

TECHNICAL MANUAL

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

**GENERATOR SET,
DIESEL ENGINE DRIVEN, 3KW
60HZ, 120/240 VAC, SINGLE PHASE, 12 VDC**

MODEL 30D36R

**PART NO. 0015-70029
NSN 6115-01-256-1059**

T&J MANUFACTURING INC.
OSHKOSH, WISCONSIN
FSCM 51879

CONTRACT NO. F04606-89-D-0106

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SAFETY SUMMARY

These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance. The following warnings appear in the text in this manual, and are repeated here for emphasis.

WARNING

When working around batteries, always wear eye protection (face shield), acid resistant rubber apron, and gloves. (Page 3-1)

WARNING

Personnel in the immediate vicinity of an operating generator set must wear ear protection. (Page 4-6, 4-8)

WARNING

Do not operate generator set with wet hands or in the rain. Severe shock potential exists. (Page 4-6)

WARNING

Wear electrically insulated gloves while performing the following tests. (6-29)

WARNING

Solvent P-D-680, Type II is toxic to skin, eyes, and respiratory tract. Skin and eye protection required. Avoid repeated or prolonged contact. Use only in a well-ventilated area. (6-10, 6-18, 6-28)

WARNING

Compressed air used for cleaning can create airborne particles that may enter the eyes. Pressure will not exceed 30 psig. Eye protection required. (6-18, 6-28)

WARNING

Cleaning Compound, MIL-C-87396, Type I, is toxic to eyes, skin and respiratory tract. Skin and eye protection required. Use only in well-ventilated area. (6-28)

SAFETY SUMMARY - CONT

These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance. The following cautions appear in the text in this manual, and are repeated here for emphasis.

CAUTION

DO NOT operate Diesel Engine Generator in an enclosed compartment. This is a potential fire hazard due to inadequate cooling air flow through the generator. (Page 4-5)

CAUTION

Do Not fill fuel tank while engine is running. If fuel is spilled, wipe it and let dry before starting engine. (Page 4-6)

CAUTION

Do not place flammable materials near the generator. (Page 4-6)

CAUTION

Do not connect a ground cable to a water pipe or to a ground used by a radio system. (Page 4-6)

CAUTION

Ensure that electrical components are thoroughly dried before connecting to an electrical power supply. (Page 6-28)

CAUTION

Do not crank engine continuously with electric starter for more than 10 seconds. Allow starter to cool between start attempts. If engine fails to start after three attempts, shut off key switch and determine cause of hard starting. (Page 4-7)

CAUTION

The capacitor (5, Figure 6-9) has the ability to store an electric charge which creates a dangerous shock potential. To discharge the capacitor, the leads of the capacitor must be shorted together with metal. (Page 6-15)

CAUTION

Do not reverse polarity of leads. If polarity is reversed, damage may occur to the diodes or rotor or both. (Page 6-25)

CAUTION

Do not use P-D-680, Type II, or MIL-C-87396, Type I, to clean lubricant seals or rubber hoses. (Page 6-26)

WARRANTY

The 3KW Diesel Engine Driven Lightweight Independent Power System (LIPS) Generator Set, Model 30D36R is supported by a one year parts and labor warranty from date of delivery.

Manufacturer's obligation under this warranty is limited to correcting at the manufacturer's factory, or point designated, any part or parts returned, transportation charges prepaid, and which upon examination shall disclose an original defect. Item requiring repair or replacement due to normal wear, misuse, negligence, accident, or repaired or altered by other than the manufacturer are not covered by this warranty.

All claims must be brought to the manufacturer's attention within 30 (thirty) days after discovery. For expedient processing of repair, or claims, specific details regarding the failure should be directed promptly as indicated below.

Complete assembly (Generator, controls, fuel tank, etc.)

T & J Manufacturing, Inc.
102 W. 5th Avenue
Oshkosh, WI 54902
P.O. Box 200
Phone (414) 236-4200

Electrical Assembly
T & J Manufacturing, Inc.
102 W. 5th Avenue
Oshkosh, WI 54902
P.O. Box 200
Phone (414) 236-4200

Engine Assembly (For known engine related deficiencies)

Teledyne Total Power
1127 International Pky
Fredericksburg, VA 22405-1125
Phone (703) 752-9395

CHAPTER 1

GENERAL INFORMATION

1-1 INTRODUCTION

1-1.1 Scope. This manual covers the Model 30D36R, 3KW, Diesel Engine Driven Lightweight Independent Power System (LIPS) Generator Set manufactured by T & J Manufacturing, Inc. of Oshkosh, Wisconsin 51879, under Contract Number F04606-89-D-0106. Information in this manual includes Operation, Maintenance, Overhaul Instructions and Illustrated Parts Breakdown as per MIL-M-38798B. The text is supplemented with illustrations, tables and diagrams. References to illustrations, tables and diagrams are given in the text as necessary for clarification of procedures. An overall view of the Diesel Engine Powered generator Set is shown in Figure 1-1.

1-2 DESCRIPTION

1-2.1 Engine-Generator. This unit is a 2 pole, single phase 60 Hertz generator. It is driven by a single cylinder, air cooled 4 cycle diesel engine at a design speed of 3600 RPM (Revolutions Per Minute). The engine-generator is rubber mounted within a one piece frame assembly. The rotating components of the generator are mounted directly to the engine output shaft to form a single rotating element.

This rotating element is supported by a heavy duty sealed ball bearing assembly at the generator end and by the engine crankshaft plain bearings. A fan mounted between the engine and generator draws air through the generator to cool the internal components.

1-2.2 Base Assembly. The engine-generator assembly is mounted within a one piece steel base assembly using rubber shock mounts to isolate the base assembly from engine vibration. A ground lug is mounted on the generator assembly for grounding the unit.

1-3 PURPOSE

The purpose of the engine generator is to provide a lightweight portable source of electrical power to operate a variety of communications equipment and/or lighting equipment. This unit may also be used to recharge 12 VDC batteries by using the built-in battery charger terminals.

1-4 LEADING PARTICULARS

Refer to Table 1-1 for leading particulars pertaining to the Model 30D36R Diesel Engine Generator Set.

Table 1-1. Leading Particulars

Output Power (AC)

Voltage and Amps	110 to 120V/25.0 amps at 120 volt outlet 220 to 240V/12.5 amps at 240 volt outlet
Phase	Single
Frequency	60Hz
Kilowatts (KW)	3KW Continuous, 3.15KW for 5 min.
Power Factor	1.0

Output Power (DC)

Voltage and Amp	12 VDC @ 8 amps
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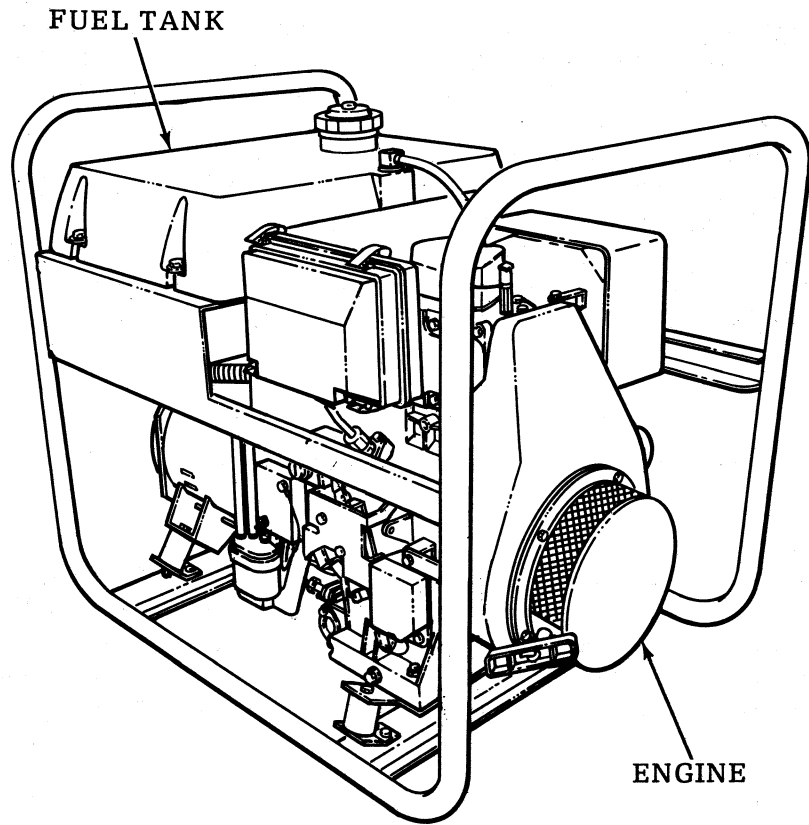
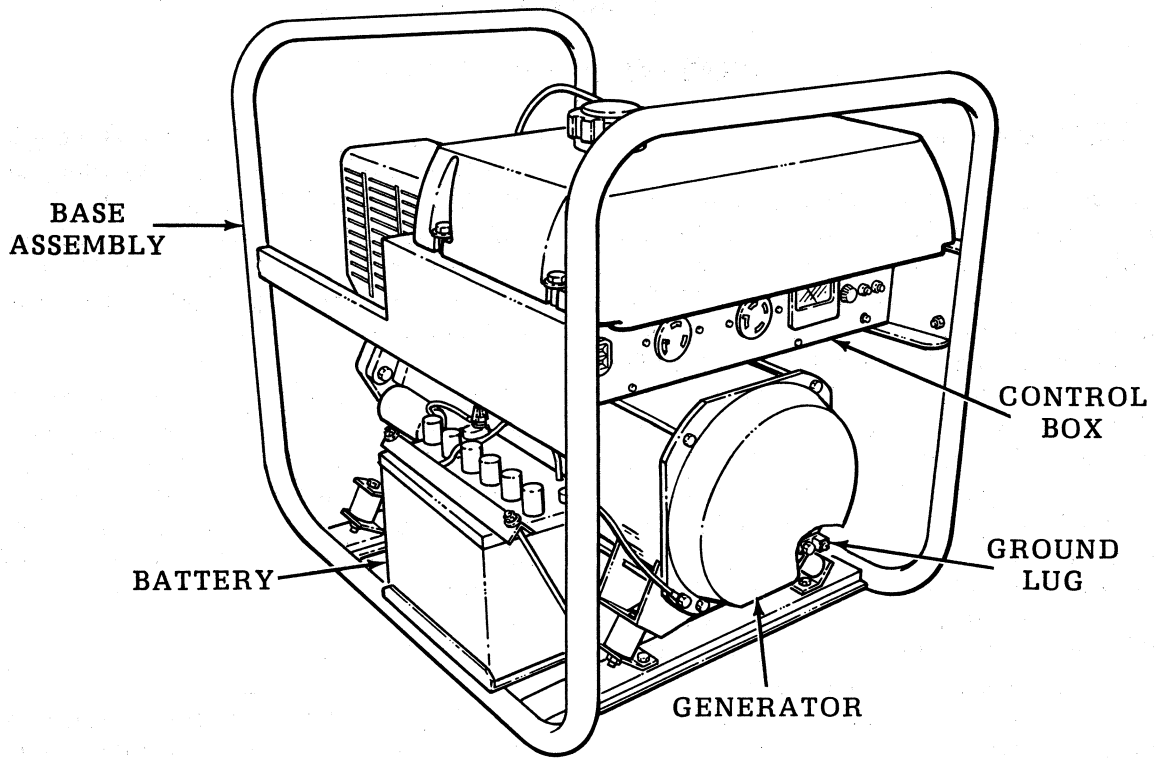


Figure 1-1. Generator Set, Diesel Engine Powered

Table 1-1. Leading Particulars - CONT

 Dimensions in. (mm)

Length	25 in. (645.16mm)
Width	19 in. (482.6mm)
Height	22 in. (558.8mm)
Weight (dry)	180 lbs. (81.64Kg)

Operable Climatic Conditions

Operational Temperature Range	-25°F to +125°F
Altitude Conditions Affecting Output	
3000 ft. at 107°F	Unit will produce no less than 2.25kw.
5000 ft. at 95°F	Unit will produce no less than 2.25kw.

Engine Characteristics

Type	Single Cylinder, 4-Cycle Diesel
Cooling System	Forced Air
Combustion System	Direct Injection
Compression Ratio	21 to 1
Starting Systems	Electric and Manual Recoil
Lubrication System	Trochoidal Pump
Oil	SAE 10W-30 or equivalent
Fuel Requirements	DF-1, DF-2, DFA JP-4, JP-5 and JP-8
Fuel Consumption (Under 75 % Power at 3600 RPM)	0.30 GPH
Fuel Capacity (9 Hours and 20 Minutes Operating Time)	2.8 Gallons
Engine Protection System	Automatic Shutdown due to Low Oil Pressure
Engine Rotation	Counterclockwise as viewed from output shaft side
Governor System	Centrifugal Flyweight Type
Valves	Solid Tappets

 1-5 SPECIAL TOOLS AND TEST EQUIPMENT

The following is a list of special tools and

test equipment required to perform diagnostic troubleshooting procedures on the diesel engine driven generator set.

Table 1-2. Special Tools and Test Equipment

Tool Number	Mfr. Code	Figure and Index Number	Nomenclature	Use
		Figure 6-13	Voltmeter 0-300 VAC Contactless Tachometer	Test Generator Set Output Adjust Engine Speed.
		Figure 6-10A Figure 6-10B Figure 6-10C Figure 6-10D	Multimeter With Diode Checking Capability	Test Generator Components for Continuity or Short Circuits and test diodes
		Figure 6-10A	Soldering Pencil 25 Watt	Diode removal and Installation
		Figure 6-10C	12 Volt Automotive Type Battery	Use with voltmeter to test generator battery charging capability.
		Figure 6-14 Figure 6-10C	Voltmeter 0-50 VDC	Test Generator battery charging capability. Test capacitor charge retention capability.

NOTE: Metric sockets, box end, and open end tools will be necessary for normal engine maintenance.

1-6 RELATED TECHNICAL MANUALS

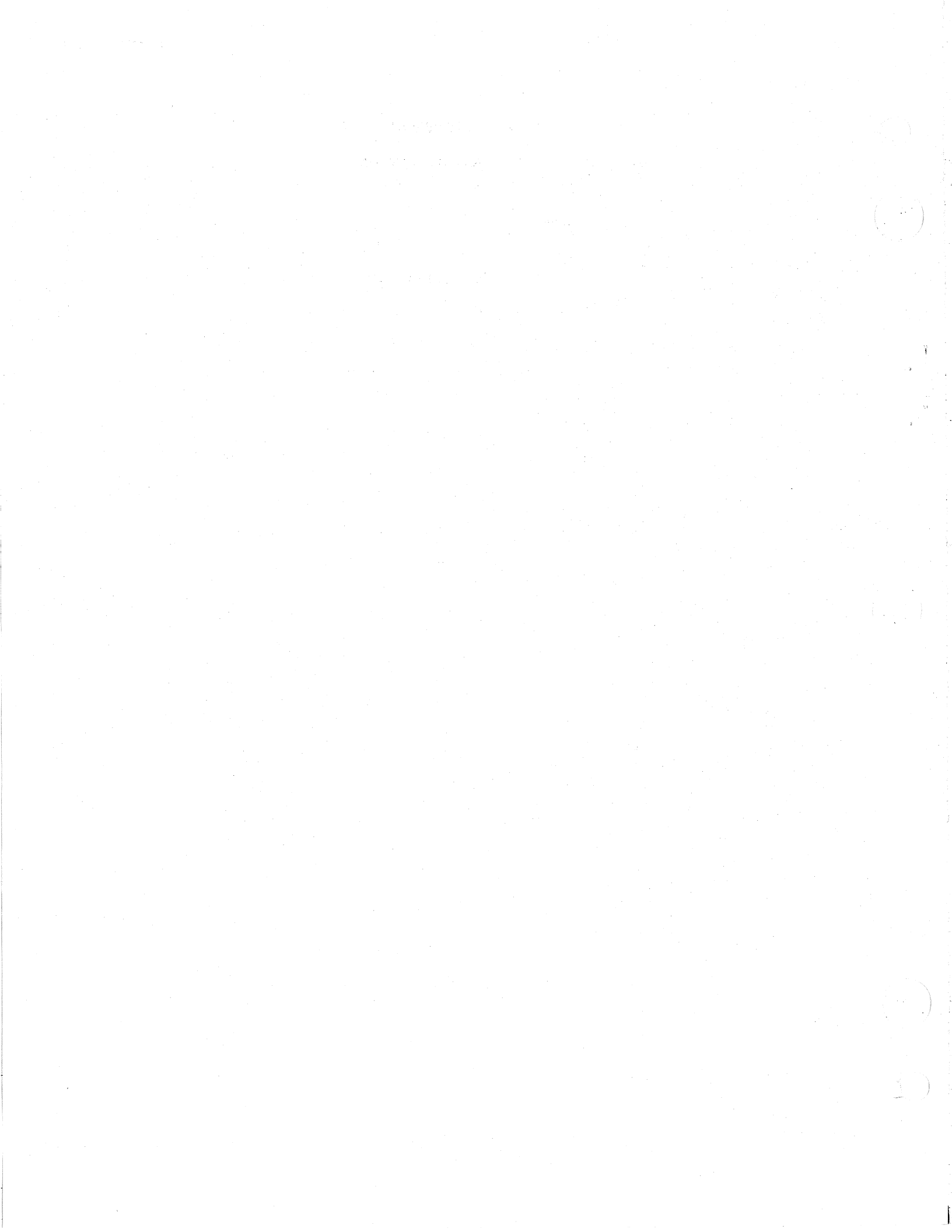
Table 1-3. Related Technical Manuals

Publication Number	Title	Equipment Nomenclature
TTP30190	Repair Manual Wisconsin Robin Models WRD1- 270	Diesel Engine Generator Set Model 30D 36R

NOTE: This manual is available, and can be obtained through Teledyne distributors.

CHAPTER 2
INSTALLATION

(Not Applicable)



CHAPTER 3

PREPARATION FOR USE, RESHIPMENT AND STORAGE

SECTION I. PREPARATION FOR USE

3-1 GENERAL

This section provides information necessary for personnel to make the unit operational. Initial inspection and preparation for use are included.

3-2 INITIAL INSPECTION

- a. Upon receipt of the unit, make a thorough inspection to detect any shipping damage that may have occurred.
- b. Check for loose or missing components.
- c. Notify supervisor about any damage or missing parts.

3-3 PREPARATION FOR USE

- a. Refer to Lubrication Instructions (Tables 6-3 and 6-4) in this manual and fill the crankcase with the correct specified motor oil for the operating temperatures.
- b. Fill the fuel tank with one of the following fuels; DF-1, DF-2, DFA, JP-4, JP-5 or JP-8 depending on the ambient temperatures and/or fuel availability.
- c. Perform the following procedures to prepare the battery for operation:

WARNING

When working around batteries, always wear eye protection (face shield), acid resistant rubber apron, and gloves.

- (1) Remove the seal from each of the six cells.
- (2) Fill each cell with 1.285 specific gravity sulphuric acid electrolyte to the bottom of the split ring.
- (3) Rock the battery side to side to release any trapped air then, readjust electrolyte as necessary.
- (4) Let battery stand for one hour.
- (5) Check and readjust electrolyte level if necessary.
- (6) Clean and neutralize any spilled electrolyte on battery.
- (7) Charge battery with a 3 amp charger until all cells are gassing freely and the charge voltage and specific gravity of electrolyte are constant over three successive readings taken at one hour intervals. (This procedure may take 18 - 24 hours with a constant current charger.) During this period of charging, the electrolyte temperature must be maintained between 60°F and 110°F (15.6°C and 43.3°C).
- (8) When battery is fully charged, the specific gravity should read between 1.285 and 1.295.
- (9) Check and readjust electrolyte level to proper height then recharge for one hour.
- (10) Install spill-proof caps on all cells.

- d. Refer to paragraph 6.6 and perform the fuel system bleeding procedures to expel any air trapped in the fuel lines.
- e. If the unit has been idle for an extended period of time, the residual magnetism in the rotor may have diminished. If the unit fails to produce electricity, it may need to be "flashed". Refer to paragraph 6-13 and perform the procedures to "Flash" unit.
- f. Generator Sets shipped to areas where the normal operating temperatures are above 30°F are delivered with the manifold heater electrical lead (Figure 3-1) disconnected

to protect the engine from possible damage. If the generator set is transported to an area where ambient temperatures are below 30°F, the manifold heater electrical lead shall be connected to the manifold heater terminal stud to render the manifold heater operational. To do so, perform the following.

- (1) Remove the nut with lockwasher from the terminal stud.
- (2) Install the electrical lead on the terminal stud.
- (3) Secure with nut with lockwasher.

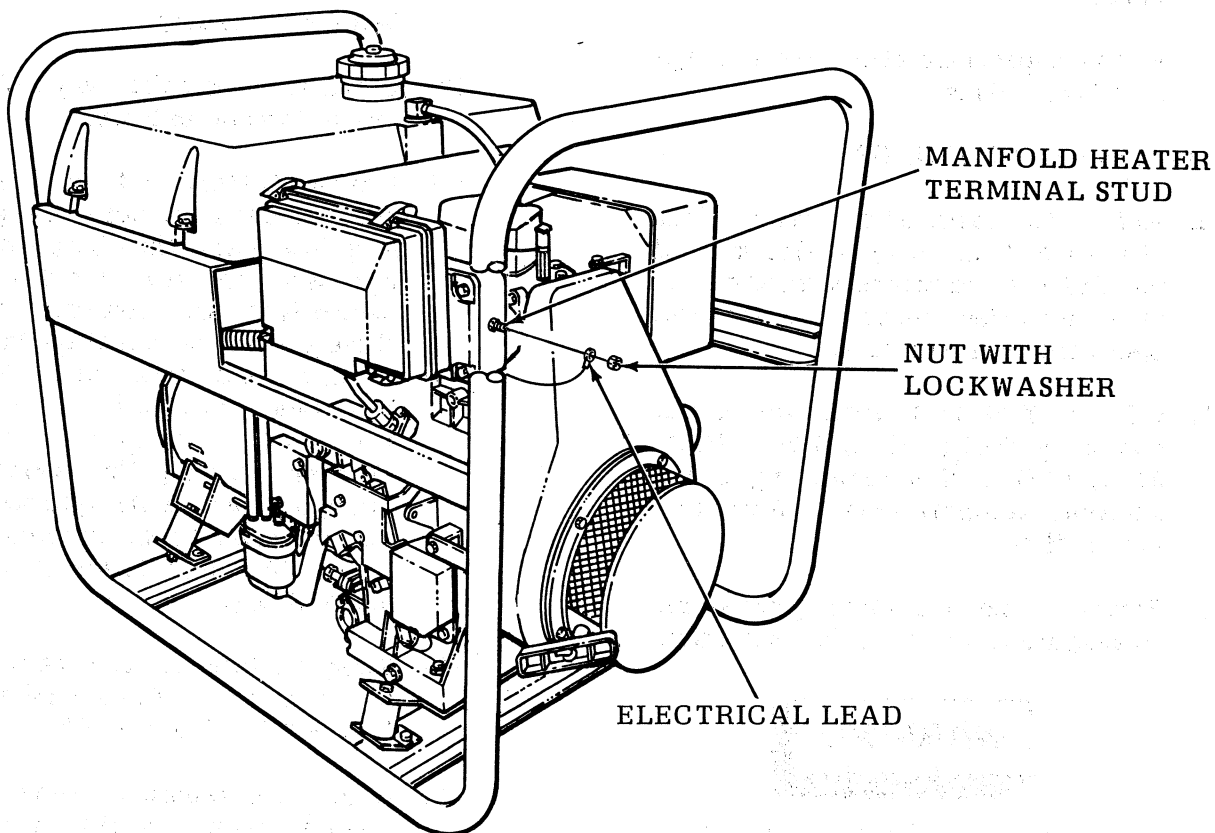


Figure 3-1. Manifold Heater

SECTION II. PREPARATION FOR RESHIPMENT AND STORAGE**3-4 GENERAL**

Perform the following steps to remove a unit from service and prepare it for shipment and/or storage.

- a. Disconnect all electrical loads by unplugging connectors from receptacles.
- b. Refer to Figure 3-2 and provide a suitable container to catch drainings then remove the drain capscrew (1) from the bottom of the fuel filter (2) to drain all fuel from the fuel system. Once drained replace the drain capscrew.
- c. Loosen the fuel tube cap nut (3) on the injector nozzle to allow fuel to escape injection pump (4), then tighten fuel tube cap nut.
- d. While engine is still warm, remove crankcase drain capscrew (5) to drain crankcase oil. Once drained, replace drain capscrew (5), remove dipstick (6) and fill with fresh oil.
- e. Disconnect battery terminals, negative (-) first, and isolate them.
- f. Store the Diesel Engine Generator Set in a cool dry place and charge the battery once a month to maintain battery at full charge and prevent sulfating of the battery plates.
- g. If the unit is to remain idle for 30 days or more, remove the auxiliary fuel inlet cap (7) on top of the engine and pour in 4cc of SAE 30 motor oil. Replace priming cap then, crank engine three revolutions to distribute oil in cylinder. Do not start engine.

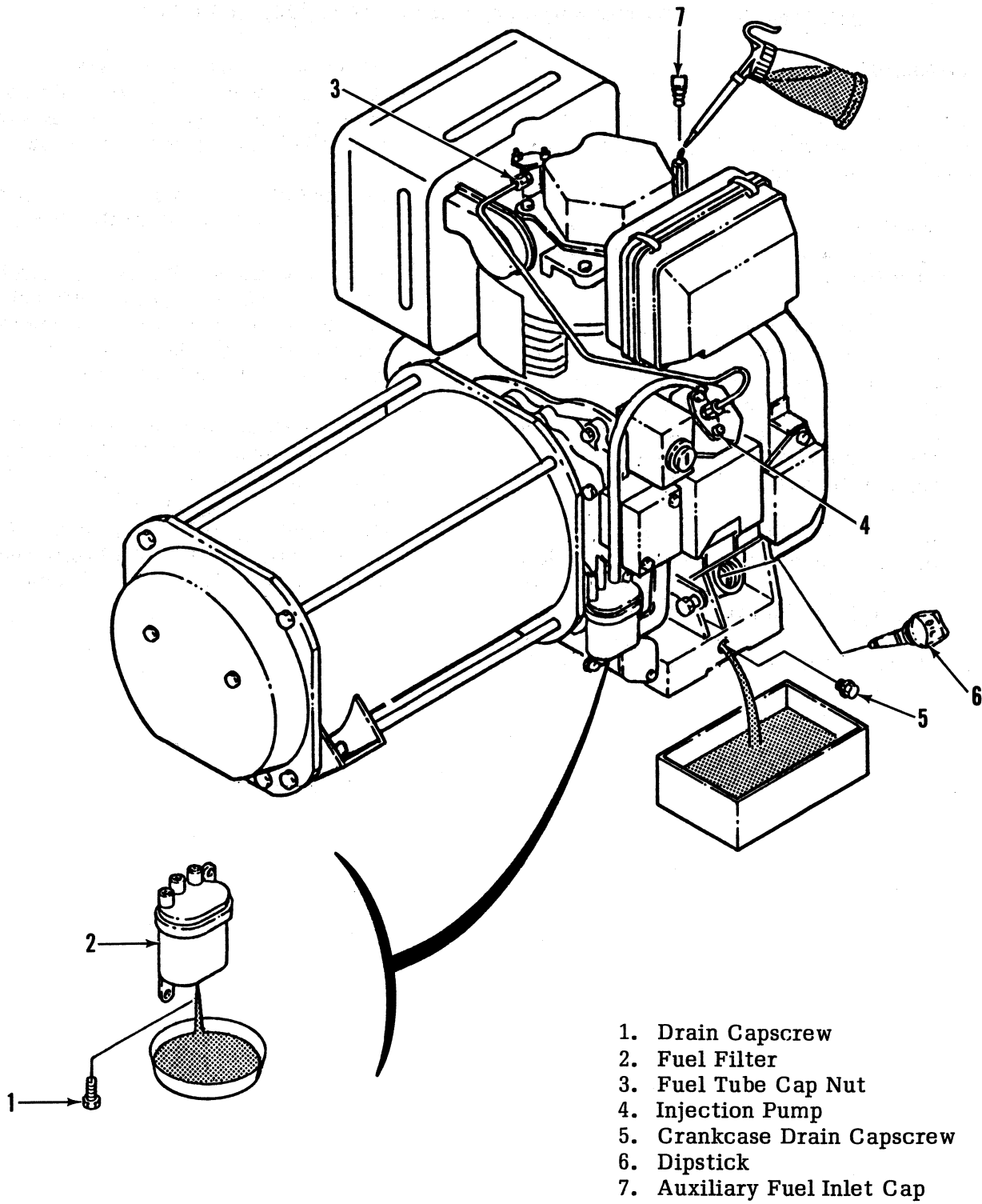


Figure 3-2. Preparing for Storage

CHAPTER 4

OPERATION

SECTION I. CONTROLS AND INDICATORS

4-1 GENERAL

The controls and indicators for operation of the Diesel Engine Generator Set are shown in Figure 4-1. The name and function of each control and indicator are listed in Table 4-1. The index numbers in the

figure correspond to the index numbers in the table. The operator should know the location of each control and indicator and have a thorough knowledge of the function and operation of each before attempting to operate the unit.

Table 4-1. Controls and Indicators

ITEM NO.	NAME	FUNCTION
1	Fuel Gauge	The fuel filler cap incorporates a fuel level gauge to show level of fuel remaining in tank.
2	Circuit Breaker (CB2)	Button pops out to indicate a short or overload exists in the 240 volt, 15 amp circuit. Determine cause of short or overload then push button in to reset.
3	Circuit Breaker (CB1)	Button pops out to indicate a short or overload exists in 120V, 30 amp circuit. Determine cause of short or overload then push button in to reset.
4	Low Oil Pressure Light	Red lamp illuminates to indicate engine lubricating oil pressure is too low.
5	Fuse Holder	Push cap in and rotate cap 1/4 turn counterclockwise to remove cap and fuse.
6	Voltmeter	Indicates AC voltage output of generator set.
7	Receptacle	120/240 VAC, 20 amp maximum rated electrical power outlet.
8	Receptacle	120 VAC, 30 amp maximum rated electrical power outlet.
9, 10	Receptacles	120 VAC, 15 amp maximum rated electrical power outlet.
11	Oil Dipstick-Fill Plug	Dipstick is used to measure level of lubricating oil in crankcase.
12	Drain Plug	Remove plug to drain engine lubricating oil.

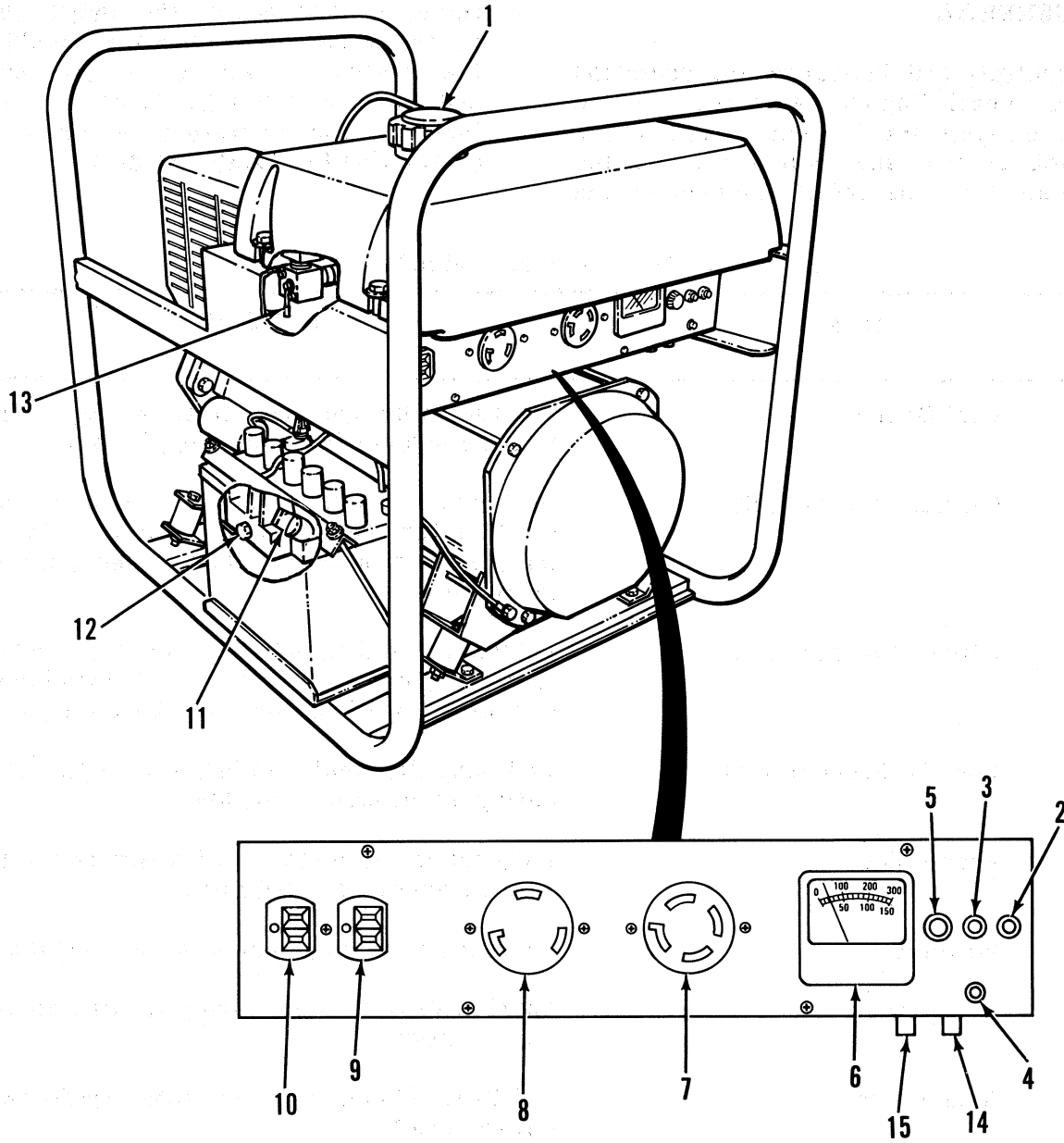


Figure 4-1. Controls and Indicators (Sheet 1 of 2)

Table 4-1. Controls and Indicators - CONT

ITEM NO.	NAME	FUNCTION
13	Fuel Valve	1/4 turn valve opens or closes fuel supply to engine. Handle points down to turn fuel ON, handle points toward engine to shut off fuel supply.
14	Positive (+) Battery Charger Terminal	Use this terminal along with item (15) negative (-) terminal to charge DC batteries. Remove red cap then connect positive (+) terminal of battery to positive (+) terminal (14).
15	Negative (-) Battery Charger Terminal	Use this terminal along with item (14) positive (+) terminal to charge DC batteries. Remove black cap then connect negative (-) terminal of battery to negative (-) terminal (15).
16	Auxiliary Fuel Inlet	Used for priming engine. Remove cap, add 3 to 5 cc of diesel fuel then replace cap to prime engine.
17	Recoil Starter Handle	Grasp handle and pull out starter cable to crank engine.
18	Fuel Filter Water Trap Drain	Remove bolt to drain accumulated water and sediment from filter housing. Once drained, replace bolt.
19	Dipstick and Oil Fill Plug	See Item 11.
20	Engine Oil Drain Plug	See Item 12.
21	Engine STOP Lever	Push stop lever right to shut down engine, then turn key switch (23) to off.
22	Engine Run Lever	Push Run Lever right to "RUN" position to allow engine to be started.
23	Engine Start Switch	Key operated, four position switch. Positions are, (clockwise from left) manifold heater on, OFF, RUN, Start.
		Manifold Heater On - This position is to be used when ambient temperature is below 20°F to heat the air in the intake manifold to ease starting. Rotate key to this position for 15 seconds prior to attempting to start engine.

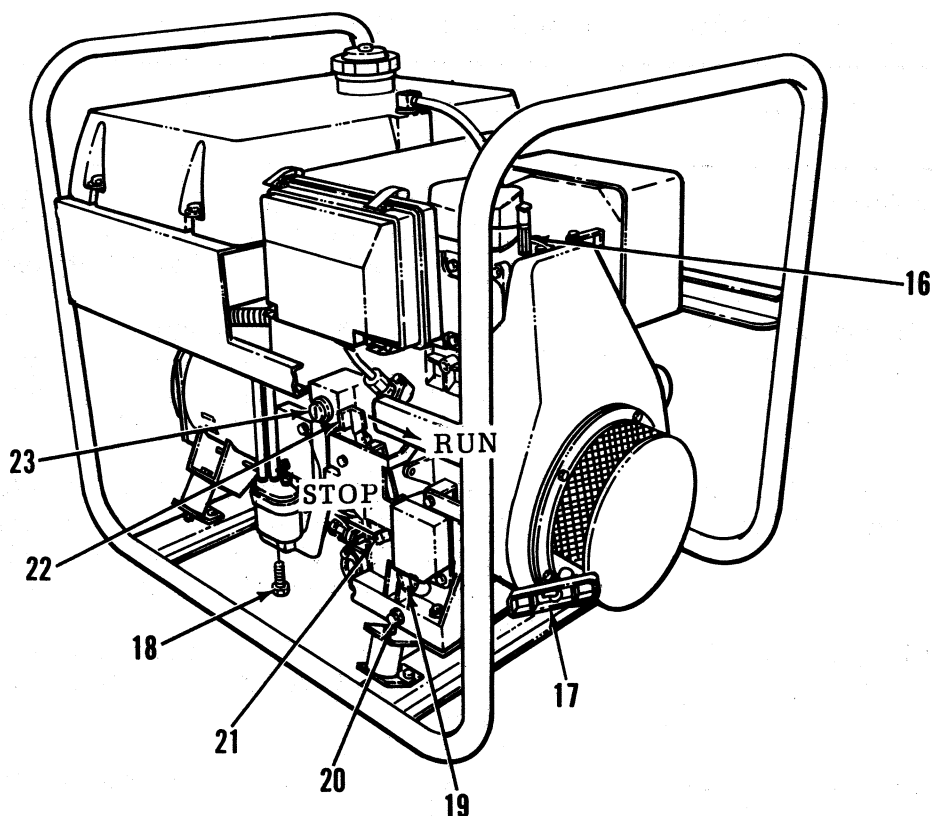


Figure 4-1. Controls and Indicators (Sheet 2 of 2)

Table 4-1. Controls and Indicators - CONT

ITEM NO.	NAME	FUNCTION
23	Engine Start Switch - continued	<p>Manifold Heater On - Do not exceed 20 seconds or damage to manifold heater may result.</p> <p>OFF - This position de-energizes the battery charging electrical circuit and the low oil pressure sensor circuit.</p> <p>RUN - This position energizes the low oil pressure sensor circuit and the battery charging circuit.</p> <p>Start - Spring loaded position sends electrical power to the starter motor to crank the engine for starting. Release key to RUN position once engine starts.</p>

SECTION II. OPERATING INSTRUCTIONS

4-2 SITE LOCATION

Choose an operating location for the Diesel Engine Generator that will best protect the unit from the following:

- a. **MOISTURE** - All electrical equipment should be protected from excessive moisture. Failure to do so will result in deterioration of the insulation and may result in short circuits.
- b. **DIRT** - Foreign materials such as dust, sand, lint and abrasive materials have a tendency to cause excessive wear not only to the engine parts, but also to the generator parts. It is important that the unit be installed in a reasonably clean location for best service.
- c. **HEAT** - All engines give off considerable heat when running. Since the engine used on the generator set is air-cooled it is important that the temperature of the area in which it is located does not exceed 125°F. Where natural ventilation is inadequate a fan to boost circulation should be installed.
- d. **COLD** - Engines start easiest when they are not subjected to extreme cold. Engine-generators should be located where the temperature does not fall below freezing.

4-3 SAFETY PRECAUTIONS

Observe the following safety precautions whenever operating the Diesel Engine Generator.



DO NOT operate Diesel Engine Generator in an enclosed compartment. This is a potential fire hazard due to inadequate

cooling air flow through the generator.

- a. Exhaust gases from diesel engines are extremely poisonous. Whenever an engine is used indoors, the exhaust fumes must be vented to the outside.
- b. Use sufficiently large insulated wire to connect the unit to the load. The size of wire will depend largely on the distance, permissible voltage drop in the amount and kind of load. Use the following table as a guide:

Table 4-2. Wire Size Guide

0 - 100 ft.	Use #10 wire
100 - 300 ft.	Use #8 wire
Over 300 ft.	Use #6 wire

- c. Whenever the generator set is to be temporarily connected to a building that is also supplied electricity by a local utility, the generator set shall be connected only after opening the main power switch of the building. This will isolate the building's electrical system from the local utilities electrical wires and prevent the hazard of backfeed.
- d. Whenever the generator set is to be connected permanently to a building which is supplied electricity by a local utility, the generator set shall be connected only by means of a double throw (transfer) switch. This will isolate the building's electrical system from the local utility's electrical wires and prevent the hazard of backfeed.
- e. Do Not hold circuit breaker buttons in to override circuit breakers. Overloading the generator could cause damage to both generator

and equipment.

CAUTION

Do Not fill fuel tank while engine is running. If fuel is spilled, wipe it and let dry before starting engine.

- f. Do not smoke or use open flame near the fuel tank.

WARNING

Do not operate generator set with wet hands or in the rain. Severe shock potential exists.

CAUTION

Do not place flammable materials near the generator.

- g. Operate generator set on level ground or surface.

4-4 PRESTART CHECK

Perform the following steps prior to starting the Diesel Engine Generator.

- a. Check that the fuel tank is full of the proper specified fuel.
- b. Provide a suitable container then, drain the fuel filter (2, Figure 3-2) using drain capscrew to remove condensation.
- c. Check the level of lubricating oil in the engine crankcase using dipstick (5, Figure 6-1).
- d. Make certain unit is grounded by performing the following:

- (1) As close to the generator set as possible, drive a 3/4" to 1" diameter metal pipe into the ground to a depth of 2 feet.

- (2) Connect a #10 wire to both the pipe and the ground lug of the generator.

CAUTION

Do not connect a ground cable to a water pipe or to a ground used by a radio system.

- e. Check all fuel line connections for signs of leakage. Have leaks fixed.
- f. Check mounting hardware for looseness. Tighten any loose hardware.

4-5 NORMAL ENGINE START

- a. Perform the pre-start checks outlined in paragraph 4-4.

NOTE

Remove all electrical loads prior to starting engine.

- b. Open fuel valve (13, Figure 4-1) under fuel tank.

WARNING

Personnel in the immediate vicinity of an operating generator set must wear ear protection.

- c. Set engine run lever (22), to "RUN" position.

CAUTION

Do not crank engine continuously with electric starter for more than 10 seconds. Allow starter to cool between start attempts. If engine fails to start after three attempts, shut off key switch and determine cause of hard starting.

- d. Rotate key switch (23) to "START" position to crank engine. When engine starts, release key switch to "RUN" position.
- e. If battery is not sufficiently charged to crank and start engine, perform steps a, b, and c above then, pull recoil starter handle (17) out until heavy resistance is felt. Allow recoil mechanism to retract starter cable into starter housing.
- f. Grasp recoil starter handle firmly **WITH BOTH HANDS** and pull out starter cable **RAPIDLY**. If engine fails to start after three attempts, it may be necessary to prime the engine. Perform the following procedures to prime the engine.

4-5.1 Priming Engine

- a. Remove the cap of the auxiliary fuel inlet (16) and add 2 or 3 cc's of diesel fuel while pulling the recoil start handle out slowly.
- b. Replace cap, then perform normal engine start procedures.

4-6 **COLD WEATHER ENGINE START**

- a. Perform the pre-start checks outlined in paragraph 4-4.

NOTE

Remove all electrical loads prior to starting engine.

- b. Open fuel valve (13) under tank.
- c. Set engine run lever (22) to "RUN" position.
- d. Pull recoil starter handle (17) out slowly several times to inject fuel.
- e. If the temperature is below 20°F, refer to paragraph 4-5.1 and perform the engine priming procedures.

CAUTION

Do not crank engine continuously with electric starter for more than 10 seconds. Allow starter to cool between start attempts. If engine fails to start after three attempts, shut off key switch and determine cause of hard starting.

- f. Rotate key switch (23) to the manifold preheat position for 15 seconds then, rotate key switch (23) to "START" position to crank engine. When running starts, release key switch to "RUN" position.
- g. To recoil start engine, rotate key switch (23) to the manifold heat position for 15 seconds, then rotate the switch to the RUN position.
- h. Slowly pull out starter cable until heavy resistance is felt, then allow starter cable to retract back into housing.
- i. Grasp recoil starter handle **WITH**

BOTH HANDS and pull out RAPIDLY.

4-7 APPLYING LOAD AND NORMAL OPERATION

WARNING

Personnel in the immediate vicinity of an operating generator set must wear ear protection.

- a. The Diesel Engine Generator must be run at the proper speed in order to generate the rated electrical power. Allow engine to warm to normal operating temperature prior to applying electrical loads.

All engines have a tendency to slow down when a load is applied. The governor on the engine is designed to hold the engine speed as nearly constant as possible, however, when the electrical load connected to the generator is increased, the engine is more heavily loaded and as a result the engine speed will decrease slightly. Since the voltage obtainable from the unit is controlled by engine speed,

the voltage output will drop as the electrical load is increased and the engine speed decreases.

- b. Shut engine down and check crankcase oil level every 5 hours.

4-8 SHUTDOWN

- a. Disconnect Generator Set engine from load and allow to run no load for 2 to 3 minutes for controlled cooldown period.

If engine is inadvertently shut down with load applied, remove load, restart engine and complete cooldown cycle.

- b. Push the engine stop lever (21, Figure 4-1) to the STOP position.
- c. Turn the key switch (23) to the OFF position.
- d. Close the fuel valve (13) under the fuel tank.
- e. Allow engine to cool.
- f. Fill the fuel tank to prevent formation of condensation.

SECTION III. EMERGENCY OPERATION

(Not Applicable)

CHAPTER 5

THEORY OF OPERATION

SECTION I. FUNCTIONAL SYSTEM OPERATION

5-1 GENERAL.

This alternator operates on the principle which is fundamental to all alternators; when a conductor is moved through a magnetic field, a voltage will be induced across that conductor. The rotating magnetic field (rotor), which is turned by a prime-mover (in this case, a diesel engine), produces a rotating magnetic field which induces a voltage across the stationary coils (stator).

5-2 GENERATING AC CURRENT

Reference Figure 5-1 for the following; upon start-up, the residual magnetism in the rotor (1) will generate a small amount of current in the capacitor (2). The capacitor acts as a leading power-factor load on this winding, thus creating a magnetizing force in the stator (3) which is additive to the magnetizing force of the rotor (1). This induces a current to flow in the field coil of the rotor (1), thereby increasing the magnetizing force of the rotor (1), thereby increasing the voltage across the capacitor (2) and stator (3) winding, and thereby increasing the current in the capacitor (2) winding. This process will repeat until a balance is reached such that the amount of magnetic field strength matches that required to support the voltage across the capacitor (2) winding.

5-2.1 Polarity. Rotating diodes (4) which

are mounted on the rotor (1) complete the field coil circuit and ensure that the field current flows in one direction only, thus creating a rotating field of constant polarity.

5-3 GENERATING DC CURRENT

A full wave rectifier (5) is used to convert AC voltage, from the battery charge windings within the stator (3), to DC voltage which can be used to charge 12 VDC batteries.

5-4 ELECTRICAL POWER TRANSFER

Electrical power is transferred from the AC windings to the load via the receptacles. The AC windings consists of two 120 VAC (nominal) windings connected in series (at the neutral connection), giving this alternator the ability to supply dual, HIGH/LOW voltages (120v/240v nominal). 240VAC loads are connected across the series-connected windings. 120VAC loads are connected across the FULL-POWER WINDING. Furthermore, all AC windings are protected from overload conditions by means of circuit breakers. (CB1 and CB2.)

5-4.1 Grounding. The neutral connection is grounded to the engine-generator set frame, and when grounded to earth, will establish the frame as neutral at zero (earth) potential for safety and reference.

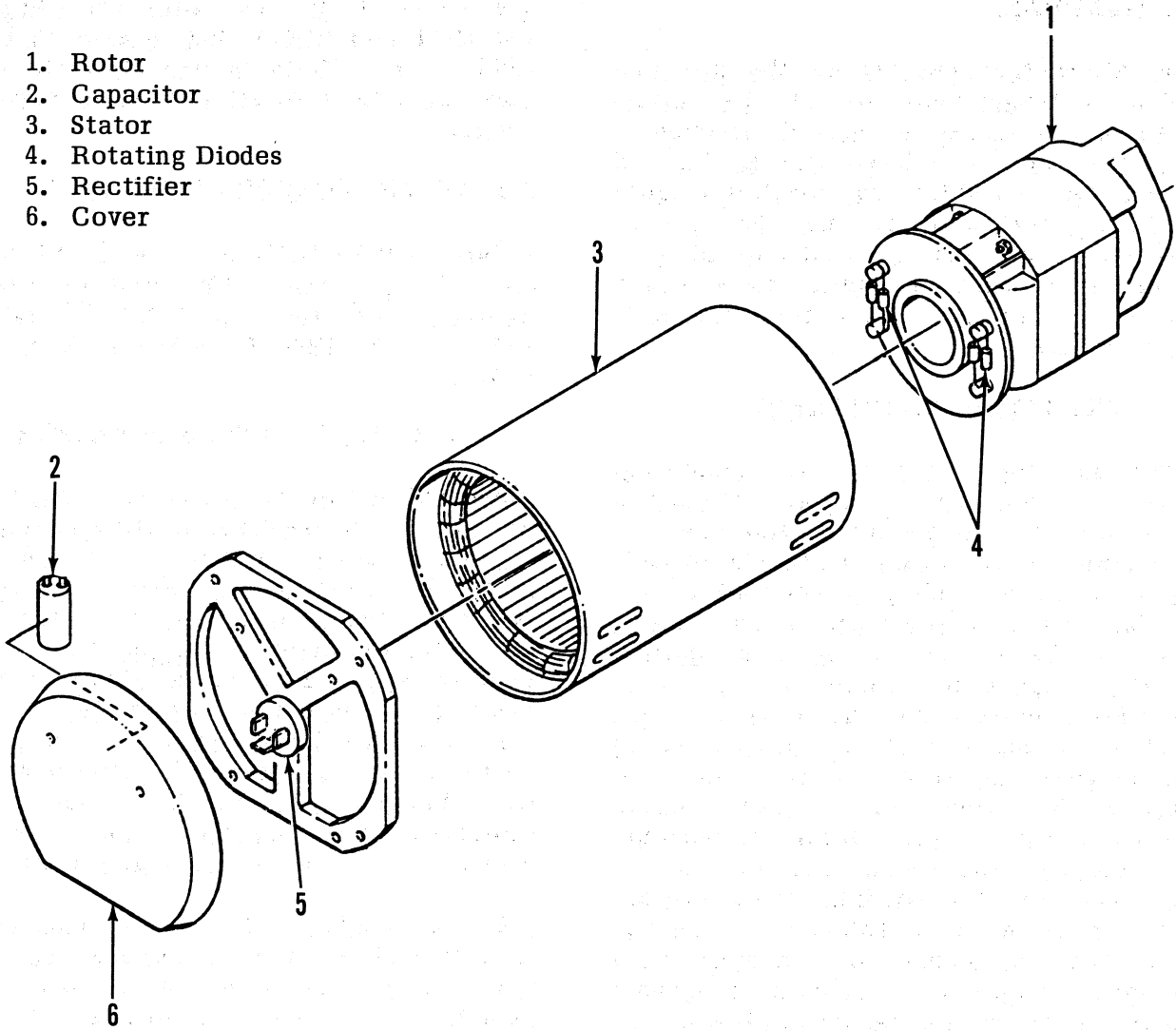


Figure 5-1. Generator Assembly

SECTION II. FUNCTIONAL OPERATION OF ELECTRICAL CIRCUITS

5-5 AC CIRCUIT

Reference Figure 5-2 for the following; upon start-up, the residual magnetism in the rotor will generate a small amount of current in the capacitor winding (i_C). The capacitor acts as a leading power-factor load on this winding, thus creating a magnetizing force in the stator which is additive to the magnetizing force of the rotor. This induces a current to flow in the field coil (i_f), thereby increasing the magnetizing force of the rotor, thereby increasing the voltage across the capacitor (and AC) windings, and thereby increasing the current in the capacitor winding (i_C). This process will repeat until a point of equilibrium is reached such that the amount of magnetic field strength matches that required to support the voltage across the capacitor winding.

5-5.1 Load Application. As load is applied and AC current begins to flow (i_{AC}), magnetic flux is induced in the AC windings. This magnetic flux links with the capacitor winding and increases the voltage across

the capacitor, thereby increasing the capacitor current (i_C), which increases the magnetizing force of the rotor as described earlier. Thus, this increase in the rotor's field strength improves the voltage regulation of the alternator.

5-5.2 Electrical Power Transfer. Electrical power is transferred from the AC windings to the load via the receptacles (A, B and C). The AC windings consists of two 120 VAC (nominal) windings connected in series (at the neutral connection), giving this alternator the ability to supply dual, HIGH/LOW voltages (120v/240v nominal). 240VAC loads are connected across the series-connected windings. 120VAC loads are connected across the FULL-POWER WINDING. Since the full-power winding is a heavy-duty winding, full-rated load can be drawn from it continuously, thus eliminating the need for a full power (series/parallel) reconnection switch. Furthermore, all AC windings are protected from overload conditions by means of circuit breakers CB1 and CB2.

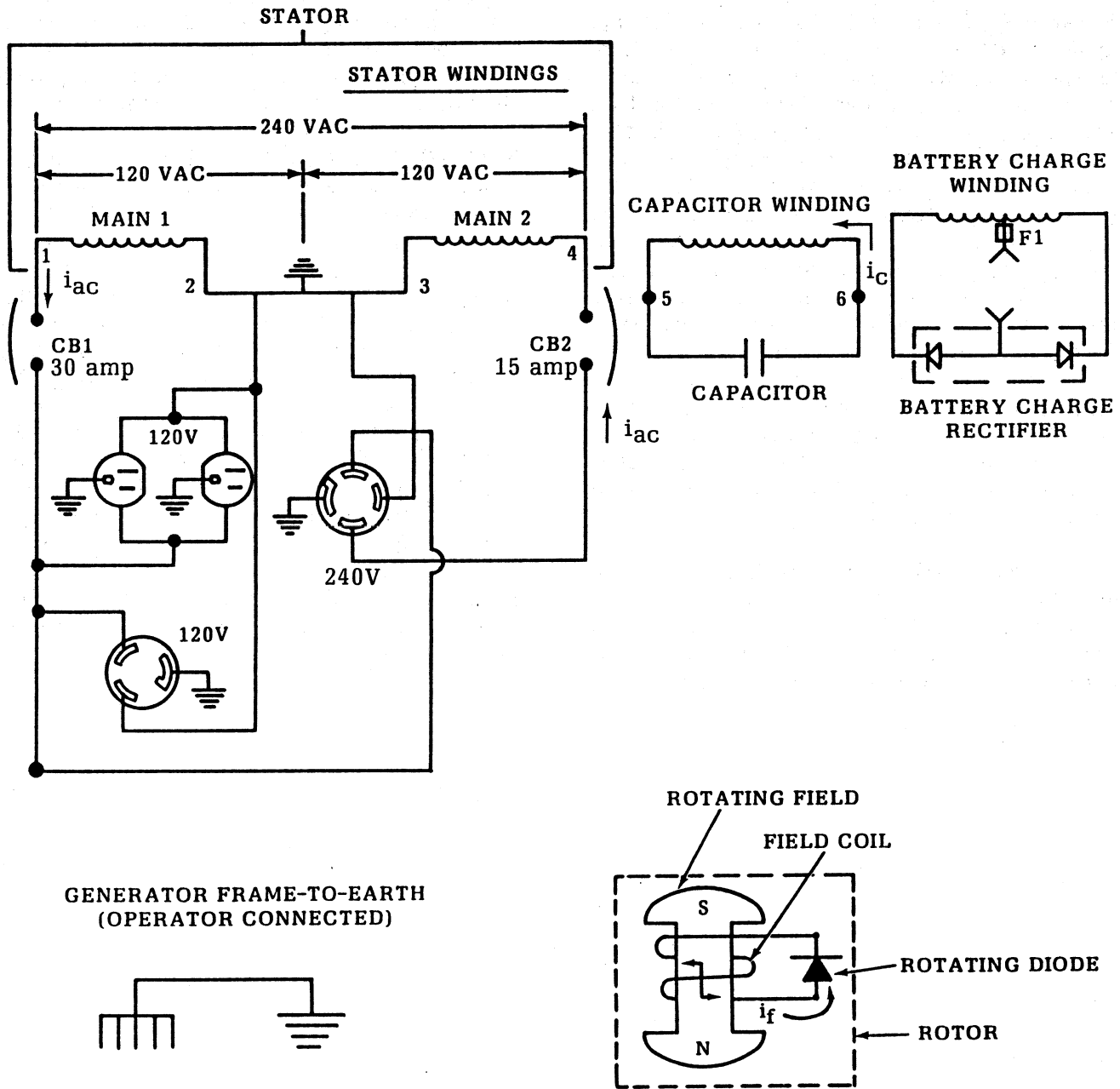


Figure 5-2. Electrical Operation Schematic Diagram

SECTION III. FUNCTIONAL OPERATION OF MECHANICAL ASSEMBLIES

(Not Applicable)

CHAPTER 6

MAINTENANCE

SECTION I. ORGANIZATIONAL AND INTERMEDIATE MAINTENANCE

6-1 TROUBLESHOOTING

6-1.1 Introduction. Troubleshooting is a fault-failure analysis. Table 6-1 provides such an analysis in order of probability of occurrence. Only the most

common malfunctions are listed in the table. When remedial action is beyond the scope of organizational and intermediate responsibility the instruction "refer to higher level of maintenance" is stated.

Table 6-1. Troubleshooting

Trouble	Probable Cause	Remedy
Engine will not crank or cranks slowly	Battery discharged or dead.	Charge battery or replace.
	Battery connections corroded or loose.	Clean and tighten connections.
	Engine oil incorrect viscosity.	Provide a safe way of warming the generator set.
	Starter solenoid or starter motor defective.	Refer to higher level of maintenance.
Engine cranks but will not start	Fuel valve under tank not turned on.	Turn on fuel valve.
	Fuel tank empty.	Fill fuel tank.
	Run lever in OFF position.	Position run lever to RUN position.
	Air in fuel system.	Perform fuel system bleeding procedures. (Para. 6-6)
	Water or contaminants in fuel.	Drain fuel filter to remove water. If fuel is contaminated, drain all fuel, replace filter and refill with fresh diesel fuel.
	Fuel injection pump or injector clogged.	Refer to higher level of maintenance..
	Low compression.	Check valve tappet adjustment (para. 6-8). If clearances are correct refer to higher level of maintenance.
Engine misses	Water in fuel.	Drain and refill fuel tank.

Table 6-1. Troubleshooting - CONT

Trouble	Probable Cause	Remedy
Engine misses - continued	Poor quality fuel.	Drain and refill fuel tank.
	Air filter dirty.	Clean or replace air filter element. (Para. 6-7)
	Air in fuel.	Perform fuel system bleeding procedures (para. 6-6).
	Injector nozzle dirty.	Refer to higher level of maintenance.
Engine knocks	Poor quality fuel.	Drain and refill fuel tank.
	Worn connecting rod bearings.	Refer to higher level of maintenance.
Engine will not pull load	Air filter clogged.	Clean or replace air filter element (para. 6-7).
	Electrical load too large.	Reduce load.
	Improper fuel delivery due to dirty injector nozzle.	Refer to higher level of maintenance.
	Low compression.	Refer to higher level of maintenance.
Engine stops	Fuel tank empty.	Fill fuel tank.
	Water in fuel or contaminated fuel.	Drain and refill tank. Drain fuel filter.
	Injection pump failure.	Refer to higher level maintenance.
	Injection nozzle clogged.	Refer to higher level of maintenance.
Generator does not produce electricity	Circuit breaker tripped.	Determine reason for circuit breaker tripping, remedy problem then reset circuit breaker.
	Check load by connecting it to utility power source to determine if load is operational.	If load is operational, go to next probable cause.
	Generator needs to be "flashed".	Refer to paragraph 6-13 and "Flash" generator.
	Check that load is not too large for generator set.	Reduce load.
	Check for short circuit or loose connections in load connection line.	Repair or replace load connection line.

Table 6-1. Troubleshooting - CONT

Trouble	Probable Cause	Remedy
Generator does not produce electricity - continued	Shorted or open diodes.	Refer to higher level of maintenance.
	Stator windings or field windings shorted.	Refer to higher level of maintenance.
Generator voltage too high	Engine running too fast.	Reduce engine RPM.
Generator voltage too low	Engine not sufficiently warmed.	Recheck once engine is at normal operating temperature.
	Engine RPM low	Adjust RPM to increase.
	Load too large	See "Engine will not pull load"
	Power connecting line shorted or bad connections.	Repair or replace line.
	Shorted or open diodes.	Refer to higher level of maintenance.
	Partial rectifier failure.	Replace rectifier.
	Shorted stator or field windings.	Refer to higher level of maintenance.
	Partial capacitor failure.	Replace capacitor.
Generator overheats	Malfunction of load.	Test output voltage of generator set. If correct, test load in utility outlet to see if load is operational.
	Load too large.	Reduce load.
	Generator bearings worn.	Refer to higher level of maintenance.
	Power connection line shorted.	Repair or replace line.
	Improper generator location.	See "Site Location" (para. 4-2).

6-2 INSPECTION

6-2.1 Introduction. The Diesel Engine Generator is to be inspected at certain

intervals of time according to the amount of usage the unit receives. Table 6-2 lists the items and indicates the time period intervals between inspections.

Table 6-2. Periodic Inspection and Service

Item to be Inspected	(Daily) 8 hrs.	HOURLY INTERVALS			
		100 hrs.	500 hrs.	1000 hrs.	2500 hrs.
Check for fuel and oil leakage	X				
Check hardware for tightness	X				
Check engine oil level	X (5 hrs)				
Change engine oil	Initially at 25 hrs. X	X			
Change filter element			X or as conditions warrant		
Adjust valve clearances			X		
Drain water from fuel filter		X			
Replace fuel filter				X	
Clean oil filter screen		X			
Replace injection nozzle			X		
Check battery electrolyte level		X (monthly)			

Table 6-2. Periodic Inspection and Service - CONT

Item to be Inspected	(Daily) 8 hrs.	HOURLY INTERVALS			
		100 hrs.	500 hrs.	1000 hrs.	2500 hrs.
Replace fuel hoses				X	

X - Indicates Organizational and Intermediate Level Maintenance

6-3 MAINTENANCE

6-3.1 The following maintenance items are within the scope of organizational and intermediate echelons to service. Refer to the figures as indicated while performing the following maintenance procedures.

6-4 ENGINE OIL CHANGE AND FILTER CLEANING (Figure 6-1)

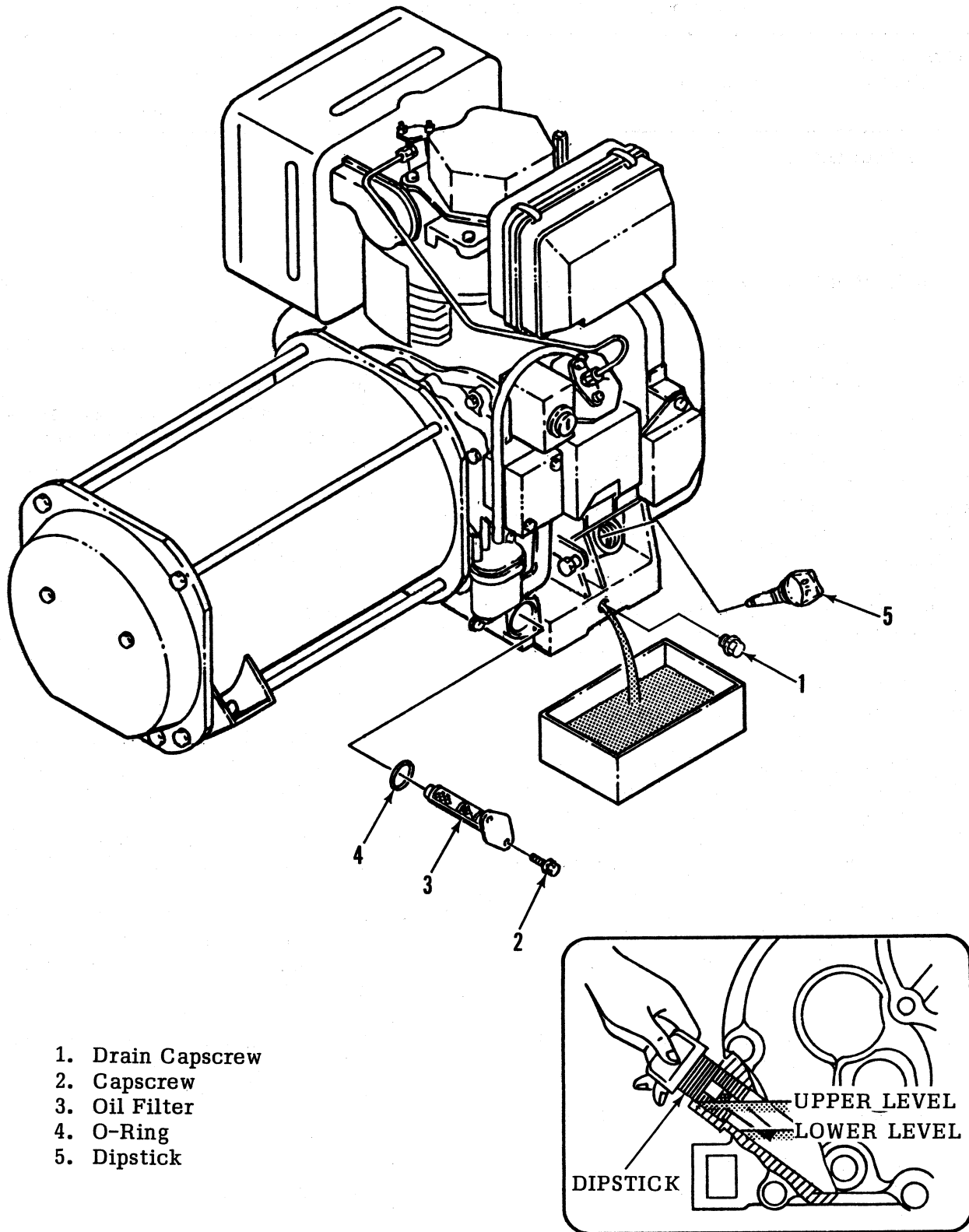
6-4.1 Perform the following procedures while the engine is warm.

- a. Provide a suitable container to catch the drainings then remove the drain capscrew (1).
- b. Remove the two capscrews (2) then pull out the oil filter (3) and o-ring (4).
- c. Clean the oil filter (3) in fresh diesel fuel.
- d. Once completely drained, install the drain capscrew (1).
- e. Position the o-ring (4) on the cleaned oil filter (3). Slide the filter into position and secure with capscrews (2).
- f. Remove the dipstick (5). Refer to the Lubrication Instructions, Tables 6-3 and 6-4 for the proper

specification of lubricant then fill the crankcase to the top mark on the dipstick (5). Install dipstick (5).

6-5 FUEL FILTER REPLACEMENT

- a. Refer to Figure 4-1 and shut off fuel valve (13).
- b. Provide a suitable container to catch drainings then remove drain capscrew and washer (1, Figure 6-2).
- c. Remove the hose clamps (2, 3 and 4) to release the fuel hoses (5, 6 and 7).
- d. Remove the capscrews (8 and 9) to release fuel filter (10).
- e. Inspect the fuel lines at this time, for cracks, leaks or signs of deterioration. Replace fuel lines if unserviceable.
- f. Position replacement fuel filter (10) on bracket. Secure with capscrews (8 and 9).
- g. Connect the three fuel lines (5, 6 and 7) and secure with hose clamps (2, 3 and 4).
- h. Perform the fuel system bleeding procedures outlined in paragraph 6-6.



1. Drain Capscrew
2. Capscrew
3. Oil Filter
4. O-Ring
5. Dipstick

Figure 6-1. Oil Change and Filter Cleaning

1. Drain Capscrew and Washer
2. Hose Clamp
3. Hose Clamp
4. Hose Clamp
5. Fuel Hose
6. Fuel Hose
7. Fuel Hose
8. Capscrew
9. Capscrew
10. Fuel Filter

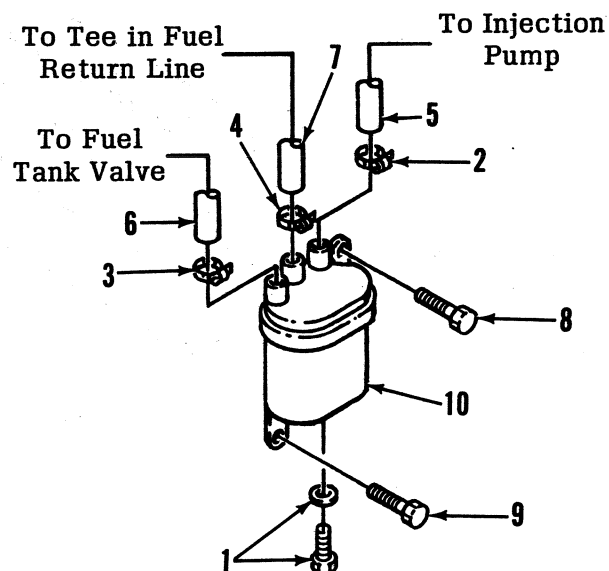


Figure 6-2. Fuel Filter Replacement

6-6 FUEL SYSTEM BLEEDING

- a. Perform the following procedures:
 - (1) When starting a brand new engine for the first time.
 - (2) When restarting the engine after the engine has stopped due to lack of fuel.
 - (3) When starting an engine after fuel filter cleaning or replacement.
 - (4) After the fuel injection pump, high pressure line or injection nozzle have been removed for service.
- b. Be certain fuel tank is full then, open fuel valve (13, Figure 4-1).
- c. Refer to Figure 3-1 and loosen fuel tube cap nut (3). Pull recoil starter handle (17, Figure 4-1) out slowly. When a smooth, bubble

free flow of fuel flows from cap nut tube, tighten cap nut.

6-7 AIR FILTER ELEMENT REPLACEMENT

- a. Clean the area around the filter housing (1, Figure 6-3) and the housing itself.
- b. Remove the cover (2) by releasing the four clips (3).
- c. Remove the filter element (4).
- d. Position replacement element (4) within the housing (1).
- e. Install cover (2) and secure with clips (3).

6-8 VALVE TAPPET CLEARANCE ADJUSTMENT

NOTE

Perform valve adjustment procedures while the engine is cold.

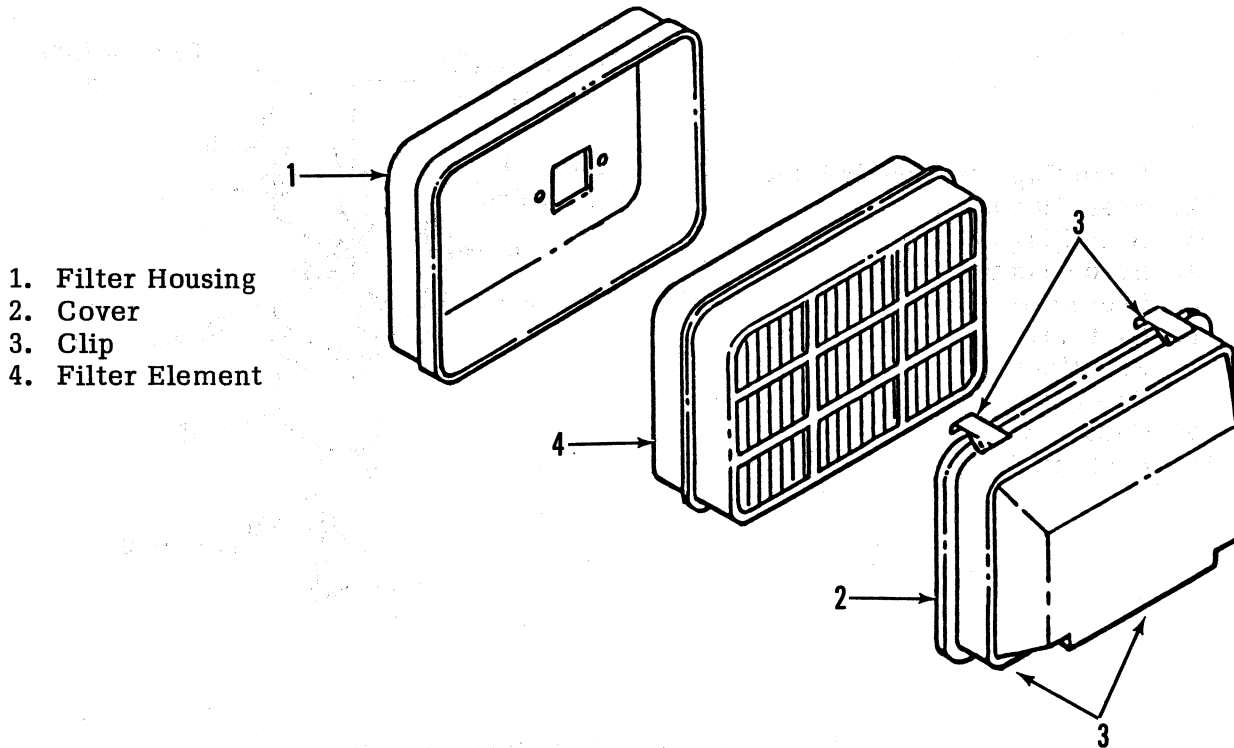


Figure 6-3. Air Filter Replacement

- a. Refer to Figure 6-4 and remove the four flanged capscrews (1), and valve cover (2).

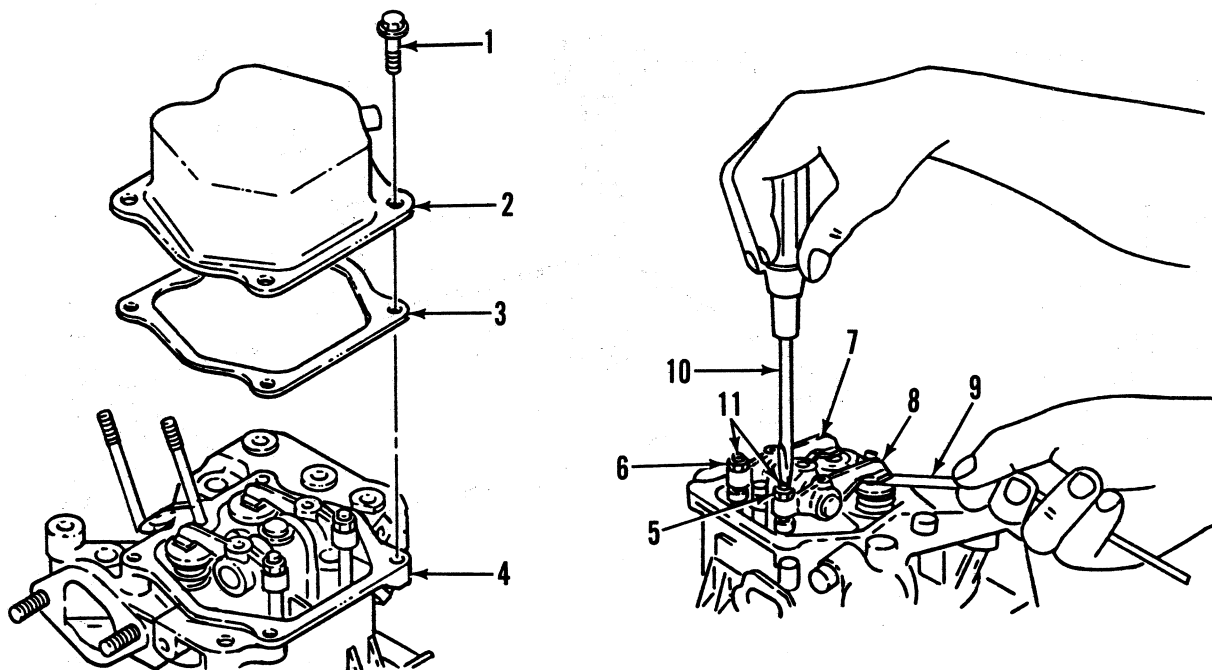
NOTE

The gasket (3) need not be removed unless it is damaged during removal of the valve cover (2) or if it shows signs of leakage.

- b. Rotate the crankshaft slowly until an audible "click" is heard from the injection pump. The click means the piston is at or very near Top Dead Center on the compression stroke, and both valves are closed.
- c. Loosen the jam nuts (5 and 6)

on the exhaust rocker arm (7) and intake rocker arm (8) and turn the adjusting screws (11) to achieve a clearance between the rocker arms and valve stem ends of 0.004" (0.1mm).

- d. Tighten each jam nut (5 and 6) then recheck clearance.
- e. Rotate crankshaft by hand to check that the valves move smoothly without hitting piston.
- f. Install gasket (3) on cylinder head (4).
- g. Apply a thin even film of gasket sealant to the joining surface of the valve cover (2) then install valve cover and secure with flanged capscrews (1).



1. Flanged Capscrew
2. Valve Cover
3. Gasket
4. Cylinder Head
5. Jam Nut
6. Jam Nut

7. Exhaust Rocker Arm
8. Intake Rocker Arm
9. Feeler Gauge
10. Screw Driver
11. Adjusting Screw

Figure 6-4. Valve Tappet Clearance Adjustment

6-9 FUEL TANK

a. Removal.

- (1) Be certain the fuel valve (1, Figure 6-5) is closed then loosen clamp (2) and disconnect fuel hose (3) from the fuel filter.
- (2) Provide a suitable container for fuel then drain fuel tank (4) by opening fuel valve (1).
- (3) Loosen clamp (5) and disconnect fuel hose (6) from elbow (7).
- (4) Once fuel is drained, close fuel valve (1). Remove the four lock-

nuts (8), capscrews (9) and flatwashers (10) to release the fuel tank (4) from the base assembly.

b. Disassembly.

- (1) Remove the elbow (7) and grommet (11).
- (2) Loosen clamp (14) to remove fuel hose (3) from fuel valve (1).
- (3) Remove the fuel valve (1) and grommet (12).
- (4) Remove the fuel gauge/cap (13).

1. Fuel Valve
2. Clamp
3. Fuel Hose
4. Fuel Tank
5. Clamp
6. Fuel Hose
7. Elbow
8. Locknut
9. Capscrew
10. Flatwasher
11. Grommet
12. Grommet
13. Fuel Gauge/Cap
14. Clamp

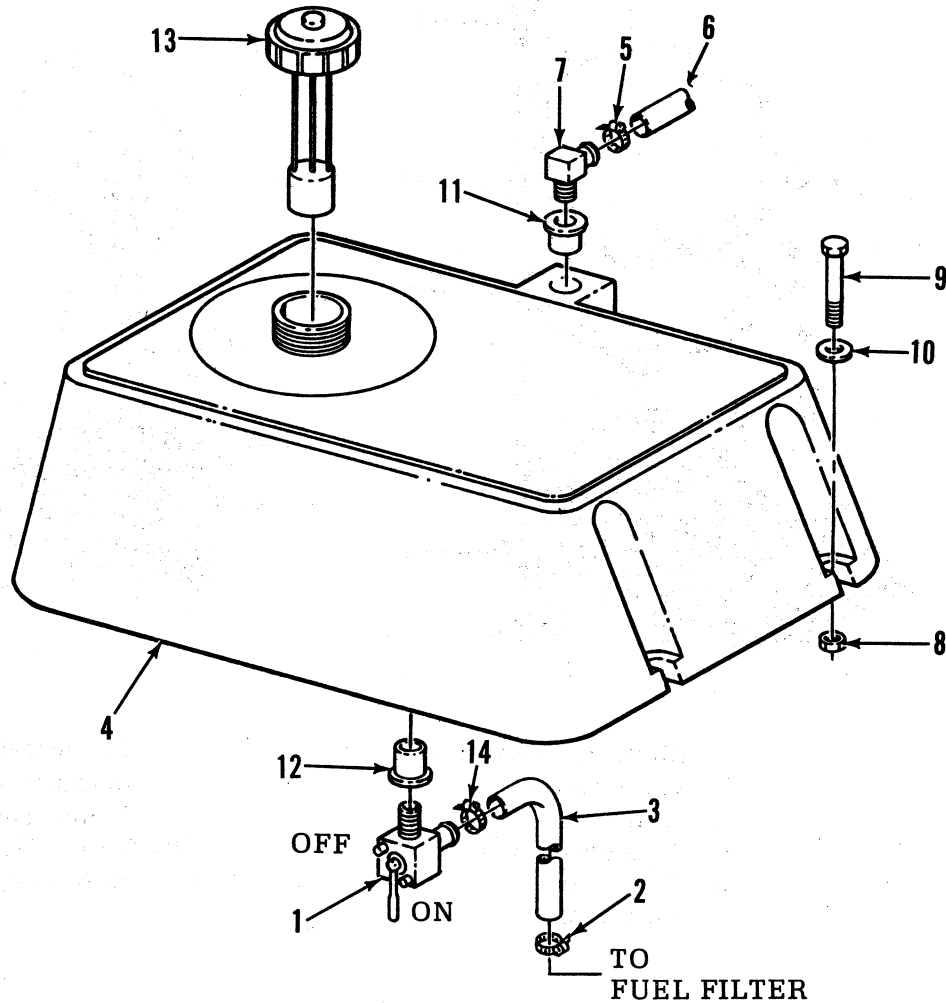


Figure 6-5. Fuel Tank Replacement

c. Cleaning.

WARNING

Solvent P-D-680, Type II is toxic to skin, eyes, and respiratory tract. Skin and eye protection required. Avoid repeated or prolonged contact. Use only in a well-ventilated area.

- (1) Clean metal parts in PD-680-

Type II.

- (2) Clean non-metallic parts with mild soap and water.

d. Inspection and Repair.

- (1) Check all threaded components for damaged or stripped threads. Replace parts found unserviceable.
- (2) Discard and replace grommets (11 and 12).

- (3) Check the fuel gauge/filler cap (13) for smooth free operation. Replace if damaged.
- (4) Check the fuel tank for cracks or leaks. Replace if unserviceable.

e. Assembly and Installation.

- (1) Obtain the necessary replacement parts and perform assembly as follows:
- (2) Insert the grommet (11) into the tank (4) then, install the elbow (7) into the grommet (11).
- (3) Assemble the grommet (12) into the fuel tank (4) then, install fuel valve (1) into grommet (12).
- (4) Position fuel tank (4) on the base assembly and secure with capscrews (9), flatwashers (10) and locknuts (8).
- (5) Connect fuel hose (6) to elbow (7) and secure with clamp (5).
- (6) Connect fuel hose (3) to fuel valve (1) and secure with clamp (14).
- (7) Connect fuel hose (3) to fuel filter and secure with clamp (2).
- (8) Fill fuel tank with specified fuel.
- (9) Install fuel gauge/cap (13).
- (10) Refer to paragraph 6-6 and perform fuel system bleeding procedures.

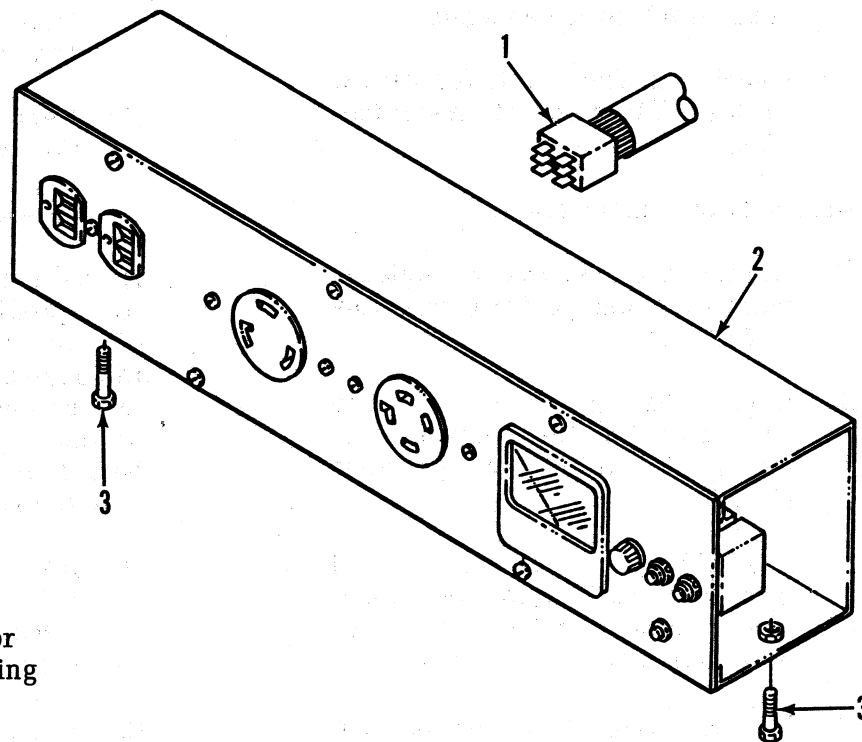
6-10 CONTROL BOX

a. Removal.

- (1) Refer to Figure 6-6 and unplug the harness connector (1) from the back of control box housing (2).
- (2) Remove the two capscrews (3) then, slide the control box housing (2) from the base assembly.

b. Disassembly. It is not possible to predict which components of the control box will require replacement, therefore the following procedures cover replacement of each component of the control box. Perform only the steps necessary to effect the desired repairs.

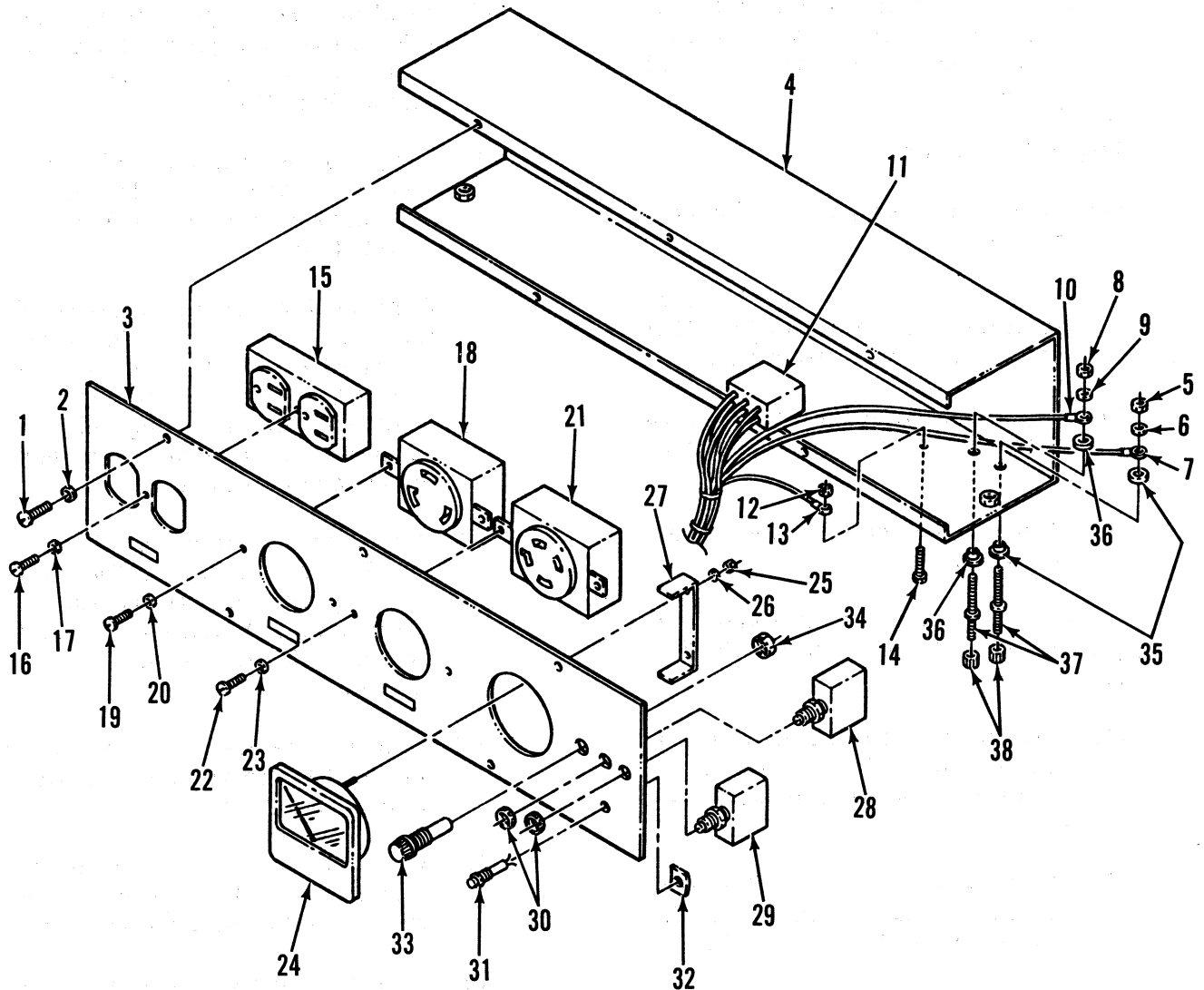
- (1) Remove screws (1, Figure 6-7) and lockwashers (2) to release front panel (3) from control box housing (4).
- (2) Remove nut (5) and flat washer (6) to release positive electrical lead (7). Tag positive lead (7) then replace nut (5) and flatwasher (6).
- (3) Remove nut (8) and flatwasher (9) to release negative electrical lead (10). Tag negative lead (10), then replace nut (8) and flatwasher (9).
- (4) Unclip the harness receptacle (11) from the control box housing (4).
- (5) Remove nut (12), ground lead (13) and capscrew (14).
- (6) Tag and disconnect the electrical leads to the duplex receptacle (15) then remove the screw (16) and lockwasher (17) to release duplex receptacle (15) from front panel (3).
- (7) Tag and disconnect the electrical leads to the 3-pole recep-



- 1. Harness Connector
- 2. Control Box Housing
- 3. Capscrew

Figure 6-6. Control Box

- tacle (18) then, remove the 2 screws (19) and lockwashers (20) to release 3-pole receptacle (18) from front panel (3).
- (8) Tag and disconnect electrical leads to 4 pole receptacle (21) then remove 2 screws (22) and lockwashers (23) to release 4 pole receptacle (21) from front panel (3).
 - (9) Tag and disconnect the two electrical leads from the voltmeter (24) then remove the two nuts (25), lockwashers (26) and bracket (27) to release voltmeter (24) from front panel (3).
 - (10) Tag and disconnect electrical leads from circuit breakers (28 and 29) then remove ring nuts (30) to release circuit breakers (28 and 29) from front panel (3).
 - (11) Unplug the two electrical leads from the low oil pressure indicator light (31) then remove clip (32) to release light assembly from front panel (3).
 - (12) Unplug then tag the two electrical leads from the fuse holder assembly (33) then remove ring nut (34) to release fuse holder assembly (33) from front panel (3).
 - (13) To remove terminal studs (37), remove nuts (5 and 8), flatwashers (6 and 9) and terminal studs (37).



- | | | |
|------------------------------|-----------------------|--------------------------------------|
| 1. Screw | 14. Capscrew | 27. Bracket |
| 2. Lockwasher | 15. Duplex Receptacle | 28. Circuit Breaker (CB 1) |
| 3. Front Panel | 16. Screw | 29. Circuit Breaker (CB 2) |
| 4. Control Box Housing | 17. Lockwasher | 30. Ring Nut |
| 5. Nut | 18. 3 Pole Receptacle | 31. Low Oil Pressure Indicator Light |
| 6. Flatwasher | 19. Screw | 32. Clip |
| 7. Positive Electrical Lead | 20. Lockwasher | 33. Fuse Holder Assembly |
| 8. Nut | 21. 4 Pole Receptacle | 34. Ring Nut |
| 9. Flatwasher | 22. Screw | 35. Red Insulator Assembly |
| 10. Negative Electrical Lead | 23. Lockwasher | 36. Black Insulator Assembly |
| 11. Harness Receptacle | 24. Voltmeter | 37. Terminal Stud |
| 12. Nut | 25. Nut | 38. Cap |
| 13. Ground Lead | 26. Lockwasher | |

Figure 6-7. Control Box Assembly

The red insulator assembly (35) and black insulator assembly (36) may be removed at this time.

c. Inspection and Repair.

- (1) Inspect all components for corrosion.
- (2) Check the harness and wiring insulation for deterioration that could cause short circuiting.
- (3) Check the interior of the fuse holder assembly (33) for corrosion.
- (4) Replace any parts found unserviceable.

d. Assembly. Obtain the necessary replacement parts and perform the following.

- (1) Position the low oil pressure indicator light (31) on the front panel (3) and secure with clip (32).
- (2) Position the two circuit breakers (28 and 29) on the front panel (3) and secure with ring nuts (30).
- (3) Slide the fuse holder (33) into position and secure with ring nut (34).
- (4) Position the voltmeter (24) on the front panel (3) and secure with bracket (27), lockwashers (26) and nuts (25).
- (5) Position the 4-pole receptacle (21) on the front panel (3) and secure with screws (22) and lockwashers (23).
- (6) Position 3-pole receptacle (18) on the front panel (3) and secure with screws (19) and lockwashers (20).

(7) Position the duplex receptacle (15) on the front panel (3) and secure with screw (16) and lockwasher (17).

(8) Refer to the tags on the harness electrical leads then plug in the two leads to the fuse holder assembly (33).

(9) Connect the remaining leads of the harness to locations indicated on the tags. If harness is being replaced, refer to the electrical circuit diagrams in Chapter 7 as a guide to attach replacement harness.

(10) Install the red insulator (35) and black insulator (36) on the control box housing (4) and secure with terminal studs (37), flatwashers (6 and 9) and nuts (5 and 8).

(11) Connect the positive (+) electrical lead (7) to the red insulator (35) terminal stud.

(12) Connect the negative (-) electrical lead (10) to the black insulator (36) terminal stud.

(13) Snap the harness plug (11) into the opening in the back of control box housing (4).

(14) Secure ground lead (13) with capscrew (14) and nut (12).

(15) Position front panel (3) on control box housing (4) and secure with screws (1) and lockwashers (2).

e. Installation (Figure 6-6)

(1) Position the control box housing (2, Figure 6-6) within the base assembly and secure with 2 capscrews (3).

- (2) Plug harness connector (1) into harness receptacle on back of control box housing (2).

6-11 BATTERY

a. Removal.

- (1) Refer to Figure 6-8 and disconnect the negative (-) battery cable (1) first by removing nut (2), lockwasher (3), flatwasher (4) and cable (1) from negative terminal (5).
- (2) Disconnect the positive (+) battery cable (6) by removing the nut (7), lockwasher (8), flatwasher (9) and cable (6) from positive (+) terminal (10).
- (3) Loosen the two nuts with washers (11) to allow the battery holddown bracket (13) to be moved out of the way then, lift the battery (14) from the base assembly (15).

b. Installation.

- (1) Prepare the replacement battery by performing the procedures outlined in paragraph 3-3c.

- (2) Install the replacement battery (14) within the base assembly (15) and secure with battery holddown bracket (13). Position battery bracket on top of battery, 1/4 inch in from edge. Do not position hold down bracket on corner of battery. Tighten nuts with washers (11), snug but do not over tighten.

- (3) Place the positive (+) battery cable (6) over the positive terminal (10) and secure with flatwasher (9), lockwasher (8) and nut (7).

- (4) Place negative (-) battery cable (1) over negative terminal (5) and secure with flatwasher (4), lockwasher (3) and nut (2).

SECTION II. SPECIAL MAINTENANCE

6-12 GENERATOR

a. Removal and Disassembly.

- (1) Refer to Figure 6-6 and disconnect the harness connector (1) from the control box housing (2).
- (2) Tag and disconnect the electrical leads from the generator to the engine.
- (3) Remove the nuts with washers (1, Figure 6-9) from both generator mounting feet (2).

6-9) has the ability to store an electric charge which creates a dangerous shock potential. To discharge the capacitor, the leads of the capacitor must be shorted together with metal.

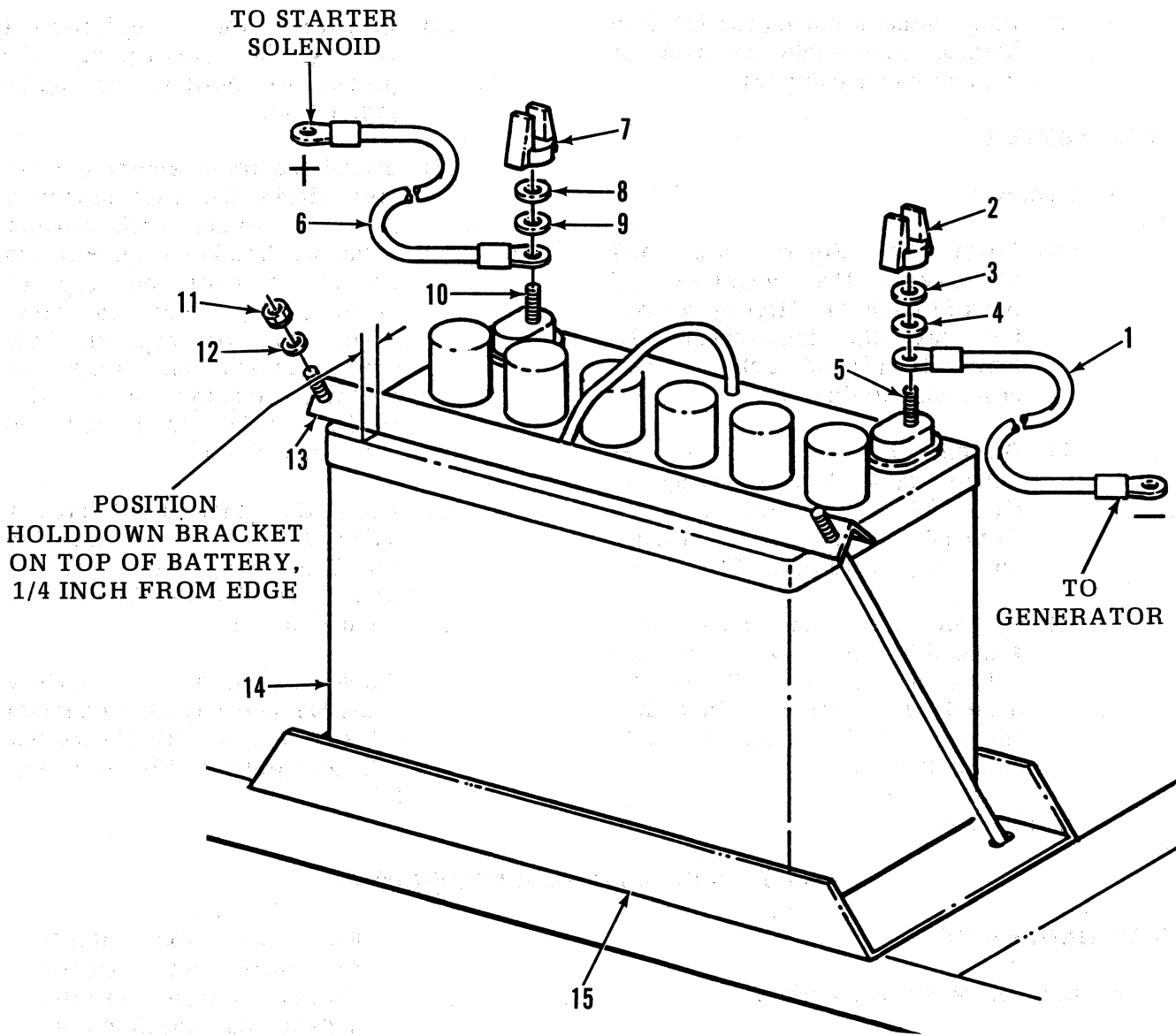
- (4) Remove the two screws (3) and cover (4) then short the terminals of the capacitor (5) together. Once shorted tag and unplug the two electrical leads (6) from the capacitor (5).

CAUTION

The capacitor (5, Figure

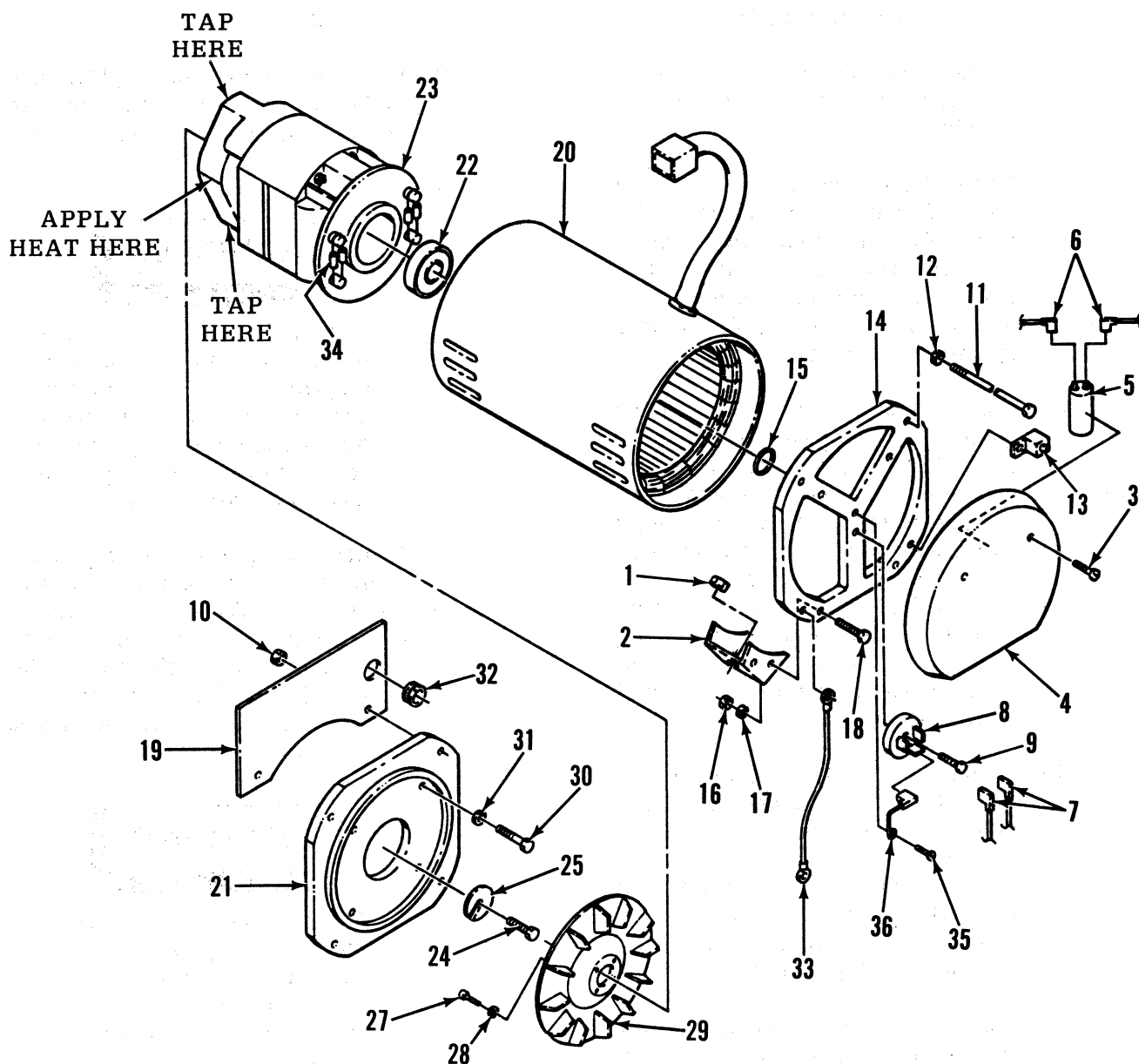
NOTE

Do not remove capacitor



- | | |
|-------------------------------|------------------------------|
| 1. Negative (-) Battery Cable | 8. Lockwasher |
| 2. Nut | 9. Flatwasher |
| 3. Lockwasher | 10. Positive Terminal |
| 4. Flatwasher | 11. Nut with Washer |
| 5. Negative Terminal | 12. Flatwasher |
| 6. Positive (+) Battery Cable | 13. Battery Holddown Bracket |
| 7. Nut | 14. Battery |
| | 15. Base Assembly |

Figure 6-8. Battery



- | | | |
|----------------------------|------------------------------|----------------------------|
| 1. Nut with Washer | 13. Ground Lug | 25. "C" Washer |
| 2. Generator Mounting Foot | 14. Outboard Bearing Bracket | 26. Socket Head Capscrew |
| 3. Screw | 15. O-Ring | 27. Flatwashers |
| 4. Cover | 16. Nut | 28. Fan |
| 5. Capacitor | 17. Lockwasher | 29. Capscrew |
| 6. Electrical Leads | 18. Capscrew | 30. Lockwasher |
| 7. Electrical Leads | 19. Heat Shield | 31. Grommet |
| 8. Rectifier | 20. Stator | 32. Battery Cable |
| 9. Screw | 21. Engine Adapter | 33. Diode |
| 10. Nut with Washer | 22. Bearing | 34. Screw |
| 11. Long Capscrew | 23. Rotor | 35. Ground Electrical Lead |
| 12. Lockwasher | 24. Capscrew | |

Figure 6-9. Generator Removal and Disassembly

NOTE (Cont'd)

- (5) from cover (4) unless capacitor is to be replaced.
- (5) Tag and disconnect the electrical leads (7 and 35) from the rectifier (8). Remove the screw (9) to release rectifier (8). Do not remove screw (34) or ground lead (35) unless replacement is necessary.
- (6) Place wooden support blocks under the engine to support it while the generator assembly is removed, then remove the 4 nuts with washers (10), long capscrews (11) and lockwashers (12) to release the ground lug (13), outboard bearing bracket (14) (with mounting feet (2) attached), heat shield (19), battery cable (32) and o-ring (15).
- (7) Remove the nuts (16), lockwashers (17), capscrews (18) and mounting feet (2).
- (8) Use a soft head mallet to tap the stator housing (20) side to side to free it from the engine adapter (21).
- (9) Use a suitable bearing puller to remove the bearing (22) from the rotor (23).
- (10) Loosen capscrew (24) a few turns then, remove "C" washer (25). Use a soft mallet to tap on the rotor (23) to release it from the engine. If rotor remains stuck, apply heat, as shown, to rotor bracket. Do not heat remainder of rotor.
- (11) Remove the socket head capscrews (26) and flatwashers (27) to release fan (28) from

rotor (23).

- (12) Remove capscrews (29) and lockwashers (30) to release engine adapter (21) from engine.

b. Cleaning and Drying.

WARNING

Solvent P-D-680, Type II is toxic to skin, eyes, and respiratory tract. Skin and eye protection required. Avoid repeated or prolonged contact. Use only in a well-ventilated area.

- (1) Electrical parts incorporating insulating materials (coils, junction blocks, switches, etc.) should not be soaked or sprayed with cleaning solutions. Clean these parts with a clean lint-free cloth moistened with solvent P-D-680, Type II.

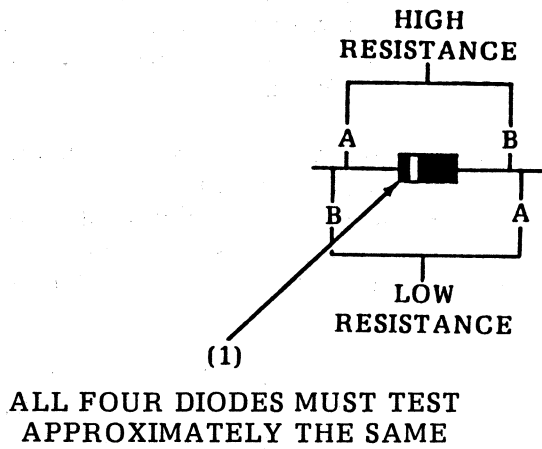
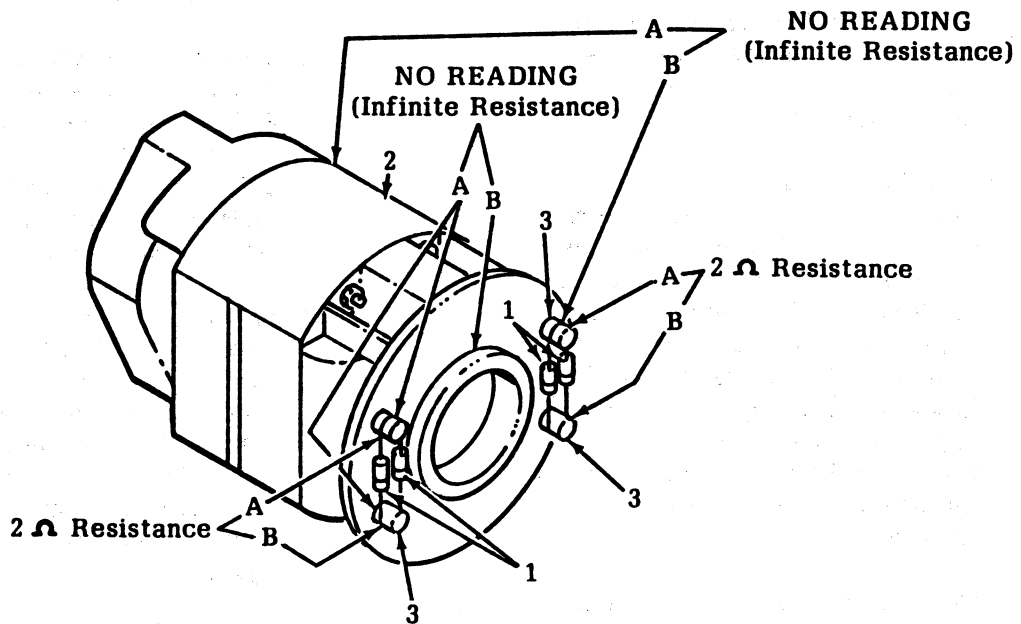
WARNING

Compressed air used for cleaning can create airborne particles that may enter the eyes. Pressure will not exceed 30 psig. Eye protection required.

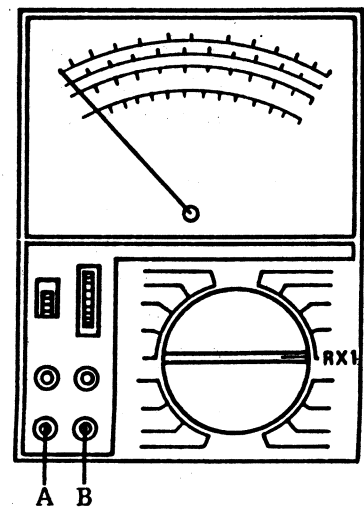
- (2) The component parts can be dried with compressed air.

c. Testing.

- (1) Rotor. The rotor must be checked for shorted and open circuits and the rotor diodes must be checked for resistance. Refer to Figure 6-10A and perform the following test procedures to determine serviceability fo the rotor (2)



ANALOG MULTIMETER WITH DIODE TESTING CAPABILITY SET ON RX1 SCALE



A-Rotor and Diode Test

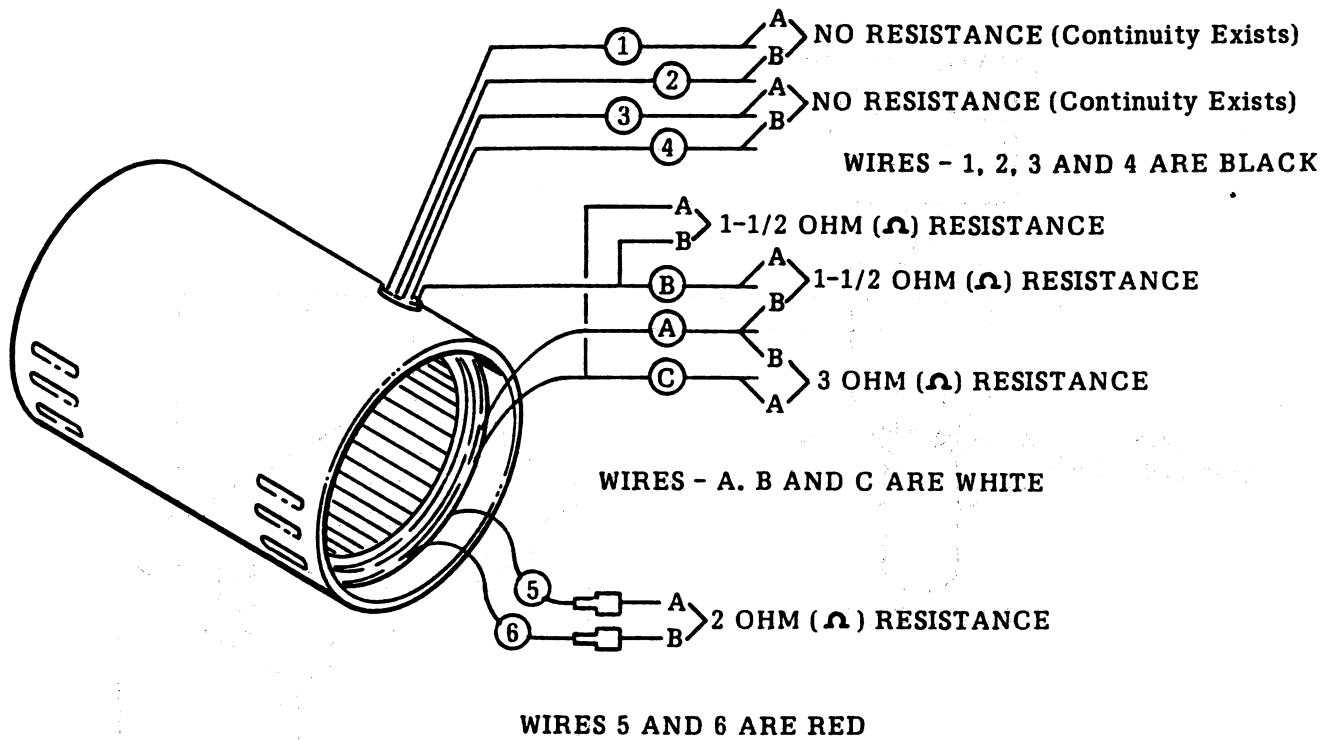
Figure 6-10. Testing Generator Components (Sheet 1 of 4)

and diodes (1).

- (a) Take note of the positioning of the white lines on the diodes (1). Mark the posts (3) which are closest to the white lines.
 - (b) Unsolder the diodes (1) from the posts (3) then use a multimeter set on the RX1 scale, as shown to test each diode (1) for high resistance in one direction and little or no resistance in the opposite direction. If the meter shows low resistance in both directions, the diode is defective.
 - (c) Set meter on RX1 scale then check for resistance between each pair of diode posts (3). There should be 2 ohm (Ω) resistance between posts.
 - (d) Check the rotor (2) for short circuits by touching the rotor body with one lead and each post (3) with the other lead. The meter should get no reading meaning infinite resistance.
 - (e) Check the rotor (2) for short circuits by touching the rotor bearing pocket with one meter lead and touching the other lead to each of the four posts (3). The meter should get no reading.
 - (f) If either step (d) or (e) yields a meter reading, the rotor is internally shorted and must be replaced.
- (2) Stator. Test the stator for both short circuits, and open circuits as well as the proper

resistance by referring to Figure 6-10, B and performing the following tests.

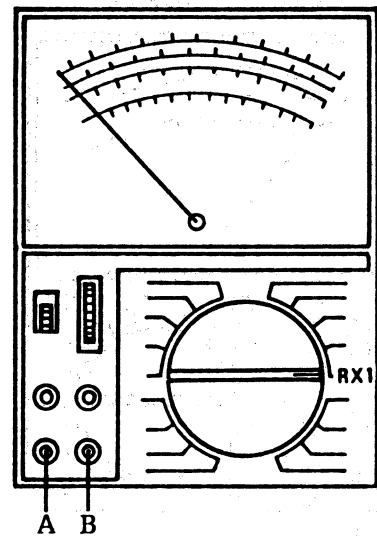
- (a) Identify the marked electrical leads as shown in Figure 6-10, B, then using the multimeter set on the RX1 scale, test for continuity between wires (1) and (2) and wires (3) and (4).
 - (b) When testing the WHITE wires A, B and C, there should be 1-1/2 ohm resistance between wires (A) and (B) and between (B) and (C). The meter should indicate 3 ohm resistance when testing wires (A) and (C).
 - (c) Touching the meter leads to RED wires (5) and (6) should yield a 2 ohm resistance reading.
 - (d) There should be no continuity (no meter reading) between wires of different colors, and there should be no continuity between any wire and the stator housing (ground).
- (3) Capacitor. The capacitor must be able to store a charge. Perform the following procedures to test the capacitor's ability to retain an electrical charge.
- (a) Refer to Figure 6-10, C and briefly apply a 12 VDC charge from a fully charged automotive type battery to the terminals of the capacitor.
 - (b) Allow the capacitor to stand for 1 hour then test the terminals with a DC voltmeter. The reading



THERE SHOULD BE NO CONTINUITY (no reading) BETWEEN DIFFERENT COLORED WIRES.

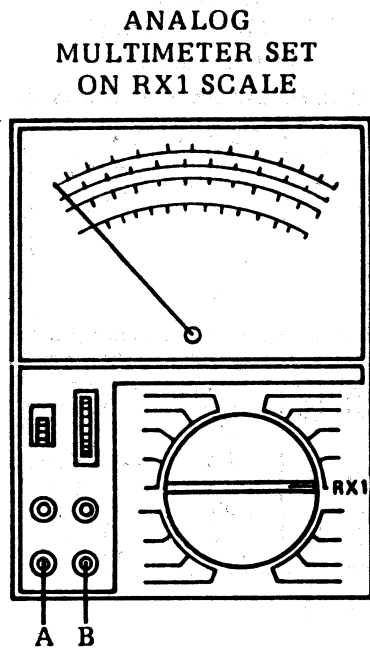
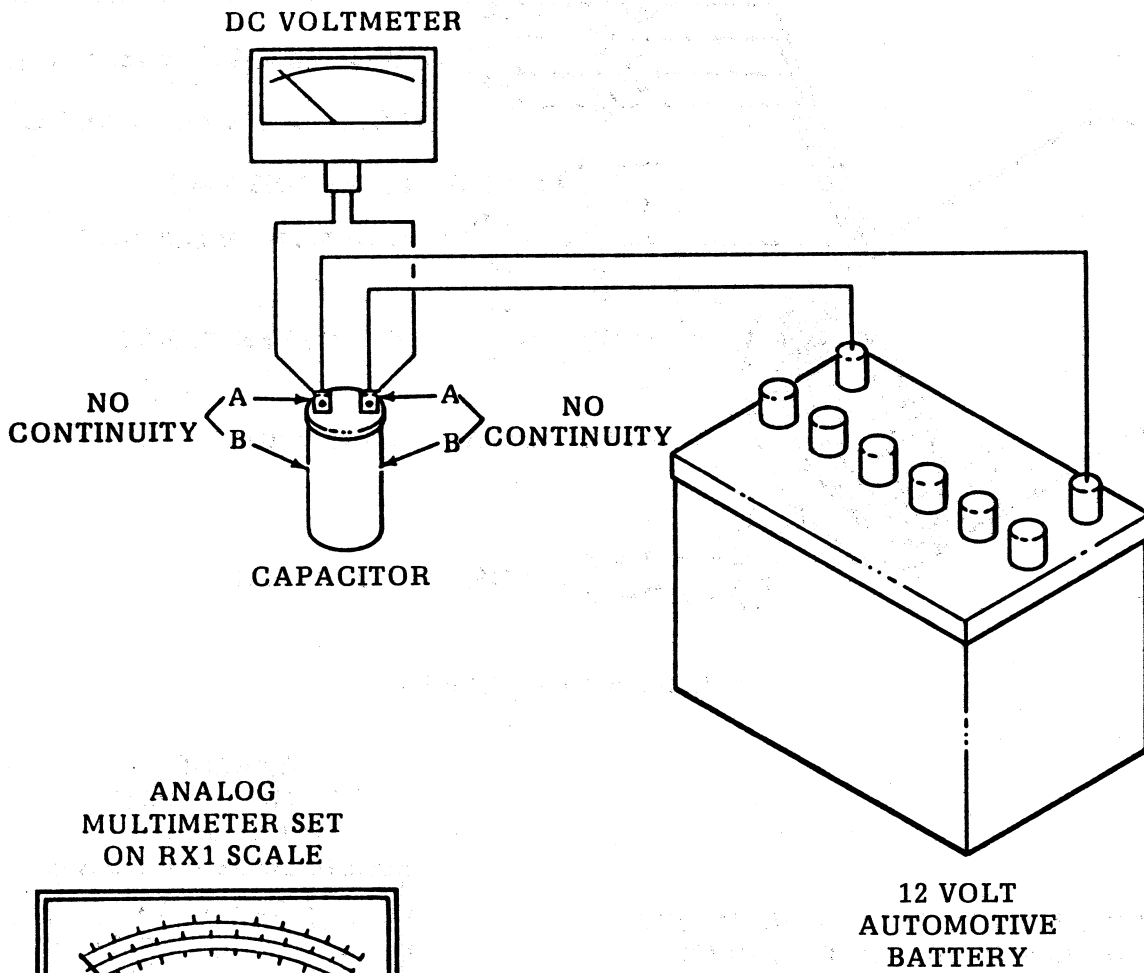
THERE SHOULD BE NO CONTINUITY (no reading) FROM THE STATOR HOUSING (Ground) TO ANY WIRE.

ANALOG MULTIMETER SET ON RX1 SCALE



B-STATOR TEST

Figure 6-10. Testing Generator Components (Sheet 2 of 4)



C - CAPACITOR

Figure 6-10. Testing Generator Components (Sheet 3 of 4)

should be at least 90% of the original applied voltage.

Example - If 14 volts are applied then one hour later the capacitor should still retain 12.6 volts.

(c) Check each terminal to the case (ground) for continuity with a multimeter set on RX1 scale - there should be no reading, which indicates no continuity.

(d) Check the capacitor for signs of leakage of internal fluid, dents or corrosion. Replace if unserviceable.

(4) Rectifier. The rectifier must prevent current flow in one direction while allowing current flow in the opposite direction. Perform the following test to determine serviceability of the rectifier.

(a) Refer to Figure 6-10, D. Use a multimeter set on the RX1 scale and touch the meter leads to one AC terminal and the ground (-) terminal. Switch the leads and test again. The resistance should be high in one direction and very low in the opposite direction.

(b) Repeat the above test for the other AC terminal and ground (-) terminal. Approximately the same results should be obtained.

d. Assembly and Installation. (Figure 6-9)

(1) Position the engine adapter (21) on the engine and secure with capscrews (29) and lockwashers (30).

(2) Press a replacement bearing (22) into the rotor (23).

(3) Assemble fan (28) onto rotor (23) using socket head capscrews (26) and flatwashers (27).

(4) Install capscrew (24) into engine shaft a few turns, then install rotor and fan onto engine shaft.

(5) Install "C washer (25) onto capscrew (24) then tighten capscrew (24).

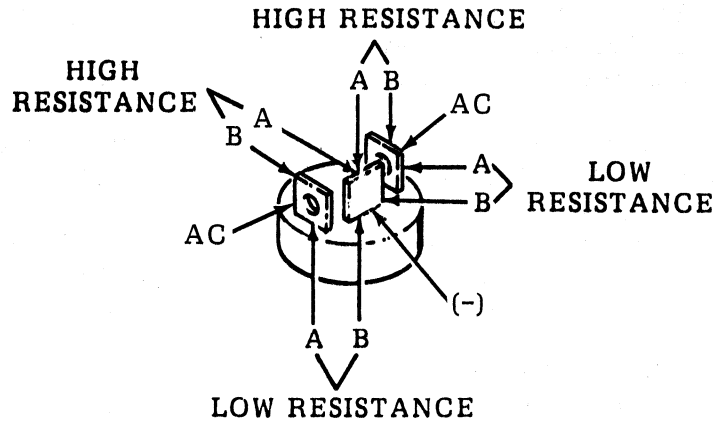
(6) Install the stator (20) on the engine adapter (21) and tap with soft head mallet to seat the stator (20) on the engine adapter (21).

(7) Pull the two electrical leads (6) for the capacitor (5) and the two electrical leads (7) for the rectifier (8) out through the outboard bearing bracket (14). Position o-ring (15) on the outboard bearing bracket (14) then seat the outboard bearing bracket (14) on the stator (20) with a soft mallet.

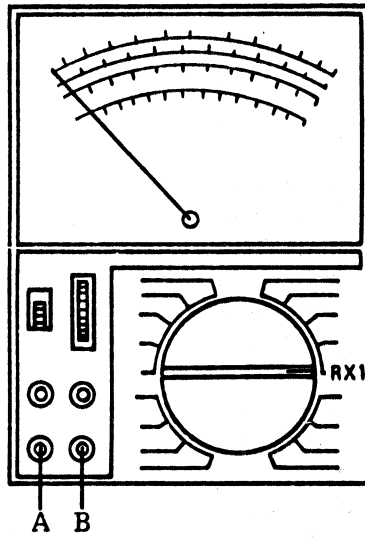
(8) Install the lockwashers (12) onto the long capscrews (11).

(9) Slide the two top long capscrews (11) through the outboard bearing bracket (14) then through the engine adapter (21) and heat shield (19). Install nuts with washers (10) but do not tighten.

(10) Slide the lower right long capscrew (11) through the ground lug (13), the outboard bearing bracket (14), the generator mounting foot (2), and through engine adapter (21) then install nut with washer (10).



ANALOG
MULTIMETER SET
ON RX1 SCALE



D - RECTIFIER

Figure 6-10. Testing Generator Components (Sheet 4 of 4)

- (11) Slide the one remaining long capscrew (11) through the negative battery cable (32), outboard bearing bracket (14), the generator mounting foot (2) then on through the engine generator adapter (21). Secure with nut with washer (10).
- (12) Install the capscrews (18), lockwashers (17) and nuts (16) to secure the generator mounting feet (2).
- (13) Tighten all four long capscrews (11) equally.
- (14) Position the rectifier (8) on the outboard bearing bracket (14) and secure with screw (9), then connect the three electrical leads (7) and (35).
- (15) Attach the capacitor (5) to the cover (4) using nonconductive silicon and allow adhesive to cure.
- (16) Connect the two electrical leads (6) to the capacitor (5).
- (17) Position the cover (4) on the outboard bearing bracket (14) and secure with screws (3).
- (18) Connect the electrical leads from the generator to the engine.
- (19) Connect the harness connector (1, Figure 6-5) to the control box.
- (20) Refer to paragraph 6-13 and perform flashing procedures.
- (21) Start engine and check generator output (Section III).

6-13 FLASHING GENERATOR

NOTE

Generator must be stopped to perform flashing operation.

- a. Refer to Figure 6-9 and remove screws (3) and cover (4).
- b. Locate diodes (34) on end of rotor (23).

CAUTION

Do not reverse polarity of leads. If polarity is reversed, damage may occur to the diodes or rotor or both.

- c. Refer to Figure 6-11. Scrape away insulating varnish on diode posts to allow contact then using a 12-volt automotive battery, with the leads properly marked, touch the positive (+) lead to the end of the diodes marked with a white line. At the same time, touch the negative (-) battery lead to the opposite end of the diodes. Hold the leads across the diodes for 3 to 5 seconds.
- d. Remove the battery leads then, replace the cover (4, Figure 6-9) and screws (3).

6-14 ENGINE

- a. Removal.

NOTE

The engine and generator are removed as one assembly. The generator is then disassembled and removed from the engine.

- (1) Refer to paragraph 6-9,a. and remove the fuel tank.

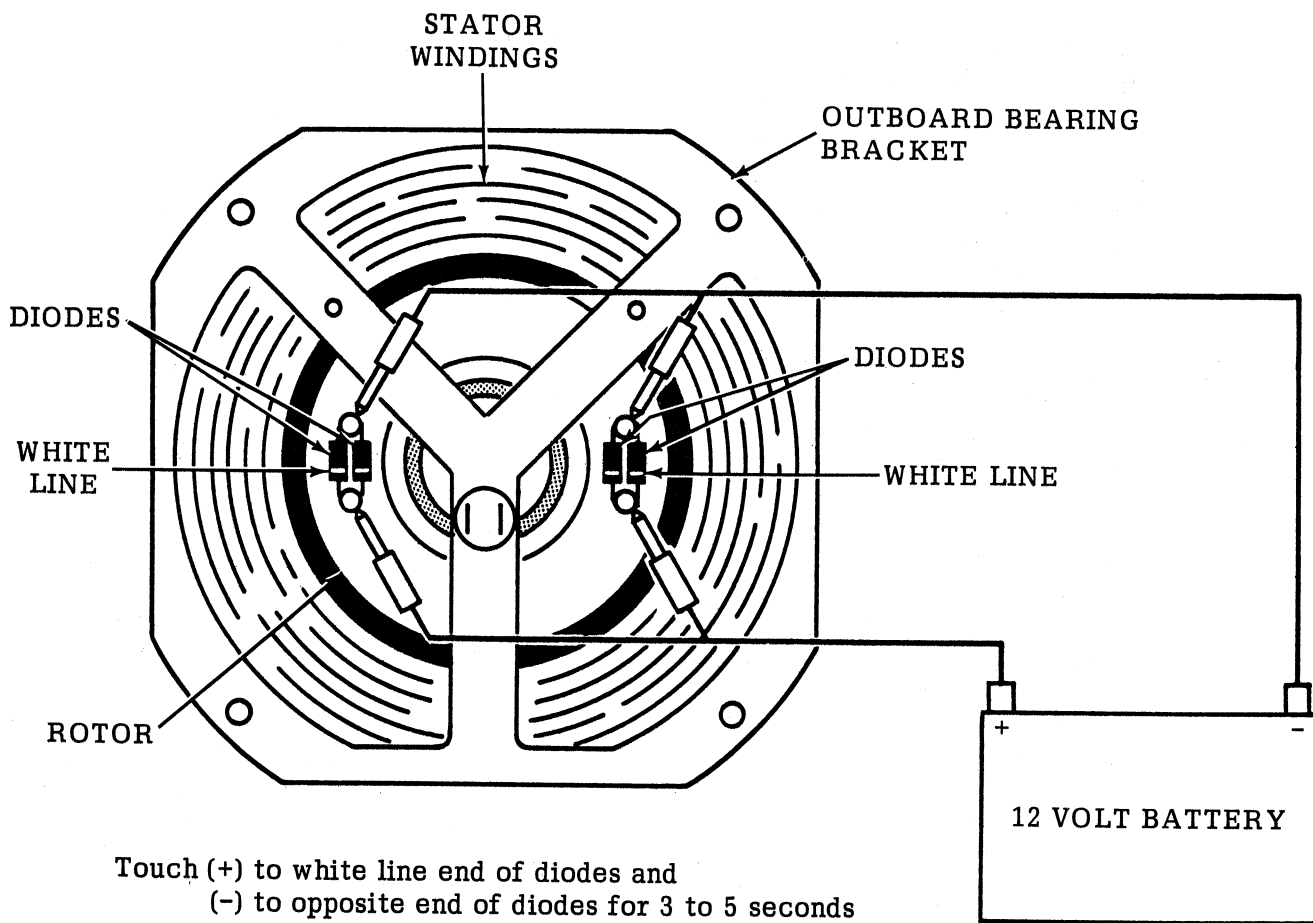
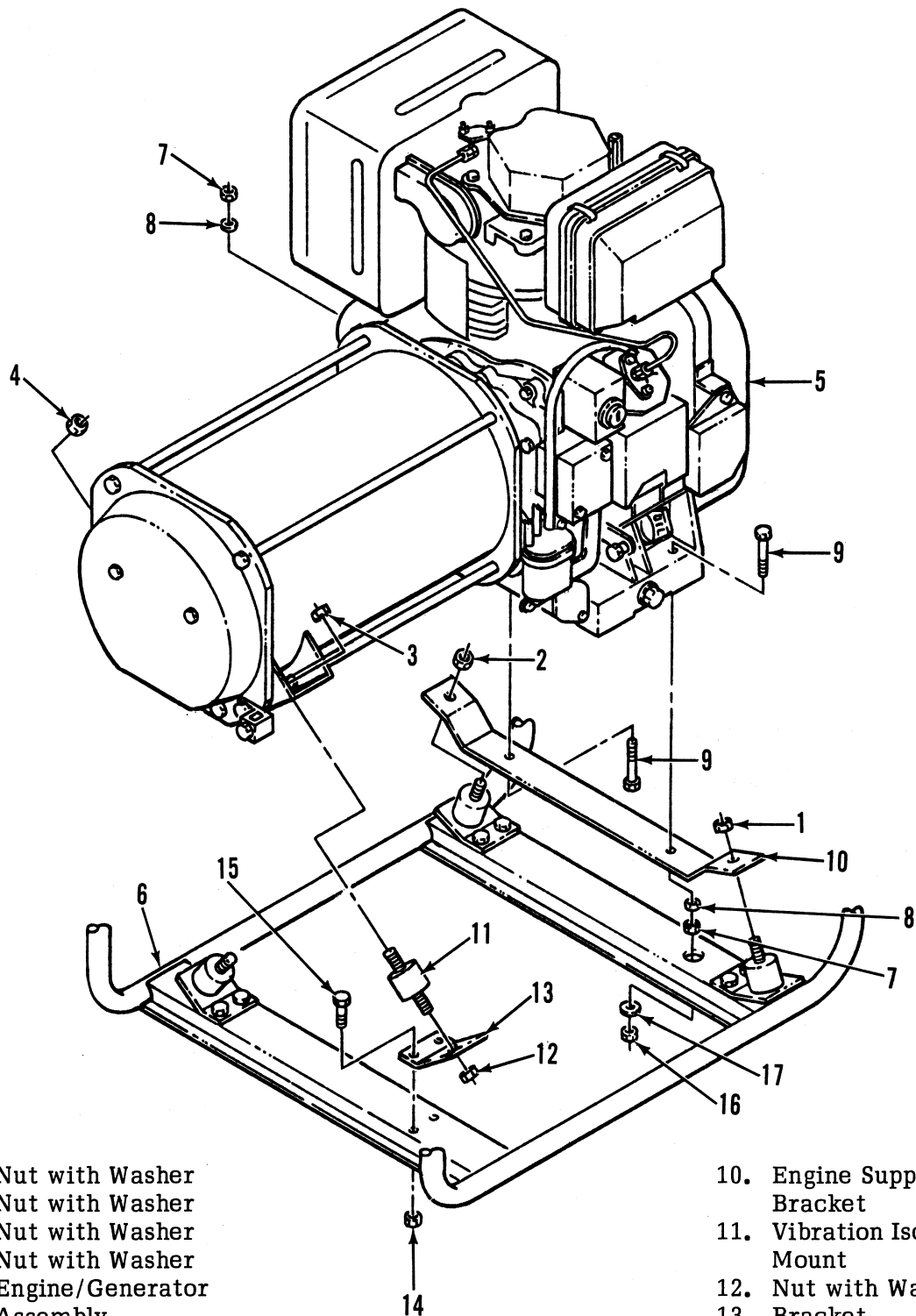


Figure 6-11. Flashing Generator

- (2) Refer to paragraph 6-11,a. and b. to disconnect the battery cables.
 - (3) Refer to paragraph 6-10 and remove the control box.
 - (4) Refer to Figure 6-12 and remove the nuts with washers (1, 2, 3 and 4).
 - (5) Attach a suitable hoist and sling to the engine/generator assembly (5) and hoist it clear of the base assembly (6).
 - (6) Remove the locknut (16), flat-washer (17), lockwashers (8) and capscrews (9) to release the engine support bracket (10).
 - (7) Refer to paragraph 6-12,a. and perform the steps necessary to remove the generator from the engine.
- b. Cleaning and Drying.

CAUTION

Do not use P-D-680, Type II, or MIL-C-87396, Type I, to clean lubricant seals or rubber hoses.



- | | |
|------------------------------|------------------------------|
| 1. Nut with Washer | 10. Engine Support Bracket |
| 2. Nut with Washer | 11. Vibration Isolator Mount |
| 3. Nut with Washer | 12. Nut with Washer |
| 4. Nut with Washer | 13. Bracket |
| 5. Engine/Generator Assembly | 14. Nut with Washer |
| 6. Base Assembly | 15. Capscrew |
| 7. Nut | 16. Locknut |
| 8. Lockwasher | 17. Flatwasher |
| 9. Capscrew | |

Figure 6-12. Engine/Generator Removal

- (1) Prior to disassembly of the engine the exterior parts of the equipment should be thoroughly cleaned to remove accumulated mud and grease. This procedure will facilitate inspection and disassembly.

WARNING

Cleaning Compound, MIL-C-87396, Type I, is toxic to eyes, skin and respiratory tract. Skin and eye protection required. Use only in well-ventilated area.

- (2) Wash painted surfaces of the unit with cleaning compound, MIL-C-87396, Type I.

WARNING

Solvent P-D-680, Type II is toxic to skin, eyes, and respiratory tract. Skin and eye protection required. Avoid repeated or prolonged contact. Use only in a well-ventilated area.

- (3) Electrical parts incorporating insulating materials (coils, junction blocks, switches, etc.) should not be soaked or sprayed with cleaning solutions. Clean these parts with a clean lint-free cloth moistened with solvent P-D-680, Type II.

WARNING

Compressed air used for cleaning can create

airborne particles that may enter the eyes. Pressure will not exceed 30 psig. Eye protection required.

- (4) The component parts can be dried with compressed air.

CAUTION

Ensure that electrical components are thoroughly dried before connecting to an electrical power supply.

- c. Disassembly. Refer to the engine manufacturer's service manual (#TTP30190) for instructions pertaining to disassembly, repair, assembly, and adjustment of engine and engine systems.

- d. Installation.

- (1) Prior to installing engine, perform the following mounting equipment check;

- (a) Check the condition of the vibration isolator mounts (11, Figure 6-12). If cracked, torn or damaged in any way, remove isolator mount by removing nut with washer (12) and install replacement.

- (b) Check condition of brackets (13). If cracked or damaged, remove nuts with washers (14) and capscrews (15) to release brackets (13) from base assembly (6).

- (c) Check the engine support bracket (10) for cracks or damage. Replace bracket if found unserviceable.

- (d) Check the base assembly

- (6) for cracked or broken welds. Have cracks rewelded and the weld area repainted.
- (2) Refer to paragraph 6-12,d. and perform the steps necessary to assemble the generator onto the engine.
 - (3) Position the engine support bracket (10) under the engine and secure with capscrews (9), lock-washers (8) and nuts (7).
 - (4) Attach a suitable hoist and sling to the engine generator assembly (5) and hoist it into the base assembly (6) and onto the vibration isolator mounts (11). Secure with nuts with washers (1).
 - (5) Install flatwasher (17) and locknut (16). Leave locknut (16) loose enough to allow engine to move around freely on rubber mounts.
- (6) Refer to paragraph 6-10, d. and perform the control box installation procedures.
 - (7) Refer to paragraph 6-11 and reconnect the battery cables.
 - (8) Refer to paragraph 6-9, e. and perform the steps necessary to install the fuel tank.
 - (9) Once installation is complete refer to paragraph 3-3 and perform the procedures necessary to prepare the unit for operation.
 - (10) Refer to Section III of this chapter and perform the operational tests to determine if unit is performing properly.

SECTION III. PERFORMANCE TEST CHECKS

6-15 GENERAL.

Perform the following procedures to determine if the generator set output is within the normal operating range established by the manufacturer.

6-16 AC CIRCUIT TESTING

- a. Start the engine (paragraph 4-5) and allow it to warm to normal operating temperature.

WARNING

Wear electrically insulated gloves while performing the following tests.

- b. Using a 0-300 VAC Voltmeter, insert the meter test leads into the slots of the 120 volt duplex receptacle

as shown in Figure 6-13. The meter should indicate between 120 and 125 volts, if not perform the following:

- (1) If the unit is not generating any current refer to paragraph 6-13 and "flash" generator.
 - (2) If voltage is low, check the engine speed with a contactless tachometer. Adjust engine speed to between 3660 and 3720 rpm. (Refer to engine service manual TTP30190 for procedures.)
 - (3) If voltage is too high, check engine speed with contactless tachometer. Adjust engine speed to between 3660 and 3720 rpm. (Refer to engine service manual TTP30190 for procedures.)
- c. Insert the meter test leads into

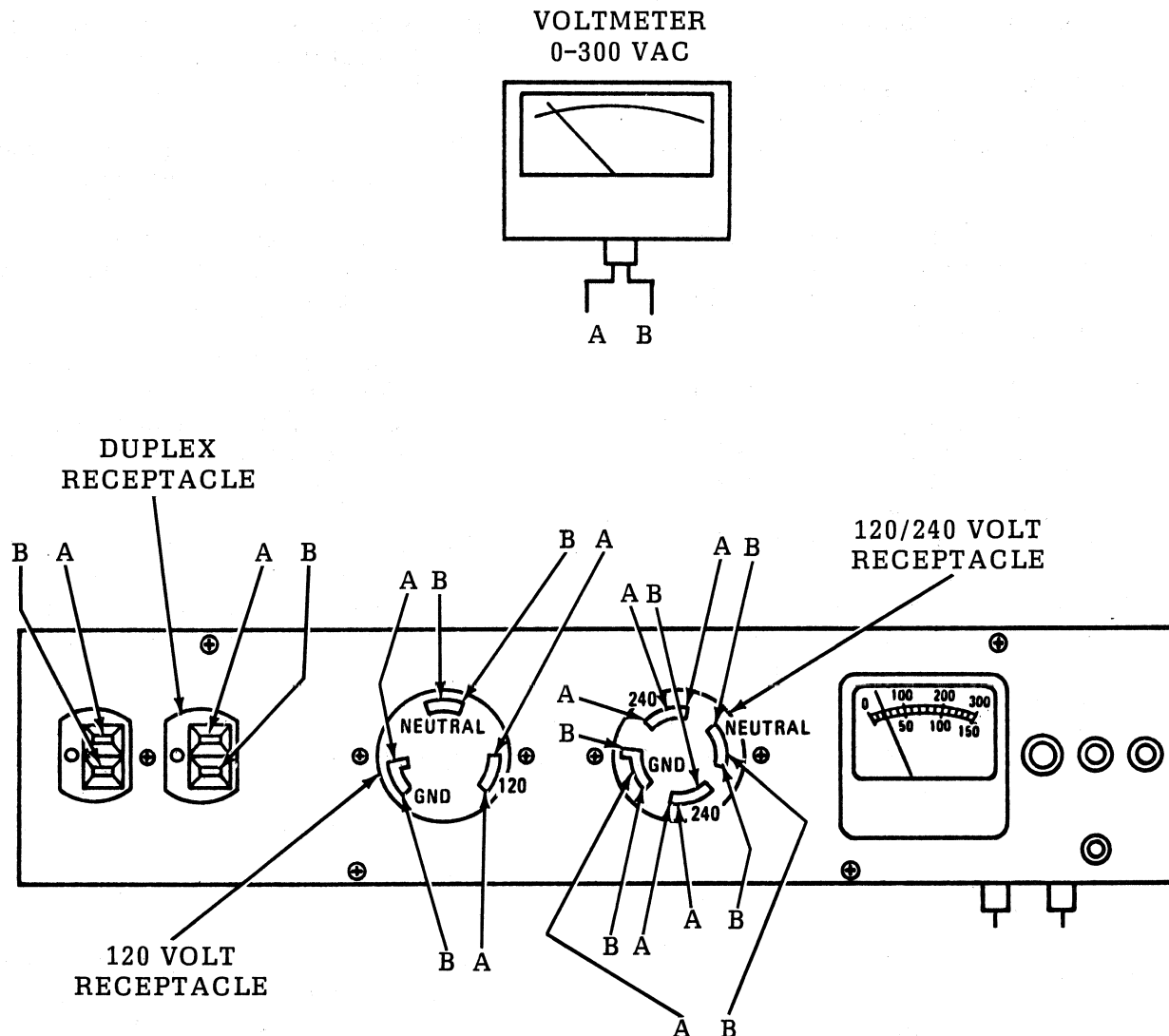


Figure 6-13. AC Circuit Performance Test Checks

the "Neutral" and "120" slots of the locking 120 volt receptacle as shown in Figure 6-13. The meter should indicate between 120 and 125 volts.

d. Insert the meter test leads into the "GND" and "120" slots of the locking 120 volt receptacle, as shown in Figure 6-13. The meter should indicate between 120 and 125 volts.

e. Inserting the meter test leads into

the "Neutral" and "GND" slots should yield no reading on the meter.

f. If the conditions of step b. are met but, readings other than those indicated in steps c, d and e are received, check for loose or improper connections to the 120 volt locking receptacle.

g. Insert one of the meter test leads into one of the "240 volt" slots and the other lead into the "Neutral"

- slot of the 120/240 volt receptacle. The meter should indicate between 120 and 125 volts. Move the 240 slot test lead to the other 240 slot. This should also indicate between 120 and 125 volts.
- h. Insert the test leads into the 240 slots. This should yield a reading between 240 and 250 volts.
- i. Insert the test leads into the "GND" and "Neutral" slots. This should yield a "0" volts reading.
- j. Insert one test lead into either "240" slot and the other lead into the "GND" slot. This should yield a reading between 120 and 125 volts. Moving the "240" slot test lead to the other "240" slot should bring the same 120 to 125 volt reading.
- k. If the conditions of steps b thru f are met but the readings taken in steps g thru k are incorrect, check for loose or improper connections to the 120/240 volt receptacles.

6-17 DC CHARGING CIRCUIT TEST

- a. The DC charging circuit must be connected to a load (in this case a 12-volt battery) in order to receive accurate voltage meter readings. Refer to Figure 6-14 to set up test equipment.
- b. Once engine is running at normal operating speed and temperature connect the test setup to the black and red terminals as shown in Figure 6-14. The meter should indicate between 13 and 15 volts.

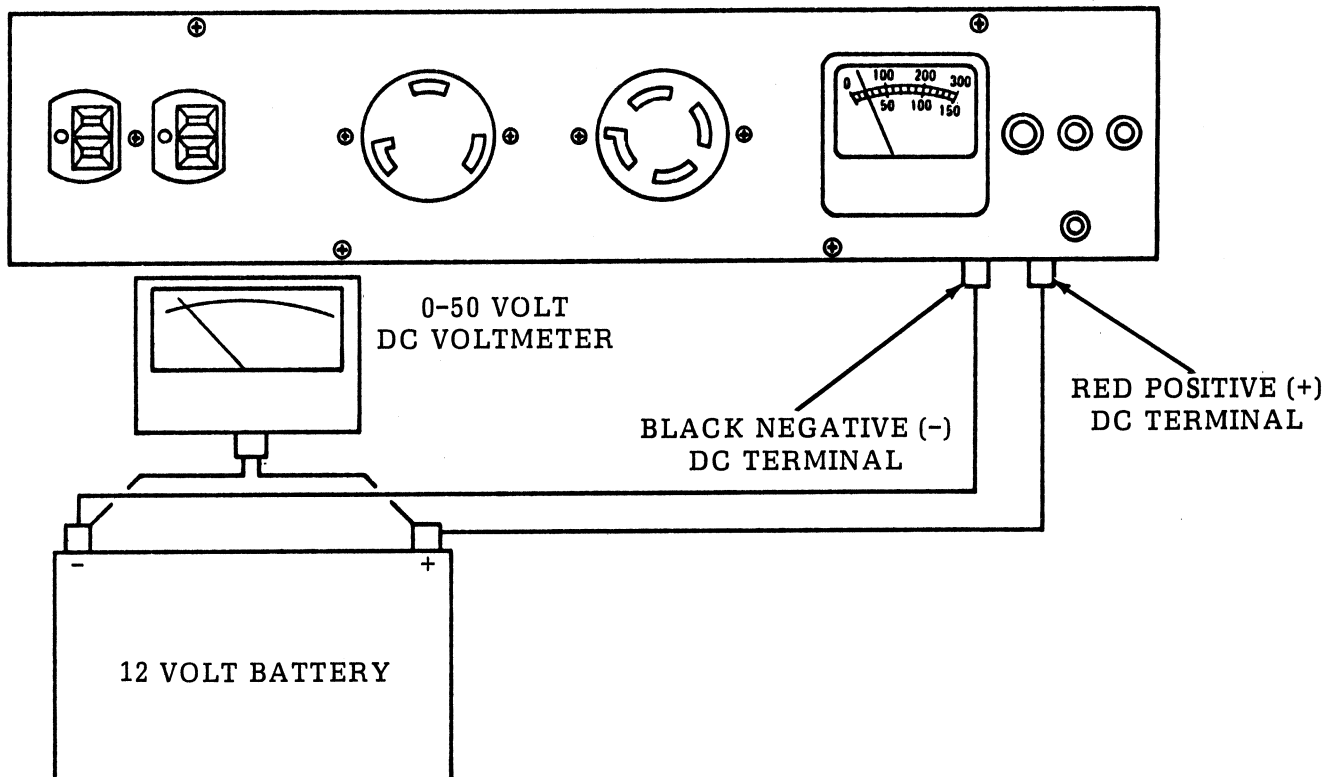


Figure 6-14. DC Charging Circuit Test

Table 6-3. Lubrication Instructions

○ DAILY (5 hrs)

☞ OIL CAN

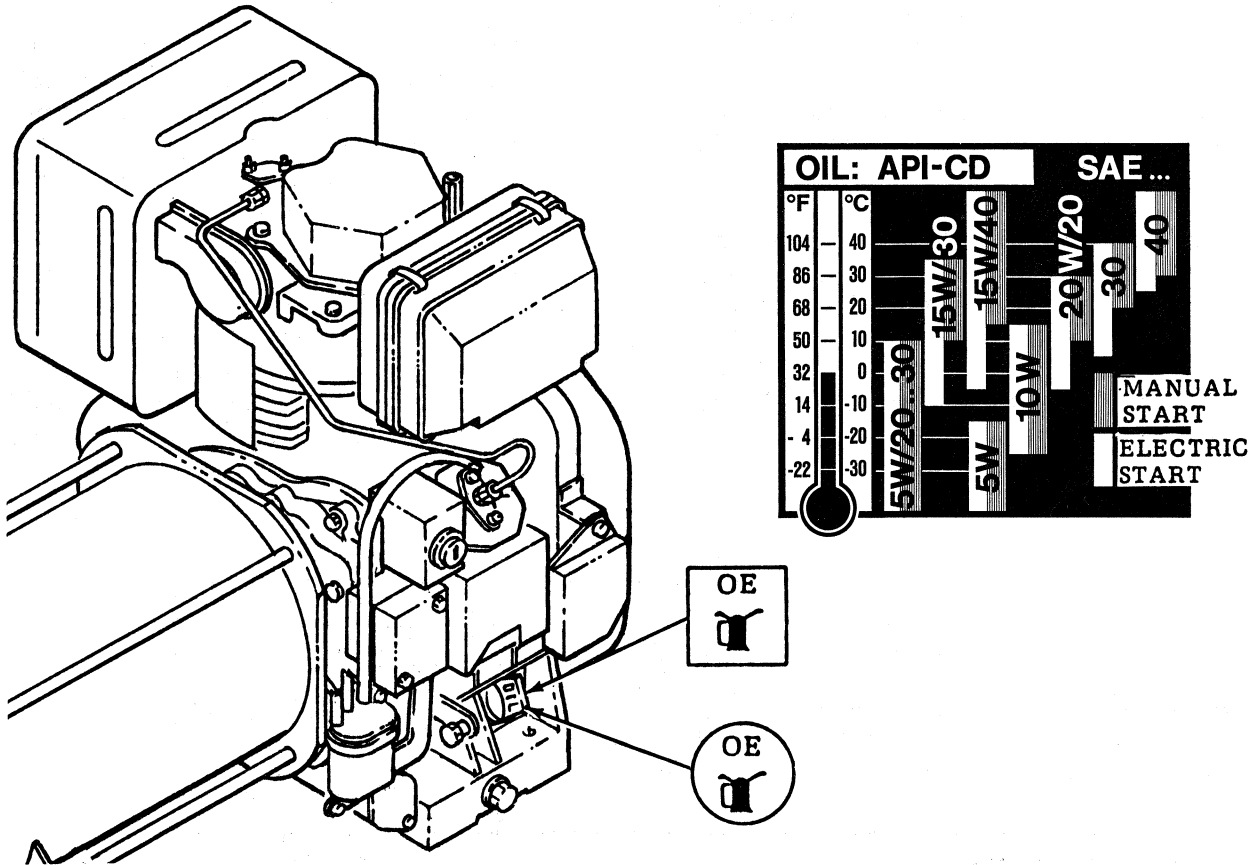


Table 6-4. Lubricant Specifications

Item and Location	Lube Agent	Lube Symbol	MIL Specification	Frequency		
				Daily	Periodic	Annual
Engine Crankcase	Oil	OE	MIL-L-8383	See Table 6-2 for Intervals		

CHAPTER 7**CIRCUIT DIAGRAMS****7-1 GENERAL**

The following chapter contains an electrical circuit diagram for the engine, an electrical

schematic of the generator and control box and a wiring diagram of the generator and control box. Use the following reference designator index to identify components.

Reference Designator Index

CB1	-	Circuit Breaker, 30 amp
CB2	-	Circuit Breaker, 15 amp
F1	-	Fuse, DC
GND	-	Ground Terminal
J1	-	Junction Connector 1 of Wiring Harness
L	-	Low Oil Pressure Light
P1	-	Plug Connector 1 of Wiring Harness
VM	-	Volt Meter

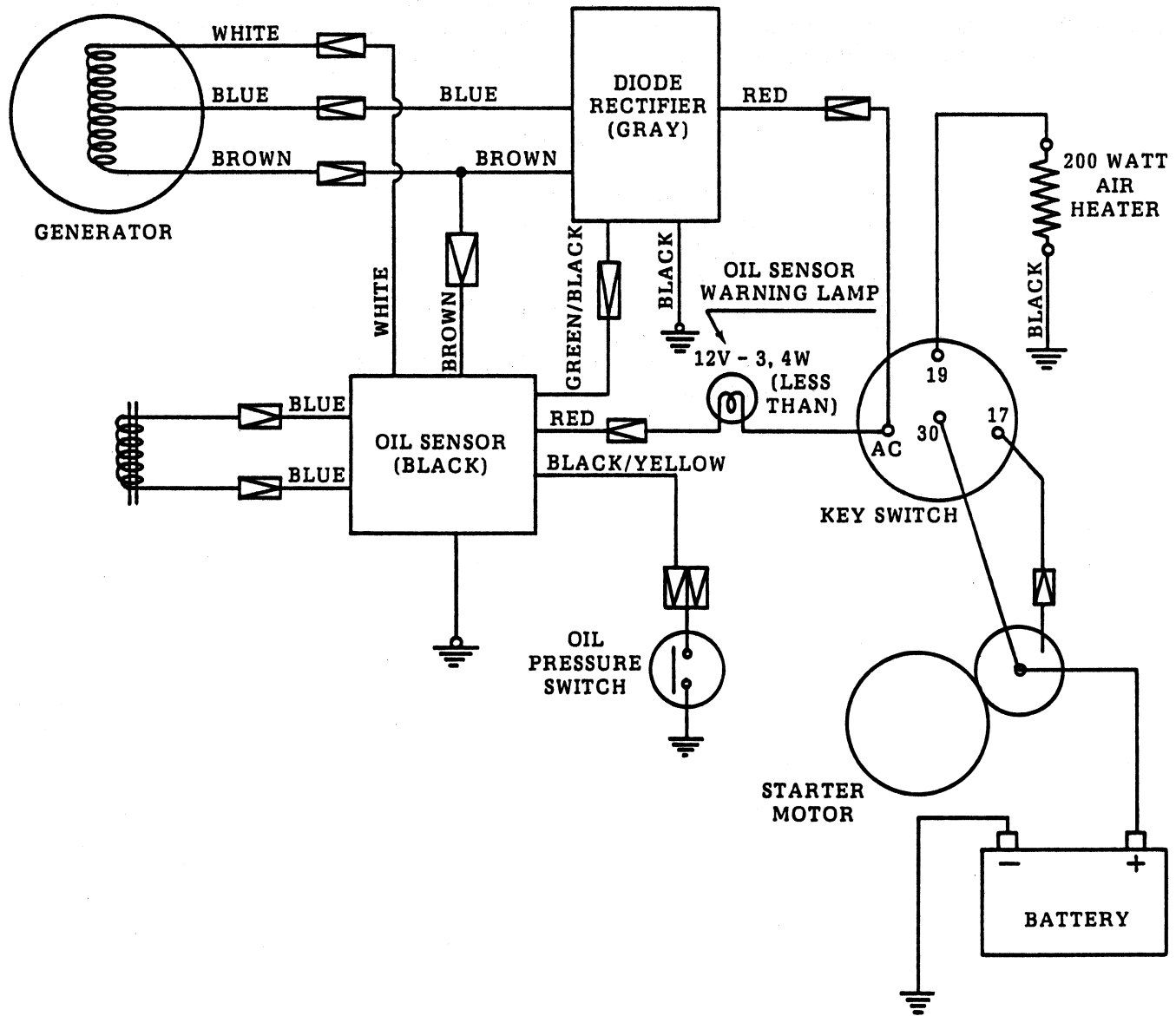


Figure 7-1. Engine Electrical Circuit

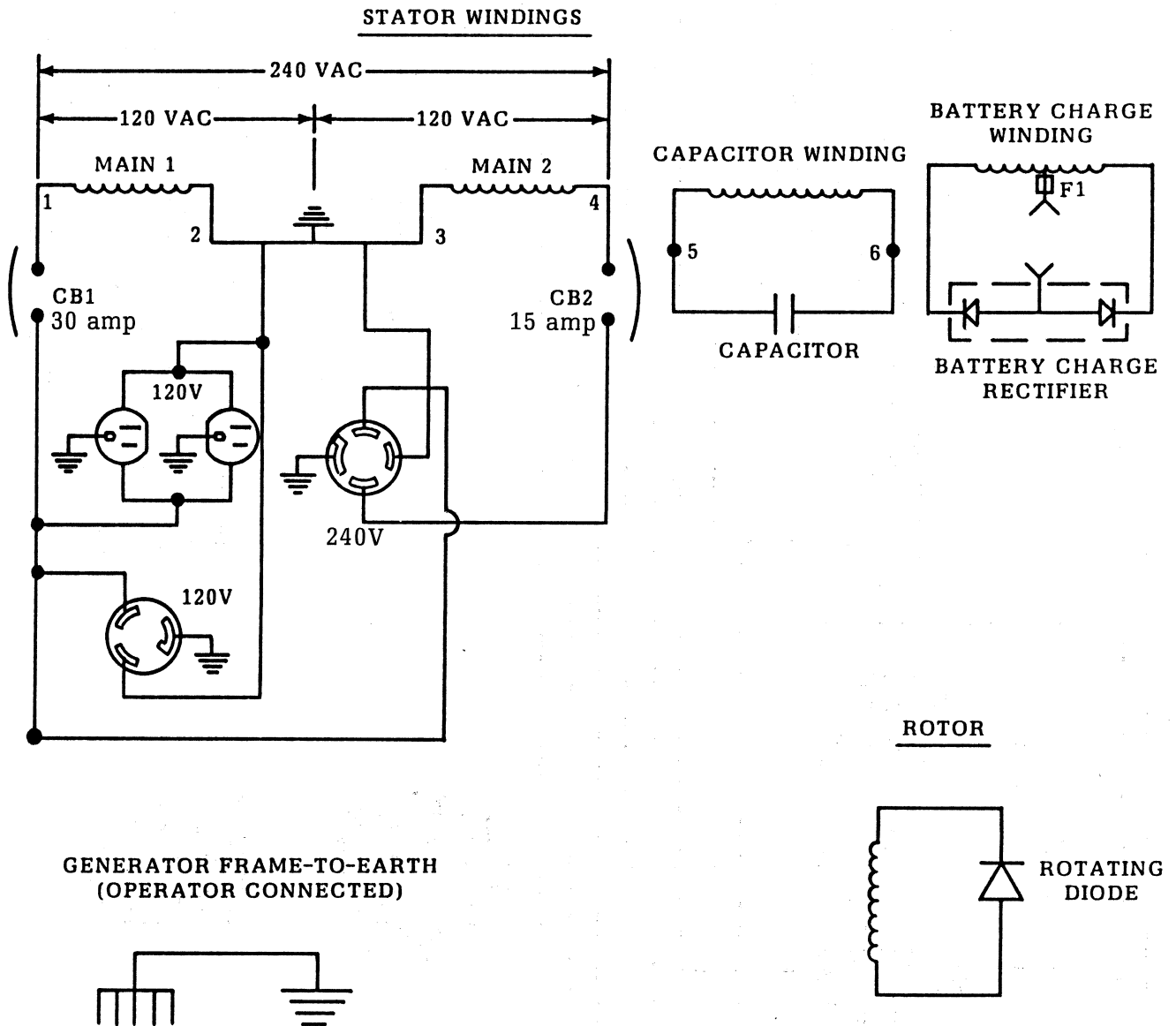


Figure 7-2. Generator Schematic Diagram

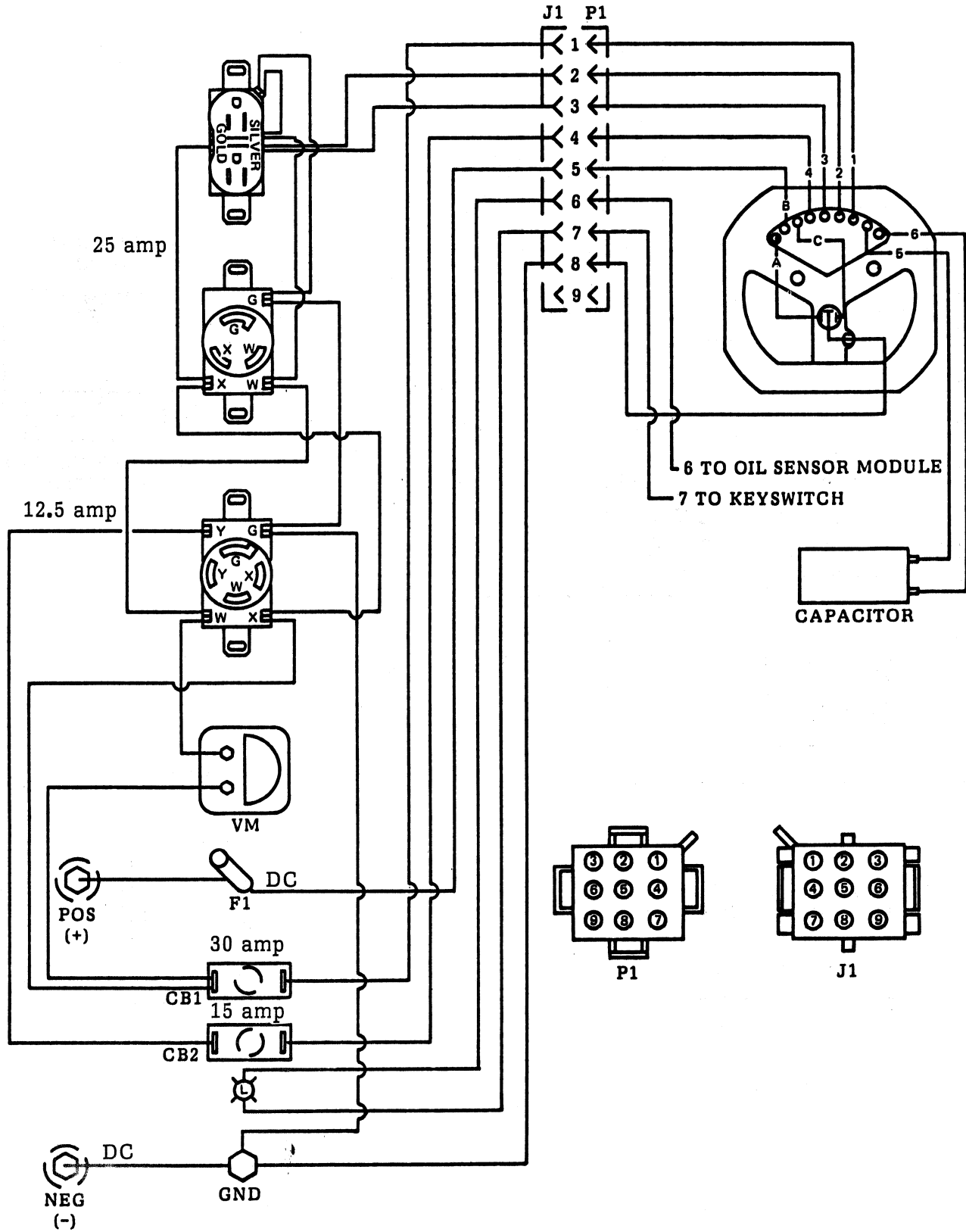


Figure 7-3. Generator Set Wiring Diagram

CHAPTER 8

ILLUSTRATED PARTS BREAKDOWN

8-1 GENERAL

8-1.1 Purpose and Scope.

This illustrated Parts Breakdown lists and identifies the parts of the Diesel Engine Driven Generator Set, Model 30D36R, manufactured by T & J Manufacturing, Inc., Oshkosh, Wisconsin.

8-2 MAINTENANCE PARTS LIST

8-2.1 General.

The Maintenance Parts List contains a parts listing of the complete unit divided into its assemblies, sub-assemblies and detail parts. Each assembly is followed by its component parts indented to show their relationship to the assembly. Attaching parts for a part or assembly follow that part or assembly and are indicated by an AP in parenthesis following the description.

8-3 EXPLANATION OF COLUMNS IN MAINTENANCE PARTS LIST

8-3.1 Figure and Index Number Column. The figure and index numbers correlate each parts list to its appropriate illustration. The first number in this column on each page of listings indicates the figure number of the associated illustration. The following numbers, preceded by a dash, correspond to the index numbers of each part on the illustration.

8-3.2 Part Number Column. This column contains the manufacturer's or Government standard part number for each item listed.

8-3.3 FSCM Column. This column contains the Federal Supply Code for Manufacturers (FSCM) assigned to the manufacturer or Government agency whose part number appears in the Part Number column. The codes are listed as currently shown in Cataloging Handbooks H4-1 and H4-2.

8-3.4 Description Column. This column contains the manufacturer's nomenclature for each assembly or part. Each part description is indented to show relationship. References to next higher assembly or detail parts breakdowns follow the description where applicable.

8-3.5 Units Per Assembly Column. This column contains the quantity required for each assembly in the next higher assembly and for each detail part in an assembly. The abbreviation "AR" in this column indicates "as required". Items that are listed for reference purposes are indicated by "REF" in this column.

8-3.6 Usable on Code Column. Part variations within assemblies are indicated by a letter symbol or combination of symbols appearing in this column. Where this column is left blank, parts apply to all articles covered in this manual.

8-3.7 SMR Code Column. This column contains Government assigned Source, Maintenance and Recoverability (SMR) codes. This manual contains Joint Military Services Uniform SMR codes only. Definitions of these SMR codes are available in T.O. 00-25-195.

8-4 INDEXES

8-4.1 Numerical Index. This index contains an alphanumeric listing, by part number, of all parts appearing in the Maintenance Parts List. Explanation of columns used in the index are as follows:

- a. Part Number Column. Contains all part numbers as described in Paragraph 8-3.2 arranged in an alphanumeric sequence.
- b. Figure and Index Number Column. Contains the figure and index number for each part number listed in the part number column.

Government standard numbers reflect only the first appearance of that number in the manual. When an assembly or part no. has not been assigned a figure and index number, the figure and index number of the preceding part number in the MPL, prefixed with the letter "F" is shown. The letter "F" indicates "follows".

8-5 HOW TO USE THE PARTS LIST

8-5.1 When the Part Number is Known.
 Locate the part number in the numerical index with the corresponding figure and index number. Refer to the related illustration and parts list to find the part.

8-5.2 When the Part Number is Not Known.

- a. Determine the function and application of the part required.
- b. Turn to the page indicated and locate the desired part on the illustration.
- c. From the illustration, obtain the index number assigned to the part desired. Refer to the accompanying description for specific information regarding the part.

8-6 ABBREVIATIONS

8-6.1 The following is a list of abbreviations used in the Maintenance Parts List.

Abbreviation	Explanation
AP	Attaching Parts
AR	As Required
FSCM	Federal Supply Code for Manufacturers
NHA	Next Higher Assembly
SMR	Source, Maintenance and Recoverability

8-7 FEDERAL MANUFACTURER'S CODE

8-7.1 The following is a list of Federal Manufacturers' Codes and the manufacturers they represent as listed in the federal Supply Code for manufacturers, H4-1.

CODE VENDOR'S NAME AND ADDRESS

- 51879 T & J Manufacturing, Inc.
 102 W. 5th Ave.
 Oshkosh, WI 54902
 P.O. Box 200
 Phone (414) 236-4200
- 7J925 Endries Fasteners & Supply, Inc.
 Highway 10 W.
 Brillion, WI 54110-0069
 P.O. Box 69
 Phone (414) 756-2174
- 72041 Eagle Electric Mfg. Co., Inc.
 4531 Court Sq.
 Long Island City, NY 11101-4326
 Phone (718) 937-8000
- 8R123 Teledyne Total Power
 Sub of Teledyne, Inc.
 1127 International Pky
 Fredericksburg, VA 22405-1125
 Phone (703) 752-9395
- 81091 Pass & Seymour, Inc.
 50 Boyd Ave.
 Syracuse, NY 13221
 P.O. Box 4822
 Phone (315) 468-6211
- 83701 Electronic Devices, Inc.
 21 Grey Oaks
 Yonkers, NY 10710-3205
 Phone (914) 965-4400

**8-8 TELEDYNE TOTAL POWER
 DISTRIBUTION CENTERS**

Mr. Dave Gumbita
 The Power Center - VA
 1127 International Parkway
 Fredericksburg, VA 22405
 P.O. Box 5409
 Phone (703) 752-9395

Mr. Howard Johnston
The Power Center - CA
3271 Cherry Avenue
Long Beach, CA 90807
P.O. Box 7428
Phone (213) 424-0913

Mr. Dick McDowell
The Power Center - PA
1061 Main Street
Building 2-C
North Huntingdon, PA 15642
Phone (412) 863-8874

Mr. Dan Martin
The Power Center - WI
2244 W. Bluemound Road
Waukesha, WI 53187
P.O. Box 178
Phones (414) 786-1600, and
(800) 558-6107

Mr. Don Bossart
Minnesota Power Center
4401 85th Avenue North
Brooklyn Park, MN 55443
Phones (612) 424-8234, and
(800) 328-0916

Mr. Steve Rodgers
The Power Center - Utah
2712 South 3600 West
Building B-Suites G, H & I
West Valley City, UT 84120
Phones (801) 964-1278, and
(800) 999-7610

Mr. Knut Gustad
Teledyne Total Power
Rue Joseph Deflandre 13
B-4920 Chaudfontaine
Liege, Belgium
Phone (41) 67.53.20

8-9 **GENERATOR MANUFACTURER**
(Will also be available to supply service parts)

Mr. Bill Magritz
T & J Manufacturing Inc.
102 West Fifth Avenue
Oshkosh, WI 54901
P.O. Box 200
Phone (414) 236-4200

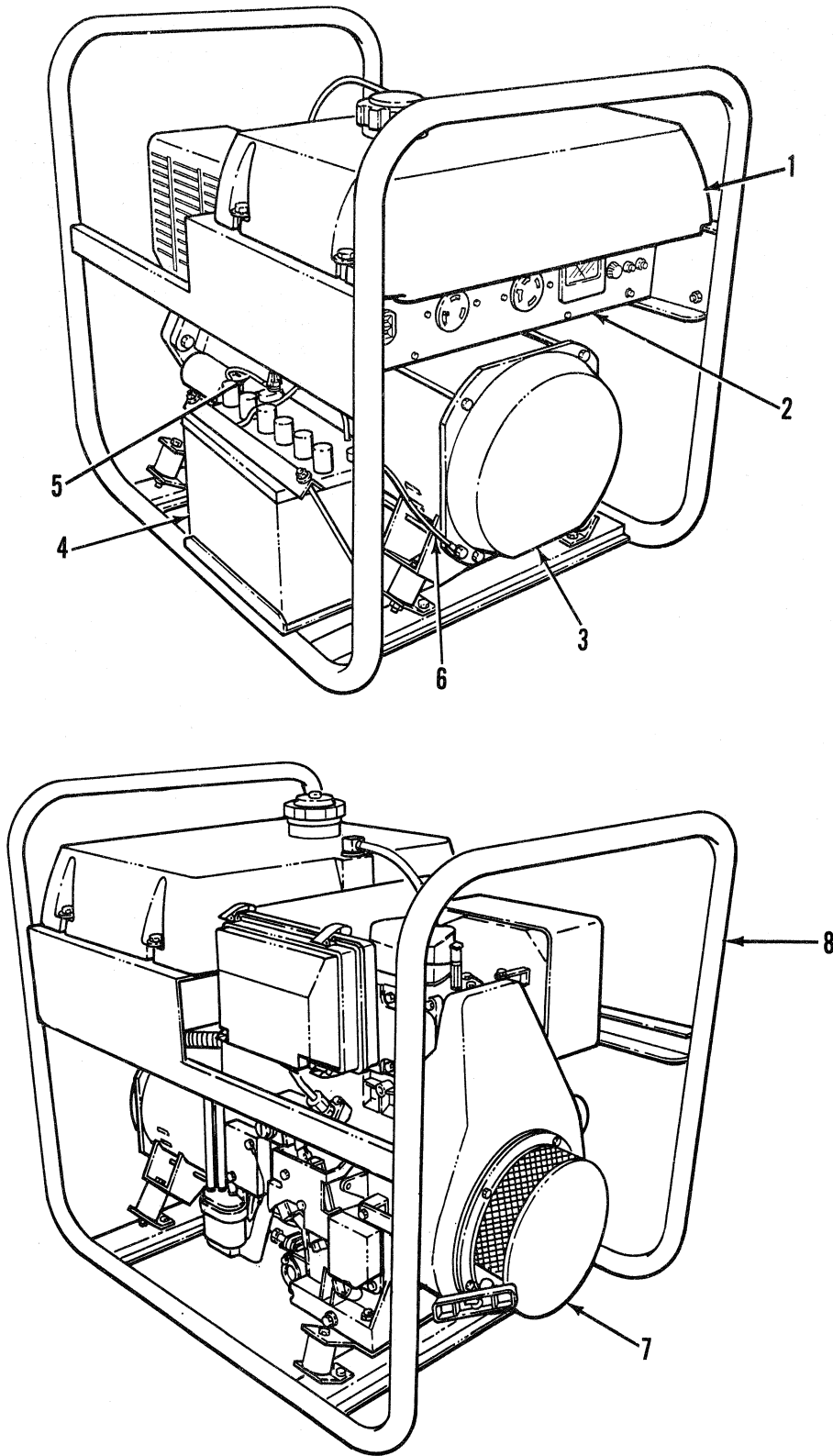


Figure 8-1. 3KW Diesel Engine Driven Generator Set

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-1	0015-70029	51879	GENERATOR SET, Model 30D36R, .. diesel engine driven, 3KW, NSN 6115-01-1059	1		PEOFF
-1	0713-00100	51879	. TANK ASSY (See Figure 8-2 for ... detail parts)	1		
-2	9077-00000	51879	. CONTROL BOX ASSY (See Fig- ... ure 8-3 for detail parts)	1		
-3	0035-00300	51879	. GENERATOR ASSY (See Figure ... 8-4 for detail parts)	1		
-4	0630-00002	51879	. BATTERY	1		
-5	0100-00100	51879	. . CABLE (-)	1		
-6	0100-00200	51879	. . CABLE (+)	1		
-7	WRD1-270	8R123	. ENGINE, Diesel (See Figure 8-5 ... for detail parts) (51879) (PN 0020-10402)	1		
-8	0380-50100	51879	. BASE ASSY (See Figure 8-10 for ... detail parts)	1		

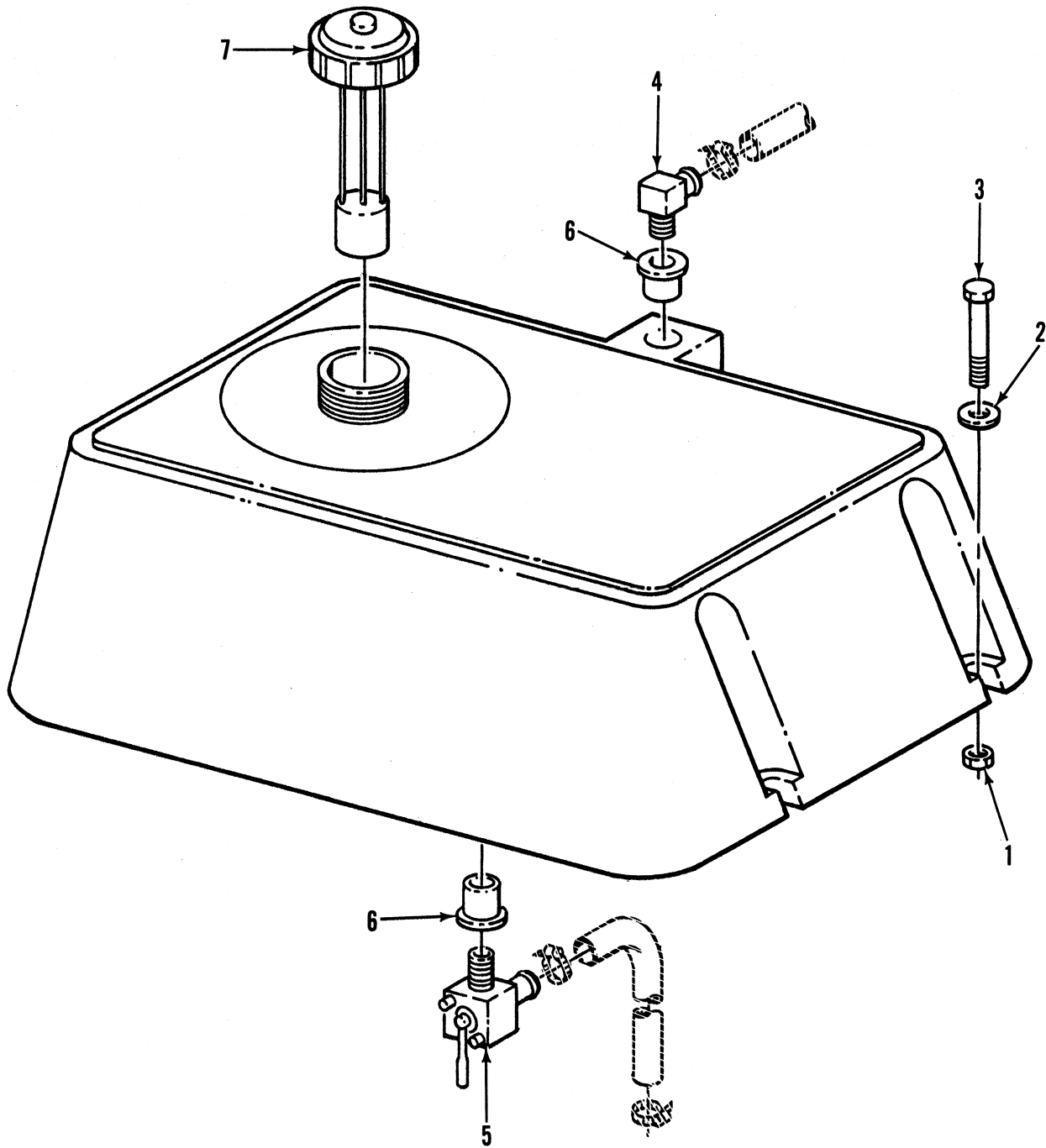


Figure 8-2. Tank Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	QTY	USABLE	SMR
				REQD	ON CODE	CODE
8-2	0713-00100	51879	TANK ASSY (See Figure 5-1 for NHA)	REF		
-1	MS51922-9	96906	. NUT, Self locking (AP)	4		
-2	MS27183-11	96906	. WASHER, Flat (AP)	4		
-3	MS90725-39	96906	. SCREW, Cap (AP)	4		
-4	0713-00212	51879	. ELBOW, 90°	1		
-5	0713-00211	51879	. VALVE, 90°	1		
-6	0713-00213	51879	. GROMMET	2		
-7	0715-00000	51879	. CAP, Fuel gage	1		

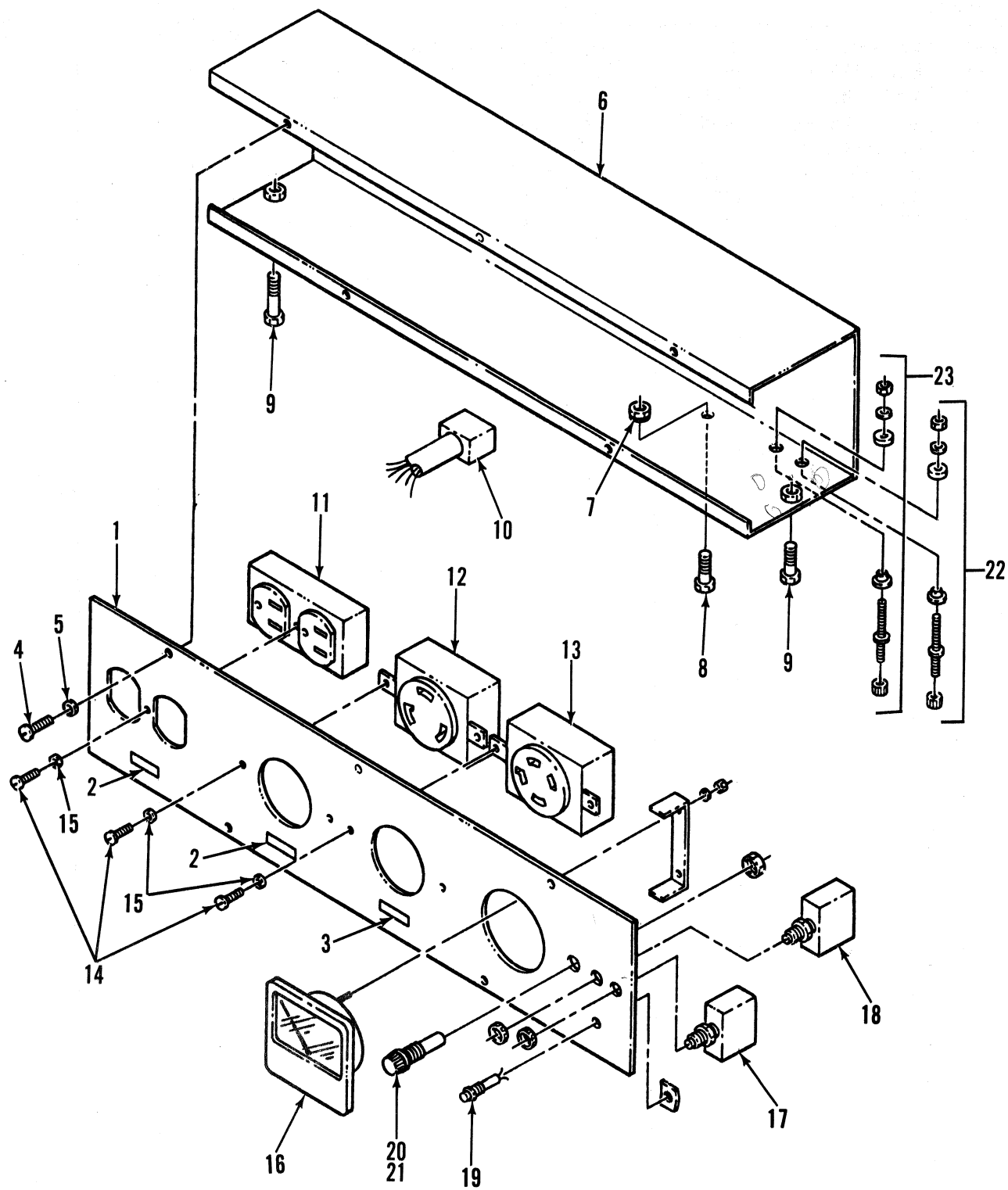


Figure 8-3. Control Box Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-3	9077-00000	51879	CONTROL BOX ASSY (See Figure ... 8-1 for NHA)	REF		
-1	0370-11100	51879	. COVER, Control box	1		
-2	0730-00001	51879	. . DECAL, 120V	2		
-3	0730-00002	51879	. . DECAL, 120/240V	1		
-4	MS35207-261	96906	. SCREW, Mach (AP)	5		
-5	MS35333-39	96906	. WASHER, Lock (AP)	5		
-6	0360-04800	51879	. BOX	1		
-7	1/2-20 KEPS	7J925	. NUT, Lock (AP)	1		
-8	MS90725-8	96906	. SCREW, Cap (AP)	1		
-9	MS90725-3	96906	. SCREW, Cap (AP)	2		
-10	0100-00300	51879	. HARNESS, Wiring	1		
-11	2705-15R	72041	. RECEPTACLE, Duplex	1		
-12	L5-30R	81091	. RECEPTACLE, 30 amp	1		
-13	L1420R	81091	. RECEPTACLE, 20 amp	1		
-14	MS35206-228	96906	. SCREW, Mach (AP)	5		
-15	MS35333-37	96906	. WASHER, Lock (AP)	5		
-16	0540-00300	51879	. METER, Volt, AC output	1		
-17	0610-00015	51879	. BREAKER, Circuit, 15 amp	1		
-18	0610-00030	51879	. BREAKER, Circuit, 30 amp	1		
-19	0550-00445	51879	. LIGHT, Low oil pressure	1		
-20	0671-00200	51879	. HOLDER, Fuse	1		
-21	0671-00011	51879	. . FUSE, 15 amp	1		
-22	0550-00300	51879	. TERMINAL POST ASSY, Red	1		
-23	0550-00301	51879	. TERMINAL POST ASSY, Black	1		

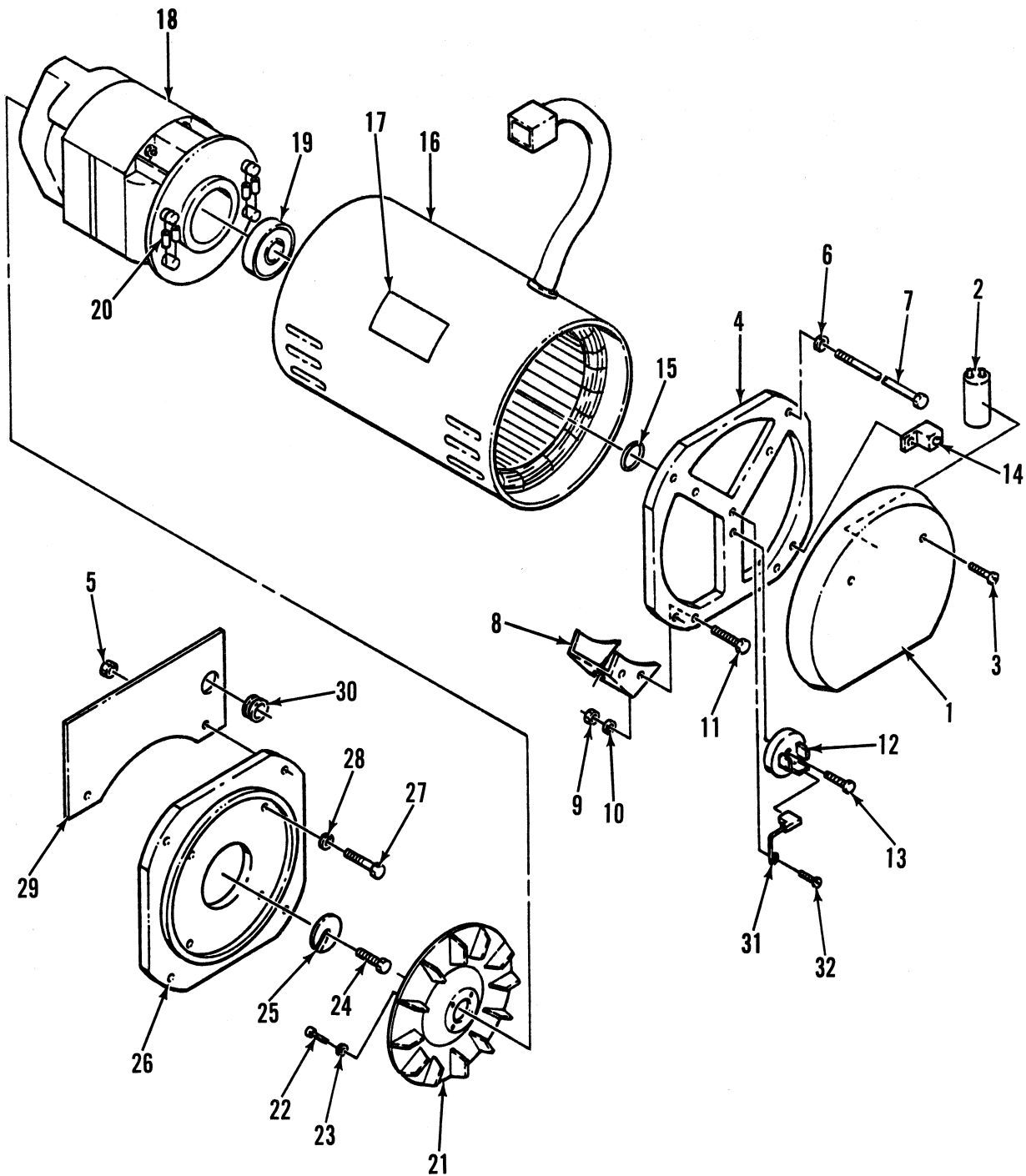


Figure 8-4. Generator Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-4	0035-00000	51879	GENERATOR ASSY (See Figure 8-1 for NHA)	REF		
-1	0370-03600	51879	. COVER	1		
-2	0600-00026	51879	. . CAPACITOR	1		
-3	0230-26015	51879	. SCREW, Mach, self locking, Rh, 1/4-20NC x 2-1/4) (AP)	2		
-4	0400-20100	51879	. BRACKET, Outboard bearing	1		
-5	1/4-20 KEPS	7J925	. NUT, Lock (AP)	4		
-6	MS35338-44	96906	. WASHER, Lock (AP)	4		
-7	0480-00030	51879	. SCREW, Cap (AP)	4		
-8	0450-06400	51879	. FOOT, Mtg, gen support	2		
-9	MS35649-2312	96906	. NUT, Hex (AP)	4		
-10	MS35338-45	96906	. WASHER, Lock (AP)	4		
-11	MS90725-34	96906	. SCREW, Cap (AP)	4		
-12	PKCN80F	83701	. RECTIFIER (0500-00150, 51879) ...	1		
-13	MS35206-231	96906	. SCREW, Mach (AP)	1		
-14	0590-40000	51879	. LUG, Grounding	1		
-15	0261-00000	51879	. PACKING, Preformed	1		
-16	0046-03002	51879	. STATOR	1		
-17	0730-00003	51879	. . PLATE, Data	1		
-18	0066-03002	51879	. ROTOR ASSY	1		
-19	0410-00600	51879	. . BEARING	1		
-20	0500-10005	51879	. . DIODE	4		
-21	0340-00000	51879	. FAN	1		
-22	MS16998-28L	96906	. SCREW, Cap, sockethead (AP)	4		
-23	MS35338-43	96906	. WASHER, Flat (AP)	4		
-24	MS90726-32	96906	. SCREW, Cap	1		
-25	0390-00000	51879	. WASHER, "C"	1		
-26	0400-00100	51879	. ADAPTER, Engine	1		
-27	MS90725-62	96906	. SCREW, Cap (AP)	4		
-28	MS35338-46	96906	. WASHER, Lock (AP)	4		
-29	0440-50600	51879	. SHIELD, Heat	1		
-30	0260-00050	51879	. GROMMET	1		
-31	100-00400	51879	. WIRE, Ground	1		
-32	MS90725-3	96906	. SCREW	1		

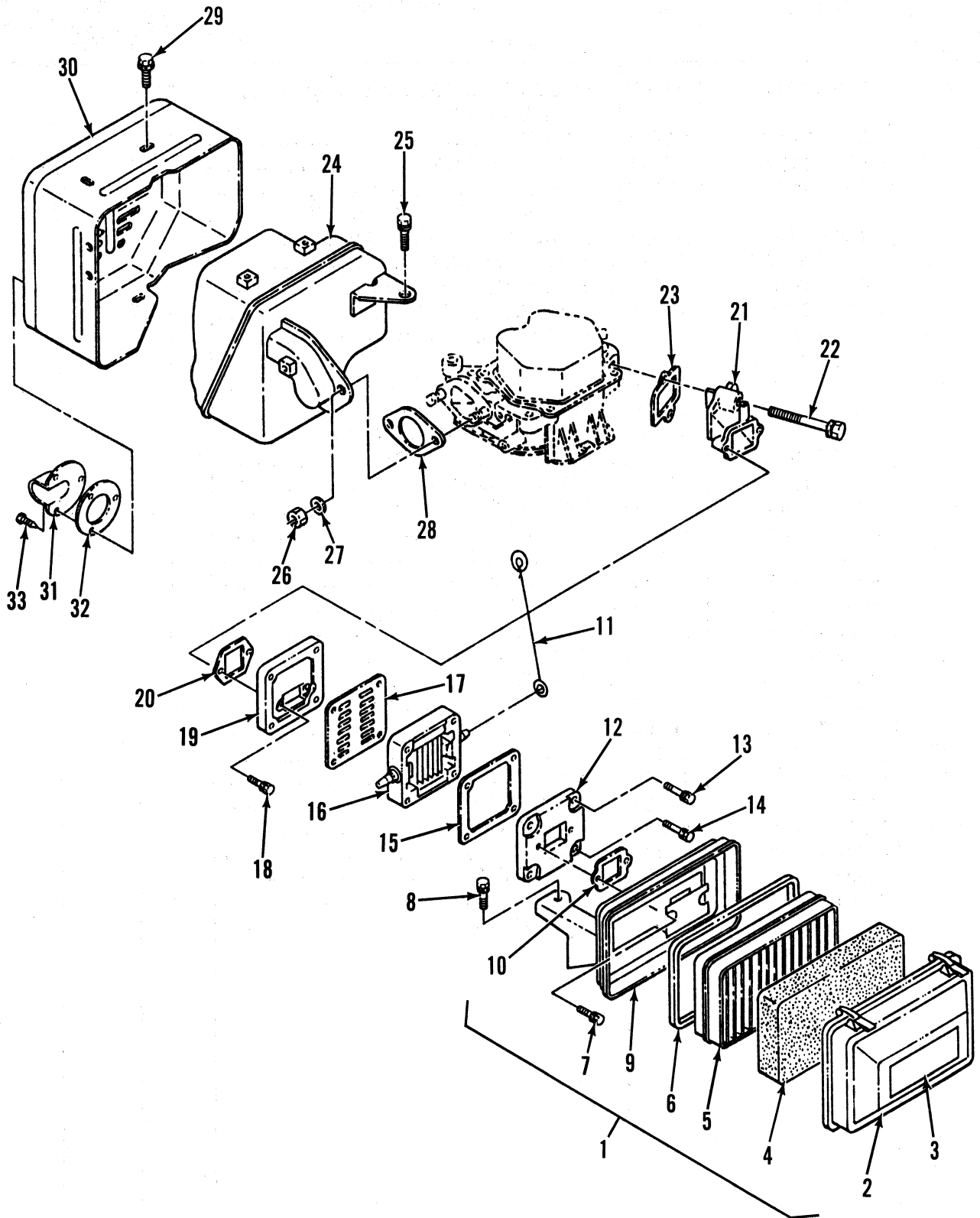


Figure 8-5. Engine (Sheet 1 of 9)

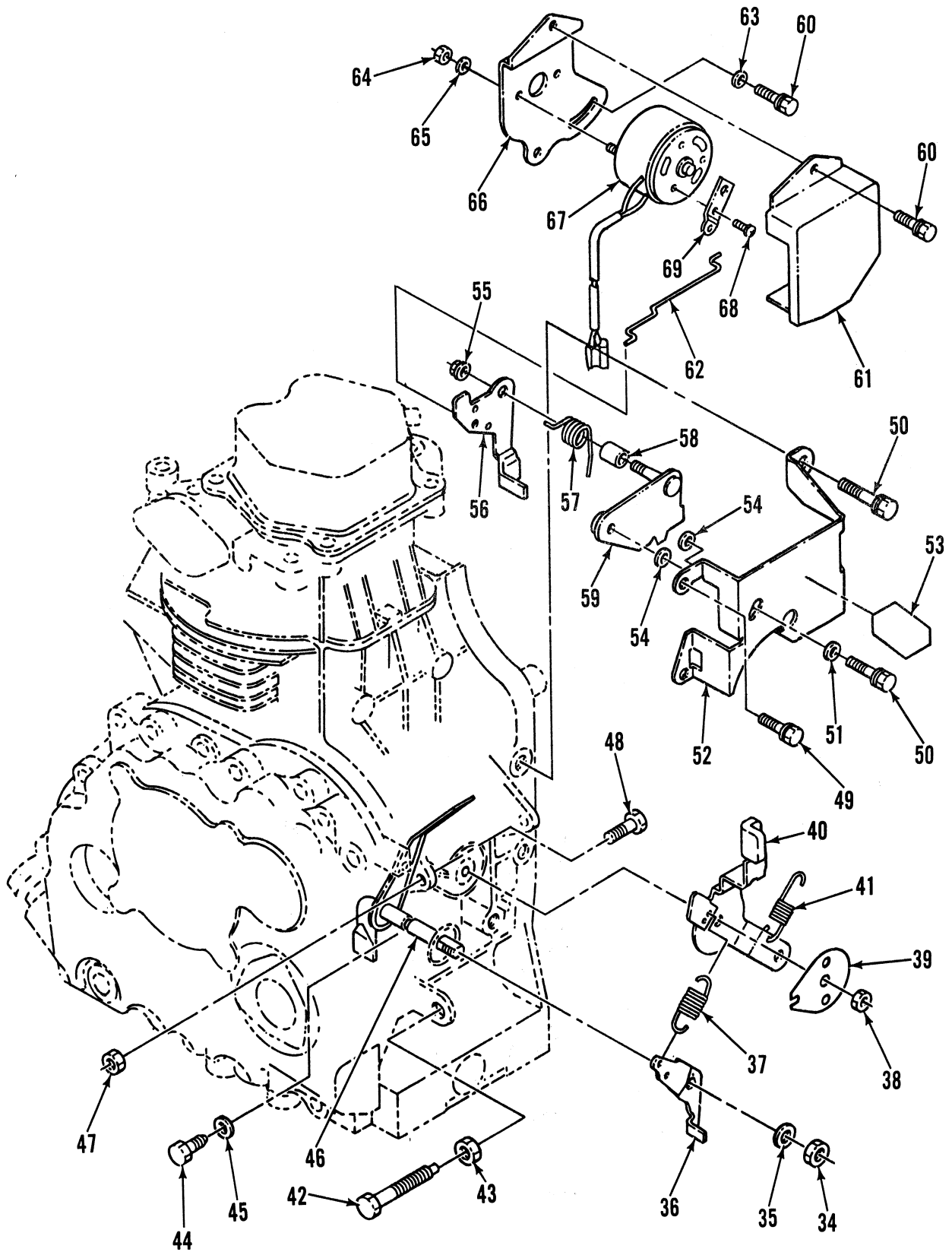


Figure 8-5. Engine (Sheet 2 of 9)

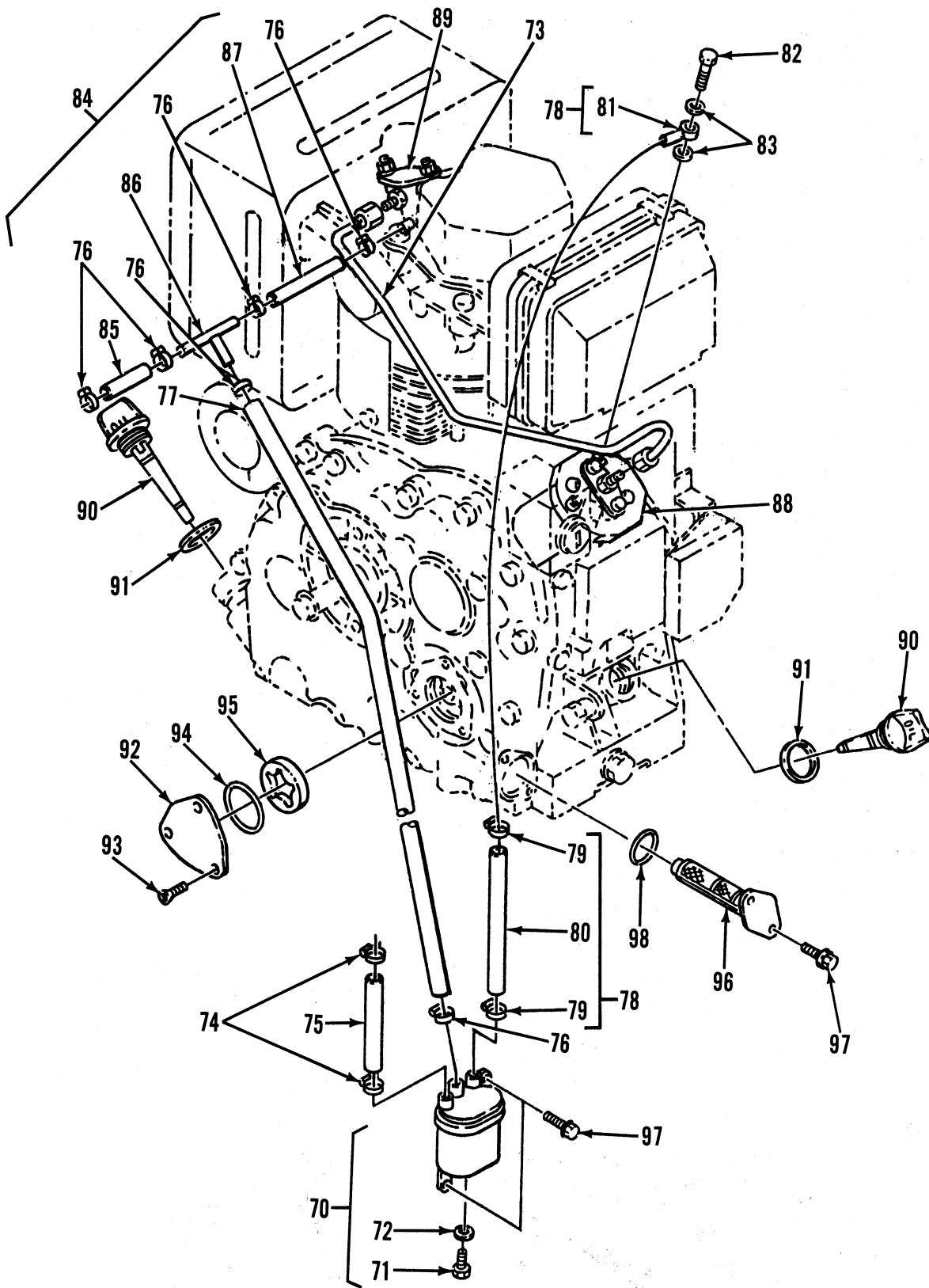


Figure 8-5. Engine (Sheet 3 of 9)

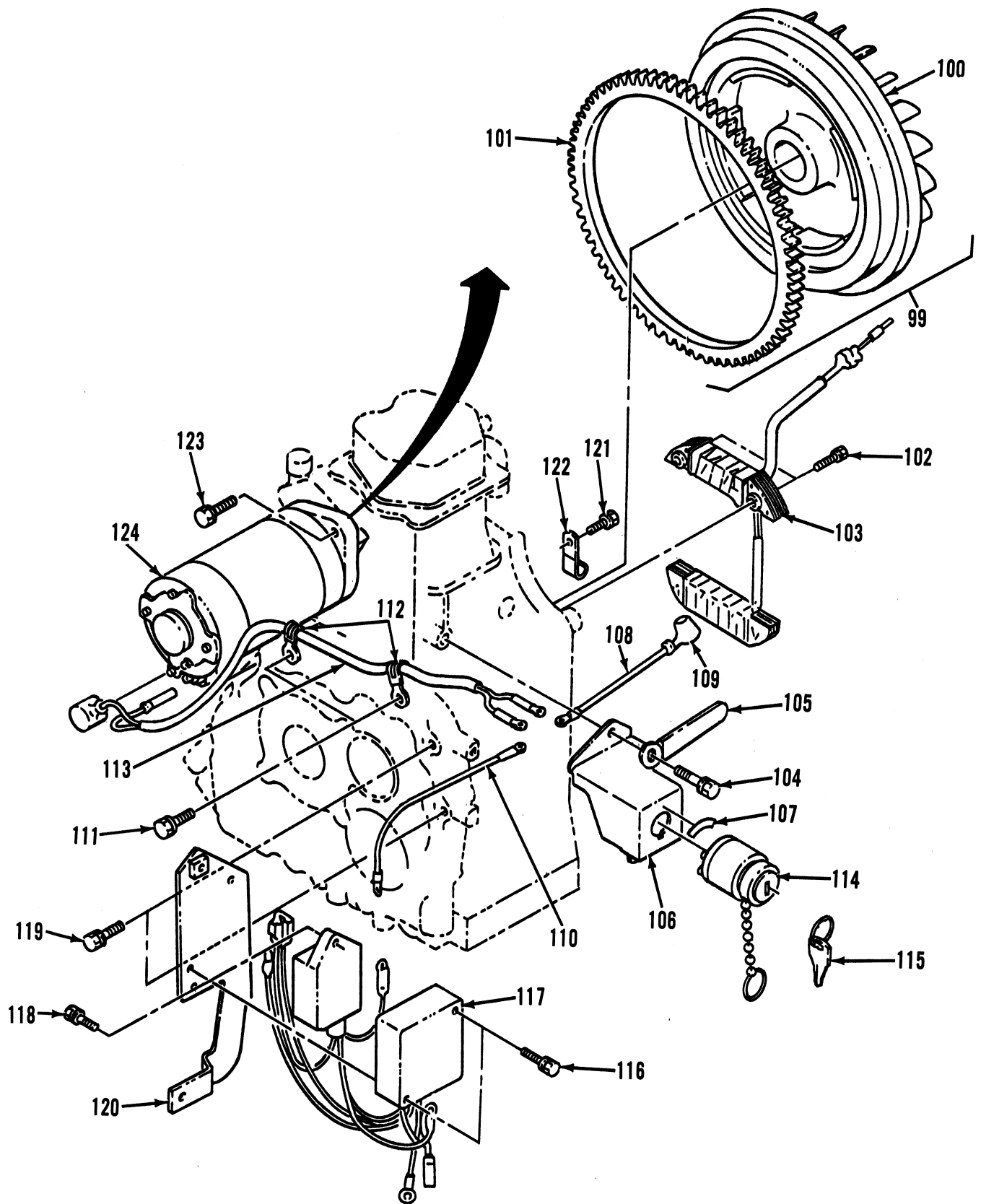


Figure 8-5. Engine (Sheet 4 of 9)

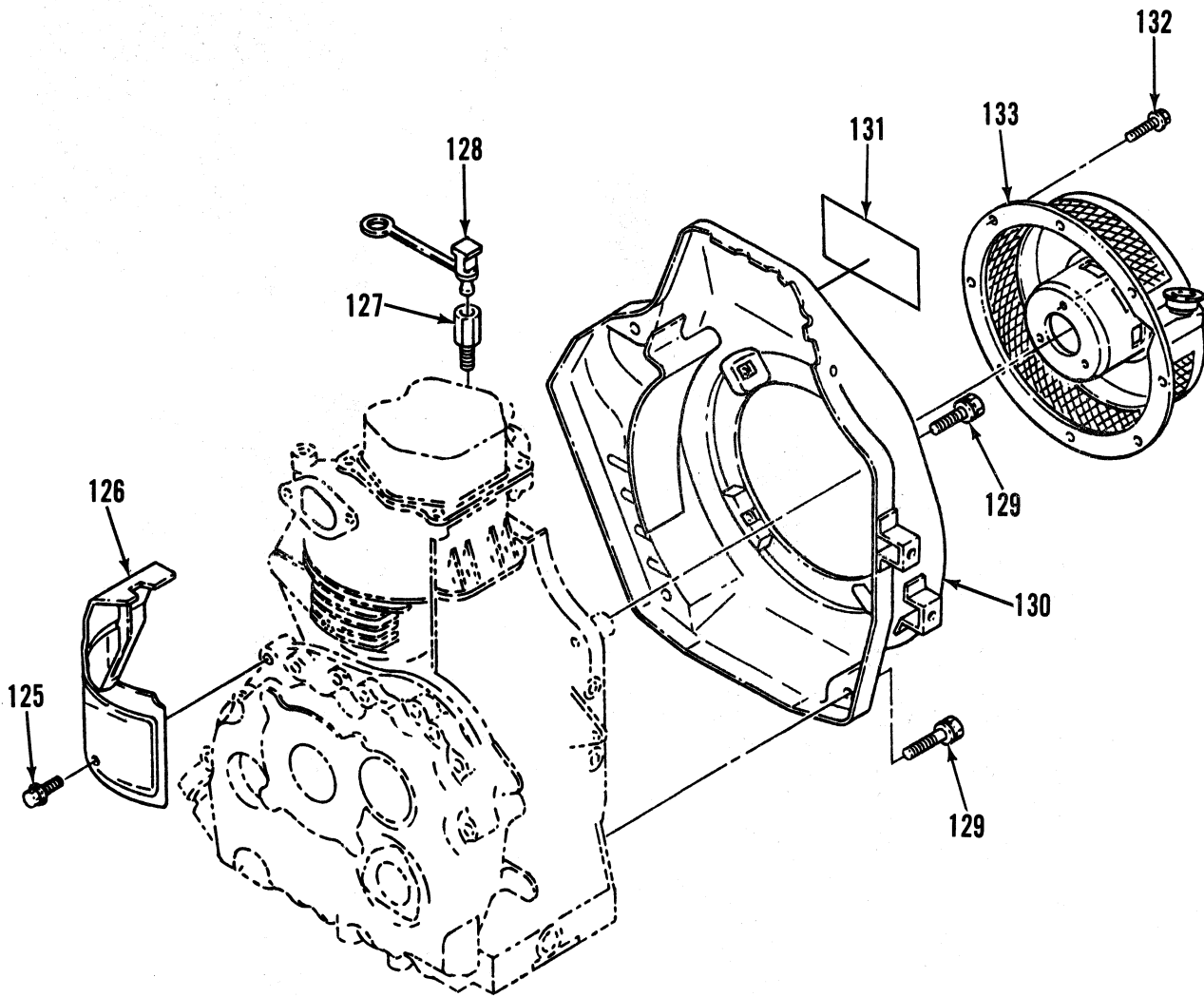


Figure 8-5. Engine (Sheet 5 of 9)

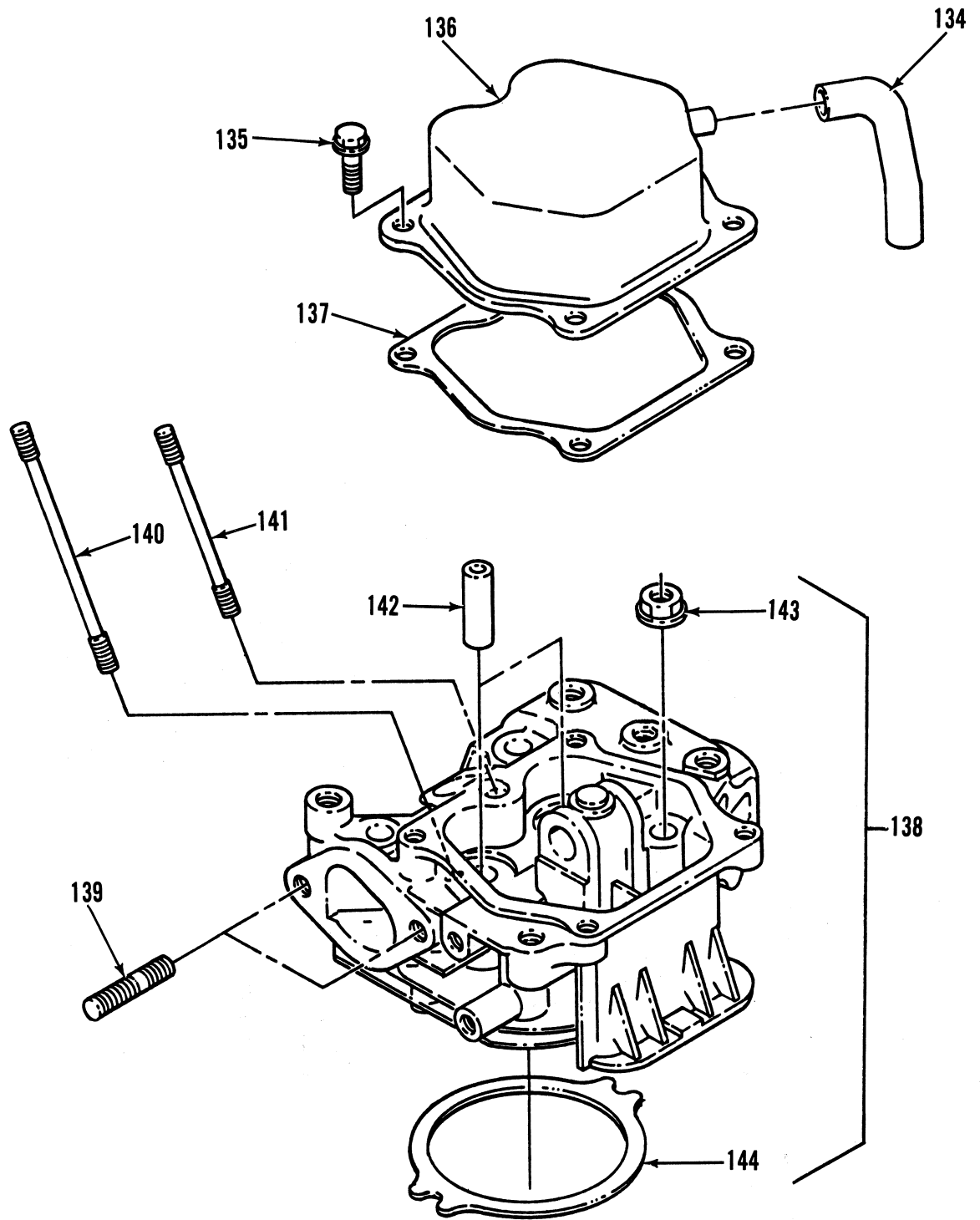


Figure 8-5. Engine (Sheet 6 of 9)

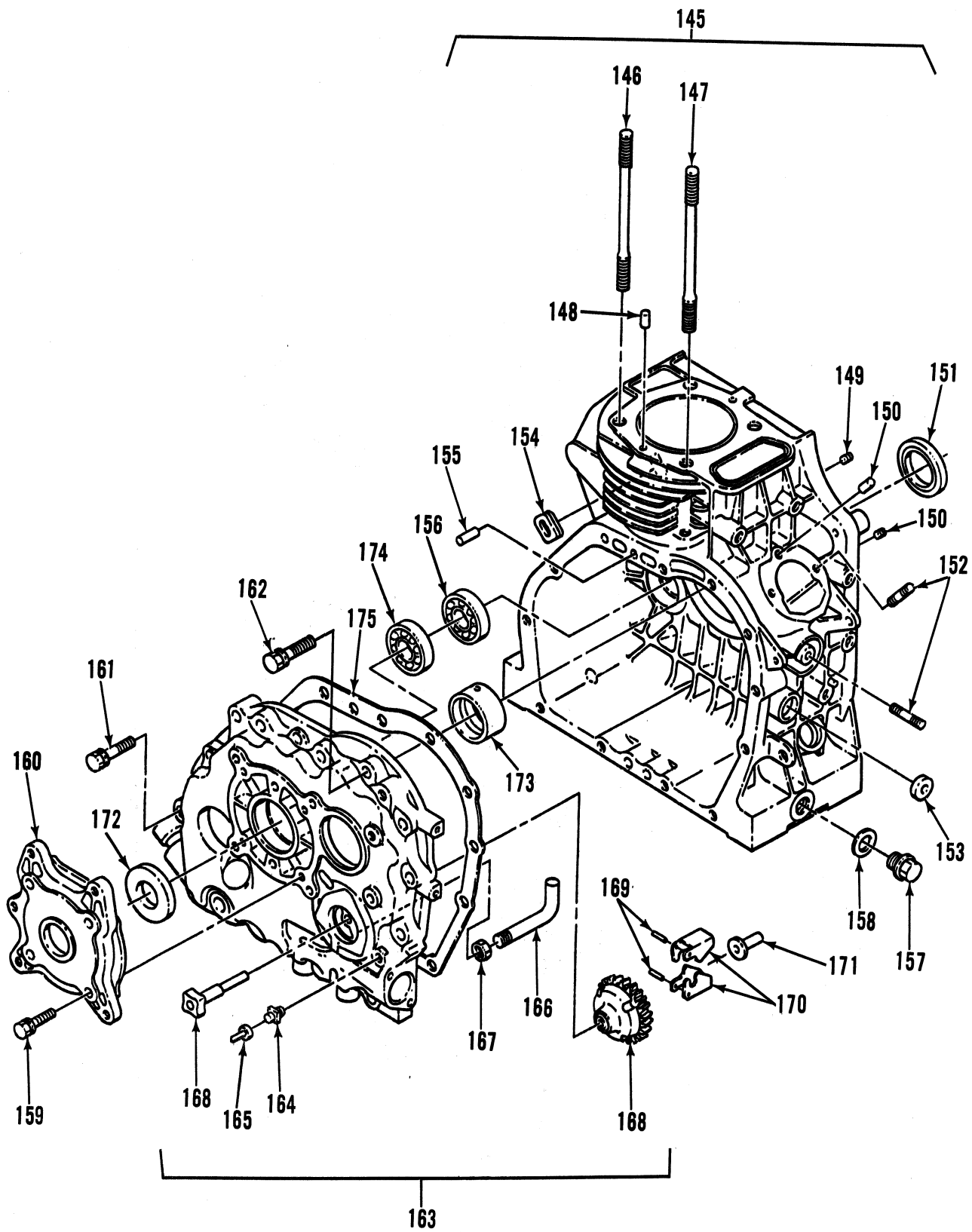


Figure 8-5. Engine (Sheet 7 of 9)

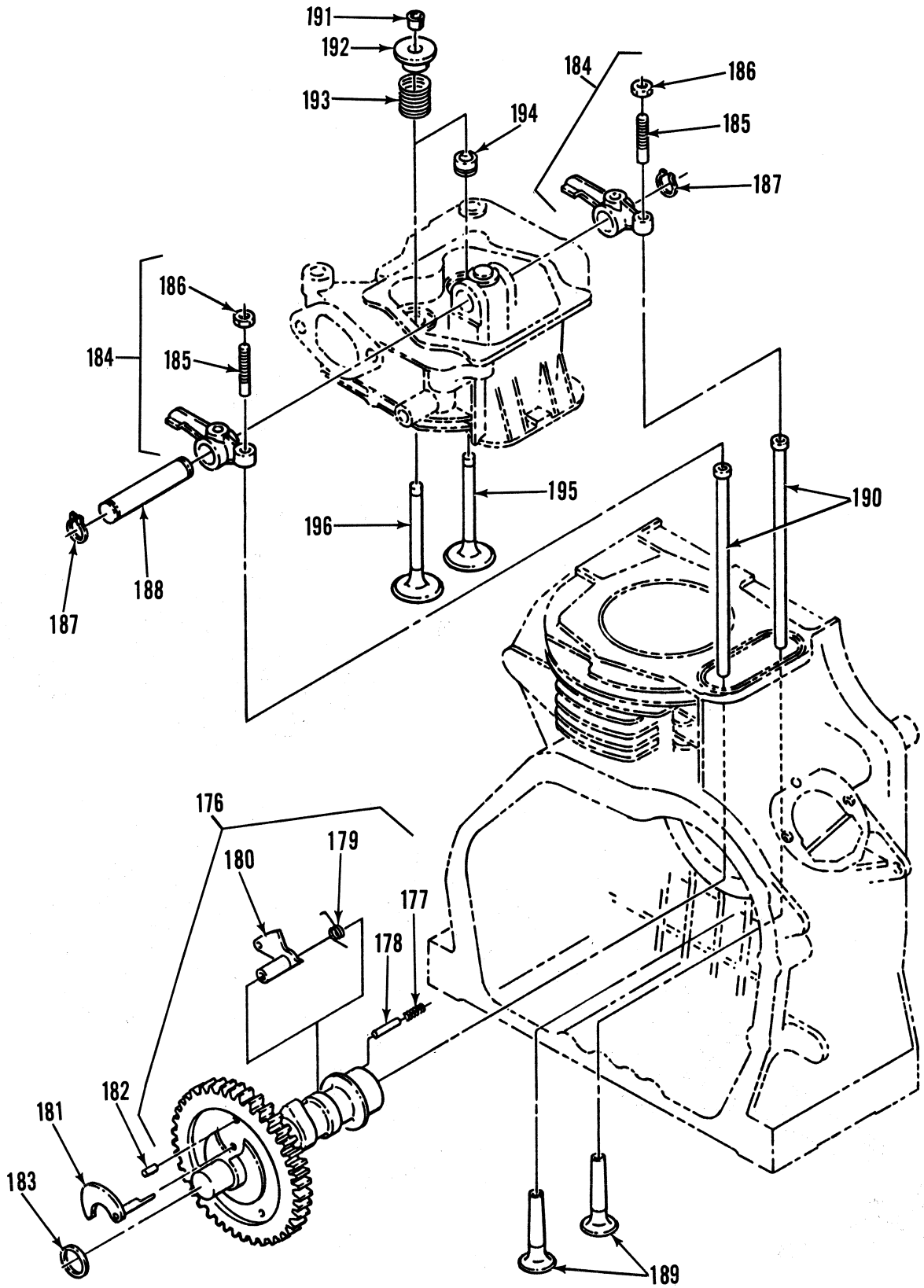


Figure 8-5. Engine (Sheet 8 of 9)

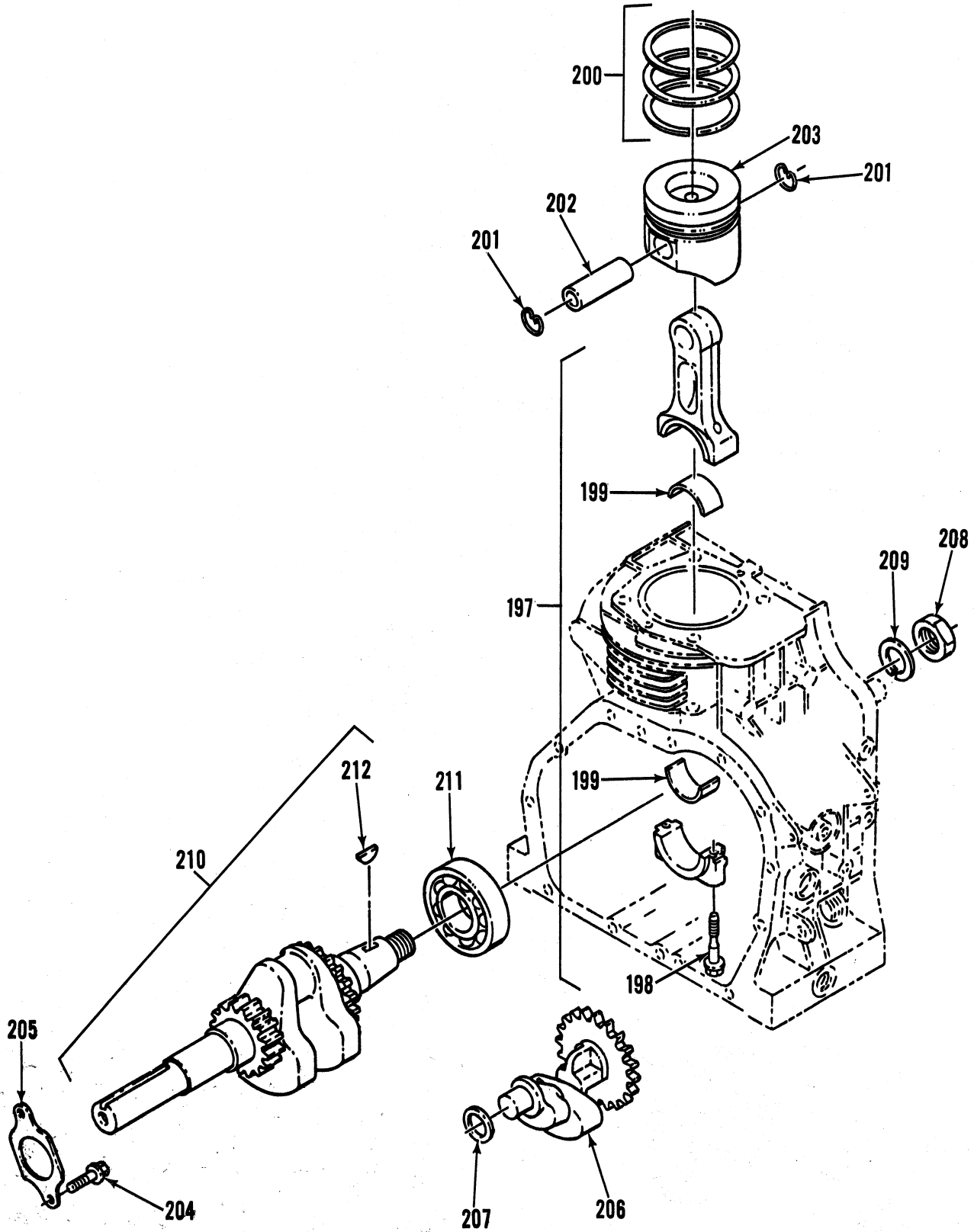


Figure 8-5. Engine (Sheet 9 of 9)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION							QTY REQD	USABLE ON CODE	SMR CODE
			1	2	3	4	5	6	7			
8-5	WRD1-270	8R123	ENGINE, Diesel (See Figure 8-1 for NHA) (51879) (PN 0020-10402)							REF		
-1	EY2433260600	8R123	. AIR CLEANER ASSY							1		
-2	EY2433263408	8R123	. . BODY							1		
-3	EY2439190903	8R123	. . . LABEL, Instructions							1		
-4	EY2283280208	8R123	. . ELEMENT							1		
-5	EY2283280308	8R123	. . ELEMENT							1		
-6	EY2283280508	8R123	. . PACKING							1		
-7	EY0011306120	8R123	. . BOLT & WASHER ASSY							2		
-8	EY0011308160	8R123	. . BOLT & WASHER ASSY							1		
-9	EY2433262508	8R123	. . PLATE, Back							1		
-10	EY2433265408	8R123	. . . PACKING							1		
-11	EY2437311101	8R123	. WIRE							1		
-12	EY2433502603	8R123	. SPACER, Heater							1		
-13	EY0011308400	8R123	. BOLT & WASHER ASSY (AP)							2		
-14	EY0011306400	8R123	. BOLT & WASHER ASSY (AP)							2		
-15	EY2433500703	8R123	. GASKET, Heater							1		
-16	EY2437600100	8R123	. AIR HEATER ASSY							1		
-17	EY2433500703	8R123	. GASKET, Heater							1		
-18	EY0011306160	8R123	. BOLT & WASHER ASSY							2		
-19	EY2433500803	8R123	. FLANGE, Heater							1		
-20	EY2433500603	8R123	. GASKET, Pipe, intake							1		
-21	EY2433310103	8R123	. MANIFOLD, Intake							1		
-22	EY0011308350	8R123	. BOLT & WASHER ASSY (AP)							2		
-23	EY2433500313	8R123	. GASKET, Manifold, intake							1		
-24	EY2433010131	8R123	. MUFFLER							1		
-25	EY0011308160	8R123	. BOLT & WASHER ASSY (AP)							1		
-26	EY0021908000	8R123	. NUT (AP)							2		
-27	EY0032008000	8R123	. WASHER, Lock (AP)							2		
-28	EY2433500203	8R123	. GASKET, Exhaust							1		
-29	EY0011006100	8R123	. BOLT & WASHER ASSY (AP)							4		
-30	EY2433420801	8R123	. COVER, Muffler							1		
-31	EY243700211	8R123	. PIPE, Tail							1		
-32	EY2433500523	8R123	. GASKET, Tail pipe							1		
-33	EY0150040040	8R123	. SCREW, Tapping (AP)							3		
-34	EY002-18080-00	8R123	. NUT							1		
-35	EY003-20080-00	8R123	. WASHER, Spring							1		
-36	EY243-42910-10	8R123	. LINK, Control							1		
-37	EY243-42504-03	8R123	. SPRING, Governor							1		
-38	EY017-60600-30	8R123	. NUT, Self locking							1		
-39	EY227-43501-01	8R123	. PLATE, Stop							1		
-40	EY243-43302-10	8R123	. SPEED CONTROL ASSY							1		
-41	EY206-42801-01	8R123	. SPRING, Rod							1		
-42	EY243-45501-10	8R123	. SMOKE SET ASSY							1		
-43	EY002-24100-00	8R123	. . NUT							1		
-44	EY243-45002-03	8R123	. BOLT							1		
-45	EY003-10060-00	8R123	. WASHER							1		
-46	EY243-42301-12	8R123	. LEVER, Governor							1		

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-5-47	EY002-18060-00	8R123	. NUT	1		
-48	EY001-65061-20	8R123	. BOLT	1		
-49	EY001-13061-20	8R123	. BOLT & WASHER ASSY	2		
-50	EY001-13081-60	8R123	. BOLT & WASHER ASSY	3		
-51	EY003-10080-00	8R123	. WASHER	1		
-52	EY243-40160-01	8R123	. PANEL, Control	1		
-53	EY243-92105-03	8R123	. . LABEL, Operation	1		
-54	EY021-70800-10	8R123	. WASHER, Friction	2		
-55	EY002-38060-00	8R123	. NUT, Flange	1		
-56	EY243-45701-20	8R123	. STOP LEVER ASSY	1		
-57	EY243-46002-03	8R123	. SPRING, Return	1		
-58	EY243-00801-20	8R123	. SPACER	1		
-59	EY243-47001-01	8R123	. BRACKET, Stop lever	1		
-60	EY001-13061-20	8R123	. BOLT & WASHER ASSY	3		
-61	EY243-47020-01	8R123	. COVER, Solenoid	1		
-62	EY243-45004-03	8R123	. ROD, Control	1		
-63	EY003-10060-00	8R123	. WASHER	2		
-64	EY002-17040-00	8R123	. NUT	2		
-65	EY003-20040-00	8R123	. WASHER, Spring	2		
-66	EY243-47010-01	8R123	. BRACKET, Solenoid	1		
-67	EY243-75014-00	8R123	. ROTARY SOLENOID ASSY	1		
-68	EY243-75004-03	8R123	. SCREW & WASHER ASSY	1		
-69	EY243-47031-01	8R123	. LINK, Solenoid	1		
-70	EY2436210110	8R123	. FUEL FILTER ASSY	1		
-71	EY2286211108	8R123	. . PLUG	1		
-72	EY2286211208	8R123	. . PACKING	1		
-73	EY2436330101	8R123	. PIPE, Injection	1		
-74	EY0561110020	8R123	. CLAMP, Hose	2		
-75	EY2436501603	8R123	. HOSE, Rubber	1		
-76	EY0561080010	8R123	. CLAMP, Hose	6		
-77	EY2436501403	8R123	. HOSE, Rubber	1		
-78	EY2436261401	8R123	. FUEL PIPE ASSY	1		
-79	EY0561110020	8R123	. . CLAMP, Hose	2		
-80	EY2436501503	8R123	. . HOSE, Rubber	1		
-81	EY0521100020	8R123	. . BANJO	1		
-82	EY0530100011	8R123	. . . BOLT, Banjo	1		
-83	EY2436500703	8R123	. . . GASKET	2		
-84	EY2436261501	8R123	. FUEL PIPE ASSY	1		
-85	EY2436501203	8R123	. . HOSE, Rubber	1		
-86	EY2436501701	8R123	. . CONNECTOR, Tee	1		
-87	EY2436501303	8R123	. . HOSE, Rubber	1		
-88	EY2436310110	8R123	. INJECTION PUMP ASSY (See Figure 8-6 for detail parts)	1		
-89	EY2436320200	8R123	. NOZZLE ASSY (See Figure 8-5 ... for detail parts)	1		
-90	EY2146360113	8R123	. DIPSTICK	2		
-91	EY0213200030	8R123	. . GASKET	2		
-92	EY2436602001	8R123	. COVER, Oil pump	1		

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-5-93	EY0041106160	8R123	. SCREW (AP)	3		
-94	EY0240330030	8R123	. PACKING, Preformed	1		
-95	EY2286390203	8R123	. PUMP, Oil, outer	1		
-96	EY2436430100	8R123	. OIL FILTER ASSEMBLY	1		
-97	EY0011406160	8R123	. BOLT & WASHER ASSY (AP)	2		
-98	EY0062620200	8R123	. PACKING, Preformed	1		
-99	EY2437011500	8R123	. MAGNETO ASSY	1		
-100	EY2437012108	8R123	. . FLYWHEEL	1		
-101	EY2437100213	8R123	. . . GEAR, Ring	1		
-102	EY0043506250	8R123	. . SCREW & WASHER ASSY	4		
-103	EY2437015008	8R123	. . COIL, Charge	1		
-104	EY0011308160	8R123	. . BOLT & WASHER ASSY	1		
-105	EY0566000170	8R123	. . CLAMP	1		
-106	EY2434060401	8R123	. . BOX, Control	1		
-107	EY2119280103	8R123	. . . LABEL, Starter switch	1		
-108	EY2437312801	8R123	. . WIRE, Heater	1		
-109	EY2287500303	8R123	. . . CAP, Connector	1		
-110	EY2437313201	8R123	. . WIRE	1		
-111	EY0011308120	8R123	. . BOLT & WASHER ASSY	2		
-112	EY0566000170	8R123	. . CLAMP	2		
-113	EY2437312601	8R123	. . WIRE, Starter	1		
-114	EY2437260100	8R123	. . SWITCH (W/Key Retainer Chain)	1		
-115	EY2437260103	8R123	. . KEY	1		
-116	EY0011406350	8R123	. . BOLT & WASHER ASSY	2		
-117	EY2437501500	8R123	. . OIL SENSOR ASSY	1		
-118	EY0011406160	8R123	. . BOLT & WASHER ASSY	1		
-119	EY0011308120	8R123	. . BOLT & WASHER ASSY	2		
-120	EY2437550401	8R123	. . BRACKET, Oil sensor	1		
-121	EY0043506100	8R123	. . SCREW & WASHER ASSY	1		
-122	EY1507520103	8R123	. . CLAMP	1		
-123	EY0011408300	8R123	. . BOLT & WASHER ASSY	2		
-124	EY2437050600	8R123	. STARTING MOTOR ASSY (See ... Figure 8-8 for detail parts)	1		
-125	EY0110060010	8R123	. BOLT, Flange	1		
-126	EY2435260123	8R123	. BAFFLE, Cylinder	1		
-127	EY2435500201	8R123	. BOLT	1		
-128	EY2435501103	8R123	. . PLUG	1		
-129	EY0011308200	8R123	. BOLT & WASHER ASSY	4		
-130	E2435121101	8R123	. SHROUD, Air	1		
-131	EY2449170903	8R123	. . LABEL, Trade mark	1		
-132	EY0110060010	8R123	. BOLT, Flange	4		
-133	EY2435020200	8R123	. RECOIL STARTER ASSEMBLY ... (See Figure 8-9 for detail parts)	1		
-134	EY2431502503	8R123	. PIPE, Breather	1		
-135	EY0110060020	8R123	. BOLT, Flange	4		
-136	EY2431700120	8R123	. ROCKER COVER ASSY	1		
-137	EY2431501003	8R123	. GASKET, Rocker cover	1		
-138	EY2431300131	8R123	. CYLINDER HEAD ASSY	1		

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-5-139	EY0013708201	8R123	. . STUD	2		
-140	EY0105060070	8R123	. . STUD	1		
-141	EY0105060150	8R123	. . STUD	1		
-142	EY2431420203	8R123	. . GUIDE, Valve	2		
-143	EY0180090010	8R123	. . NUT, Flange	4		
-144	EY2441502101	8R123	. . SPACER, Head 0.024 inch	1		
			(0.6mm)			
	EY2441502201	8R123	. . SPACER, Head 0.028 inch	1		
			(0.7mm)			
-145	EY2441010521	8R123	. CRANKCASE ASSY	1		
-146	EY2441600111	8R123	. . BOLT, Tension	3		
-147	EY2441600211	8R123	. . BOLT, Tension	1		
-148	EY0310060010	8R123	. . PIN, Dowel	2		
-149	EY0403060010	8R123	. . PLUG, Blind	2		
-150	EY0052605120	8R123	. . PIN, Dowel	1		
-151	EY0440300030	8R123	. . SEAL, Oil	1		
-152	EY0013706221	8R123	. . STUD	3		
-153	EY0440080030	8R123	. . SEAL, Oil	1		
-154	EY2437500103	8R123	. . GROMMET	1		
-155	EY0052608180	8R123	. . PIN, Dowel	2		
-156	EY0600170040	8R123	. . BEARING, Ball	1		
-157	EY0401140030	8R123	. PLUG	2		
-158	EY0211140020	8R123	. GASKET	2		
-159	EY0011308250	8R123	. BOLT & WASHER ASSY	4		
-160	EY2241750113	8R123	. ADAPTER	1		
-161	EY0011308400	8R123	. BOLT & WASHER ASSY	1		
-162	EY0011308350	8R123	. BOLT & WASHER ASSY	11		
-163	EY2441100631	8R123	. GEAR COVER ASSY	1		
-164	EY9429951300	8R123	. . SWITCH ASSY, Oil pressure	1		
-165	EY2437501603	8R123	. . BOOT, Rubber	1		
-166	EY2436420501	8R123	. . PIPE, Suction	1		
-167	EY0022410000	8R123	. . NUT	1		
-168	EY2434501107	8R123	. . GEAR SHAFT SET, Governor	1		
-169	EY0307300070	8R123	. . . PIN	2		
-170	EY2204160103	8R123	. . . FLYWEIGHT	2		
-171	EY2054190103	8R123	. . . SLEEVE, Governor	1		
-172	EY0440300030	8R123	. . SEAL, Oil	1		
-173	EY2431580103	8R123	. . BEARING, Main, standard	1		
	EY2431580203	8R123	. . BEARING, Main, 0.010 inch	1		
			(0.25mm) U/S			
	EY2431580303	8R123	. . BEARING, Main, 0.020 inch	1		
			(0.50mm) U/S			
-174	EY0600170040	8R123	. . BEARING, Ball	1		
-175	EY2431500203	8R123	. GASKET, Gear cover	1		
	EY2439900107	8R123	. GASKET, Set	1		
-176	EY2433170221	8R123	. CAMSHAFT	1		
-177	EY0051903120	8R123	. . PIN, Spring	1		

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-5-178	EY2433502203	8R123	. . SHAFT, Release	1		
-179	EY2433502103	8R123	. . SPRING, Release	1		
-180	EY2433550503	8R123	. . LEVER, Release	1		
-181	EY2433550313	8R123	. . LEVER, Release	1		
-182	EY0052608180	8R123	. . PIN, Dowel	1		
-183	EY0230160020	8R123	. . SPACER, 0.031 inch (0.8mm)	1		
	EY0230160031	8R123	. . SPACER, 0.039 inch (1.0mm)	1		
-184	EY2433600101	8R123	. . ROCKER ARM ASSY	2		
-185	EY0149060080	8R123	. . SCREW, Adjusting	2		
-186	EY0170060086	8R123	. . NUT	2		
-187	EY0031512000	8R123	. . RING, Snap	2		
-188	EY2433500113	8R123	. . SHAFT, Rocker	1		
-189	EY2433330103	8R123	. . TAPPET	2		
-190	EY2433501601	8R123	. . PUSH ROD	2		
-191	EY2433380103	8R123	. . LOCK, Retainer	4		
-192	EY2433370103	8R123	. . RETAINER, Spring	2		
-193	EY2433360103	8R123	. . SPRING, Valve	2		
-194	EY2371600801	8R123	. . SEAL, Stem	2		
-195	EY2433340103	8R123	. . VALVE, Intake	1		
-196	EY2433350103	8R123	. . VALVE, Exhaust	1		
-197	EY2432250110	8R123	. . CONNECTING ROD ASSEMBLY ...	1		
-198	EY2432300103	8R123	. . BOLT, Connecting rod	2		
-199	EY2432280103	8R123	. . BEARING, Large end, standard ..	2		
	EY2432280203	8R123	. . BEARING, Large end, 0.010 inch (0.25mm)	2		
	EY2432280303	8R123	. . BEARING, Large end, 0.020 inch (0.50mm)	2		
-200	EY2442350117	8R123	. . PISTON RING SET, Standard	1		
	EY2442350217	8R123	. . PISTON RING SET, 0.010 inch .. (0.25mm) O/S	1		
	EY2442350317	8R123	. . PISTON RING SET, 0.020 inch ... (0.50mm) O/S	1		
-201	EY0565200030	8R123	. . CLIP	2		
-202	EY2432330103	8R123	. . PIN, Piston	1		
-203	EY2442340203	8R123	. . PISTON, 0.010 inch (0.25mm) O/S	1		
	EY2442340303	8R123	. . PISTON, 0.020 inch (0.50mm) O/S	1		
-204	EY0110060010	8R123	. . BOLT, Flange	2		
-205	EY2432500103	8R123	. . WASHER, Thrust, 0.031 inch	1		
	EY2432500203	8R123	. . WASHER, Thrust, 0.039 inch	1		
	EY2432500303	8R123	. . WASHER, Thrust, 0.047 inch	1		
-206	EY2432430101	8R123	. . BALANCER	1		

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION							QTY REQD	USABLE ON CODE	SMR CODE
			1	2	3	4	5	6	7			
8-5-207	EY0230170020	8R123	.	.	SPACER, 0.031 inch (0.8mm)					1		
	EY0230170030	8R123	.	.	SPACER, 0.039 inch (1.0mm)					1		
	EY0230170040	8R123	.	.	SPACER, 0.047 inch (1.2mm)					1		
-208	EY0021818000	8R123	.		NUT					1		
-209	EY0032018000	8R123	.		WASHER, Spring					1		
-210	EY2442050201	8R123	.		CRANKSHAFT ASSY					1		
-211	EY0600350010	8R123	.	.	BEARING, Ball					1		
-212	EY0323030010	8R123	.	.	KEY, Woodruff					1		

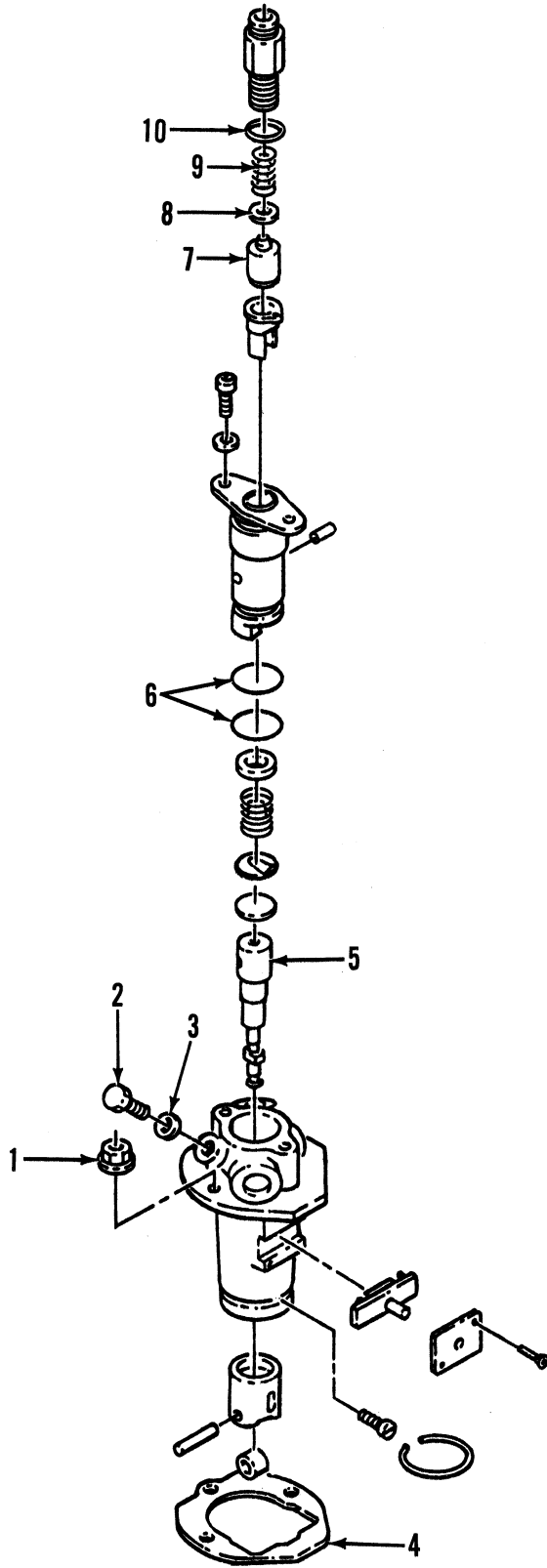


Figure 8-6. Injection Pump Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-6	EY2436310110	8R123	INJECTION PUMP ASSY (See Figure 8-5 for NHA)	REF		
-1	EY0023806000	8R123	. NUT, Flange (AP)	2		
-2	EY2436312408	8R123	. BOLT	1		
-3	EY2436312508	8R123	. GASKET	1		
-4	EY2436500103	8R123	. GASKET, Injection pump 0.004 inch (0.1mm)	1		
	EY2436500203	8R123	. GASKET, Injection pump 0.008 inch (0.2mm)	1		
	EY2436500303	8R123	. GASKET, Injection pump 0.012 inch (0.3mm)	1		
-5	EY243610208	8R123	. PLUNGER ASSY	1		
-6	EY2436311008	8R123	. PACKING, Preformed	2		
-7	EY2436310308	8R123	. VALVE, Delivery	1		
-8	EY2436310508	8R123	. GASKET	1		
-9	EY2436310408	8R123	. SPRING	1		
-10	EY2436310708	8R123	. PACKING, Preformed	1		

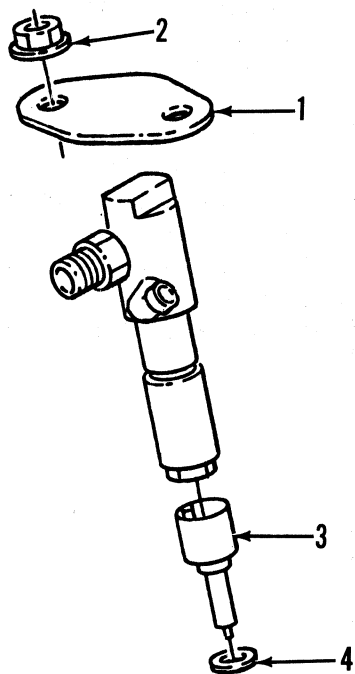


Figure 8-7. Nozzle Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-7	EY2436320200	8R123	NOZZLE ASSY (See Figure 8-5 for ... NHA)	REF		
-1	EY2436600101	8R123	. BRACKET, Nozzle	1		
-2	EY0023806000	8R123	. NUT, Flange (AP)	2		
-3	EY2436320408	8R123	. NOZZLE	1		
-4	EY2286500403	8R123	. GASKET, Nozzle	1		

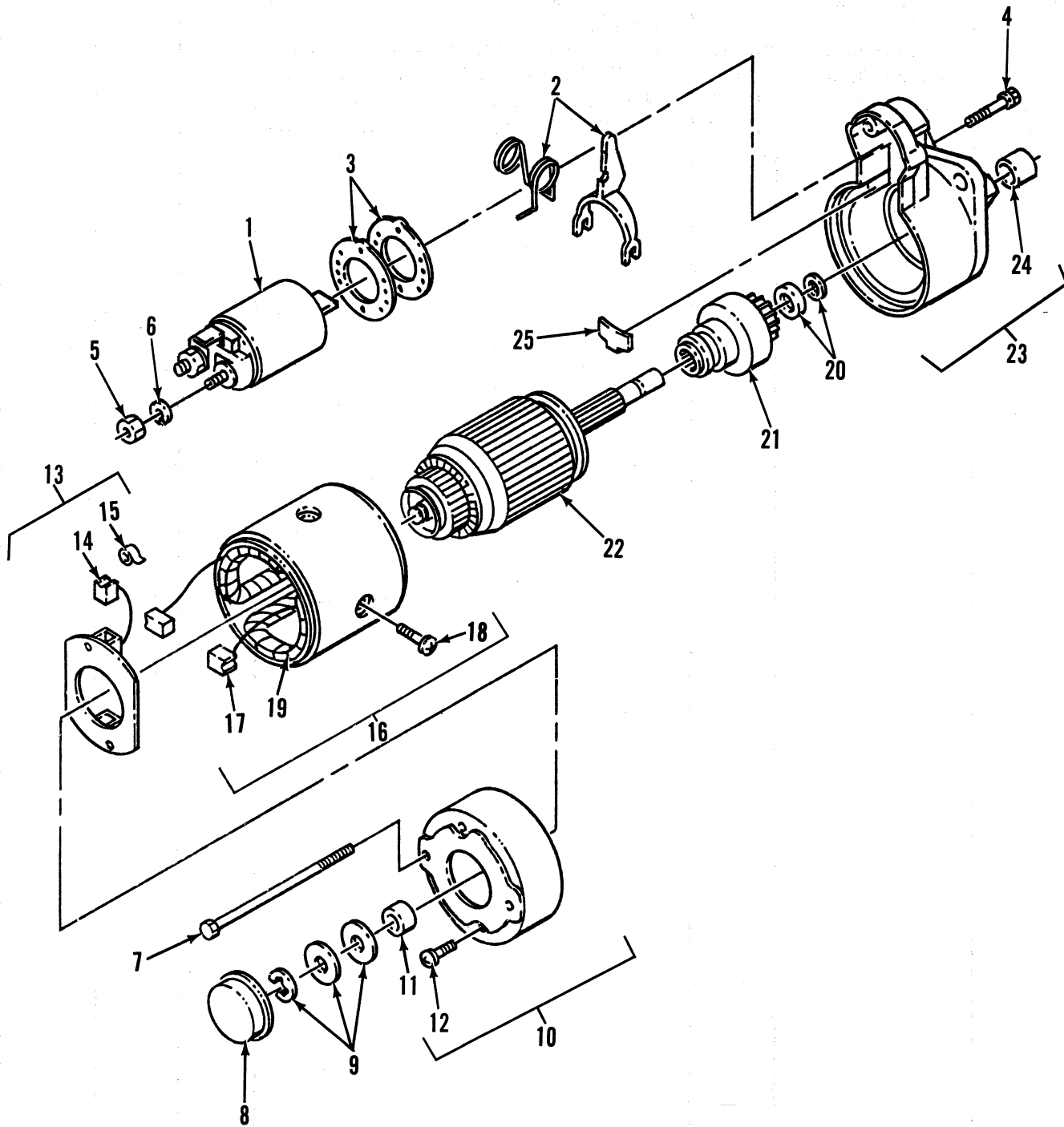


Figure 8-8. Starter Motor

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	QTY REQD	USABLE ON CODE	SMR CODE
8-8	EY2437050600	8R123	STARTING MOTOR ASSY (See Fig- .. ure 8-5 for NHA)	REF		
-1	EY2437051508	8R123	. MAGNETIC SWITCH ASSY	1		
-2	EY2437052508	8R123	. KIT, Shift lever	1		
-3	EY2437056908	8R123	. KIT, Dust cover	1		
-4	EY2437057108	8R123	. BOLT (AP)	2		
-5	EY002280800	8R123	. NUT	2		
-6	EY0032008000	8R123	. WASHER, Lock	2		
-7	EY2437057008	8R123	. BOLT, Thru	2		
-8	EY2437056908	8R123	. KIT, Dust cover	1		
-9	EY2107053308	8R123	. KIT, Thrust washer	1		
-10	EY2437050608	8R123	. REAR COVER ASSY	1		
-11	EY2107054208	8R123	. . METAL, Starter	1		
-12	EY2177053308	8R123	. . SCREW, Set	4		
-13	EY2437053008	8R123	. BRUSH HOLDER ASSY	1		
-14	EY2437054008	8R123	. . BRUSH (-)	1		
-15	EY2437054208	8R123	. . SPRING, Brush	3		
-16	EY2437056308	8R123	. YOKE	1		
-17	EY2107053908	8R123	. . BRUSH (+)	2		
-18	EY2107050808	8R123	. . SCREW, Set (AP)	4		
-19	EY2437056508	8R123	. . FIELD COIL ASSY	1		
-20	EY2107053408	8R123	. PINION STOPPER SET	1		
-21	EY2437056708	8R123	. PINION ASSY	1		
-22	EY2437056108	8R123	. ARMATURE ASSY	1		
-23	EY2437056808	8R123	. GEARCASE ASSY	1		
-24	EY2107054208	8R123	. . BUSHING	1		
-25	EY2437056908	8R123	. COVER, Dust	1		

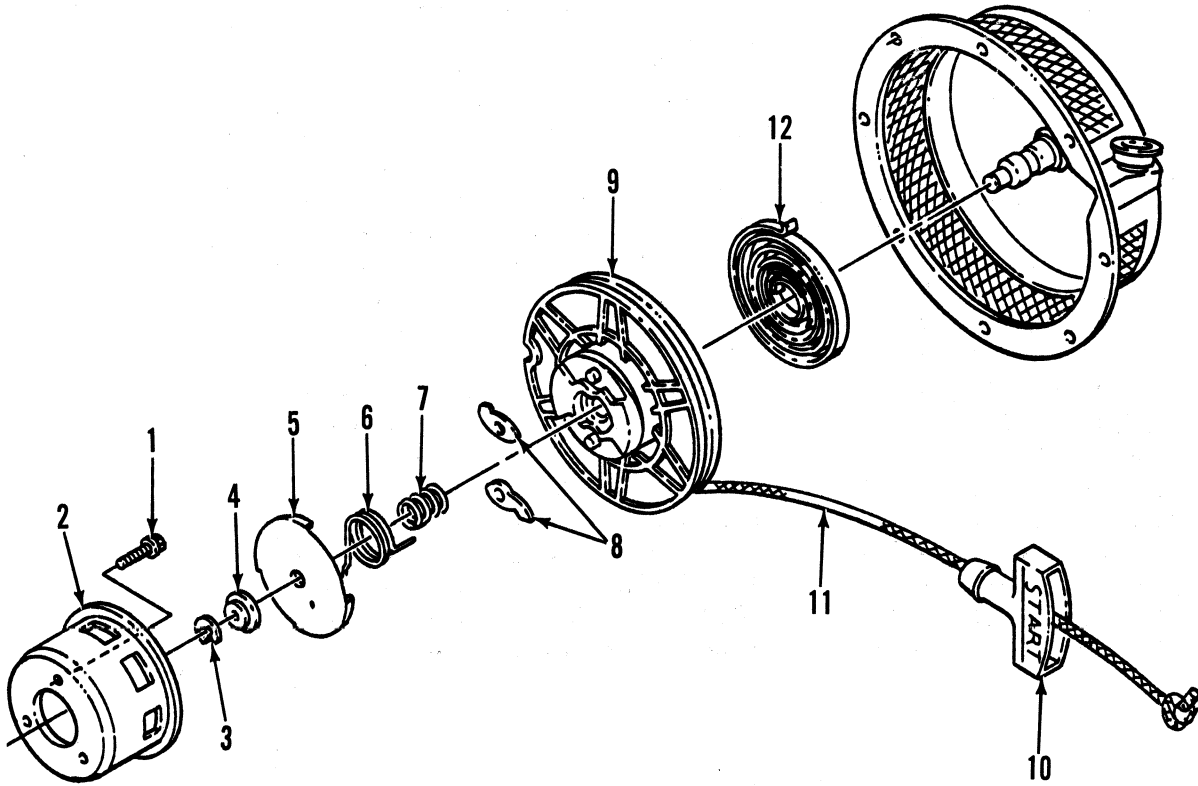


Figure 8-9. Recoil Starter Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION	QTY REQD	USABLE ON CODE	SMR CODE
8-9	EY2435020200	8R123	RECOIL STARTER ASSY (See Figure 8-5 for NHA)	REF		
-1	EY0011306120	8R123	. BOLT & WASHER ASSY	3		
-2	EY2435014508	8R123	. PULLEY, Starting	1		
-3	EY1065018608	8R123	. CLIP	1		
-4	EY1065018518	8R123	. WASHER, Thrust	1		
-5	EY1065014418	8R123	. PLATE, Friction	1		
-6	EY1065013618	8R123	. SPRING, Return	1		
-7	EY1065013208	8R123	. SPRING, Friction	1		
-8	EY1065012818	8R123	. RATCHET	2		
-9	EY2075012218	8R123	. REEL	1		
-10	EY2365010008	8R123	. . KNOB, Starter	1		
-11	EY2435011208	8R123	. . ROPE, Starter	1		
-12	EY1065011608	8R123	. SPRING, Spiral	1		

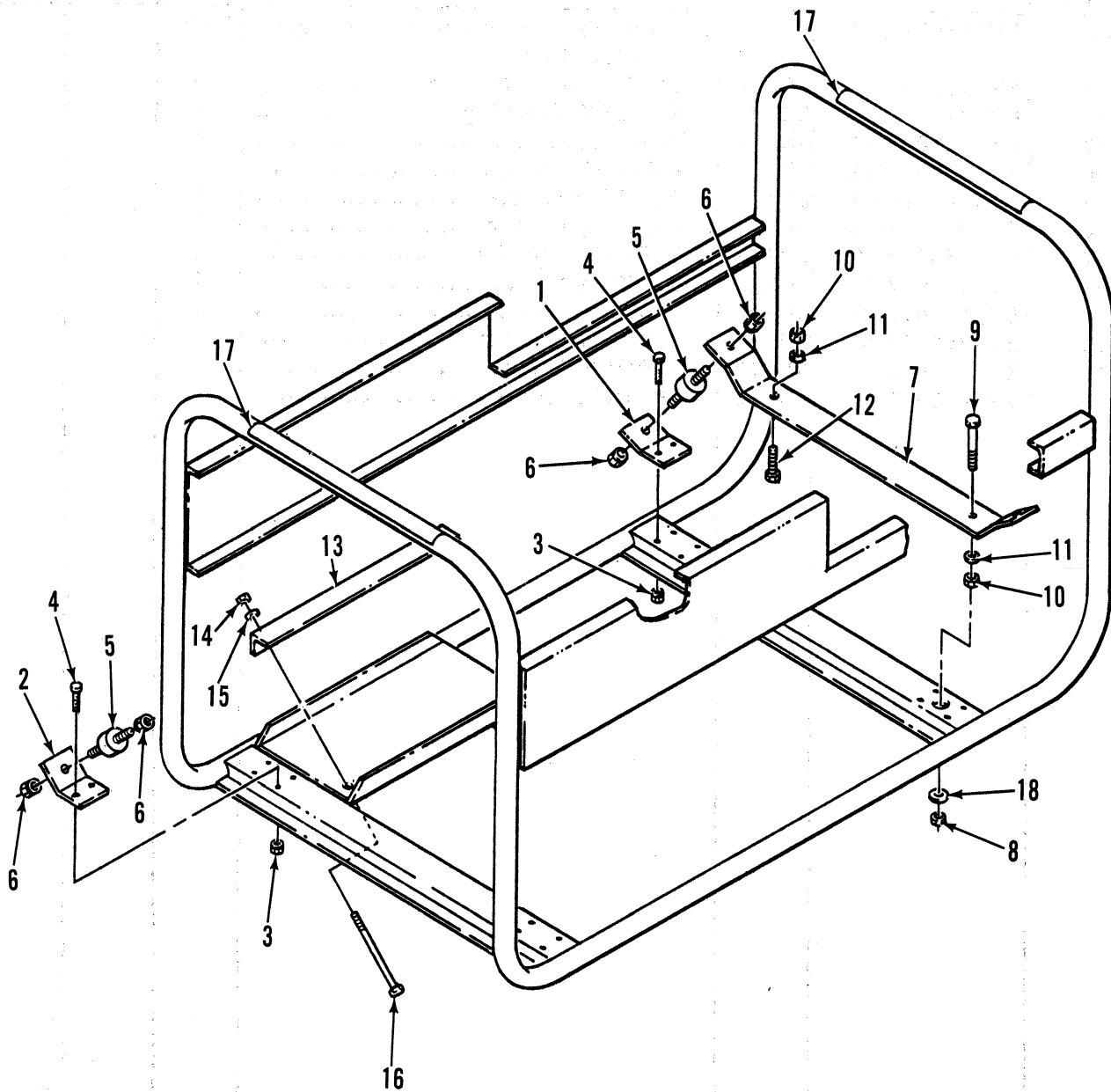


Figure 8-10. Base Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	QTY REQD	USABLE ON CODE	SMR CODE
8-10	0380-50100	51879	BASE, ASSY (See Figure 8-1 for NHA)	REF		
-1	0450-05100	51879	. FOOT, Mtg, engine end	2		
-2	0450-06500	51879	. FOOT, Mtg, generator end	2		
-3	5/16-18KEPS	7J925	. NUT, Lock (AP)	8		
-4	MS90725-32	96906	. SCREW, Cap (AP)	8		
-5	0700-00504	51879	. MOUNT, Vibration isolator	4		
-6	1/2-13KEPS	7J925	. NUT, Lock (AP)	8		
-7	0450-06300	51879	. FOOT, Mtg, engine strap	1		
-8	MS51922-9	96906	. NUT, Self locking (AP)	2		
-9	MS90725-44	96906	. SCREW, Cap (AP)	1		
-10	MS51967-5	96906	. NUT, Hex (AP)	1		
-11	MS35338-45	96906	. WASHER, Lock (AP)	2		
-12	MS90725-39	96906	. SCREW, Cap	1		
-13	0440-51500	51879	. BRACKET, Battery holddown	1		
-14	1/4-20KEPS	7J925	. NUT, Lock (AP)	2		
-15	MS27183-9	96906	. WASHER, Flat (AP)	2		
-16	0480-00012	51879	. BOLT, Battery holddown (AP)	2		
-17	0730-00004	51879	. DECAL, No step/warning	2		
-18	MS27183-13	96906	. WASHER, Flat	1		

NUMERICAL INDEX

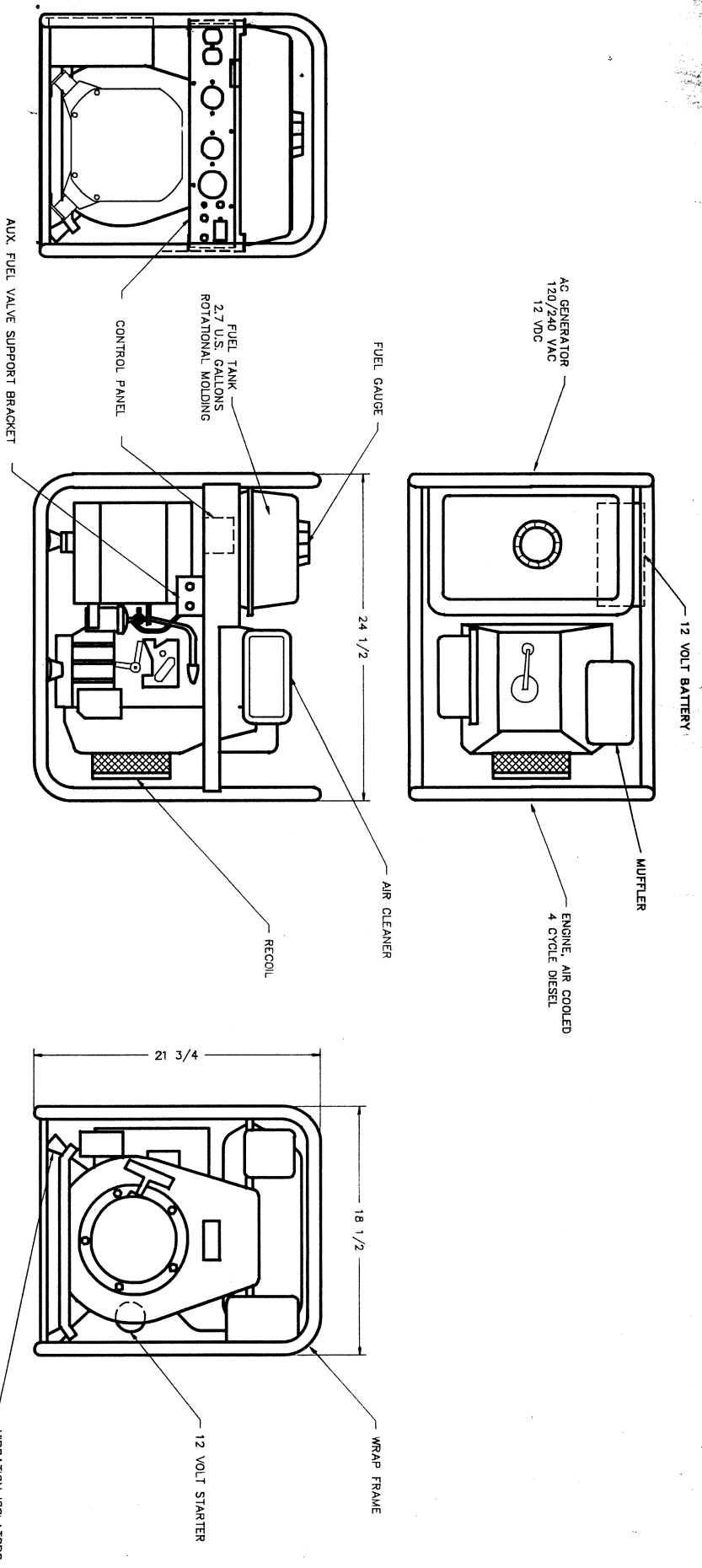
Part Number	Figure and Index	Part Number	Figure and Index
EY001-13061-20	8-5-49	EY0031512000	8-5-187
EY001-13061-20	8-5-60	EY0032008000	8-5-27
EY001-13081-60	8-5-50	EY0032008000	8-8-6
EY001-65061-20	8-5-48	EY0032018000	8-5-209
EY0011006100	8-5-29	EY0041106160	8-5-93
EY0011306120	8-5-7	EY0043506100	8-5-121
EY0011306120	8-9-1	EY0043506250	8-5-102
EY0011306160	8-5-18	EY0051903120	8-5-177
EY0011306400	8-5-14		
EY0011308120	8-5-111	EY0052605120	8-5-150
		EY0052608180	8-5-155
EY0011308120	8-5-119	EY0052608180	8-5-182
EY0011308160	8-5-8	EY0062620200	8-5-98
EY0011308160	8-5-25	EY0105060070	8-5-140
EY0011308160	8-5-104	EY0105060150	8-5-141
EY0011308200	8-5-129	EY0110060010	8-5-125
EY0011308250	8-5-159	EY0110060010	8-5-132
EY0011308350	8-5-22	EY0110060010	8-5-204
EY0011308350	8-5-162	EY0110060020	8-5-135
EY0011308400	8-5-13		
EY0011308400	8-5-161	EY0149060080	8-5-185
		EY0150040040	8-5-33
EY0011406160	8-5-97	EY017-60600-30	8-5-38
EY0011406160	8-5-118	EY0170060086	8-5-186
EY0011406350	8-5-116	EY0180090010	8-5-143
EY0011408300	8-5-123	EY021-70800-10	8-5-54
EY0013706221	8-5-152	EY0211140020	8-5-158
EY0013708201	8-5-139	EY0213200030	8-5-91
EY002-17040-00	8-5-64	EY0230160020	8-5-183
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EY002-18080-00	8-5-34		
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		EY0230170030	F8-5-207
EY002-38060-00	8-5-55	EY0230170040	F8-5-207
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EY0021908000	8-5-26	EY0307300070	8-5-169
EY0022410000	8-5-167	EY0310060010	8-5-148
EY002280800	8-8-5	EY0323030010	8-5-212
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EY0023806000	8-7-2	EY0403060010	8-5-149
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		EY0440300030	8-5-172
EY003-20040-00	8-5-65	EY0521100020	8-5-81
EY003-20080-00	8-5-35	EY0530100011	8-5-82

Part Number	Figure and Index	Part Number	Figure and Index
EY0561080010	8-5-76	EY243-40160-01	8-5-52
EY0561110020	8-5-74	EY243-42301-12	8-5-46
EY0561110020	8-5-79	EY243-42504-03	8-5-37
EY0565200030	8-5-201		
EY0566000170	8-5-105	EY243-42910-10	8-5-36
EY0566000170	8-5-112	EY243-43302-10	8-5-40
		EY243-45002-03	8-5-44
EY0600170040	8-5-156	EY243-45004-03	8-5-62
EY0600170040	8-5-174	EY243-45501-10	8-5-42
EY0600350010	8-5-211	EY243-45701-20	8-5-56
EY1065011608	8-9-12	EY243-46002-03	8-5-57
EY1065012818	8-9-8	EY243-47001-01	8-5-59
EY1065013208	8-9-7	EY243-47010-01	8-5-66
EY1065013618	8-9-6	EY243-47020-01	8-5-61
EY1065014418	8-9-5		
EY1065018518	8-9-4	EY243-47031-01	8-5-69
EY1065018608	8-9-3	EY243-75004-03	8-5-68
		EY243-75014-00	8-5-67
EY1507520103	8-5-122	EY243-92105-03	8-5-53
EY2054190103	8-5-171	EY2431300131	8-5-138
EY206-42801-01	8-5-41	EY2431420203	8-5-142
EY2075012218	8-9-9	EY2431500203	8-5-175
EY2107050808	8-8-18	EY2431501003	8-5-137
EY2107053308	8-8-9	EY2431502503	8-5-134
EY2107053408	8-8-20	EY2431580103	8-5-173
EY2107053908	8-8-17		
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EY2107054208	8-8-24	EY2431580303	F8-5-173
		EY2431700120	8-5-136
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UNLESS OTHERWISE SPECIFIED		DATE 9-4-91		PART NO. A20025A	
DIMENSIONS IN INCHES		SCALE 1/8 = 1		DR. BY HJ	
TOLERANCES		CH. BY		APPD. BY <i>RS</i>	
FRACTIONS +/- 1/64 "		UNIT OUTLINE		MATERIAL	
DECIMALS .XXX +/- .005		30036R		T&W MANUFACTURING, INCORPORATED	
.XX +/- .030		OSHKOSH, WI. 54901		A20025A	
.X +/- .100					
ANGLES +/- 1/2°					

