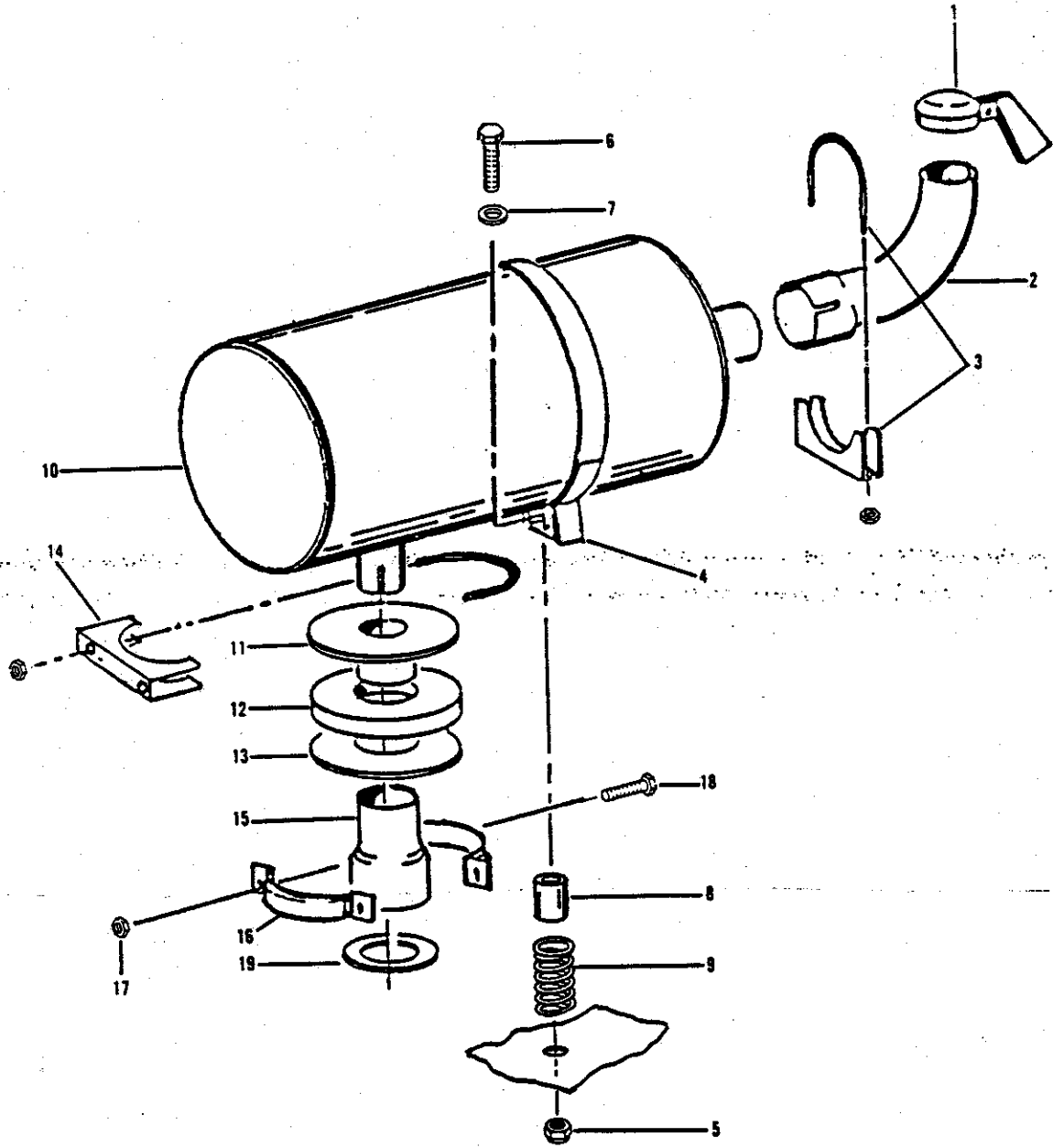


FIGURE 7-7. EXHAUST AND MUFFLER GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-7-	NO NUMBER	16004	EXHAUST AND MUFFLER GROUP.	REF		
			(SEE FIGURE 7-1-6 FOR NHA)			
-1	89422A	76700	CAP, RAIN, MUFFLER (16004 SPEC. CONT NO. 86396)	1		PAFZZ
-2	81219-1	16004	ELBOW, EXHAUST, SST	1		PAFZZ
-3	T250	80266	CLAMP, MUFFLER (16004 SPEC. CONT NO. 63481) (AP)	1		PAFZZ
-4	86540-1	16004	BAND, MOUNTING, MUFFLER	1		PAFZZ
-5	MS51922-1	96906	NUT, LOCK, HEX, 1/4-20NC (AP).	2		PAFZZ
-6	MS90725-12	96906	SCREW, CAP, HEX HD, 1/4-20NC X 1-1/2 IN. LG (AP)	2		PAFZZ
-7	67919	16004	WASHER, SAE, 1/4 IN (AP).	2		PAFZZ
-8	86503	16004	GUIDE, SPRING (AP)	2		XBFZZ
-9	16041	16004	SPRING, MOUNTING (AP).	2		XBFZZ
-10	20908-A	76700	MUFFLER, EXHAUST (16004 SPEC. CONT NO. 8002B-1)	1		PAFZZ
-11	86387	16004	ESCUTCHEON, MUFFLER MOUNTING	1		XBFZZ
-12	86388	16004	INSULATION, SOUND.	1		XBFZZ
-13	86386	16004	FLANGE, EXHAUST.	1		XBFZZ
-14	T250	80266	CLAMP, MOUNTING (16004 SPEC. CONT NO. 63481) (AP)	2		PAFZZ
-15	86389-1	16004	STACK, EXHAUST, SST	1		PAFZZ
-16	AT63813	75160	CLAMP, EXHAUST STACK (16004. SPEC CONT NO. 81263)	2		PAFZZ
-17	MS51922-9	96906	NUT, LOCK, HEX, 5/16-18NC (AP)	2		PAFZZ
-18	MS90725-38	96906	SCREW, CAP, HEX HD, 5/16-18NC X 1-1/2 IN. LG (AP)	2		PAFZZ
-19	T20141	75160	GASKET, EXHAUST (16004 SPEC. CONT NO. 81264)	1		PAFZZ

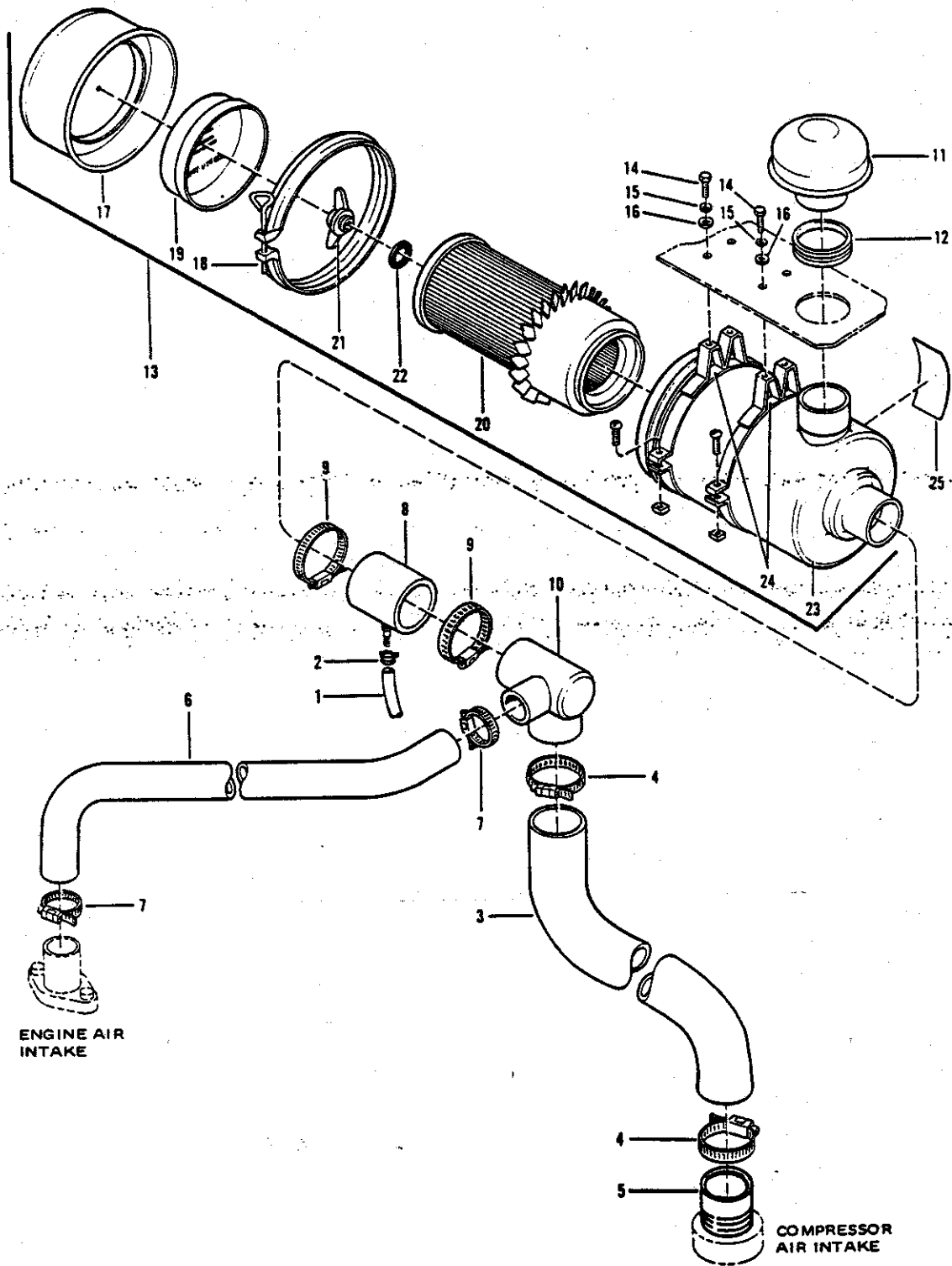


FIGURE 7-B. AIR INTAKE AND CLEANER GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-8-	NO NUMBER	16004	AIR INTAKE AND CLEANER GROUP (SEE FIGURE 7-1-7 FOR NHA)	REF		
-1	86494	16004	HOSE ASSEMBLY, SERVICE INDICATOR	1		XBFZZ
-2	Q5700M4H	08484	CLAMP, HOSE (16004 SPEC CONT NO. 65249) (AP)	1		XBFZZ
-3	80671	16004	HOSE, AIR INTAKE, COMPRESSOR.	1		PAFZZ
-4	52K	66295	CLAMP, HOSE (16004 SPEC CONT NO. 61055) (AP)	2		XBFZZ
-5	45846	16004	PIPE, AIR INTAKE, COMPRESSOR.	1		PAFZZ
-6	NED-FAB-2	92850	HOSE, AIR INTAKE, ENGINE. (16004 SPEC CONT NO. 80412)	1		PAFZZ
-7	36K	66295	CLAMP, HOSE (16004 SPEC CONT NO. 46330) (AP)	2		PAFZZ
-8	67991	16004	HOSE ASSEMBLY, MANIFOLD.	1		PAFZZ
-9	52K	66295	CLAMP, HOSE (16004 SPEC CONT NO. 61055) (AP)	2		XBFZZ
-10	45813	16004	MANIFOLD, AIR INTAKE	1		PAFZZ
-11	GAX00-2014	18265	CAP, AIR CLEANER (16004 SPEC CONT NO. 43516)	1		PAFZZ
-12	Z-1028	76385	GROMMET, AIR CLEANER (16004. SPEC CONT NO. 69847)	1		PAFZZ
-13	FW008-0023	18265	AIR CLEANER ASSEMBLY. (16004 SPEC CONT NO. 46155)	1		PAFZZ
-14	MS90725-58	96906	SCREW, CAP, HEX HD, 3/8-16NC X 3/4 IN LG (AP)	4		PAFZZ
-15	MS35338-27	96906	WASHER, LOCK, SPLIT, 3/8 (AP).	4		PAFZZ
-16	MS27183-13	96906	WASHER, FLAT, 3/8 (AP).	4		PAFZZ
-17	P10-3113	18265	CUP, AIR CLEANER.	1		XBFZZ
-18	P00-3951	18265	CLAMP, CUP.	1		XBFZZ
-19	P10-2980	18265	BAFFLE, CUP	1		PAFZZ
-20	P10-1246	18265	ELEMENT, AIR CLEANER (16004 SPEC CONT NO. 48141)	1		PAFZZ
-21	P10-2144	18265	NUT, WING (AP).	1		XBFZZ
-22	P10-1872	18265	GASKET, WASHER (AP)	1		XBFZZ
-23	NO NUMBER	18265	BODY, AIR CLEANER (NOT SERVICED SEPARATELY)	REF		XBFZZ
-24	62112	16004	BAND, MOUNTING	2		PAFZZ
-25	63302*	16004	DECAL, SERVICE	1		XBFZZ

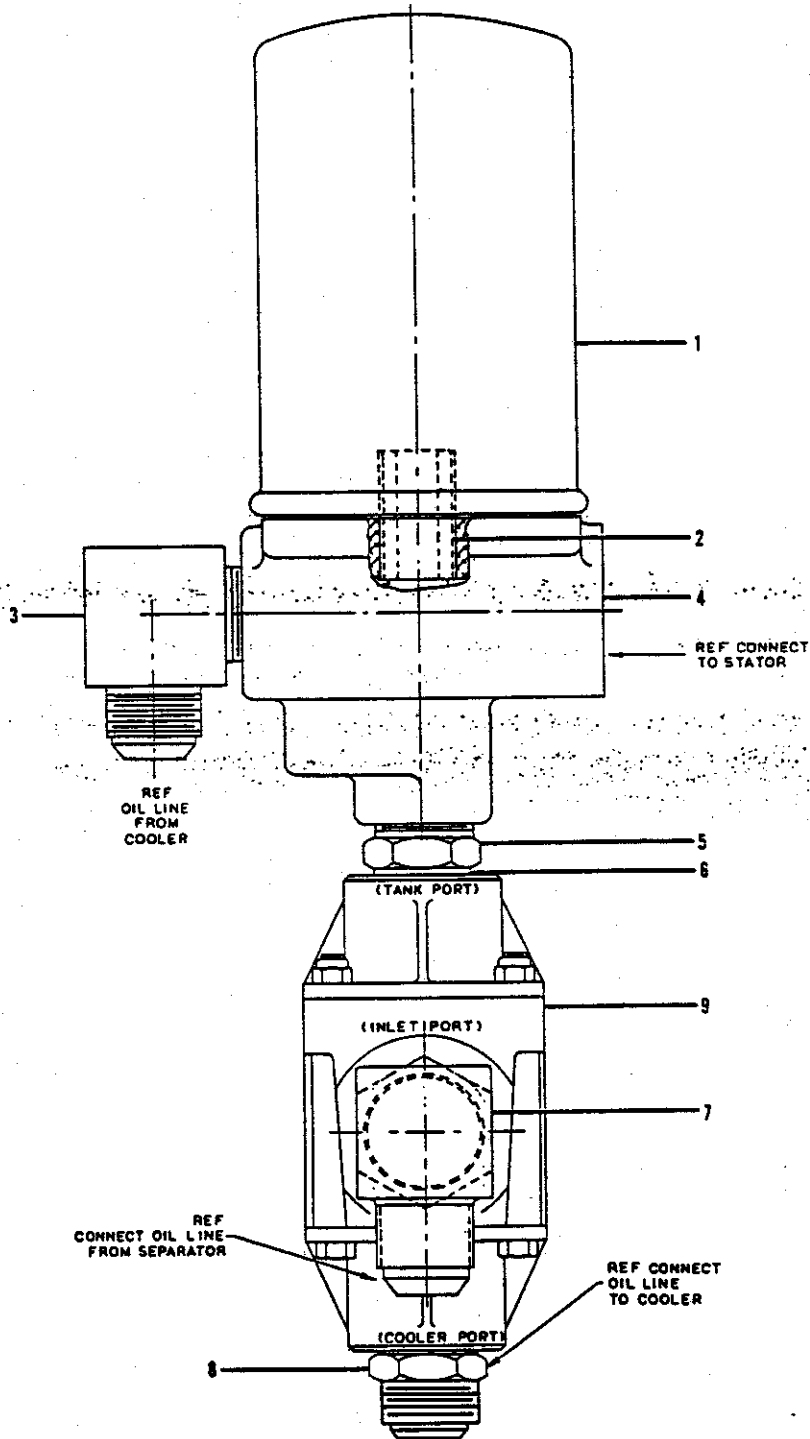


FIGURE 7-9. OIL FILTER AND BYPASS ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-9-	86452	16004	OIL FILTER AND BYPASS ASSEMBLY (SEE FIGURE 7-1-15 FOR NHA)	REF		AFFZZ
-1	PER-1A	81321	FILTER, OIL (16004 SPEC CONT NO. 46704)	1		PAFZZ
-2	61808	16004	ADAPTER, OIL FILTER	1		PAFZZ
-3	2024-12-12S	00624	ELBOW, TUBE (16004 SPEC CONT NO. 23678)	1		PAFZZ
-4	86449	16004	CONNECTION, BYPASS	1		XBFZZ
-5	7205X16X12	79470	CONNECTOR, MALE (16004 SPEC. CONT NO. 46220)	1		PAFZZ
-6	7629X16	79470	O-RING, SAE -16 BOSS (16004. SPEC CONT NO. 72071)	1		PAFZZ
-7	2062-16-12S	01276	ELBOW, SAE O-RING (16004 SPEC. CONT NO. 86455)	1		PAFZZ
-8	2702-16-12S	01276	ADAPTER, SAE O-RING (16004 SPEC. CONT NO. 86472)	1		PAFZZ
-9	86454	16004	THERMAL BYPASS ASSY	1		PAFZZ

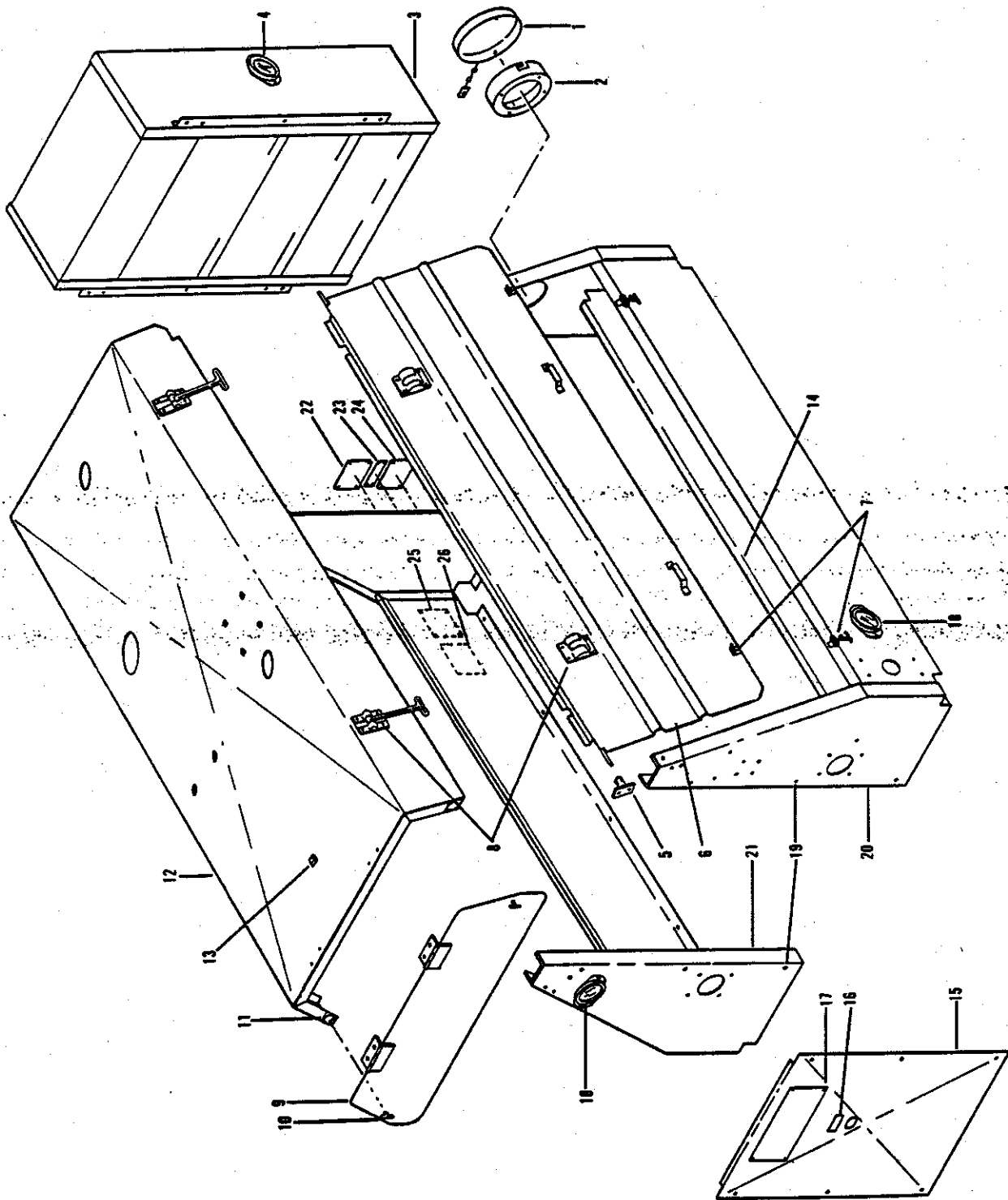
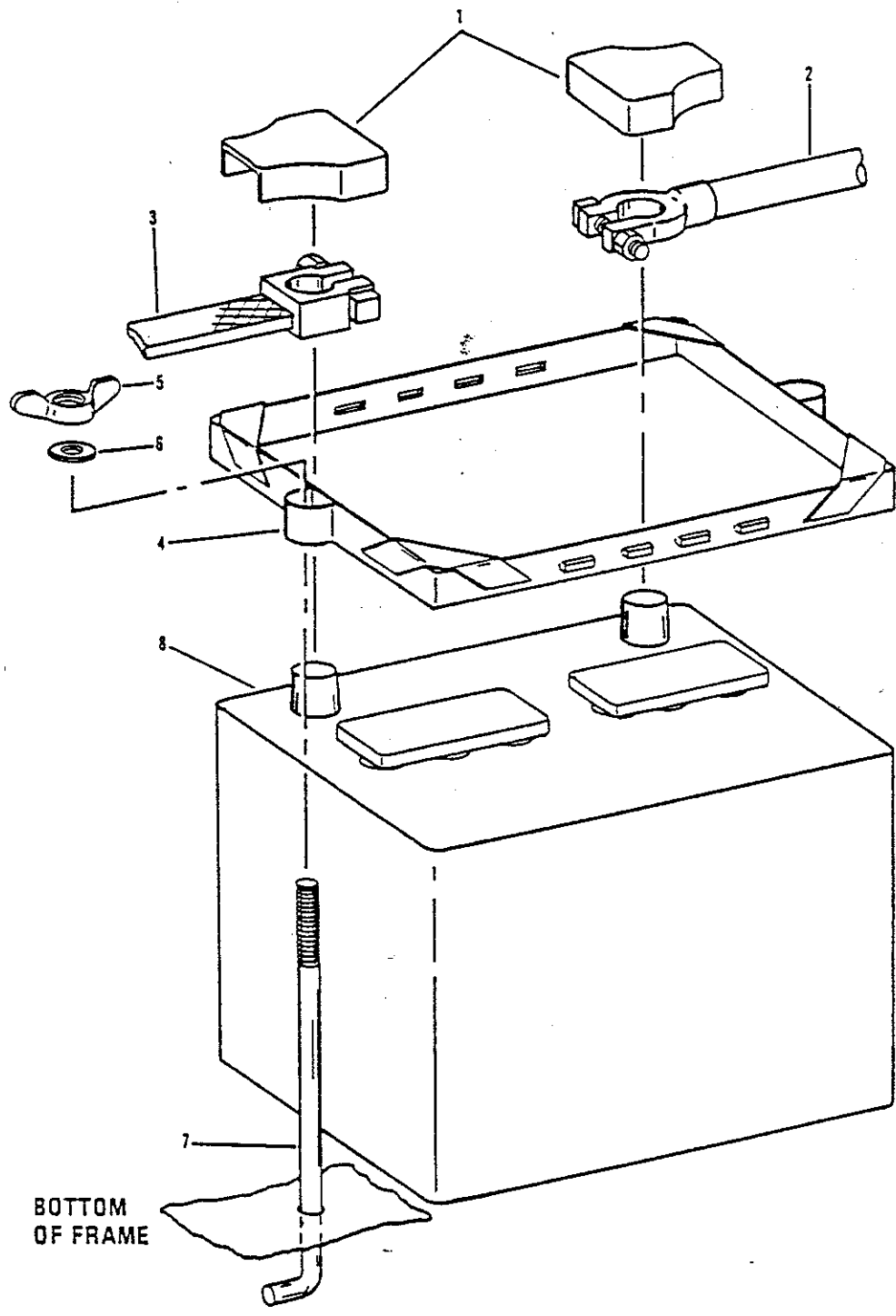


FIGURE 7-10. HOUSING GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-10-	NO NUMBER	16004	HOUSING GROUP. (SEE FIGURE 7-1-19 FOR NHA)	REF		
-1	65061	16004	COVER ASSY, HEAT DUCT.	2		XBFZZ
	65060	16004	ANCHOR, CHAIN	1		XBFZZ
	27455	16004	CHAIN, ANCHOR	1		XBFZZ
	AD64-ABS	07707	RIVET, BLIND (16004 SPEC CONT NO. 49235) (AP)	1		XBFZZ
	64534	16004	COVER, HEAT DUCT.	1		PAFZZ
-2	86537	16004	FLANGE ASSY, HEAT DUCT	2		XBFZZ
	MS51922-1	96906	NUT, LOCK, HEX, 1/4-20NC (AP)	4		PAFZZ
	274473	16004	SCREW, HEX SERR HD, 1/4-20NC X 5/8 IN. LG (AP)	4		PAFZZ
-3	80585	16004	BAFFLE, AIR.	1		XBFZZ
	9416918	16004	NUT, HEX SERR FLG, 1/4-20NC (AP)	10		PAFZZ
	9419376	16004	SCREW, HEX SERR HD, 1/4-20NC X 1 IN. LG (AP)	10		PAFZZ
-4	MS35387-1	96906	REFLECTOR, RED (16004 SPEC CONT. NO. 24338)	4		PAFZZ
	9416918	16004	NUT, HEX SERR HD, 1/4-20NC (AP)	2		PAFZZ
	273771	16004	SCREW, HEX SERR HD, 1/4-20NC X 1/2 IN. LG (AP)	2		PAFZZ
-5	86433	16004	HINGE PLATE, DOOR.	4		PAFZZ
	9416918	16004	NUT, HEX, SERR FLG, 1/4-20NC (AP)	8		PAFZZ
	274473	16004	SCREW, HEX SERR HD, 1/4-20NC X 5/8 IN. LG (AP)	8		PAFZZ
-6	86395	16004	DOOR ASSEMBLY	2		XBFZZ
	86444	16004	NOISE DAMPENER, DOOR	1		XBFZZ
	86498	16004	NOISE DAMPENER, DOOR, TANK SIDE	1		XBFZZ
	69992*	16004	DECAL, PAINT	1		XBFZZ
-7	37-10-071-10	94222	LATCH, DOOR (16004 SPEC CONT NO. 80031)	4		PAFZZ
-8	MS20606M4T3	96906	RIVET, BLIND (AP)	12		PAFZZ
	6-5601-U	19220	HOLDER, DOOR (16004 SPEC CONT. NO. 83616)	4		PAFZZ
	190254	16004	NUT, LOCK, HEX, NO. 10-24 (AP)	32		PAFZZ
	443874	16004	SCREW, CAP, HEX HD, NO. 10-24 X 1/2 IN. LG (AP)	32		PAFZZ
-9	86533	16004	DOOR, ACCESS. CONTROL PANEL	1		XBFZZ
	86500	16004	NUT, LOCK, NO. 10-24 (AP)	4		XBFZZ
	86499	16004	WASHER, FLAT, NO. 10, SST (AP)	4		XBFZZ
	9418752	16004	SCREW, TRUSS HD, NO. 10-24 X 5/8 IN. LG (AP)	4		XBFZZ
-10	85-12-220-20	94222	STUD, WING HD (16004 SPEC CONT NO. 86535)	2		XBFZZ
	85-34-101-20	94222	RETAINER, SPLIT-RING (16004 SPEC CONT NO. 86545) (AP)	2		XBFZZ
-11	85-47-101-20	94222	RECEPTACLE, FASTENER (16004 SPEC CONT NO. 86544)	2		XBFZZ
-12	86393	16004	ROOF, HOUSING.	1		XBFZZ
	9416918	16004	NUT, HEX SERR FLG, 1/4-20NC (AP)	6		PAFZZ
	273771	16004	SCREW, HEX SERR HD, 1/4-20NC X 1/2 IN. LG (AP)	6		PAFZZ
	86447	16004	NOISE DAMPENER, ROOF	1		XBFZZ
-13	SJ-5514	76381	BUMPER, DOOR (16004 SPEC CONT. NO. 65995)	1		PAFZZ
-14	86391	16004	PANEL, BACK, TOOL BOX	1		XBFZZ
	9416918	16004	NUT, HEX SERR FLG, 1/4-20NC (AP)	2		PAFZZ
	273771	16004	SCREW, HEX SERR HD, 1/4-20NC X 1/2 IN. LG (AP)	2		PAFZZ
	86445	16004	NOISE DAMPENER, PANEL	1		XBFZZ
-15	86397	16004	PANEL, FRONT, HOUSING	1		XBFZZ
	273771	16004	SCREW, HEX SERR HD, 1/4-20NC X 1/2 IN. LG (AP)	6		PAFZZ
	86443	16004	NOISE DAMPENER, FRONT PANEL	1		XBFZZ
-16	86459*	16004	DECAL, UNLOADER AND IDLE CONTROL	1		XBFZZ
-17	86496	16004	PLATE, OPERATING INSTRUCTIONS	1		PBFZZ
	68749	16004	SCREW, SELF TAPPING, NO. 4-40 X 1/4 IN. LG (AP)	4		PAFZZ

ORIGINAL

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-10-18	MS35387-2	96906	REFLECTOR, AMBER (16004 SPEC CONT NO. 24606)	4		PAFZZ
	9416918	16004	NUT, HEX SERR FLG, 1/4-20NC (AP)	8		PAFZZ
	273771	16004	SCREW, HEX SERR HD, 1/4-20NC X 1/2 IN. LG (AP)	8		PAFZZ
-19	C7998-1420-24	78553	NUT, CAGED, 1/4-20NC (16004 SPEC CONT NO. 80075)	6		PAFZZ
-20	86390	16004	PANEL, SIDE, ROAD	1		XBFZZ
	9416918	16004	NUT, HEX SERR FLG, 1/4-20NC (AP)	2		PAFZZ
	274473	16004	SCREW, HEX SERR HD, 1/4-20NC X 5/8 IN. LG (AP)	2		PAFZZ
	MS51922-17	96906	NUT, LOCK, HEX, 3/8-16NC (AP)	7		PAFZZ
	MS90725-60	96906	SCREW, CAP, HEX HD, 3/8-16NC X 1 IN. LG (AP)	7		PAFZZ
-21	MS27183-13	96906	WASHER, FLAT, 3/8 (AP)	14		PAFZZ
	86392	16004	PANEL, SIDE, CURB	1		XBFZZ
	9416918	16004	NUT, HEX SERR FLG, 1/4-20NC (AP)	2		PAFZZ
	274473	16004	SCREW, HEX SERR HD, 1/4-20NC X 5/8 IN. LG (AP)	2		PAFZZ
	MS51922-17	96906	NUT, LOCK, HEX, 3/8-16NC (AP)	7		PAFZZ
	MS90725-60	96906	SCREW, CAP, HEX HD, 3/8-16NC X 1 IN. LG (AP)	7		PAFZZ
-22	MS27183-13	96906	WASHER, FLAT, 3/8 (AP)	14		PAFZZ
	80107	16004	PLATE, E. P. A.	1		XBFZZ
	190734	16004	NUT, LOCK (AP)	4		XBFZZ
	132636	16004	SCREW, MACH, RD HD (AP)	4		XBFZZ
-23	85362	16004	PLATE, WARRANTY	1		XBFZZ
	68749	16004	SCREW, SELF TAPPING, NO. 4-40 X 1/4 IN. LG (AP)	4		PAFZZ
-24	86464-1	16004	PLATE, IDENTIFICATION, USAF	1		XBFZZ
	68749	16004	SCREW, SELF TAPPING, NO. 4-40 X 1/4 IN. LG (AP)	4		PAFZZ
-25	86501	16004	PLATE, SHIPPING DATA	1		XBFZZ
	68749	16004	SCREW, SELF TAPPING, NO. 4-40 X 1/4 IN. LG (AP)	4		PAFZZ
-26	82756*	16004	DECAL, FLAG	1		XBFZZ



BOTTOM
OF FRAME

FIGURE 7-11. BATTERY AND MOUNTING GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE		SMR CODE
				PER ASSY.	ON CODE	
7-11-	NO NUMBER	16004	BATTERY AND MOUNTING GROUP (SEE FIGURE 7-1-20 FOR NHA)		REF	
-1	80696	16004	. SHIELD, BATTERY TERMINAL	2		XBFZZ
-2	83284-2	16004	. CABLE ASSY, BATTERY POSITIVE	1		XBFZZ
	120377	16004	. NUT, HEX, 3/8-16NC (AP)	1		PAFZZ
	120382	16004	. WASHER, LOCK, 3/8 IN. (AP)	1		PAFZZ
-3	2194-5	19328	. STRAP, BATTERY GROUND (16004 SPEC CONT NO. 1102B)	1		XBFZZ
-4	86168	16004	. HOLDDOWN, BATTERY.	1		PAFZZ
-5	MS35425-42	96906	. WINGNUT, 3/8-16NC (AP)	2		PAFZZ
-6	MS27183-13	96906	. WASHER, FLAT, 3/8 IN. (AP)	2		PAFZZ
-7	65578	16004	. J-BOLT, BATTERY (AP)	2		XBFZZ
-8	9MC6	81343	. BATTERY, SIZE 27, 12 VOLT	1		PAFZZ

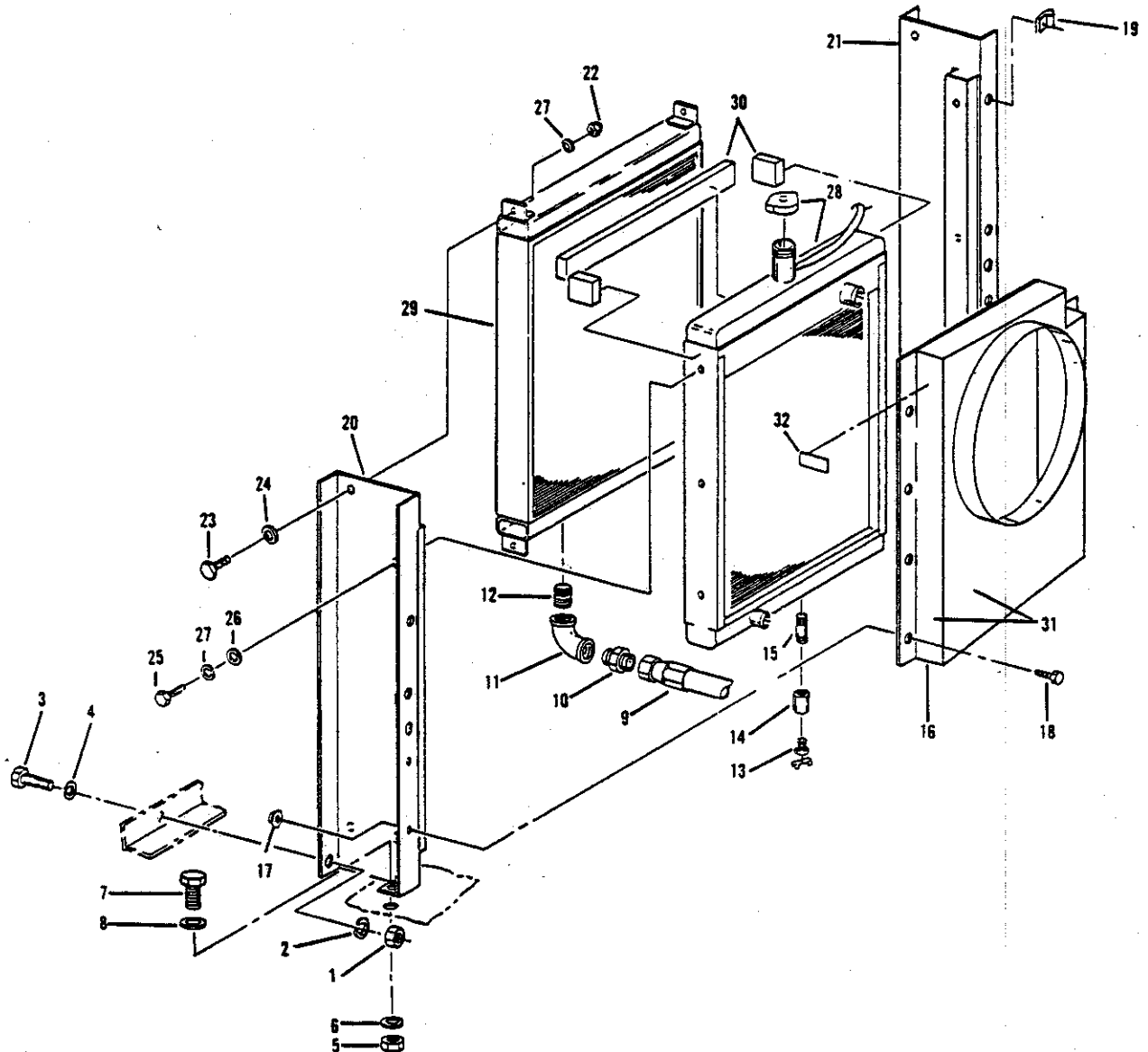


FIGURE 7-12. RADIATOR AND OIL COOLER GROUP

FIG. & INDEX NO.	PART NUMBER	FBCM 1234567	DESCRIPTION	UNITS USABLE		
				PER ASSY.	ON CODE	SMR CODE
7-12-	NO NUMBER	16004	RADIATOR AND OIL COOLER GROUP.	REF		
-1	MS51967-14	96906	NUT, HEX, 1/2-13NC (AP)	2		PAFZZ
-2	MS35338-29	96906	WASHER, LOCK, SPLIT, 1/2 IN. (AP).	2		PAFZZ
-3	MS90725-113	96906	SCREW, CAP, HEX HD, 1/2-13NC X 1-1/2 IN. LG (AP)	2		PAFZZ
-4	MS27183-18	96906	WASHER, FLAT, 1/2 IN. (AP).	2		PAFZZ
-5	MS51967-8	96906	NUT, HEX, 3/8-16NC (AP)	2		PAFZZ
-6	MS35338-27	96906	WASHER, LOCK SPLIT, 3/8 IN. (AP).	2		PAFZZ
-7	MS90725-60	96906	SCREW, CAP, HEX HD, 3/8-16NC X 1 IN. LG (AP)	2		PAFZZ
-8	MS27183-13 86502	96906 16004	WASHER, FLAT, 3/8 IN. (AP). RADIATOR AND OIL COOLER	2 1		PAFZZ AFFZZ
-9	64195	16004	HOSE ASSEMBLY, OIL.	2		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-12-10	2021-12-12S	00624	.. ADAPTER, HOSE (16004 SPEC CONT. NO. 23671)	2		PAFZZ
-11	144129	16004	.. ELBOW, PIPE, 3/4NPT.	2		PAFZZ
-12	MS51953-101	96906	.. NIPPLE, PIPE, 3/4 NPT X 2 IN. LG.	2		PAFZZ
-13	270	79470	.. DRAIN COCK, RADIATOR (16004 SPEC CONT NO. 14028)	1		PAFZZ
-14	MS39233-3	96906	.. COUPLING, PIPE, 3/8NPT	1		PAFZZ
-15	MS51953-52	96906	.. NIPPLE, PIPE, 3/8NPT X 1-1/2 IN. LG	1		PAFZZ
-16	86416	16004	.. SHROUD, FAN	1		XBFZZ
-17	9416918	16004	.. NUT, HEX SERR FLG, 1/4-20NC (AP)	8		PAFZZ
-18	274825	16004	.. SCREW, HEX SERR HD, 1/4-20NC X 3/4 IN. LG (AP)	8		PAFZZ
-19	TC78	75272	.. CLIP, TUBING (16004 SPEC CONT NO. 11033)	2		PAFZZ
-20	65290	16004	.. SUPPORT, RADIATOR AND COOLER.	1		XBFZZ
-21	65291	16004	.. SUPPORT, RADIATOR AND COOLER.	1		XBFZZ
-22	MS51967-B	96906	.. NUT, HEX, 3/8-16NC (AP).	4		PAFZZ
-23	MS90725-60	96906	.. SCREW, CAP, HEX HD, 3/8-16NC X 1 IN. LG (AP)	4		PAFZZ
-24	67924	16004	.. WASHER, FLAT, 3/8 SAE (AP)	4		PAFZZ
-25	MS90725-58	96906	.. SCREW, CAP, HEX HD, 3/8-16NC X 3/4 IN. LG (AP)	6		PAFZZ
-26	MS27183-13	96906	.. WASHER, FLAT, 3/8 IN. (AP)	6		PAFZZ
-27	MS35338-27	96906	.. WASHER, LOCK, SPLIT, 3/8 IN. (AP)	10		PAFZZ
-28	63345	16004	.. RADIATOR, COOLING	1		PAFZZ
-29	63346	16004	.. COOLER, OIL	1		PBFZZ
-30	65595	16004	.. SPONGE STRIP (CUT 2 PIECES 26. IN. LG AND 4 PIECES 2-1/2 IN. LG)	2		PAFZZ
-31	86446	16004	.. NOISE DAMPENER, SHROUD	1		XBFZZ
-32	66604*	16004	.. DECAL, CAUTION FAN, ONE EACH. SIDE	2		XBFZZ

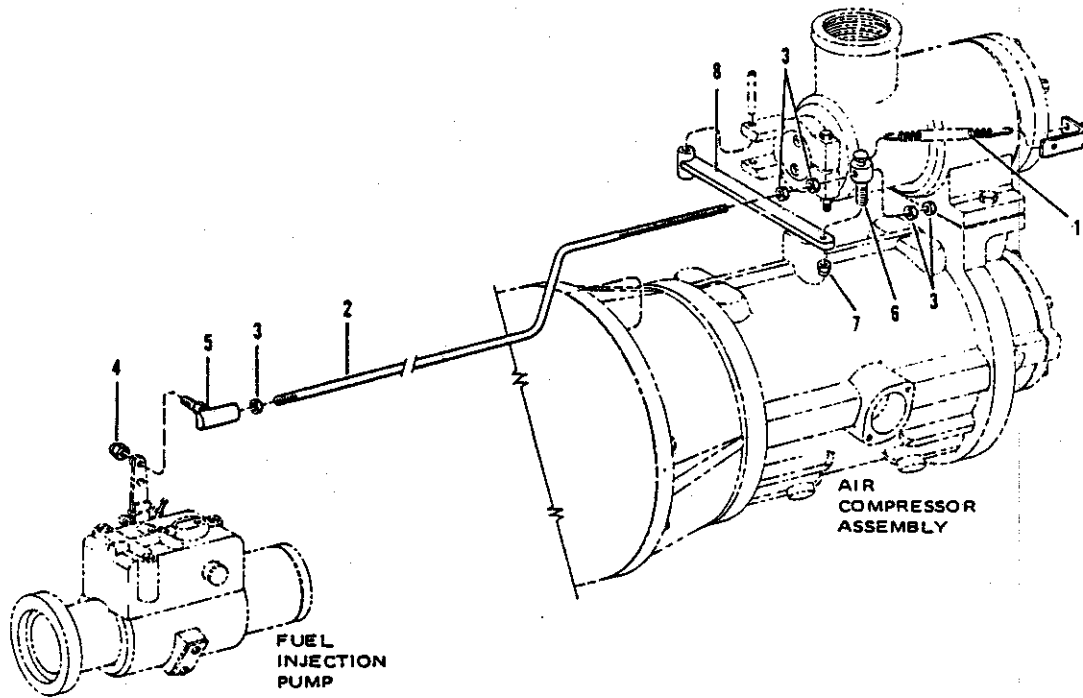


FIGURE 7-13. SPEED CONTROL GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-13-	NO NUMBER	16004	SPEED CONTROL GROUP. (SEE FIGURE 7-1-22 FOR NHA)	REF		
-1	63076	16004	. SPRING, RETURN	1		PAFZZ
-2	80383	16004	. ROD, CONTROL, SPEED	1		X8FZZ
-3	MS51968-2	96906	. NUT, HEX, 1/4-28NF (AP)	5		PAFZZ
-4	443318	16004	. NUT, LOCK, HEX, THIN, 1/4-28NF.	1		PAFZZ
-5	SP1002CP	01428	. BALL JOINT, CONTROL ROD (16004 SPEC CONT NO. 09665)	1		PAFZZ
-6	18952	16004	. STOP BLOCK, CONTROL.	1		PAFZZ
-7	MS51922-5	96906	. NUT, LOCK, HEX, 1/4-28NF (AP).	1		PAFZZ
-8	62286	16004	. ARM ASSY, SPEED CONTROL.	1		PAFZZ

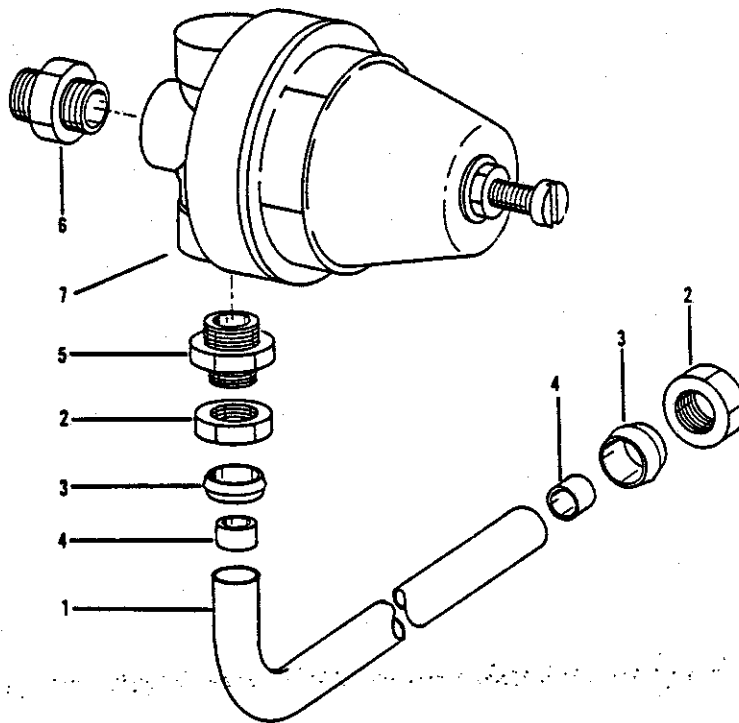


FIGURE 7-14. AIR PRESSURE REGULATOR GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-14-	NO NUMBER	16004	AIR PRESSURE REGULATOR GROUP	REF		
			(SEE FIGURE 7-1-23 FOR NHA)			
-1	83671	16004	TUBE, SEPARATOR TO REGULATOR	1		XBFZZ
-2	61X5	79470	NUT, TUBING (16004 SPEC CONT NO. 41959)	2		PAFZZ
-3	60X5	79470	FERRULE, TUBING (16004 SPEC. CONT NO. 41958)	2		PAFZZ
-4	63PT5-40	93029	SLEEVE, TUBING (16004 SPEC CONT. NO. 65211)	2		PAFZZ
-5	68X5X4	79470	CONNECTOR, TUBING (16004 SPEC. CONT NO. 43024)	2		PAFZZ
-6	C3069X4	79470	NIPPLE, HEX, 1/4NPT (16004 SPEC CONT NO. 28914)	1		PAFZZ
-7	12299	71342	REGULATOR, AIR PRESSURE (16004 SPEC CONT NO. 86410)	1		PAFZZ

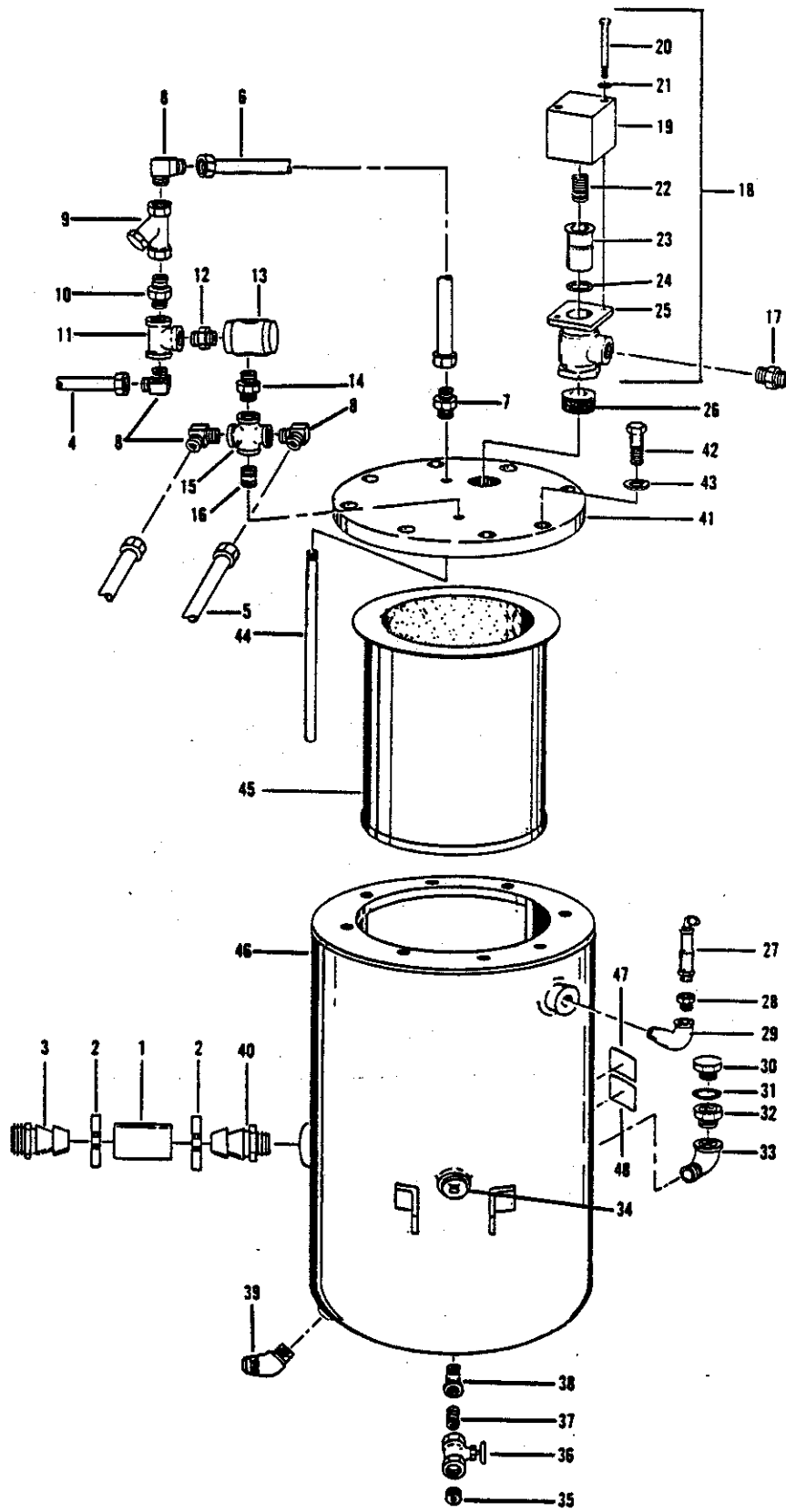


FIGURE 7-15. AIR LINES AND OIL SEPARATOR GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-15-	NO NUMBER	16004	AIR LINES AND OIL SEPARATOR.	REF		
			GROUP (SEE FIGURE 7-1-24 FOR NHA)			
-1	86488	16004	HOSE, DISCHARGE, COMPRESSOR TO SEPARATOR	1		PAFZZ
-2	55083-212-2L	01276	CLAMP, HOSE (16004 SPEC CONT NO. 68499)	2		PAFZZ
-3	86489	16004	ADAPTER, HOSE.	1		PAFZZ
-4	83671	16004	TUBING, NYLON, SEPARATOR TO COMPRESSOR CONTROL HSG	1		XBFZZ
-5	86504	16004	TUBING, NYLON, SEPARATOR TO PRESSURE GAUGE	1		XBFZZ
	61X5	79470	NUT, TUBING (16004 SPEC CONT NO. 41959)	4		PAFZZ
	60X5	79470	FERRULE, TUBING (16004 SPEC CONT NO. 41958)	4		PAFZZ
	63PT5-40	93029	SLEEVE, TUBING (16004 SPEC CONT NO. 65211)	4		PAFZZ
	68X5X4	79470	CONNECTOR, TUBING, ON COMPRESSOR. (16004 SPEC CONT NO. 43024)	1		PAFZZ
	86424	16004	OIL SEPARATOR ASSEMBLY.	1		XBFZZ
-6	83671	16004	TUBING, NYLON, TANK COVER TO STRAINER	1		XBFZZ
	61X5	79470	NUT, TUBING (16004 SPEC CONT NO. 41959)	2		PAFZZ
	60X5	79470	FERRULE, TUBING (16004 SPEC CONT NO. 41958)	2		PAFZZ
	63PT5-40	93029	SLEEVE, TUBING (16004 SPEC CONT NO. 65211)	2		PAFZZ
-7	68X5X4	79470	CONNECTOR, TUBING (16004 SPEC CONT NO. 43024)	1		PAFZZ
-8	69X5X4	79470	ELBOW, TUBING (16004 SPEC CONT NO. 44209)	4		PAFZZ
-9	8600A2-1/4	04845	STRAINER, LINE (16004 SPEC CONT NO. 47690)	1		PAFZZ
	24963	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
	24X110MONEL	04845	ELEMENT, STRAINER.	1		PAFZZ
-10	63948	16004	NIPPLE, "Y" ORIFICE	1		PAFZZ
-11	144083	16004	TEE, PIPE, 1/4NPT.	1		PAFZZ
-12	0101-2-4	45681	NIPPLE, HEX REDUCING (16004 SPEC CONT NO. 66454)	1		PAFZZ
-13	X-646	13602	VALVE ASSY, BLOWDOWN (16004 SPEC CONT NO. 86428)	1		PAFZZ
-14	C3069X4	79470	NIPPLE, HEX (16004 SPEC CONT NO. 28914)	1		PAFZZ
-15	144151	16004	CROSS, PIPE, 1/4NPT.	1		PAFZZ
-16	192051	16004	NIPPLE, PIPE, 1/4NPT X 1 IN. LG	1		XBFZZ
-17	2021-16-16	00624	ADAPTER, HOSE (16004 SPEC CONT NO. 23341)	1		PAFZZ
-18	64025	16004	MINIMUM PRESSURE VALVE ASSEMBLY	1		PAFZZ
-19	64022	16004	COVER, MINIMUM PRESS VALVE	1		PAFZZ
-20	MS90725-16	96906	SCREW, CAP, HEX HD, 1/4-20NC X 2-1/2 IN. LG (AP)	2		PAFZZ
-21	1214-05	78189	WASHER, LOCK, INTERNAL TOOTH, 1/4 IN. (16004 SPEC CONT NO. 28149) (AP)	2		PAFZZ
-22	64024	16004	SPRING, MINIMUM PRESS VALVE.	1		PAFZZ
-23	64023	16004	PISTON, MINIMUM PRESS VALVE.	1		PAFZZ
-24	24628	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
-25	68110	16004	BODY, VALVE.	1		XBFZZ
-26	MS51953-145	96906	NIPPLE, PIPE, CLOSE, 1-1/4NPT	1		PAFZZ
-27	64015	16004	VALVE, SAFETY	1		PAFZZ
-28	144042	16004	BUSHING, REDUCING, 3/4 TO 1/2NPT	1		PAFZZ
-29	MS39230-5	96906	ELBOW, STREET, 3/4NPT.	1		PAFZZ
-30	26359	16004	CAP, OIL FILLER	1		PAFZZ
-31	24982	16004	PACKING, PREFORMED, O-RING	1		PAFZZ
-32	63062	16004	ADAPTER, OIL FILLER	1		PAFZZ
-33	MS39230-8	96906	ELBOW, STREET, 1-1/2NPT.	1		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-15-34	MS20913-12S	96906	.. PLUG, PIPE, 1-1/2NPT	1		PAFZZ
-35	MS20913-4S	96906	.. PLUG, PIPE, 1/2NPT	1		PAFZZ
-36	14034	16004	.. VALVE, GLOBE, DRAIN.	1		PAFZZ
-37	MS51953-78	96906	.. NIPPLE, PIPE, 1/2NPT X 2 IN. LG	1		PAFZZ
-38	MS39230-4	96906	.. ELBOW, STREET, 1/2NPT.	1		PAFZZ
-39	C5355X12	79470	.. ELBOW, TUBE, MALE, 45 DEG (16004. SPEC CONT NO. 86427)	1		PAFZZ
-40	86489	16004	.. ADAPTER, HOSE	1		PAFZZ
-41	66647	16004	.. COVER, SEPARATOR TANK (NOT. SERVICED SEPARATELY, SUPPLIED WITH TANK NO. 66646)	REF		XBFZZ
-42	60205	16004	.. SCREW, CAP, HEX HD, GRADE 5 OR. BETTER, 1/2-13NC X 2 IN. LG (AP)	8		PAFZZ
-43	MS35338-29	96906	.. WASHER, LOCK, SPLIT, 1/2 IN. (AP)	8		PAFZZ
-44	60979	16004	.. PIPE, ELEMENT DRAIN	1		PAFZZ
-45	48772	16004	.. ELEMENT, OIL SEPARATOR.	1		PAFZZ
-46	66646	16004	.. TANK, OIL SEPARATOR (INCLUDES COVER NO. 66647, INDEX 41 ABOVE)	1		XBFZZ
-47	63303*	16004	.. DECAL, OIL RECOMMENDATION.	1		XBFZZ
-48	61872*	16004	.. DECAL, FILL TO OVERFLOW.	1		XBFZZ

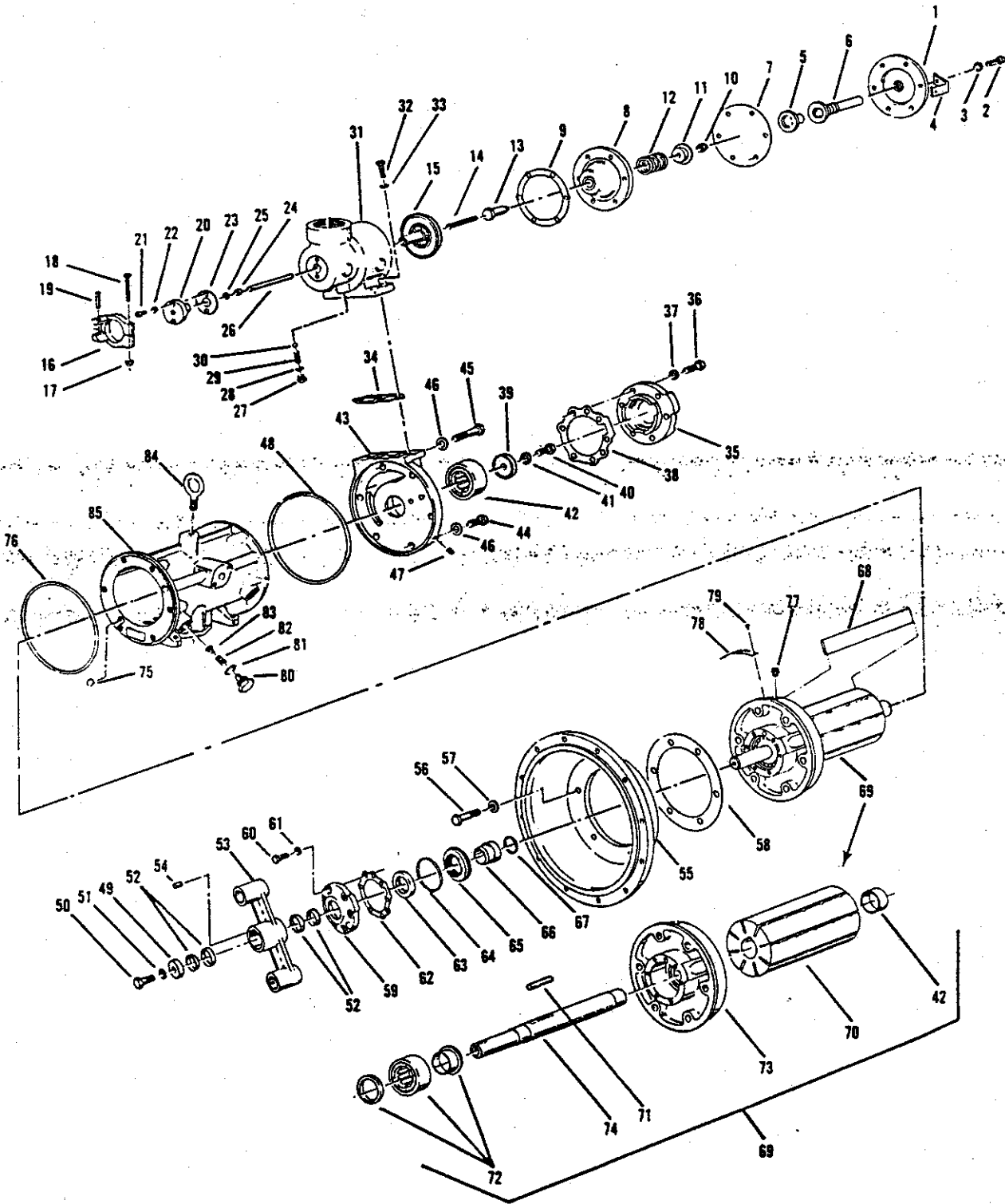


FIGURE 7-16. AIR COMPRESSOR ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-16-	86450	16004	AIR COMPRESSOR ASSEMBLY. (SEE FIGURE 7-1-26 FOR NHA)	REF		PAFFD
-1	86418	16004	COVER, AIR INTAKE.	1		XBFZZ
-2	MS90725-36	96906	SCREW, CAP, HEX HD, 5/16-18NC X 1-1/4 IN. LG (AP)	6		PAFZZ
-3	MS35338-26	96906	WASHER, LOCK, SPLIT, 5/16 IN. (AP)	6		PAFZZ
-4	64932	16004	BRACKET, SPRING.	1		PAFZZ
-5	86409	16004	PISTON, UNLOADER	1		PAFZZ
-6	86417	16004	ROD, UNLOADER.	1		PAFZZ
-7	42942	16004	DIAPHRAGM, CONTROL	1		PAFZZ
-8	43363	16004	CYLINDER, AIR INTAKE	1		PAFZZ
-9	43365	16004	GASKET, INTAKE CONTROL	1		PAFZZ
-10	67911	16004	NUT, SELF LOCKING.	1		PAFZZ
-11	43364	16004	PISTON, INTAKE CONTROL	1		PAFZZ
-12	63954	16004	SPRING, INTAKE CONTROL	1		PAFZZ
-13	42948	16004	STEM, INTAKE CONTROL	1		PAFZZ
-14	44919	16004	SPRING, INTAKE VALVE	1		PAFZZ
-15	44064	16004	INTAKE VALVE ASSY	1		PAFZZ
-16	61757	16004	CLAMP, PIVOT	1		PAFZZ
-17	MS31922-1	96906	NUT, LOCK, HEX, 1/4-20NC (AP).	1		PAFZZ
-18	MS90725-16	96906	SCREW, CAP, HEX HD, 1/4-20NC X 2-1/2 IN. LG (AP)	1		PAFZZ
-19	40596	16004	PIN, PIVOT, CONTROL ARM	1		PAFZZ
-20	61759	16004	GUIDE, SPEED CONTROL PUSH ROD.	1		PAFZZ
-21	MS16997-60	96906	SCREW, SCH, 1/4-20NC X 3/4 IN. LG. (AP)	2		PAFZZ
-22	1214-05	78189	WASHER, LOCK, INTERNAL TOOTH, 1/4 IN. (16004 SPEC CONT NO. 28149) (AP)	2		PAFZZ
-23	61761	16004	GASKET, GUIDE.	1		PAFZZ
-24	26981	16004	BUSHING, GUIDE	1		PAFZZ
-25	24498	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
-26	61758	16004	ROD, PUSH, SPEED CONTROL.	1		PAFZZ
-27	45121	16004	PLUG, RELIEF	1		PAFZZ
-28	24498	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
-29	46888	16004	SPRING, RELIEF	1		PAFZZ
-30	MS130459	16004	BALL, STEEL, 5/16 IN.	1		XBFZZ
-31	86442	16004	BODY, INTAKE CONTROL	1		XBFZZ
-32	MS90725-62	96906	SCREW, CAP, HEX HD, 3/8-16NC X 1-1/4 IN LG (AP)	3		PAFZZ
-33	MS35338-27	96906	WASHER, LOCK, SPLIT, 3/8 IN. (AP).	3		PAFZZ
-34	44055	16004	GASKET, INTAKE CONTROL BODY.	1		PAFZZ
-35	43355	16004	COVER, BEARING	1		PAFZZ
-36	MS90725-36	96906	SCREW, CAP, HEX, 5/16-18NC X 1-1/4 IN. LG (AP)	6		PAFZZ
-37	MS35338-26	96906	WASHER, LOCK, SPLIT, 5/16 IN. (AP)	6		PAFZZ
-38	43357	16004	GASKET, BEARING COVER.	1		PAFZZ
-39	63197	16004	RETAINER, BEARING.	1		PAFZZ
-40	MS90725-60	96906	SCREW, CAP, HEX HD, 3/8-16NC X 1 IN. LG (AP)	1		PAFZZ
-41	MS35338-27	96906	WASHER, LOCK, SPLIT, 3/8 IN. (AP).	1		PAFZZ
-42	MA3307EX	19382	BEARING, INTAKE END. (16004 SPEC CONT NO. 43399)	1		PAFZZ
-43	48012	16004	COVER, INTAKE END.	1		PAFZZ
-44	MS90725-111	96906	SCREW, CAP, HEX HD, 1/2-13NC X 1-1/4 IN. LG (AP)	5		PAFZZ
-45	MS90725-118	96906	SCREW, CAP, HEX HD, 1/2-13NC X 2-3/4 IN. LG (AP)	1		PAFZZ
-46	2110-0500	86579	WASHER, SEAL (16004 SPEC CONT. NO. 43397) (AP)	6		XBFZZ
-47	MS20913-1S	96906	PLUG, PIPE, 1/8NPT.	1		PAFZZ
-48	42976	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
-49	44068	16004	RETAINER, GRIPSPRING	1		PAFZZ
-50	48478	16004	BOLT, RETAINER (AP).	1		PAFZZ
-51	MS35338-29	96906	WASHER, LOCK, SPLIT, 1/2 IN. (AP).	1		PAFZZ
-52	SHBU1250	15291	GRIPSPRING, COUPLING (16004 SPEC CONT NO. 44060)	2		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-16-53	66633	16004	COUPLING, DRIVE.	1		PAFZZ
-54	46971	16004	KEY, SHAFT, COUPLING.	1		PAFZZ
-55	80162	16004	ADAPTER, ENGINE.	1		PAFZZ
-56	MS90725-117	96906	SCREW, CAP, HEX HD. 1/2-13NC X 2-1/2 IN. LG (AP)	6		PAFZZ
-57	2110-0500	86579	WASHER, SEAL (16004 SPEC CONT. NO. 43397) (AP)	6		XBFBZ
-58	44413	16004	GASKET, ENGINE ADAPTER	1		PAFZZ
-59	48793	16004	COVER ASSY, OIL SEAL	1		PAFZZ
-60	MS90725-36	96906	SCREW, CAP, HEX HD. 5/16-18NC X 1-1/4 IN. LG (AP)	6		PAFZZ
-61	MS35338-26	96906	WASHER, LOCK, SPLIT, 5/16 IN. (AP)	6		PAFZZ
	67794	16004	PLUG, PIPE, 1/16NPT.	1		PAFZZ
	47788	16004	COVER, OIL SEAL	1		XBFBZ
-62	43357	16004	GASKET, OIL SEAL COVER	1		PAFZZ
-63	150-225-12	99189	SEAL, OIL (16004 SPEC CONT NO. 48015)	1		PAFZZ
-64	24972	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
-65	47786	16004	SLEEVE, SEALING.	1		PAFZZ
-66	47784	16004	SLEEVE, OIL SEAL	1		PAFZZ
-67	24999	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
-68	44525	16004	BLADE, ROTOR	8		PAFZZ
-69	NO NUMBER	16004	ROTOR, SHAFT, AND COVER ASSY.	REF		
-70	44523	16004	ROTOR, COMPRESSOR	1		XBFBZ
-71	42950	16004	KEY, ROTOR SHAFT.	1		PAFZZ
-72	MSN5307EX	19382	BEARING, DRIVE END (16004 SPEC. CONT NO. 43400)	1		PAFZZ
-73	48016	16004	COVER ASSY, DRIVE END	1		PAFZZ
	59-02B-125-0750	72962	PIN, SPRING (16004 SPEC CONT NO. 44916)	1		PAFZZ
	48013	16004	COVER, END	1		XBFBZ
-74	46979	16004	SHAFT, ROTOR.	1		PBFZZ
-75	MS150465	96906	BALL, STEEL, 1/2 IN.	1		PAFZZ
-76	42976	16004	PACKING, PREFORMED, O-RING.	1		PAFZZ
-77	68X5	79470	CONNECTOR, TUBE (16004 SPEC. CONT NO. 41935)	1		PAFZZ
-78	44972	16004	PLATE, DATA, SERIAL NUMBER.	1		XBFBZ
-79	145369	16004	PIN, DRIVE, NO. 4 X 3/16 IN. LG (AP)	2		PAFZZ
-80	43392	16004	PLUG, DRAIN VALVE.	2		PAFZZ
-81	24964	16004	PACKING, PREFORMED, O-RING.	2		PAFZZ
-82	43394	16004	SPRING, DRAIN VALVE.	2		PAFZZ
-83	43393	16004	VALVE, DRAIN	2		PAFZZ
-84	3050	71177	EYEBOLT, STATOR (16004 SPEC. CONT NO. 24636)	1		PAFZZ
-85	44522	16004	STATOR, COMPRESSOR	1		PBFZZ

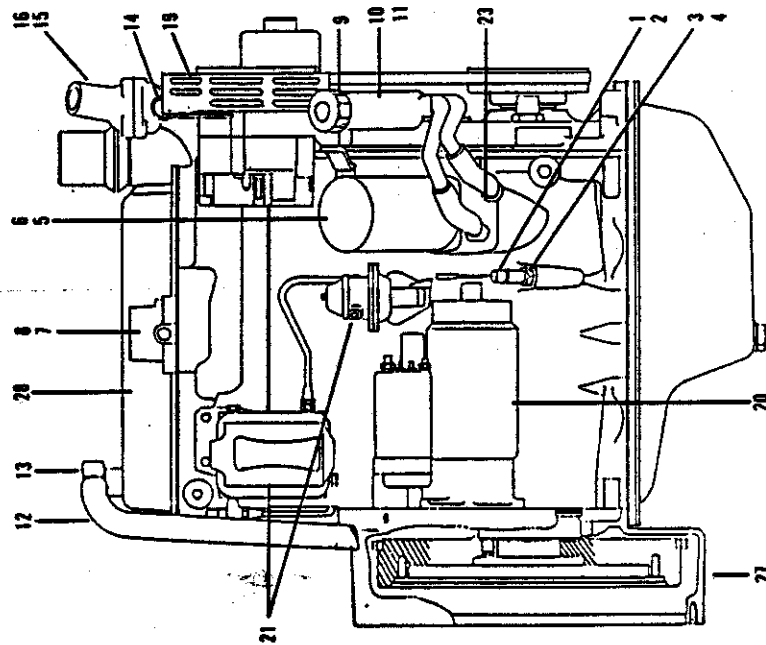
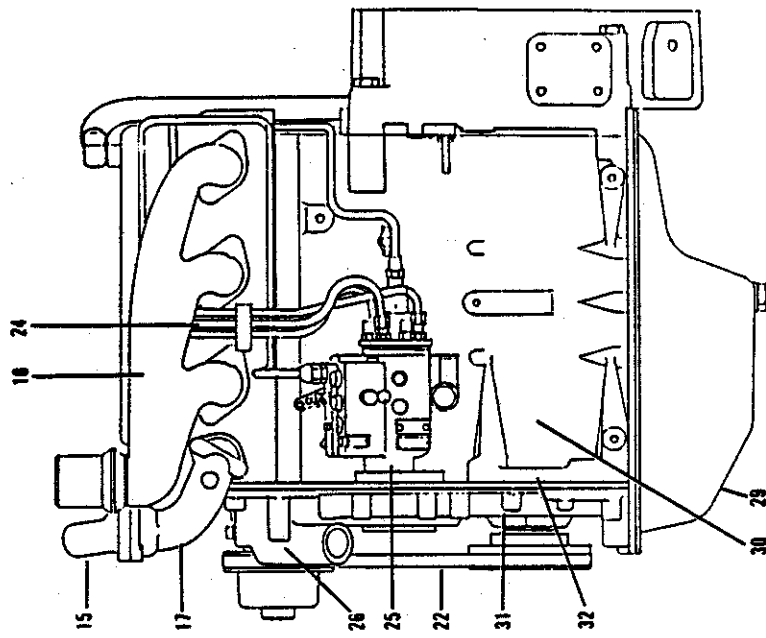


FIGURE 7-17. ENGINE ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-17-	3179D	75160	ENGINE ASSEMBLY, SPEC NO. FD16694E (16004 SPEC CONT NO. 85463) (SEE FIG 7-1-33 FOR NHA) (PARTS KIT AVAILABLE)	REF		PAFDD
-1	AT21535	75160	DIPSTICK, OIL LEVEL	1		PAFZZ
-2	R10093	75160	O-RING, DIPSTICK.	1		PAFZZ
-3	R55301	75160	NIPPLE, THREADED.	1		PAFZZ
-4	14H826	75160	NUT, JAM, HEX, 1/2 IN.	1		PAFZZ
-5	T19044	75160	FILTER, OIL.	1		PAFZZ
-6	T23435	75160	NIPPLE, THREADED (FIG. 7-30, ITEM 46)	REF		PAFZZ
-7	T31948	75160	INTAKE, AIR, ENGINE	1		PAFZZ
	19H3411	75160	BOLT, ATTACHING. 3/8-16 X 1-1/8 IN. LG (AP)	2		PAFZZ
	15H558	75160	PLUG, PIPE, 1/8NPT.	1		PAFZZ
-8	T20159	75160	GASKET, AIR INTAKE (K1) (K2)	1		PAFZZ
-9	T20294	75160	CAP, OIL FILLER.	1		PAFZZ
	T20328	75160	GASKET, FILLER CAP (K1).	1		PAFZZ
-10	T24192	75160	NECK, OIL FILLER	1		PAFZZ
	19H2665	75160	SCREW, CAP, 3/8 X 1-5/8 (AP).	1		PAFZZ
	19H2128	75160	SCREW, CAP, 3/8 X 3 (AP).	1		PAFZZ
	24H1304	75160	WASHER (AP)	2		PAFZZ
-11	T20336	75160	GASKET, FILLER NECK (K1) (AP).	1		PAFZZ
-12	H36031	75160	HOSE, VENT, HEAD COVER.	1		PAFZZ
	19H2038	75160	SCREW, CAP, 3/8 X 1/2 (AP).	1		PAFZZ
	24H1303	75160	WASHER (AP)	1		PAFZZ
	A4773R	75160	CLAMP, VENT HOSE (AP).	1		PAFZZ
	AT18904	75160	CLAMP, HOSE (AP)	1		PAFZZ
-13	AT25192	75160	FITTING, VENT.	1		PAFZZ
	R56463	75160	O-RING, VENT FITTING (K1) (K2)	1		PAFZZ
-14	T20277	75160	HOSE, WATER BYPASS	1		PAFZZ
	AR21837	75160	CLAMP, HOSE (AP)	2		PAFZZ
	T19651	75160	FITTING, HOSE (AP)	1		PAFZZ
-15	T20317	75160	COVER, THERMOSTAT.	1		PAFZZ
	19H988	75160	SCREW, CAP, 3/8 X 1-1/4 IN. LG (AP)	2		PAFZZ
	T20215	75160	GASKET, COVER (K1) (K2).	1		PAFZZ
-16	AT22961	75160	THERMOSTAT, ENGINE WATER	1		PAFZZ
-17	AR73097	75160	HOUSING, THERMOSTAT.	1		PAFZZ
	19H1726	75160	SCREW, CAP, 3/8X2-1/4 IN. LG (AP)	2		PAFZZ
	15H561	75160	PLUG, PIPE, 1/2NPT.	1		PAFZZ
	T20219	75160	GASKET, HOUSING (K1) (K2).	1		PAFZZ
-18	T20252	75160	MANIFOLD, EXHAUST.	1		PAFZZ
	19H1732	75160	SCREW, CAP, 3/8X1-1/4 IN. LG (AP)	6		PAFZZ
	24H1304	75160	WASHER (AP)	6		PAFZZ
	T20006	75160	GASKET, MANIFOLD (K1) (K2)	3		PAFZZ
-19	NO NUMBER	75160	ALTERNATOR AND MOUNTING GROUP (SEE FIGURE 7-18 FOR DETAILS)	1		
-20	1998367	16764	STARTING MOTOR ASSEMBLY (75160 SPEC CONT NO. RE19187) (SEE FIGURE 7-19 FOR DETAILS)	1		PAFFF
	14H812	75160	NUT, HEX, 3/8 IN. (AP).	1		PAFZZ
	19H1731	75160	SCREW, CAP, 3/8 X 1 IN. (AP)	1		PAFZZ
	12H304	75160	WASHER, LOCK (AP).	2		PAFZZ
	M3636T	75160	STUD, MOUNTING (AP).	1		PAFZZ
	R71835	75160	GASKET, STARTER MOUNTING	1		PAFZZ
-21	NO NUMBER	75160	FUEL FILTER AND TRANSFER PUMP GROUP (SEE FIGURE 7-20 FOR DETAILS)	1		
-22	T23526	75160	BELT, FAN.	1		PAFZZ
-23	NO NUMBER	75160	OIL COOLER GROUP. (SEE FIGURE 7-21 FOR DETAILS)	1		
-24	NO NUMBER	75160	FUEL INJECTION SYSTEM AND NOZZLE GROUP (SEE FIGURE 7-22 FOR DETAILS)	1		

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-17-25	DB2335-4531	84760	PUMP ASSEMBLY, FUEL INJECTION. (75160 SPEC CONT NO. RE21695) (SEE FIGURE 7-23 FOR DETAILS)	1		PAFFF
	14H785	75160	NUT, HEX, 5/16 IN. (FIG. 7-22, ITEM 35) (AP)	3		PAFZZ
	12H303	75160	WASHER, LOCK, 5/16 IN. (FIG. 7-22, ITEM 36) (AP)	3		PAFZZ
	24H1243	75160	WASHER, FLAT (FIG. 7-22, ITEM 37). (AP)	3		PAFZZ
	T23442	75160	STUD, MOUNTING (FIG. 7-22, ITEM 38) (AP)	3		PAFZZ
	R77126	75160	GASKET, INJECTION PUMP (FIG. 7-22, ITEM 39) (K1)	1		PAFZZ
-26	NO NUMBER	75160	WATER PUMP GROUP. (SEE FIGURE 7-24 FOR DETAILS)	1		
-27	NO NUMBER	75160	FLYWHEEL AND HOUSING GROUP. (SEE FIGURE 7-25 FOR DETAILS)	1		
-28	NO NUMBER	75160	ROCKER ARM COVER, ROCKER ARMS, VALVE, AND CYLINDER HEAD GROUP (SEE FIGURE 7-26 FOR DETAILS)	1		
-29	NO NUMBER	75160	OIL PAN AND OIL PUMP GROUP. (SEE FIGURE 7-27 FOR DETAILS)	1		
-30	NO NUMBER	75160	PISTONS AND CONNECTING RODS GROUP (SEE FIGURE 7-28 FOR DETAILS)	1		
-31	NO NUMBER	75160	GEAR COVER AND END PLATE GROUP. (SEE FIGURE 7-29 FOR DETAILS)	1		
-32	NO NUMBER	75160	CRANKSHAFT AND CYLINDER BLOCK GROUP (SEE FIGURE 7-30 FOR DETAILS)	1		
	AR102298	75160	KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	AR		PAFZZ
	AR102297	75160	KIT, GASKET SET, ENGINE TUNE-UP. (CONTAINS PARTS LISTED ABOVE DENOTED BY K2)	AR		PAFZZ

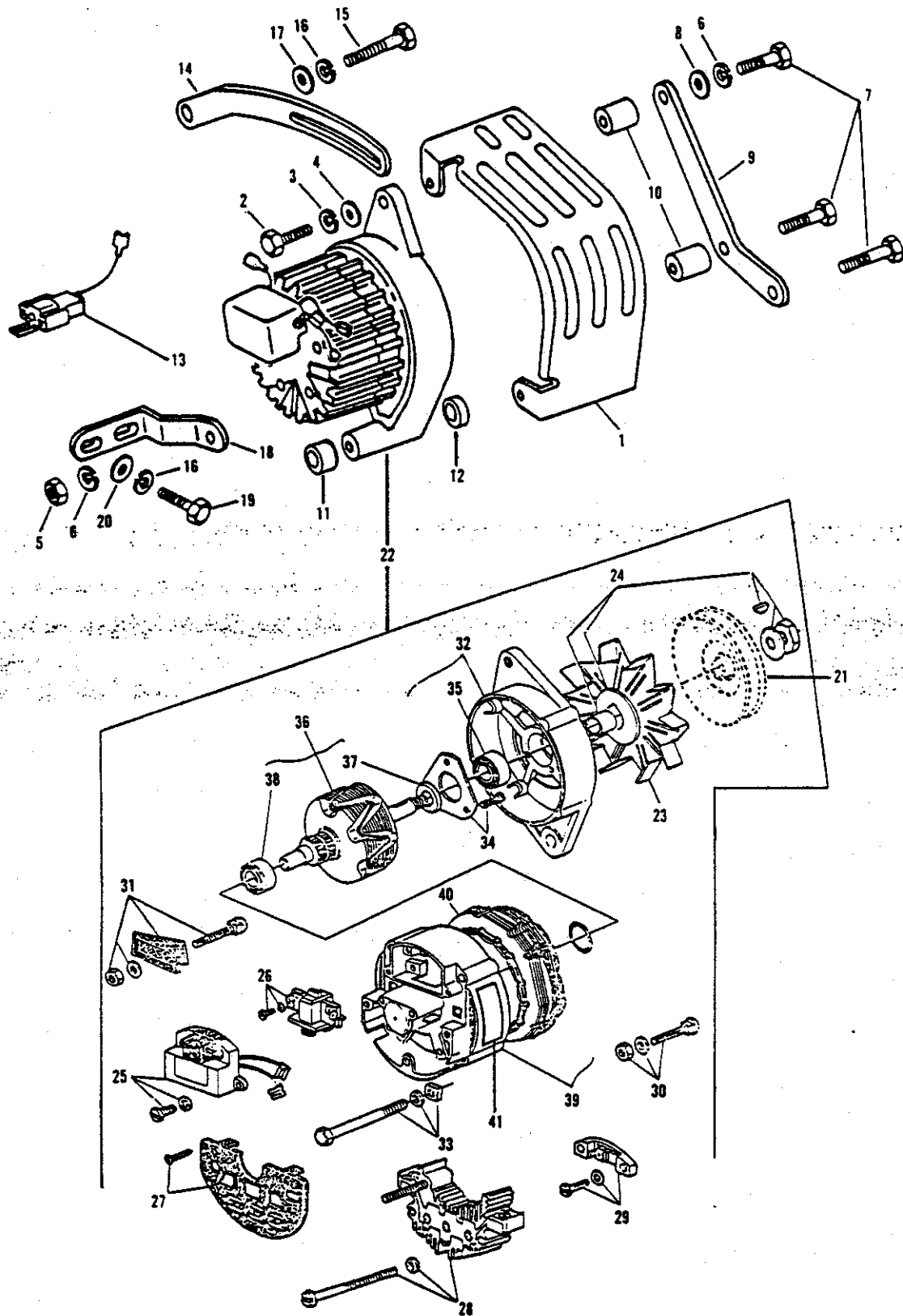


FIGURE 7-18. ALTERNATOR AND MOUNTING GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-18-	NO NUMBER	75160	ALTERNATOR AND MOUNTING GROUP. (SEE FIGURE 7-17-19 FOR NHA)	REF		
-1	R56012	75160	SHIELD, PULLEY	1		PAFZZ
-2	19H1905	75160	SCREW, CAP, 5/16 X 1 IN. LG (AP)	1		PAFZZ
-3	12H303	75160	WASHER, LOCK, 5/16 IN. (AP)	1		PAFZZ
-4	24H1136	75160	WASHER, FLAT (AP)	1		PAFZZ
-5	14H812	75160	NUT, HEX, 3/8 IN. (AP)	1		PAFZZ
-6	12H304	75160	WASHER, LOCK, 3/8 IN. (AP)	4		PAFZZ
-7	19H2128	75160	SCREW, CAP, 3/8 X 3 IN. (AP)	3		PAFZZ
-8	24H1304	75160	WASHER (AP)	3		PAFZZ
-9	T20202	75160	SUPPORT, FRONT	1		PAFZZ
-10	28H2547	75160	SPACER, ALTERNATOR	2		PAFZZ
-11	R64449	75160	BUSHING, ALTERNATOR	1		PAFZZ
-12	24H7213	75160	WASHER, ALTERNATOR	1		PAFZZ
-13	RE20612	75160	BODY, CONNECTOR	1		PAFZZ
-14	T32853	75160	STRAP, ADJUSTING	1		PAFZZ
-15	19H1819	75160	SCREW, CAP, 3/8 X 2-1/8 IN. LG (AP)	1		PAFZZ
-16	12H304	75160	WASHER, LOCK, 3/8 IN. (AP)	2		PAFZZ
-17	24H1304	75160	WASHER, FLAT (AP)	1		PAFZZ
-18	R50557	75160	BRACKET, ALTERNATOR	1		PAFZZ
-19	19H2284	75160	SCREW, CAP, 3/8 X 7/8 IN. LG (AP)	2		PAFZZ
-20	24H1305	75160	WASHER, FLAT (AP)	2		PAFZZ
-21	R82045	75160	PULLEY, ALTERNATOR	1		PAFZZ
-22	2940090A	31211	ALTERNATOR ASSEMBLY (75160. SPEC CONT NO. RE20600)	1		PAFFF
-23	R81985	75160	FAN, ALTERNATOR	1		PAFZZ
-24	AT74065	75160	RETAINER KIT, FAN	1		PAFZZ
-25	RE20601	75160	REGULATOR, ALTERNATOR	1		PAFZZ
-26	RE20603	75160	HOLDER, BRUSH	1		PAFZZ
-27	AT74051	75160	HOOD, STATOR	1		PAFZZ
-28	RE20602	75160	STATOR, ALTERNATOR	1		PAFZZ
-29	AT74053	75160	CONNECTOR, ALTERNATOR	1		PAFZZ
-30	AT74066	75160	TERMINAL, NEGATIVE	1		PAFZZ
-31	RE20610	75160	SCREW, CAP, AND NUT, POSITIVE	1		PAFZZ
-32	AT74058	75160	HOUSING, ALTERNATOR	1		PAFZZ
-33	AT74061	75160	SCREW KIT, HOUSING (AP)	4		PAFZZ
-34	RE20609	75160	RETAINER KIT, BEARING	1		PAFZZ
-35	RE20608	75160	BEARING, HOUSING	1		PAFZZ
-36	RE20606	75160	ROTOR ASSY, ALTERNATOR	1		PAFZZ
-37	R81984	75160	SPACER, ROTOR	1		PAFZZ
-38	RE20607	75160	BEARING, ROTOR	1		PAFZZ
-39	RE20604	75160	HOUSING, STATOR	1		PAFZZ
-40	RE20605	75160	STATOR, ALTERNATOR	1		PAFFF
-41	62172*	16004	DECAL, ALTERNATOR	1		XBFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-19-	1998367	16764	STARTING MOTOR ASSEMBLY. (75160 SPEC CONT NO. RE19187) (SEE FIGURE 7-17-20 FOR NHA)	REF		PAFFF
-1	1876358	16764	CONNECTOR, COIL.	1		PAFZZ
-2	9427815	16764	SCREW, COIL TO CONNECTOR (AP).	1		PAFZZ
-3	9439738	16764	SCREW, CONNECTOR TO SWITCH (AP).	1		PAFZZ
-4	1114524	16764	SWITCH, STARTER SOLENOID	1		PAFZZ
-5	132255	16764	SCREW, SWITCH ATTACHING (AP)	2		PAFZZ
-6	9421423	16764	WASHER, LOCK (AP).	2		PAFZZ
-7	1952427	16764	CASKET, SOLENOID SWITCH.	1		PAFZZ
-8	1978281	16764	SPRING, PLUNGER.	1		PAFZZ
-9	1978337	16764	CONTACT ASSY, SWITCH	1		PAFZZ
-10	1978297	16764	PLUNGER, SOLENOID.	1		PAFZZ
-11	1987049	16764	PIN, LEVER (AP).	1		PAFZZ
-12	1986455	16764	HOUSING, DRIVE	1		PAFZZ
-13	1893453	16764	BOLT, THROUGH (AP)	2		PAFZZ
-14	1862383	16764	BUSHING, DRIVE END.	1		PAFZZ
-15	1986467	16764	PLUG, OIL WICK.	1		PAFZZ
-16	1986466	16764	WICK, DRIVE END	1		PAFZZ
-17	1951567	16764	LEVER, SHIFT	1		PAFZZ
-18	1926640	16764	NUT, LEVER STUD (AP)	1		PAFZZ
-19	9421424	16764	WASHER, LOCK, STUD (AP)	1		PAFZZ
-20	1932197	16764	STUD, SHIFT LEVER (AP)	1		PAFZZ
-21	1976940	16764	PIN, DOWEL	1		PAFZZ
-22	1986464	16764	FRAME, COMMUTATOR END.	1		PAFZZ
-23	1891927	16764	BUSHING, COMMUTATOR END	1		PAFZZ
-24	1891928	16764	WICK, COMMUTATOR END.	1		PAFZZ
-25	1894023	16764	BUSHING, CENTER BEARING.	1		PAFZZ
-26	1986468	16764	PLATE, CENTER BEARING.	1		PAFZZ
-27	1972786	16764	SCREW, WITH WASHER (AP).	4		PAFZZ
-28	1986470	16764	WASHER, CENTER BEARING	1		PAFZZ
-29	1877345	16764	DRIVE ASSY, STARTER.	1		PAFFF
-30	1928021	16764	COLLER, STOP	1		PAFZZ
-31	1928022	16764	RING, RETAINING.	1		PAFZZ
-32	1964410	16764	COLLAR, THRUST	1		PAFZZ
-33	1876366	16764	ARMATURE, STARTER.	1		PAFZZ
-34	1985617	16764	WASHER, BRAKE, COMMUTATOR END	1		PAFZZ
-35	1852880	16764	BRUSH, STARTER	4		PAFZZ
-36	274875	16764	SCREW, ATTACHING, GROUND (AP)	2		PAFZZ
-37	1987070	16764	SCREW, ATTACHING, INSULATED (AP).	2		PAFZZ
-38	800091	16764	HOLDER, INSULATED, BRUSH.	2		PAFZZ
-39	1876359	16764	HOLDER, GROUND, BRUSH	2		PAFZZ
-40	1986019	16764	SPRING, BRUSH.	2		PAFZZ
-41	1876458	16764	SUPPORT, PACKAGE	2		PAFZZ
-42	1876361	16764	LEAD, GROUND.	1		PAFZZ
-43	9439734	16764	SCREW, SUPPORT (AP)	2		PAFZZ
-44	120361	16764	NUT, SUPPORT (AP)	2		PAFZZ
-45	453435	16764	WASHER, LOCK, SUPPORT (AP)	2		PAFZZ
-46	1966923	16764	PIN, SUPPORT (AP)	1		PAFZZ
-47	1887021	16764	SHOE, POLE	4		PAFZZ
-48	1968396	16764	SCREW, POLE SHOE (AP).	4		PAFZZ
-49	1955946	16764	GROMMET, FRAME	1		PAFZZ
-50	1986457	16764	FIELD COIL ASSEMBLY	1		PAFZZ
-51	NO NUMBER	16764	FRAME, FIELD (NOT SERVICED SEPARATELY)	REF		PAFZZ
-52	60837*	16004	DECAL, NEGATIVE GROUND	1		XBFZZ

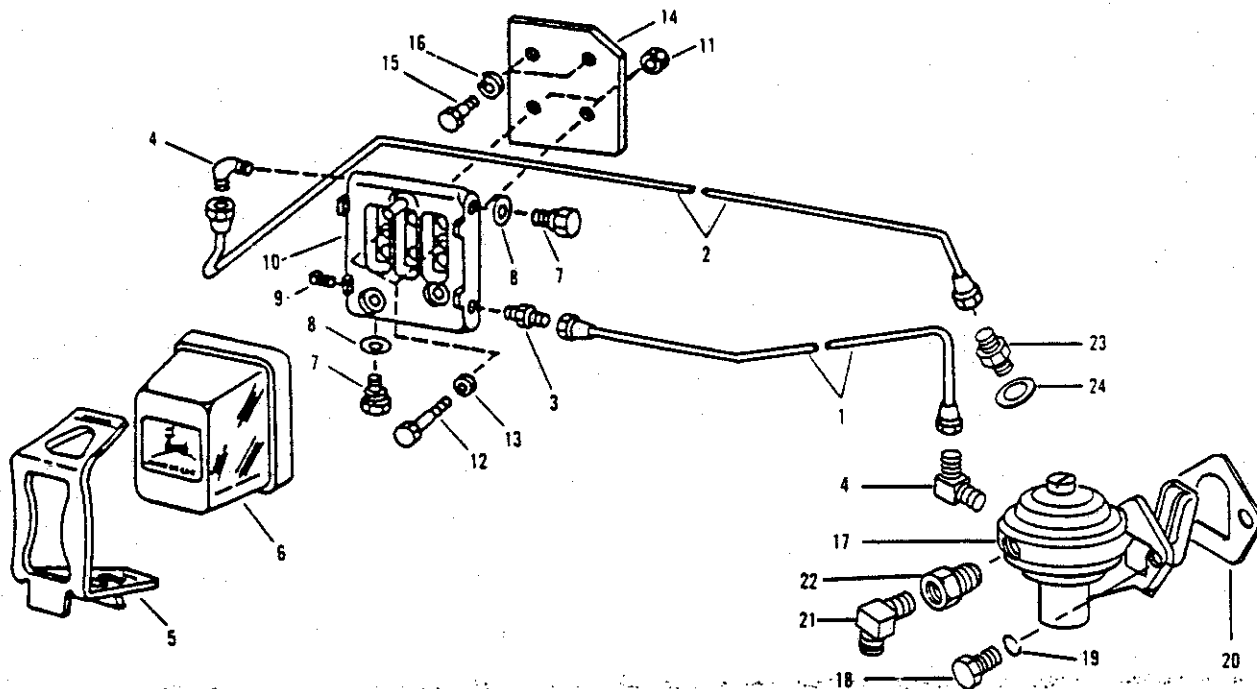


FIGURE 7-20. FUEL FILTER AND TRANSFER PUMP GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE		
				PER ASSY.	ON CODE	SMR CODE
7-20-	NO NUMBER	75160	FUEL FILTER AND TRANSFER PUMP GROUP (SEE FIGURE 7-17-21 FOR NHA)	REF		
-1	AR63653	75160	FUEL LINE, PUMP TO FILTER	1		PAFZZ
-2	RE20902	75160	FUEL LINE, FILTER TO INJECTION PUMP	1		PAFZZ
-3	R27346	75160	FITTING, FUEL LINE	1		PAFZZ
-4	T30738	75160	ELBOW, FUEL LINE	2		PAFZZ
-5	R66821	75160	CLAMP, FUEL FILTER	1		PAFZZ
-6	AR50041	75160	ELEMENT, FUEL FILTER	1		PAFZZ
-7	R48071	75160	PLUG, DRAIN	2		PAFZZ
-8	R34447	75160	WASHER, DRAIN PLUG	2		PAFZZ
-9	15H558	75160	PLUG, PIPE, 1/8NPT.	1		PAFZZ
-10	AR50040	75160	HOUSING, FUEL FILTER	1		PAFFF
-11	14H812	75160	NUT, HEX, 3/8 IN. (AP)	2		PAFZZ
-12	19H1731	75160	SCREW, CAP, 3/8 X 1 IN. LG (AP)	2		PAFZZ
-13	24H1303	75160	WASHER (AP)	2		PAFZZ
-14	R54998	75160	BRACKET, MOUNTING	1		PAFZZ
-15	19H2284	75160	SCREW, CAP, 3/8 X 7/8 IN. LG (AP)	2		PAFZZ
-16	12H304	75160	WASHER, LOCK, 3/8 IN. (AP)	2		PAFZZ
-17	AR55730	75160	PUMP ASSEMBLY, FUEL TRANSFER (PARTS KIT AVAILABLE)	1		PAFFF
-18	19H1849	75160	SCREW, CAP, 5/16 X 1-1/4 IN. LG. (AP)	2		PAFZZ
-19	R20498	75160	WASHER (AP)	2		PAFZZ
-20	R27285	75160	GASKET, TRANSFER PUMP (K1)	1		PAFZZ
-21	69X5	79470	ELBOW, TUBE (SEE FIGURE 7-1-13 FOR NHA)	REF		PAFZZ
-22	3200X2	79470	ADAPTER, FUEL LINE (SEE FIGURE 7-1-F13 FOR NHA)	REF		PAFZZ
-23	R27272	75160	FITTING, FUEL, INJECTION PUMP	1		PAFZZ
-24	R26286	75160	PACKING, PREFORMED, O-RING	1		PAFZZ
	RE13517	75160	REPAIR KIT, FUEL TRANSFER PUMP	AR		PAFZZ
	AR102298	75160	KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	REF		PAFZZ

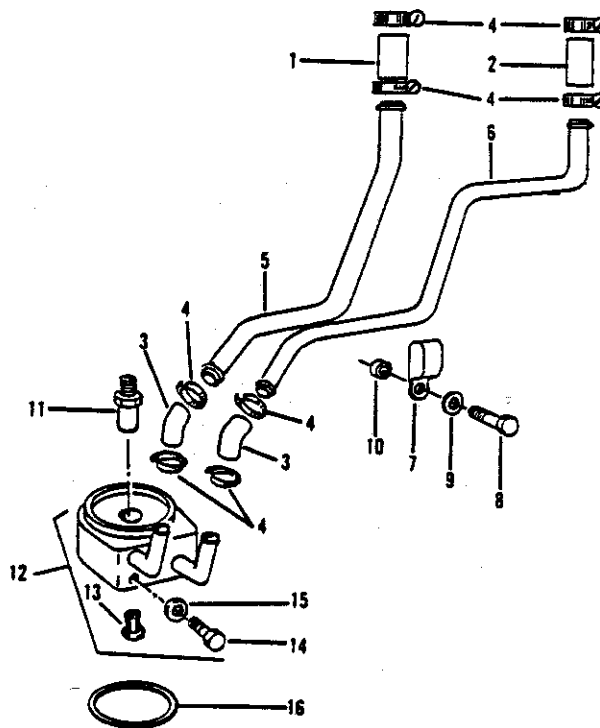


FIGURE 7-21. OIL COOLER GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-21-	NO NUMBER	75160	OIL COOLER GROUP (SEE FIGURE 7-17-23 FOR NHA)	REF		
-1	R70608	75160	HOSE, OIL COOLER	1		PAFZZ
-2	R53401	75160	HOSE, OIL COOLER	1		PAFZZ
-3	R55127	75160	HOSE, OIL COOLER	2		PAFZZ
-4	AR21837	75160	CLAMP, HOSE (AP)	8		PAFZZ
-5	R73602	75160	TUBE, OIL, UPPER	1		PAFZZ
-6	R73603	75160	TUBE, OIL, LOWER	1		PAFZZ
-7	R53524	75160	CLAMP, TUBE	1		PAFZZ
-8	19H268	75160	SCREW, CAP, 3/8 X 2-1/2 IN. LG (AP)	1		PAFZZ
-9	24H1304	75160	WASHER (AP)	1		PAFZZ
-10	T20280	75160	WASHER (AP)	1		PAFZZ
-11	T31306	75160	NIPPLE, THREADED	1		PAFZZ
-12	AR98852	75160	OIL COOLER ASSY	1		PAFZZ
-13	AR98850	75160	VALVE, RELIEF	1		PAFZZ
-14	15M2714	75160	PLUG, DRAIN	1		PAFZZ
-15	51M7012	75160	WASHER, DRAIN PLUG	1		PAFZZ
-16	R70936	75160	WASHER, OIL COOLER (K1)	1		PAFZZ
	AR102298	75160	KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	REF		PAFZZ

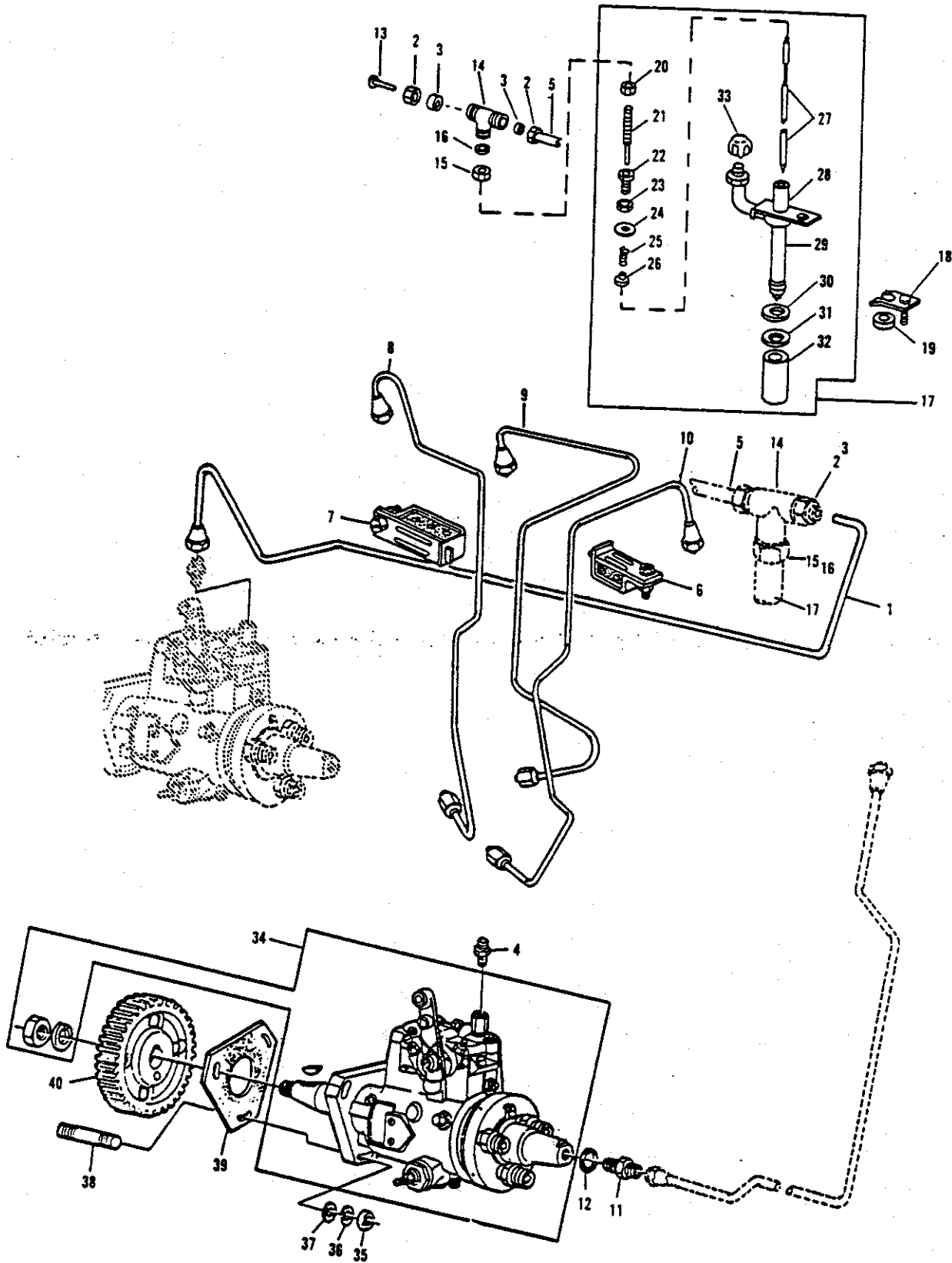


FIGURE 7-22. FUEL INJECTION SYSTEM AND NOZZLE GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-22-	NO NUMBER	75160	FUEL INJECTION SYSTEM AND. NOZZLE GROUP (SEE FIGURE 7-17-24 FOR NHA)	REF		
-1	AR89839	75160	TUBE ASSY, FUEL LEAK-OFF	1		PAFZZ
-2	R51937	75160	NUT, TUBING (AP)	6		PAFZZ
-3	R51936	75160	SLEEVE, TUBING (AP)	6		PAFZZ
-4	R35352	75160	FITTING, FUEL LINE	1		PAFZZ
-5	R66090	75160	TUBE, LEAK-OFF	2		PAFZZ
-6	RE19797	75160	CLAMP, TUBING	1		PAFZZ
-7	RE20901	75160	CLAMP, TUBING	1		PAFZZ
-8	RE20898	75160	FUEL LINE, NO. 1	1		PAFZZ
-9	RE20899	75160	FUEL LINE, NO. 2	1		PAFZZ
-10	RE20900	75160	FUEL LINE, NO. 3	1		PAFZZ
-11	R27272	75160	FITTING, FUEL	REF		PAFZZ
-12	R26286	75160	PACKING, PREFORMED, O-RING (SEE FIG. 7-20-22 FOR NHA)	REF		PAFZZ
-13	16M2605	75160	RIVET, 6X20MM.	1		PAFZZ
-14	AR85618	75160	CAP, LEAK-OFF	3		PAFZZ
-15	R79604	75160	NUT, NOZZLE	3		PAFZZ
-16	R79605	75160	SLEEVE, NOZZLE	3		PAFZZ
-17	22202	84760	NOZZLE, FUEL INJECTION (75160. SPEC CONT NO. AR89564)	3		PAFFF
-18	R34760	75160	CLAMP, INJECTION NOZZLE (AP)	3		XAFZZ
-19	R60745	75160	SPACER, CLAMP (AP)	3		XAFZZ
-20	R47733	75160	NUT, LOCK, HEX	1		XAFZZ
-21	R69443	75160	SCREW, ADJUSTING	1		XAFZZ
-22	R62984	75160	SCREW, ADJUSTING	1		XAFZZ
-23	R46675	75160	NUT, LOCK, HEX	1		XAFZZ
-24	R62981	75160	SHIM, SPRING	1		XAFZZ
-25	R69442	75160	SPRING, NOZZLE	1		XAFZZ
-26	R69982	75160	GUIDE, SPRING	1		XAFZZ
-27	NO NUMBER	75160	VALVE, NOZZLE (NOT PROCURABLE SEPARATELY)	1		XAFZZ
-28	R67779	75160	CLAMP, NOZZLE	1		XAFZZ
-29	NO NUMBER	75160	TUBE, NOZZLE (NOT PROCURABLE SEPARATELY)	1		XAFZZ
-30	R60746	75160	WASHER, NOZZLE, UPPER (K1) (K2)	1		PAFZZ
-31	R48000	75160	SEAL, CARBON STOP (K1) (K2)	1		PAFZZ
-32	T24472	75160	PLUG, NOZZLE TIP (FOR SERVICE ONLY)	1		PAFZZ
-33	T31174	75160	PLUG, NOZZLE (FOR SERVICE ONLY)	1		PAFZZ
-34	DB2335-4531	84760	PUMP ASSEMBLY, FUEL INJECTION (SEE FIG. 7-17-25 FOR NHA AND FIG. 7-23 FOR DETAILS)	REF		PAFFF
-35	14H785	75160	NUT, HEX (SEE F7-17-25 FOR NHA) (AP)	REF		PAFZZ
-36	12H303	75160	WASHER, LOCK (SEE F7-17-25 FOR NHA) (AP)	REF		PAFZZ
-37	24H1243	75160	WASHER, FLAT (SEE F7-17-25 FOR NHA) (AP)	REF		PAFZZ
-38	T23442	75160	STUD, MOUNTING (SEE F7-17-25 FOR NHA) (AP)	REF		PAFZZ
-39	R77126	75160	GASKET, INJECTION PUMP (SEE F7-17-25 FOR NHA) (K1)	REF		PAFZZ
-40	R76964	75160	GEAR, PUMP DRIVE	1		PAFZZ
	AR102298	75160	KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	REF		PAFZZ
	AR102297	75160	KIT, GASKET SET, ENGINE TUNE-UP (CONTAINS PARTS LISTED ABOVE DENOTED BY K2)	REF		PAFZZ

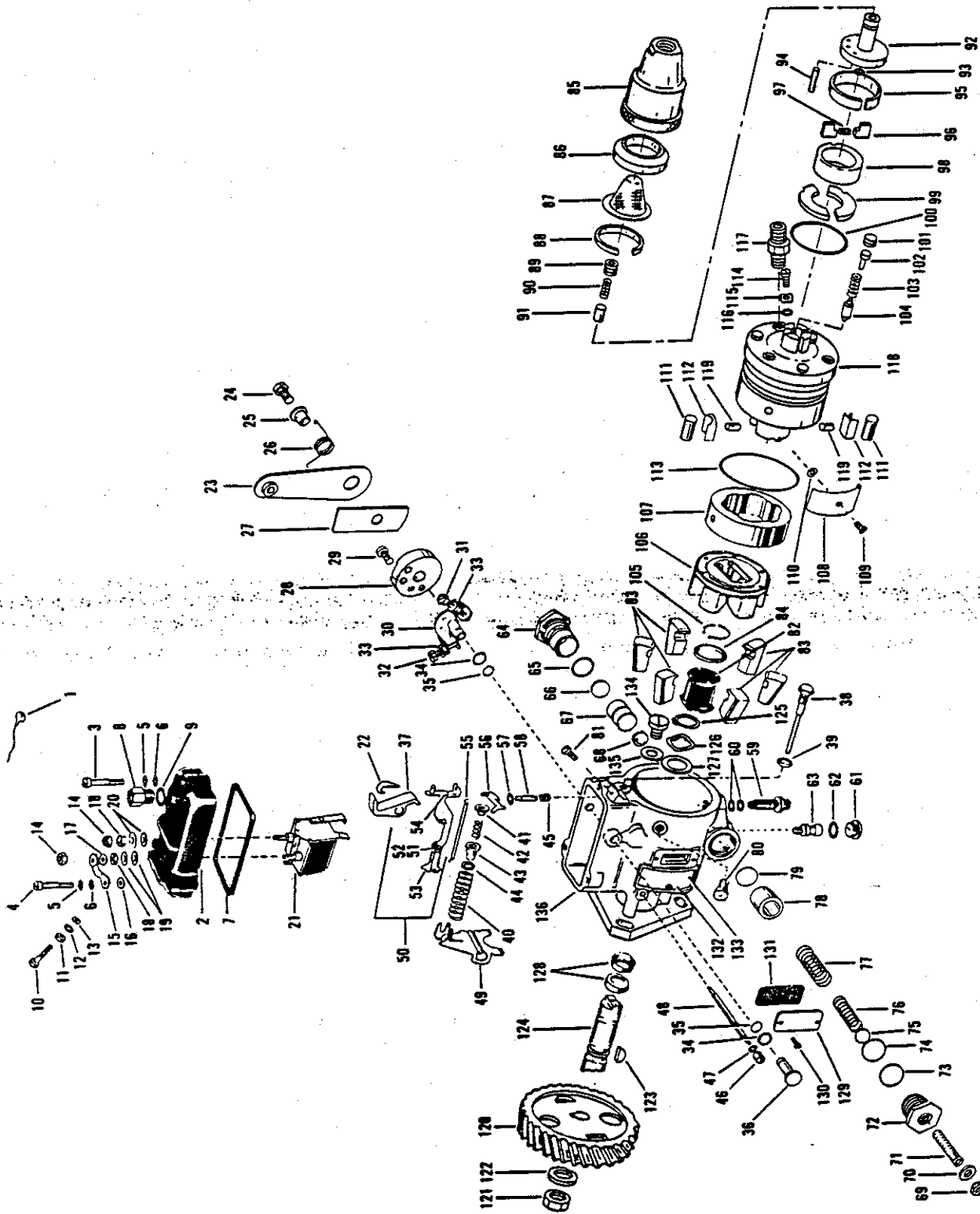


FIGURE 7-23. FUEL INJECTION PUMP

FIG. & INDEX NO.	PART NUMBER	FSCM	1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-23-	DB2335-4531	84760		PUMP ASSEMBLY, FUEL INJECTION (75160 SPEC CONT NO. RE21693) (REPAIR KIT AVAILABLE) (SEE FIGURE 7-17-25 FOR NHA)	REF		PAFFZ
-1	10408	84760		WIRE, SEALING	1		PAFZZ
-2	23402	84760		COVER, GOVERNOR CONTROL	1		PAFZZ
-3	12202	84760		SCREW, COVER (AP)	1		PAFZZ
-4	22351	84760		SCREW, COVER (AP)	2		PAFZZ
-5	11582	84760		WASHER, LOCK (AP)	3		PAFZZ
-6	13521	84760		WASHER, COVER (AP)	3		PAFZZ
-7	27244	84760		GASKET, COVER	1		PAFZZ
-8	21251	84760		CONNECTOR ASSY, FUEL RETURN	1		PAFZZ
-9	27607	84760		SEAL, CONNECTOR	1		PAFZZ
-10	15442	84760		SCREW, LOW IDLE ADJUSTING	1		PAFZZ
-11	12174	84760		NUT, ADJUSTING SCREW	1		PAFZZ
-12	12337	84760		WASHER, ADJUSTING SCREW	1		PAFZZ
-13	11588	84760		SEAL, ADJUSTING SCREW	1		PAFZZ
-14	14760	84760		NUT, LOCK, TERMINAL CONTACT	2		PAFZZ
-15	20951	84760		STRAP, GROUNDING	1		PAFZZ
-16	18493	84760		WASHER, LOCK, COVER SCREW	1		PAFZZ
-17	12049	84760		WASHER, LOCK, TERMINAL CONTACT	1		PAFZZ
-18	12319	84760		NUT, TERMINAL CONTACT	2		PAFZZ
-19	18501	84760		WASHER, TERMINAL CONTACT	2		PAFZZ
-20	12500	84760		WASHER, TERMINAL INSULATING	2		PAFZZ
-21	22315	84760		SOLENOID FRAME AND ARM ASSY	1		PAFZZ
	23190	84760		TUBE, INSULATING	2		PAFZZ
-22	12253	84760		CLIP, SHAFT RETAINING	1		PAFZZ
-23	16392	84760		LEVER ASSEMBLY, THROTTLE	1		PAFZZ
-24	15668	84760		SCREW, THROTTLE RETURN SPRING	1		PAFZZ
-25	13010	84760		RETAINER, SPRING	1		PAFZZ
-26	13003	84760		SPRING, THROTTLE LEVER	1		PAFZZ
-27	16136	84760		ARM, ADJUSTING SPACER	1		PAFZZ
-28	16135	84760		SPACER, THROTTLE LEVER	1		PAFZZ
-29	12051	84760		SCREW, THROTTLE LEVER POSITION (AP)	1		PAFZZ
-30	12019	84760		SHAFT ASSEMBLY, THROTTLE	1		PAFZZ
-31	12169	84760		SCREW, HIGH IDLE ADJUSTING	1		PAFZZ
-32	12167	84760		SCREW, LOW IDLE ADJUSTING	1		PAFZZ
-33	12175	84760		NUT, ADJUSTING SCREW	2		PAFZZ
-34	14408	84760		WASHER, THROTTLE SHAFT SEAL	2		PAFZZ
-35	17438	84760		SEAL, THROTTLE SHAFT	2		PAFZZ
-36	16279	84760		SHAFT, SHUTOFF	1		PAFZZ
-37	12221	84760		LEVER, THROTTLE SHAFT	1		PAFZZ
-38	24726	84760		STUD, GUIDE	1		PAFZZ
-39	27606	84760		SEAL, GUIDE STUD	1		PAFZZ
-40	17997	84760		SPRING, GOVERNOR CONTROL	1		PAFZZ
-41	11969	84760		GUIDE, IDLING SPRING	1		PAFZZ
-42	11966	84760		SPRING, IDLING	1		PAFZZ
-43	12210	84760		RETAINER, SPRING	1		PAFZZ
-44	15284	84760		SPACER, GOVERNOR SPRING	1		PAFZZ
-45	20359	84760		SPRING, METERING VALVE	1		PAFZZ
-46	12288	84760		NUT, PIVOT SHAFT	2		PAFZZ
-47	11588	84760		SEAL, PIVOT SHAFT	2		PAFZZ
-48	20224	84760		SHAFT, GOVERNOR ARM PIVOT	1		PAFZZ
-49	20219	84760		ARM, GOVERNOR	1		PAFZZ
-50	20226	84760		HOOK ASSY, GOVERNOR LINKAGE	1		PAFZZ
-51	12360	84760		SCREW, HOOK ADJUSTING	1		PAFZZ
-52	12362	84760		WASHER, HOOK ADJUSTING	1		PAFZZ
-53	20225	84760		LINK ASSY, ADJUSTING	1		PAFZZ
-54	17604	84760		HOOK, GOVERNOR LINKAGE	1		PAFZZ
-55	11919	84760		SPRING, GOVERNOR LINKAGE	1		PAFZZ
-56	22134	84760		ARM ASSY, METERING VALVE	1		PAFZZ
-57	11610	84760		SHIM, METERING VALVE	1		PAFZZ
-58	20849	84760		VALVE, METERING	1		PAFZZ
-59	22238	84760		SCREW ASSY, HEAD LOCATING	1		PAFZZ
-60	27602	84760		SEAL, HEAD LOCATING SCREW	2		PAFZZ
-61	23056	84760		PLUG, ADVANCE SCREW HOLE	1		PAFZZ
-62	27610	84760		SEAL, SCREW HOLE PLUG	1		PAFZZ
-63	15438	84760		SCREW, CAM ADVANCE	1		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-23-64	22655	84760	PLUG, PISTON HOLE, POWER.	1		PAFZZ
-65	18967	84760	RING, PISTON	1		PAFZZ
-66	15750	84760	SEAL, PISTON RING.	1		PAFZZ
-67	22658	84760	PISTON, POWER, -5 DEG (ASSEMBLE WITH PART NO. TOWARD PISTON HOLE PLUG)	1		PAFZZ
-68	12622	84760	WASHER, SLIDE.	1		PAFZZ
-69	13807	84760	NUT, ADVANCE ADJUSTING SCREW	1		PAFZZ
-70	17438	84760	SEAL, ADVANCE ADJUSTING SCREW.	1		PAFZZ
-71	14544	84760	SCREW, ADVANCE ADJUSTING	1		PAFZZ
-72	14941	84760	PLUG, PISTON, SPRING.	1		PAFZZ
-73	20113	84760	SEAL, PISTON HOLE PLUG	2		PAFZZ
-74	12764	84760	SEAL, PISTON HOLE PLUG	2		PAFZZ
-75	14940	84760	GUIDE, ADVANCE ADJUSTING SPRING.	1		PAFZZ
-76	14258	84760	SPRING, INNER ADVANCE, RED.	1		PAFZZ
-77	18959	84760	SPRING, OUTER ADVANCE, BLACK- BROWN	1		PAFZZ
-78	22144	84760	PISTON, SPRING, +3 DEG.	1		PAFZZ
-79	12622	84760	WASHER, SLIDE.	1		PAFZZ
-80	11331	84760	SCREW, HEAD LOCKING.	2		PAFZZ
-81	21660	84760	SCREW ASSY, VENT	1		PAFZZ
-82	14483	84760	SLEEVE, GOVERNOR THRUST.	1		PAFZZ
-83	20214	84760	WEIGHT, GOVERNOR	6		PAFZZ
-84	20222	84760	WASHER, GOVERNOR THRUST SLEEVE	1		PAFZZ
-85	20523	84760	CAP, TRANSFER PUMP END	1		PAFZZ
-86	20523	84760	PLATE, TRANSFER PUMP PRESSURE.	1		PAFZZ
-87	20527	84760	SCREEN, INLET FILTER	1		PAFZZ
-88	20529	84760	RING, SCREEN RETAINING	1		PAFZZ
-89	15228	84760	PLUG ASSY, END PLATE ADJUSTING	1		PAFZZ
-90	19855	84760	SPRING, REGULATING	1		PAFZZ
-91	19895	84760	PISTON, REGULATING	1		PAFZZ
-92	19912	84760	REGULATOR ASSY, TRANSFER PUMP.	1		PAFZZ
-93	19844	84760	SEAL, REGULATING PISTON.	1		PAFZZ
-94	19837	84760	ROLLPIN, LOCATING	1		PAFZZ
-95	20528	84760	RING, LINER LOCATING	1		PAFZZ
-96	20803	84760	BLADE, TRANSFER PUMP	4		PAFZZ
-97	15699	84760	SPRING, TRANSFER PUMP BLADE.	2		PAFZZ
-98	22988	84760	LINER, TRANSFER PUMP	1		PAFZZ
-99	20530	84760	RETAINER, ROTOR.	1		PAFZZ
-100	27608	84760	SEAL, TRANSFER PUMP.	1		PAFZZ
-101	13837	84760	SCREW, DELIVERY VALVE.	1		PAFZZ
-102	16440	84760	STOP, DELIVERY VALVE	1		PAFZZ
-103	16441	84760	SPRING, DELIVERY VALVE	1		PAFZZ
-104	13827	84760	VALVE, DELIVERY.	1		PAFZZ
-105	12285	84760	RING, CASE RETAINING	1		PAFZZ
-106	26189	84760	RETAINER ASSY, WEIGHT.	1		PAFZZ
-107	22862	84760	RING, CAM.	1		PAFZZ
-108	23752	84760	SPRING, LEAF	1		PAFZZ
-109	11175	84760	SCREW, LEAF SPRING (AP).	1		PAFZZ
-110	11213	84760	SHIM, LEAF SPRING.	1		PAFZZ
	11214	84760	SHIM, LEAF SPRING.	AR		PAFZZ
	11215	84760	SHIM, LEAF SPRING.	AR		PAFZZ
	11216	84760	SHIM, LEAF SPRING.	AR		PAFZZ
	11217	84760	SHIM, LEAF SPRING.	AR		PAFZZ
-111	11141	84760	ROLLER, CAM.	2		PAFZZ
-112	24569	84760	SHOE, CAM ROLLER	2		PAFZZ
-113	27249	84760	SEAL, HYDRAULIC HEAD	1		PAFZZ
-114	21287	84760	SCREW, LOCKING PLATE	1		PAFZZ
-115	21283	84760	PLATE, LOCKING	1		PAFZZ
-116	27601	84760	SEAL, LOCKING PLATE.	1		PAFZZ
-117	20177	84760	SCREW, HEAD VOLUME	3		PAFZZ
	12216	84760	SCREW, HYDRAULIC HEAD PLUG	1		PAFZZ
	20727	84760	CONNECTOR, FUEL LINE	3		PAFZZ
-118	26191	84760	HYDRAULIC HEAD AND ROTOR ASSY	1		PAFZZ
-119	11086	84760	PLUNGER, ROTOR.	2		PAFZZ
	11438	84760	SCREW, HYDRAULIC HEAD PLUG.	1		PAFZZ
-120	R76964	75160	GEAR, PUMP DRIVE (SEE FIG. 7-22-40 FOR NHA)	REF		PAFZZ
-121	23365	84760	NUT, DRIVE SHAFT (AP).	1		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE		SMR CODE
				PER ASSY.	ON CODE	
7-23-122	10534	84760	WASHER, DRIVE SHAFT (AP)	1		PAFZZ
-123	10274	84760	KEY, DRIVE SHAFT (AP)	1		PAFZZ
-124	23820	84760	SHAFT ASSY, DRIVE	1		PAFZZ
-125	10443	84760	RING, SHAFT RETAINING (AP)	1		PAFZZ
-126	21522	84760	WASHER, SPRING	1		PAFZZ
-127	21521	84760	WASHER, THRUST	1		PAFZZ
-128	10453	84760	SEAL, DRIVE SHAFT	2		PAFZZ
-129	23107	84760	COVER, TIMING LINE	1		PAFZZ
-130	21194	84760	SCREW, COVER (AP)	2		PAFZZ
-131	27603	84760	GASKET, COVER	1		PAFZZ
-132	10394	84760	PLATE, NAME	1		PAFZZ
-133	24419	84760	SCREW, NAME PLATE	2		PAFZZ
-134	22601	84760	PLUG, TORQUE SCREW HOLE	1		PAFZZ
-135	27606	84760	SEAL, PLUG	1		PAFZZ
-136	23799	84760	HOUSING ASSY	1		PAFZZ
	24373	84760	GASKET KIT	AR		PAFZZ
	16320	84760	TUBE, PILOT, REPLACEMENT	AR		PAFZZ
	22146	84760	SOLENOID AND FRAME ASSY KIT	AR		PAFZZ
	13093	84760	BUSHING, THROTTLE SHAFT REPLACEMENT	AR		PAFZZ

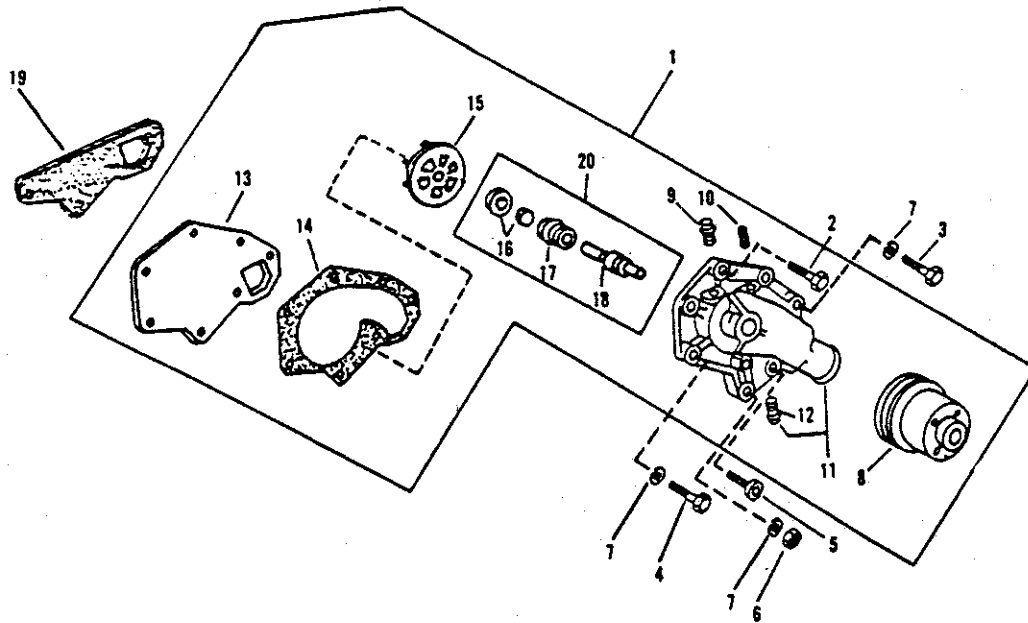


FIGURE 7-24. WATER PUMP GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE PER ASSY.	ON CODE	SMR CODE
7-24-	NO NUMBER	75160	WATER PUMP GROUP (SEE FIGURE 7-17-26 FOR NHA)	REF		
-1	AR97708	75160	WATER PUMP ASSEMBLY (REPAIR KIT AVAILABLE)	1		PAFZZ
-2	19H2545	75160	SCREW, CAP, 3/8 X 1-3/8 IN. (AP)	2		PAFZZ
-3	19H1912	75160	SCREW, CAP, 3/8 X 3-1/2 IN. (AP)	1		PAFZZ
-4	19H1801	75160	SCREW, CAP, 3/8 X 2 IN. (AP)	1		PAFZZ
-5	19H3413	75160	SCREW, CAP, 3/8 X 3-1/4 IN. (AP)	1		PAFZZ
-6	14HB12	75160	NUT, HEX, 3/8 IN. (AP)	1		PAFZZ
-7	12H304	75160	WASHER, LOCK, 3/8 IN. (AP)	3		PAFZZ
-8	T23628	75160	PULLEY, WATER PUMP	1		PAFZZ
-9	T19651	75160	FITTING, HOSE	1		XBFZZ
-10	15H584	75160	PLUG, PIPE, 1/2NPT	1		PAFZZ
-11	AR97709	75160	HOUSING, PUMP	1		PAFZZ
-12	R48993	75160	TUBE, ADAPTER	2		PAFZZ
-13	T20270	75160	COVER, WATER PUMP	1		PAFZZ
-14	T20271	75160	GASKET, COVER	1		PAFZZ
-15	T30897	75160	IMPELLER, WATER PUMP	1		PAFZZ
-16	AR41691	75160	INSERT, CUP AND SEAL	1		PAFZZ
-17	T27261	75160	SEAL, WATER PUMP	1		PAFZZ
-18	JD9257	75160	BEARING, BALL	1		PAFZZ
-19	T20243	75160	GASKET, PUMP MOUNTING (K1)	1		PAFZZ
-20	AT32489	75160	KIT, REPAIR, WATER PUMP	AR		PAFZZ
	AR102298	75160	KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	AR		PAFZZ

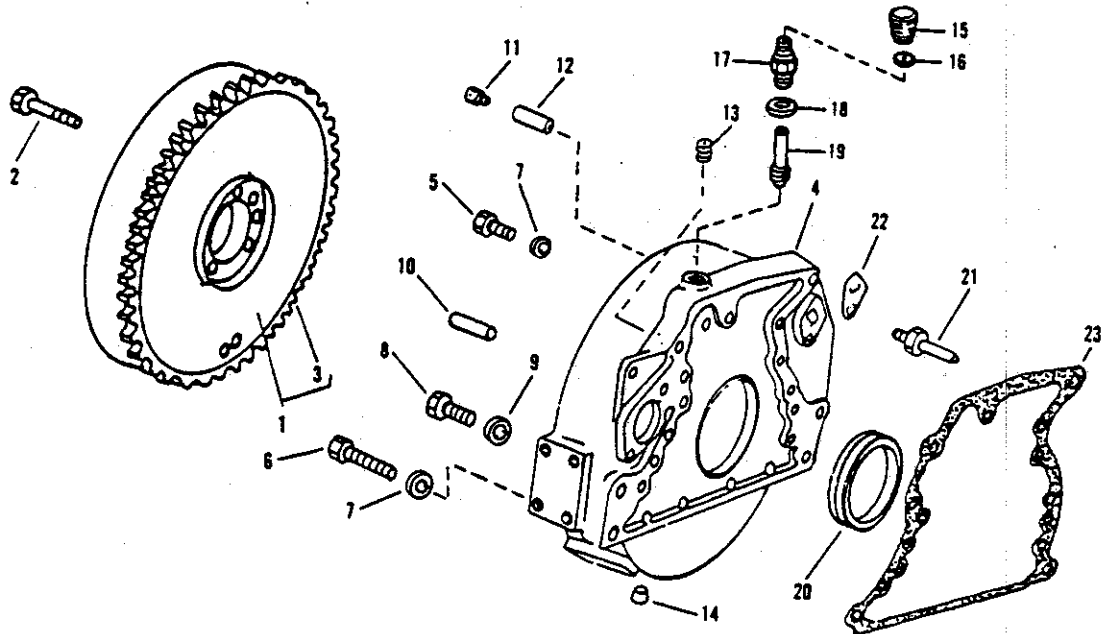


FIGURE 7-25. FLYWHEEL AND HOUSING GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM	1234567	DESCRIPTION	UNITS USABLE		
					PER ASSY.	ON CODE	SMR CODE
7-25-	NO NUMBER	75160		FLYWHEEL AND HOUSING GROUP (SEE FIGURE 7-17-27 FOR NHA)		REF	
-1	AT21178	75160		FLYWHEEL ASSY, ENGINE.	1		PAFZZ
-2	19H2993	75160		SCREW, CAP, HS, SAE 8, 1/2 X 1-1/2 IN. (AP)	4		PAFZZ
-3	T20088	75160		GEAR, FLYWHEEL.	1		PAFZZ
-4	R73527	75160		HOUSING, FLYWHEEL, SAE NO. 4	1		PAFZZ
-5	19H1439	75160		SCREW, CAP, 5/8 X 3 IN. (AP)	2		PAFZZ
-6	19H1387	75160		SCREW, CAP, 5/8 X 2-1/4 IN. (AP)	2		PAFZZ
-7	12H294	75160		WASHER, LOCK, 5/8 IN. (AP)	4		PAFZZ
-8	19H2345	75160		SCREW, CAP, 3/8 X 1-1/2 IN. (AP)	8		PAFZZ
-9	12H304	75160		WASHER, LOCK, 3/8 IN. (AP)	8		PAFZZ
-10	T26365	75160		PIN, DOWEL	2		PAFZZ
-11	22H1035	75160		SETSCREW, 5/8 X 1/2 IN.	1		PAFZZ
-12	T20461	75160		ADAPTER	1		PAFZZ
-13	R21630	75160		PLUG, PIPE	1		PAFZZ
-14	T23590	75160		PLUG, DRAIN	1		PAFZZ
-15	B3362R	75160		CAP, TACH DRIVE FITTING	1		XBFZZ
-16	B3285R	75160		WASHER, TACH DRIVE FITTING	1		XBFZZ
-17	T22537	75160		FITTING, TACH DRIVE	1		XBFZZ
-18	H1038R	75160		WASHER, TACH DRIVE FITTING	1		XBFZZ
-19	T22536	75160		GEAR, TACH DRIVE	1		XBFZZ
-20	AR92893	75160		SEAL, OIL	1		PAFZZ
-21	T20090	75160		SCREW, SPECIAL	1		PAFZZ
-22	T20089	75160		COVER, TIMING HOLE	1		PAFZZ
-23	R70483	75160		GASKET, HOUSING (K1)	1		PAFZZ
	AR102298	75160		KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	REF		PAFZZ

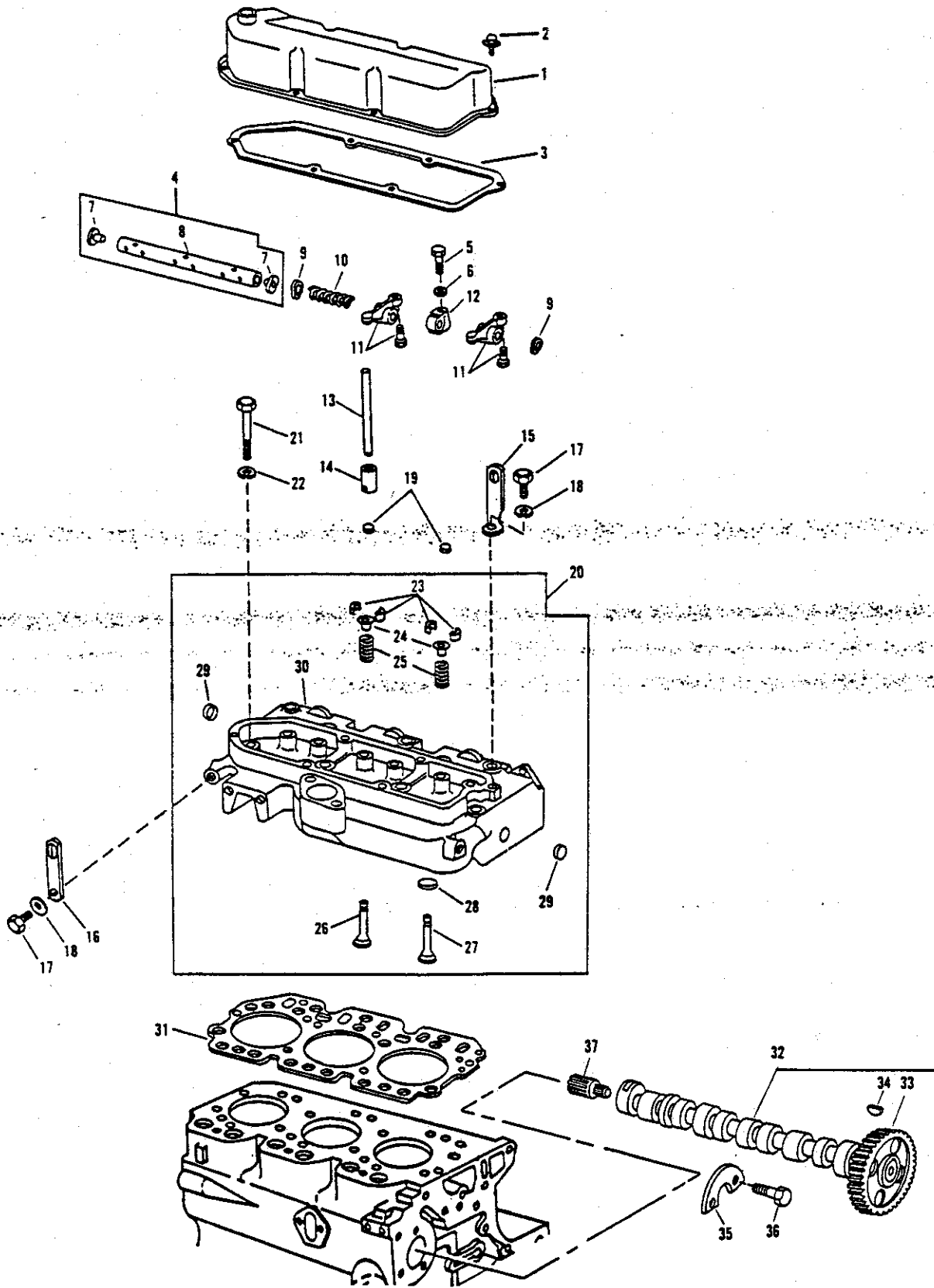


FIGURE 7-26. ROCKER ARM COVER, ROCKER ARMS, VALVES, AND CYLINDER HEAD GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-26-	NO NUMBER	75160	ROCKER ARM COVER, ROCKER ARMS, VALVES AND CYLINDER HEAD GROUP (SEE FIGURE 7-17-28 FOR NHA)	REF		
	NO NUMBER	75160	ROCKER ARM GROUP	1		
-1	AT18016	75160	COVER, ROCKER ARM	1		PAFZZ
-2	AR100124	75160	SCREW, COVER, WITH WASHER (AP)	6		PAFZZ
-3	R75729	75160	GASKET, COVER, ROCKER ARM (K1) (K2)	1		PAFZZ
-4	DD12119	75160	SHAFT, ROCKER ARM	1		PAFZZ
-5	19H268	75160	SCREW, CAP, 3/8 X 2-1/2 IN. (AP)	3		PAFZZ
-6	R42729	75160	WASHER, 3/8 IN. (AP)	3		PAFZZ
-7	R54565	75160	PLUG, ROCKER ARM SHAFT	2		PAFZZ
-8	R54985	75160	SHAFT, ROCKER ARM	1		PAFZZ
-9	T20316	75160	WASHER, BOWED	2		PAFZZ
-10	T20314	75160	SPRING, ROCKER ARM	2		PAFZZ
-11	RE19031	75160	ARM, ROCKER	6		PAFZZ
-12	T20315	75160	SUPPORT, SHAFT, ROCKER ARM	3		PAFZZ
-13	T20310	75160	PUSH ROD, VALVE	6		PAFZZ
-14	T20073	75160	TAPPET, VALVE	6		PAFZZ
	NO NUMBER	75160	CYLINDER HEAD AND VALVE GROUP	1		
-15	T26508	75160	STRAP, LIFTING	1		PAFZZ
-16	R82871	75160	STRAP, LIFTING	1		PAFZZ
-17	19H444	75160	SCREW, CAP, 1/2 X 1 IN. (AP)	2		PAFZZ
-18	12H301	75160	WASHER, LOCK, 1/2 IN. (AP)	2		PAFZZ
-19	T20129	75160	CAP, VALVE	6		PAFZZ
-20	AR70583	75160	HEAD, CYLINDER	1		PAFZZ
-21	R53223	75160	SCREW, CAP, CYLINDER HEAD (AP)	14		PAFZZ
-22	T20168	75160	WASHER, CYLINDER HEAD SCREW (AP)	14		PAFZZ
-23	T20077	75160	RETAINER, LOCK	12		PAFZZ
-24	T20176	75160	RETAINER, SPRING	6		PAFZZ
-25	R26125	75160	SPRING, VALVE	6		PAFZZ
-26	R52251	75160	VALVE, INTAKE, STANDARD	3		PAFZZ
	R57332	75160	VALVE, INTAKE, 0.08MM OVERSIZE	AR		PAFZZ
	R57334	75160	VALVE, INTAKE, 0.38MM OVERSIZE	AR		PAFZZ
	R57336	75160	VALVE, INTAKE, 0.76MM OVERSIZE	AR		PAFZZ
-27	R52252	75160	VALVE, EXHAUST, STANDARD	3		PAFZZ
	R57333	75160	VALVE, EXHAUST, 0.08MM OVERSIZE	AR		PAFZZ
	R57335	75160	VALVE, EXHAUST, 0.38MM OVERSIZE	AR		PAFZZ
	R57337	75160	VALVE, EXHAUST, 0.76MM OVERSIZE	AR		PAFZZ
-28	R51734	75160	INSERT, VALVE SEAT, EXHAUST	3		PAFZZ
	CD14725	75160	INSERT, VALVE SEAT, INTAKE	AR		PAFZZ
-29	A3910R	75160	PLUG, CYLINDER HEAD	2		PAFZZ
-30	NO NUMBER	75160	HEAD, CYLINDER (USE PART NUMBER AR70583)	1		
-31	R59447	75160	GASKET, CYLINDER HEAD (K1) (K2)	1		PAFZZ
	NO NUMBER	75160	CAMSHAFT GROUP	1		
-32	AR79622	75160	CAMSHAFT ASSEMBLY	1		PAFZZ
-33	T20070	75160	GEAR, CAMSHAFT	1		PAFZZ
-34	T28041	75160	KEY, CAMSHAFT GEAR	1		PAFZZ
-35	T20072	75160	PLATE, THRUST	1		PAFZZ
-36	19H1731	75160	SCREW, CAP, 3/8 X 1 IN. (AP)	2		PAFZZ
-37	T22535	75160	SHAFT, TACH DRIVE	1		XBFZZ
	AR102298	75160	KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	AR		PAFZZ
	AR102297	75160	KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K2)	AR		PAFZZ

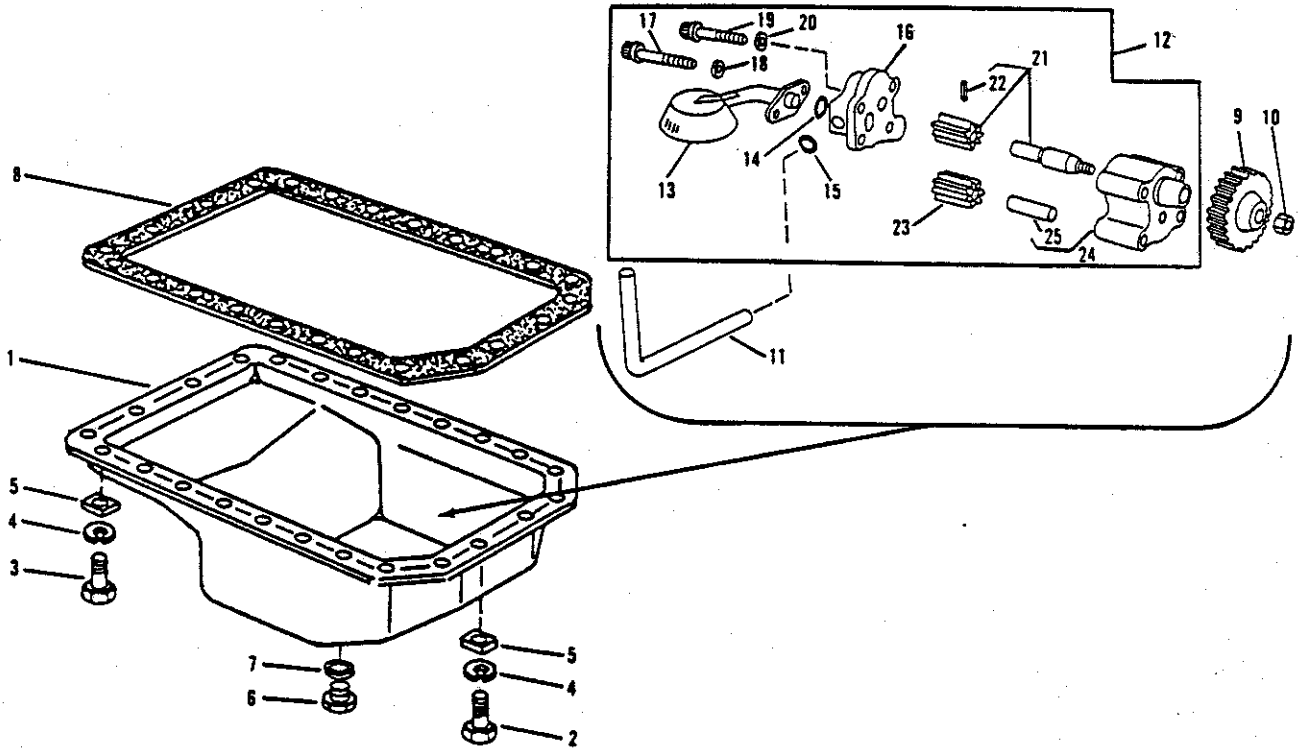


FIGURE 7-27. OIL PAN AND OIL PUMP GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-27-	NO NUMBER	75160	OIL PAN AND OIL PUMP GROUP	REF		
			(SEE FIGURE 7-17-29 FOR NHA)			
-1	AT18178	75160	. . . PAN, OIL	1		PAFZZ
-2	19H2284	75160	. . . SCREW, CAP, 3/8 X 7/8 IN. (AP)	6		PAFZZ
-3	19H1936	75160	. . . SCREW, CAP, 3/8 X 3/4 IN. (AP)	18		PAFZZ
-4	12H304	75160	. . . WASHER, LOCK, 3/8 IN. (AP)	24		PAFZZ
-5	T30726	16004	. . . STRAP (AP)	24		PAFZZ
-6	T20098	75160	. . . PLUG, DRAIN	1		PAFZZ
-7	T13213	75160	. . . WASHER, DRAIN PLUG (K1)	1		PAFZZ
-8	T24534	75160	. . . GASKET, OIL PAN (K1)	1		PAFZZ
	NO NUMBER	75160	. . . OIL PUMP GROUP	1		
-9	T20298	75160	. . . GEAR, OIL PUMP	1		PAFZZ
-10	14H826	75160	. . . NUT, HEX, 1/2 IN. (AP)	1		PAFZZ
-11	T20050	75160	. . . TUBE, OIL OUTLET	1		PAFZZ
-12	AR67074	75160	. . . OIL PUMP ASSEMBLY	1		PAFZZ
-13	AR60701	75160	. . . INTAKE, OIL PUMP	1		PAFZZ
-14	R61871	75160	. . . PACKING, PREFORMED, O-RING	1		PAFZZ
-15	R74354	75160	. . . PACKING, PREFORMED, O-RING, OUTLET TUBE (K1)	1		PAFZZ
-16	R53382	75160	. . . COVER, OIL PUMP	1		PAFZZ
-17	R74552	75160	. . . SCREW, CAP (AP)	2		PAFZZ
-18	R74553	75160	. . . WASHER (AP)	2		PAFZZ
-19	R57059	75160	. . . SCREW, CAP (AP)	2		PAFZZ
-20	12H304	75160	. . . WASHER, LOCK (AP)	2		PAFZZ
-21	AR62978	75160	. . . PINION ASSEMBLY	1		PAFZZ
-22	M3853T	75160	. . . PIN, GROOVE	1		PAFZZ
-23	R54614	75160	. . . GEAR, OIL PUMP	1		PAFZZ
-24	AR62979	75160	. . . HOUSING, OIL PUMP	1		PAFZZ
-25	T20091	75160	. . . PIN, DOWEL	1		PAFZZ
	AR10229B	75160	. . . KIT, GASKET SET, ENGINE OVERHAUL (CONTAINS PARTS LISTED ABOVE DENOTED BY K1)	AR		PAFZZ

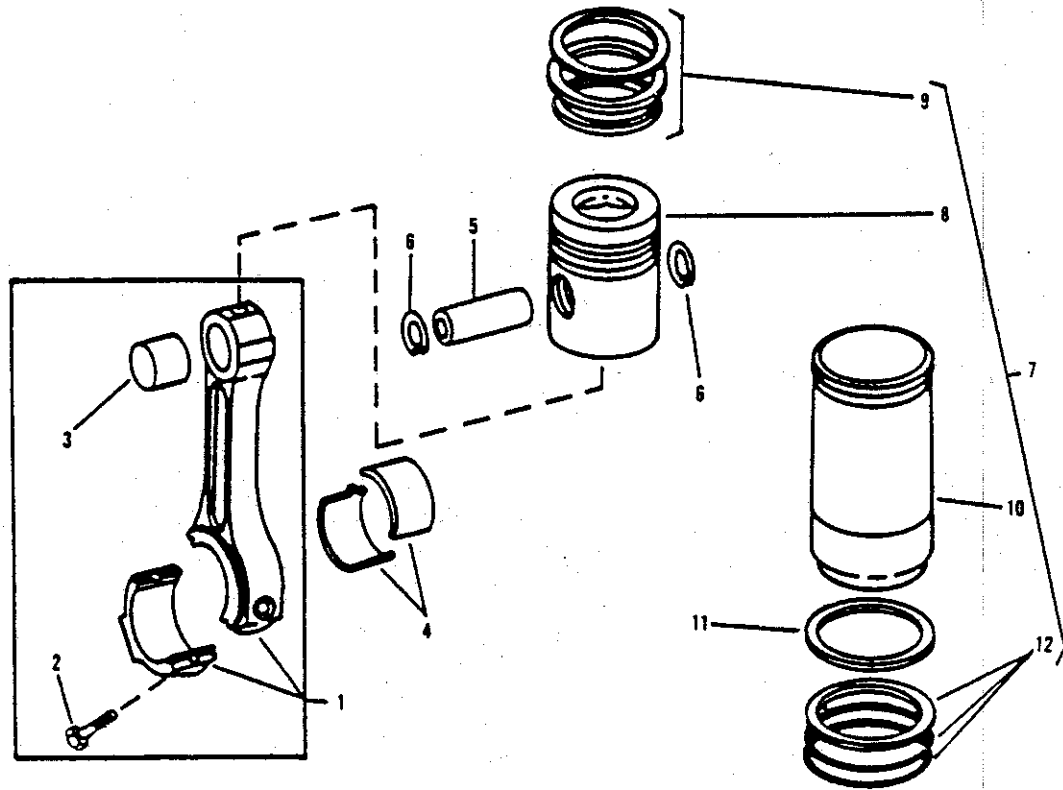


FIGURE 7-28. PISTONS AND CONNECTING RODS GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE PER ASSY.	USABLE ON CODE	SMR CODE
7-28-	NO NUMBER	75160	PISTONS AND CONNECTION RODS. GROUP (REPAIR KIT AVAILABLE) (SEE FIGURE 7-17-30 FOR NHA)	REF		
-1	RE16495	75160	ROD ASSY, CONNECTING	3		PAFZZ
-2	R80033	75160	SCREW, CONNECTING ROD CAP	2		PAFZZ
-3	R55647	75160	BUSHING, PISTON PIN	1		PAFZZ
-4	AT21138	75160	BEARING, STANDARD, SET OF 2	3		PAFZZ
	AT21122	75160	BEARING SET, 0.05MM (0.002 IN.) UNDERSIZE	AR		PAFZZ
	AT21124	75160	BEARING SET, 0.25MM (0.010 IN.) UNDERSIZE	AR		PAFZZ
	AT21126	75160	BEARING SET, 0.51MM (0.20 IN.) UNDERSIZE	AR		PAFZZ
	AT21128	75160	BEARING SET, 0.76MM (0.30 IN.) UNDERSIZE	AR		PAFZZ
-5	R51731	75160	PIN, PISTON	3		PAFZZ
-6	M41029	75160	RING, PIN RETAINING (AP)	6		PAFZZ
-7	RE18694	75160	PISTON-LINER KIT	3		PAFZZ
-8	AR79868	75160	PISTON	1		XAFZZ
-9	RE15674	75160	RING KIT, PISTON	1		XAFZZ
-10	R51726	75160	LINER, CYLINDER	1		XAFZZ
-11	CD15466	75160	SHIM, LINER, 0.05MM (0.002 IN.)	AR		XAFZZ
	R65833	75160	SHIM, LINER, 0.10MM (0.004 IN.)	AR		XAFZZ
-12	AR65507	75160	O-RING KIT, LINER	1		XAFZZ

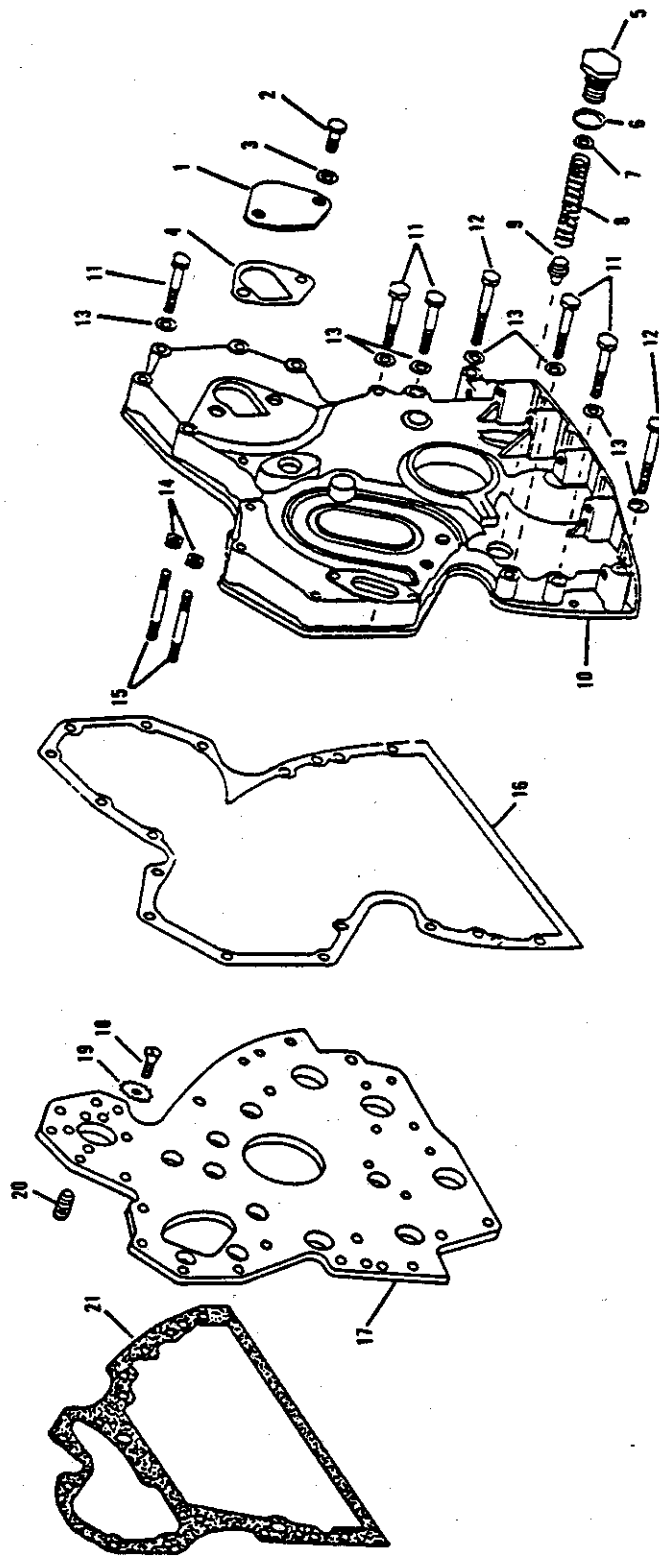


FIGURE 7-29. GEAR COVER AND END PLATE GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-29-	NO NUMBER	75160	GEAR COVER AND END PLATE GROUP	REF		
			(SEE FIGURE 7-17-31 FOR NHA)			
-1	T20362	75160	COVER, INJECTION PUMP TIMING	1		PAFZZ
			GEAR OPENING			
-2	19H2284	75160	SCREW, CAP, 3/8 X 7/8 IN. (AP)	2		PAFZZ
-3	24H1304	75160	WASHER (AP)	2		PAFZZ
-4	R69260	75160	GASKET, COVER (K1)	1		PAFZZ
-5	T27657	75160	FITTING, RELIEF VALVE	1		PAFZZ
-6	A4827R	75160	WASHER, FITTING	1		PAFZZ
-7	24H1290	75160	WASHER, SHIM	AR		PAFZZ
-8	T27658	75160	SPRING, RELIEF VALVE	1		PAFZZ
-9	R51516	75160	VALVE, OIL PRESSURE RELIEF	1		PAFZZ
-10	AR91662	75160	COVER, GEAR	1		PAFZZ
-11	19H1801	75160	SCREW, CAP, 3/8 X 2 IN. (AP)	10		PAFZZ
-12	19H1733	75160	SCREW, CAP, 3/8 X 2-1/2 IN. (AP)	2		PAFZZ
-13	24H1304	75160	WASHER, 3/8 IN. (AP)	12		PAFZZ
-14	14H812	75160	NUT, HEX, 3/8 IN. (AP)	2		PAFZZ
-15	T33279	75160	STUD, GEAR COVER (AP)	2		PAFZZ
-16	T20155	75160	GASKET, GEAR COVER (K1)	1		PAFZZ
-17	R79863	75160	PLATE, FRONT	1		PAFZZ
-18	T20166	75160	SCREW, FRONT PLATE (AP)	5		PAFZZ
-19	12H324	75160	WASHER, LOCK, 3/8 IN. EXTERNAL	5		PAFZZ
			TOOTH (AP)			
-20	AT21191	75160	SETSCREW, 5/16 X 0.380 IN. (AP)	8		PAFZZ
	AT22919	75160	SETSCREW, 3/8 X 0.380 IN. (AP)	2		PAFZZ
-21	R73140	75160	GASKET, FRONT PLATE (K1)	1		PAFZZ
	AR102298	75160	KIT, GASKET SET, ENGINE OVERHAUL	AR		PAFZZ
			(CONTAINS PARTS LISTED ABOVE DENOTED BY K1)			

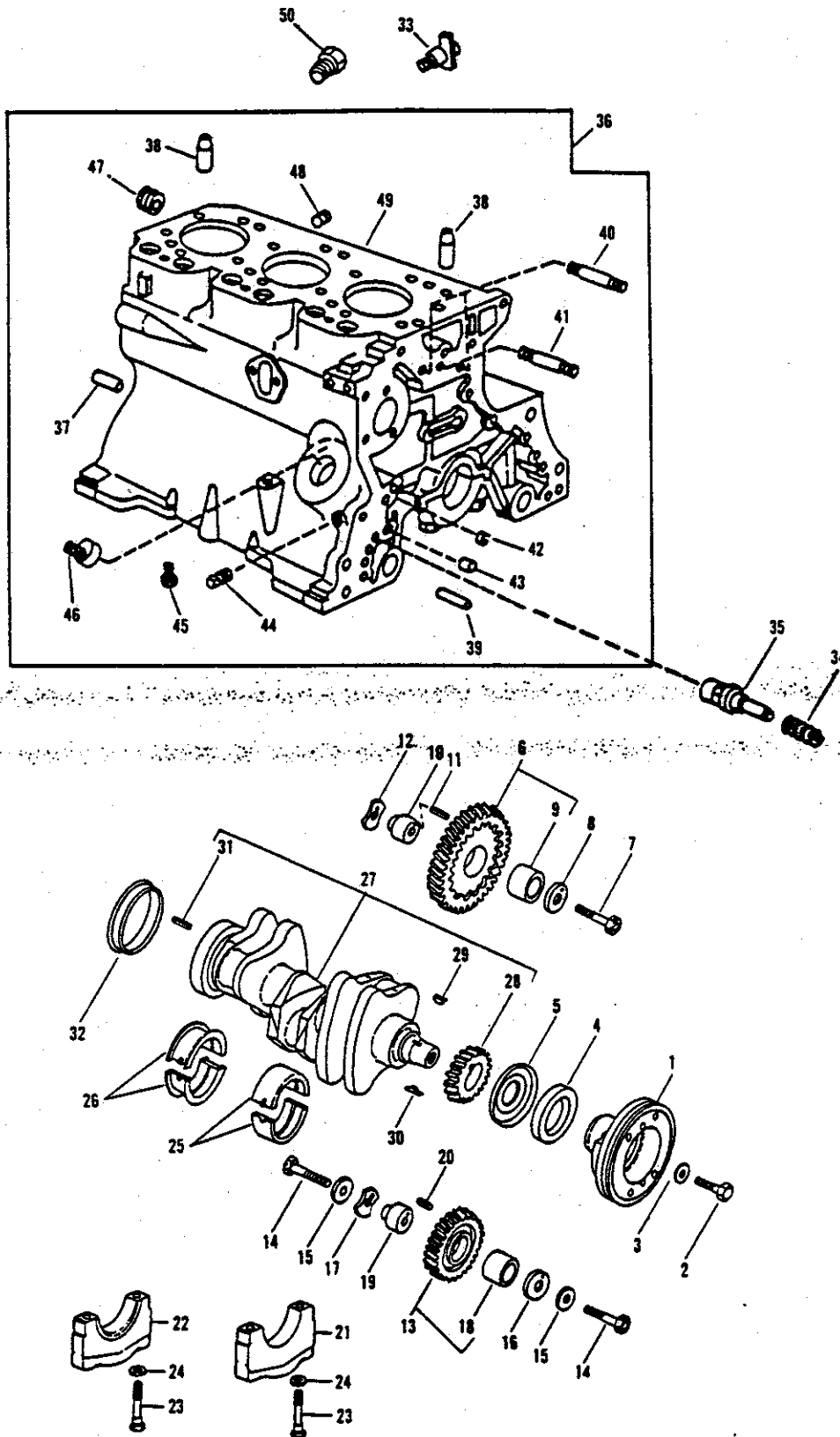


FIGURE 7-30. CRANKSHAFT AND CYLINDER BLOCK GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-30-	NO NUMBER	75160	CRANKSHAFT AND CYLINDER BLOCK. GROUP (SEE FIGURE 7-17-32 FOR NHA)	REF		
-1	R79418	75160	SHEAVE, CRANKSHAFT	1		PAFZZ
-2	19H1721	75160	SCREW, CAP, 1/2 X 1-1/2 IN. (AP)	1		PAFZZ
-3	T20217	75160	WASHER (AP)	1		PAFZZ
-4	AR67942	75160	SEAL, CRANKSHAFT	1		PAFZZ
-5	T20046	75160	SLINGER, OIL	1		PAFZZ
-6	AR91660	75160	GEAR ASSY, IDLER, UPPER	1		PAFZZ
-7	T26327	75160	SCREW, IDLER GEAR (AP)	1		PAFZZ
-8	T26326	75160	WASHER, THRUST (AP)	1		PAFZZ
-9	T20034	75160	BUSHING, IDLER GEAR	1		PAFZZ
-10	T26323	75160	SHAFT, IDLER GEAR	1		PAFZZ
-11	34H283	75160	PIN, SPRING, 3/16 X 1-1/8 IN.	1		PAFZZ
-12	T26324	75160	WASHER, THRUST	1		PAFZZ
-13	AT24252	75160	GEAR ASSY, IDLER, LOWER	1		PAFZZ
-14	T26325	75160	SCREW, IDLER GEAR (AP)	2		PAFZZ
-15	R76126	75160	WASHER, IDLER GEAR SCREW (AP)	2		PAFZZ
-16	T26326	75160	WASHER, THRUST (AP)	1		PAFZZ
-17	T26324	75160	WASHER, THRUST (AP)	1		PAFZZ
-18	T26321	75160	BUSHING, IDLER GEAR	1		PAFZZ
-19	T26323	75160	SHAFT, IDLER GEAR	1		PAFZZ
-20	34H286	75160	PIN, SPRING, 3/16 X 1-1/2 IN.	1		PAFZZ
-21	R65215	75160	CAP, MAIN BEARING, WITH SHIMS AND SET GAUGE	3		PAFZZ
-22	R79089	75160	CAP, REAR BEARING, WITH SHIMS AND SET GAUGE	1		PAFZZ
-23	T23474	75160	SCREW, BEARING CAP (AP)	8		PAFZZ
-24	T20168	75160	WASHER, BEARING CAP (AP)	8		PAFZZ
-25	AT21140	75160	BEARING, MAIN, STD, SET OF 2	3		PAFZZ
	AT21108	75160	BEARING SET, 0.05MM (0.002 IN.) UNDERSIZE	AR		PAFZZ
	AT21110	75160	BEARING, SET, 0.25MM (0.010 IN.) UNDERSIZE	AR		PAFZZ
	AT21112	75160	BEARING SET, 0.51MM (0.020 IN.) UNDERSIZE	AR		PAFZZ
	AT21114	75160	BEARING SET, 0.76MM (0.030 IN.) UNDERSIZE	AR		PAFZZ
-26	AT21139	75160	BEARING, REAR, STD, SET OF 2	1		PAFZZ
	AT21130	75160	BEARING SET, 0.05MM (0.002 IN.) UNDERSIZE	AR		PAFZZ
	AT21132	75160	BEARING SET, 0.25MM (0.010 IN.) UNDERSIZE	AR		PAFZZ
	AT21134	75160	BEARING SET, 0.51MM (0.020 IN.) UNDERSIZE	AR		PAFZZ
	AT21136	75160	BEARING SET, 0.76MM (0.030 IN.) UNDERSIZE	AR		PAFZZ
-27	AT18031	75160	CRANKSHAFT ASSEMBLY	1		PAFZZ
-28	T20094	75160	GEAR, CRANKSHAFT	1		PAFZZ
-29	26H72	75160	KEY, CRANKSHAFT GEAR (AP)	1		PAFZZ
-30	T23604	75160	KEY, SHAFT (AP)	1		PAFZZ
-31	T26565	75160	PIN, DOWEL	1		PAFZZ
-32	AR92893	75160	SEAL, REAR	1		PAFZZ
-33	AT13740	75160	DRAIN VALVE, BLOCK	1		PAFZZ
-34	R46625	75160	SPRING, RELIEF VALVE	1		PAFZZ
-35	R73139	75160	VALVE, RELIEF	1		PAFZZ
-36	AR97201	75160	CYLINDER BLOCK	1		PAFZZ
-37	R48685	75160	PIN, DOWEL	2		PAFZZ
-38	R26241	75160	PIN, DOWEL	2		PAFZZ
-39	R26650	75160	PIN, DOWEL	1		PAFZZ
-40	T33279	75160	STUD	2		PAFZZ
-41	T25701	75160	STUD	1		PAFZZ
-42	T18891	75160	CAP, PLUG	1		PAFZZ
-43	R26493	75160	BUSHING	1		PAFZZ
-44	15H563	75160	PLUG, PIPE, 3/8NPT	1		PAFZZ
-45	R54802	75160	ORIFICE, PISTON COOLING	3		PAFZZ
-46	T23435	75160	NIPPLE, THREADED (SEE FIG. 7-17, ITEM 6)	1		PAFZZ
-47	15H665	75160	PLUG, PIPE, 3/4NPT	1		PAFZZ

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-30-48	15H275	75160	.. PLUG, PIPE, 1/4NPT	1		PAFZZ
-49	NO NUMBER	75160	.. BLOCK, CYLINDER, SERVICE NUMBER. AR97201, INDEX 36 ABOVE	1		
-50	R55233	75160	.. PLUG, PIPE	1		PAFZZ

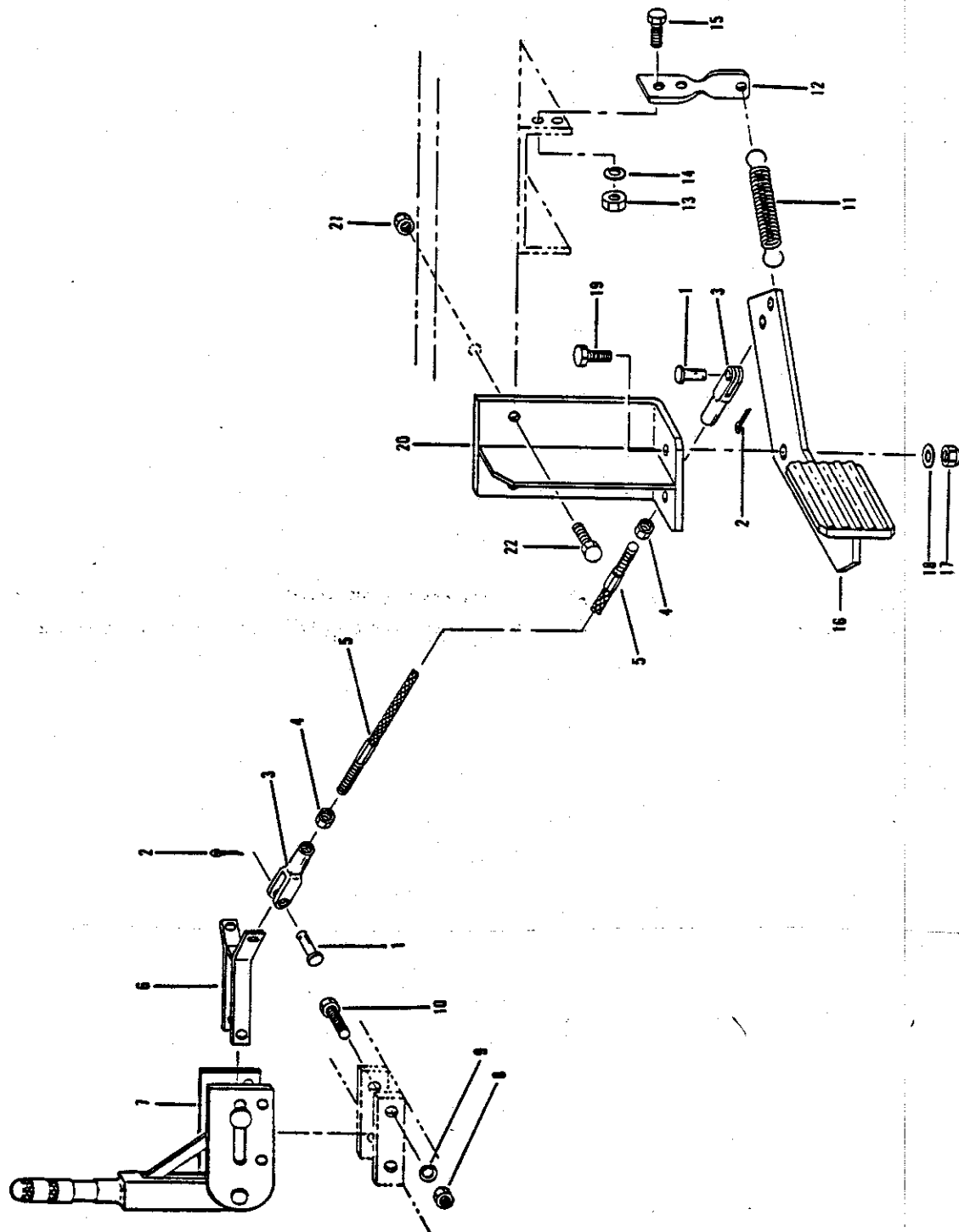


FIGURE 7-31. BRAKE ACTUATING GROUP

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS PER ASSY.	USABLE ON CODE	SMR CODE
7-31-	NO NUMBER	16004	BRAKE ACTUATING GROUP. REF			
			(SEE FIGURE 7-1-44 FOR NHA)			
-1	MS35810-32	96906	PIN, CLEVIS (16004 SPEC CONT NO. 69224)	4		PAFZZ
-2	MS24665-132	96906	PIN, COTTER, 1/16 X 1/2 IN. (AP)	4		PAFZZ
-3	MS35812-2	96906	CLEVIS, ROD END (16004 SPEC. CONT NO. 69223)	4		PAFZZ
-4	MS51968-2	96906	NUT, HEX, 1/4-28NF (AP)	4		PAFZZ
-5	86471	16004	CABLE, PARKING BRAKE	2		PAFZZ
-6	86473	16004	LINK, BRAKE CABLE	1		PAFZZ
-7	02182600	92867	LEVER, BRAKE (16004 SPEC CONT. NO. 86487)	1		PAFZZ
-8	MS51967-8	96906	NUT, HEX, 3/8-16NC (AP)	2		PAFZZ
-9	MS35338-27	96906	WASHER, LOCK, SPLIT, 3/8 IN. (AP)	2		PAFZZ
-10	MS90725-66	96906	SCREW, CAP, HEX HD, 3/8-16NC X 2 IN (AP)	2		PAFZZ
-11	75	73912	SPRING, ARM RETURN (16004 SPEC CONT NO. 86485)	2		XBZZ
-12	86486	16004	ANCHOR, SPRING	2		XBZZ
-13	MS51967-2	96906	NUT, HEX, 1/4-20NC (AP)	4		PAFZZ
-14	MS35338-25	96906	WASHER, LOCK, SPRING, 1/4 IN. (AP)	4		PAFZZ
-15	MS90725-8	96906	SCREW, CAP, HEX HD, 1/4-20NC X1. IN. LG (AP)	4		PAFZZ
-16	86470	16004	ARM, BRAKE	2		XBZZ
-17	MS51922-33	96906	NUT, LOCK, HEX, 1/2-13NC (AP)	2		PAFZZ
-18	MS27183-18	96906	WASHER, FLAT, 1/2 IN. (AP)	2		PAFZZ
-19	MS90725-113	96906	SCREW, CAP, HEX HD, 1/2-13NC X 1-1/2 IN. (AP)	2		PAFZZ
-20	86469	16004	SUPPORT, BRAKE ARM	2		XBZZ
-21	MS51922-17	96906	NUT, LOCK, HEX, 3/8-16NC (AP)	4		PAFZZ
-22	MS90725-62	96906	SCREW, CAP, HEX HD, 3/8-16NC X 1-1/4 IN LG (AP)	4		PAFZZ

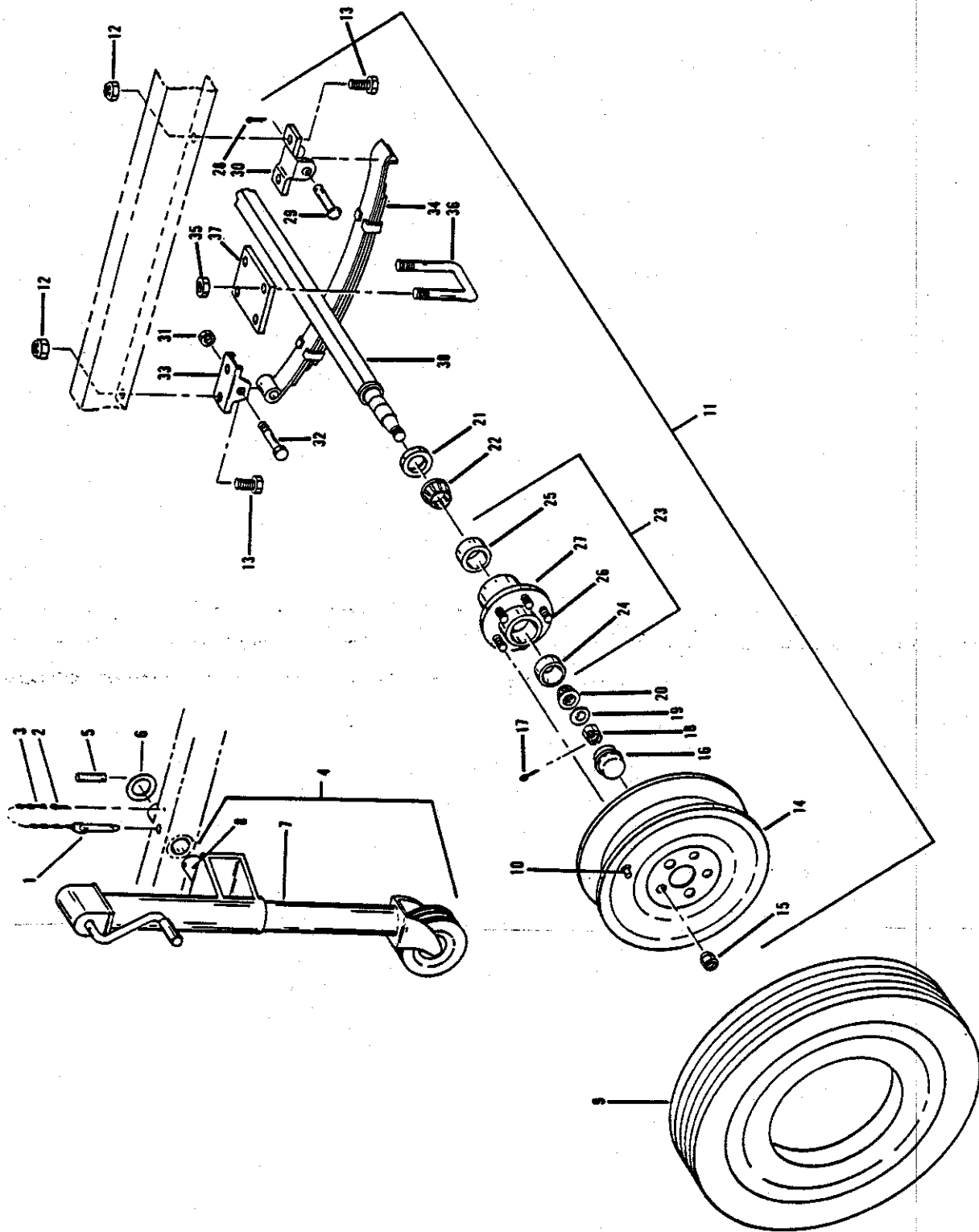


FIGURE 7-32. LANDING WHEEL AND AXLE ASSEMBLY

FIG. & INDEX NO.	PART NUMBER	FSCM 1234567	DESCRIPTION	UNITS USABLE PER ASSY.	ON CODE	SMR CODE
7-32-	NO NUMBER	16004	LANDING WHEEL AND AXLE ASSY. (SEE FIGURE 7-1-45 FOR NHA)			REF
-1	CB-25R-HANDLE	09332	PIN, BALL LOCK (16004 SPEC CONT. NO. 80592)	1		PAFZZ
-2	MS24665-351	96906	PIN, COTTER, 1/8 X 3/4 IN. (AP)	1		PAFZZ
-3	27655	16004	CHAIN (AP)	1		XBFZZ
-4	80591	16004	WHEEL ASSEMBLY, LANDING	1		PAFZZ
-5	MS16562-74	96906	PIN, SPRING (16004 SPEC CONT. NO. 80594) (AP)	1		PAFZZ
-6	80593	16004	WASHER, SPECIAL (AP)	1		PAFZZ
-7	122-81413	56049	WHEEL, LANDING (16004 SPEC CONT. NO. 80589)	1		XBFZZ
-8	80590	16004	ARM, PIVOT	1		XBFZZ
-9	64729	16004	TIRE, F78-14, 4 PLY	2		PAFZZ
-10	TR4-13	73842	STEM, VALVE (16004 SPEC CONT. NO. 67511)	2		PAFZZ
-11	634	22938	AXLE ASSEMBLY (16004 SPEC CONT. NO. 86440)	1		AFFZZ
-12	MS51922-33	96906	NUT, LOCK, HEX, 1/2-13NC (AP)	8		PAFZZ
-13	MS90725-111	96906	SCREW, CAP, HEX, HD, 1/2-13NC X 1-1/4 IN LG (AP)	8		PAFZZ
-14	3702	22938	WHEEL, 14 IN. (16004 SPEC CONT. NO. 68738)	2		PAFZZ
-15	4603-1	22938	NUT, WHEEL STUD (AP)	10		PAFZZ
-16	6301	22938	CAP, GREASE	2		PAFZZ
-17	4800-5	22938	PIN, COTTER, SPINDLE	2		PAFZZ
-18	4600-1	22938	NUT, SPINDLE	2		PAFZZ
-19	4701-10	22938	WASHER, SPINDLE	2		PAFZZ
-20	LM11949	60038	CONE, BEARING, OUTER (22938 SPEC CONT NO. 6051)	2		PAFZZ
-21	6300	22938	SEAL, GREASE	2		PAFZZ
-22	LM67048	60038	CONE, BEARING, INNER (22938 SPEC CONT NO. 6050)	2		PAFZZ
-23	3601-1	22938	HUB SUBASSEMBLY	2		XBFZZ
-24	LM11910	60038	CUP, BEARING, OUTER (22938 SPEC CONT NO. 6156)	1		PAFZZ
-25	LM67010	60038	CUP, BEARING, INNER (22938 SPEC CONT NO. 6155)	1		PAFZZ
-26	6251-10	22938	STUD, WHEEL	5		PAFZZ
-27	3601A	22938	HUB, WHEEL	1		PAFZZ
	1-4251	22938	BRACKET ASSY, SPRING, REAR	2		PAFZZ
-28	4800-3	22938	PIN, COTTER	1		PAFZZ
-29	5403-1	22938	RIVET, SPRING BRACKET	1		PAFZZ
-30	4251	22938	BRACKET, SPRING (16004 SPEC CONT NO. 27798)	1		PAFZZ
	1-4250	22938	BRACKET ASSY, SPRING, FRONT	2		PAFZZ
-31	MS51922-41	96906	NUT, HEX (22938 SPEC CONT NO. 4601-33)	1		PAFZZ
-32	4901-19	22938	SCREW, CAP, HEX HD	1		PAFZZ
-33	4250	22938	BRACKET, SPRING, FRONT (16004 SPEC CONT NO. 27797)	1		PAFZZ
-34	1-4001	22938	SPRING, AXLE	2		PAFZZ
-35	4601-7	22938	NUT, LOCK, HEX (AP)	8		PAFZZ
-36	5100-5	22938	U-BOLT, SPRING (AP)	4		XBFZZ
-37	5600-7	22938	TIE PLATE, SPRING (AP)	2		XBFZZ
-38	634-1241-3	22938	BEAM ASSEMBLY, AXLE	1		XBFZZ

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AD20051	7-5-13	1	AR97709	7-24-11	1
AD20052	7-5-7	1	AR98850	7-21-13	1
AD20053	7-5-11	1	AR98852	7-21-12	1
AD20054	7-5-10	1	AT13740	7-30-33	1
AD20055	7-5-9	1	AT18016	7-26-1	1
AD20056	7-5-12	1	AT18031	7-30-27	1
AD20057	7-5-5	2	AT18178	7-27-1	1
AD20058	7-5-6	1	AT18904	F7-17-12	1
AD20059	7-5-16	1	AT21108	F7-30-25	1
AD20060	7-5-15	1	AT21110	F7-30-25	
AD20061	7-5-14	1	AT21112	F7-30-25	
AD20062	7-5-4	1	AT21114	F7-30-25	
AD20063	7-5-8	1	AT21122	F7-28-4	
AD64-ABS	F7-10-1	2	AT21124	F7-28-4	
AM-7	7-1-49	3	AT21126	F7-28-4	
	7-2-2		AT21128	F7-28-4	
AM-B	7-6-10	2	AT21130	F7-30-26	
AR100124	7-26-2	6	AT21132	F7-30-26	
AR102297	F7-17-32		AT21134	F7-30-26	
	F7-22-40		AT21136	F7-30-26	
	F7-26-37		AT21138	7-28-4	3
AR102298	F7-17-32		AT21139	7-30-26	1
	F7-20-24		AT21140	7-30-25	3
	F7-21-16		AT21178	7-25-1	1
	F7-22-40		AT21191	7-29-20	8
	F7-24-20		AT21535	7-17-1	1
	F7-25-23		AT22919	F7-29-20	2
	F7-26-37		AT22961	7-17-16	1
	F7-27-25		AT24252	7-30-13	1
	F7-29-21		AT25192	7-17-13	1
AR21837	F7-17-14	10	AT32489	7-24-20	
	7-21-4		AT63813	7-7-16	2
	7-24-16	1	AT74051	7-18-27	1
AR41691	7-20-10	1	AT74053	7-18-29	1
AR50040	7-20-6	1	AT74058	7-18-32	1
AR50041	7-20-17	1	AT74061	7-18-33	4
AR55730	7-27-13	1	AT74065	7-18-24	1
AR60701	7-27-21	1	AT74066	7-18-30	1
AR62978	7-27-24	1	AWR-4	F7-1-50	7
AR62979					
	7-20-1	1		F7-2-2	
AR63653	7-28-12	3		F7-6-10	
AR65507	7-27-12	1	A3910R	7-26-29	2
AR67074	7-30-4	1	A4773R	F7-17-12	1
AR67942	7-26-20	1	A4827R	7-29-6	1
AR70583	7-17-17	1	B3285R	7-25-16	1
AR73097	7-26-32	1	B3362R	7-25-15	1
AR79622	7-28-8	3	CD14725	F7-26-28	
AR79868	7-22-14	3	CD15466	7-28-11	
AR83618	7-22-1	1	C3069X4	7-14-6	2
AR89839					
	7-30-6	1		7-15-14	
AR91660	7-29-10	1	C5355X12	7-15-39	1
AR91662	7-25-20	2	C7998-1420-24	7-10-19	6
AR92893	7-30-32		CB-25R-HANDLE	7-32-1	1
	7-30-36	1	DB2335-4531	7-17-25	1

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	F7-23-		MS51967-14	F7-1-43	4
DD12119	7-26-4	1	MS51967-2	7-31-13	4
DHA10	7-6-11	1	MS51967-8	7-3-1	12
FWG08-0023	7-8-13	1	MS51968-2	7-13-3	9
GAX00-2014	7-8-11	1	MS90725-111	7-16-44	
Q335	F7-1-43	4	MS90725-113	F7-1-24	25
H1058R	7-25-18	1	MS90725-117	7-16-56	6
H36031	7-17-12	1	MS90725-118	7-16-45	1
JD9257	7-24-18	1	MS90725-12	7-2-5	6
LM11910	7-32-24	2	MS90725-16	7-15-20	3
LM11949	7-32-20	2	MS90725-162	F7-1-41	2
LM67010	7-32-25	2	MS90725-165	F7-1-41	2
LM67048	7-32-22	2	MS90725-170	7-1-38	2
MA5307EX	7-16-42	1	MS90725-172	F7-1-42	1
MSN5307EX	7-16-72	8	MS90725-36	7-16-2	18
MS15001-1	7-2-21	1	MS90725-38	7-7-18	2
MS150459	7-16-30	1	MS90725-42	7-1-28	4
MS150465	7-16-73	1	MS90725-58	7-8-14	10
MS16562-74	7-32-5	1	MS90725-60	F7-10-20	21
MS16997-59	7-2-17	2	MS90725-62	F7-1-25	9
MS16997-60	7-16-21	2	MS90725-64	F7-1-26	20
MS20606M4T3	F7-3-10	13	MS90725-66	7-31-10	2
MS20913-1S	7-16-47	1	MS90725-8	7-31-15	4
MS20913-12S	7-15-34	1	M3636T	F7-17-20	1
MS20913-3S	7-3-9	1	M3853T	7-27-22	1
MS20913-4S	7-15-35	1	M4006-4	7-4-17	2
MS24665-132	7-31-2	4	M4009-10	7-4-20	1
MS24665-351	7-32-2	1	M41029	7-28-6	6
MS27183-11	7-2-13	6	NED-FAB-2	7-8-6	1
MS27183-13	7-8-16	42	PER-1A	7-9-1	1
MS27183-18	F7-1-24	16	P00-3951	7-8-18	1
MS27183-21	F7-1-42	1	P10-1246	7-8-20	1
MS3367-1	F7-1-10	5	P10-1872	7-8-22	1
MS35058-22	7-4-15	1	P10-2144	7-8-21	1
MS35338-24	F7-1-10	1	P10-2980	7-8-19	1
MS35338-25	7-2-18	6	P10-3113	7-8-17	1
MS35338-26	F7-1-28	22	Q5700M4H	7-8-2	1
MS35338-27	F7-1-25	48	RAX00-2325	7-4-11	1
MS35338-29	F7-1-43	13	RE13517	F7-20-24	
MS35338-31	7-1-39	4	RE15674	7-28-9	3
MS35387-1	7-10-4	4	RE16495	7-28-1	3
MS35387-2	7-10-18	4	RE18694	7-28-7	3
MS35425-42	7-11-5	2	RE19031	7-26-11	6
MS35649-102	F7-1-10	1	RE19797	7-22-6	1
MS35810-32	7-31-1	4	RE20601	7-18-25	1
MS35812-2	7-31-3	4	RE20602	7-18-28	1
MS39230-4	7-15-38	1	RE20603	7-18-26	1
MS39230-5	7-2-6	5	RE20604	7-18-39	1
MS39230-8	7-15-33	1	RE20605	7-18-40	1
MS39233-3	7-12-14	1	RE20606	7-18-36	1
MS51922-1	7-2-4	11	RE20607	7-18-38	1
MS51922-17	F7-10-20	18	RE20608	7-18-35	1
MS51922-33	F7-1-24	18	RE20609	7-18-34	1
MS51922-41	7-32-31	2	RE20610	7-18-31	1
MS51922-49	F7-1-41	3	RE20612	7-18-13	1
MS51922-5	7-13-7	1	RE20898	7-22-8	1
MS51922-9	7-2-11	8	RE20899	7-22-9	1
MS51953-101	7-2-8	3	RE20900	7-22-10	1
MS51953-145	7-15-26	1	RE20901	7-22-7	1
MS51953-52	7-12-15	1	RE20902	7-20-2	1
MS51953-78	7-15-37	1	R10093	7-17-2	1
MS51953-97	7-6-7	1	R20498	7-20-19	2

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R26125	7-26-25	6	R67779	7-22-28	3
R26241	7-30-38	2	R69260	7-29-4	1
R26286	7-20-24	1	R69442	7-22-25	3
	7-22-12		R69443	7-22-21	3
R26493	7-30-43	1	R69982	7-22-26	3
R26650	7-30-39	1	R70483	7-25-23	1
R27272	7-20-23	1	R70608	7-21-1	1
	7-22-11		R70956	7-21-16	1
R27285	7-20-20	1	R71835	F7-17-20	1
R27346	7-20-3	1	R73139	7-30-35	1
R34447	7-20-8	2	R73140	7-29-21	1
R34760	7-22-18	3	R73527	7-25-4	1
R35352	7-22-4	1	R73602	7-21-5	1
R42729	7-26-6	3	R73603	7-21-6	1
R46625	7-30-34	1	R74354	7-27-15	1
R46675	7-22-23	3	R74552	7-27-17	2
R47733	7-22-20	3	R74553	7-27-18	2
R48000	7-22-31	3	R75729	7-26-3	1
R48071	7-20-7	2	R76126	7-30-15	2
R48685	7-30-37	2	R76964	7-22-40	1
R48993	7-24-12	2		7-23-120	
R50597	7-18-18	1	R77126	F7-17-25	1
R51516	7-29-9	1		7-22-39	
R51726	7-28-10	3	R79089	7-30-22	1
R51731	7-28-5	3	R79418	7-30-1	1
R51734	7-26-28	3	R79604	7-22-15	3
R51936	7-22-3	6	R79605	7-22-16	3
R51937	7-22-2	6	R79863	7-29-17	1
R52251	7-26-26	3	R80033	7-28-2	6
R52252	7-26-27	3	R81984	7-18-37	1
R53223	7-26-21	14	R81985	7-18-23	1
R53382	7-27-16	1	R82045	7-18-21	1
R53524	7-21-7	1	R82871	7-26-16	1
R54565	7-26-7	2	SJ-5514	7-10-13	1
R54614	7-27-23	1	SMBU1250	7-16-52	2
R54802	7-30-45	3	SP1002CP	7-13-5	1
R54985	7-26-8	1	S320C-3/4TON	F7-1-43	2
R54998	7-20-14	1	TC7B	7-12-19	2
R55127	7-21-3	2	TR4-13	7-32-10	2
R55233	7-30-50	1	T13213	7-27-7	1
R55301	7-17-3	1	T18891	7-30-42	1
R55401	7-21-2	1	T19044	7-17-5	1
R55647	7-28-3	3	T19651	F7-17-14	2
R56012	7-18-1	1		7-24-9	
R56463	F7-17-13	1	T20006	F7-17-18	3
R57059	7-27-19	2	T20034	7-30-9	1
R57332	F7-26-26		T20046	7-30-5	1
R57333	F7-26-27		T20050	7-27-11	1
R57334	F7-26-26		T20070	7-24-33	1
R57335	F7-26-27		T20072	7-24-35	1
R57336	F7-26-26		T20073	7-26-14	6
R57337	F7-26-27		T20077	7-26-23	12
R59447	7-26-31	1	T20088	7-25-3	1
R60745	7-22-19	3	T20089	7-25-22	1
R60746	7-22-30	3	T20090	7-25-21	1
R61871	7-27-14	1	T20091	7-27-25	1
R62981	7-22-24	3	T20094	7-30-28	1
R62984	7-22-22	3	T20098	7-27-6	1
R64449	7-18-11	1	T20129	7-24-19	6
R65215	7-30-21	3	T20141	7-7-19	1
R65833	F7-28-11		T20155	7-29-16	1
R66090	7-22-5	2	T20159	7-17-8	1

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T20176	7-26-24	6
T20202	7-18-9	1
T20215	F7-17-15	1
T20217	7-30-3	1
T20219	F7-17-17	1
T20243	7-24-19	1
T20252	7-17-18	1
T20270	7-24-13	1
T20271	7-24-14	1
T20277	7-17-14	1
T20280	7-21-10	1
T20294	7-17-9	1
T20298	7-27-9	1
T20310	7-26-13	6
T20314	7-26-10	2
T20315	7-26-12	3
T20316	7-26-9	2
T20317	7-17-15	1
T20328	F7-17-9	1
T20336	7-17-11	1
T20362	7-29-1	1
T20461	7-25-12	1
T22535	7-26-37	1
T22536	7-25-19	1
T22537	7-25-17	1
T23435	7-17-6	1
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T23442	F7-17-25	3
	7-22-38	
T23474	7-30-23	8
T23526	7-17-22	1
T23590	7-25-14	1
T23604	7-30-30	1
T23628	7-24-8	1
T24192	7-17-10	1
T24472	7-22-32	3
T24534	7-27-8	1
T250	7-7-3	3
	7-7-14	
T25701	7-30-41	1
T26321	7-30-18	1
T26323	7-30-10	2
	7-30-19	
T26324	7-30-12	2
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T26325	7-30-14	2
T26326	7-30-8	2
	7-30-16	
T26327	7-30-7	1
T26508	7-26-15	1
T26965	7-25-10	3
	7-30-31	
T27261	7-24-17	1
T27657	7-29-5	1
T27658	7-29-8	1
T28041	7-26-34	1
T30726	7-27-5	24
T30738	7-20-4	3
T30897	7-24-15	1
T31174	7-22-33	3

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T31948	7-17-7	1
T32853	7-18-14	1
T33279	7-29-15	4
	7-30-40	
	7-15-13	1
X-646	7-8-12	1
Z-1028	7-15-12	1
0101-2-4	7-31-7	1
02182600	7-32-34	2
1-4001		
1-4250	F7-32-30	2
1-4251	F7-32-27	2
10274	7-23-123	1
10394	7-23-132	1
10408	7-23-1	1
10443	7-23-125	1
10453	7-23-128	2
10534	7-23-122	1
11086	7-23-119	2
11141	7-23-111	2
1114524	7-19-4	1
11175	7-23-109	1
11213	7-23-110	1
11214	F7-23-110	
11215	F7-23-110	
11216	F7-23-110	
11217	F7-23-110	
11331	7-23-80	2
11438	F7-23-119	1
11500204	F7-1-10	2
11500205	F7-1-10	1
11582	7-23-5	3
11588	7-23-13	3
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	7-23-57	1
11610	7-5-17	1
116332	7-4-12	1
117	7-23-55	1
11919	7-23-42	1
11966	7-23-41	1
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12H294	7-25-7	4
12H301	7-26-18	2
12H303	F7-17-25	4
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12H304	F7-17-20	47
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12H324	7-23-30	1
12019	7-19-44	4
120361	F7-11-2	1
120377	F7-11-2	1
120382	7-23-17	1
12049	7-23-29	1
12051		
1214-05	7-15-21	4
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12167	7-23-32	1

PART NUMBER	FIG & INDEX NUMBER	QTY PER END ITEM	PART NUMBER	FIG & INDEX NUMBER	QTY PER END ITEM
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12174	7-23-11	1	15H584	7-24-10	1
12175	7-23-33	2	15H665	7-30-47	1
1218-02	F7-1-15	2	15M2714	7-21-14	1
122-81413	7-32-7	1	150-225-12	7-16-63	1
12202	7-23-3	1	15093	F7-23-136	
12210	7-23-43	1	15228	7-23-89	1
12216	F7-23-117	1	15284	7-23-44	1
12221	7-23-37	1	15438	7-23-63	1
12253	7-23-22	1	15442	7-23-10	1
12285	7-23-105	1	15668	7-23-24	1
12288	7-23-46	2	15699	7-23-97	2
12299	7-14-7	1	15750	7-23-66	1
12337	7-23-12	1	16M2605	7-22-13	1
12360	7-23-51	1	16041	7-7-9	2
12362	7-23-52	1	16135	7-23-28	1
12500	7-23-20	2	16136	7-23-27	1
12519	7-23-18	2	16279	7-23-36	1
12622	7-23-68	2	1631	F7-4-24	36
	7-23-79		16320	F7-23-136	
12764	7-23-74	2	16392	7-23-23	1
13003	7-23-26	1	16440	7-23-102	1
13010	7-23-25	1	16441	7-23-103	1
132255	7-19-5	2	17438	7-23-35	3
132636	F7-10-22	4		7-23-70	
13521	7-23-6	3	17604	7-23-54	1
13807	7-23-69	1	179623	7-6-9	1
13827	7-23-104	1	17997	7-23-40	1
13837	7-23-101	1	18493	7-23-16	1
14H785	F7-17-25	3	18501	7-23-19	2
14H812	7-22-35		1852880	7-19-35	4
	F7-17-20	7	1862383	7-19-14	1
	7-18-5		1876358	7-19-1	1
	7-20-11		1876359	7-19-39	2
	7-24-6		1876361	7-19-42	2
14H826	7-29-14		1876366	7-19-33	1
	7-17-4	2	1876458	7-19-41	2
	7-27-10		1877345	7-19-29	1
14034	7-15-36	1	1887021	7-19-47	4
14048	7-3-4	89	1891927	7-19-23	1
14258	7-23-76	1	1891928	7-19-24	1
144039	F7-1-25	2	1893453	7-19-13	2
	7-1-48		1894023	7-19-25	1
144042	7-15-28	1	18952	7-13-6	1
14408	7-23-34	2	18959	7-23-77	1
144082	7-4-21	1	18967	7-23-65	1
144083	7-15-11	1	19H1387	7-25-6	2
144086	7-6-6	1	19H1439	7-25-5	2
144129	7-12-11	2	19H1721	7-30-2	1
144150	7-4-19	1	19H1726	F7-17-17	2
144151	7-15-15	1	19H1731	F7-17-20	4
14483	7-23-82	1		7-20-12	
145369	7-16-79	2		7-26-36	
14544	7-23-71	1	19H1732	F7-17-18	6
14570	7-4-2	12	19H1733	7-29-12	2
14760	7-23-14	2	19H1801	7-24-4	11
148898	7-4-5	1		7-29-11	
14940	7-23-75	1	19H1819	7-18-15	1
14941	7-23-72	1	19H1849	7-20-18	2
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	7-18-7		20225	7-23-53	1
19H2284	7-18-19	12	20226	7-23-50	1
	7-20-15		2024-12-12S	7-9-3	1
	7-27-2		20359	7-23-45	1
19H2545	7-29-2	10	20523	7-23-86	1
	7-24-2		20525	7-23-85	1
	7-25-8		20527	7-23-87	1
19H2665	F7-17-10	1	20528	7-23-95	1
19H268	7-21-8	4	20529	7-23-88	1
	7-26-5		20530	7-23-99	1
19H2993	7-25-2	4	2062-16-12S	7-9-7	1
19H3411	F7-17-7	2	20727	F7-23-117	3
19H3413	7-24-5	1	20803	7-23-96	4
19H444	7-26-17	2	20849	7-23-58	1
19H988	F7-17-15	2	20908-A	7-7-10	1
190254	F7-10-8	32	20951	7-23-15	1
190734	F7-10-22	4	21150-0500	7-16-46	12
192051	7-15-16	1		7-16-57	
1926640	7-19-18	1	21194	7-23-130	2
	7-19-30	1	21251	7-23-8	1
1928021	7-19-31	1	21283	7-23-115	1
1928022	7-19-20	1	21287	7-23-114	1
1932197	7-19-17	1	21521	7-23-127	1
1951567	7-19-7	1	21522	7-23-126	1
1952427	7-19-49	1	21660	7-23-81	1
1955946	7-19-32	1	2194-5	7-11-3	1
1964410	7-19-46	2	22H1035	7-25-11	1
1966923	7-19-48	4	22003-15	7-1-37	3
1968396	7-19-27	4		7-1-42	
1972786			22134	7-23-56	1
1976940	7-19-21	1	22144	7-23-78	1
1978281	7-19-8	1	22146	F7-23-136	3
1978297	7-19-10	1	22202	7-23-17	3
1978337	7-19-9	1	22238	7-23-59	1
19837	7-23-94	1	22315	7-23-21	1
19844	7-23-93	1	22351	7-23-4	2
19855	7-23-90	1	22601	7-23-134	1
1985617	7-19-34	1	22655	7-23-64	1
1986019	7-19-40	2	22658	7-23-67	1
1986455	7-19-12	1			
1986457	7-19-50	1	22862	7-23-107	1
1986464	7-19-22	1	22988	7-23-98	1
1986466	7-19-16	1	2302J022	F7-3-10	1
1986467	7-19-15	1	23056	7-23-61	1
1986468	7-19-26	1	23107	7-23-129	1
1986470	7-19-28	1	23190	F7-23-21	2
1987049	7-19-11	1	233	7-4-7	1
1987070	7-19-37	2	23365	7-23-121	1
19895	7-23-91	1	23402	7-23-2	1
19912	7-23-92	1	23752	7-23-108	1
1998367	7-17-20	1	23799	7-23-136	1
	F7-19-		23820	7-23-124	1
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20T7FT TUBE	7-4-9	1	24H1243	F7-17-25	3
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20177	7-23-117	3	24H1290	7-29-7	
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20219	7-23-49	1		7-18-17	
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24498	7-23-133	2		7-20-22	
	7-16-25	2	34H283	7-30-11	1
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24936	7-2-20	2	34170	F7-4-2	1
24963	F7-15-9	1	34855	F7-4-2	1
24964	7-16-81	2	36K	7-8-7	2
24972	7-16-64	1	3601-1	7-32-23	2
24978	F7-1-25	1	3601A	7-32-27	2
24982	7-15-31	1	37-10-071-10	7-10-7	4
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			39367	7-6-1	1
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2617	7-4-23	2	4015-98	7-4-3	1
26189	7-23-106	1	40596	7-16-19	1
26191	7-23-118	1	4250	7-32-33	2
26359	7-15-30	1	4251	7-32-30	2
26981	7-16-24	1	4283-29	7-1-17	1
270	7-12-13	1	42942	7-16-7	1
2702-16-12S	7-9-8	1	42948	7-16-13	1
27244	7-23-7	1	42950	7-16-71	8
			42976	7-16-48	2
27245	7-23-113	1			
273771	F7-1-3	29	43355	7-16-76	
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27422	F7-10-18		43365	7-16-11	1
274473	7-4-1	90	43392	7-16-9	1
	7-6-14	20	43393	7-16-80	2
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				7-16-82	2
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	F7-10-21		44064	7-16-15	1
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274875	7-19-36	2	44359	7-3-6	1
27601	7-23-116	1	443874	F7-10-8	32
27602	7-23-60	2	44413	7-16-58	1
27603	7-23-131	1	44522	7-16-85	1
27606	7-23-39	2	44523	7-16-70	8
	7-23-135		44525	7-16-68	8
27607	7-23-9	1	44919	7-16-14	1
27608	7-23-100	1	44972	7-16-78	1
27610	7-23-62	1	45121	7-16-27	1
27655	F7-3-10	4	453435	7-19-45	4
	F7-10-1		45813	7-8-10	1
	7-32-3		45846	7-8-5	1
28H2547	7-18-10	2	46T	7-2-7	1
28K	F7-1-16	4	4600-1	7-32-18	2
	F7-1-17		4601-7	7-32-35	8
29020	F7-1-43	72	4603-1	7-32-15	10
2940090A	7-18-22	1	46888	7-16-29	1
30-5632-4	7-4-16	1	46971	7-16-54	1

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47784	7-16-66	1	63954	7-16-12	1
47786	7-16-65	1	64015	7-15-27	1
47788	F7-16-61	1	64022	7-15-19	1
4800-3	7-32-28	2	64023	7-15-23	1
4800-5	7-32-17	2	64024	7-15-22	1
48012	7-16-43	1	64025	7-15-18	1
48013	F7-16-73	8	64195	7-12-9	2
48016	7-16-73	8	64534	F7-10-1	2
48465	7-1-31	2	64729	7-32-9	2
48466	7-1-30	2	64821	7-1-50	2
48478	7-16-30	1	64932	7-16-4	1
48772	7-15-45	1	65060	F7-10-1	2
48793	7-16-39	1	65061	7-10-1	2
4901-19	7-32-32	2	65290	7-12-20	1
5011	7-4-14	1	65291	7-12-21	1
51M7012	7-21-15	1	65578	7-11-7	2
5100-5	7-32-36	4	65595	7-12-30	2
52K	7-8-4	4	66419	7-2-22	1
	7-8-9		66421	7-2-16	1
52435-013	7-4-10	1	66424	7-2-15	1
5403-1	7-32-29	2	66425	7-2-14	1
55083-212-2L	7-15-2	2	66604*	7-12-32	2
5600-7	7-32-37	2	66633	7-16-53	1
59-028-125-0750	F7-16-73	8	66646	7-15-46	1
6-5601-U	7-10-8	4	66647	7-15-41	1
60X5	F7-1-8	12	66745	7-6-3	1
	7-14-3		67724	F7-1-15	2
	F7-15-5		67794	F7-16-61	1
	F7-15-6		67911	7-16-10	1
60205	7-15-42	8	67919	7-7-7	2
60837*	7-19-52	1	67924	7-12-24	4
60979	7-15-44	1	67991	7-8-8	1
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61758	7-16-26	1	68524	7-1-25	1
61759	7-16-20	1	68716	7-1-18	1
61761	7-16-23	1	68749	F7-10-17	16
61808	7-9-2	1		F7-10-23	
61872*	7-15-48	1		F7-10-24	
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6300	7-32-21	2	69372	F7-1-10	1
6301	7-32-16	2	69992*	F7-10-6	1
63062	7-15-32	1	7205X16X12	7-9-5	1
63076	7-13-1	1	75	7-31-11	2
63197	7-16-39	1	75000316	F7-2-13	126
63302*	7-8-23	1	7629X16	7-9-6	1
63303*	7-15-47	1	80009	7-1-29	1
63345	7-12-28	1	800091	7-19-38	2
63346	7-12-29	1	80107	7-10-22	1
634	7-32-11	1	80138	F7-1-42	1

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80163	7-1-32	1	86445	F7-10-14	1
80383	7-13-2	1	86446	7-12-31	1
80569	7-1-27	1	86447	F7-10-12	1
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80696	7-11-1	2		F7-9-	
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81038	7-1-40	2	86456-1*	7-4-25	1
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81796	7-6-12	1	86458*	7-4-27	1
82756*	7-10-26	1	86459*	7-10-16	1
83212	7-1-16	1	86460*	7-5-18	1
83284-2	7-11-2	1	86464-1	7-10-24	1
83667	7-1-8	1	86466	7-3-3	2
83671	7-14-1	3	86467	7-1-34	2
	7-15-4		86468	7-1-41	1
	7-15-6		86469	7-31-20	2
83929	7-1-43	2	86470	7-31-16	2
85-12-220-20	7-10-10	2	86471	7-31-5	2
85-34-101-20	F7-10-10	2	86473	7-31-6	1
85-47-101-20	7-10-11	2	86486	7-31-12	2
85362	7-10-23	1	86488	7-15-1	1
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85981	7-11-8	1		7-15-40	
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86168	7-11-4	1	86491	7-3-10	1
86170	7-3-5	1	86492	F7-3-4	1
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86385	7-3-11	1	86494	7-8-1	1
86386	7-7-13	1	86495	7-1-12	1
86387	7-7-11	1	86496	7-10-17	1
86388	7-7-12	1	86498	F7-10-6	1
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86390	7-10-20	1	86500	F7-10-9	4
86391	7-10-14	1	86501	7-10-25	1
86392	7-10-21	1	86502	F7-12-8	1
86393	7-10-12	1	86503	7-7-8	2
86394	7-3-8	1	86504	7-15-5	1
86395	7-10-6	2	86505	7-1-10	2
86397	7-10-15	1	86533	7-10-9	1
86399	7-2-19	1	86537	7-10-2	2
86405	F7-1-	1	86540-1	7-7-4	1
86409	7-16-5	1	86668	F7-1-8	1
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86417	7-16-6	1	900729-12	F7-1-16	1
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86419	F7-2-13	1	9095	7-4-13	2
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