

TM 5-6115-296-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

**GENERATOR SET, GASOLINE ENGINE:
10KW, AC, 120V, 1 & 3 PHASE,
120/240 V SINGLE PHASE, 120/208
V, 3 PHASE 60 CYCLE; SKID MOUNTED**

**(KURZ & ROOT MODEL FERO-1) SERIAL
NUMBERS: 560-1001 THRU 560-4600
FSN 6115-833-1498**



HEADQUARTERS, DEPARTMENT OF THE ARMY

FEBRUARY 1962

SAFETY PRECAUTIONS

BEFORE OPERATION

Before starting the engine, see that no loose tools, parts, and the like are lying in or on any part of the engine as they could cause serious damage to the engine or bodily injury to personnel.

The voltage produced by this generator set is dangerous to personnel coming in contact with any part of the electrical system during operation. Severe, possibly fatal shock may result. See that the generator set is grounded before operation. Be extremely careful when the unit or surrounding area is damp or wet.

When servicing any part of the electrical system or making any connections, be sure that the generator set is not operating and is not connected to an energized line.

Clean or service the generator set only when the engine is shut down. If unit stops by operation of safety devices, do not attempt to operate it until fault has been corrected.

When operating in an inclosed area, pipe exhaust fumes to the outside. Continued breathing of exhaust fumes may be fatal.

When servicing the batteries, do not smoke or use an open flame in the vicinity. Batteries generate explosive gas during charge.

When filling the fuel tank, do not smoke or use open flame in servicing area.

DURING OPERATION

In case of an accident from electrical shock, shut down the set at once. If the set cannot be shut down, free the victim from contact with live conductor. Avoid direct contact with the victim. Use a dry board, dry rope, or any nonconducting implement to free the victim. If the victim is unconscious, apply artificial respiration and get medical help.

Avoid breathing of smoke when fighting fire with monobromotri-fluoromethane fire extinguisher.

AFTER OPERATION

Disconnect the battery ground before removing and installing components of the engine to avoid injury to personnel or damage to the unit.

Use extreme care in the use of test lamp circuits of 110 volts or higher. Death by electrocution or serious injury can result from contact with the test lamp circuit.

Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen, a highly explosive gas.

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL
GENERATOR SET, GASOLINE ENGINE: 10KW, AC, 120V, 1 & 3
PHASE, 120/240 V SINGLE PHASE, 120/208 V, 3 PHASE 60
CYCLE; SKID MOUNTED (KURZ & ROOT MODEL FERO-1) SERIAL
NUMBERS: 560-101 THRU 560-4600
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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the use of the personnel to whom the Kurz & Root Model FERO-1 Generator Set is issued. They provide information on the operation and organizational maintenance of the equipment. Also included are descriptions of main units and their functions in relationship to other components.

b. Appendix I contains a list of publications applicable to this manual. Appendix II contains the maintenance allocation chart. Appendix III contains the list of basic issue items authorized the operator of this equipment. The organizational maintenance repair parts and special tool lists will be listed in TM 5-6115-296-20P, when published.

c. Numbers in parentheses on illustrations indicate quantity. Numbers preceding nomen-

clature callouts on illustrations indicate the preferred maintenance sequence.

d. Report all deficiencies in this manual on DA Form 2028. Submit recommendations for changes, additions, or deletions to the commanding officer, U.S. Army Engineer Maintenance Center, Corps of Engineers, ATTN: EMCDM-S, P.O. Box 119, Columbus 16, Ohio. Direct communication is authorized.

e. Report unsatisfactory equipment performance and suggestions for equipment improvement as specified in AR 700-38.

2. Record and Report Forms

For record and report forms applicable to the first and second echelons of maintenance refer to TM 5-505.

Note. Applicable forms, excluding standard Form 46 which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.

Section II. DESCRIPTION AND DATA

3. Description

a. General. The Kurz & Root Model FERO-1 generator set (figs. 1 and 2) is a self-contained, skid mounted, winterized, portable unit. It is powered by a four cylinder gasoline engine (fig. 1) that is directly connected to the main generator (fig. 2). The generator control panel (fig. 1), the engine control panel (fig. 1), and the heater control panel (fig. 1) contain the controls and instruments necessary for single unit operation, also operation by remote control. Doors and panels (figs. 1 and 2) are provided for easy access to all components and accessories. The generator set can be operated from a remote position when operators cannot be with the equipment.

b. Engine. The Hercules engine model 1XB-3ER (fig. 1) is a 133 cubic inch displacement engine, which is governed at a speed of 1,800 rpm (revolutions per minute) at 60 cycles.

c. Main Generator. The Kurz & Root Model F1700M1088 main generator is driven directly from the engine flywheel. It is a 1 and 3 phase, 60 cycle, 10 kw (kilow. tt) unit. The generator has six stator leads which can be connected at the conversion block for 120/240-v (volt) single phase or 120/208-v 3 phase, four wire operation. Full load rating is 10 kw at 60 cycles.

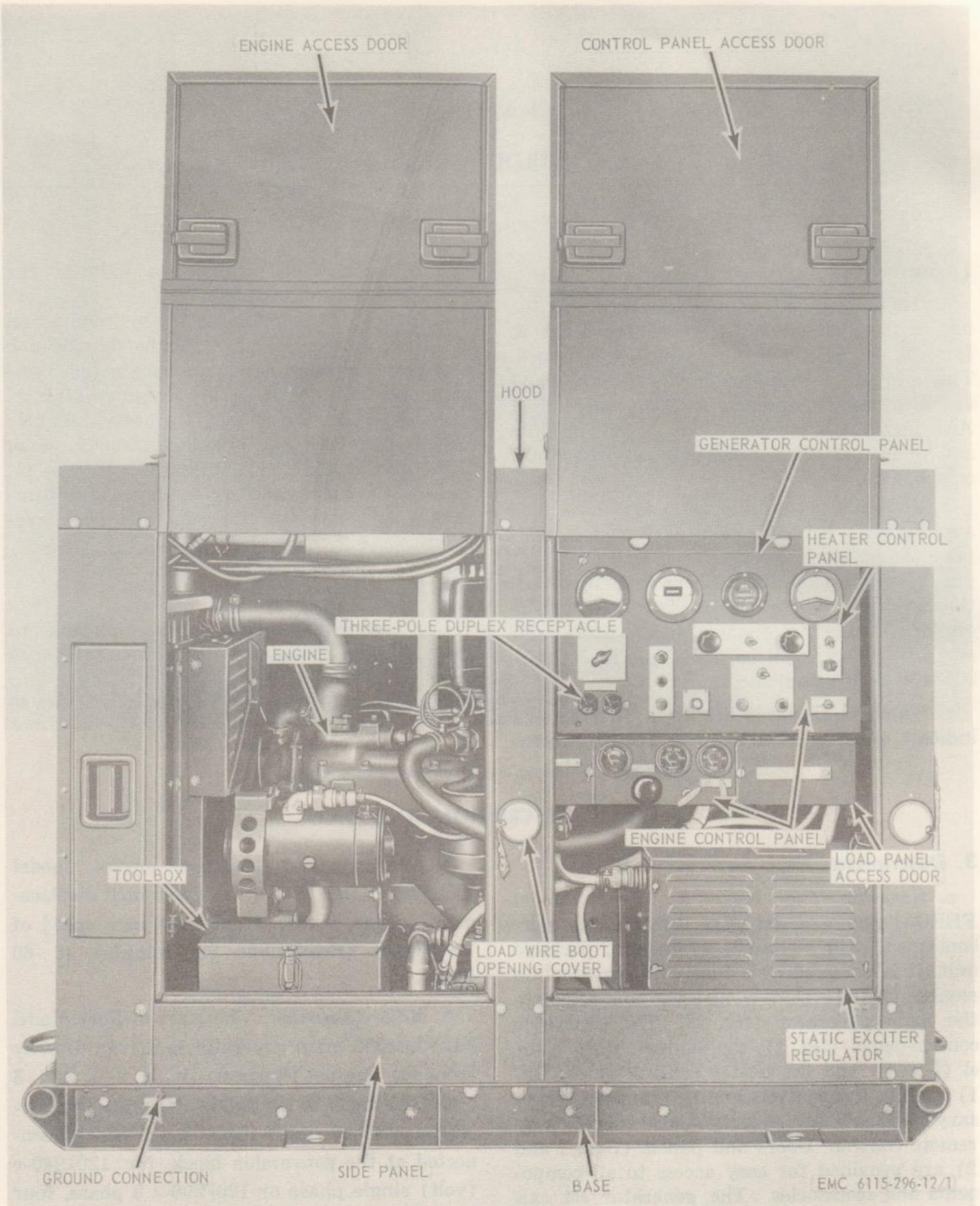


Figure 1. Generator set, left side view.

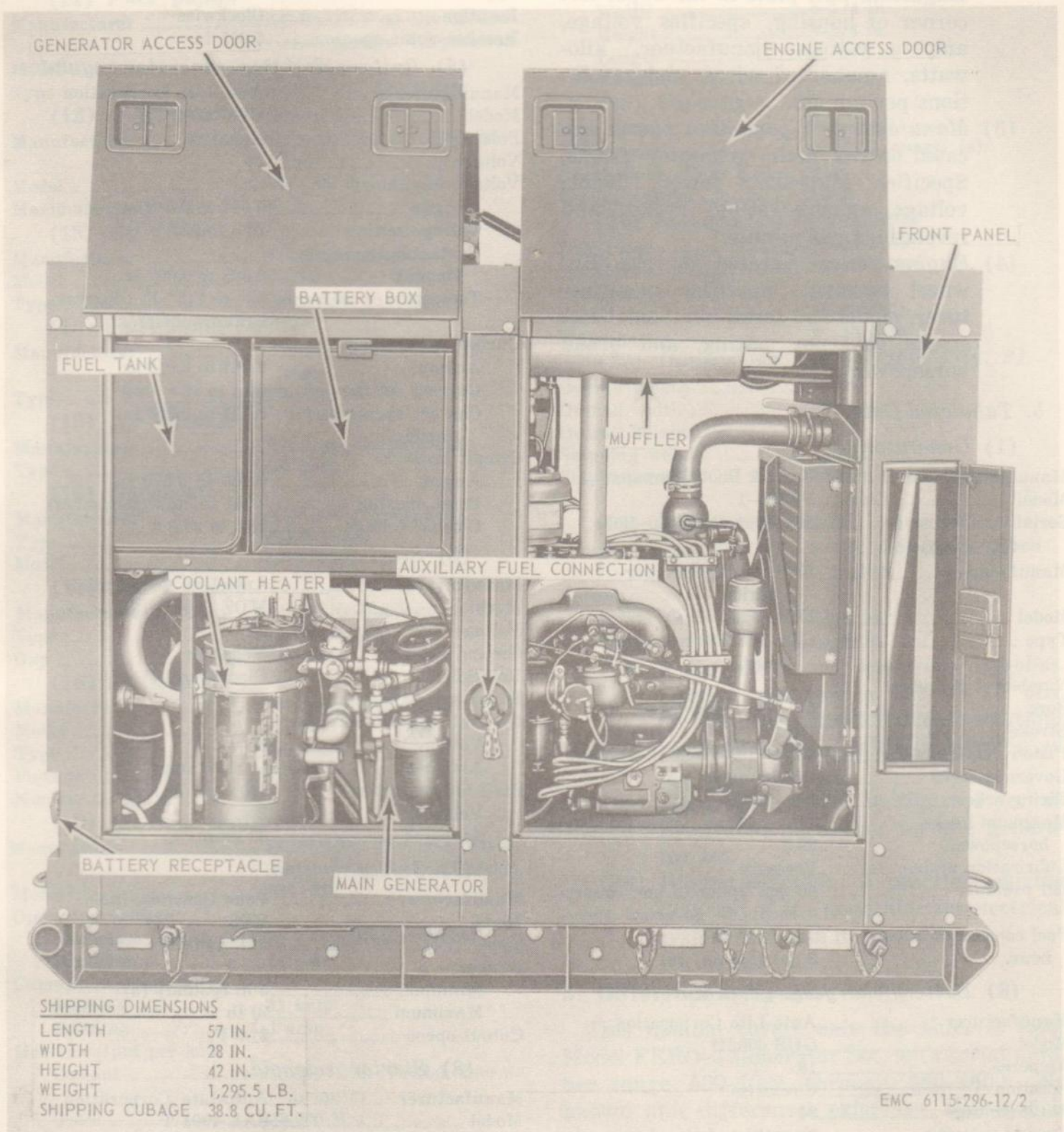


Figure 2. Generator set, right side view, and shipping dimensions.

4. Identification and Tabulated Data

a. *Identification.* The generator set has four identification plates.

(1) *Corps of Engineers unit plate.* Located on the unit housing in upper

left hand corner. Specifies nomenclature, model, manufacturer, and serial number.

(2) *Corps of Engineers main generator plate.* Located below the Corps of

Engineers unit plate in the upper left corner of housing, specifies voltage, ampere rating, manufacturer, kilowatts, number of wires, and revolutions per minute.

- (3) *Manufacturer's generator plate.* Located on the main generator frame. Specifies kilowatts, power factor, voltage, ampere rating, cycles, and revolutions per minute.
- (4) *Engine plate.* Located on the fly-wheel housing. Specifies manufacturer, model and serial numbers, bore, stroke, governor setting, and brake horsepower.

b. Tabulated Data.

(1) *Generator set.*

Manufacturer ----- Kurz & Root Company
 Model ----- FERO-1
 Serial number range ----- 560-1001 thru 560-4600

(2) *Engine.*

Manufacturer ----- Hercules Motors Corporation
 Model ----- IXB-3ER
 Type ----- Gasoline, L-head, liquid cooled
 Number of cylinders ----- 4
 Bore ----- 3-1/4 in. (inch) (es)
 Stroke ----- 4 in.
 Piston displacement ----- 133 cu in. (cubic inch) (es)
 Governed speed ----- 1,800 rpm
 Firing order ----- 1-2-4-3
 Maximum brake horsepower. ----- 29.3
 Lubrication system ----- Pressure
 Oil pressure ----- 30 psi (pounds per square inch) @ governed speed
 Fuel consumption per hour. ----- 3 gal (gallon) (s)

(3) *Battery-charging generator.*

Manufacturer ----- Auto-Lite Corporation
 Model ----- GHS 6002D
 Amperes ----- 18
 Rotation ----- Clockwise
 Rated voltage ----- 24
 Ground polarity ----- Negative
 Brush spring tension ----- 23 to 30 oz (ounce) (s)
 Output at 1,950 maximum rpm:
 Voltage ----- 28.5 v
 Ampere ----- 18 amp (ampere) (s)

(4) *Magneto.*

Manufacturer ----- Fairbanks Morse and Co.
 Model ----- FMXE4B 14E-1

Type ----- Shield
 Rotation ----- Clockwise
 Breaker point opening ----- 0.015 in.

(5) *Battery-charging generator regulator.*

Manufacturer ----- Auto-Lite Corporation
 Model ----- VBU 4002 UT
 Polarity ----- Negative
 Voltage ----- 24

Voltage regulator:
 Air gap ----- 0.047 to 0.049 in.
 Voltage setting ----- 27.5 to 28.5 v
 Contact spring and stopgap ----- 0.005 to 0.007 in.
 Temperature tolerance ----- 50° to 140° F. (degrees Fahrenheit)

Current regulator:
 Airgap ----- 0.047 to 0.049 in.
 Current setting ----- 17.5 to 18.5 amp
 Contact spring and stopgap. ----- 0.001 to 0.003 in.

Circuit breaker:
 Airgap ----- 0.066 to 0.070 in.
 Point opening ----- 0.047 in. min (minimum)
 Closing voltage ----- 25.5 to 26.5 v

(6) *Starter.*

Manufacturer ----- Auto-Lite Corporation
 Model ----- MDZ 600IT-12R
 Voltage ----- 24
 Ground polarity ----- Negative
 Rotation ----- Clockwise
 Brush spring tension ----- 43 to 53 oz
 No load test at 3,600 rpm:
 Voltage ----- 20 v
 Amperes ----- 14 max amp
 Stall torque test at 6 ft-lb (foot-pound) (s)
 Voltage ----- 8 v
 Amperes ----- 80 amp

(7) *Safety switch.*

Manufacturer ----- Penn Controls, Inc.
 Model ----- 1508
 Type ----- 261 APOIX
 Range:
 Minimum ----- 5 lb (pound) (s)
 Maximum ----- 50 lb
 Cutout opens ----- 214° F.

(8) *Starter solenoid.*

Manufacturer ----- Auto-Lite Corporation
 Model ----- SAL 4001 T

(9) *Fuel filter.*

Manufacturer ----- Fram Corporation
 Model ----- FBM 1110-PL MIL

(10) *Carburetor.*

Manufacturer ----- Marvel-Schebler Products
 Div of Borg-Warner Corporation
 Model ----- TSX-841

(11) *Fuel pump.*

Manufacturer ----- AC Spark Plug Div of General Motors Corporation
 Model ----- 5594125
 Type ----- Mechanical diaphragm

(12) *Oil pressure sending switch.*

Manufacturer ----- Stewart-Warner Corporation
 Model ----- SW-506-T
 Maximum pressure ----- 60 lb

(13) *Oil filter.*

Manufacturer ----- Fram Corporation
 Model ----- F-21P
 Type ----- Cartridge

(14) *Fuel pump (heater).*

Manufacturer ----- Bendix Electric Corporation
 Type ----- Electric

(15) *Air cleaner.*

Manufacturer ----- Air Maze Corporation
 Type ----- Oil bath

(16) *Governor.*

Manufacturer ----- Hercules Corporation
 Type ----- Centrifugal
 Model ----- GG236745

(17) *Spark plugs.*

Manufacturer ----- Auto-Lite Corporation
 Type ----- 14MM AR8S
 Gap ----- 0.025 in.

(18) *Batteries.*

Manufacturer ----- Willard Battery Co.
 Model ----- 2HN-11
 Type ----- Lead-acid
 Voltage ----- 12
 Number ----- 2

(19) *Coolant heater.*

Manufacturer ----- Southwind Division, Stewart-Warner Corporation
 Model ----- 939-E24
 Operating voltage:
 Maximum ----- 28 v dc (direct current)
 Minimum ----- 18 v dc
 Current consumption:
 Starting ----- 11 amp
 Running ----- 1 amp
 Heater output per hour:
 Coolant ----- 15,000 Btu (British thermal units)
 Total ----- 23,000 Btu
 Fuel consumption ----- 0.26 gph (gallons per hour)

Dimensions:

Width ----- 6-1/4 in.
 Height ----- 8-1/4 in.
 Length ----- 15-1/4 in.
 Weight ----- 15 lb

(20) *Capacities.*

Fuel tank ----- 5-1/4 gal
 Air cleaner ----- 3/16 qt (quart) (s)
 Crankcase w/filter ----- 6 qt
 Cooling system ----- 12 qt

(21) *Nut and bolt torque data.*

Fuel filter ----- 12-14 ft-lb
 Manifold ----- 25-30 ft-lb
 Cylinder head ----- 50 ft-lb
 Spark plug ----- 25-30 ft-lb
 Water pump ----- 37-40 ft-lb

(22) *Dimensions and weights (fig. 2).*

Overall length ----- 57 in.
 Overall width ----- 28 in.
 Overall height ----- 42 in.
 Shipping weight ----- 1,295.5 lb
 Shipping cubage ----- 38.8 cu ft (cubic foot) (feet)

(23) *Adjustment data.*

V-belts ----- 3/4-in. deflection between pulleys

Valves:

Intake (hot) ----- 0.006 in.
 Exhaust (hot) ----- 0.008 in.

(24) *Maintenance and operating supplies.*

Table I provides a list of all oils, greases, fuels, and antifreeze solutions required for the initial operation of the generator set.

(25) *Base plan.* Refer to figure 3 for an illustrated base plan for the generator set.

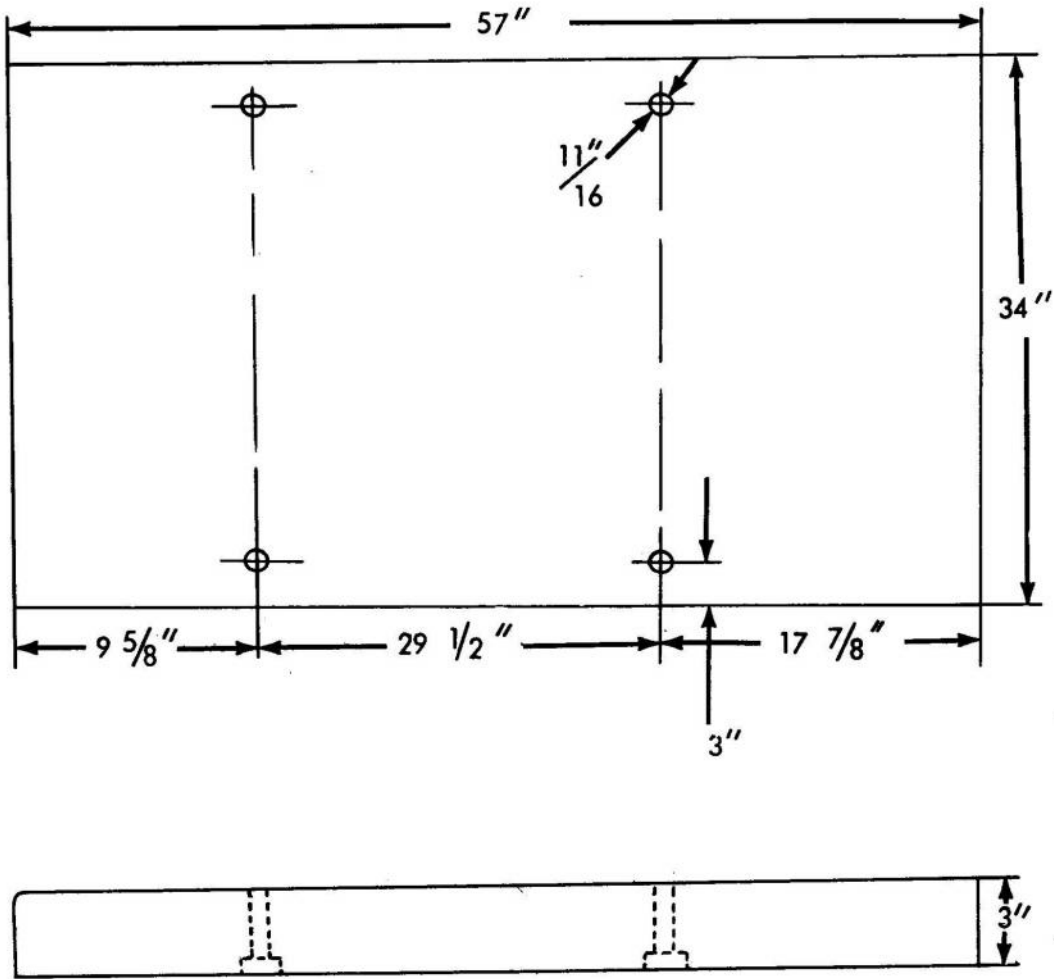
(26) *Wiring diagram.* A practical wiring diagram of the generator set electrical system is shown in figure 4.

5. Difference in Models

This manual covers only the Kurz & Root Model FERO-1 Generator Set, with serial number range 560-1001 through 560-4600. No known unit differences exist for the models covered by this manual.

Table I. Maintenance and Operating Supplies

Item	Component application	Source of supply	Federal stock No.	Description	Quantity required for initial operation	Quantity required for 8 hours operation	Notes
1.	0101 CRANKCASE (1)	10	9150-231-6653	OIL, LUBRICATING: 5-gal drums, as follows:	6 qt	(2)	(1) Includes quantity of oil to fill engine oil system as follows: 5 qt—crankcase 1 qt—oil filter assembly (2) See current LO for grade application and replenishment intervals. (3) Use oil as prescribed in item 1. (4) Average fuel consumption is 3 gph of continuous operation. (5) See Table II.
			9150-265-9435		6 qt	(2)	
			9150-231-9037		6 qt	(2)	
			9150-265-9428		6 qt	(2)	
			9150-242-7603		6 qt	(2)	
2.	0304 AIR CLEANER			OIL, LUBRICATING: (3)	3/16 qt	(2)	
3.	0306 FUEL TANK			GASOLINE, AUTOMOTIVE: bulk:			
4.	0500 COOLING SYSTEM	10	9130-160-1818	91A	5-1/4 gal	(4)	
				WATER:	12 qt	(5)	
		9	6850-224-8730	ANTIFREEZE: inhibited glycol			
			6850-174-1806	ANTIFREEZE: compound arctic			

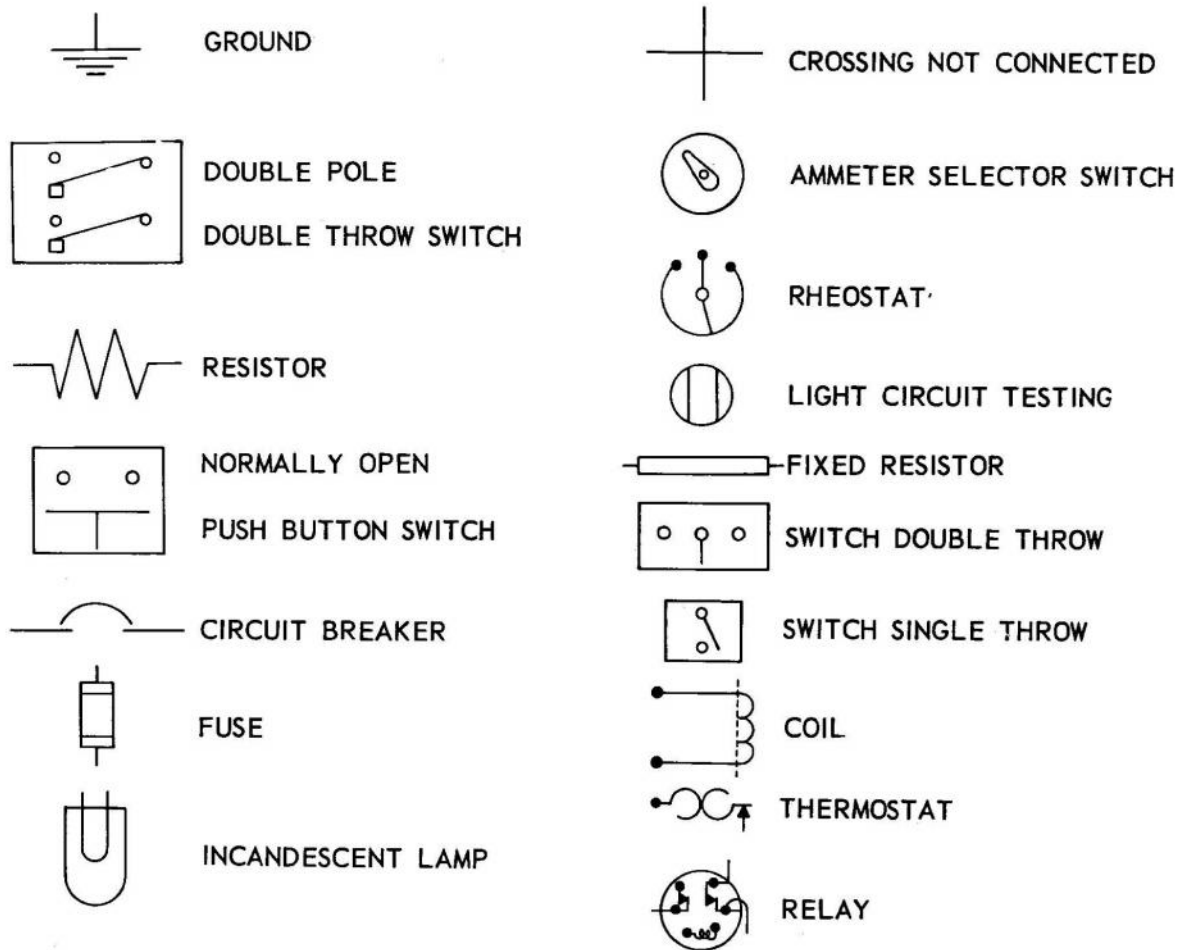


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Figure 3. Base plan.

Figure 4. Practical wiring diagram.
(Located in back of manual)

SYMBOL LEGEND



EMC 6115-296-12/4 (2)

Figure 4—Continued.

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

6. Unloading the Generator Set

a. Shipment by Trailer Tractor.

- (1) Remove all tiedown and blocking that secure the generator set to the carrier.
- (2) Use a fork lift truck or crane to remove the generator set from the bed of the carrier.

b. Shipment by Rail.

- (1) Remove all tiedown and blocking securing the generator set to the bed of the carrier.
- (2) Use a crane or skid the generator set from the bed of the carrier.

Warning: When lifting the generator set, be sure the lifting device has a rated capacity to lift the weight of the unit. Do not allow the unit to swing while suspended. Failure to observe this warning may result in damage to the unit or severe injury to personnel.

7. Unpacking the Generator Set

a. Unpacking. Place the generator set as close as possible to the site where it will be used and carefully unpack to avoid damage to the unit. Remove the steel straps. Remove the top of the crate as a unit, then remove the two sides and two ends.

b. Depreservation. Prepare the item for inspection as outlined in DA Form 2258, attached on or near the operational controls.

8. Inspection and Servicing Generator Set

a. Inspect the packing list and make sure that all equipment listed has been received. Ex-

amine the identification plates for positive identification of the generator set.

b. Inspect the generator set for damage or missing parts. Be especially careful when inspecting used equipment.

c. Perform operator's daily services (par. 35).

d. Lubricate the generator set as directed in LO 5-6115-296-12.

e. If freezing temperatures are expected, protect the engine cooling system with antifreeze. In arctic areas, use an arctic antifreeze compound. In other areas, add ethylene glycol in accordance with table II. Protect the engine cooling system to at least 10° F. below the lowest temperature expected. Use a hydrometer to test the freezing point of the coolant after it is thoroughly mixed and up to operating temperature.

9. Installation of Separately Packed Components

Remove the caps from the batteries (fig. 5) and fill each cell with electrolyte. Be sure the plates are covered by three-eighths of an inch of electrolyte. Refer to TM 9-6140-200-15 or table III for specific gravity temperature corrections.

Warning: Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen, a highly explosive gas.

10. Installation or Settingup Instructions

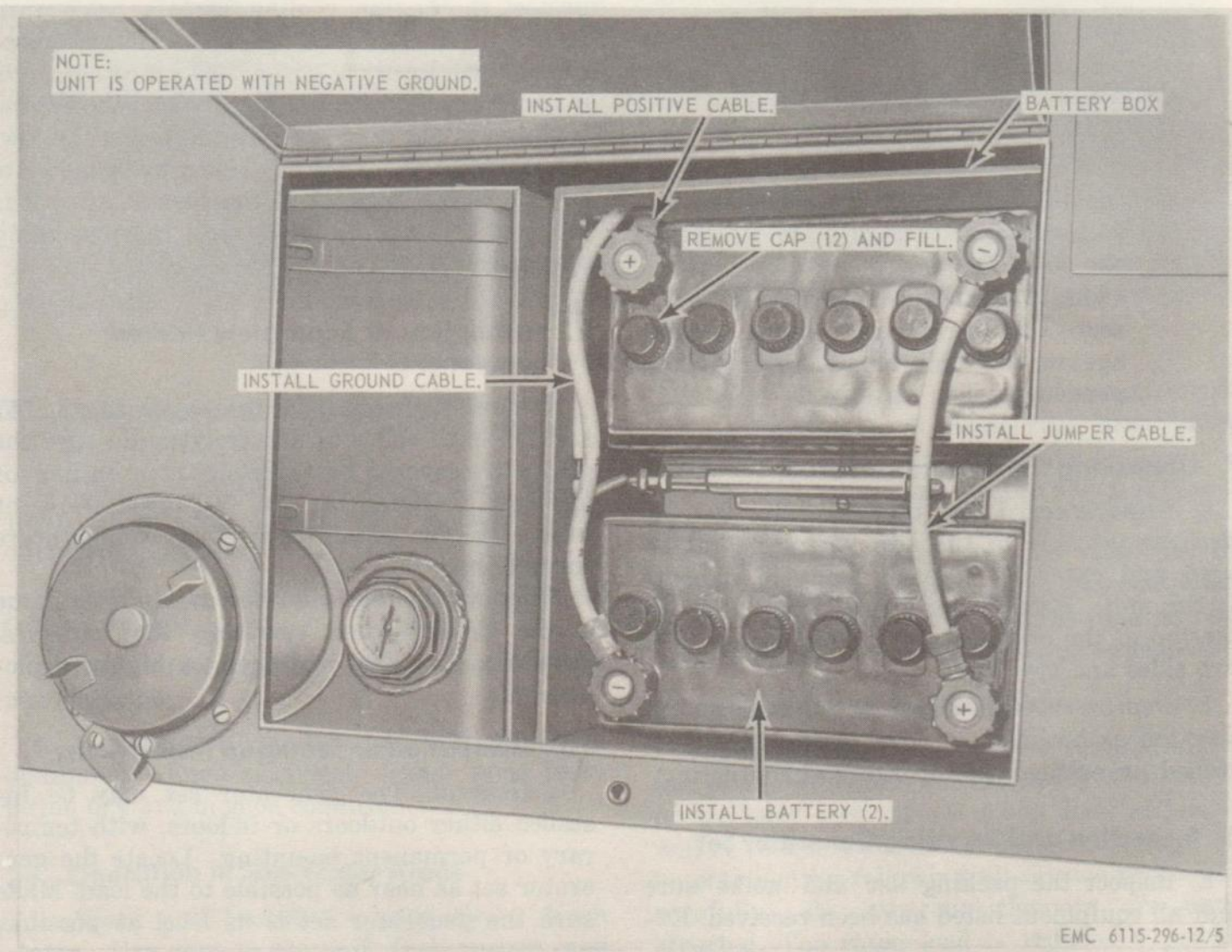
a. General. The generator set may be installed either outdoors or indoors, with temporary or permanent mounting. Locate the generator set as near as possible to the load. Make sure the generator set is as level as possible.

Table II. Freezing Points, Composition, and Specific Gravities of Military Anti-freeze Materials

Lowest expected ambient temp °F	Pints of inhibited glycol per gal of coolant ¹	compound, Antifreeze Arctic ²	Ethylene glycol coolant solution specific gravity at 68°F ³
+20	1 1/2	Issued full strength and ready mixed for 0°F. to -65°F. temperatures for both initial installation and replenishment of losses	1.022
+10	2		1.036
0	2 3/4		1.047
-10	3 1/4		1.055
-20	3 1/2		1.062
-30	4		1.067
-40	4 1/4		1.073
-50	Arctic Anti-freeze preferred	DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE	
-60			
-75			

Maximum protection is obtained at 60 percent by volume, that is 4.8 pints of ethylene per gallon of solution. Military Specification MIL-C 11755 Arctic type, nonvolatile antifreeze compound is intended for use in the cooling system of liquid-cooled internal combustion engines for protection against freezing primarily in Arctic regions where the ambient temperature remains for extended periods of time close to -40° F. or drops below to as low as -90°F. Use an accurate hydrometer. To test hydrometer, use 1 part ethylene glycol antifreeze to 2 parts water. This should produce a hydrometer reading of 0°F.

Note. Fasten a tag near the radiator filler cap indicating the type of anti-freeze.



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Figure 5. Battery installation and service.

Table III. Specific Gravity Temperature Corrections

Available cranking power	-65° F.	-40° F.	-20° F.	-10° F.	0° F.	20° F.	40° F.	80° F.	100° F.	110° F.	120° F.
50%	1.277	1.267	1.259	1.255	1.251	1.243	1.236	1.220	1.213	1.209	1.205
58.3%	1.287	1.277	1.269	1.265	1.261	1.253	1.246	1.230	1.223	1.219	1.215
66.6%	1.297	1.287	1.279	1.275	1.271	1.263	1.256	1.240	1.233	1.229	1.225
75%	1.307	1.297	1.289	1.285	1.281	1.273	1.266	1.250	1.243	1.239	1.235
83.3%	1.317	1.307	1.299	1.295	1.291	1.283	1.276	1.260	1.252	1.248	1.245
91.6%	1.327	1.317	1.309	1.305	1.301	1.294	1.286	1.270	1.262	1.258	1.255
100%	1.338	1.328	1.320	1.316	1.312	1.304	1.296	1.280	1.272	1.268	1.265

b. Indoor Installation. Make sure the floor of the inclosure is of sufficient strength to support the weight of the generator set. If the installation is to be permanent, the generator set may be secured to the floor with five-eighth inch bolts. Provide at least 4 feet of space around the generator set for servicing and adequate ventilation. Use as few bends as possible in the exhaust line and make sure that all connections are gas tight.

Warning: When the unit is to be operated in an inclosed area, exhaust gases must be piped to the outside. These gases contain carbon monoxide. Continued breathing of exhaust fumes is dangerous and could be fatal.

c. Outdoor Installation. Avoid sandy, muddy, or damp locations if possible. If it is necessary to install the unit on soft ground, refer to figure 3, and construct a foundation of planks, logs, or concrete. Locate the generator set so that it is as level as possible.

d. Grounding. The generator set must be grounded prior to operation. Connect one end of a ground cable of not less than No. 4 AWG wire to the ground terminal (fig. 1) and tighten the nut securely. The other end of the ground cable must be connected to a common service ground or to steel, iron, or copper pipe that is driven to a depth of not less than 4 feet. If a copper plate is used, it must be buried underground to a depth of not less than 4 feet. Connection of the ground cable to ground conductor must be made by a ground clamp that provides a tight connection. If a ground clamp is not used, the ground cable must be soldered to the ground conductor.

Warning: See that the generator set is grounded before operating it. Serious, possibly fatal, shock may result from contact with the components carrying current during operation,

especially when the unit or surrounding area is damp or wet.

e. Attaching Load Lines. Open the load panel access door (fig. 1). Attach the load lines to the proper terminals (par. 19). Do not use any smaller than No. 4 AWG copper wire with sound insulation. Position the load cables above head height or on the ground, covering to prevent a tripping hazard to the operator.

f. Battery-Charging Receptacle. A battery-charging receptacle (fig. 2) is provided to attach an external source of 24-volt current to be used in starting the generator set in case the batteries in the unit are weak or have been removed and also to engage source of power to charge the batteries.

g. Three-pole Duplex Receptacles. The three-pole duplex 12-volt receptacles on the generator control panel (fig. 1) can be used to provide power for electrically operated hand-tools and other items which are designed to operate on the power provided by these receptacles.

h. Auxiliary Fuel Line Installation. The generator set is equipped with a 5 1/4 gallon gasoline fuel tank. If it is more practical to operate the unit from an auxiliary fuel source, refer to figure 6 for auxiliary fuel line installation and valve position. Do not position auxiliary fuel source lower than five feet below fuel pump.

11. Equipment Conversion

a. General. The ac generator may be connected to operate on four voltage and phase combinations. This paragraph covers the changeover board and output terminal connections.

NOTE:
CONNECT AUXILIARY FUEL LINE FROM AUXILIARY
TANK OR SOURCE TO THE ADAPTER AND LINE TO
THREE-WAY VALVE.

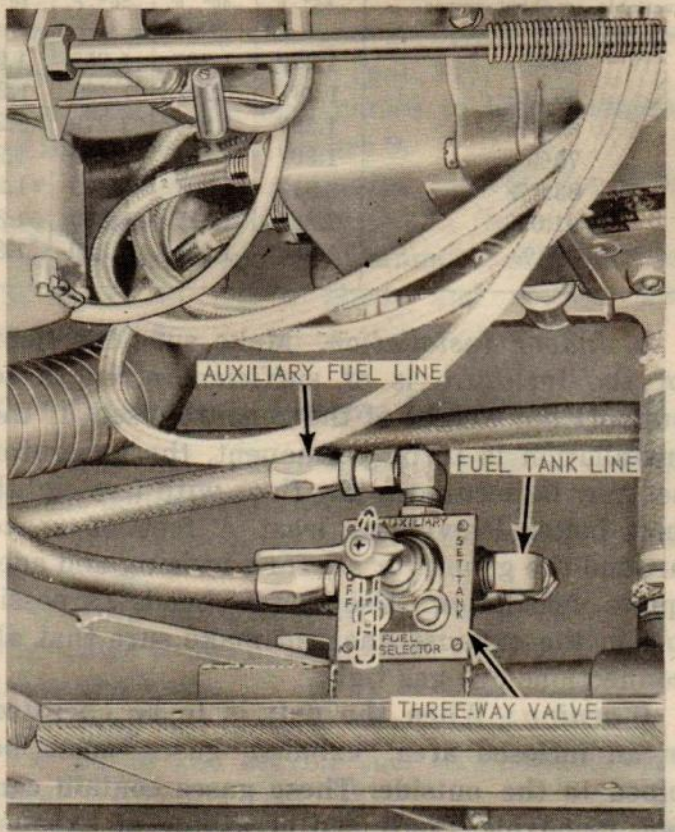
AUXILIARY FUEL LINE ADAPTER

CENTER FRAME

REMOVE CAP.

CAUTION:
DO NOT SET AUXILIARY FUEL SOURCE LOWER THAN
5 FEET BELOW FUEL PUMP.

A



B

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A—Auxiliary hose connection
B—Valve setting

Figure 6. Auxiliary fuel line installation and valve position.

Warning: The voltage generated by this unit can cause death by electrocution. Stop the generator set before making connections on the changeover board and the load terminals.

b. Conversion.

- (1) *Single phase operation.* Remove the changeover board as illustrated in figure 7 and replace with boards for sin-

gle phase operation as illustrated in figure 8.

- (2) *Three phase operation.* Replace the changeover panel board with appropriate board as illustrated in figure 8.

Warning: A generator changeover must be checked carefully to avoid damage to electrical equipment and possible injury to using personnel.

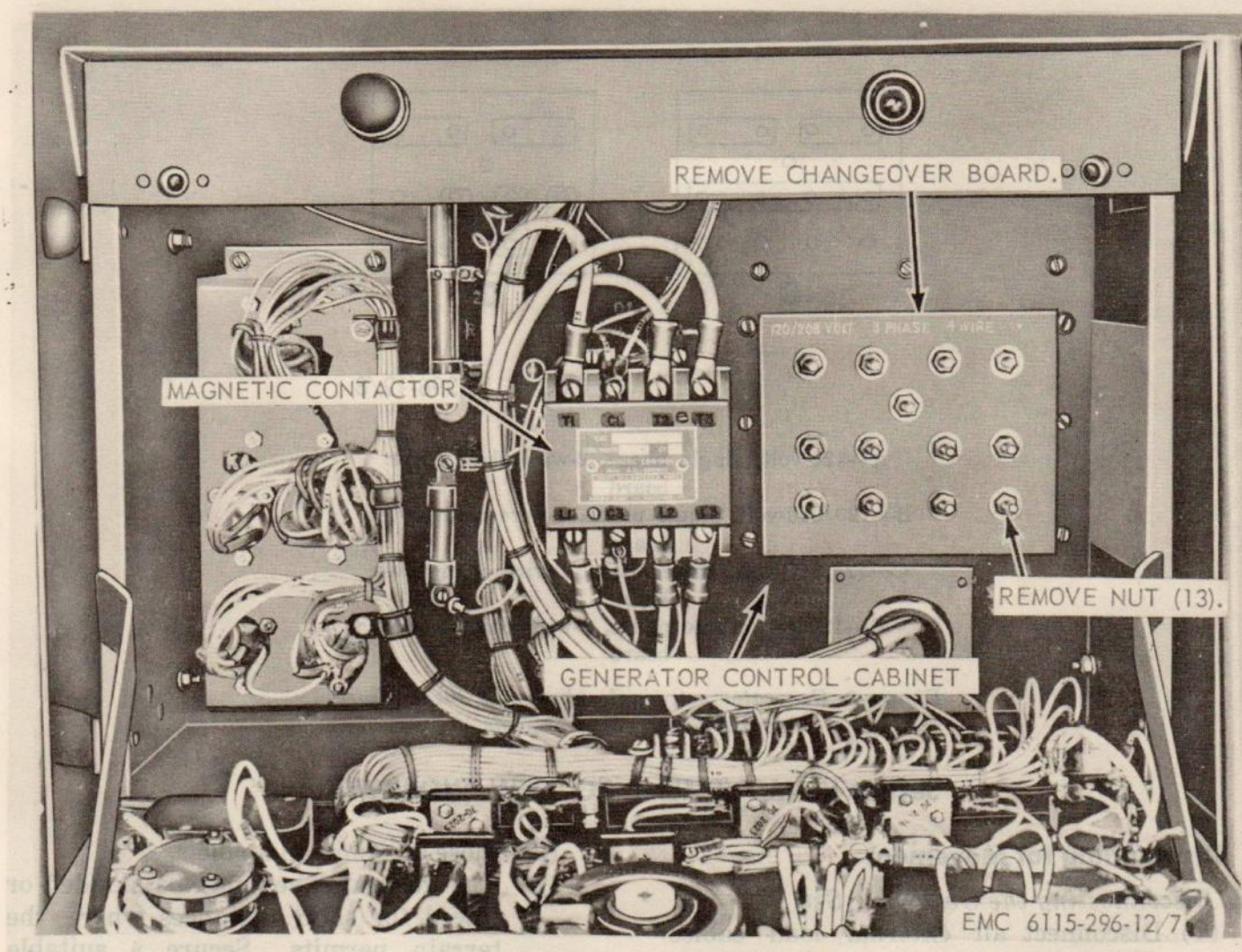
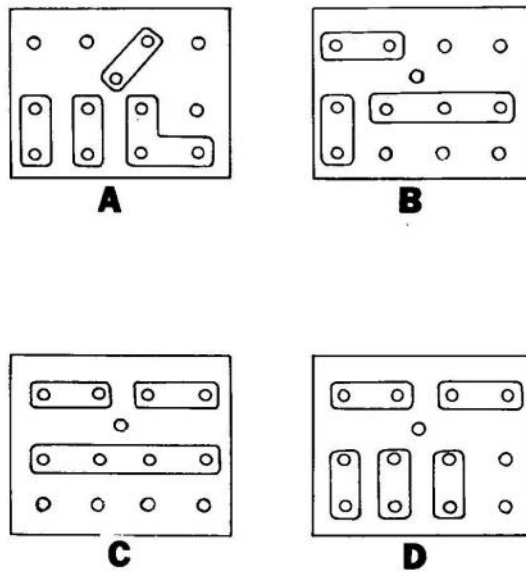


Figure 7. Changeover board, installed view.



EMC 6115-296-12/8

- A—120-volt, single phase, 2-wire changeover board
- B—120/240-volt, single phase, 3-wire changeover board
- C—120/208-volt, three phase, 4-wire changeover board
- D—120-volt, three phase, 3-wire changeover board

Figure 8. Generator set, single phase and three phase operation changeover boards.

Section II. MOVEMENT TO NEW WORKSITE

12. Dismantling for Movement

a. Disconnecting the Generator Set.

- (1) Disconnect all external load cables and the ground wire (par. 10).
- (2) Disconnect exhaust pipe extensions if used.
- (3) Disconnect all auxiliary fuel lines (fig. 6).

b. Preparation for Movement.

- (1) Refer to the basic issue items list and make sure all items described are on, or with the generator set.

- (2) Close all doors and panels.

- (3) The generator set may be skidded or towed for short distances where the terrain permits. Secure a suitable chain or cable to the skid base and tow the generator to the new worksite.

- (4) A U-bolt located in the center frame can be used as the lifting point of the generator set.

13. Reinstallation After Movement

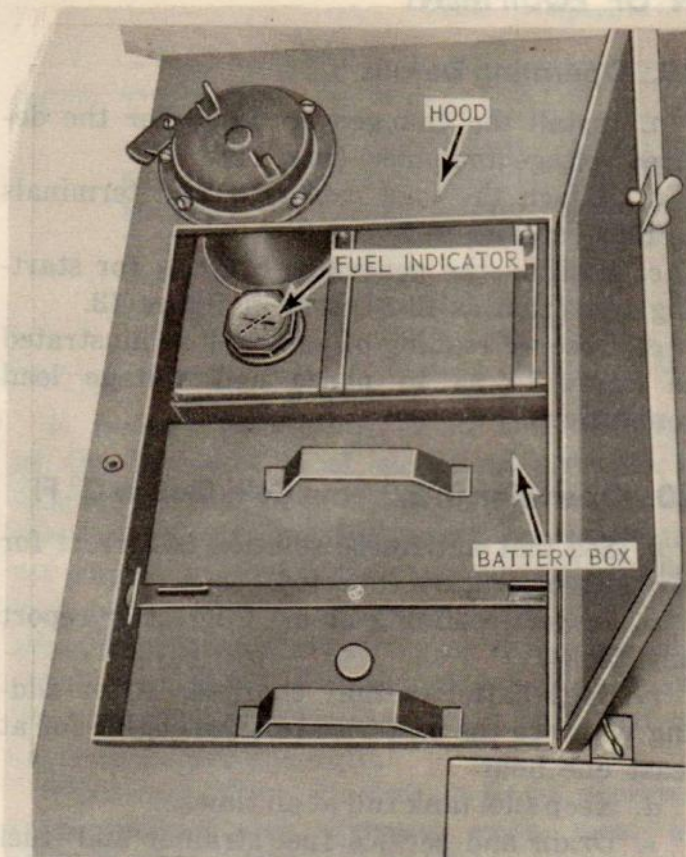
Refer to paragraphs 10 and 11 for reinstallation after movement to a new worksite.

Section III. CONTROLS AND INSTRUMENTS**14. General**

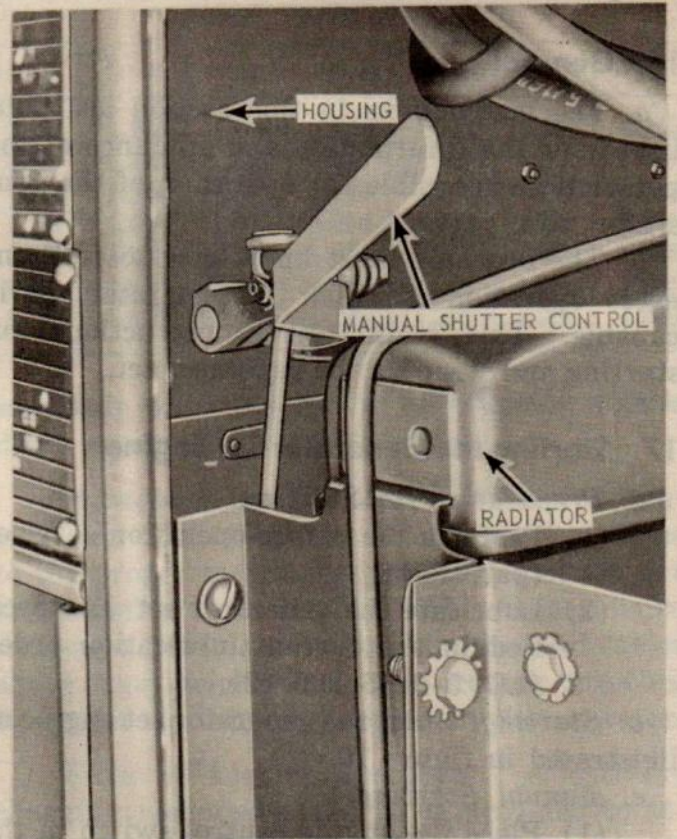
This section describes, locates, illustrates, and furnishes the operator, crew, or organizational maintenance personnel sufficient information about the various controls and instruments for proper operation of the generator set.

15. Controls and Instruments

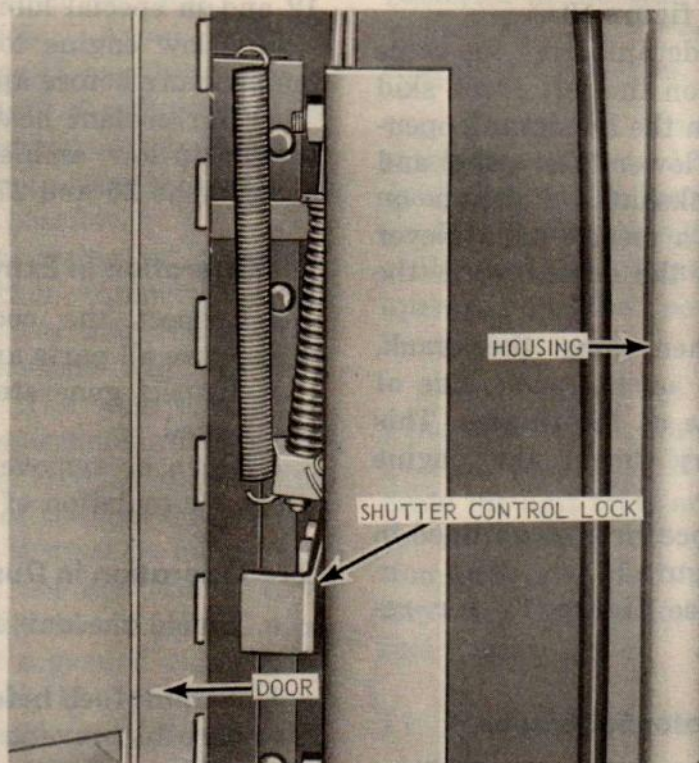
The purpose, location, and normal readings of the controls and instruments are illustrated in figure 9.



C



D



E

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C—Fuel indicator

D—Manual shutter control

E—Shutter control lock

Figure 9—Continued.

Section IV. OPERATION OF EQUIPMENT

16. General

a. The instructions in this section are published for the information and guidance of the personnel responsible for operation of the generator set.

b. The operator must know how to perform every operation of which the generator set is capable. This section gives instructions on starting and stopping the generator set.

17. Starting the Generator Set Engine

a. *Preparation for Starting.*

- (1) Perform the before-operation services (par. 35).
- (2) Lubricate the generator set as specified in the current lubrication order (LO 5-6115-296-12).

b. *Starting.* Start the generator set engine as illustrated in figure 10.

c. *Manual Starting.*

- (1) Place the engine control switch in the handcrank position.
- (2) Perform the procedures as outlined in steps 1, 2, and 3, figure 10.
- (3) Remove the handcrank from the three storage clamps on the left front skid base. Insert it in the handcrank opening in the front lower filler panel and engage the crankshaft. Pull up on the crank with a steady pull. Never attempt to spin the engine with the crank.

Warning: When using the crank, keep the thumb on the same side of the crank handle as the fingers. This will avoid injury should the engine backfire.

- (4) Perform the procedures as outlined in steps 5 and 6, figure 10.

d. *Remote Control.* See figure 11 for remote control connections.

18. Stopping the Generator Set Engine

a. Stop the generator set engine as illustrated in figure 12.

b. Perform the after-operation services (par. 35).

19. Operating Details

a. Install the changeover board for the desired voltage and phase (par. 11).

b. Attach the load cables to load terminals as illustrated in B, figure 9.

c. Position the generator controls for starting operation as illustrated in figure 13.

d. Observe reading of ammeter as illustrated in figure 14 as to phase and voltage load connections.

20. Operation in Extreme Cold (Below 0° F)

a. See that antifreeze solution is correct for lowest temperature expected.

b. Inspect cooling system. Correct or report any leaks.

c. Keep batteries fully charged. After adding water to the batteries run the engine for at least one hour.

d. Keep fuel tank full at all times.

e. Drain and service fuel strainer and fuel filter frequently (par. 92).

f. Lubricate as specified in LO 5-6115-296-12 and in special lubrication instructions.

g. Allow engine to reach normal operating temperature before applying load.

h. For coolant heater and primer pump operation in low ambient temperature refer to paragraphs 26 and 27.

21. Operation in Extreme Heat

a. Inspect the cooling system frequently. Make sure all parts are clean and unobstructed.

b. Inspect generator set to be sure it is not overloaded.

c. Open or remove access doors to permit greater circulation of air.

22. Operation in Dusty or Sandy Areas

a. Shield the unit as much as possible from dirt.

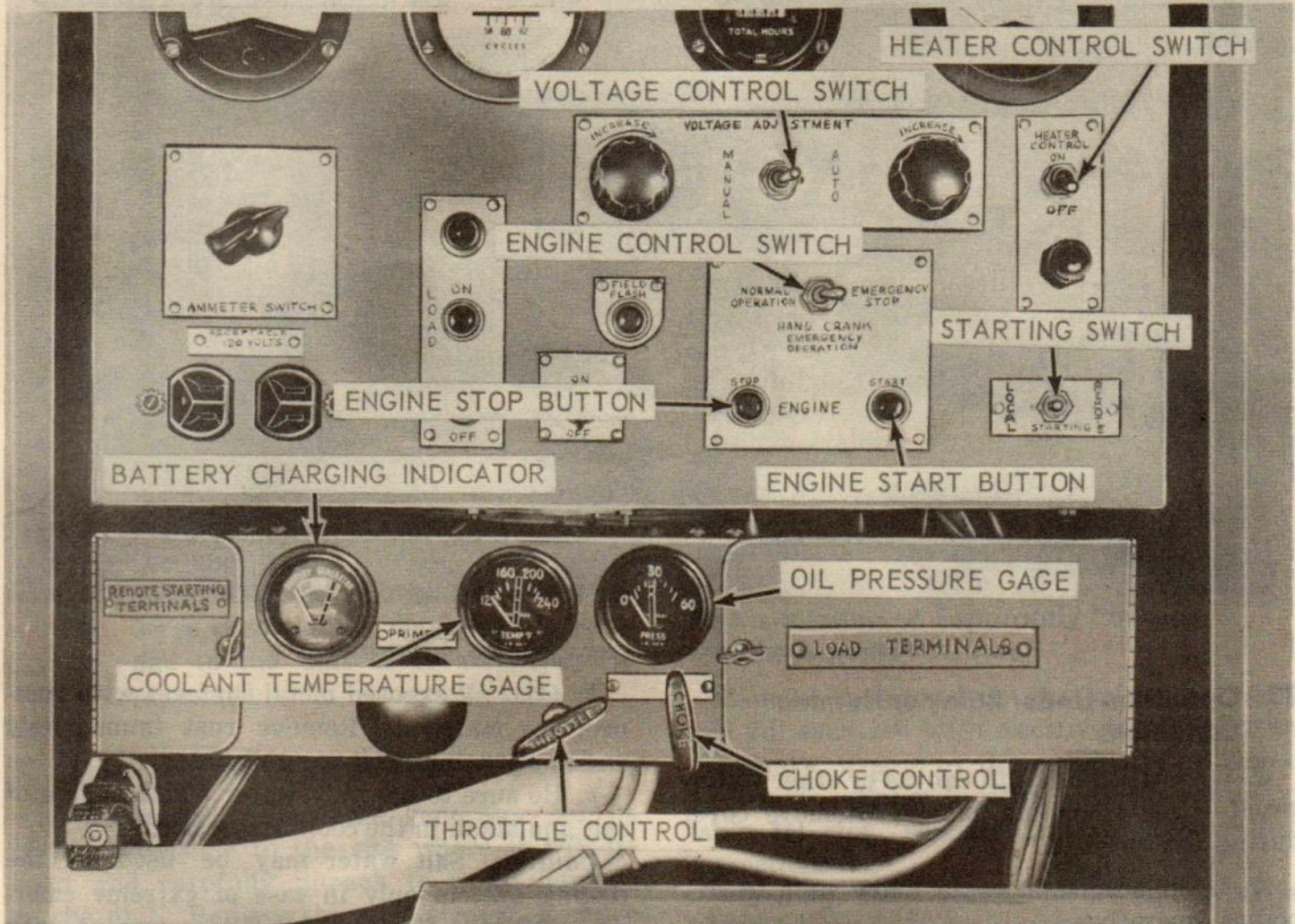
b. Strain fuel before adding to fuel tank. Use care to prevent sand from entering tank when filling. Service air cleaner frequently.

c. Clean area thoroughly around lubrication points, oil filter cap, and oil level gage before inspecting or adding engine oil (par. 35).

STEP 1.
 FOLLOWING CONTROLS SHOULD BE IN STATED POSITIONS: HEATER CONTROL SWITCH-OFF, ENGINE CONTROL SWITCH-NORMAL OPERATION, STARTING SWITCH-LOCAL, VOLTAGE CONTROL SWITCH-AUTO.

STEP 2.
 PULL THROTTLE HALFWAY OUT. TURN CLOCKWISE TO LOCK.

STEP 3.
 PULL CHOKE TO LOCKING POSITION.



STEP 4.
 PUSH ENGINE START BUTTON.

STEP 5.
 AFTER ENGINE STARTS, PUSH THROTTLE ALL WAY IN.

STEP 6.
 ALLOW ENGINE TO WARM UP.

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Figure 10. Starting the generator set engine.

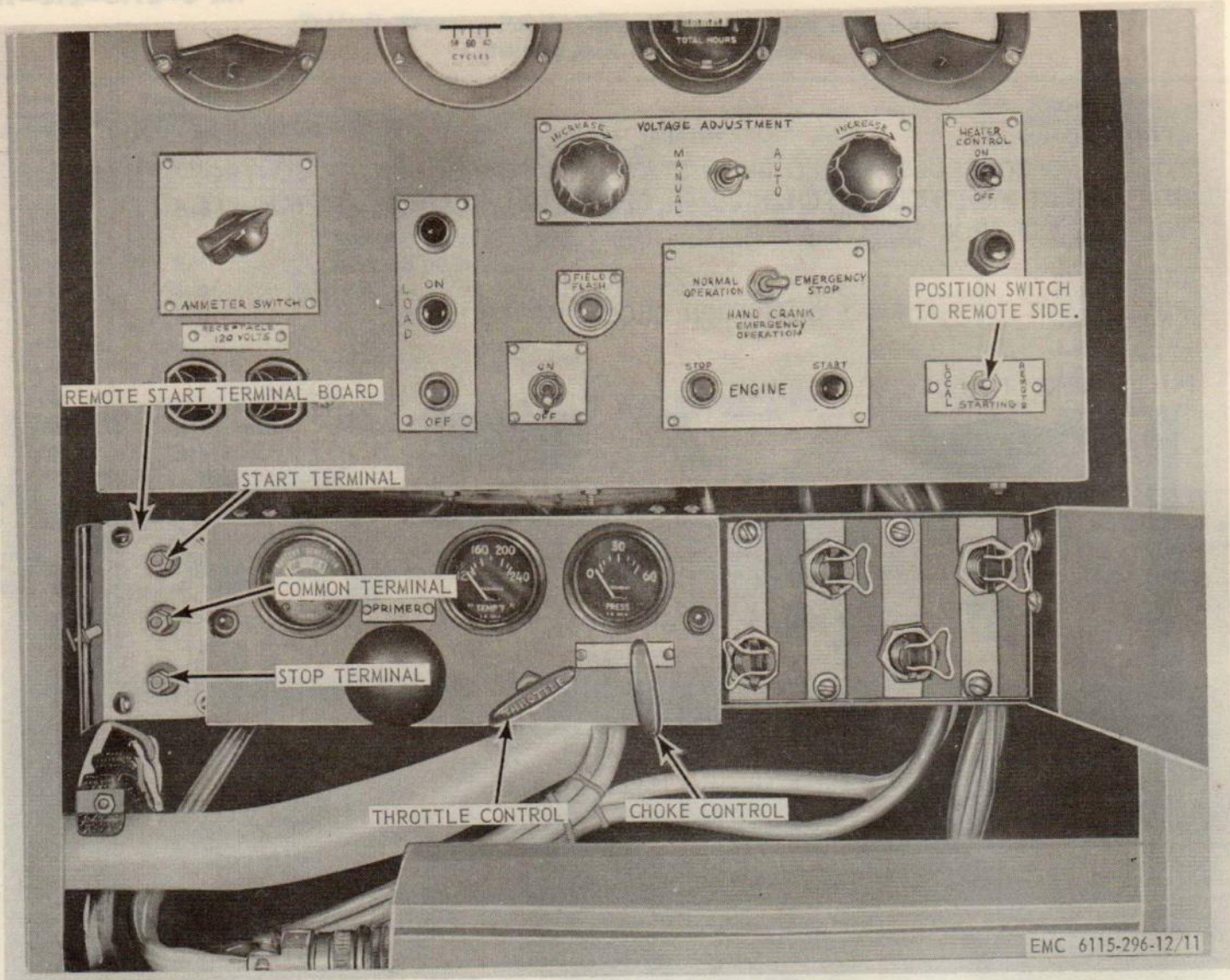


Figure 11. Remote control connections for operating the generator set.

23. Operation Under Rainy or Humid Conditions

- a. Cover the unit with canvas or other water-proof cover when not in use. Remove cover during dry periods.
- b. Open access doors to allow unit to dry before operating.
- c. Keep fuel tanks filled to avoid condensation.
- d. Use caution when operating electrical equipment. Keep electrical leads and insulation dry and in good condition.

24. Operation in Salt-Water Areas

- a. Wash unit frequently with clean, fresh water. Use care to see that fuel system and electrical system are not damaged.

b. Coat all exposed metal surfaces with rust-proofing material. Remove rust immediately and apply paint or oil as applicable.

c. Be sure to use only water which is free of salt and alkali in the cooling system.

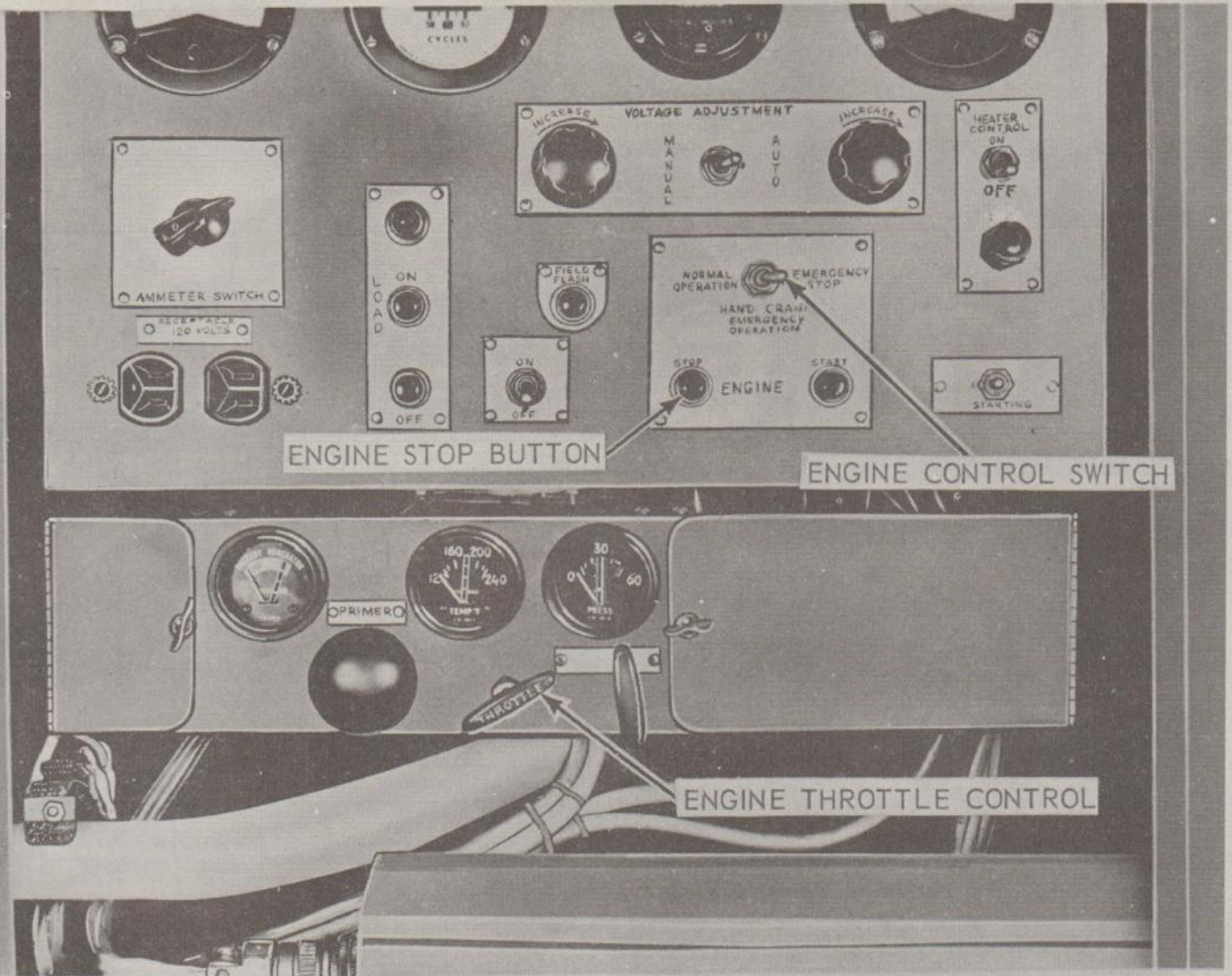
Caution: Salt water may be used in the cooling system only in case of extreme emergency. Drain, flush, and refill system as soon as possible after having used this expedient.

25. Operation at High Altitude

The engine of the generator set is designed to operate at maximum efficiency at altitudes up to 5,000 feet. Above 5,000 feet, efficiency will be reduced, but maximum performance can be obtained by following all service procedures carefully. Be sure air cleaners are unobstructed. The rated load is reduced 6 percent for each 1,000 feet above 5,000 feet.

STEP 1.
PULL THROTTLE OUT TO SLOW ENGINE DOWN.

STEP 2.
ALLOW ENGINE TO RUN FIVE MINUTES.



STEP 3.
PUSH ENGINE STOP BUTTON.

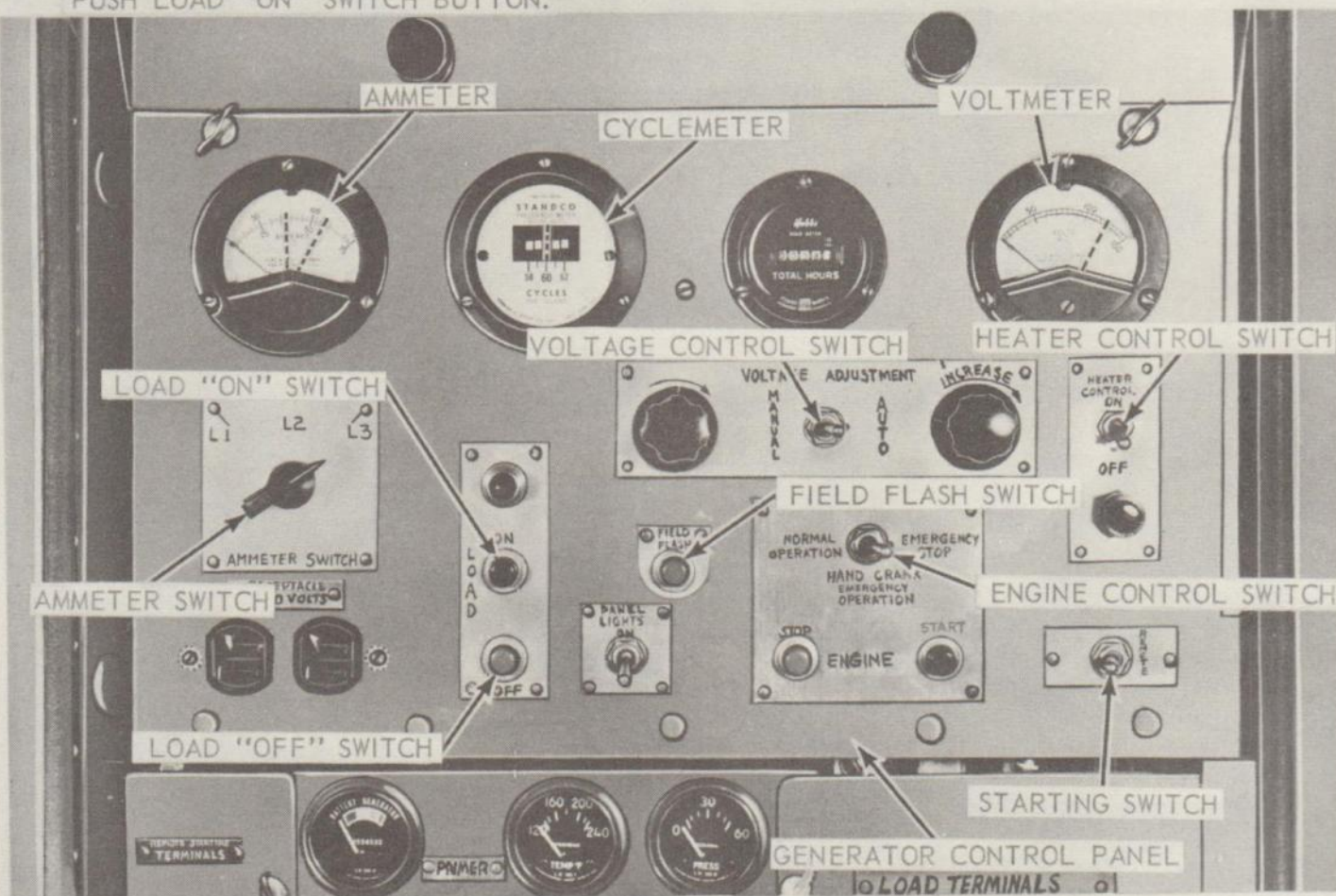
STEP 4.
PUSH THROTTLE CONTROL IN.

NOTE:
FOR EMERGENCY SHUT-DOWN, PLACE ENGINE
CONTROL SWITCH IN EMERGENCY STOP POSITION.

EMC 6115-296-12/12

Figure 12. Stopping the generator set engine.

- STEP 1.
CHECK CHANGEOVER BOARD FOR PROPER VOLTAGE CONNECTION (PAR. 11).
- STEP 2.
CONNECT EXTERNAL LOAD TO TERMINAL BOARD (PAR. 19).
- STEP 3.
START ENGINE (PAR. 17). CYCLEMETER SHOULD READ 61.5 CYCLES (NO LOAD).
- STEP 4.
ADJUST VOLTMETER TO 120 VOLTS.
- STEP 5.
PUSH LOAD "ON" SWITCH BUTTON.



- STEP 6.
CHECK AMMETER FOR CORRECT READING (PAR. 19).

WARNING:

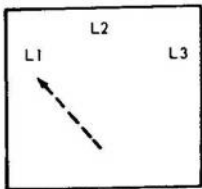
BEFORE OPERATING GENERATOR SET MAKE CERTAIN SET IS GROUNDED.

NOTE:

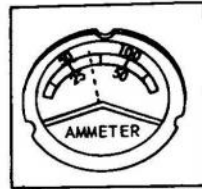
IF NO VOLTAGE IS INDICATED ON THE VOLTMETER AFTER THE LOAD HAS BEEN APPLIED, ENGAGE THE LOAD "OFF" BUTTON AND PUSH THE FIELD FLASH BUTTON TO ENERGIZE THE GENERATOR FIELD UNTIL THE VOLTAGE BUILDS UP. APPLY THE LOAD BUTTON AND IF NO VOLTAGE IS INDICATED ON THE VOLTMETER SHUT DOWN GENERATOR SET AND REPORT TO FIELD MAINTENANCE.

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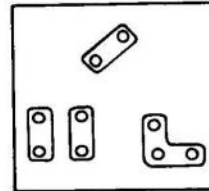
Figure 13. Generator set operation.



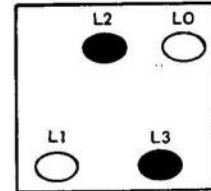
AMMETER SWITCH



NORMAL READING
34.7 AMP.
LOWER SCALE

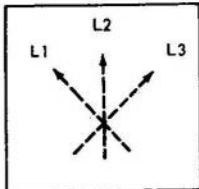


CHANGEOVER BOARD

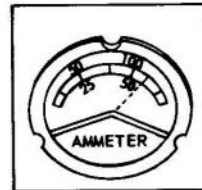


LOAD CONNECTION
PANEL

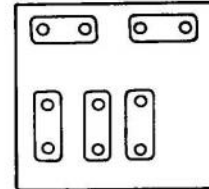
A. LOAD CONNECTION, CHANGEOVER BOARD AND NORMAL AMMETER READING 120V, SINGLE PHASE, 2 WIRE, AT CONTINUOUS LOAD.



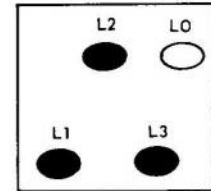
AMMETER SWITCH



NORMAL READING
60 AMP.
LOWER SCALE

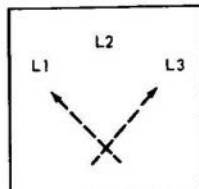


CHANGEOVER BOARD

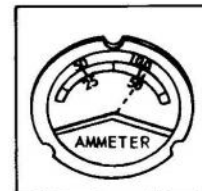


LOAD CONNECTION
PANEL

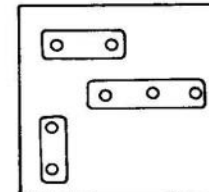
B. LOAD CONNECTION, CHANGEOVER BOARD AND NORMAL AMMETER READING 120V, 3-PHASE, 3 WIRE, AT CONTINUOUS LOAD.



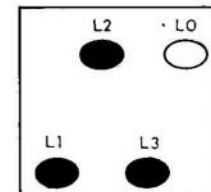
AMMETER SWITCH



NORMAL READING
52 AMP.
LOWER SCALE

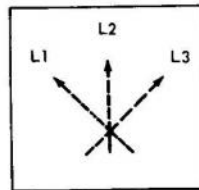


CHANGEOVER BOARD

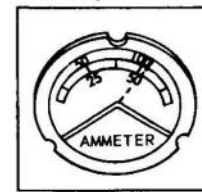


LOAD CONNECTION
PANEL

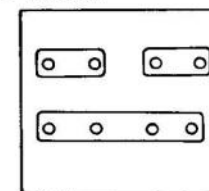
C. LOAD CONNECTION, CHANGEOVER BOARD AND NORMAL AMMETER READING 120/240-V, SINGLE PHASE, 3 WIRE, AT CONTINUOUS LOAD.



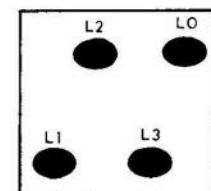
AMMETER SWITCH



NORMAL READING
104 AMP.
UPPER SCALE



CHANGEOVER BOARD



LOAD CONNECTION
PANEL

D. LOAD CONNECTION, CHANGEOVER BOARD AND NORMAL AMMETER READING 120/208-V, 3-PHASE, 4 WIRE, AT CONTINUOUS LOAD.

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Figure 14. Proper load connection and ammeter reading as to voltage and phase.

Section V. OPERATION OF AUXILIARY MATERIEL USED IN CONJUNCTION WITH THE GENERATOR SET

26. Engine Coolant Heater

a. General. The coolant heater, when in operation heats the cooling system to provide easier starting of the generator set in low ambient temperatures. The exhaust from the heater is piped into the battery box chamber. An overheat thermostat is mounted on the exhaust pipe controls and controls the amount of heat furnished by the exhaust to the battery box. An electrical heating element is mounted within the battery box maintaining a constant temperature on the batteries after the heater has been shut down and the generator set is in operation. Alternating current and direct current thermostats controlling the heat output of the element are mounted in the battery box. The coolant passes through the heater by heat gravity. After the generator set has been started the heater will be shut down.

b. Operation. Operate the heater as illustrated in figure 15.

27. Priming Pump Assembly

a. General. The generator set is provided with a hand-operated priming pump to facilitate starting the engine in subfreezing temperatures and to purge the fuel system of air. Fuel is pumped from the fuel tank and injected directly into the manifold.

b. Operation. Operate the priming pump assembly as illustrated in figure 16.

28. Fire Extinguisher (Monobromotrifluoromethane type)

a. Description. The monobromotrifluoromethane type fire extinguisher is generally suitable for use on all types of fire, with exception of fires involved with LOX (liquid oxygen)

generating equipment. The fire extinguisher is furnished with a disposable type cylinder.

b. Operation. To operate the fire extinguisher, perform the following operations:

- (1) Remove fire extinguisher from its location.
- (2) Break the seal by pulling safety pin from handle.
- (3) Point the horn at base of flame.
- (4) Depress trigger for discharge and direct stream at the base of the fire.

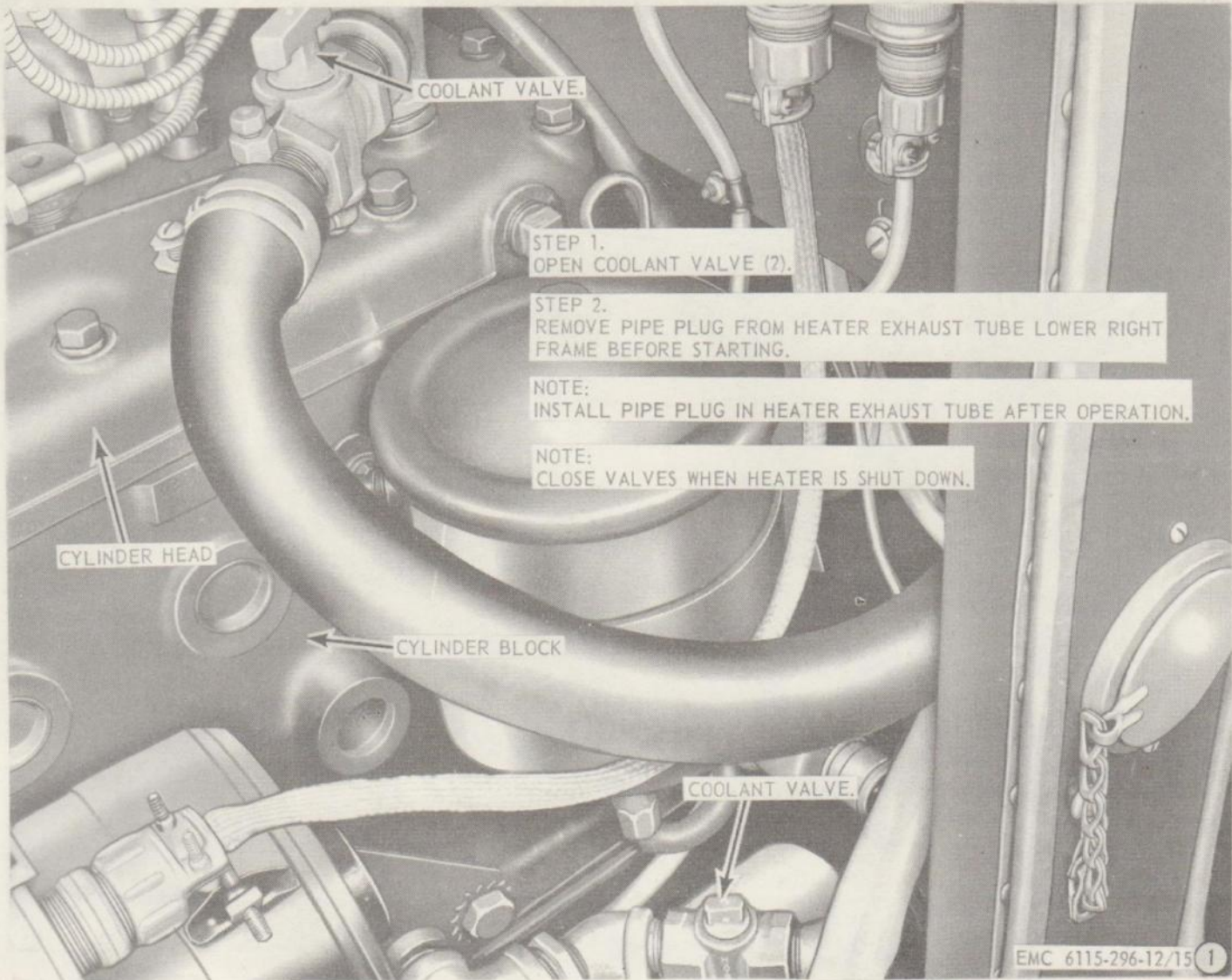
Warning: Avoid breathing of smoke.

- (5) Replace cylinder immediately after using.

c. Replacement of Cylinder. To replace cylinder, perform the following operations:

- (1) Press lever to release pressure from used cylinder.
- (2) Loosen swivel valve coupling nut and remove valve assembly from used cylinder.
- (3) Remove instruction band from used cylinder.
- (4) Place new cylinder through instruction band.
- (5) Replace safety pin in valve and seal pin with sealing wire.
- (6) Attach valve assembly and tighten swivel coupling nut on the new cylinder and place fire extinguisher in mounting bracket.
- (7) Adjust instruction band on cylinder to show maintenance and operating instructions.

d. Maintenance. Weigh fire extinguisher every 3 months and replace cylinder if gross weight has decreased 4 ounces or more. Lubricate cylinder neck threads with one drop of OE 30 oil before reassembly.



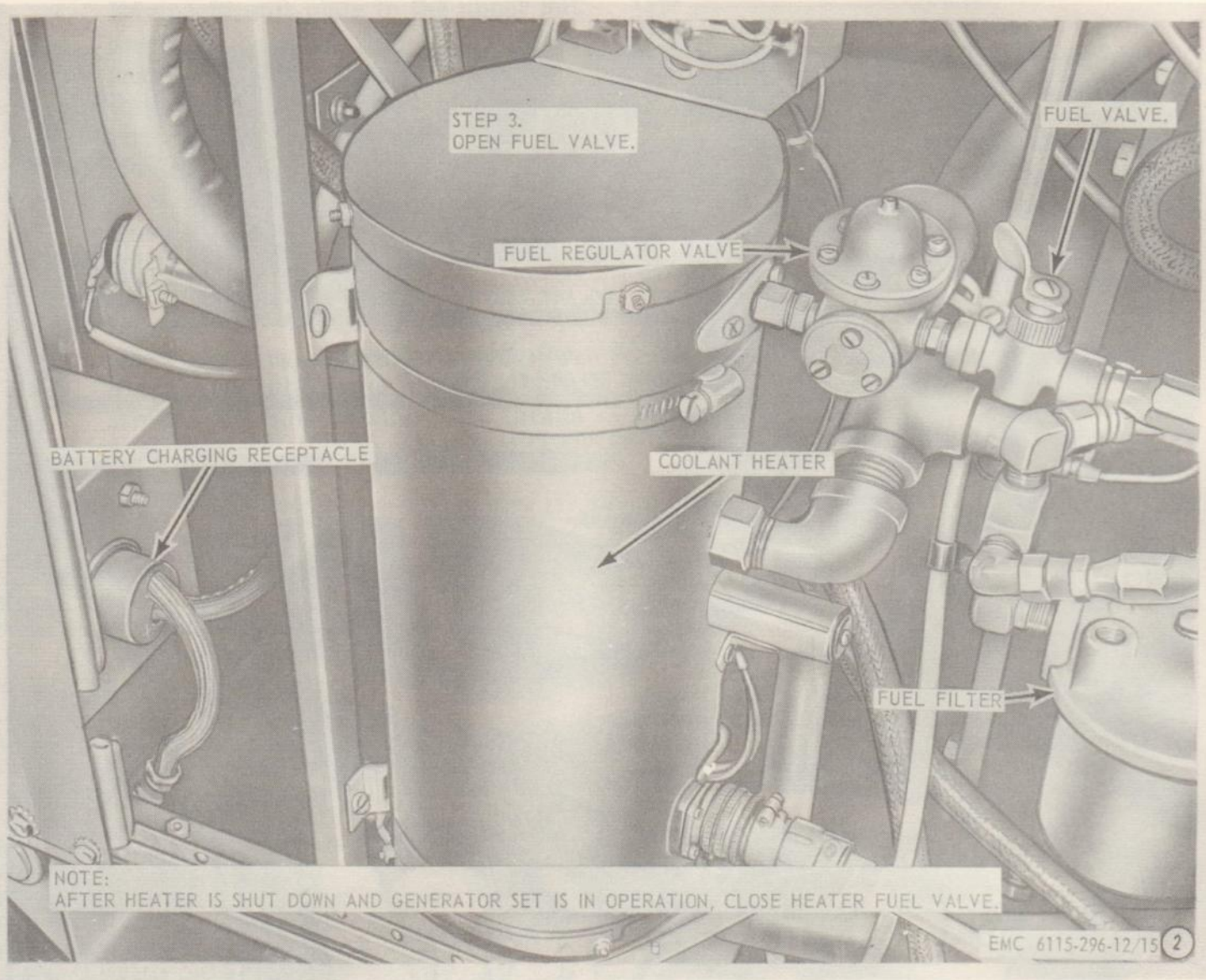
A—Coolant system shutoff valves
 Figure 15. Coolant heater operation.

3. Identification and Tabulation Data

a. Identification. The generator set has four identification plates:
 (1) Corps of Engineers unit plate. Located on the unit housing in upper

left hand corner. Contains the manufacturer, model, manufacturer, and serial number.

(2) Corps of Engineers main generator plate. Located below the Corps of



B—Coolant heater fuel shutoff valves

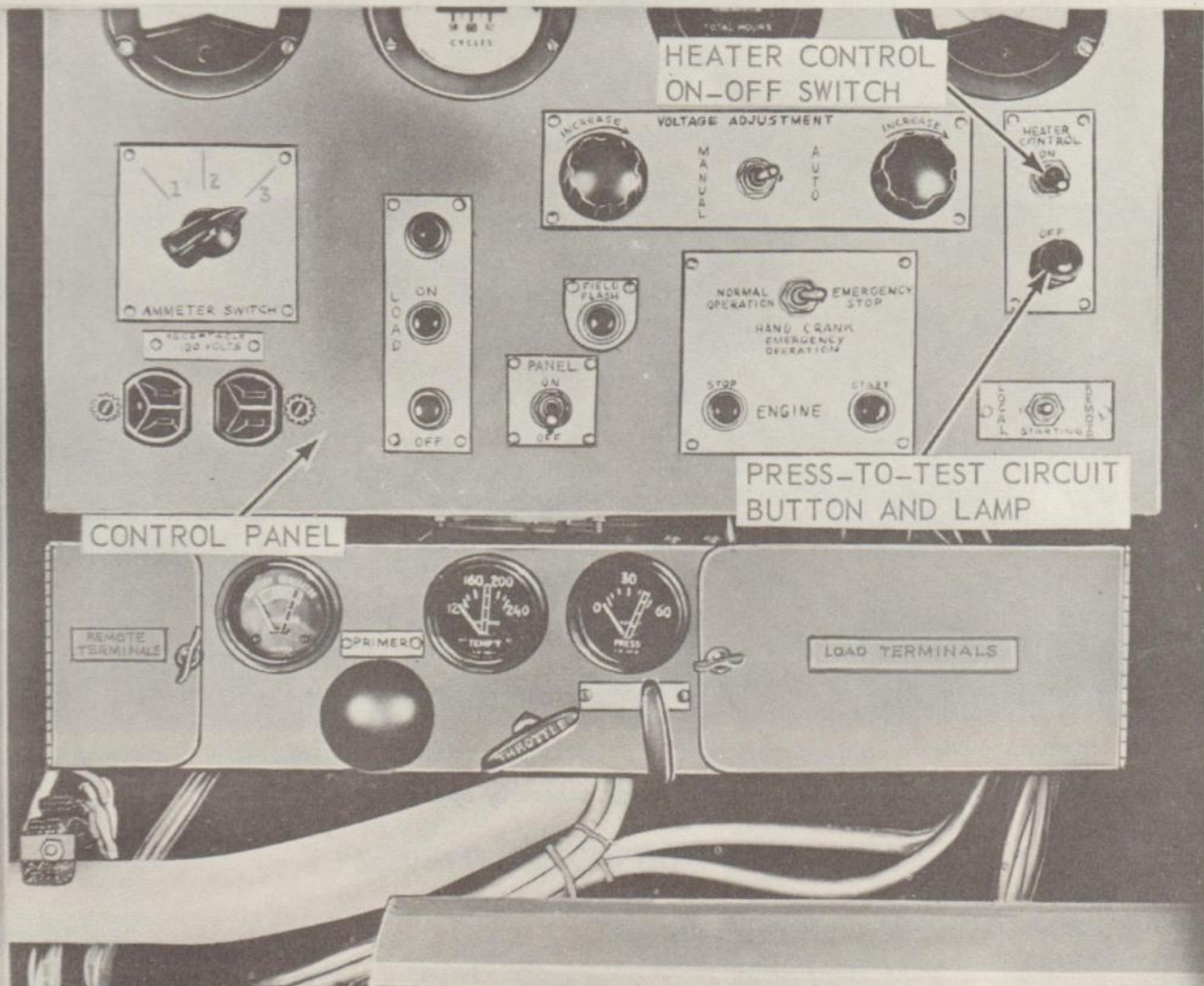
Figure 15—Continued.

STEP 4.

PUSH THE PRESS-TO-TEST CIRCUIT BUTTON. IF THE LAMP LIGHTS, ELECTRICAL POWER IS AVAILABLE.

STEP 5.

PLACE THE HEATER CONTROL SWITCH IN THE "ON" POSITION. IN 1½ MINUTES THE LAMP SHOULD GLOW INDICATING CORRECT HEATER OPERATION.



STEP 3.

IF LAMP GLOWS 1½ TO 2 MINUTES, IT INDICATES THAT THE ELECTRICAL SYSTEM IS FUNCTIONING PROPERLY.

NOTE:

IF LAMP DOES NOT GLOW, TURN OFF THE HEATER CONTROL SWITCH AND CHECK CIRCUIT AND FUEL LINES. WAIT 3 TO 5 MINUTES BEFORE TURNING SWITCH ON AGAIN. IF MALFUNCTION CONTINUES, REPORT TO FIELD MAINTENANCE, 3rd ECHELON.

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C—Heater control

Figure 15—Continued.

NOTE:

TO FACILITATE STARTING IN LOW AMBIENT TEMPERATURES, PUMP THE PRIMING PUMP 3 OR 4 STROKES BEFORE STARTING THE ENGINE.

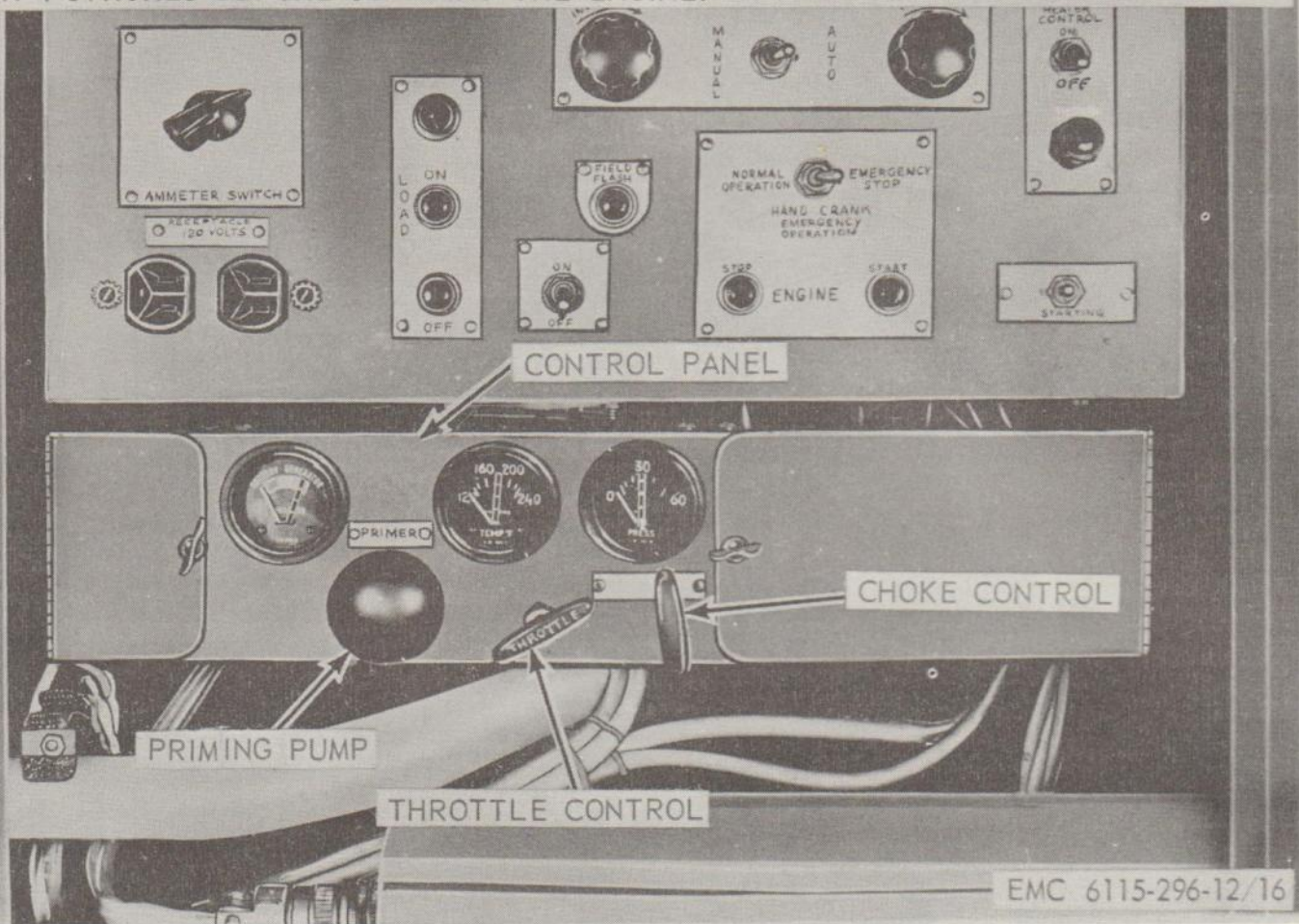


Figure 16. Priming pump assembly operation.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE TOOLS AND EQUIPMENT

29. Special Tools or Equipment

There are no special tools or equipment used by the operator or by organizational maintenance personnel for performing maintenance on the generator set.

30. Basic Issue Tools and Equipment

Tools and repair parts issued with or author-

ized for the generator set are listed in the basic issue items list, appendix III.

31. Organizational Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5-6115-296-20P.

Section II. LUBRICATION

32. General Lubrication Information

a. This section contains a reproduction of the lubrication order and lubrication instructions which are supplemental to, and not specifically covered in the lubrication order.

b. The lubrication order shown in figure 17 is an exact reproduction of the approved lubrication order for the generator set. For current lubrication order, refer to DA Pam 310-4.

33. Detailed Lubrication Information

a. General. Keep all lubricants in closed containers and store in a clean, dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready for use.

b. Cleaning. Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

c. Points of Lubrication. Service the lubrication points at proper intervals as illustrated in figure 17.

d. OES Oil.

- (1) The crankcase oil level must be checked frequently, as oil consumption may increase.
- (2) The oil may require changing more frequently than usual because contamination by dilution and sludge formation will increase under cold-weather operation conditions.

e. Oil Filter Service and Level Gage. Service the oil filter and replace level gage as illustrated in figure 18.

f. Air Cleaner Service. Service the air cleaner as illustrated in figure 19.

g. Magneto Service.

- (1) Remove the magneto (par. 109).
- (2) Service the magneto as illustrated in figure 20.
- (3) Install the magneto (par. 109).

h. Breather Service. Service the crankcase breather as illustrated in figure 21.

LUBRICATION

ORDER

LO 5-6115-296-12

12 DECEMBER 1961

GENERATOR SET, GASOLINE ENGINE: 10 KW, AC, 120 V, 1 AND 3 PHASE, 120/240 V, SINGLE PHASE, 120/208 V, 3 PHASE, 60 CYCLE; SKID MOUNTED (KURZ AND ROOT MODEL FERO-1) W/HERCULES ENGINE MODEL IXB3ER

Reference: SM 10-1-C4-1

Intervals are based on normal operation. Reduce to compensate for abnormal operations and severe conditions. During inactive periods sufficient lubrication must be performed for adequate preservation.

Clean fittings before lubricating.

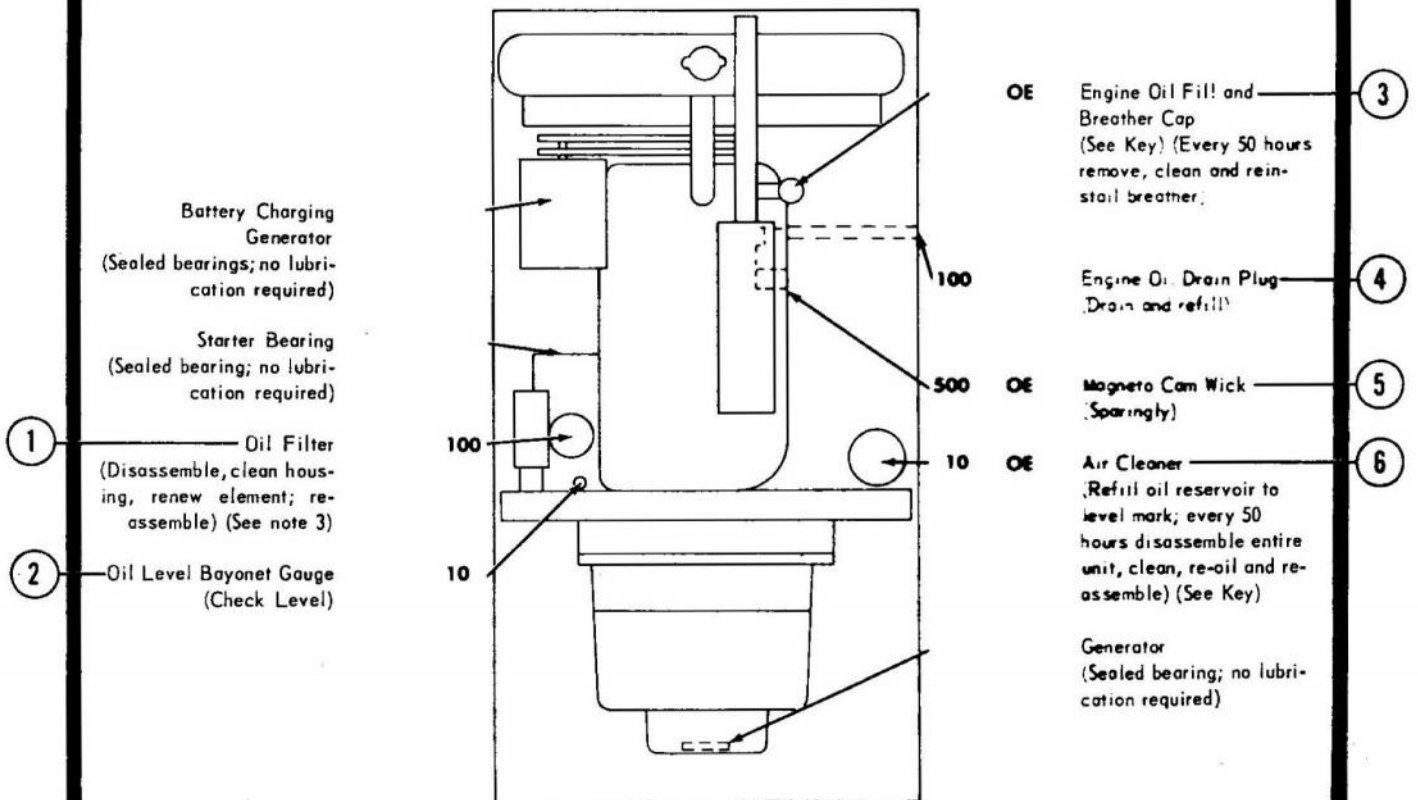
Clean parts with SOLVENT, dry-cleaning, or with OIL, fuel, Diesel. Dry before lubricating.

Relubricate after washing.

Drain crankcase when hot. Fill and check level.

LUBRICANT • INTERVAL

INTERVAL • LUBRICANT



CONTINUED ON FOLLOWING PAGE

EMC 6115-296-12/17 ①

Front

Figure 17. Lubrication order.

CONTINUED FROM
PRECEDING PAGE
- KEY -

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURES			INTERVALS
		Above +32°F	+40°F to -10°F	0°F to -65°F	
OE -OIL, Engine, Heavy Duty		OE 30 or 9250	OE 10 or 9110	OES	Intervals given are in hours of normal operation.
Crankcase	6 qt				
Air Cleaner	3/16 qt				
Oil Can Points					
OES -OIL, Engine, Sub-zero					

NOTES:

1. FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW -10°F. Remove lubricants prescribed in the key for temperatures above -10°F. Clean parts with SOLVENT, dry-cleaning. Relubricate with lubricants specified in the key for temperatures below -10°F.

2. OIL CAN POINTS. Every 50 hours clean and lightly coat door hinges and latches, and throttle controls with OE.

3. OIL FILTER. After installing new filter element, fill crankcase, operate engine 5 minutes, check housing for leaks, check crankcase oil level and bring to full mark.

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory.

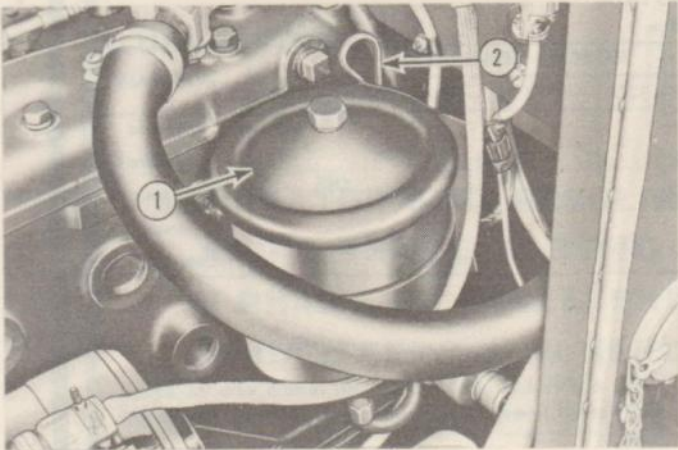
BY ORDER OF THE
SECRETARY OF THE ARMY:

G. H. DECKER,
General, United States Army,
Chief of Staff.

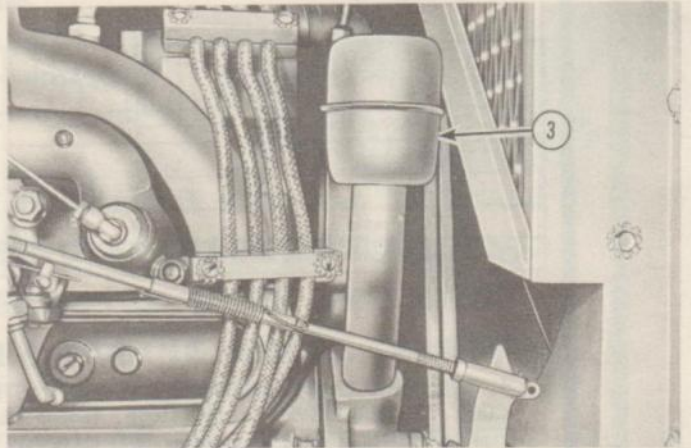
OFFICIAL:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

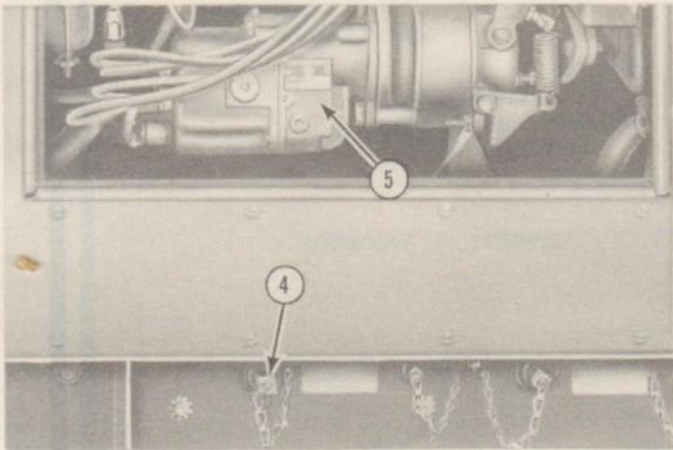
EMC 6115-296-12/1.7 (2)



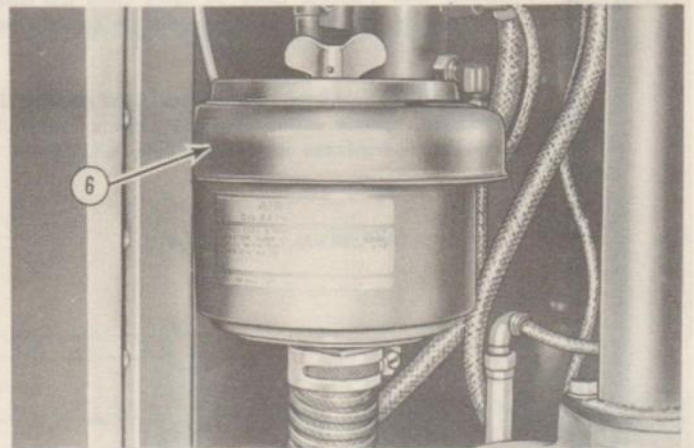
REF. 1 OIL FILTER
REF. 2 OIL LEVEL BAYONET GAUGE



REF. 3 ENGINE OIL FILL AND BREATHER CAP



REF. 4 ENGINE OIL DRAIN PLUG
REF. 5 MAGNETO CAM WICK



REF. 6 AIR CLEANER

EMC 6115-296-12/17 (3)

Figure 17—Continued.

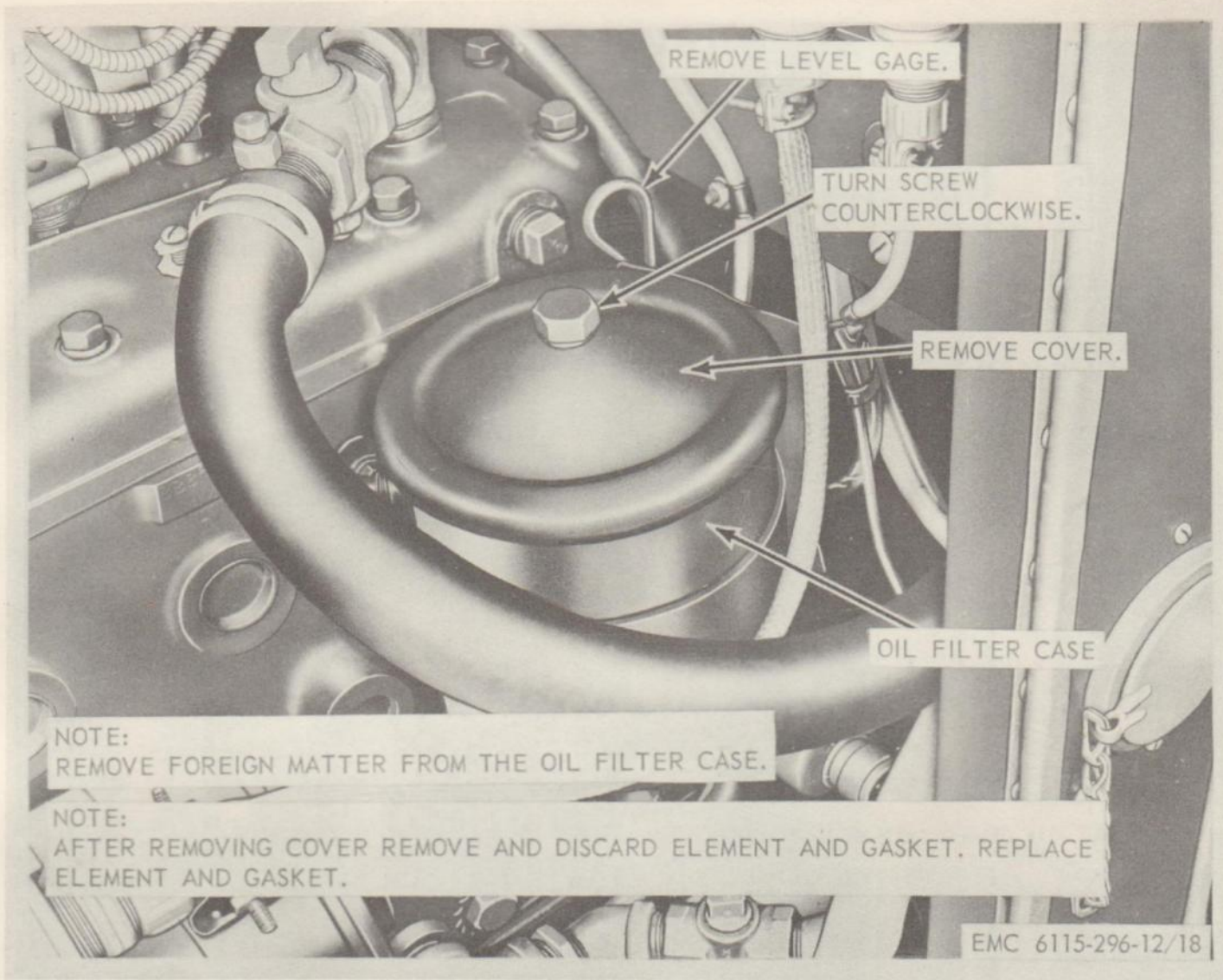


Figure 18. Oil filter service and level gage replacement.

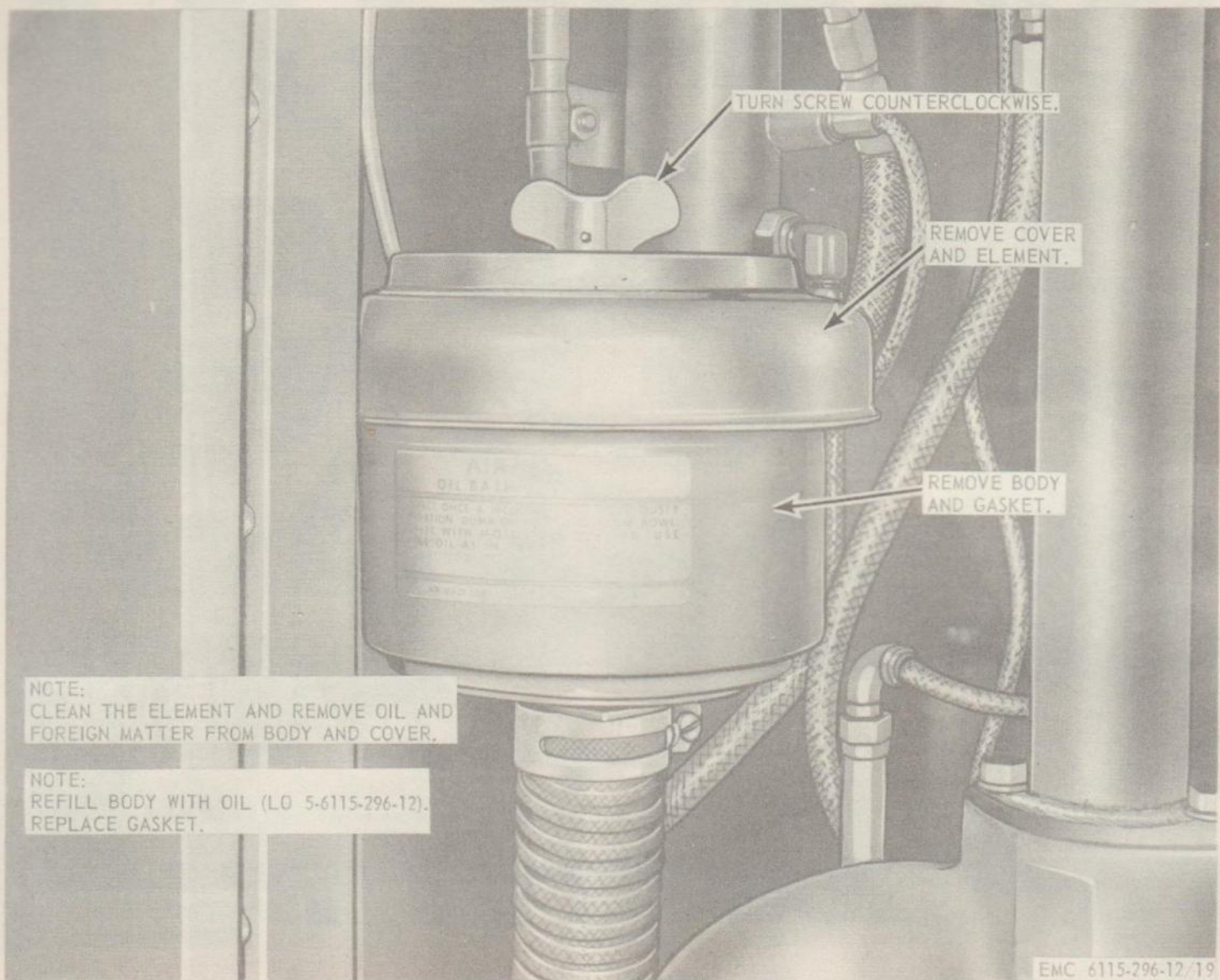


Figure 19. Air cleaner service.

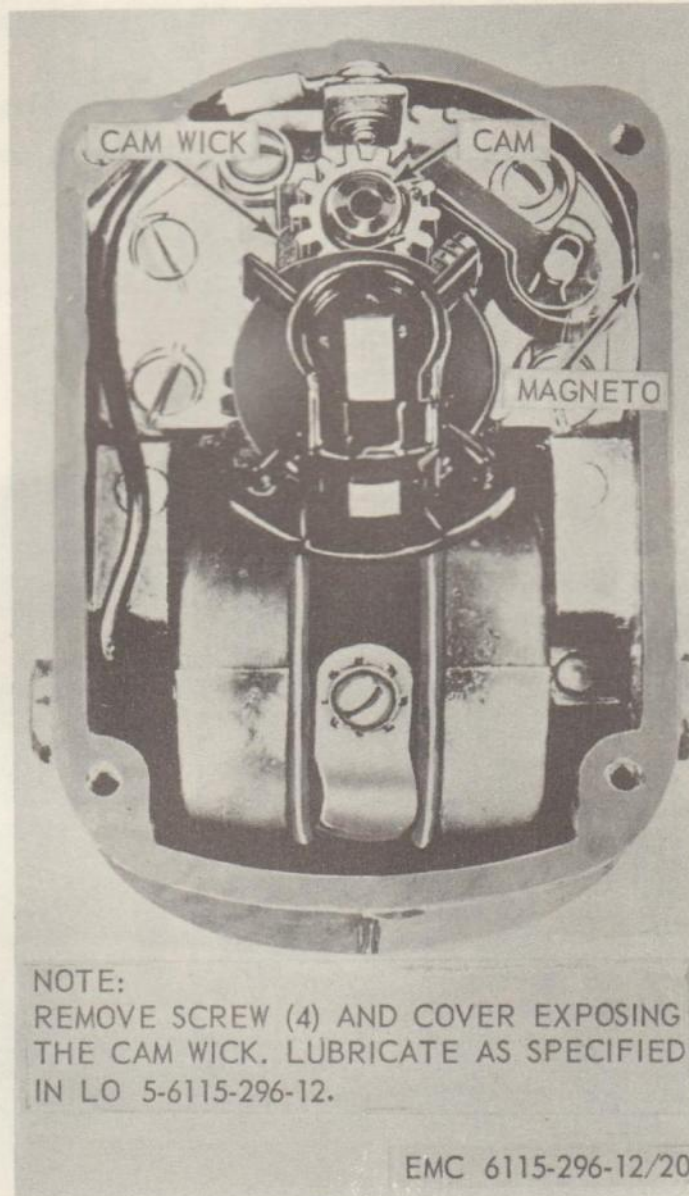


Figure 20. Magneto service.

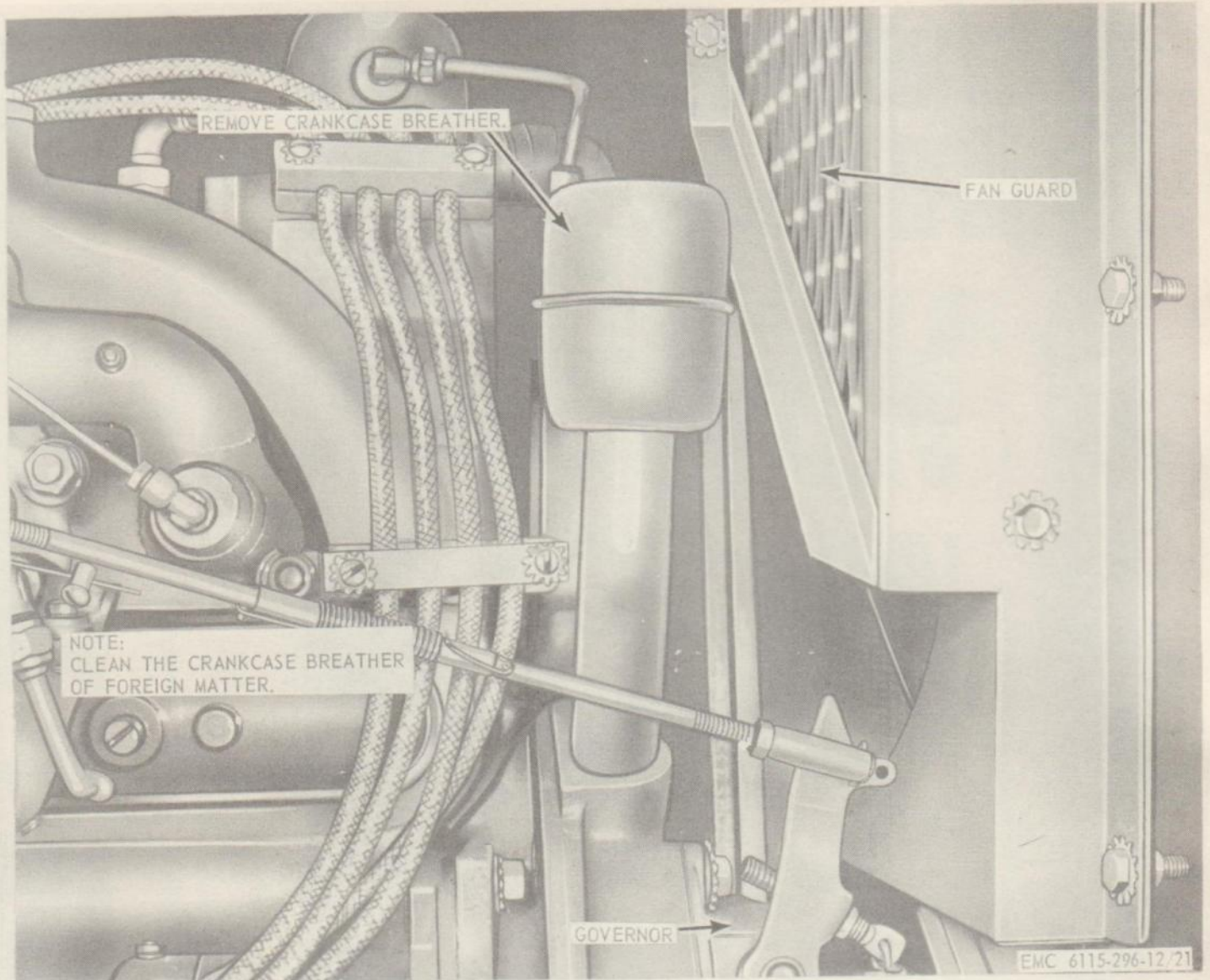


Figure 21. Crankcase breather service.

Section III. PREVENTIVE MAINTENANCE SERVICES

34. General

To insure that the equipment is ready for operation at all times, it must be inspected systematically before operation, during operation, and after operation, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services will be performed before operation. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operations immediately if a defi-

ciency is noticed during operation which would damage the equipment if operation were continued. After-operation services will be performed by the operator after every operating period. After-operation services will be performed at intervals based on normal operations of the equipment. Reduce interval to compensate for abnormal conditions. Defects or unsatisfactory operating characteristics beyond the scope of the operator to correct must be reported at the earliest opportunity to organizational maintenance. Responsibility for performance of preventive maintenance services

rests not only with the operator, but also with the entire chain of command from section chief to commanding officer (AR 750-5).

daily services are to be performed by the operator or crew are indicated by an X in the appropriate column in figure 22 as follows:

35. Operator's Daily Services

- B—Before operation
- D—During operation
- A—After operation

a. General. The intervals at which specific

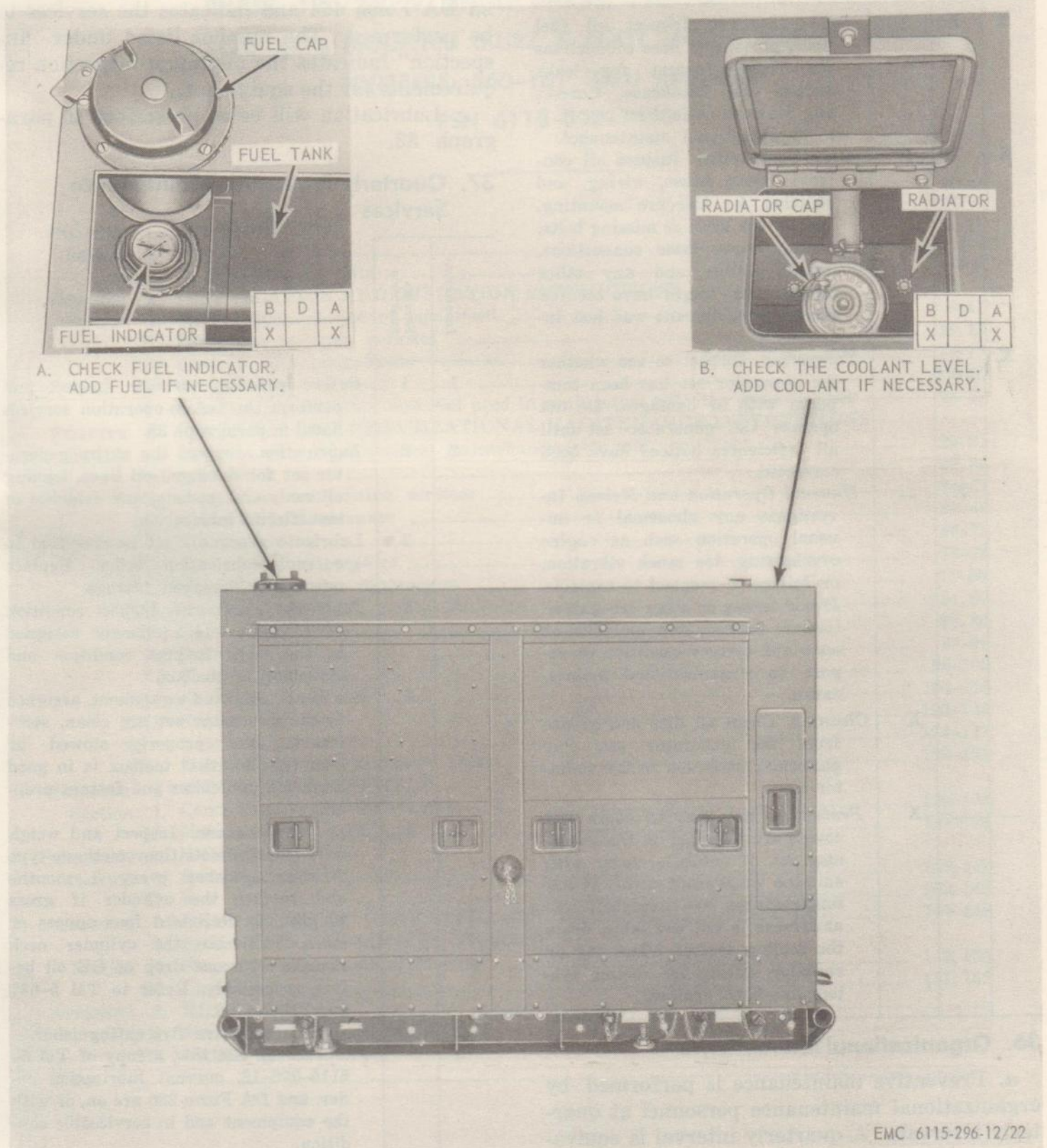


Figure 22. Operator's daily services.

b. *Additional Daily Services (Not illustrated)*. An X in the appropriate column (s) indicates the interval at which the service is to be performed.

Intervals			Procedure
B	D	A	
X	X	X	<i>Leaks, general.</i> Inspect all fuel lines, pipes, and hose connections for leaks. Inspect for leaks around the crankcase. Correct any leakage noticed or report it to organizational maintenance.
X	X	X	<i>Visual inspection.</i> Inspect all controls, pipes, hoses, wiring, and switches for insecure mounting. Inspect for loose or missing bolts, screws, nuts, loose connections, broken wires, and any other damage that might have occurred since the equipment was last inspected.
X	--	--	<i>Tampering.</i> Inspect to see whether the generator set has been tampered with or damaged. Do not operate the generator set until all deficiencies noticed have been corrected.
	X	--	<i>Unusual Operation and Noises.</i> Investigate any abnormal or unusual operation such as engine overheating, too much vibration, or failure to respond to controls. If odd noises or other irregularities are noticed, stop operation at once and correct condition or report to organizational maintenance.
		X	<i>Cleaning.</i> Clean all dirt and grease from the generator set. Pay particular attention to the radiator core.
--	--	X	<i>Protection.</i> See that all doors and covers are installed on the generator set. If outdoors, cover with suitable waterproof cover. If low temperatures are expected, and antifreeze is not available, drain the cooling system. Place tag on radiator stating the cooling system has been drained.

36. Organizational Maintenance

a. Preventive maintenance is performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equivalent to 3 calendar months, or 250 hours of operation, whichever occurs first.

b. The preventive maintenance services to be performed at quarterly intervals are listed consecutively (starting with number 1) and are described in paragraph 37. The service refers to a Preventive Maintenance Service "Title" on DA Form 464 and indicates the services to be performed. The number listed under "Inspection" indicates the minimum inspection requirements for the equipment.

c. Lubrication will be as prescribed in paragraph 32.

37. Quarterly Preventive Maintenance Services

Inspection	Service quarterly	GENERAL
1	1	<i>Before-operation services.</i> Inspect and perform the before-operation services listed in paragraph 35.
2	2	<i>Lubrication.</i> Inspect the entire generator set for damaged oil lines, leaking oil seals and gaskets, and evidence of insufficient lubrication.
	2	Lubricate generator set as specified in current lubrication order. Replace missing or damaged fittings.
3	3	<i>Tools and equipment.</i> Inspect condition of all tools and equipment assigned to the unit. Inspect condition and mounting of toolbox.
	3	See that tools and equipment assigned to the generator set are clean, serviceable, and properly stowed or mounted. See that toolbox is in good condition and closes and fastens properly.
4	4	<i>Fire extinguishers.</i> Inspect and weigh a monobromotrifluoromethane-type fire extinguisher every 3 months and replace the cylinder if gross weight has decreased four ounces or more. Lubricate the cylinder neck threads with one drop of OE oil before reassembly. Refer to TM 5-687 and TM 9-1799.
	4	Replace a defective fire extinguisher.
5	5	<i>Publications.</i> See that a copy of TM 5-6115-296-12, current lubrication order, and D/A Form 285 are on, or with the equipment and in serviceable condition.

	Service Quarterly		Inspection	Service Quarterly	
6	6	<i>Appearance.</i> Inspect the general appearance of the generator set, paying special attention to cleanness, legibility of identification markings, and condition of paint.		12	Replace a defective radiator (par. 100). Tighten loose or replace defective coolant hose (par. 97). Replace a defective thermostat (par. 102). Replace a defective shutter (par. 99), and/ or control (par. 99).
	6	See that deficiencies are corrected or reported to field maintenance, 3d echelon.	13	13	<i>Water pump, fan, and shroud.</i> Inspect the water pump for secure mounting. Inspect the fan and shroud for damage and secure mounting.
7	7	<i>Modification.</i> See that all available modification work orders applying to the generator set have been completed and recorded on DA Form 478, DA Form 5-73, and DA Form 5-73A as applicable.		13	Tighten loose mounting hardware. Replace a defective water pump (par. 103), fan (par. 101), and shroud or guard (par. 98).
		ENGINE			
8	8	<i>Cylinder head, manifold, muffler, and exhaust pipe.</i> Inspect cylinder head, manifold, and muffler for leaks, loose mounting bolts and nuts, and defective gaskets.	14	14	<i>Belts and pulleys.</i> Inspect the v-belt for wear, fraying, and other damage. Test v-belt tension (par. 42).
8		Tighten loose mounting bolts and nuts, replace defective manifold (par. 88), muffler (par. 84), and cylinder head (par. 121).	14	14	Replace defective v-belt (par. 101). Adjust v-belt tension (par. 42).
9	9	<i>Valve mechanism.</i> Inspect the valve cover and gasket for oil leaks. Inspect for excessive tappet noise.	15	15	<i>Oil pressure regulator valve.</i> Observe the oil pressure reading. Correct pressure is 30 psi at governed speed. In the event of a wide variation in the oil pressure from normal reading, inspect for leaks or defective filter.
9		Replace a leaking valve cover gasket (par. 123). Adjust valve tappets (par. 123).	15	15	Remove the oil lines and clean. Pay particular attention to cleaning oil passages (par. 125). Clean and adjust oil pressure regulator (par. 126). Report repeated variation to field maintenance, 3d echelon.
10	10	<i>Crankcase and breathers.</i> Inspect the crankcase for leaks. Inspect the crankcase breather for dirt or other foreign matter.	16	16	<i>Governor and linkage.</i> Inspect the governor connecting rod for worn, damaged, or defective parts. Note engine operation to determine if it is hunting or surging.
10		Clean the crankcase breather (par. 33). Correct any leaks noticed or report to field maintenance, 3d echelon.	16	16	Adjust and/or replace a defective governor and connecting rod (par. 95).
11	11	<i>Oil filter.</i> Inspect the lines leading to oil filter for kinks, leaks, and other damage when the engine is running. Inspect the oil filter case for leaks and secure mounting.	17	17	<i>Primer pump.</i> Inspect the primer pump for loose mounting and proper operation.
11		Tighten loose connections and mountings. Replace defective lines or filter (par. 125).	17	17	Replace a defective primer pump (par. 93).
12	12	<i>Radiator.</i> Inspect the radiator core and hose for leaks. Inspect the radiator mountings. Examine the coolant for rust or other foreign matter. Observe the coolant temperature when engine has been operating for a period of time. Test the antifreeze. Refer to table II. Inspect core for obstructions.	18	18	<i>Fuel pump.</i> Inspect the fuel pump for loose or missing hardware. Inspect for loose lines and leaks. Tighten or replace missing hardware. Replace a defective pump (par. 89). Tighten loose line (par. 89). <i>Carburetor and linkage.</i> Inspect the carburetor for loose mounting, incorrect automatic choke setting, and

Inspection	Service Quarterly		Inspection	Service Quarterly		
		other damage. Inspect the choke and throttle cables for kinks, insecure mounting, and other damage.			105). Test the starter (TM 5-764). Inspect brush wear.	
	19	Tighten loose linkage and mounting hardware, adjust incorrect automatic choke setting or replace defective carburetor (par. 87). Tighten or replace defective throttle cable (par. 94).		25	Tighten all loose mounting hardware and wire connections. Replace a defective battery charging generator (par. 105). Replace a defective starter (par. 107). Replace starter brushes (par. 107). Replace generator brushes (par. 105).	
20	20	<i>Air cleaner.</i> Inspect the air cleaner for loose mountings and connections or damaged condition. Inspect the cup chamber for dirt and incorrect level.	26	26	<i>Magneto.</i> Inspect the magneto for loose mounting and other damage. Remove the cap and examine the rotor and contact set for burning, pitting, improper alignment and gap.	
	20	Tighten loose mountings and connections. Service the air cleaner (par. 33). Replace a damaged air cleaner (par. 90).		26	Tighten loose mounting hardware. Clean distributor and adjust the contact set (par. 109). Replace a defective magneto (par. 109).	
21	21	<i>Fuel tank, cap, and gaskets.</i> Inspect the fuel tank for loose mounting hardware or damage. Inspect the fuel tank cap for defective gasket or improper seating.	27	27	<i>Wiring and switches.</i> Inspect the wiring for frayed or broken insulation, broken strands or shielding, and loose or corroded connectors. Inspect the mounting and condition of switches.	
	21	Tighten or replace loose mounting hardware. Service the fuel tank (par. 35). Replace a defective fuel tank (par. 86).		27	Replace frayed or broken wiring, clean corroded connectors, and tighten loose connectors. Replace defective switches (pars. 110 and 134).	
22	22	<i>Fuel lines.</i> Inspect the fuel line for breaks, kinks, or leaks.		28	28	<i>Battery-charging generator regulator.</i> Inspect the regulator for improper operation, loose connections and insecure mounting.
	22	Tighten loose connections. Replace damaged fuel lines (par. 86).	28	28	Tighten loose mounting and connections. Adjust or replace defective regulator (par. 106).	
		ELECTRICAL SYSTEM		29	29	<i>Lights.</i> Inspect the panel light receptacles for insecure mounting and loose wiring connections.
23	23	<i>Spark plugs.</i> Inspect the spark plugs for looseness and bad connections. Remove spark plugs and inspect for cracked insulators, burned electrodes, and improper gap.		29	29	Replace a defective lamp or light receptacle (par. 133).
	23	Tighten loose connections, or clean plugs. Adjust to 0.025 inch and test. Replace defective spark plugs (par. 108).	30	30	<i>Gages.</i> Inspect the gages for broken windows, loose mounting, and improper operation.	
24	24	<i>Batteries.</i> Inspect the batteries for cracks, leaks, loose connections, corroded terminals, electrolyte level, and specific gravity (table III).		30	30	Tighten or replace mounting hardware. Replace defective gages (pars. 113-115).
	24	Clean corroded terminals, tighten loose connections, or replace defective batteries (par. 118). Add distilled water to electrolyte as necessary. Record specific gravity readings on DA Form 464.	31	31	<i>Meters.</i> Inspect all meters for broken windows, insecure mounting, and improper operation.	
25	25	<i>Generators, starter.</i> Inspect for loose mounting bolts or for loose external wire connections. Test the battery-charging generator on the unit (par.		31	31	Tighten or replace loose mounting hardware. Replace defective meter (par. 135).

Inspection	Service Quarterly	
32	32	<i>Levers, linkage, and cable.</i> Inspect shutter control lever for loose mounting, missing or damaged hardware.
	32	Replace a defective shutter control (par. 99).
33	33	<i>Frame.</i> Inspect the frame for distortion and loose or missing mounting hardware. Note all breaks in structural members or welded points.
	33	Tighten all loose mounting hardware. Report a defective frame to field maintenance, 3d echelon.
34	34	<i>Hood, panels, and doors.</i> Inspect for dents, cracks, breaks, or other damage. Inspect the hinges and latches for defective parts and freedom of movement. Inspect for loose or missing hardware.
	34	Tighten all loose, or replace all missing hardware. Repair or replace defective parts (par. 82).
35	35	<i>Safety switch.</i> Inspect the safety switch for insecure mounting, or missing mounting hardware. Inspect for loose or corroded connections and improper operation.
	35	Clean and tighten loose connections, replace a defective safety switch (par. 111).
MAIN GENERATOR		
36	36	<i>Wiring and switches.</i> Inspect all electrical switches and wiring for loose mounting and connections. Inspect all wiring for defective insulation. Inspect receptacle connectors for cracks and breaks.
	36	Tighten all loose mounting and electrical connections. Repair defective wiring and replace defective switches (par. 134). Report defective wiring harness to field maintenance, 3d echelon.
37	37	<i>Regulator, rheostat.</i> Inspect the regulator assembly for loose mounting hardware, cracked housing, and defective wiring. Inspect for excessive dirt or foreign matter.

Inspection	Service Quarterly	
	37	Tighten all loose mounting hardware and electrical connections. Report a damaged or defective regulator to field maintenance, 3d echelon.
38	38	<i>Armature and sliprings.</i> Inspect the sliprings for dirty or worn surfaces. Inspect the brushes for excessive wear. See that all electrical connections are tight and the insulation is in serviceable condition. Inspect the brush holders for secure mounting.
	38	Replace defective brushes (par. 138). Tighten all loose connections. Repair electrical wiring as necessary. Adjust brush spring tension (par. 138). Report defective springs and brush holders to field maintenance, 3d echelon.
	39	<i>Controls and instruments.</i> Inspect all controls for insecure mounting and loose wiring connections.
	39	Replace a defective control (par. 135) and repair defective wiring connections.
	40	<i>Driving disk and ventilating fan.</i> Inspect for insecure mounting or missing mounting hardware. Note any unusual noises while unit is in operation.
	40	Report to field maintenance, 3d echelon if defective driving disk or fan is found.
	41	<i>Generator control panel.</i> Inspect for insecure mounting, missing or damaged hardware. Inspect for improper operation of instruments.
	41	Report to field maintenance, 3d echelon if a defective control panel is noted.
WINTERIZATION		
	42	<i>Coolant heater.</i> Inspect the heater for breaks, leaks, loose mounting, and improper operation. Inspect wiring and fuel system.
	42	Tighten all loose mounting hardware and electrical connections. Repair or replace a defective heater (par. 141).

Section IV. OPERATOR'S MAINTENANCE

38. General

The instructions in this section are published for the information and guidance of the operator to maintain the generator set.

39. Engine and Heater Fuel Pump Service

Service the engine and heater fuel pumps as illustrated in figure 23.

40. Fuel Filter Service

Service the fuel filter as illustrated in figure 24.

41. Fuel Tank Cap and Strainer

a. Removal. Remove the fuel tank cap and strainer as illustrated in figure 25.

b. Cleaning and Inspection. Clean and inspect. Replace a defective fuel tank cap and strainer.

c. Installation. Install the fuel tank cap and strainer as illustrated in figure 25.

42. Fan V-Belt Adjustment

Adjust the fan V-belt as illustrated in figure 26.

43. Carburetor Adjustment

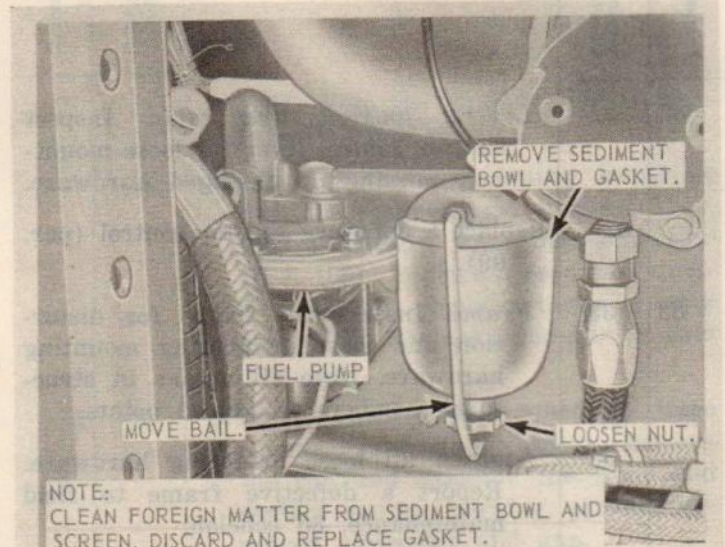
Adjust the carburetor as illustrated in figure 27.

44. Fuse Replacement

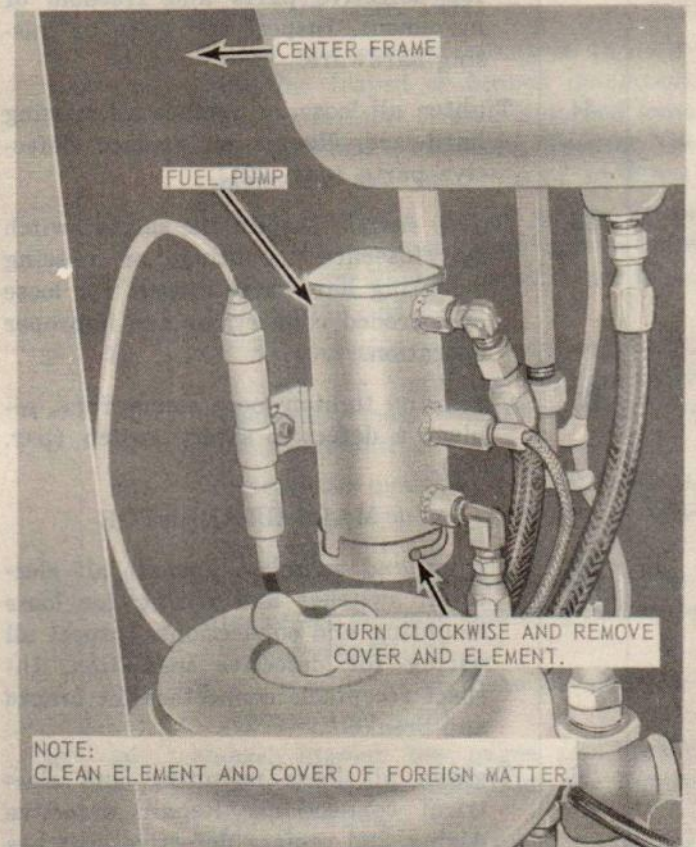
Replace the fuse as illustrated in figure 28.

45. Instrument Panel Lamp Replacement

Replace the instrument panel lamp as illustrated in figure 28.



A



B

EMC 6115-296-12/23

A—Engine fuel pump service
B—Heater fuel pump service

Figure 23. Engine and heater fuel pumps service.

NOTE:
CLEAN FOREIGN MATTER FROM CASE. DISCARD GASKET AND ELEMENT. REPLACE
GASKET AND ELEMENT.

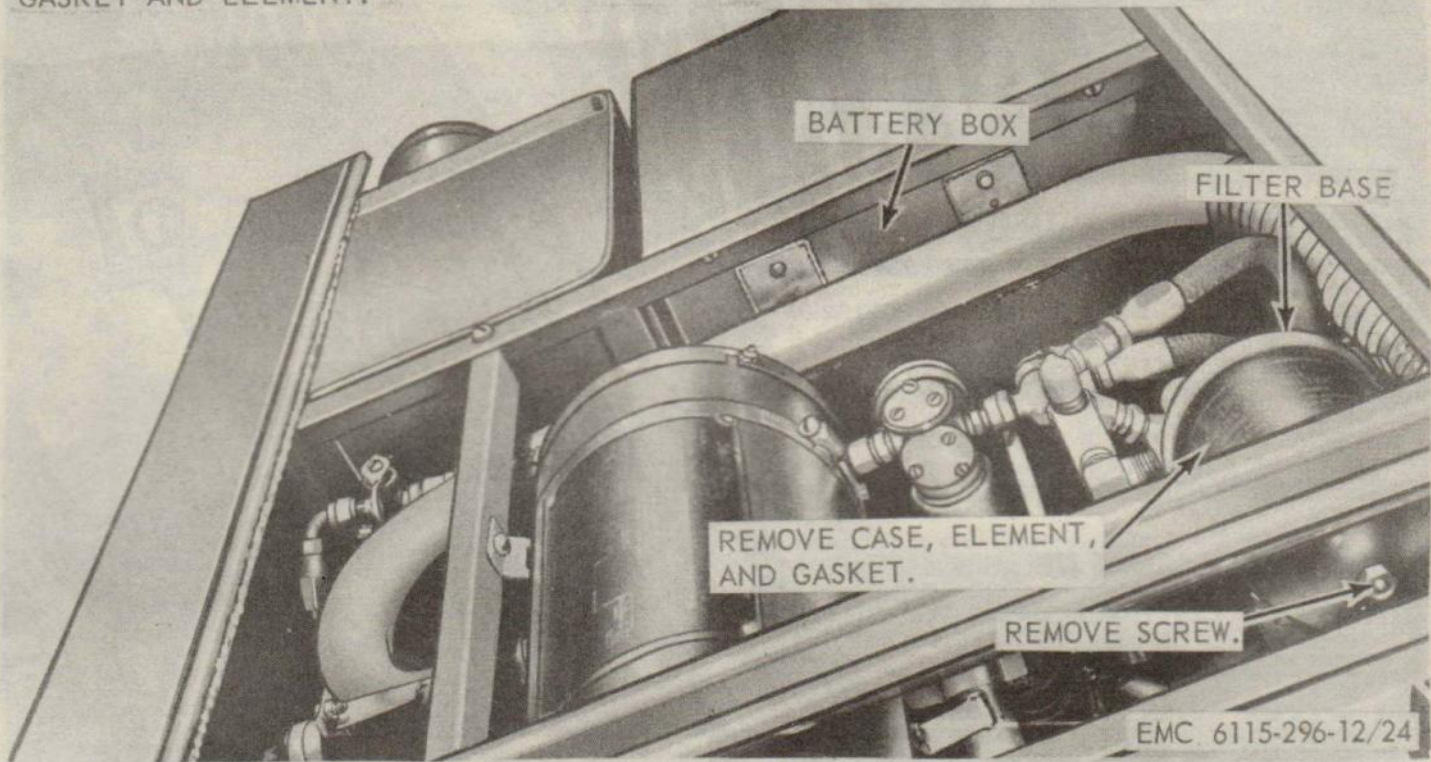


Figure 24. Fuel filter service.

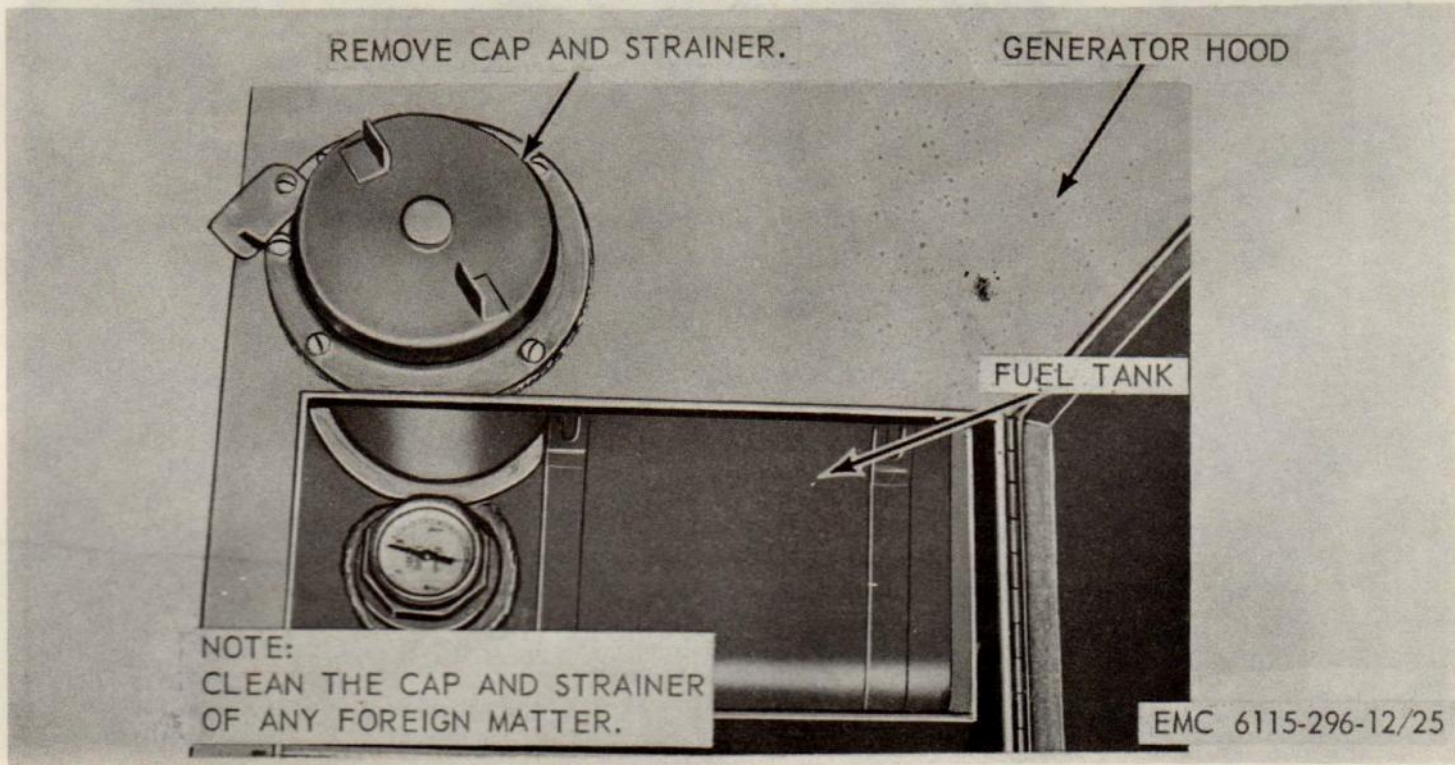
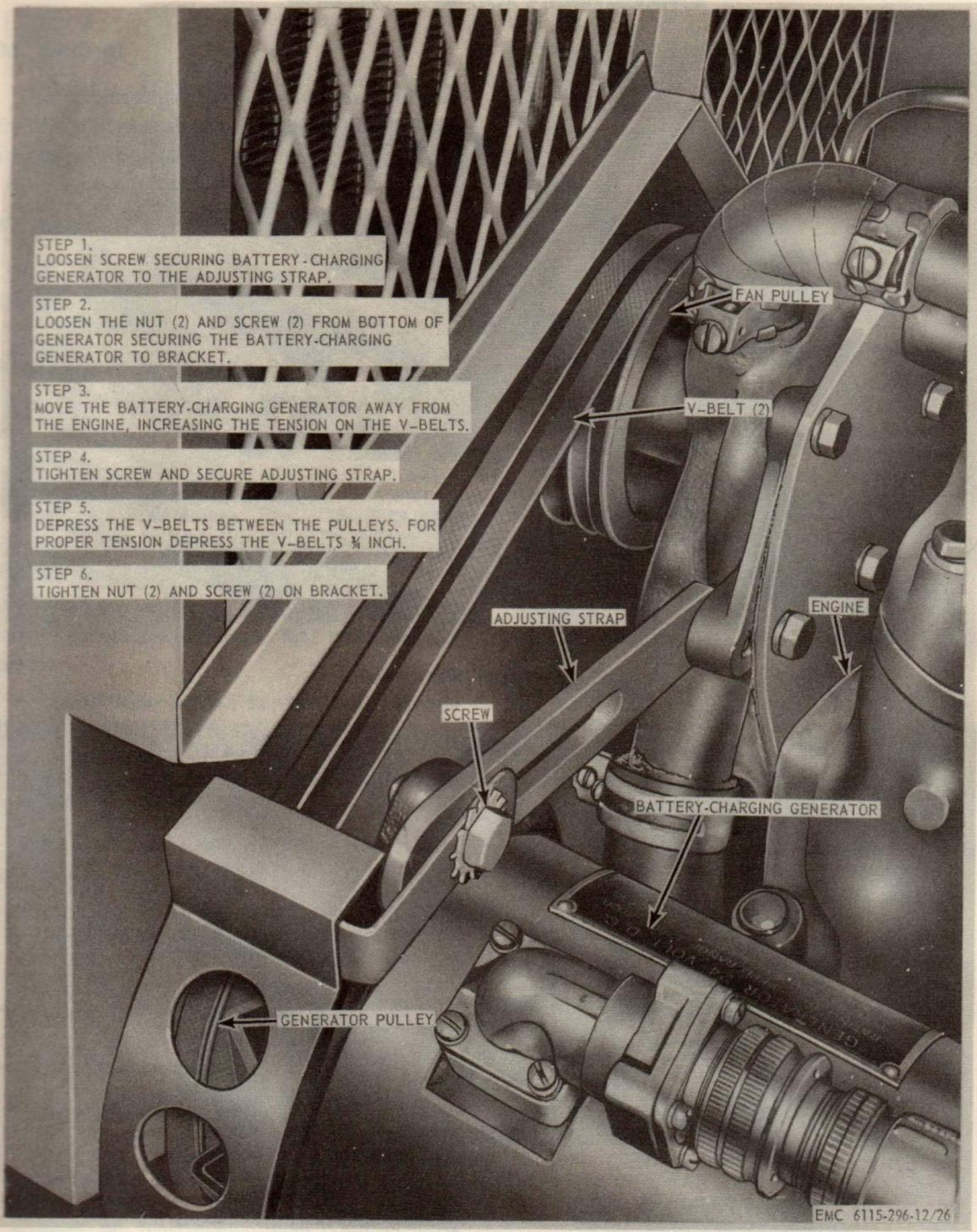


Figure 25. Fuel tank cap and strainer, removal and installation.



STEP 1.
 LOOSEN SCREW SECURING BATTERY-CHARGING GENERATOR TO THE ADJUSTING STRAP.

STEP 2.
 LOOSEN THE NUT (2) AND SCREW (2) FROM BOTTOM OF GENERATOR SECURING THE BATTERY-CHARGING GENERATOR TO BRACKET.

STEP 3.
 MOVE THE BATTERY-CHARGING GENERATOR AWAY FROM THE ENGINE, INCREASING THE TENSION ON THE V-BELTS.

STEP 4.
 TIGHTEN SCREW AND SECURE ADJUSTING STRAP.

STEP 5.
 DEPRESS THE V-BELTS BETWEEN THE PULLEYS. FOR PROPER TENSION DEPRESS THE V-BELTS 3/4 INCH.

STEP 6.
 TIGHTEN NUT (2) AND SCREW (2) ON BRACKET.

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Figure 26. Fan V-belt adjustment.

CARBURETOR ADJUSTMENT

STEP 1.
CLOSE THE IDLE MIXTURE ADJUSTMENT SCREW.

NOTE:
DO NOT TIGHTEN SCREW. IF FORCE IS APPLIED DAMAGE TO SCREW AND CARBURETOR WILL RESULT.

STEP 2.
FROM CLOSED POSITION OPEN THE IDLE MIXTURE ADJUSTMENT SCREW 1/4 TURN.

STEP 3.
START THE ENGINE AND OPERATE UNTIL IT IS THOROUGHLY WARM.

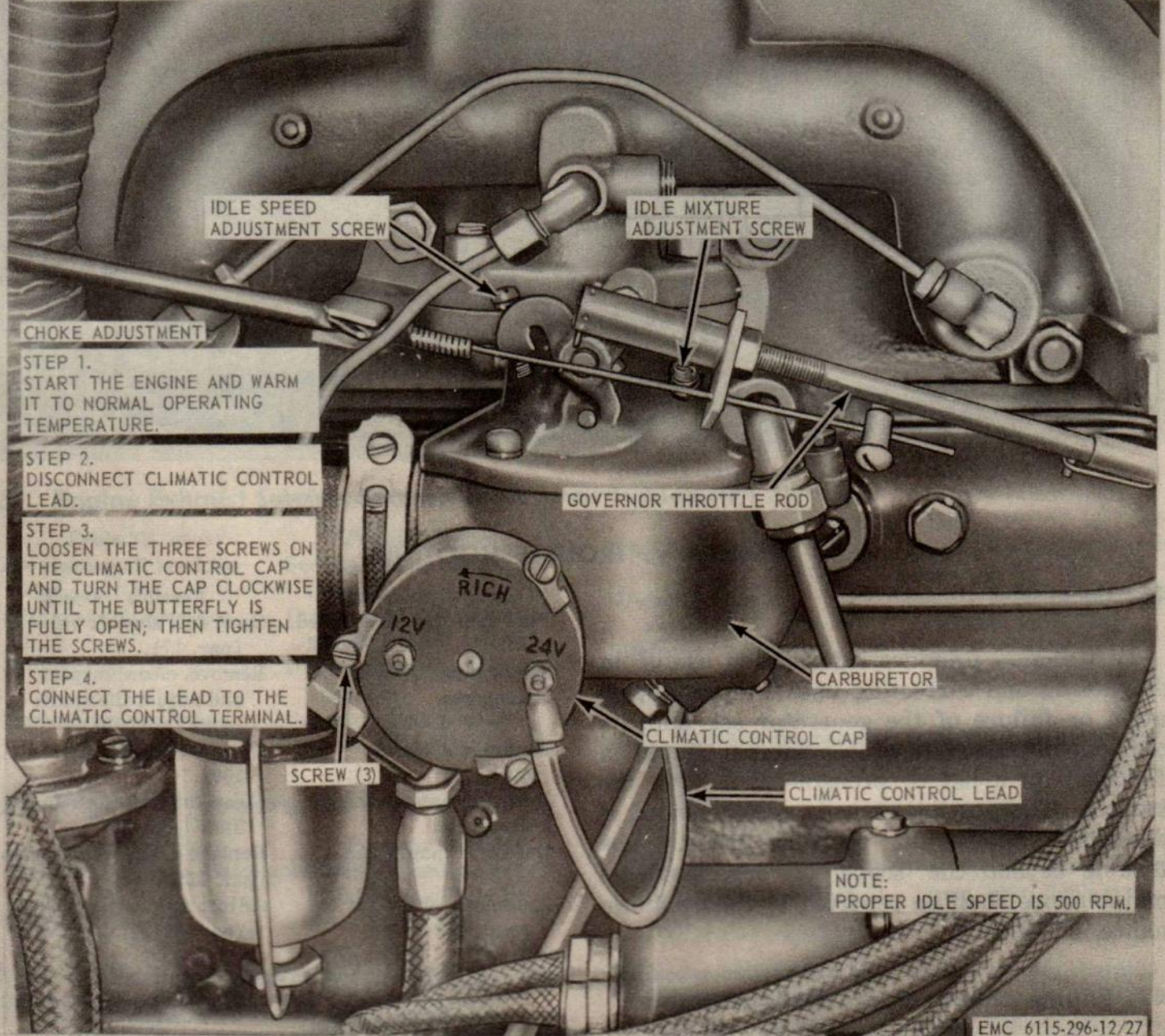
STEP 4.
PUSH THE GOVERNOR THROTTLE ROD TOWARD THE REAR OF THE ENGINE.

STEP 5.
ADJUST THE IDLE SPEED ADJUSTMENT SCREW TO OBTAIN AN IDLE SPEED OF 500 RPM.

STEP 6.
TURN THE IDLE MIXTURE ADJUSTMENT SCREW SLOWLY TOWARD THE CLOSED POSITION UNTIL THE ENGINE BEGINS TO FALTER.

STEP 7.
TURN THE IDLE MIXTURE SCREW TOWARD THE OPEN POSITION UNTIL THE ENGINE IDLES SMOOTHLY.

STEP 8.
FOLLOW STEPS 4 AND 5 ABOVE TO OBTAIN FINAL SPEED ADJUSTMENT.



CHOKE ADJUSTMENT

STEP 1.
START THE ENGINE AND WARM IT TO NORMAL OPERATING TEMPERATURE.

STEP 2.
DISCONNECT CLIMATIC CONTROL LEAD.

STEP 3.
LOOSEN THE THREE SCREWS ON THE CLIMATIC CONTROL CAP AND TURN THE CAP CLOCKWISE UNTIL THE BUTTERFLY IS FULLY OPEN; THEN TIGHTEN THE SCREWS.

STEP 4.
CONNECT THE LEAD TO THE CLIMATIC CONTROL TERMINAL.

NOTE:
PROPER IDLE SPEED IS 500 RPM.

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Figure 27. Carburetor adjustment.

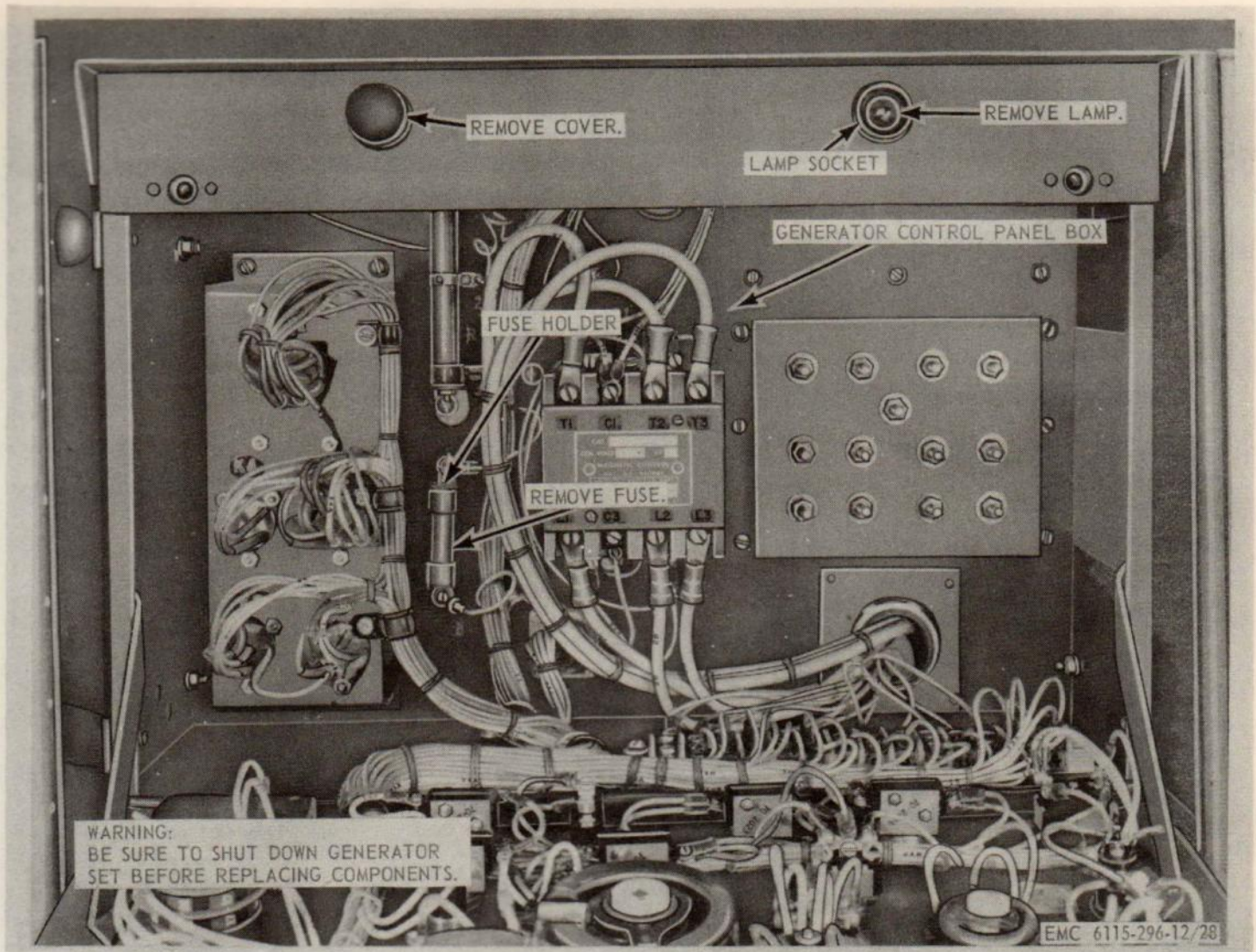


Figure 28. Fuse and instrument panel lamp replacement.

Section V. TROUBLESHOOTING

46. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the generator set and its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause. Any trouble beyond the scope of organizational maintenance shall be reported to field maintenance, 3d echelon.

47. Engine Hard to Start or Fails to Start

<i>Probable cause</i>	<i>Possible remedy</i>
Lack of fuel.....	Fill fuel tank (par. 35).

<i>Probable cause</i>	<i>Possible remedy</i>
Fuel shutoff valve closed....	Open fuel shutoff valve (par. 17).
Spark plugs dirty or damaged.	Remove, clean, inspect, and adjust the spark plugs (par. 108).
Engine not timed properly.	Time the engine (par. 109).
Fuel line assemblies obstructed.	Clean the fuel tank and lines (par. 86).
Defective magneto.....	Replace defective magneto (par. 109).
Automatic choke set too lean.	Adjust automatic choke (par. 87).

48. Engine Misses or Runs Erratically

<i>Probable cause</i>	<i>Possible remedy</i>
Spark plug leads loose or shorted.	Tighten all connections or replace the leads (par. 108).

<i>Probable cause</i>	<i>Possible remedy</i>
Engine overheated.....	Check coolant level and refill if necessary (par. 35).
Engine not timed properly.	Time the engine (par. 109).
Valve tappets out of adjustment.	Adjust the valve tappets (par. 123).
Automatic choke set too rich.	Adjust automatic choke (par. 87).

49. Engine Stops Suddenly

<i>Probable cause</i>	<i>Possible remedy</i>
Fuel tank empty.....	Fill the fuel tank (par. 35).
Defective magneto.....	Adjust the points (par. 109), replace a defective magneto (par. 109).
Low oil pressure.....	Safety switch shuts down engine. Add oil to crankcase (LO 5-6115-296-12).

50. Engine Overheats

<i>Probable cause</i>	<i>Possible remedy</i>
Radiator coolant level low.	Check coolant level and refill if necessary (par. 35).
Defective thermostat.....	Replace a defective thermostat (par. 102).
Radiator assembly air passages clogged.	Clean the radiator air passages with compressed air (par. 100).
V-belts broken, loose, or slipping.	Adjust or replace the V-belts (par. 101).
Engine out of time.....	Time the engine (par. 109).

51. Engine Exhaust Smokes Excessive

<i>Probable cause</i>	<i>Possible remedy</i>
Air cleaner oil level too high.	Service the air cleaner (par. 33).
Crankcase oil level too high.	Drain crankcase oil until proper level is reached.
Diluted fuel.....	Drain fuel tank and refill (par. 35).
Damaged piston rings.....	Report to field maintenance, 3d echelon.

52. Engine Oil Pressure Low

<i>Probable cause</i>	<i>Possible remedy</i>
Crankcase oil level low.....	Add oil to crankcase (LO 5-6115-296-12).
Oil filter clogged.....	Service the oil filter (par. 33).
Leaks in oil line.....	Tighten connections.
Oil pressure regulator out of adjustment.	Adjust the oil pressure regulator (par. 126).
Crankcase oil diluted.....	Faulty fuel pump. Replace pump (par. 89).

<i>Probable cause</i>	<i>Possible remedy</i>
Water in crankcase.....	Defective head gasket, head, or engine block. Replace faulty cylinder head or gasket (par. 121) and report to field maintenance, 3d echelon.

53. Engine Lacks Power

<i>Probable cause</i>	<i>Possible remedy</i>
Carburetor defective.....	Replace the carburetor (par. 87).
Compression low.....	Adjust the valve tappets (par. 123).
Engine not developing proper speed.	Adjust the governor linkage (par. 95).
Fuel pump defective.....	Replace fuel pump (par. 89).
Weak spark.....	Inspect, adjust, or replace spark plugs or magneto (pars. 108 and 109).
Engine out of time.....	Time the engine (par. 109).

54. Engine Noisy

<i>Probable cause</i>	<i>Possible remedy</i>
Worn pistons or pins.....	Report to field maintenance, 3d echelon.
Valve tappets out of adjustment.	Adjust valve tappets (par. 123).

55. Starter Fails to Crank Engine

<i>Probable cause</i>	<i>Possible remedy</i>
Battery cables loose or defective.	Clean, tighten, or replace battery cables (par. 118).
Defective starter.....	Replace a defective starter (par. 107).
Defective starter switches.	Replace defective starter switches (par. 110).
Defective batteries.....	Replace batteries (par. 118).

56. Battery Generator Indicator Shows Low or No Charging Rate When Batteries Are Low

<i>Probable cause</i>	<i>Possible remedy</i>
Generator regulator defective or out of adjustment.	Test and adjust regulator (par. 106). Replace defective regulator (par. 106).
Defective battery charging generator or battery charging generator brushes.	Replace battery charging generator brushes (par. 105). Replace defective battery charging generator (par. 105).

<i>Probable cause</i>	<i>Possible remedy</i>
v-belt broken, slipping, or out of adjustment.	Adjust v-belt (par. 101). Replace broken v-belt (par. 101).
Defective battery generator indicator.	Replace defective battery charging indicator (par. 113).

57. Battery Indicator Shows Continuous Charging Rate When Batteries are Fully Charged

<i>Probable cause</i>	<i>Possible remedy</i>
Battery-charging generator regulator defective or out of adjustment.	Test and adjust battery-charging regulator (par. 106). Replace defective battery-charging regulator (par. 106).
Defective battery-charging indicator.	Replace defective battery-charging indicator (par. 113).

58. Battery-Charging Generator Overheats

<i>Probable cause</i>	<i>Possible remedy</i>
Defective battery-charging generator.	Replace defective battery-charging generator (par. 105).
Defective battery-charging generator regulator.	Test and adjust (par. 106) or replace defective battery-charging generator regulator (par. 106).

59. Batteries Discharge When Engine is Stopped

<i>Probable cause</i>	<i>Possible remedy</i>
Defective battery-----	Replace defective battery (par. 118).
Defective battery-charging voltage regulator.	Replace defective battery-charging voltage regulator (par. 106).
Shorts or loose connections in wiring.	Check all wiring for shorts or loose connections. Replace defective wiring (par. 116).

60. Main Generator Fails to Build Up Rated Voltage

<i>Probable cause</i>	<i>Possible remedy</i>
Generator brushes worn----	Replace the generator brushes (par. 138).
Defective generator-----	Report this condition to field maintenance, 3d echelon.
Engine speed too slow-----	Adjust the governor assembly (par. 95).
Exciter defective-----	Report to field maintenance, 3d echelon.

61. Main Generator Voltage Drops Under Load

<i>Probable cause</i>	<i>Possible remedy</i>
Generator brushes worn or dirty.	Clean or replace generator brushes (par. 138).
Defective generator-----	Report this condition to field maintenance, 3d echelon.
Engine speed too slow-----	Adjust the governor assembly (par. 95).

62. Ac Ammeter Registers Incorrectly

<i>Probable cause</i>	<i>Possible remedy</i>
Current transformer defective.	Report this condition to field maintenance, 3d echelon.
Loose terminals or wiring defective.	Tighten terminals. Repair or replace defective wiring.
Defective ammeter-----	Replace a defective ammeter (par. 135).

63. Ac Voltmeter Registers Incorrectly

<i>Probable cause</i>	<i>Possible remedy</i>
Defective voltmeter-----	Disconnect leads and tape separately or replace defective voltmeter.
Defective rheostat-----	Report this condition to field maintenance, 3d echelon.
Defective voltmeter wiring.	Report this condition to field maintenance, 3d echelon.

64. Main Generator Voltage Erratic

<i>Probable cause</i>	<i>Possible remedy</i>
Engine speed erratic-----	Adjust or replace the governor assembly (par. 95).
Defective main generator brushes.	Replace the main generator brushes (par. 138).
Loose terminals-----	Tighten terminal connections.
Exciter regulator defective.	Report to field maintenance, 3d echelon.

65. Main Generator Frequency Fluctuates or Drifts

<i>Probable cause</i>	<i>Possible remedy</i>
Engine speed erratic-----	Adjust the governor assembly (par. 95).
Main generator brushes sticking in brush holder.	Clean or replace the main generator brushes (par. 138).

<i>Probable cause</i>	<i>Possible remedy</i>
Defective main generator	Report this condition to field maintenance, 3d echelon.

66. Main Generator Frequency Drops When Under Load

<i>Probable cause</i>	<i>Possible remedy</i>
Main generator brushes worn or dirty.	Clean or replace the main generator brushes (par. 138).
Engine speed erratic	Adjust the governor assembly (par. 95).
Defective main generator	Report this condition to field maintenance, 3d echelon.
Defective ignition	Adjust or replace magneto (par. 109).

67. Main Generator Fails to Supply Power to the Load

<i>Probable cause</i>	<i>Possible remedy</i>
Load terminal defective or loose.	Tighten or replace the load terminal (par. 19).
Main generator defective	Report this condition to field maintenance, 3d echelon.

68. Main Circuit Breaker Trips or Fails to Close

<i>Probable cause</i>	<i>Possible remedy</i>
Circuit breaker defective	Report this condition to field maintenance, 3d echelon.
Output voltage too low	Adjust voltage control (par. 19).
Load excessive	Reduce the load (par. 19).

69. Excessive Sparking at Generator Brushes

<i>Probable cause</i>	<i>Possible remedy</i>
Loose terminals	Tighten terminals (par. 138).

<i>Probable cause</i>	<i>Possible remedy</i>
Worn or dirty main generator brushes.	Clean or replace defective main generator brushes (par. 138).
Defective main generator	Report this condition to field maintenance, 3d echelon.

70. Main Generator Overheats

<i>Probable cause</i>	<i>Possible remedy</i>
Guard screens dirty or plugged.	Remove and clean the guard screens (par. 138).
Defective main generator	Report this condition to field maintenance, 3d echelon.

71. Main Generator Noisy

<i>Probable cause</i>	<i>Possible remedy</i>
Load excessive	Reduce load (par. 19).
Defective main generator	Report this condition to field maintenance, 3d echelon.

72. Engine Heater Fails to Ignite

<i>Probable cause</i>	<i>Possible remedy</i>
Heater overheat control switch defective.	Replace the heater overheat control switch (par. 131).
Igniter assembly defective	Replace the igniter assembly (par. 141).
Battery box thermostat defective.	Replace a defective battery box thermostat (par. 118).
Fuel solenoid valve defective.	Replace the fuel regulator valve (par. 130).

73. Battery Box Heating Element Fails to Operate

<i>Probable cause</i>	<i>Possible remedy</i>
Defective heating element	Replace a defective heating element (par. 118).
Defective wiring or loose terminals.	Tighten terminals. Replace or repair defective wiring (par. 118).

Section VI. FIELD EXPEDIENT REPAIRS

74. Field Expedient Repairs

Operator and organizational maintenance troubles may occur while the generator set is operating in the field where supplies and repair parts are not available and normal corrective action cannot be performed. When this

condition exists, the following expedient repairs may be used in emergencies, upon the decision of the unit commander. Equipment so repaired must be removed from operation as soon as possible and properly repaired before being placed in operation again.

75. Loss of Fuel

<i>Trouble</i>	<i>Expedient remedy</i>
Fuel line cracked.....	Tape cracked line until defective line can be replaced.

76. Engine Heats Up

<i>Trouble</i>	<i>Expedient remedy</i>
Defective thermostat.....	Remove thermostat and operate equipment until it can be replaced.

Section VII. RADIO INTERFERENCE SUPPRESSION

77. General Methods Used to Attain Proper Suppression

Essentially, suppression is attained by providing a low resistance path to ground for the stray currents. The methods used include shielding the ignition and high-frequency wires, grounding the frame with bonding straps, and using capacitors and resistors. For general information on radio interference suppression see TM 11-483.

78. Interference Suppression Components

a. Primary Suppression Components.

- (1) *Heater fuel pump capacitor.* The heater fuel pump capacitor (1, A, fig. 29) is a feed through type rated at 0.28 to 0.35 mfd. It is mounted on the fuel pump mounting bracket.
- (2) *Main generator brush capacitor.* The two 500 v, ac/dc main generator brush capacitors (3, B, fig. 29) are mounted on the stator housing at the rear of the main generator. They are rated at 0.10 mfd.
- (3) *Magneto capacitor.* The magneto capacitor is located on the magneto housing at the rear of the magneto. The 400 v-dc 20 amp capacitor is rated at 0.28 to 0.35 mfd.
- (4) *Engine bonding strap.* The engine bonding strap (2, D, fig. 29) is located at the front of the engine below the governor assembly.
- (5) *Generator control panel box bonding strap.* The generator control panel box bonding strap (4, E, fig. 29) is located at the rear of the control box near the center frame.
- (6) *Coolant heater bonding strap.* The coolant heater bonding strap (1, F, 29) is located at the base of the coolant heater frame.

- (7) *Main generator bonding strap.* The main generator bonding strap (4, G, fig. 29) is located on the right side of the main generator near the skid base.

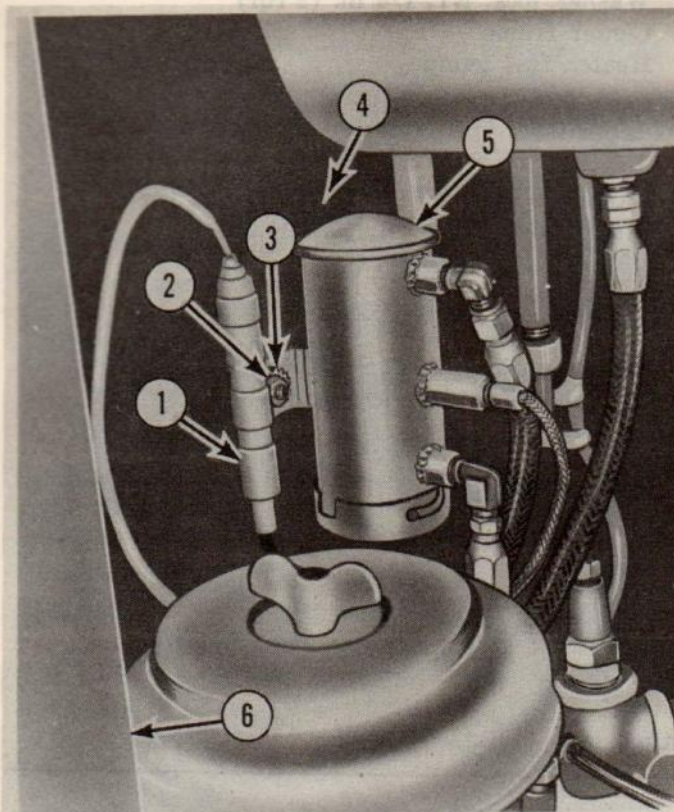
b. Secondary Suppression Components.

- (1) *Ignition cables.* The ignition cables are completely covered with braided shielding for the purpose of suppressing electrical disturbances in the radio frequency range, which are transmitted through the ignition system.
- (2) *Spark plugs.* The spark plugs are completely shielded and internally suppressed for the purpose of the suppression of electrical disturbances.
- (3) *Tooth-type lockwashers.* Tooth-type lockwashers are used to assure a good metal-to-metal contact where electrical components are mounted.

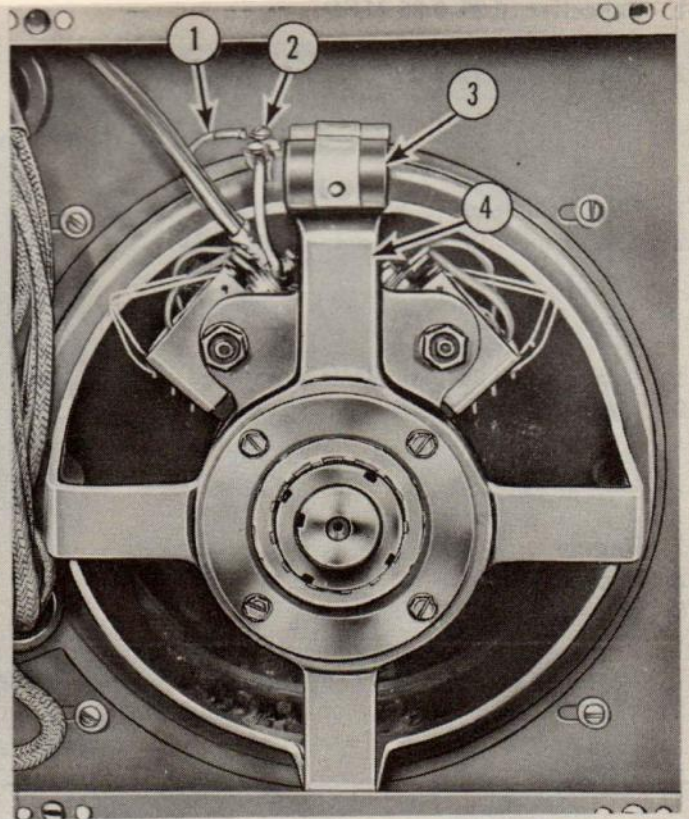
79. Replacement of Suppression Components

a. Primary Suppression Components.

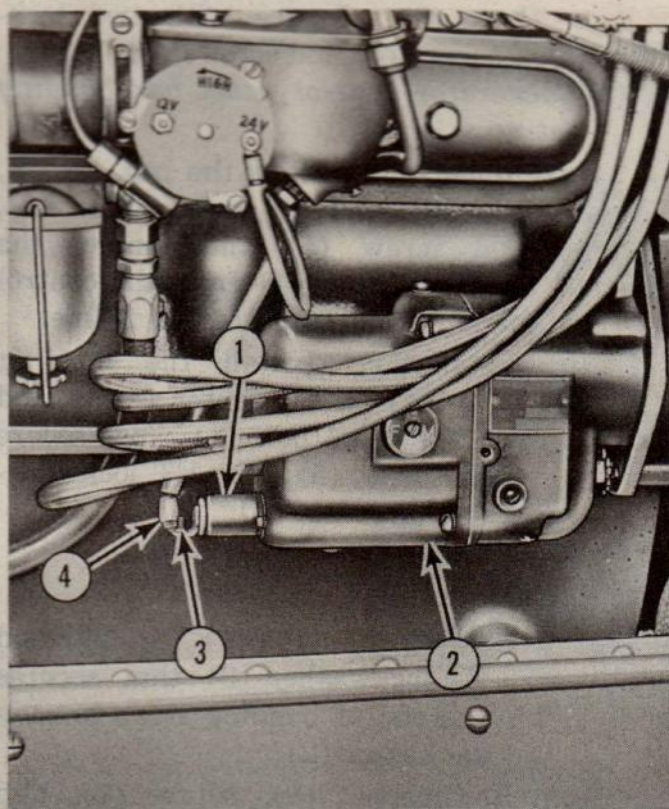
- (1) *Heater fuel pump capacitor.* The heater fuel pump capacitor (A, fig. 29) is part of the fuel pump and must be removed with the fuel pump. For removal of the fuel pump refer to figure 75.
- (2) *Main generator brush capacitors.*
 - (a) *Removal.*
 1. Remove stator hosing cover (par. 138).
 2. Remove the two screws (2, B, fig. 29) and disconnect the two leads (1).
 3. Remove the mounting screw that secures the capacitors (3) to the stator housing (4) and remove the capacitors (3).



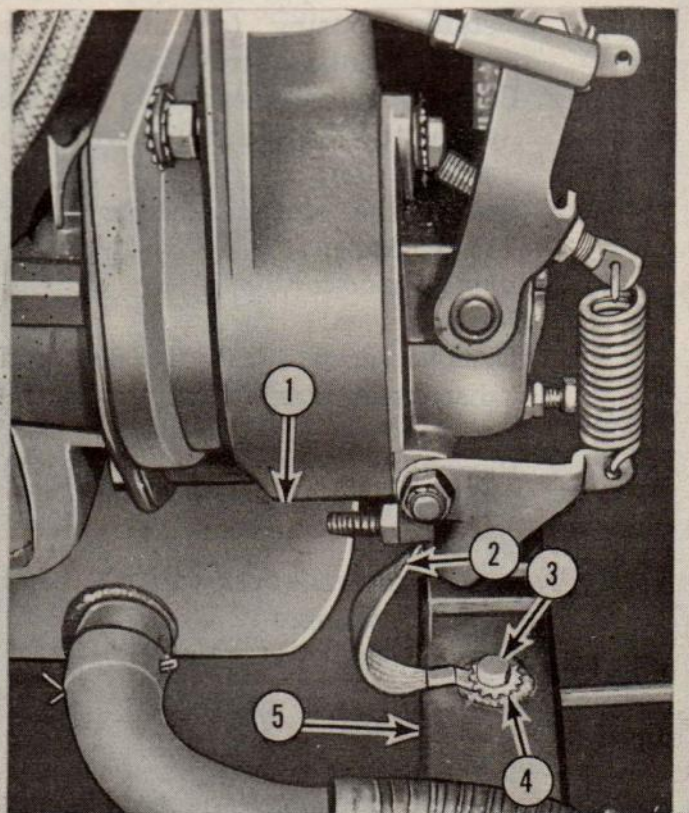
A



B



C



D

EMC 6115-296-12/29 (1)

Figure 29. Radio interference suppression components.

- 1 Capacitor, 0.28-0.35 MFD
400 v-dc
- 2 Nut, 1/4-20 (2 rqr)

- 3 Washer, lock, ET, 1/4 in. (2 rqr)
- 4 Center frame
- 5 Heater fuel pump

A—Heater fuel pump capacitor

- 1 Electrical lead (2 rqr)
- 2 Screw, machine, 8-32 x 1/4 in. (2 rqr)

- 3 Capacitor, 0.10 MFD, 500 v ac/dc (2 rqr)
- 4 Stator housing

B—Main generator brush capacitors

- 1 Capacitor, 0.28-0.35 MFD 400 v-dc
- 2 Magneto

- 3 Screw, machine, 6-32 x 1/2 in.
- 4 Starter switch electrical lead

C—Magneto capacitor

- 1 Engine
- 2 Bonding strap
- 3 Screw, 3/8-16 x 1/2 in.

- 4 Washer, lock, ET, 3/8 in. (2 rqr)
- 5 Base

D—Engine bonding strap

Figure 29—Continued.

(b) *Installation.*

1. Install the capacitors (3) to the stator housing (4) and secure with mounting screw.
2. Connect the two leads (1) on the capacitor (3) and secure with two screws (2).
3. Install the stator housing cover (par. 138).

(3) *Magneto capacitor.*

(a) *Removal.*

1. Remove screw (3, C, fig. 29) and disconnect starter switch electrical lead (4).
2. Remove the magneto capacitor (1) from the magneto (2).

(b) *Installation.*

1. Install the magneto capacitor (1) on the magneto (2).
2. Connect the starter switch electrical lead (4) and secure with screw (3).

(4) *Engine bonding strap.*

- a) *Removal.* Remove the two screws (3, D, fig. 29) and two ET lockwashers (4) from the base (5) and engine (1) and remove the bonding strap (2).

- (b) *Installation.* Install the bonding strap (2) on the engine (1) and base (5). Secure with two lockwashers (4) and screws (3).

(5) *Generator control panel box bonding strap.*

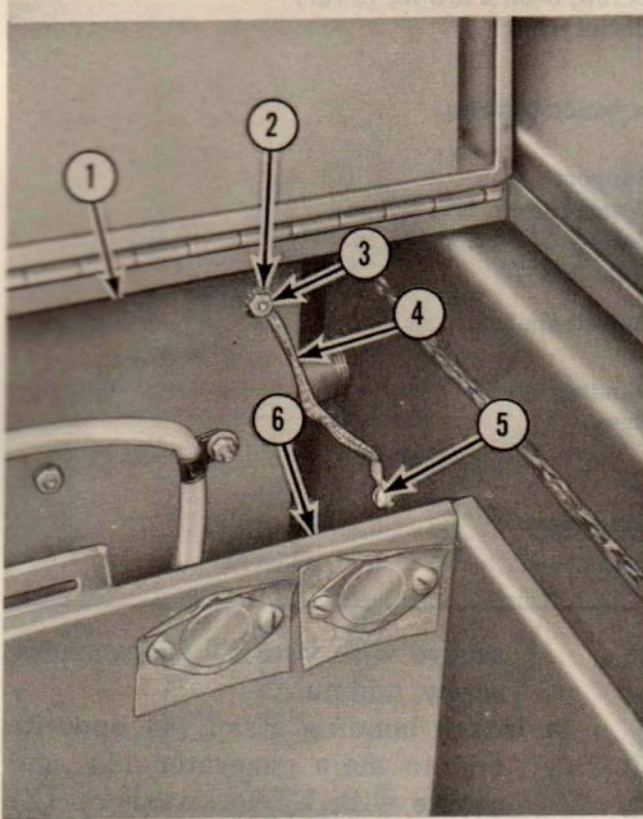
- (a) *Removal.* Remove the nut (3, E, fig. 29), two ET lockwashers (2), and screw (5) and remove the bonding strap (4) from the control panel box (1) and center frame.

- (b) *Installation.* Install the bonding strap (4) on the center frame and control panel box (1) and secure with screw (5), two ET lockwashers (2), and nut (3).

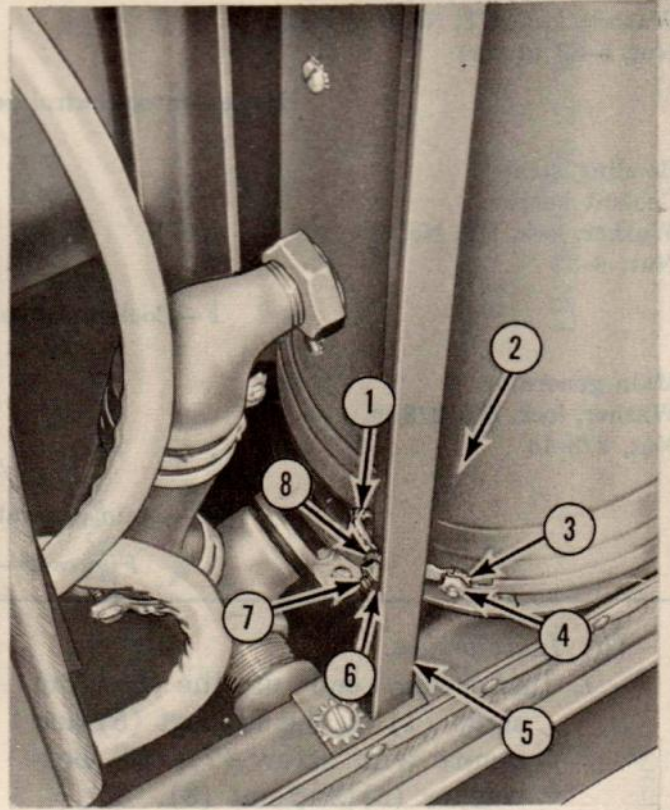
(6) *Coolant heater bonding strap.*

(a) *Removal.*

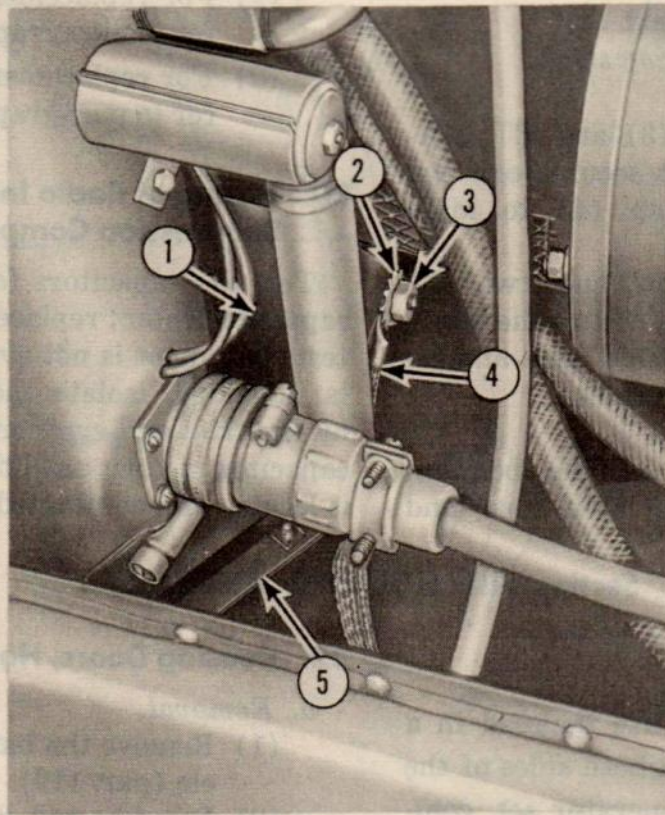
1. Remove the nut (4, F, fig. 29) and ET lockwasher (3) that secures one end of bonding strap to coolant heater (2).
2. Remove nut (8), screw (7), and ET lockwasher (6) that secures other end of bonding strap to the support (5) and remove the bonding strap (1).



E



F



G

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Figure 29—Continued.

- 1 Control panel box
- 2 Washer, lock, ET, No. 8
- 2 Washer, lock, ET, No. 8 (2 rqr)
- 3 Nut, 8-32 (2 rqr)

- 4 Bonding strap
- 5 Screw, 8-32 x 3/8 in. (2 rqr)
- 6 Battery box

E—Generator control panel box bonding strap.

- 1 Bonding strap
- 2 Coolant heater
- 3 Washer, lock, ET, No. 6
- 4 Nut, 6-32

- 5 Support
- 6 Washer, lock, ET, 1/4 in.
- 7 Screw, 1/4-20 x 1/2 in.
- 8 Nut, 1/4-20

F—Coolant heater bonding strap.

- 1 Main generator
- 2 Washer, lock, ET, 3/8 in.
- 3 Nut, 3/8-16

- 4 Bonding strap
- 5 Base

G—Main generator bonding strap.

Figure 29—Continued.

(b) *Installation.*

1. Install one end of the bonding strap (1) on the support (5) and secure with screw (7), ET lockwasher (6) and nut (8).
2. Install the other end of the bonding strap (5) to the coolant heater (2) and secure with ET lockwasher (3) and nut (4).

(7) *Main generator bonding strap.*

(a) *Removal.*

1. Remove the nut (3) and ET lockwasher (2) that secures one end of bonding strap (4) to main generator (1).
2. Remove screw, nut, and two ET lockwashers that secure the bonding strap to the skid base and remove bonding strap (4).

(b) *Installation.*

1. Install one end of the bonding strap (4) to the skid base and

secure with two ET lockwashers, screw, and nut.

2. Install bonding strap (4) opposite end to main generator (1) and secure with ET lockwashers (2) and nut (3).

b. *Secondary Components.*

- (1) For replacement of ignition cables refer to paragraph 108.
- (2) For replacement of the spark plugs refer to paragraph 108.

80. Testing of Radio Interference Suppression Components

Test the capacitors for leaks and shorts on a capacitor tester; replace defective capacitors. If test equipment is not available and interference is indicated, isolate the cause of interference by the trial-and-error method of replacing each capacitor in turn until the cause of interference is located and eliminated.

Section VIII. HOUSING ASSEMBLY

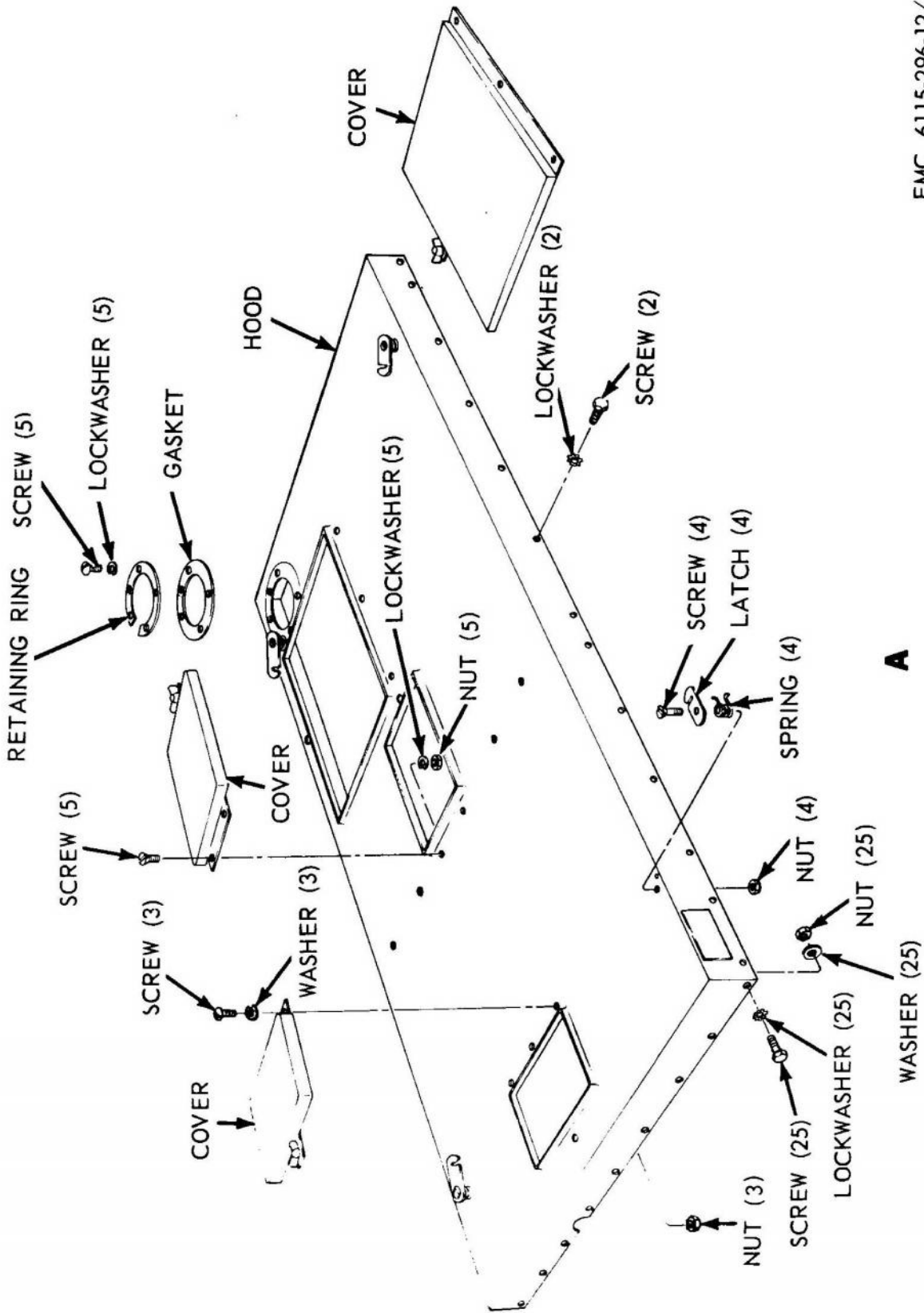
81. General

The engine and generator are inclosed in a sheet metal housing. Doors at both sides of the unit provide access to the generator set components. Sheet metal panels and the hood complete the housing assembly.

82. Housing Doors, Hood, and Panels

a. *Removal.*

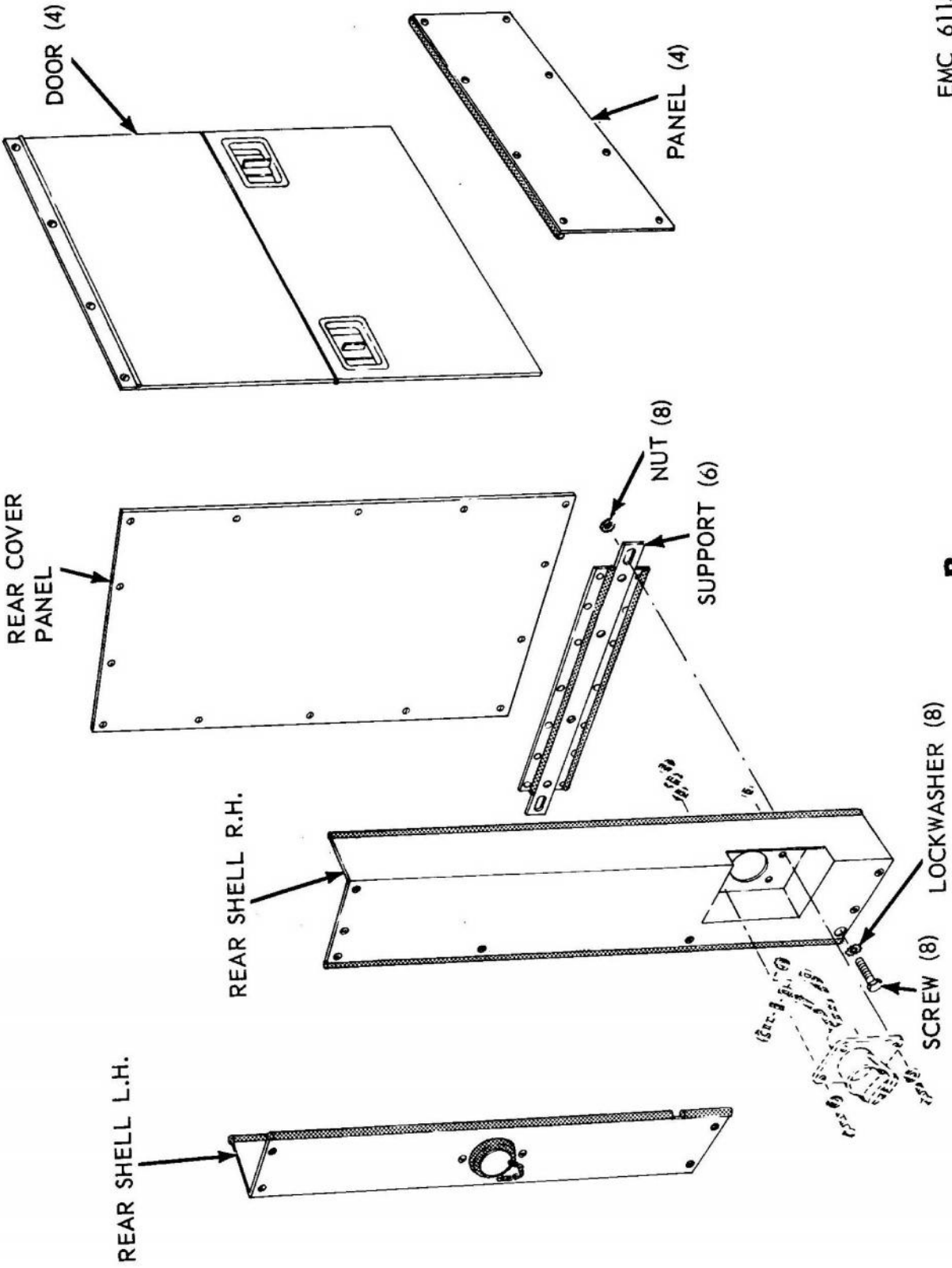
- (1) Remove the battery-charging receptacle (par. 119).
- (2) Remove and disassemble the housing doors, hood, and panels as illustrated in figure 30.



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A—Hood and doors

Figure 30. Housing doors, hood, and panels, removal, disassembly, reassembly, and installation.

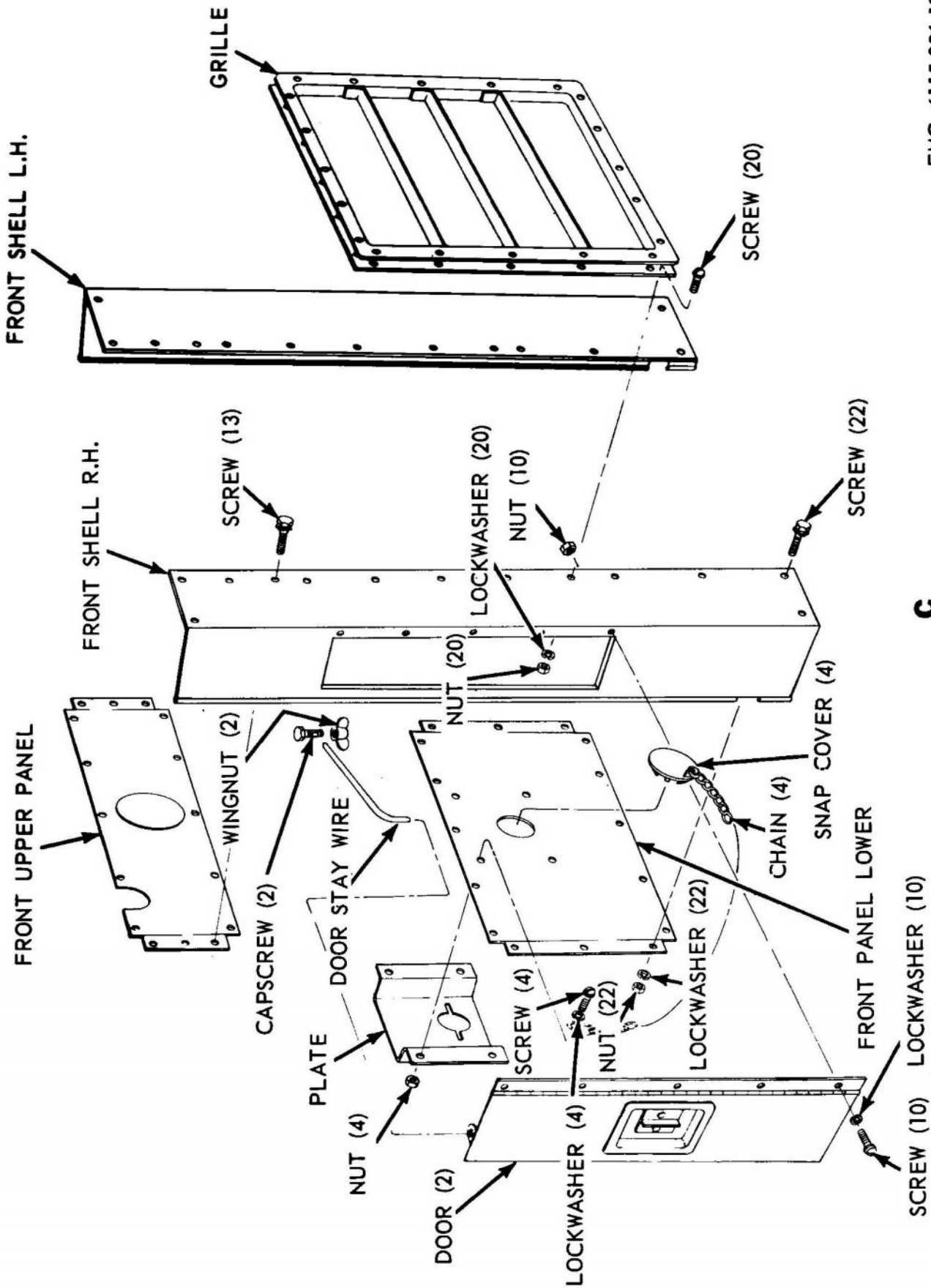


EMC 6115-296-12/30 ②

B

B—Panels and shells

Figure 30—Continued.



EMC 6115-296-12/30 ③

C

C—Front shells and grille
 Figure 30—Continued.

b. Cleaning, Inspection, and Repair. Clean and inspect. Replace or repair all worn, damaged, or defective parts.

c. Installation. Reassemble and install the housing doors, hood, and panels as illustrated in figure 30.

Section IX. EXHAUST SYSTEM

83. General

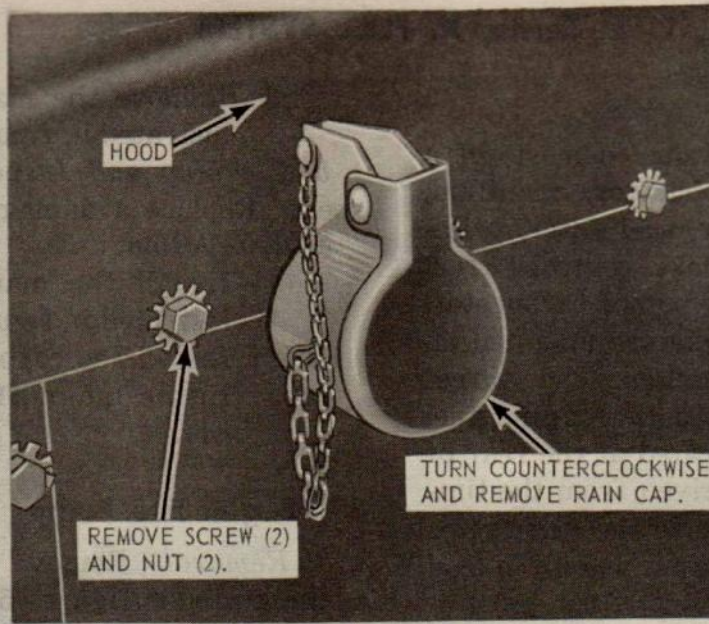
The exhaust system is comprised of the exhaust manifold integral with the intake manifold, pipe, muffler and rain cap. Exhaust gases expelled from the engine are discharged into the manifold and from there into the muffler.

84. Muffler and Rain Cap

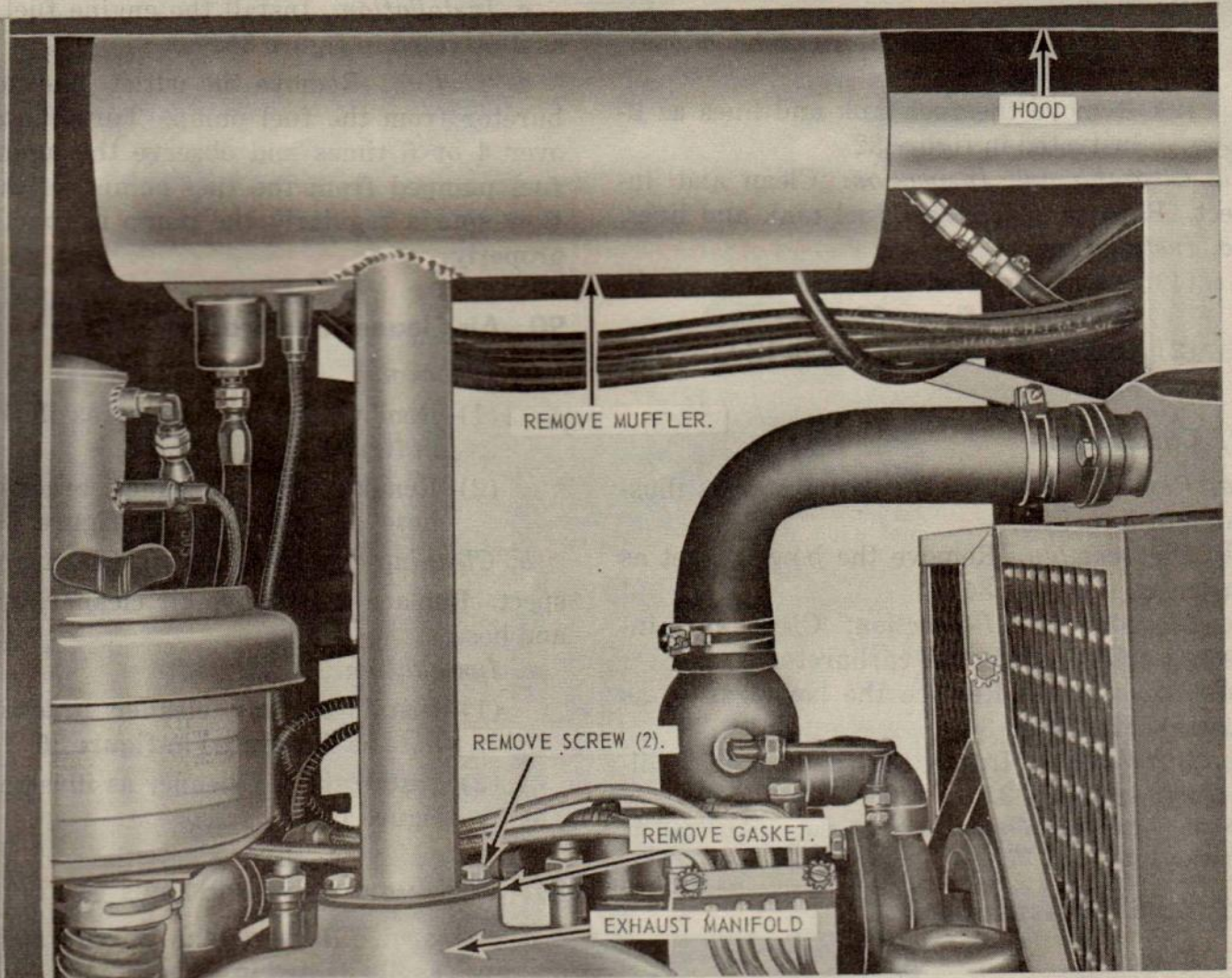
a. Removal. Remove the muffler and rain cap as illustrated in figure 31.

b. Cleaning and Inspection. Clean and inspect. Replace a damaged muffler or rain cap.

c. Installation. Install the muffler and rain cap as illustrated in figure 31.



A



B

EMC 6115-296-12/31

A—Rain cap removal B—Muffler removal
Figure 31. Muffler and rain cap, removal and installation.

Section X. FUEL SYSTEM

85. General

The generator set fuel system consists of a fuel tank, fuel pump, carburetor, manifold, air cleaner, three-way valve, fuel filter, priming pump, throttle and choke controls, fuel lines and fittings. The fuel pump, carburetor, governor, manifold, and choke are mounted on the right side of the engine. The three-way valve is located beneath the engine fuel pump. The air cleaner is located at the rear of the engine. The governor, driven from the timing gear train and connected to the carburetor linkage, maintains constant rpm when the load is increased on the generator set.

86. Fuel Tank and Lines*a. Removal.*

- (1) Remove the generator set hood (par. 82).
- (2) Remove the fuel tank and lines as illustrated in figure 32.

b. Cleaning and Inspection. Clean and inspect. Replace a damaged fuel tank and lines.

c. Installation.

- (1) Install the fuel tank and lines as illustrated in figure 32.
- (2) Install the generator set hood (par. 82).

87. Carburetor

a. Removal. Remove the carburetor as illustrated in figure 33.

b. Disassembly. Remove the bowl gasket as illustrated in figure 34.

c. Cleaning and Inspection. Clean and inspect. Replace a defective carburetor.

d. Reassembly. Replace the bowl gasket as illustrated in figure 34.

e. Installation. Install the carburetor as illustrated in figure 33.

Note. After installation, adjust the carburetor as illustrated in figure 27.

88. Manifold Assembly*a. Removal.*

- (1) Remove the muffler and rain cap (par. 84).
- (2) Remove the carburetor (par. 87).

(3) Remove the manifold assembly as illustrated in figure 33.

b. Cleaning and Inspection. Clean and inspect. Replace a damaged manifold assembly.

c. Installation.

- (1) Install the manifold assembly as illustrated in figure 33.
- (2) Install the carburetor (par. 87).
- (3) Install the muffler and rain cap (par. 84).

89. Engine Fuel Pump

a. Removal. Remove the engine fuel pump as illustrated in figure 35.

b. Cleaning and Inspection. Clean and inspect. Replace a defective engine fuel pump.

c. Installation. Install the engine fuel pump as illustrated in figure 35.

d. Testing. Remove the outlet line to carburetor from the fuel pump. Turn the engine over 4 or 5 times and observe the amount of fuel pumped from the fuel pump. If the fuel flow spurts regularly the pump is functioning properly.

90. Air Cleaner and Bracket*a. Removal.*

- (1) Remove the air cleaner as illustrated in figure 19.
- (2) Remove the air cleaner bracket and hose as illustrated in figure 36.

b. Cleaning and Inspection. Clean and inspect. Replace a defective air cleaner, bracket, and hose.

c. Installation.

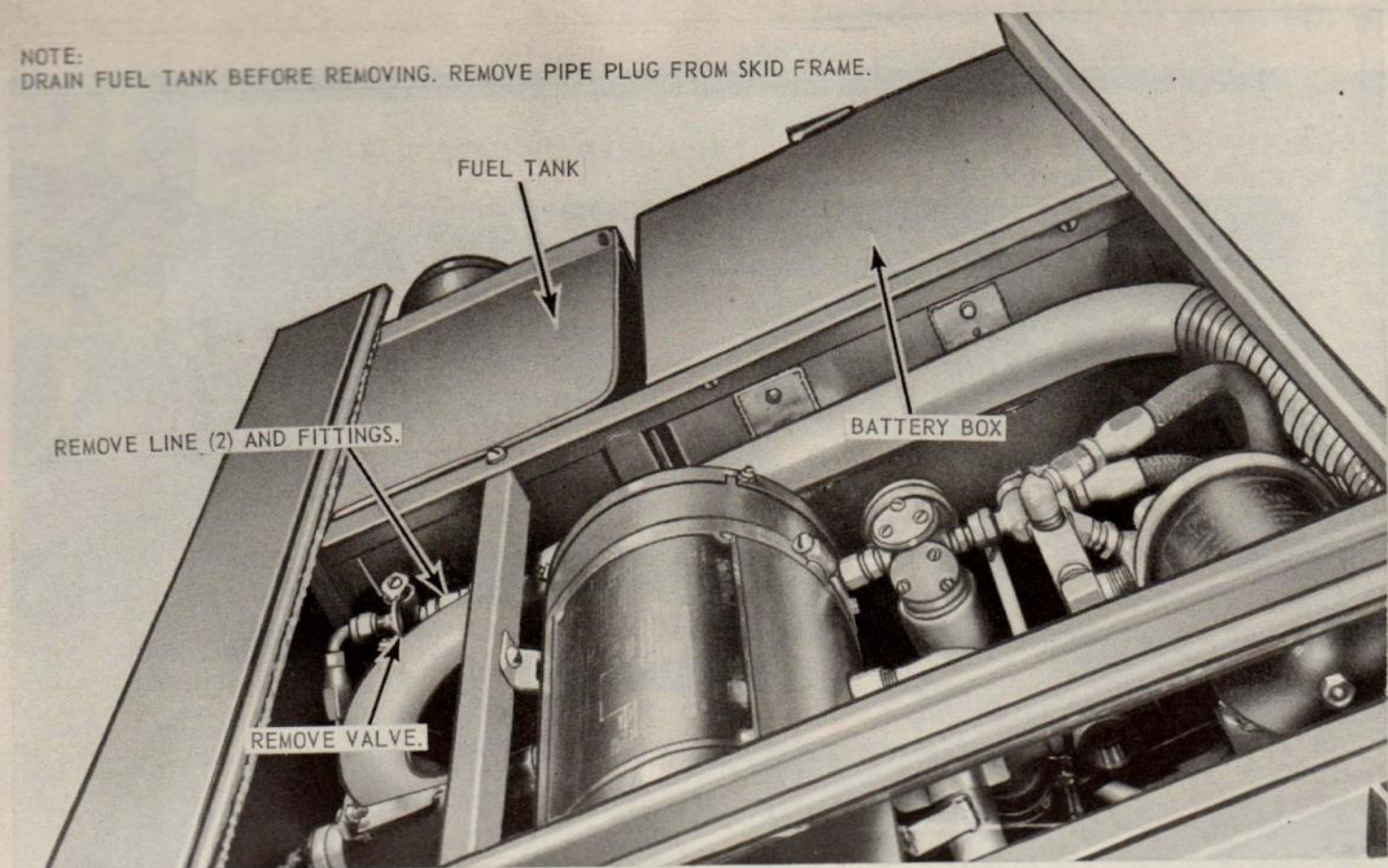
- (1) Install the air cleaner bracket and hose as illustrated in figure 36.
- (2) Install the air cleaner as illustrated in figure 19.

91. Three-way Valve and Lines

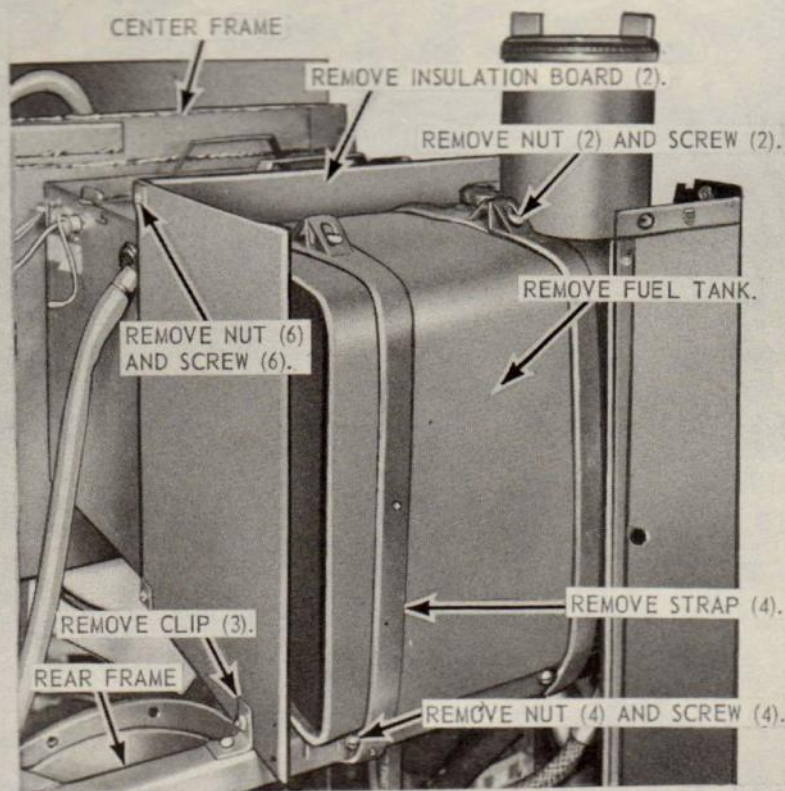
a. Removal. Remove the three-way valve and lines as illustrated in figure 37.

b. Cleaning and Inspection. Clean and inspect. Replace a defective three-way valve and lines.

NOTE:
DRAIN FUEL TANK BEFORE REMOVING. REMOVE PIPE PLUG FROM SKID FRAME.



A



B

EMC 6115-296-12/32

A—Fuel tank drain valve and line removal points

B—Fuel tank removal points

Figure 32. Fuel tank and lines, removal and installation.

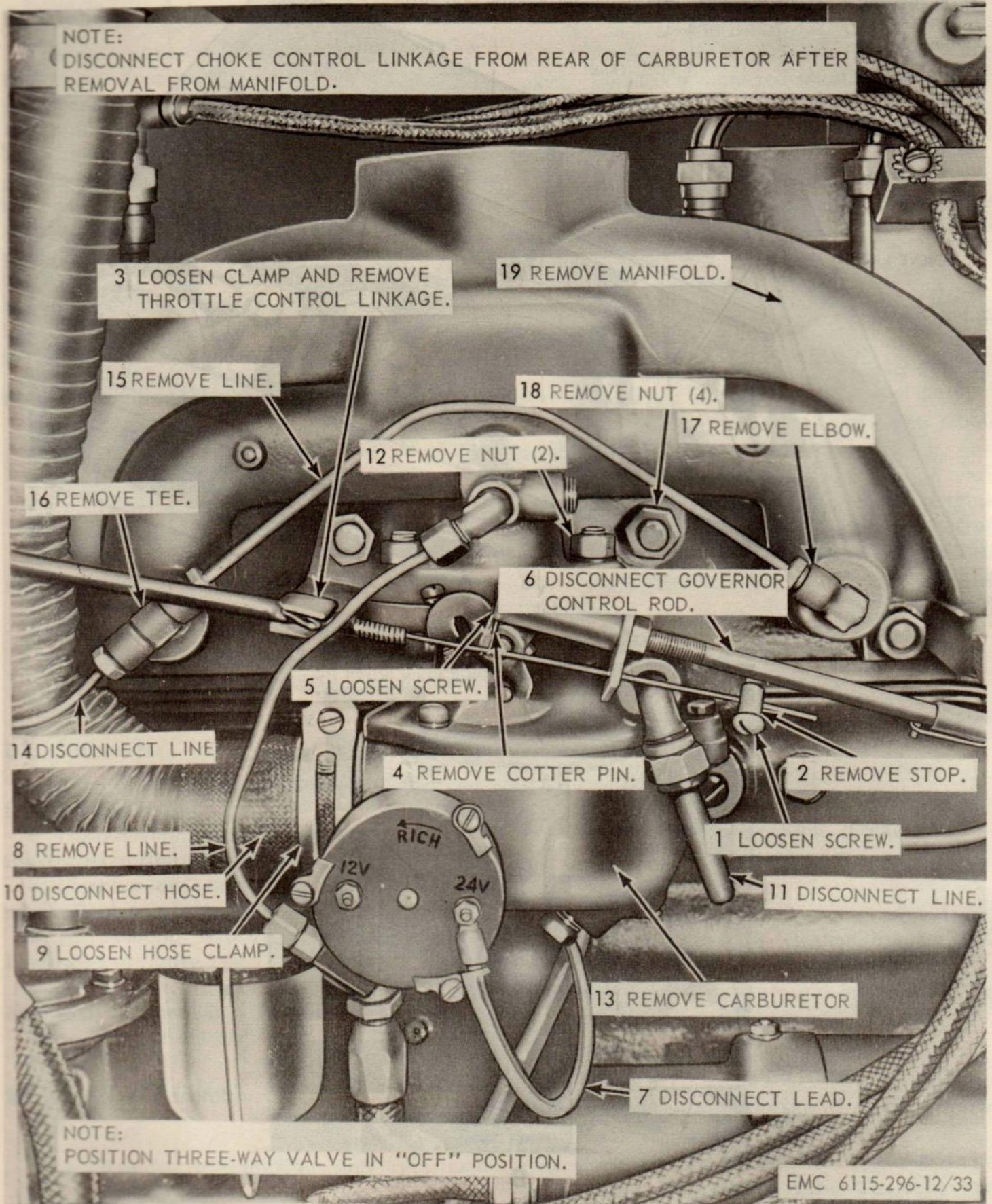


Figure 33. Carburetor and manifold, removal and installation, and carburetor choke adjustment.

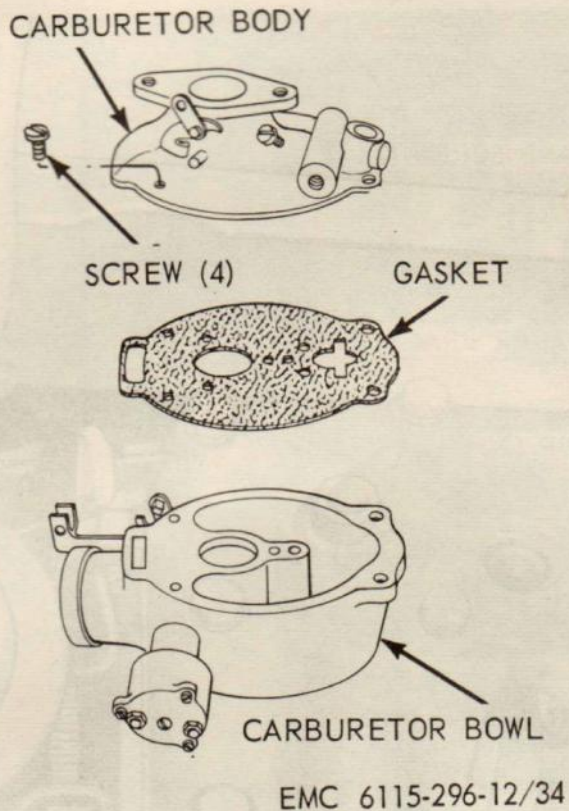


Figure 34. Carburetor, partially exploded view.

c. *Installation.* Install the three-way valve and lines as illustrated in figure 37.

92. Fuel Filter

a. *Removal.* Remove the fuel filter as illustrated in figure 38.

b. *Cleaning and Inspection.* Clean and inspect. Replace a defective fuel filter.

c. *Installation.* Install the fuel filter as illustrated in figure 38.

93. Priming Pump and Lines

a. *Removal.* Remove the priming pump and lines as illustrated in figure 39.

b. *Cleaning and Inspection.* Clean and inspect. Replace a defective priming pump and lines.

c. *Installation.* Install the priming pump and lines as illustrated in figure 39.

94. Throttle and Choke Controls

a. *Removal.* Remove the throttle and choke controls as illustrated in figure 39.

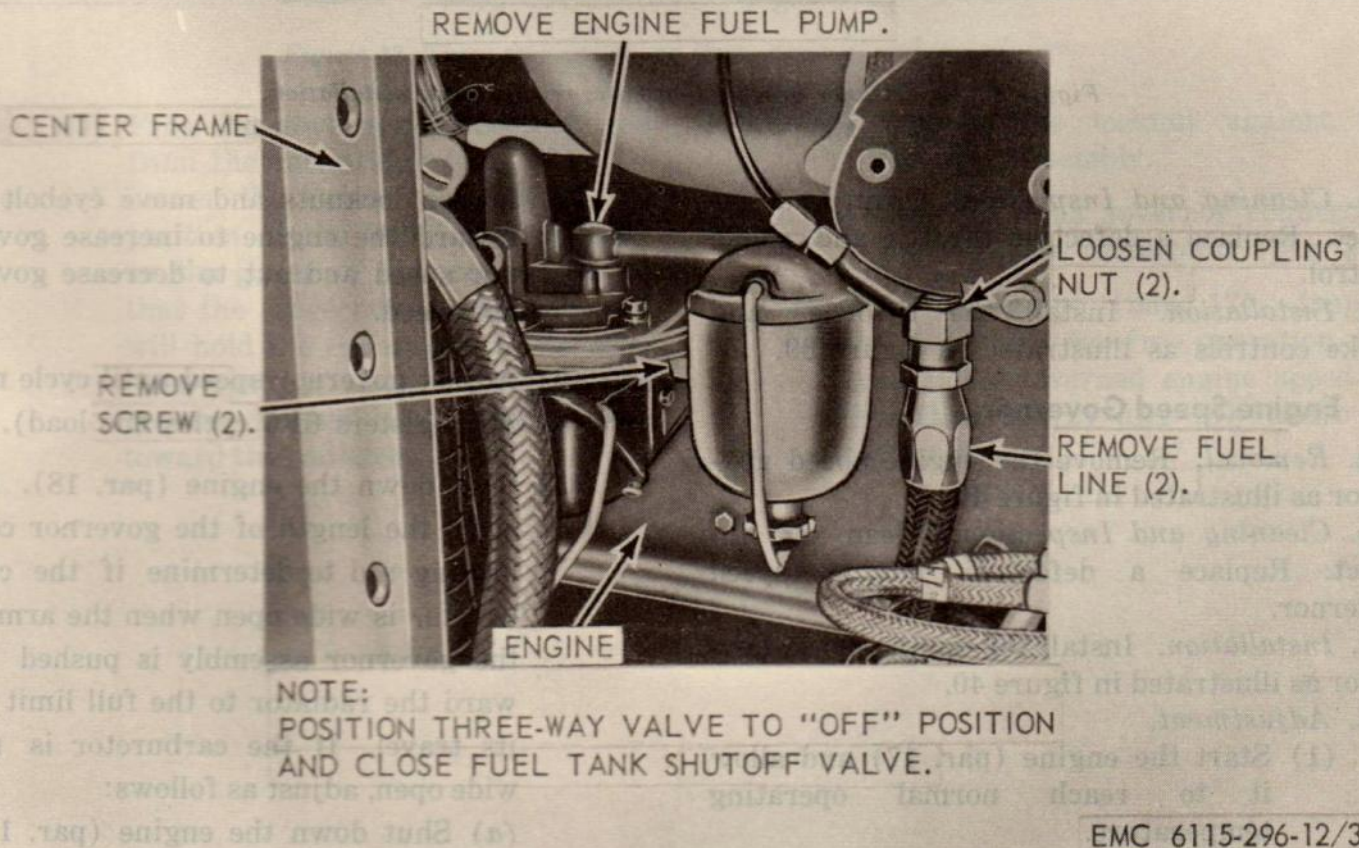


Figure 35. Engine fuel pump, removal and installation.

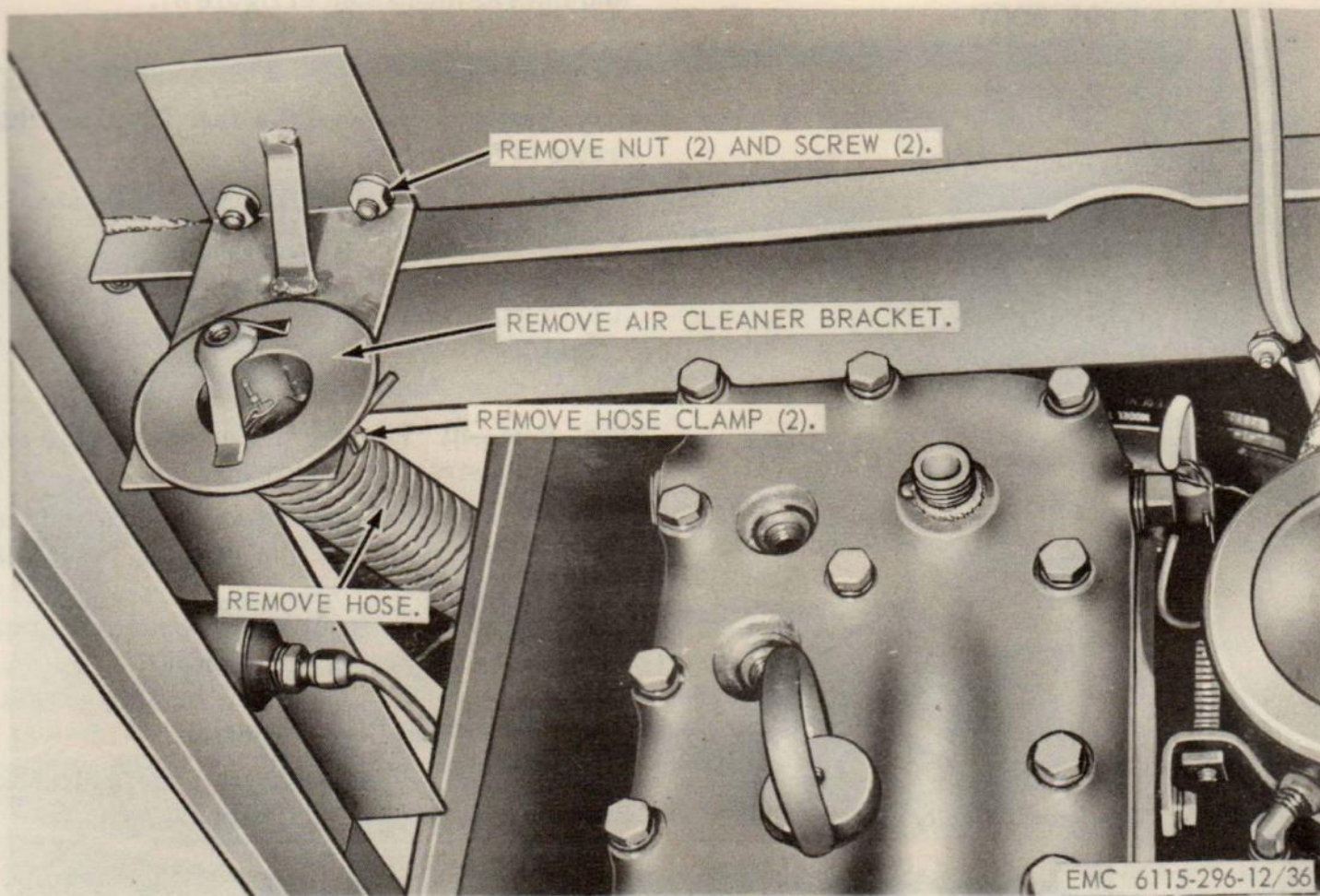


Figure 36. Air cleaner bracket and hose, removal and installation.

b. Cleaning and Inspection. Clean and inspect. Replace a defective throttle and choke control.

c. Installation. Install the throttle and choke controls as illustrated in figure 39.

95. Engine Speed Governor

a. Removal. Remove the engine speed governor as illustrated in figure 40.

b. Cleaning and Inspection. Clean and inspect. Replace a defective engine speed governor.

c. Installation. Install the engine speed governor as illustrated in figure 40.

d. Adjustment.

- (1) Start the engine (par. 17) and allow it to reach normal operating temperature.

- (2) Loosen locknuts and move eyebolt in toward the engine to increase governor speed and out to decrease governor speed.

- (3) Adjust governor speed until cycle meter registers 61.5 cycles (no load).

- (4) Shut down the engine (par. 18). Inspect the length of the governor connecting rod to determine if the carburetor is wide open when the arm of the governor assembly is pushed toward the radiator to the full limit of its travel. If the carburetor is not wide open, adjust as follows:

- (a) Shut down the engine (par. 18).

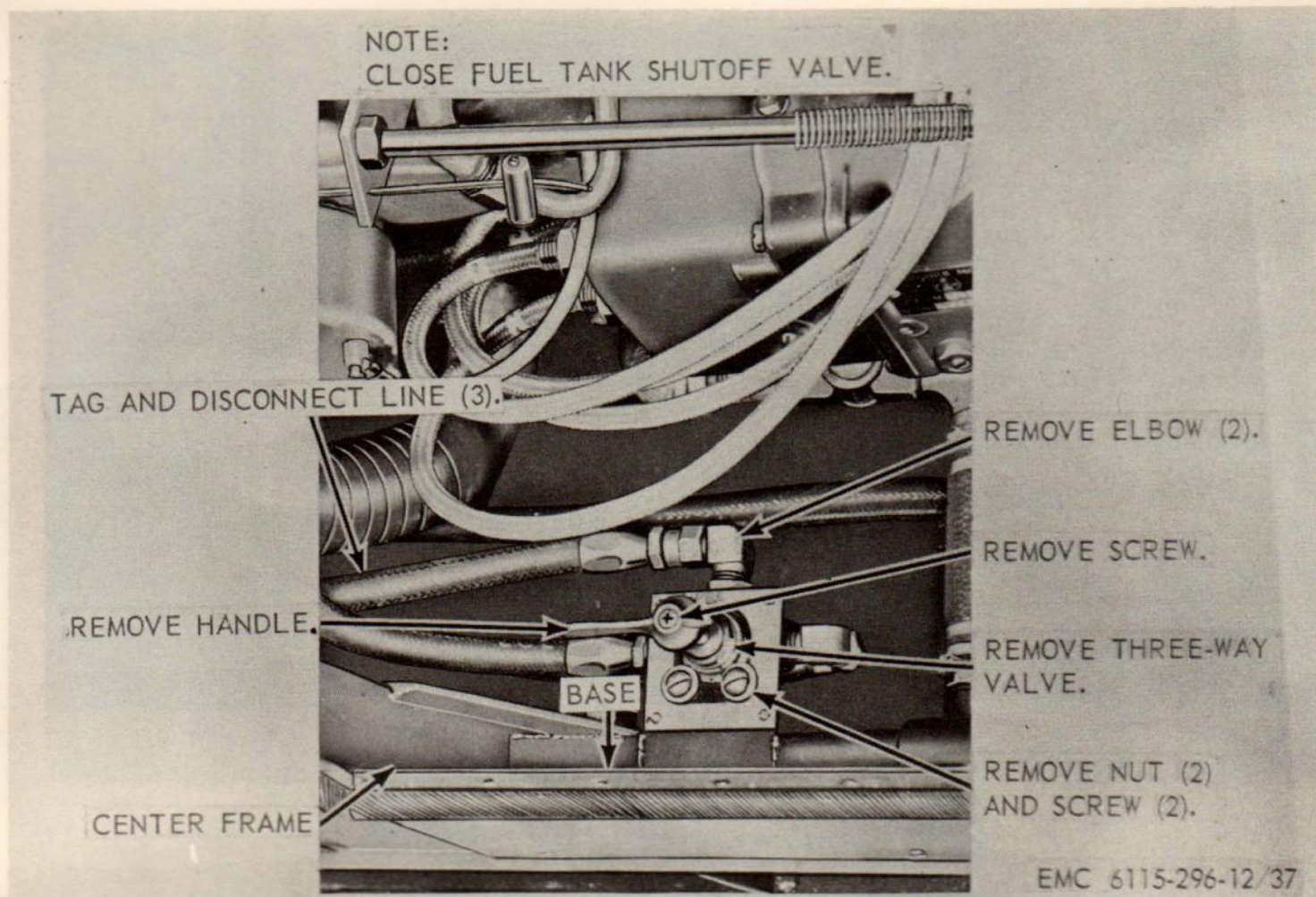


Figure 37. Three-way valve and lines, removal and installation.

- (b) Free the governor connecting rod from the carburetor (par. 87).
- (c) Loosen the locknut and adjust the position of the ball joint assembly on the governor connecting rod so that the governor connecting rod will hold the carburetor to its wide open position when the arm of the governor assembly is pushed firmly toward the radiator.
- (d) Tighten the locknut against the ball joint assembly.
- (e) Reconnect the governor connecting rod with the carburetor (par. 87).
- (5) Start the engine (par. 17). Inspect the ball joints for free operation and adjust the governed engine speed as described in (2) and (3) above if necessary.

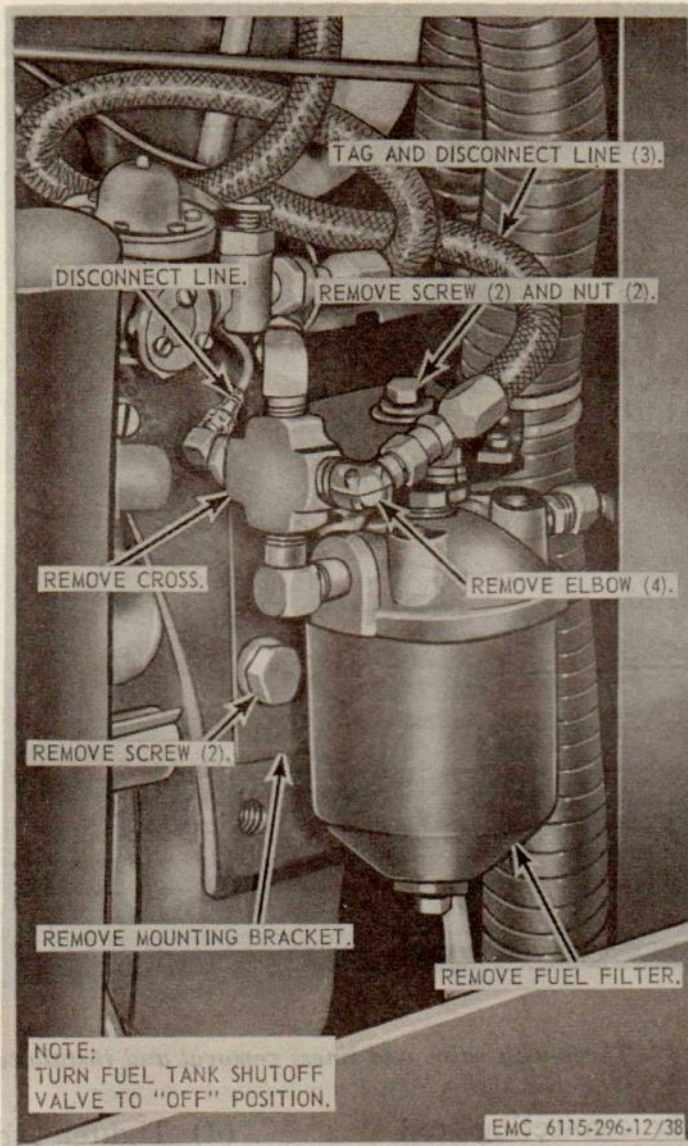
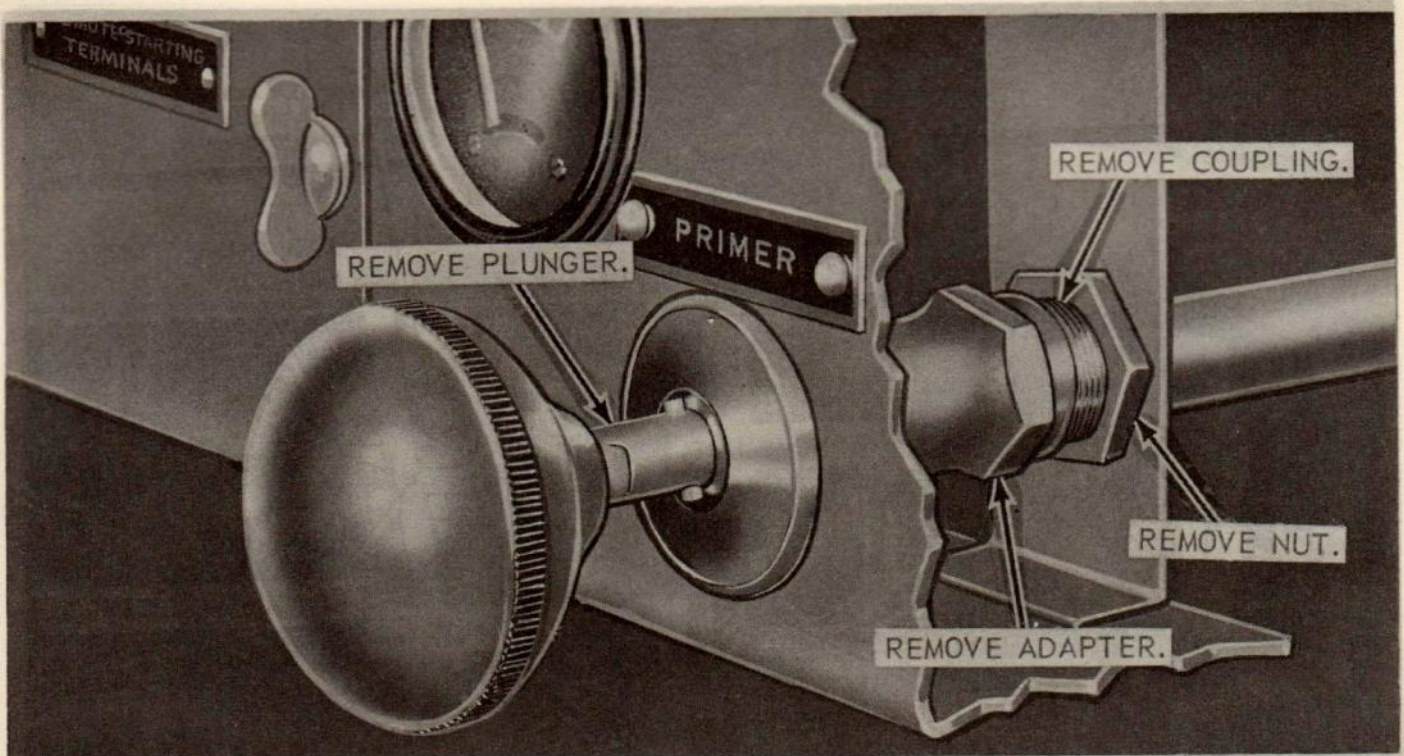


Figure 38. Fuel filter, removal and installation.



A

EMC 6115-296-12/39 ①

A—Priming pump removal point

Figure 39. Priming pump, lines, choke and throttle cables, removal and installation.

EMC 6115-296-12/39

B

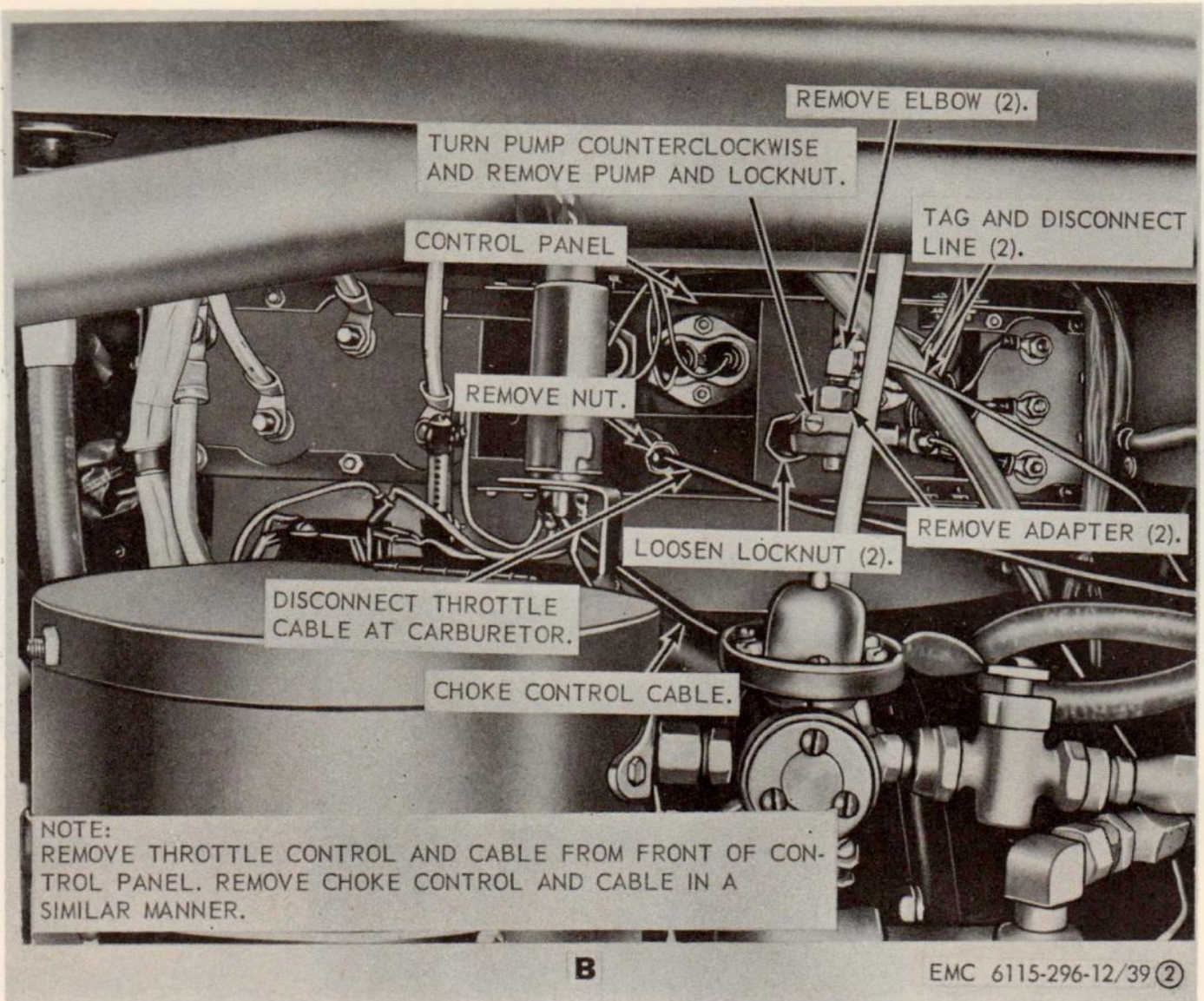
Remove the hood and front panel (see figure 32).
 Remove the shutter controls and shutter as illustrated in figure 43.
 Disassemble the shutter controls as illustrated in figure 44.

37. Hose, Lines, and Fittings

- a. Removal. Remove the hose, lines, and fittings as illustrated in figure 41.
- b. Clean-up and Inspection. Clean and inspect. Replace damaged hose, lines, and fittings.
- c. Installation. Install the hose, lines, and fittings as illustrated in figure 41.

39. Shutter Controls and Shutter

- a. Removal.
 - (1) Remove the hood and front panel (see 32).
 - (2) Remove the shutter controls and shutter as illustrated in figure 43.
- b. Disassembly. Disassemble the shutter controls as illustrated in figure 44.



B—Engine control panel rear view

Figure 39—Continued.

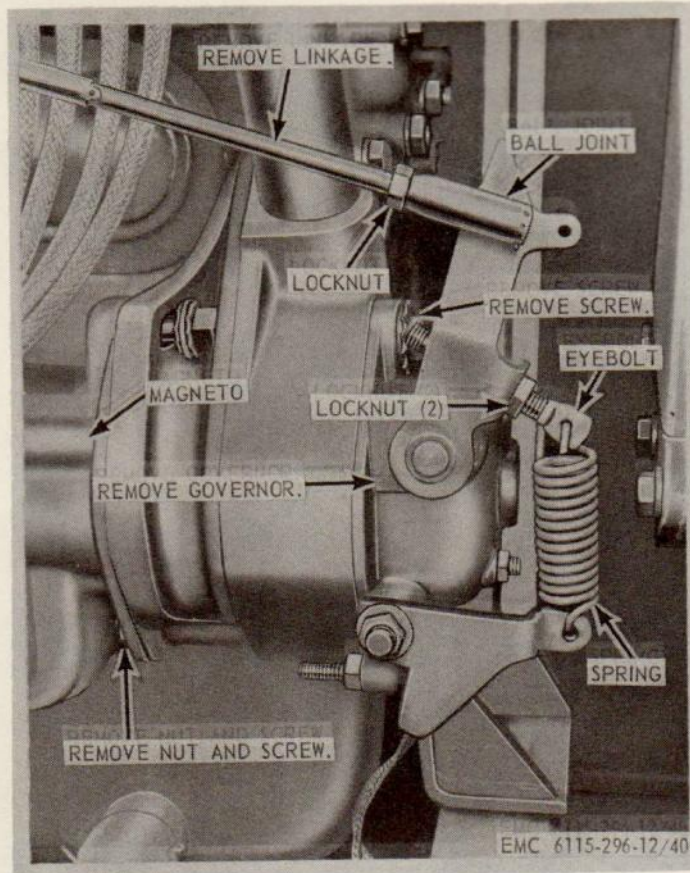


Figure 40. Engine speed governor, removal and installation.

Section XI. COOLING SYSTEM

96. General

The cooling system fan draws cooling air through the housing and radiator assembly. The fan, driven by a V-belt from the crankshaft, is located behind the radiator. The flow of outside cooling air through the generator set is governed by an automatic shutter and control. Coolant is circulated through the engine and radiator by the water pump.

97. Hose, Lines, and Fittings

a. Removal. Remove the hose, lines, and fittings, as illustrated in figure 41.

b. Cleaning and Inspection. Clean and inspect. Replace damaged hose, lines, and fittings.

c. Installation. Install the hose, lines, and fittings as illustrated in figure 41.

98. Shroud and Fan Guard

a. Removal. Remove the fan guard and shroud as illustrated in figure 42.

b. Cleaning and Inspection. Clean and inspect. Replace damaged shroud and fan guard.

c. Installation. Install the shroud and fan guard as illustrated in figure 42.

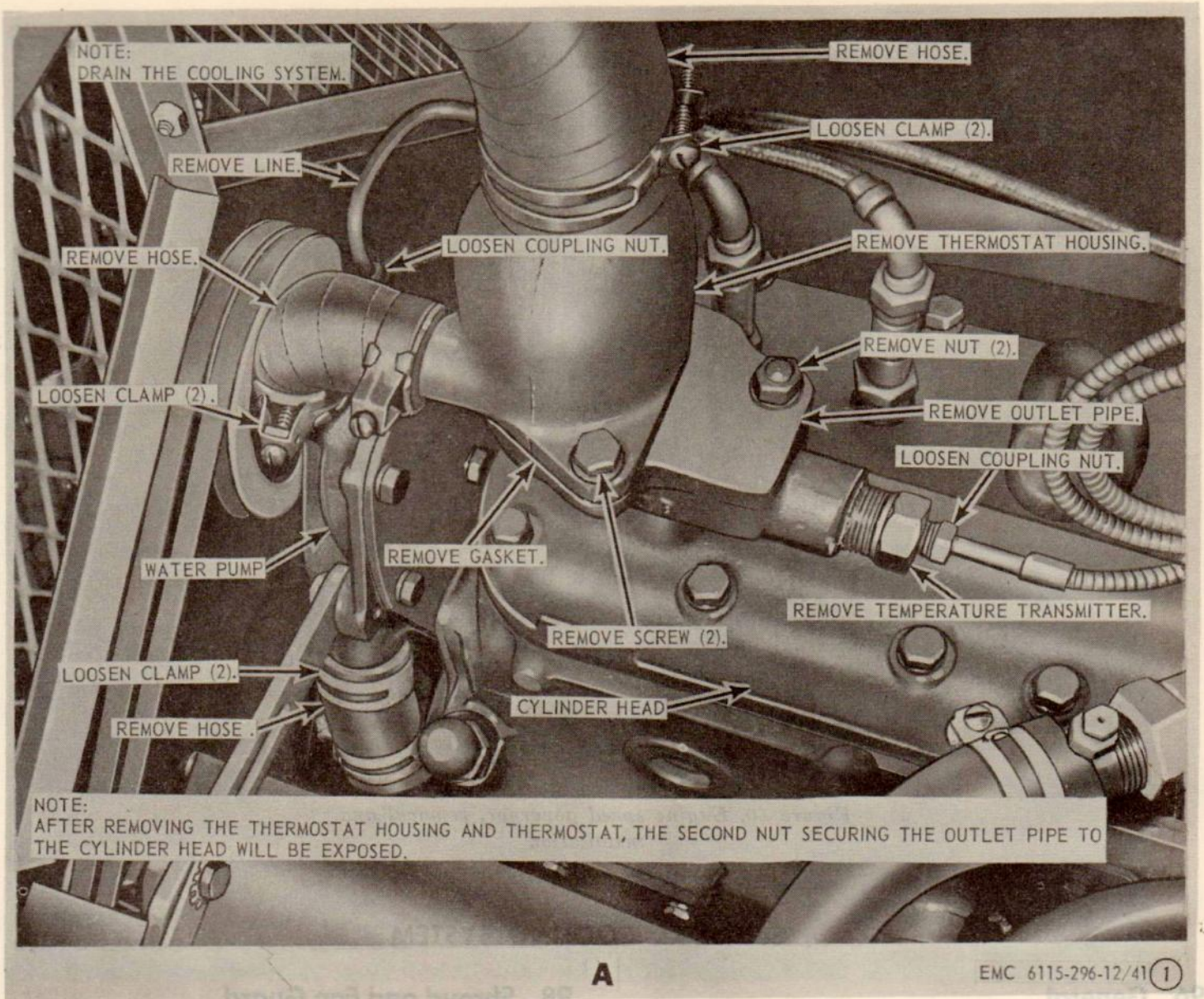
99. Shutter Controls and Shutter

a. Removal.

(1) Remove the hood and front panel (par. 82).

(2) Remove the shutter controls and shutter as illustrated in figure 43.

b. Disassembly. Disassemble the shutter controls as illustrated in figure 44.



A—Upper radiator hose, water pump hose, and thermostat housing removal

Figure 41. Hose, lines, fittings, and thermostat housing, removal and installation.

c. *Cleaning and Inspection.* Clean and inspect. Replace or repair worn, damaged, or defective parts.

d. *Reassembly.* Reassemble the shutter controls as illustrated in figure 44.

e. *Installation.*

- (1) Install the shutter controls and shutter as illustrated in figure 43.
- (2) Install the front panel and hood (par. 82).

100. Radiator

a. *Removal.*

- (1) Drain the cooling system.

- (2) Remove cooling system hose (par. 97).

- (3) Remove the shutter controls and shutter (par. 99).

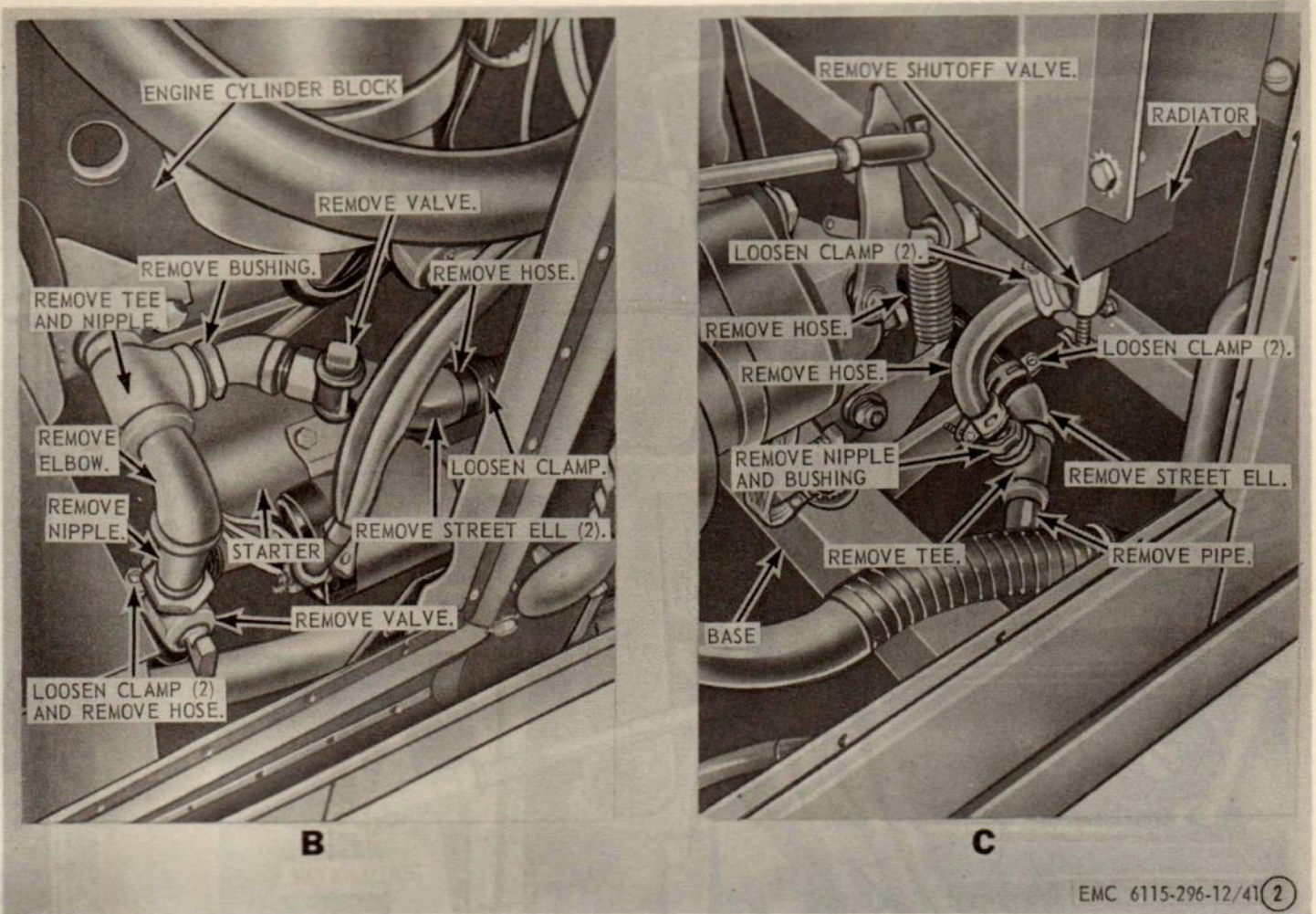
- (4) Remove the hood and panels (par. 82).

- (5) Remove the radiator as illustrated in figure 43.

b. *Cleaning and Inspection.* Clean and inspect. Replace a defective radiator.

c. *Installation.*

- (1) Install the radiator as illustrated in figure 43.



B—Engine cylinder block lines and fittings removal

C—Lower radiator hose and fittings removal

Figure 41—Continued.

- (2) Install the shutter controls and shutter (par. 99).
- (3) Install the cooling system hose (par. 97).
- (4) Install the hood and panels (par. 82).
- (5) Fill the cooling system.

101. Fan V-Belt and Fan

a. Removal.

- (1) Remove the fan guard and shroud (par. 98).
- (2) Remove the fan V-belt and fan as illustrated in figure 45.

b. *Cleaning and Inspection.* Clean and inspect. Replace defective V-belt and fan.

c. Installation.

- (1) Install the fan V-belt and fan as illustrated in figure 45.
- (2) Install the shroud and fan guard (par. 98).

Note. After installation adjust the fan belt as illustrated in figure 26.

102. Thermostat Housing and Thermostat

a. *Removal.* Remove the thermostat housing and thermostat as illustrated in figure 41.

b. *Cleaning, Inspection, and Testing.*

- (1) Clean and inspect. Replace a defective thermostat housing and thermostat.

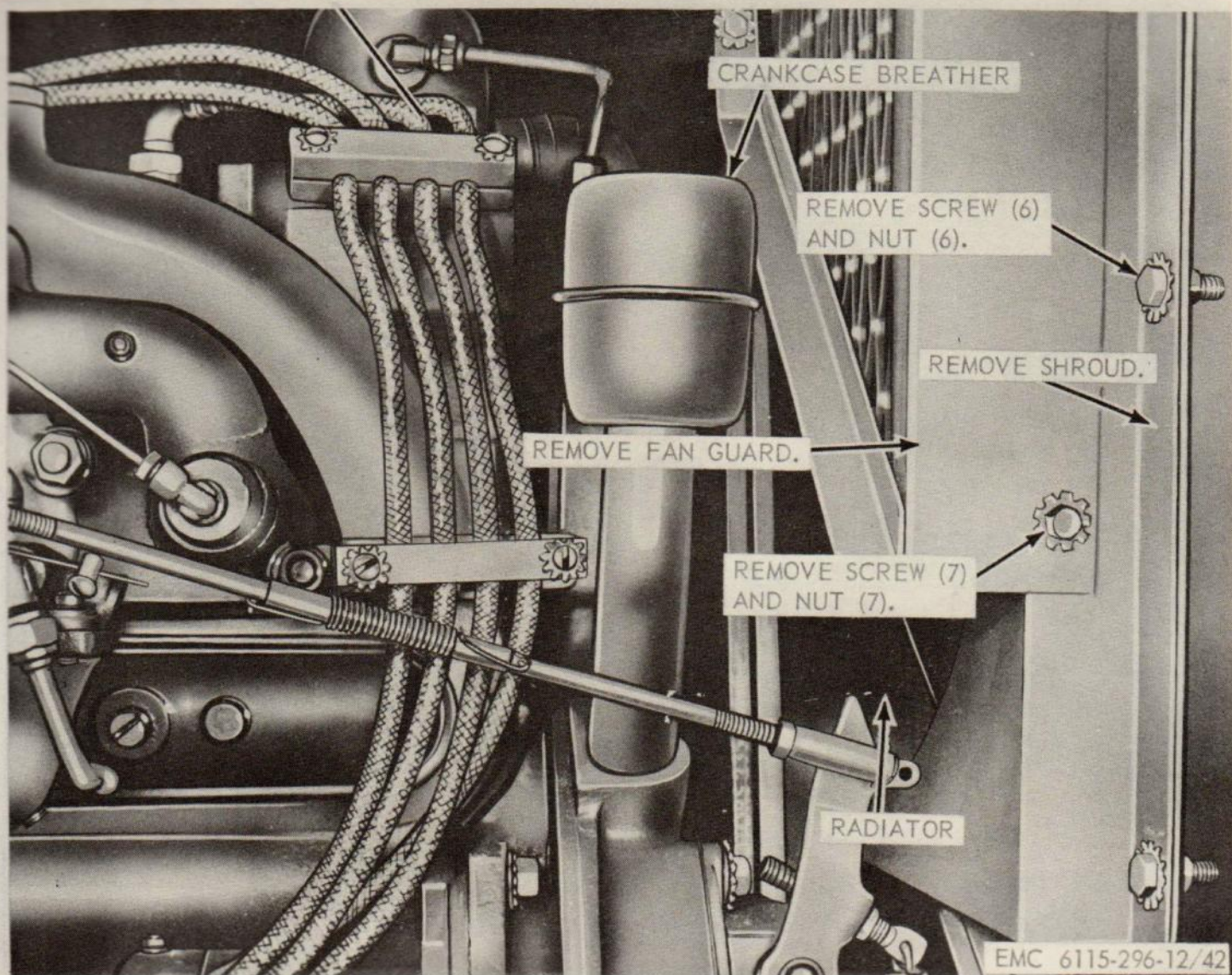


Figure 42. Fan guard and shroud, removal and installation.

(2) To test, place the thermostat in water and heat slowly. Thermostat should start to open at 160° F. and be fully open at 180° F. Replace a defective thermostat.

c. *Installation.* Install the thermostat housing and thermostat as illustrated in figure 41.

103. Water Pump

a. Removal.

- (1) Drain the cooling system.
- (2) Remove the water pump hose (par. 97).

(3) Remove the shroud (par. 98), fan V-belts, and fan (par. 101).

(4) Remove the water pump as illustrated in figure 46.

b. *Cleaning and Inspection.* Clean and inspect. Replace a defective water pump.

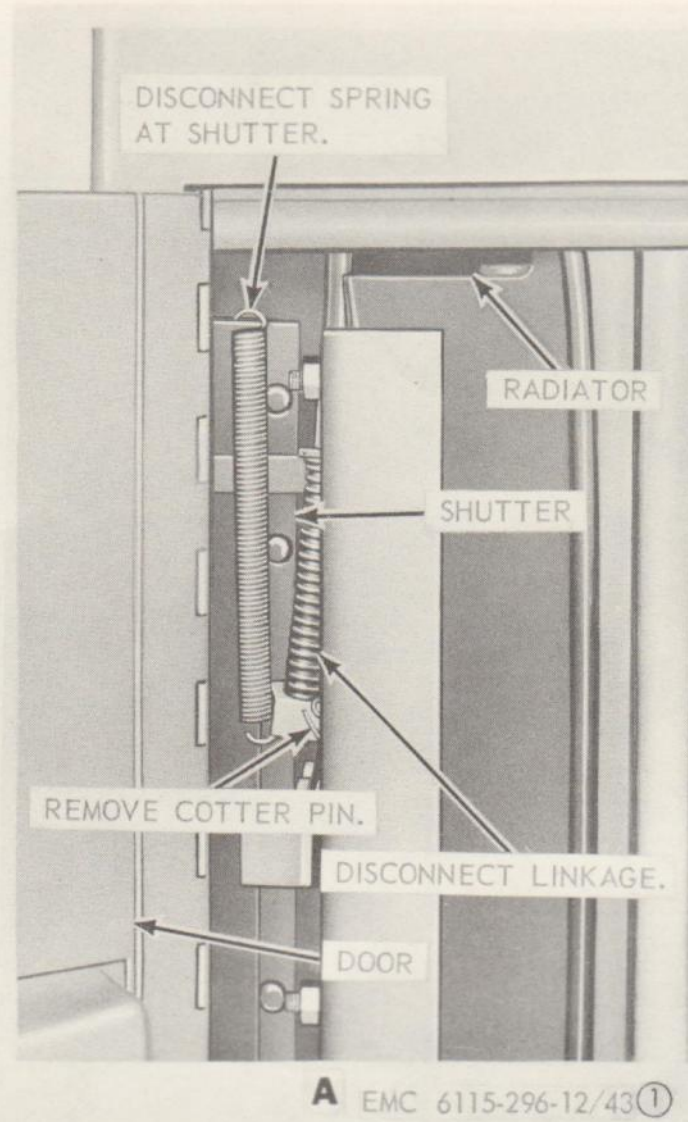
c. Installation.

(1) Install the water pump as illustrated in figure 46.

(2) Install the water pump hose (par. 97).

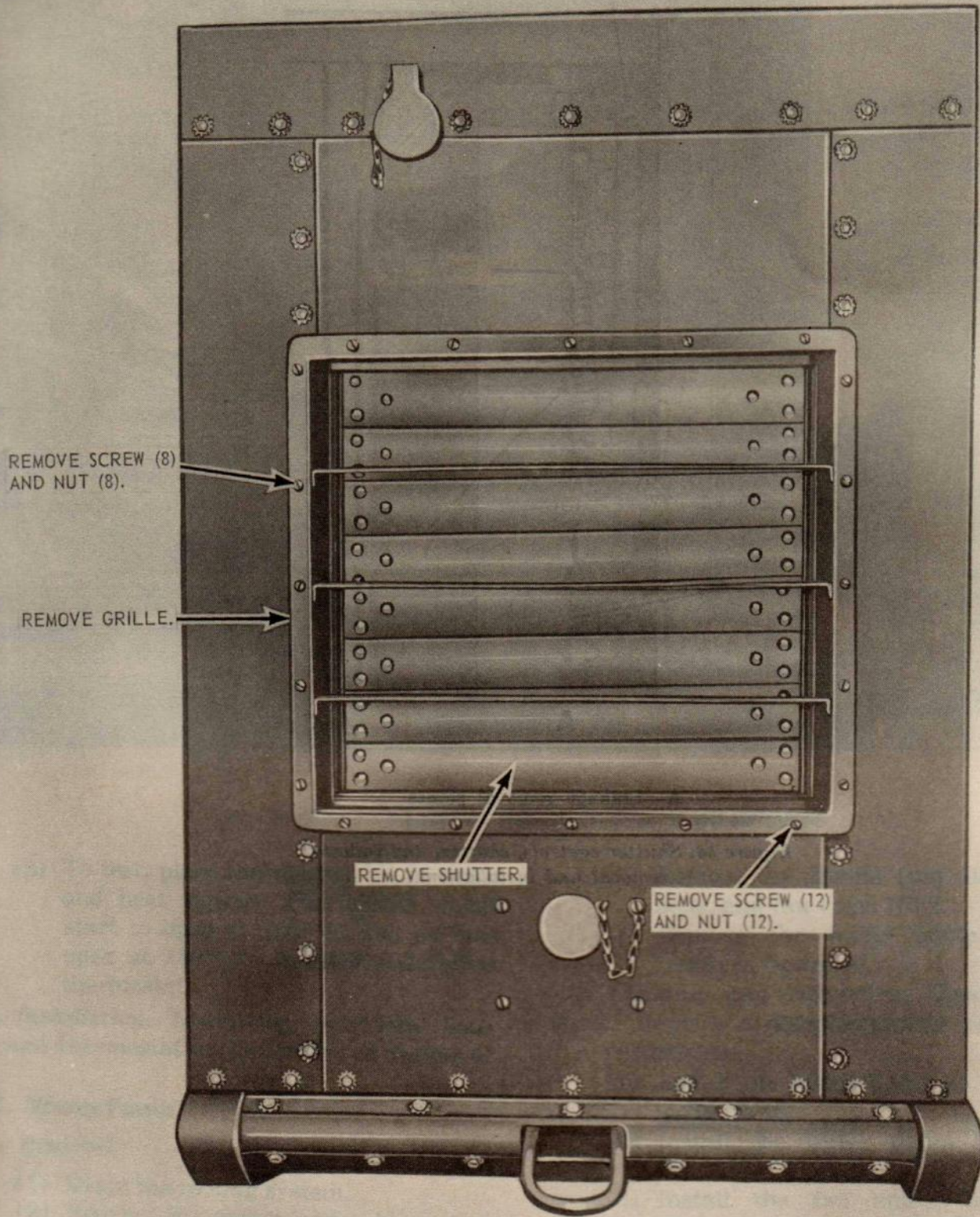
(3) Install the fan and V-belts (par. 101), and the shroud (par. 98).

(4) Fill the cooling system.



A—Linkage removal points

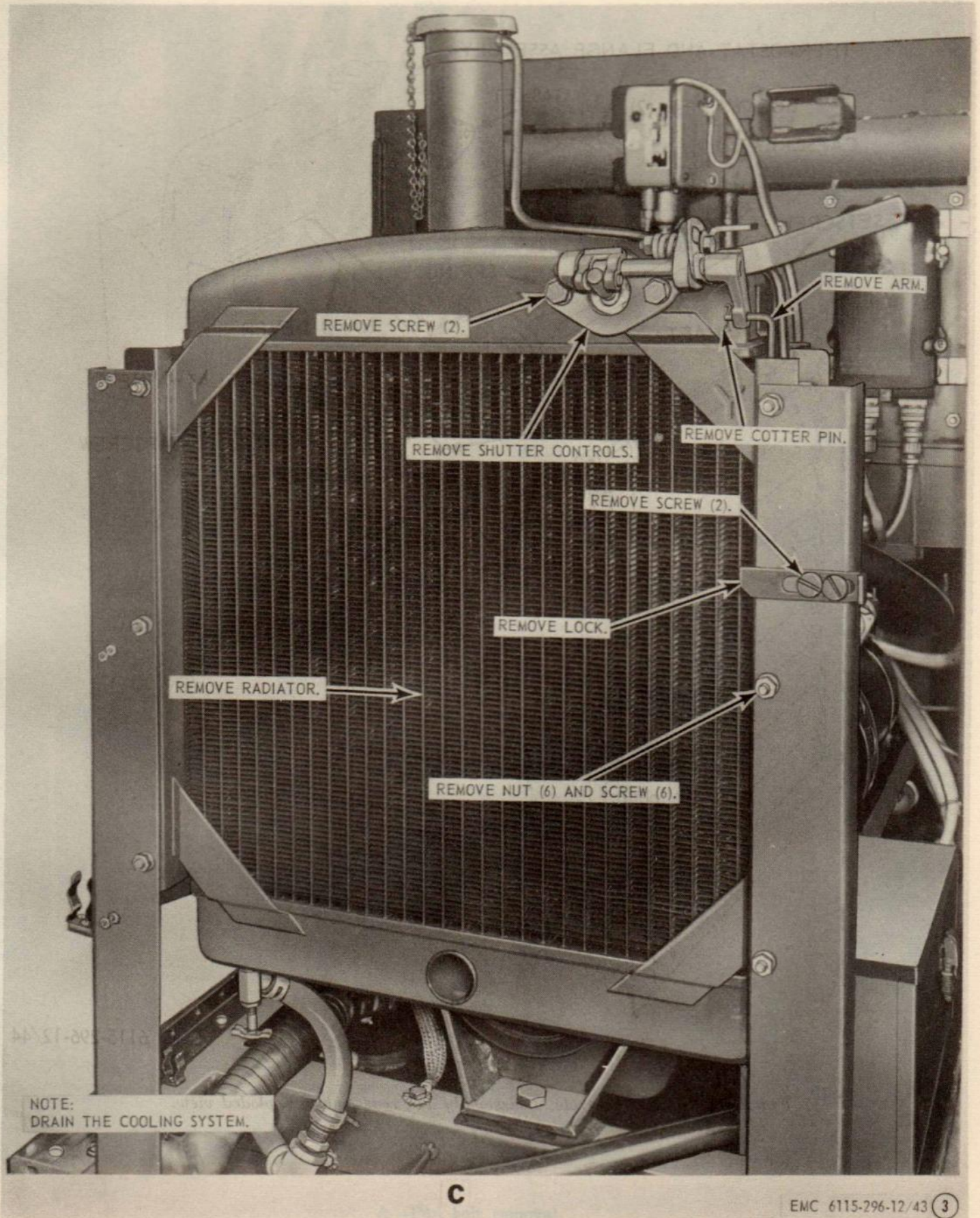
Figure 43. Shutter controls, shutter, and radiator, removal and installation.



B

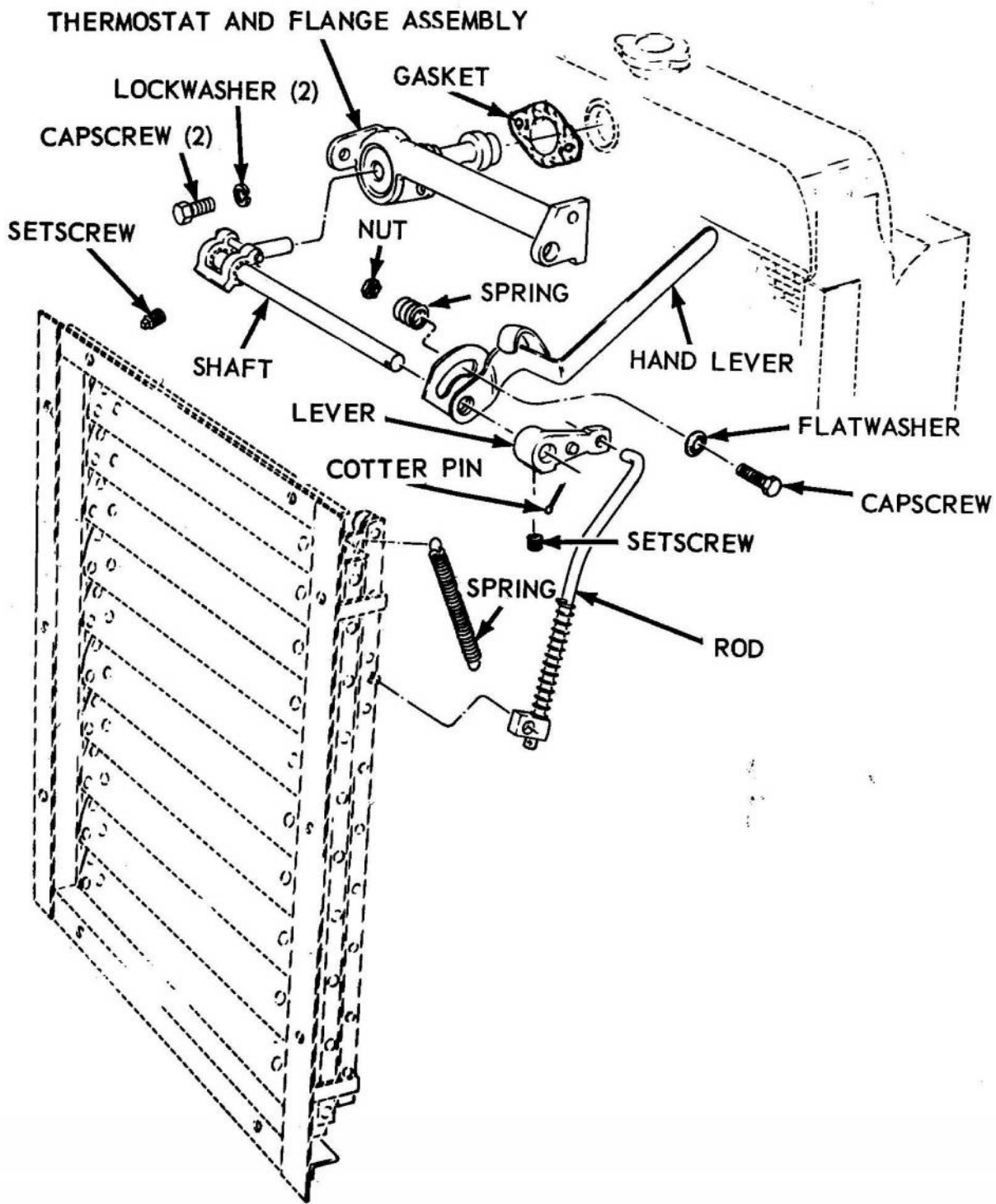
EMC 6115-296-12/43 (2)

B—Shutter removal points
Figure 43—Continued.



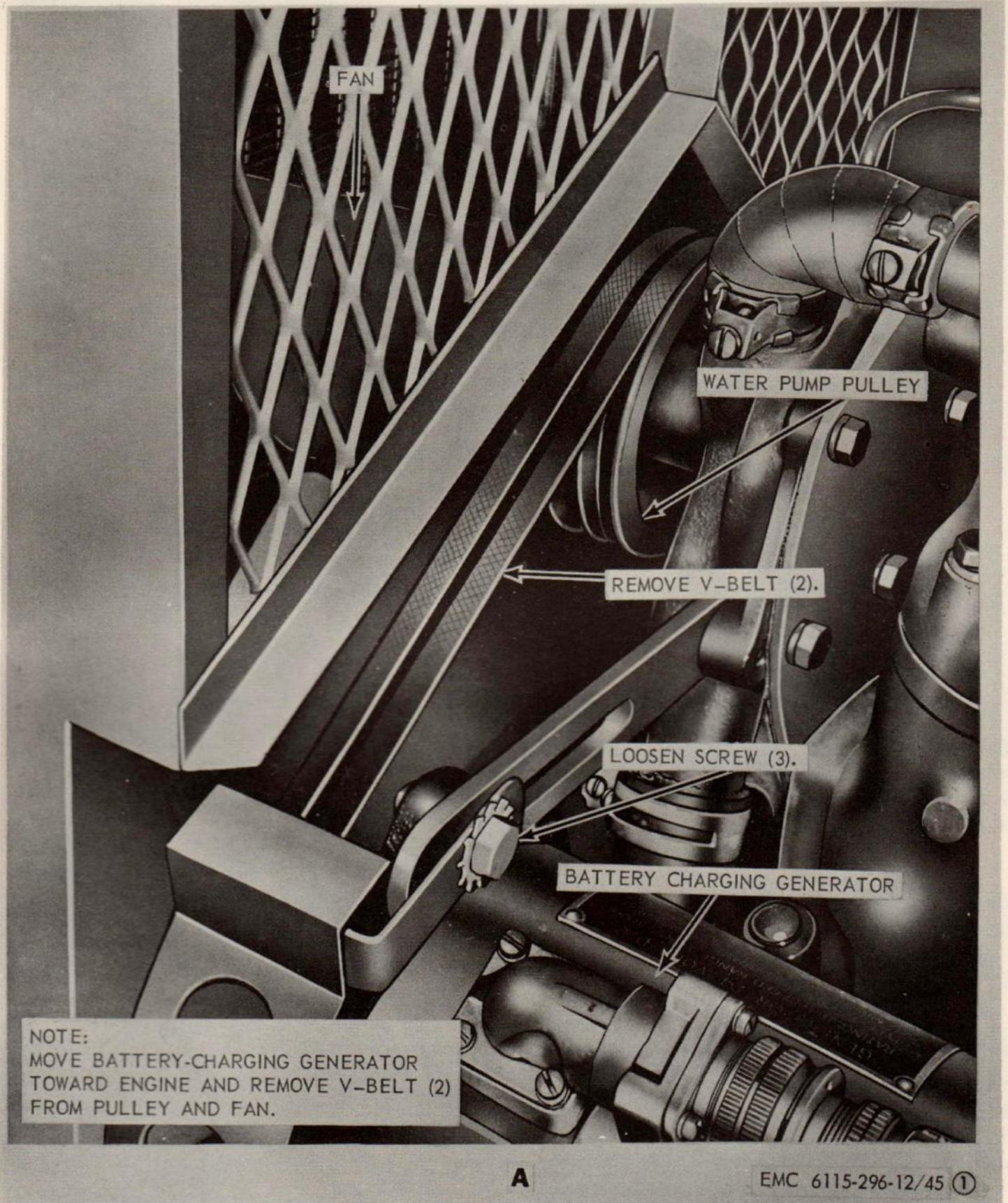
C—Radiator and shutter controls removal points

Figure 43—Continued.



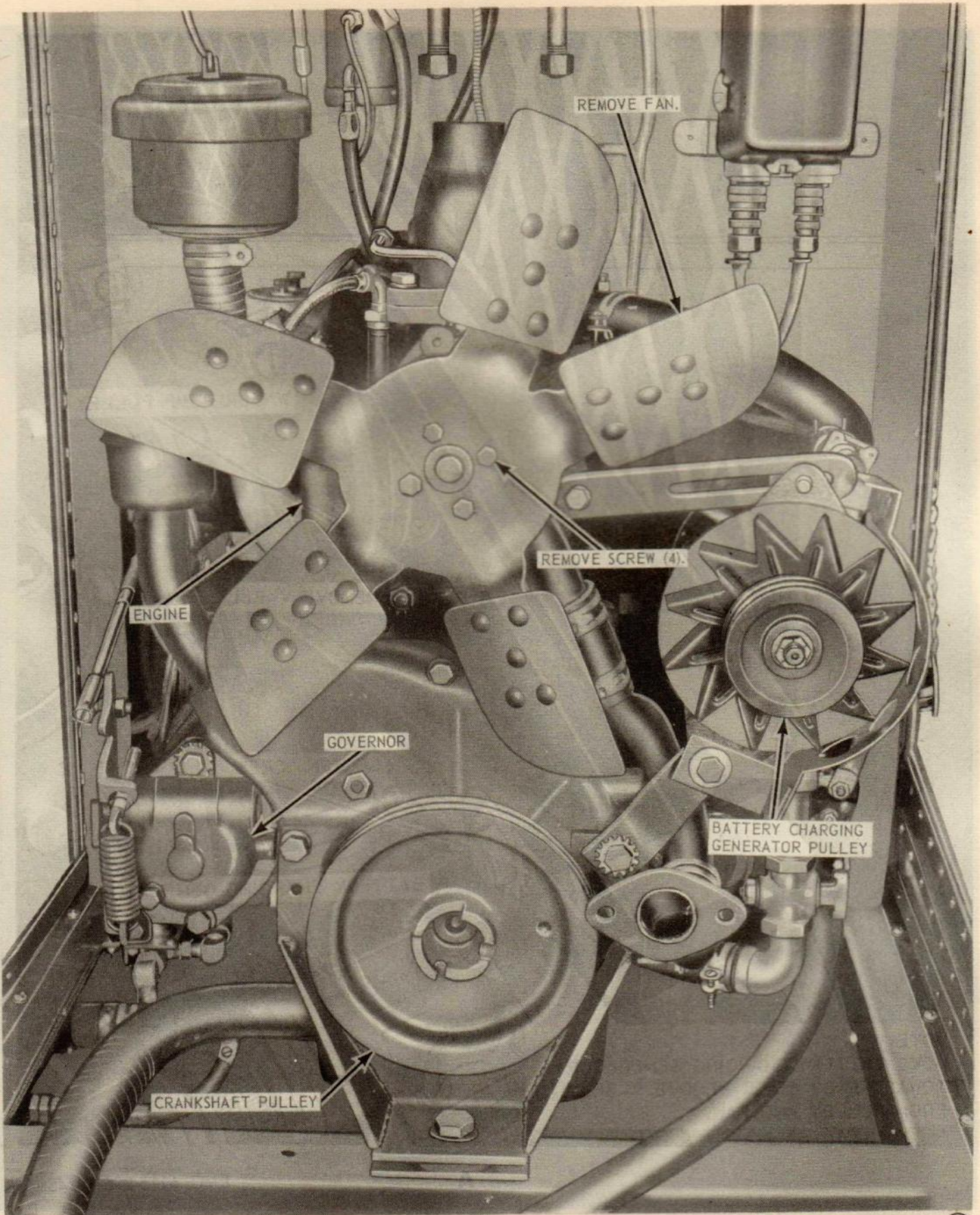
EMC 6115-296-12/44

Figure 44. Shutter controls, disassembly and reassembly, exploded view.



A—Fan belt removal

Figure 45. Fan V-belt and fan, removal and installation.



B

EMC 6115-296-12/45 (2)

A—Fan belt removal

B—Fan removal
Figure 45. Fan V-belt and installation.

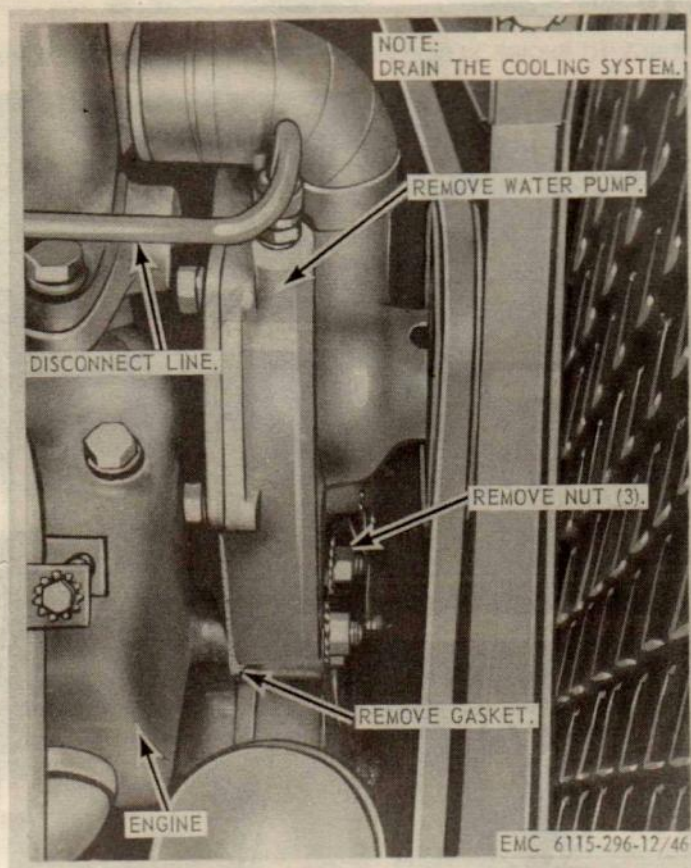


Figure 46. Water pump, removal and installation.

Section XII. ELECTRICAL SYSTEM

104. General

The engine electrical system provides starting and stopping of the engine either at the unit or from a remote location. Two series connected, 12-volt batteries furnish 24 volts to the panel lights, engine controls, and engine starting motor, while the ignition spark current is generated and timed by the magneto. The output of the battery-charging generator is controlled as to amperes and voltage by the battery-charging generator regulator. A pressure switch and a thermostatic switch stop the engine by actuating the stop relay which grounds out the magneto current whenever the oil pressure is too low or the coolant temperature is too high.

105. Battery-Charging Generator and Brackets

a. Removal. Remove the battery-charging generator and brackets as illustrated in figure 47.

b. Fan, Pulley, and Brush Replacement. Replace the battery-charging generator fan, pulley, and brushes as illustrated in figure 48.

c. Cleaning and Inspection. Clean and inspect all parts and replace as necessary.

d. Installation and Testing.

- (1) Install the battery-charging generator and bracket as illustrated in figure 47.
- (2) Test the battery-charging generator (TM 5-764).

106. Battery-Charging Generator Regulator

a. Removal. Remove the battery-charging generator regulator as illustrated in figure 49.

b. Cleaning and Inspection. Clean and inspect the battery-charging generator regulator and replace as necessary.

c. Installation. Install the battery-charging generator.

d. Testing and Adjusting.

- (1) *Armature airgap adjustment.*

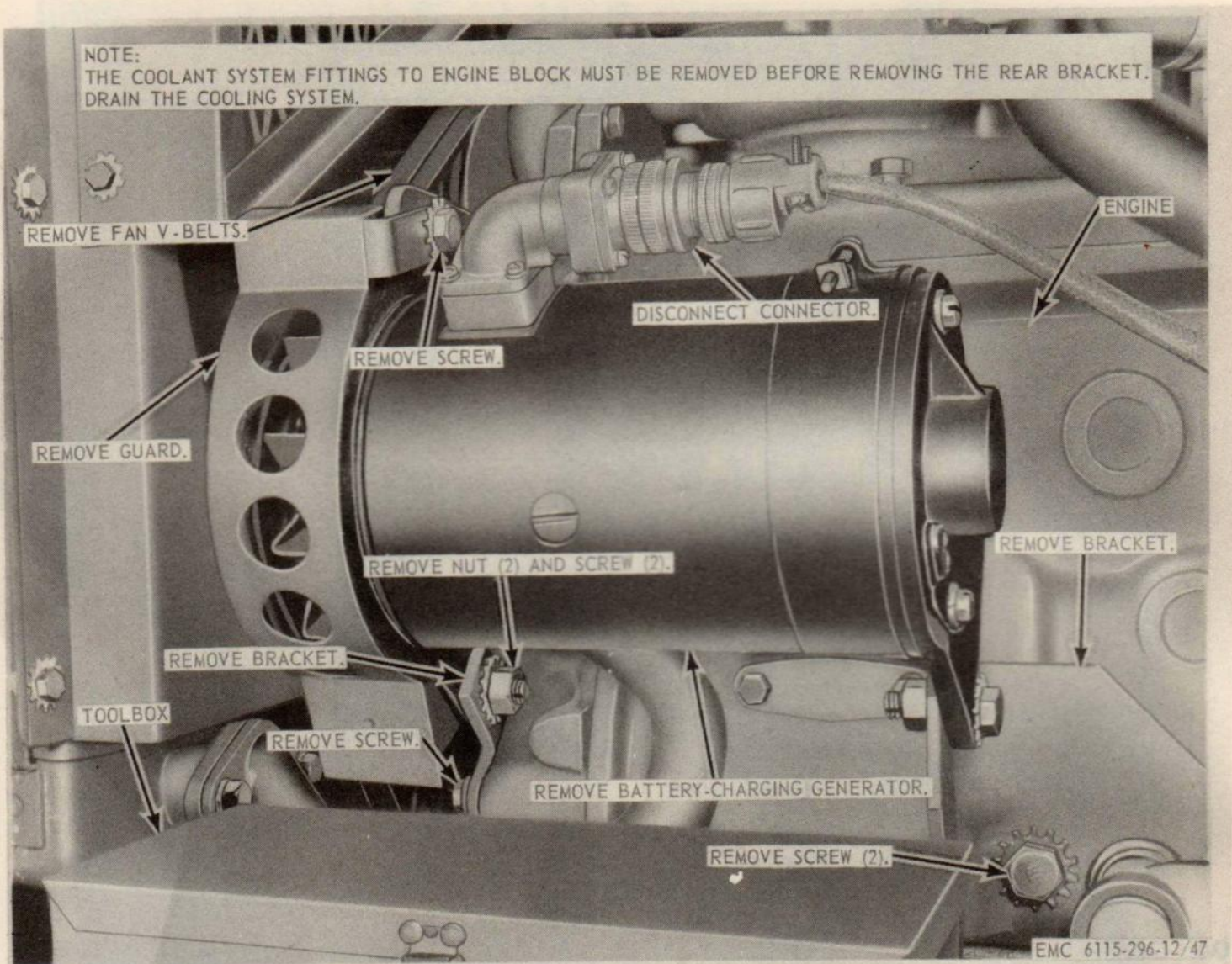
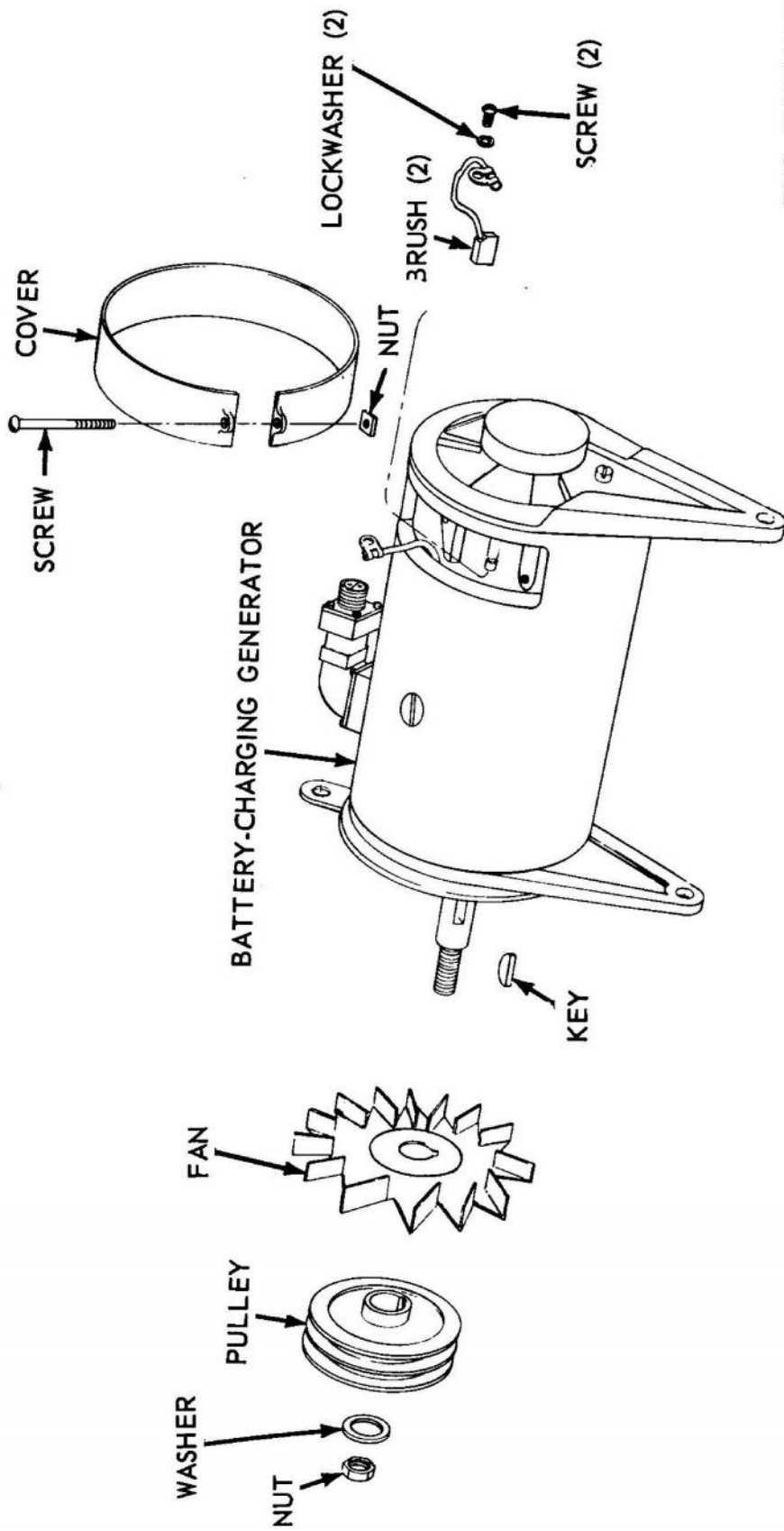


Figure 47. Battery-charging generator and brackets, removal and installation.

- (a) *Circuit breaker unit.* Remove regulator cover. Use a pin gage of correct limits and insert gage between the armature and core on the contact side and next to brass pin in core. Refer to figure 50. Adjust gap by bending the armature stop. Be sure stop does not interfere with armature movement.
- (b) *Voltage regulator unit.* Connect battery and lamp in series "A" and "B" terminals to indicate when contacts are opened and closed. Insert a pin gage of correct dimension between the armature and core. Hold armature down with two fingers so the contact spring is not touched.

Adjust gap so the lamp will burn brightly when the high limit gage is in place, and will dim or go out when low limit gage is in place. Adjust gap by slightly loosening screws holding the armature stop, and raising or lowering stop. Tighten screws and check gap. Repeat until correct adjustment is obtained.

- (c) *Current regulator unit.* Check and adjust the current regulator unit as described in (b) above, using correct gage.
- (2) *Checking gap between contact spring and gap.*



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Figure 48. Battery-charging generator pulley, fan, and brush replacement.

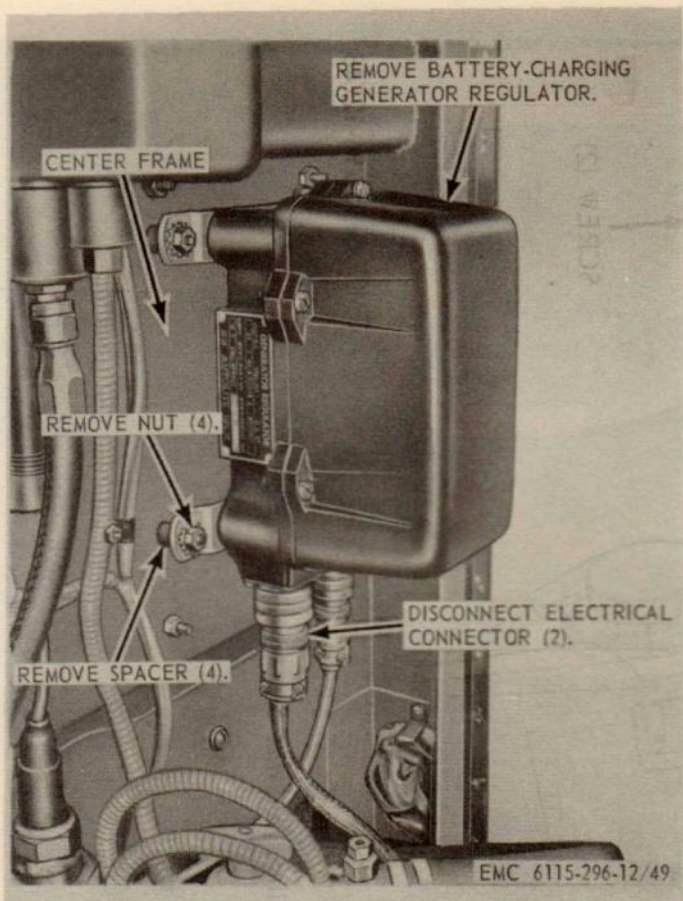


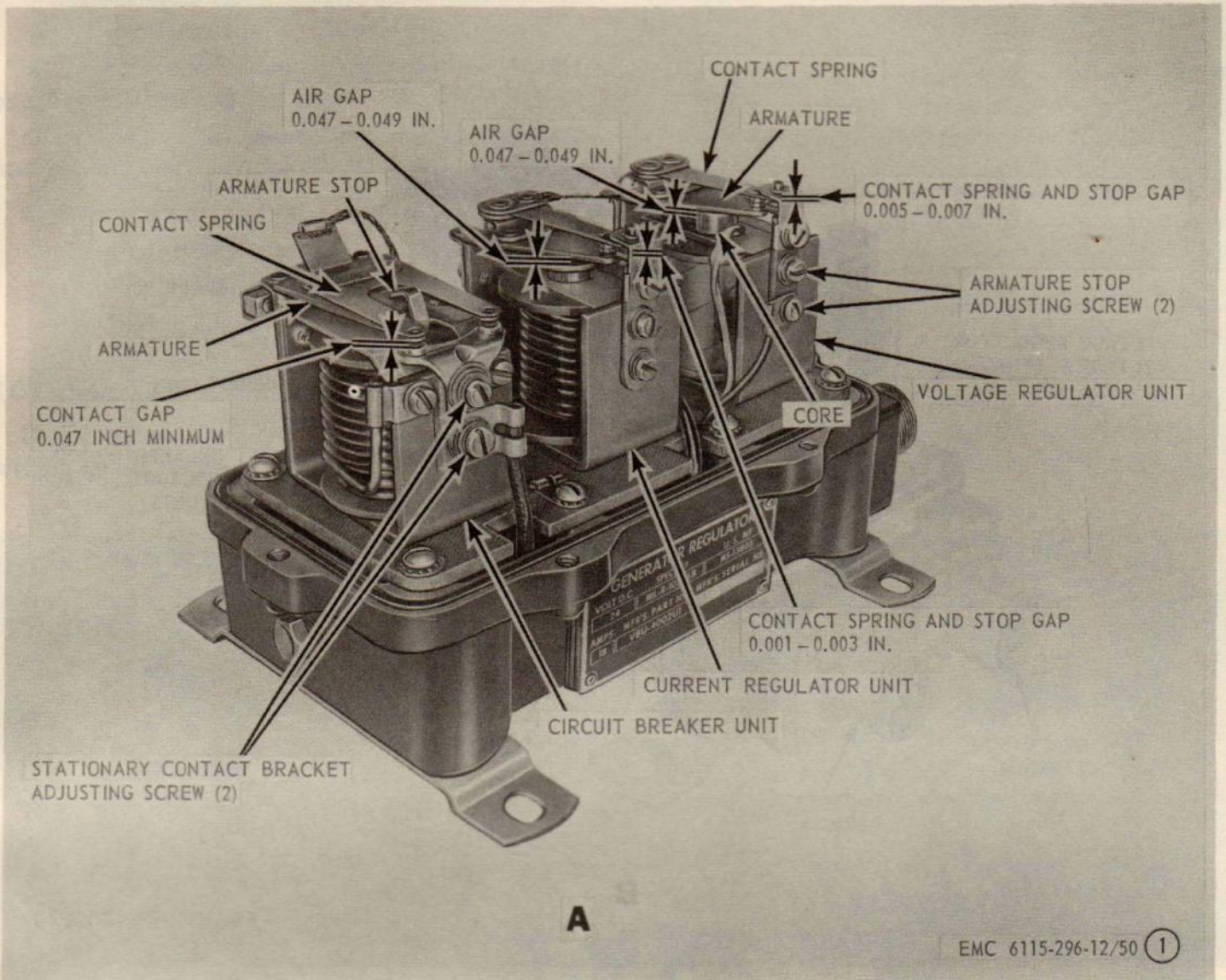
Figure 49. Battery-charging generator regulator, removal and installation.

- (a) *Voltage regulator unit.* Hold the armature down against the core stop and, with feeler gage, measure gap between the contact spring and armature stop. If gap is not between 0.005 and 0.007 inch, inspect the bumper block for damage or improper assembly.
- (b) *Current regulator unit.* The same procedure as described for voltage regulator applies to the current regulator unit, except the gap should be between 0.001 and 0.003 inch.
- (3) *Circuit breaker contact point gap measurement.* Measure gaps of both sets of contacts. Do not set this gap to less than 0.047 inch. Slightly loosen stationary contact bracket screws to adjust gaps and aline contacts so contact is made and broken on both sets of contacts at the same time.

(4) *Testing.*

(a) *Circuit breaker.*

1. Mount the regulator on a test stand in the same position as it is mounted on the equipment. Use generator of the proper type and mount it on test stand. Connect battery for correct voltage and polarity.
2. Connect the test stand battery ground lead to the generator frame and connect other battery lead to the regulator battery terminal. Connect generator "ARM" terminal to regulator "A" terminal and connect variable resistance in series with generator "FIELD" and regulator "B" terminals. Run a ground lead from generator frame to regulator ground screw. Connect voltmeter from regulator ground screw to regulator "A" terminal.
3. Polarize the generator to prevent burning regulator contacts; remove generator field lead from variable resistance, close test stand battery switch and momentarily touch field lead to regulator "Bat" terminal, then connect field lead to variable resistance as above.
4. Insert all the resistance in field circuit. Start the generator and operate at 1,000 to 2,000 rpm. Decrease the field resistance slowly, noting voltmeter reading just before change caused by closing of the circuit breaker. Decrease resistance until ammeter shows a charge of about 9 amperes, then increase resistance slowly. Note amperage discharge just before contacts open and ammeter reading drops to zero.
5. Adjust the closing voltage to 25.5 to 26.5 volts by turning the thumbnut on the lower end of armature spring. Recheck closing voltage after each adjustment.



A—Airgap and contact gap

Figure 50. Voltage regulator adjustment.

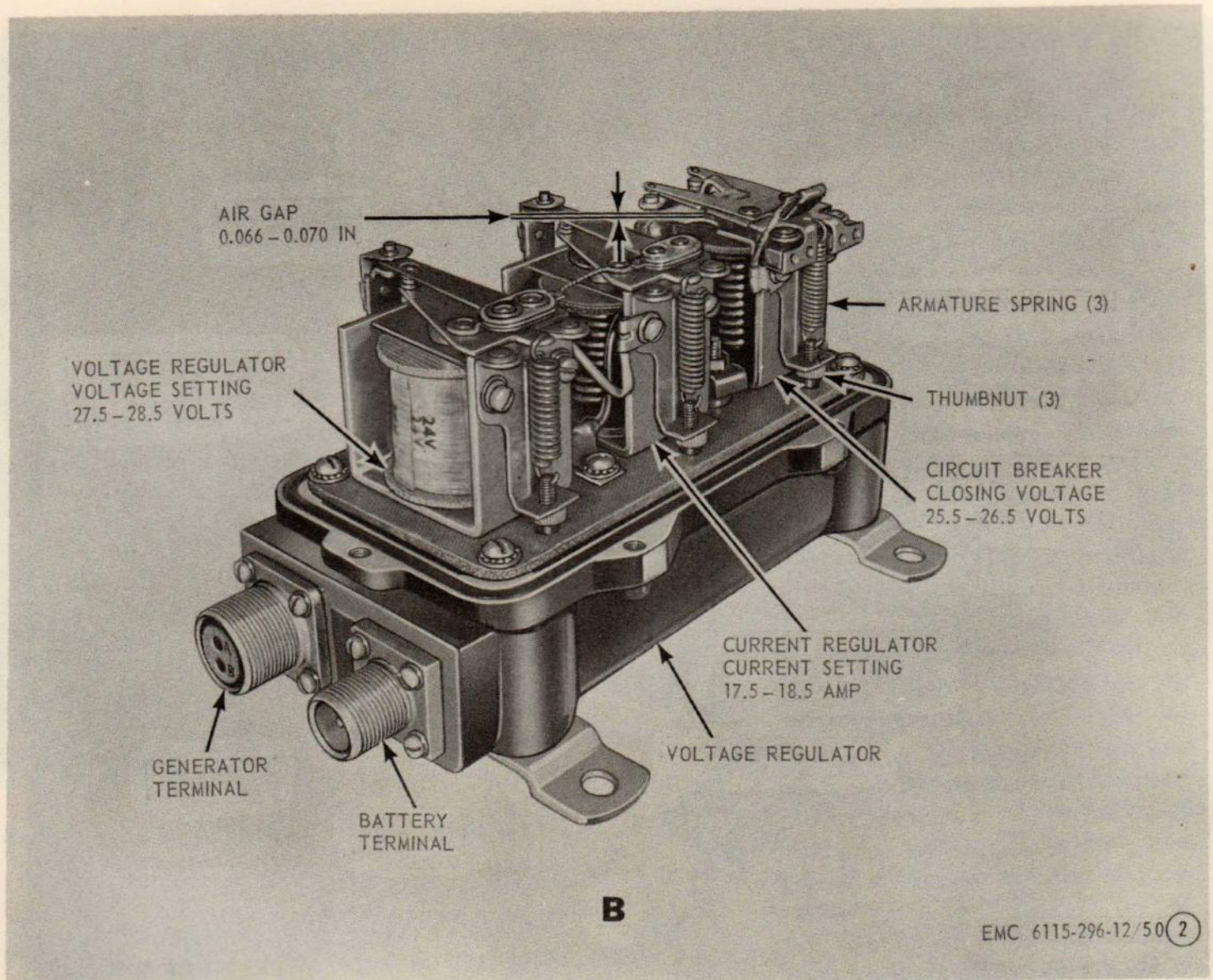
6. Adjust the opening discharge current to 17.5 to 18.5 amperes by raising or lowering the stationary contacts. Open the test stand battery switch to prevent shorting. Bend the stationary contact brackets to increase or decrease contact gap. Increasing contact gap increases opening discharge amperes. Keep the contacts alined for full face contact and adjust both sets of contacts so they operate simultaneously. Do not adjust gap between contacts

when open to less than 0.047 inch.

7. Open the test stand battery switch.
(b) Voltage and current regulator.

1. Remove the variable resistance from the field circuit. Change voltmeter connections so that it is connected to regulator base and "Bat" terminal. Connect variable load across battery. This load may consist of a carbon pile or lamp bank.

2. Close test stand battery switch and operate generator at 2,500 to



B—Voltage, current, and closing settings

Figure 50—Continued.

3,000 rpm. Hold the voltage regulator contacts closed by pressing lightly on the back of the voltage regulator armature and read ammeter. If this is within two amperes of correct setting do not adjust. If the current setting is not within two amperes, turn the adjusting nut on the lower end of current regulator armature spring. Release voltage regulator armature. Stop generator, then start and bring speed up to 2,500 to 3,000 rpm. Adjust the current to about 9 am-

peres by changing the load rheostat or lamp banks. Read the voltmeter. If this reading is 27.5 to 28.5 volts, do not adjust. If voltage is not within these approximate settings, turn the adjusting nut on lower end of armature spring. Stop generator and open test stand battery switch.

3. Install the cover gasket and cover on regulator.

107. Starter and Solenoid Relay

a. Removal.

- (1) Remove coolant lines (par. 97).

- (2) Remove the starter and solenoid relay as illustrated in figure 51.

b. Brush Replacement. Replace the starter brushes as illustrated in figure 52.

c. Cleaning and Inspection. Clean, inspect, and replace defective parts as necessary.

d. Installation.

- (1) Install the starter and solenoid relay as illustrated in figure 51.
- (2) Install coolant lines (par. 97).

b. Cleaning, Inspection, Testing and Adjustment.

- (1) Clean and inspect the spark plugs and wiring for breaks, cracks, burned electrodes, and frayed insulation.
- (2) Pay particular attention to the removal of carbon from the electrodes and insulation when cleaning.
- (3) Measure the gap between the electrodes with a wire feeler gage. The gap clearance should be 0.025 inch. If the dimension of the gap is incorrect, adjust by bending the outer electrode until proper clearance is obtained.

108. Spark Plugs and Wiring

a. Removal. Remove the spark plugs and wiring as illustrated in figure 53.

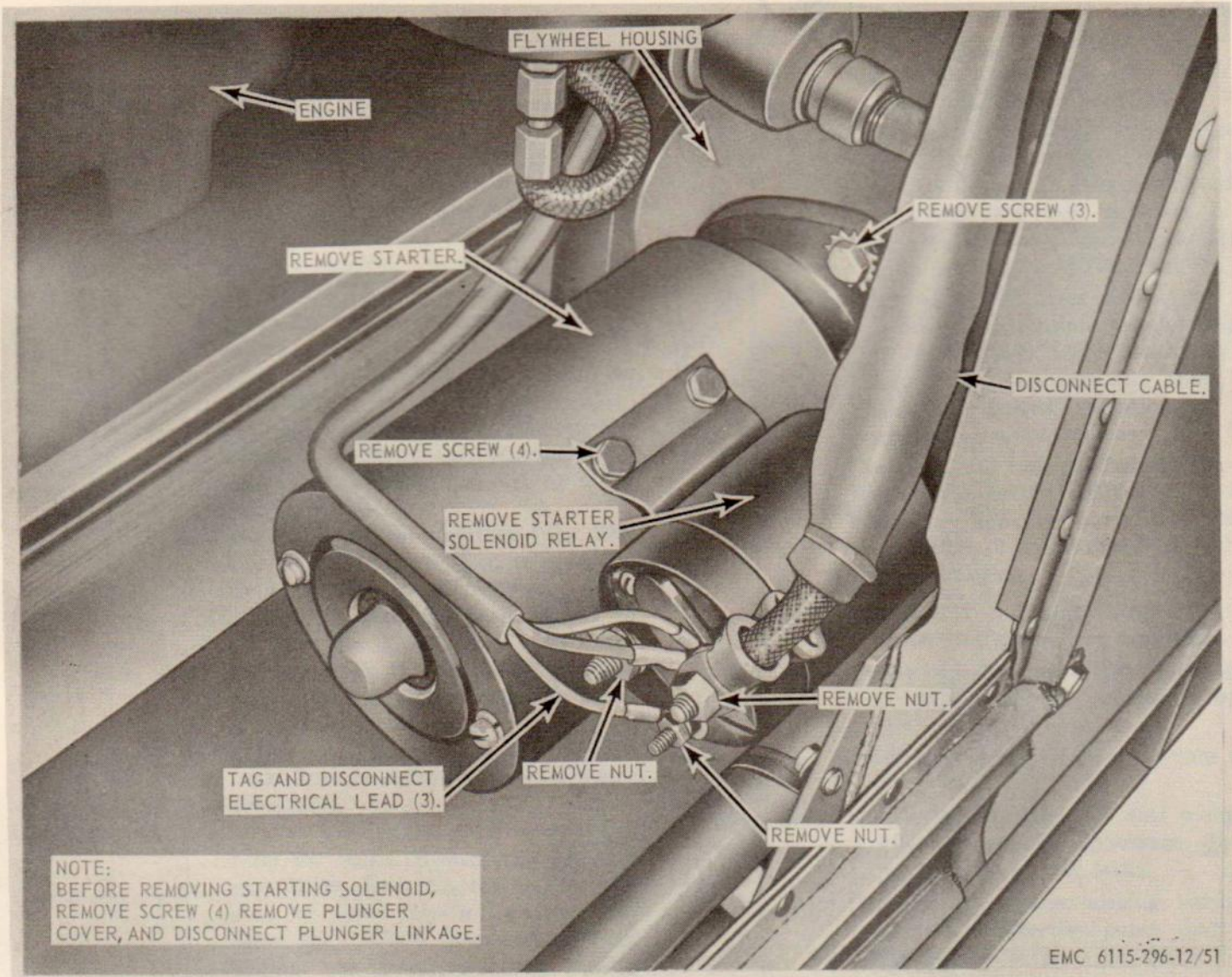
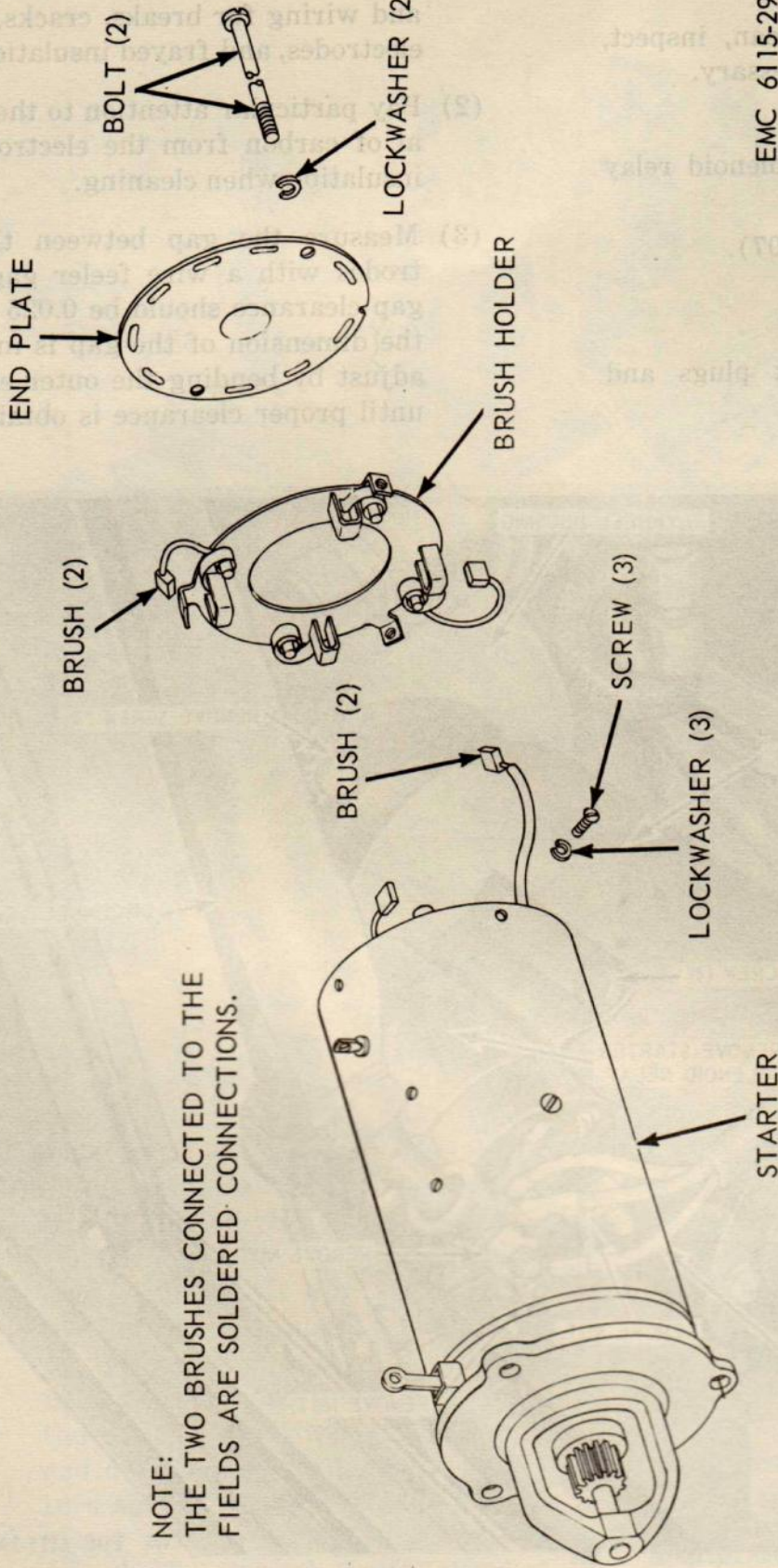


Figure 51. Starter and solenoid relay, removal and installation.



NOTE:
THE TWO BRUSHES CONNECTED TO THE
FIELDS ARE SOLDERED CONNECTIONS.

Figure 52. Starter brush replacement.

EMC 6115-296-12/52

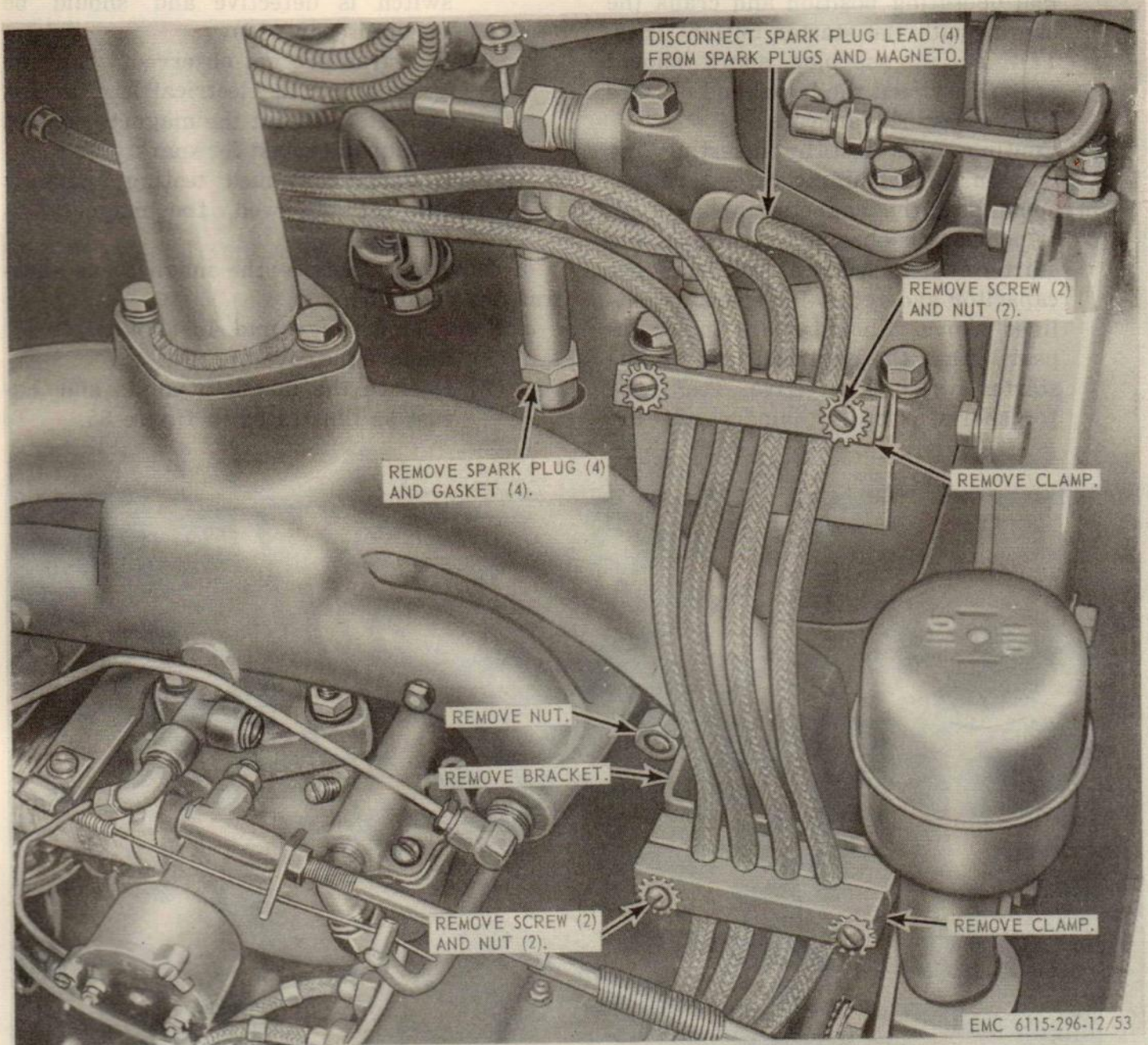


Figure 53. Spark plug wiring and spark plugs, removal and installation.

- (4) Place spark plugs in machine and test spark plugs for firing under air pressure.

c. *Installation.* Install the spark plugs and wiring as illustrated in figure 53.

109. Magneto

a. *Testing.*

- (1) Tag and disconnect the four spark plug leads from the magneto cap.

Caution: Do not pull the spark plug lead or twist the braided shielding. Gently work the spark plug lead from side to side to free rubber seal. Do not use sharp metal tools to install the rubber seal.

- (2) Insert an insulated wire, bared at both ends, into one of the terminal openings of the magneto, and hold the other end one-eighth inch away from engine crankcase.

- (3) Position the starter switch in normal operating position and crank the engine with the starter button (par. 17). An intense blue spark should appear between the bared end of wire and the engine crankcase.
- (4) Continue this test by inserting the wire in the remaining three terminal openings of the magneto cap.
- (5) If no spark is observed, disconnect the starter switch electrical lead from the capacitor and retest for spark as outlined above. Should spark now appear, either the electrical lead or the starter switch is defective. Test wire for shorts or other damage. If the

electrical lead tests good, the starter switch is defective and should be replaced (par. 110).

- (6) If sparks are not observed when the ignition switch electrical lead is disconnected, adjust the magneto contact set gap and retest for spark.
- (7) If under continued testing spark is still not observed, the magneto is defective.

b. *Removal.* Remove the magneto as illustrated in figure 54.

c. *Point Replacement and Adjustment.*

- (1) Remove the cover.
- (2) Replace the magneto points and adjust as illustrated in figure 55.

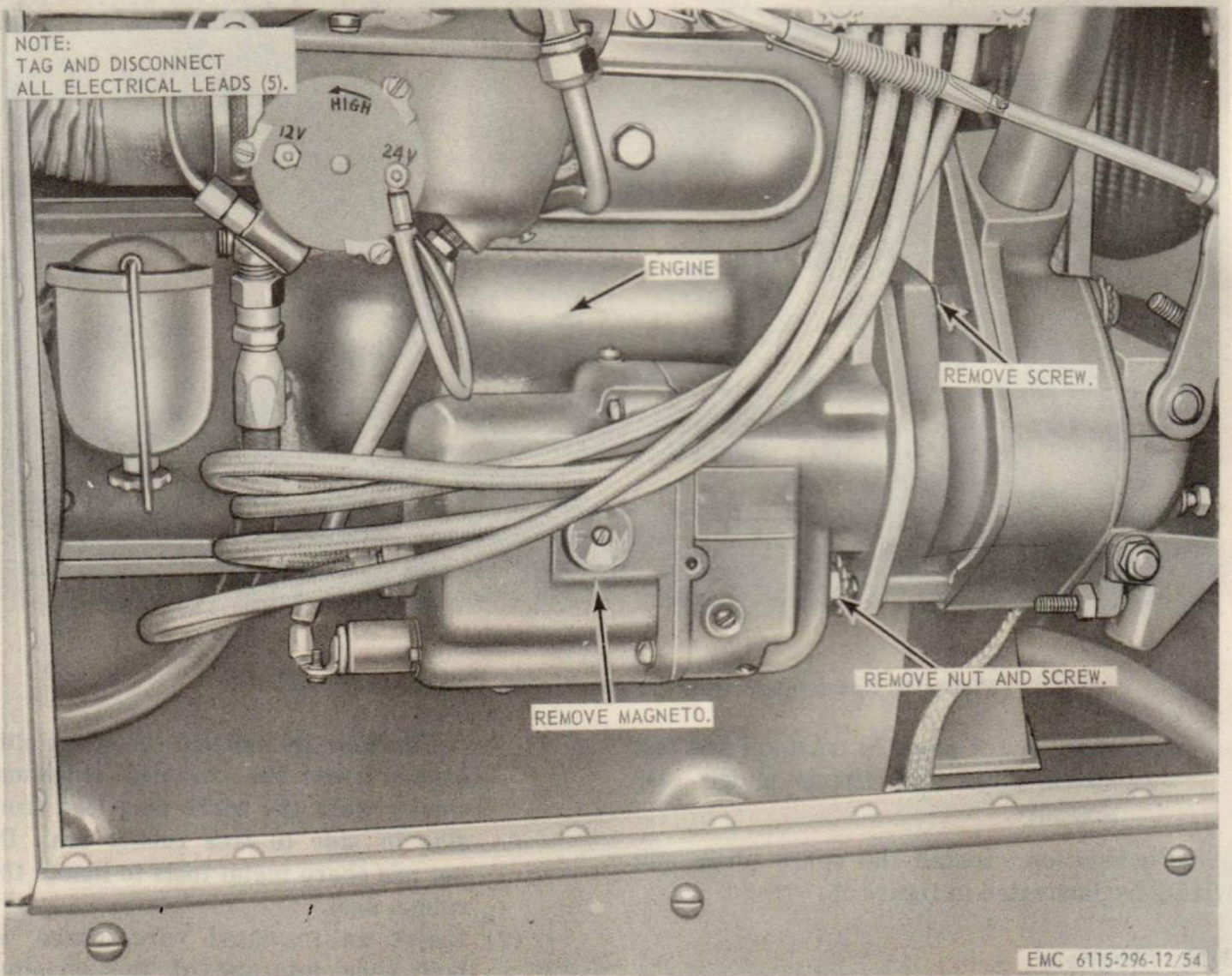


Figure 54. Magneto, removal and installation.

ADJUSTMENT

STEP 1.

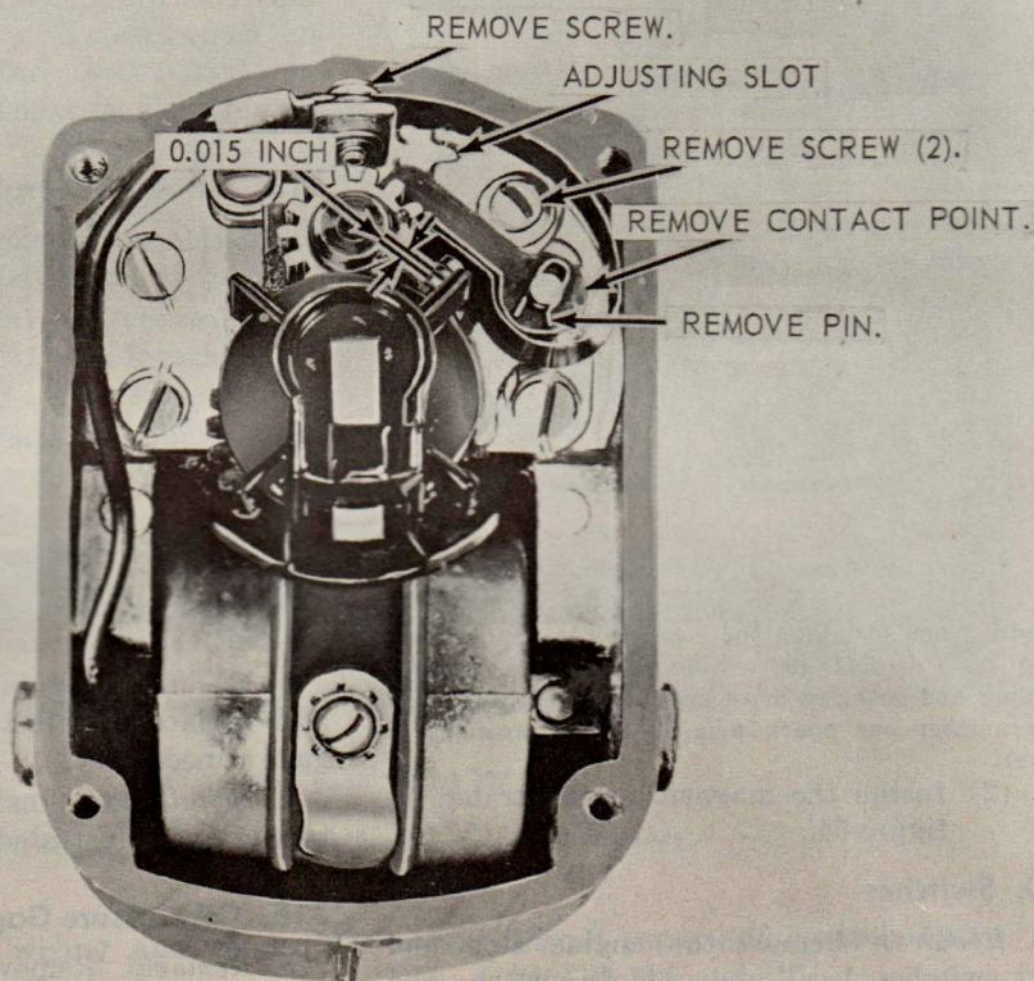
LOOSEN SCREW (2).

STEP 2.

POSITION CAM LOBE ON HIGH SIDE, OPENING THE CONTACT POINTS.

STEP 3.

INSERT THE BLADE OF A SCREWDRIVER IN THE ADJUSTING SLOT. TURN SCREWDRIVER CLOCKWISE TO INCREASE GAP AND COUNTERCLOCKWISE TO DECREASE GAP.



STEP 4.

WITH A FEELER GAGE MEASURE THE GAP. THE PROPER GAP IS 0.015 INCH.

STEP 5.

AFTER PROPER GAP CLEARANCE HAS BEEN OBTAINED TIGHTEN SCREW (2).

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Figure 55. Point replacement and adjustment.

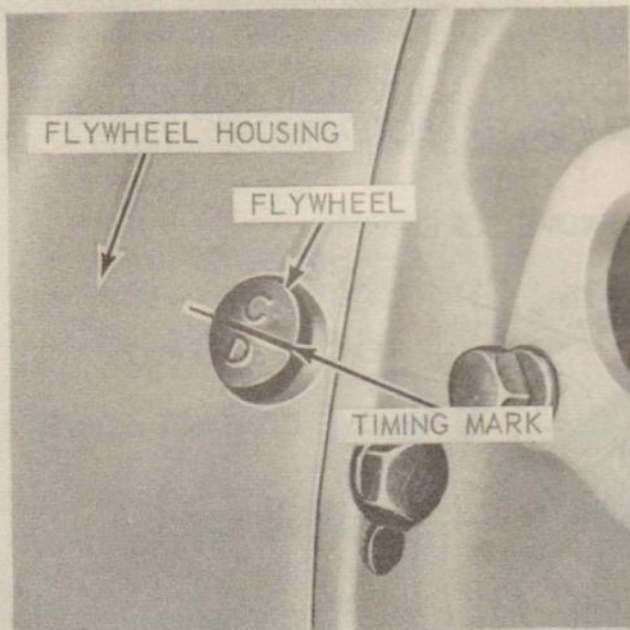
(3) Install the cover.

e. Installation and Timing.

d. *Cleaning and Inspection.* Clean, inspect and replace defective parts as necessary.

(1) Rotate engine until the timing marks on flywheel are visible as illustrated in figure 56.

NOTE:
ROTATE ENGINE UNTIL COMPRESSION
STROKE IS ON NUMBER ONE CYLINDER
AND TIMING MARK APPEARS.



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Figure 56. Engine flywheel timing marks.

Note. When installing the magneto the impulse coupling could be off 180°. Note marking on impulse coupling and governor drive gear for proper alinement with number one spark plug in firing position. (a above).

(2) Install the magneto as illustrated in figure 54.

110. Switches

a. *Removal.* Remove the engine stop and start switches, local and remote switch, and heater control switch, as illustrated in figure 57.

b. *Cleaning and Inspection.* Clean, inspect, and replace defective switches as necessary.

c. *Installation.* Install the local and remote switch, engine stop and start switches, and heater control switch as illustrated in figure 57.

111. Safety Switch (Oil Pressure and Overheat)

a. *Removal.* Remove the safety switch as illustrated in figure 58.

b. *Cleaning and Inspection.* Clean, inspect, and replace a damaged safety switch as necessary.

c. *Installation.* Install the safety switch as illustrated in figure 58.

112. Oil Pressure Sending Unit

a. *Removal.* Remove the oil pressure sending unit as illustrated in figure 59.

b. *Cleaning and Inspection.* Clean, inspect, and replace a defective oil pressure sending unit as necessary.

c. *Installation.* Install the oil pressure sending unit as illustrated in figure 59.

113. Battery Generator Indicator

a. *Removal.* Remove the battery generator indicator as illustrated in figure 57.

b. *Cleaning and Inspection.* Clean, inspect, and replace a defective battery generator indicator as necessary.

c. *Installation.* Install the battery generator indicator as illustrated in figure 57.

114. Coolant Temperature Gage

a. *Removal.* Remove the coolant temperature gage as illustrated in figure 57.

b. *Cleaning and Inspection.* Clean, inspect, and replace a defective coolant temperature gage as necessary.

c. *Installation.* Install the coolant temperature gage as illustrated in figure 57.

115. Oil Pressure Gage

a. *Removal.* Remove the oil pressure gage as illustrated in figure 57.

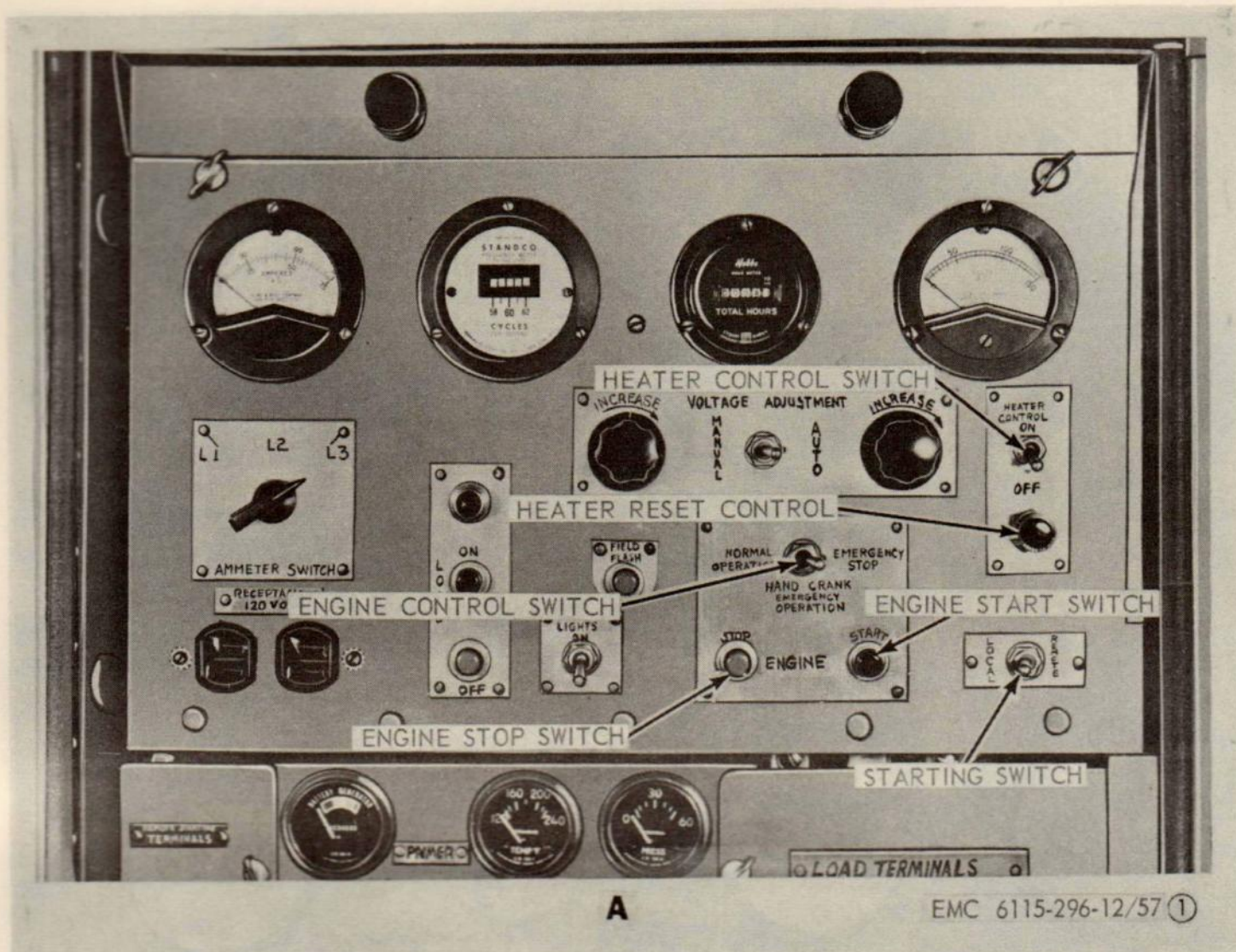
b. *Cleaning and Inspection.* Clean, inspect and replace a defective oil pressure gage as necessary.

c. *Installation.* Install the oil pressure gage as illustrated in figure 57.

116. Wiring

a. *Removal.* Remove damaged wiring and connections as illustrated in figure 4.

b. *Cleaning and Inspection.* Clean, inspect, and repair damaged wiring and connections as necessary.



A—Control panel, front view

Figure 57. Engine controls, instruments, and switches, removal and installation.

c. *Installation.* Install wiring and connections as illustrated in figure 4.

(2) Install gages and controls (pars. 93, 94, 113, 114, and 115).

117. Instrument Panel

a. *Removal.*

(1) Remove gages and controls (pars. 93, 94, 113, 114, and 115).

(2) Remove the instrument panel as illustrated in figure 57.

b. *Cleaning, Inspection, and Repair.* Clean, inspect, repair, or replace a damaged instrument panel as necessary.

c. *Installation.*

(1) Install the instrument panel as illustrated in figure 57.

118. Batteries and Battery Box

a. *Removal.*

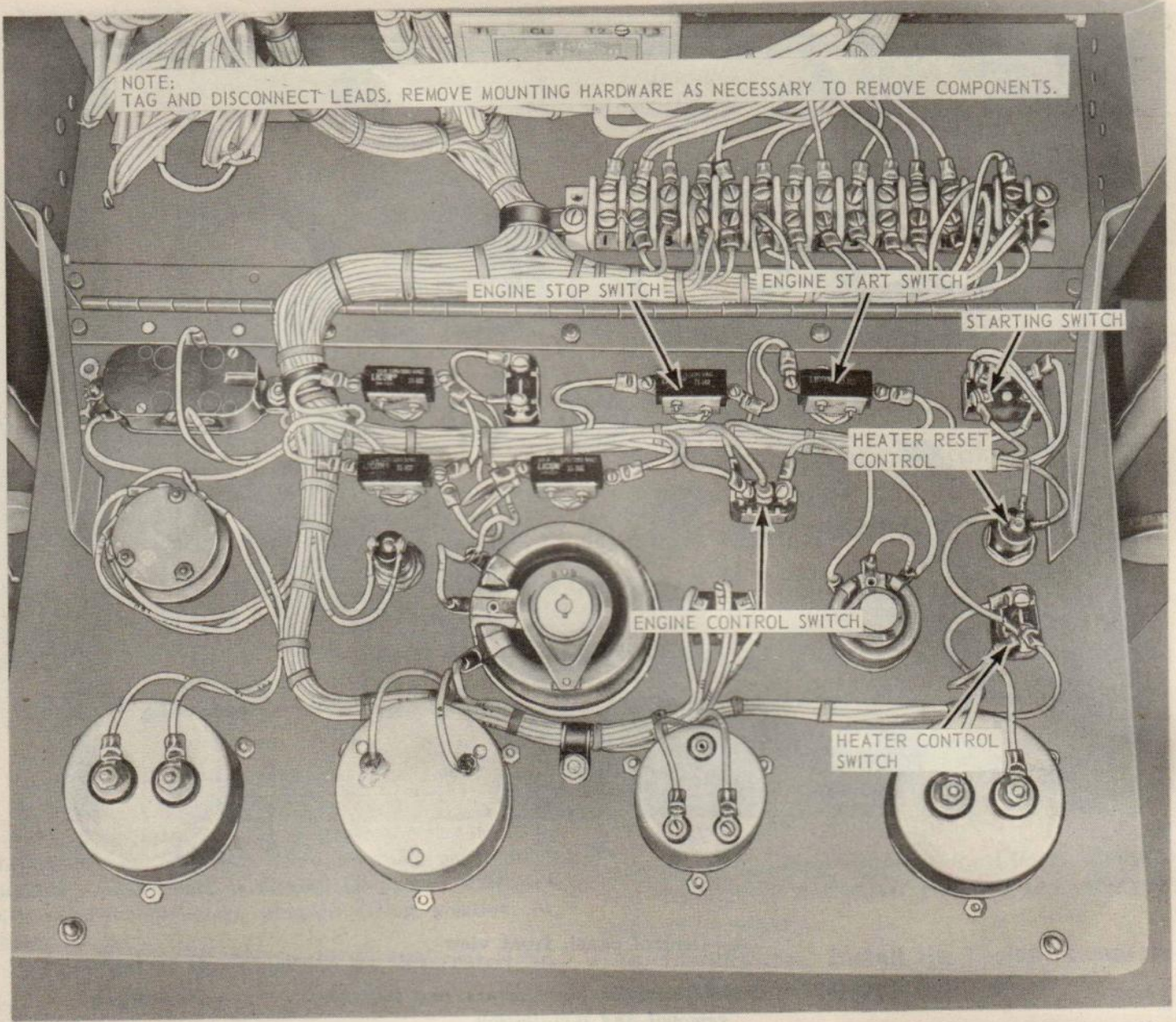
(1) Remove the batteries as illustrated in figure 60.

(2) Remove the battery box as illustrated in figure 60.

b. *Disassembly.* Disassemble the battery box as illustrated in figure 61.

c. *Cleaning, Inspection, and Repair.* Clean, inspect, repair or replace defective parts as necessary.

NOTE:
TAG AND DISCONNECT LEADS. REMOVE MOUNTING HARDWARE AS NECESSARY TO REMOVE COMPONENTS.



B

EMC 6115-296-12/57 (2)

B—Control panel, rear view

Figure 57—Continued.

d. *Reassembly.* Reassemble the battery box as illustrated in figure 61.

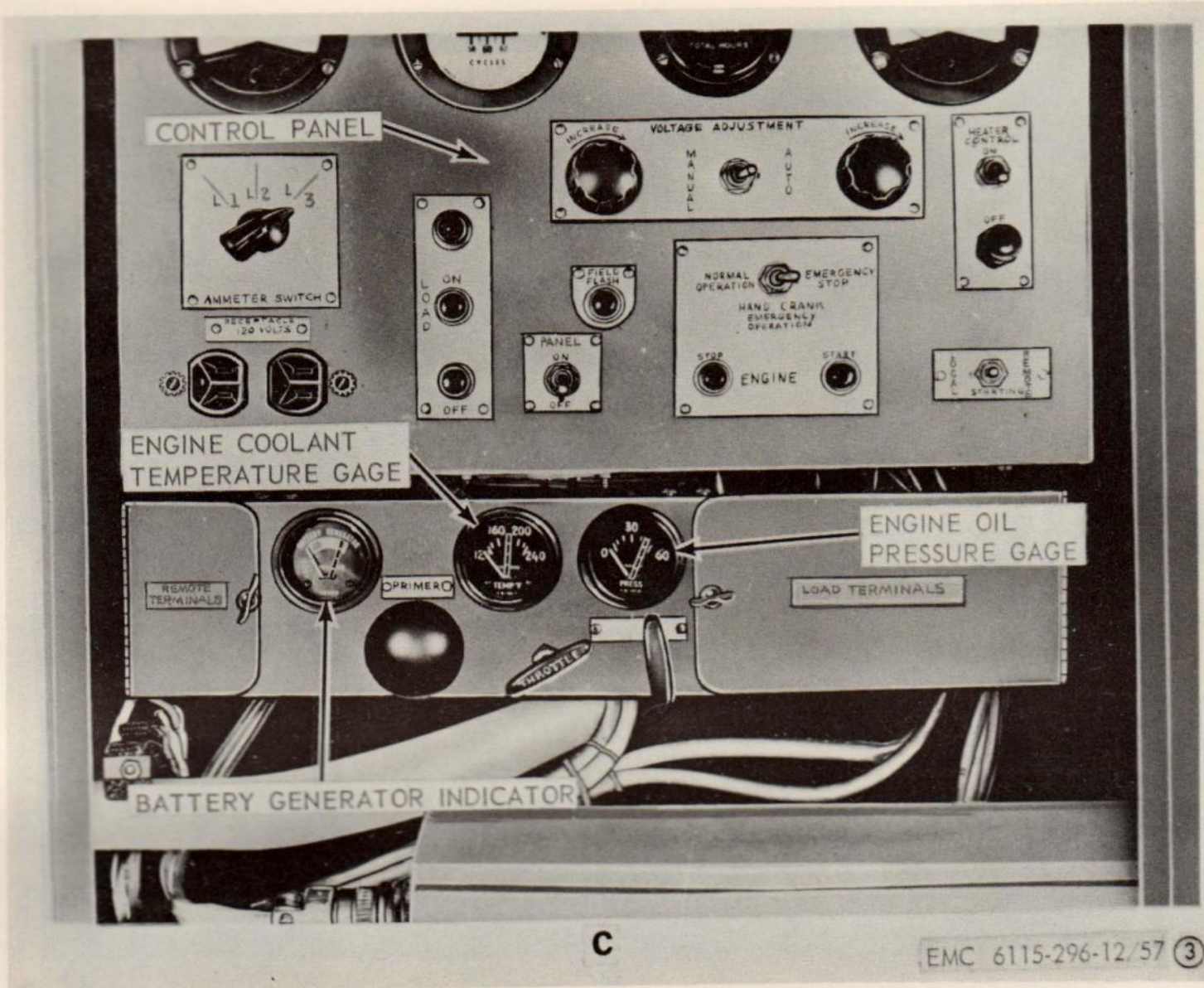
e. *Installation.* Install the battery box and batteries as illustrated in figure 60.

119. Battery-Charging Receptacle

a. *Removal.* Remove the battery-charging receptacle as illustrated in figure 62.

b. *Cleaning and Inspection.* Clean, inspect, and replace a defective receptacle as necessary.

c. *Installation.* Install the battery-charging receptacle as illustrated in figure 62.

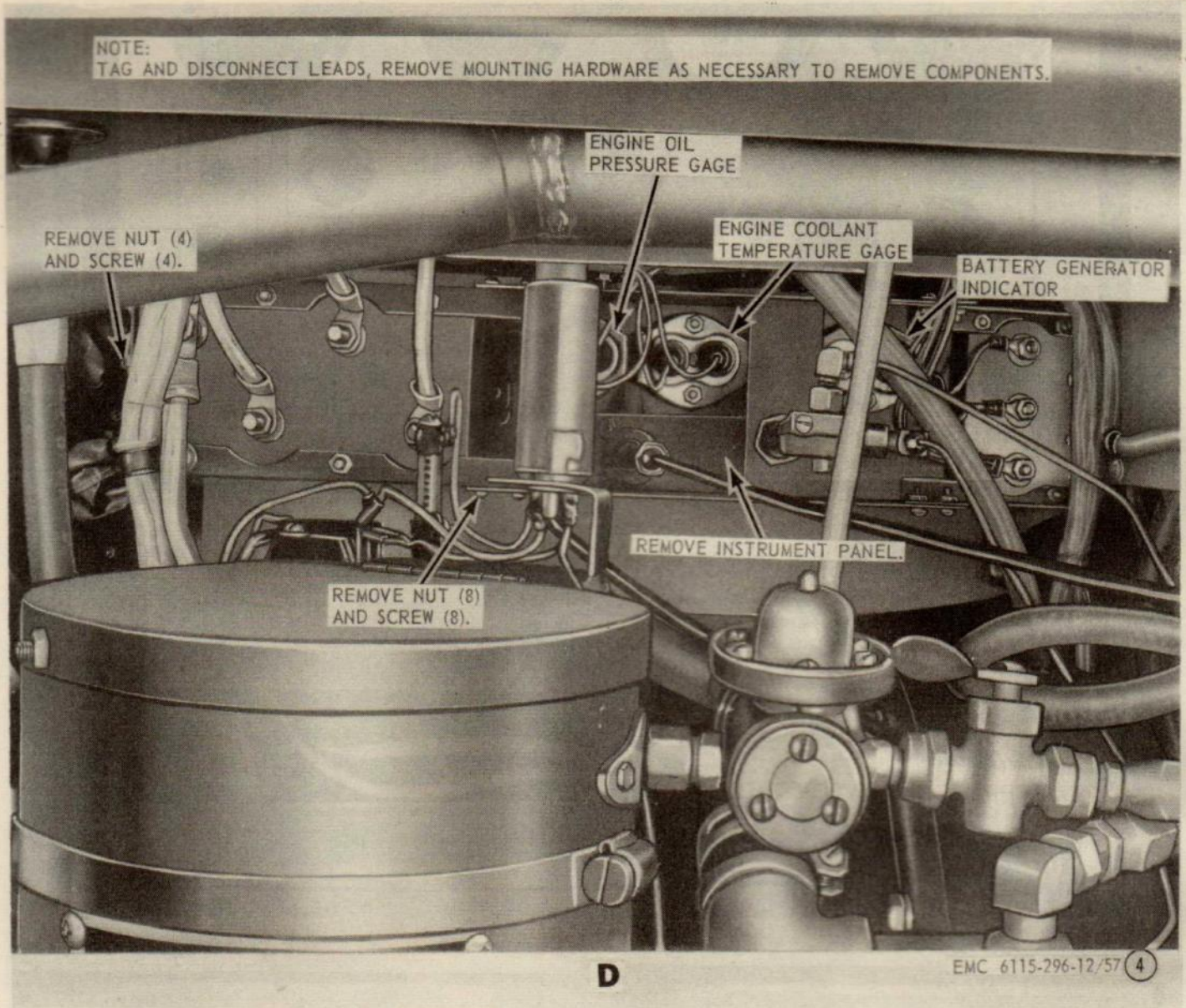


C

EMC 6115-296-12/57 ③

C—Engine gage panel, front view

Figure 57—Continued.



D—Engine gage panel, rear view.

Figure 57—Continued.

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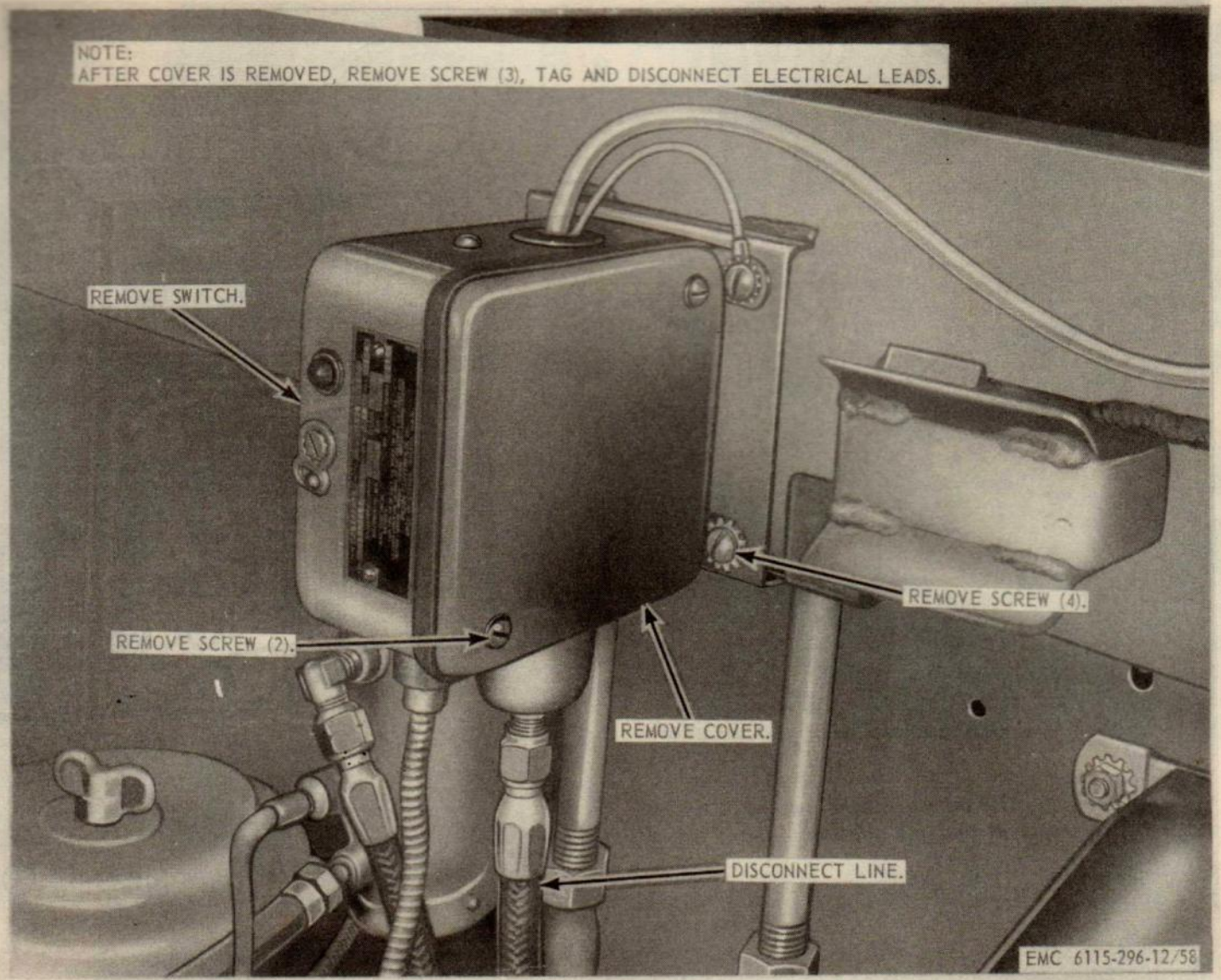


Figure 58. Safety switch, removal and installation.

B—Battery box, top view, removal points

Figure 58—Continued

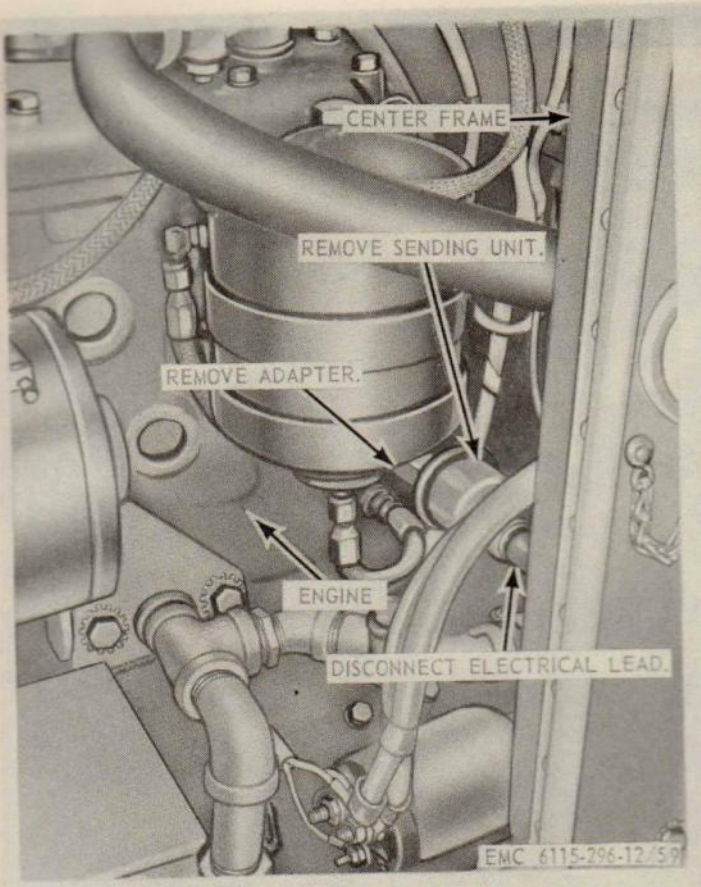
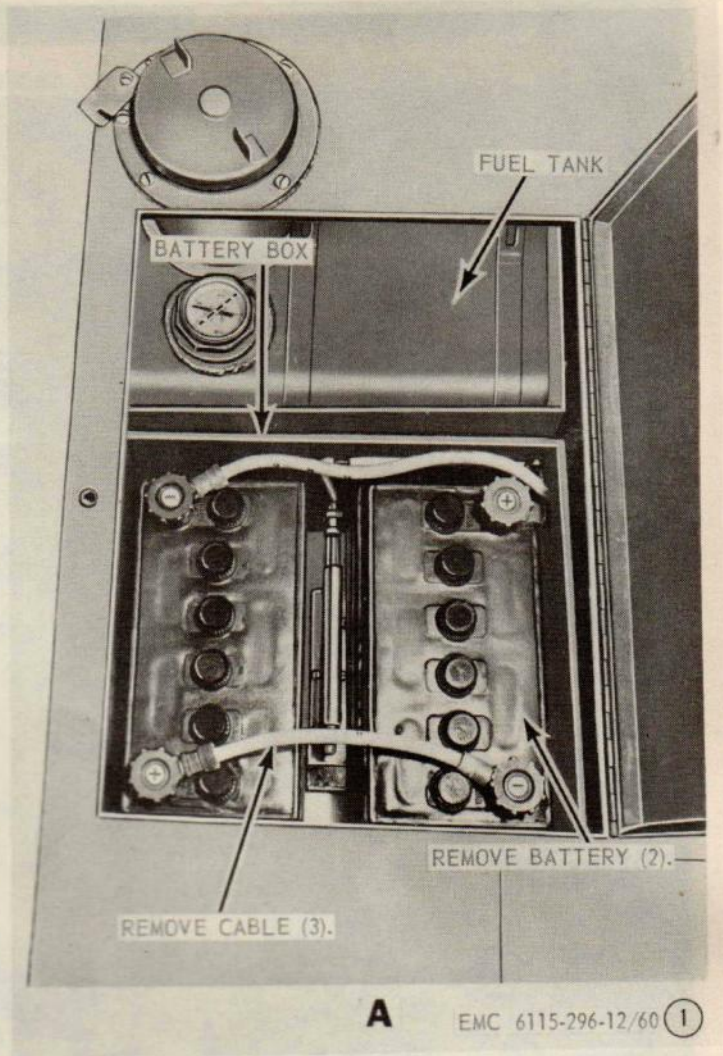
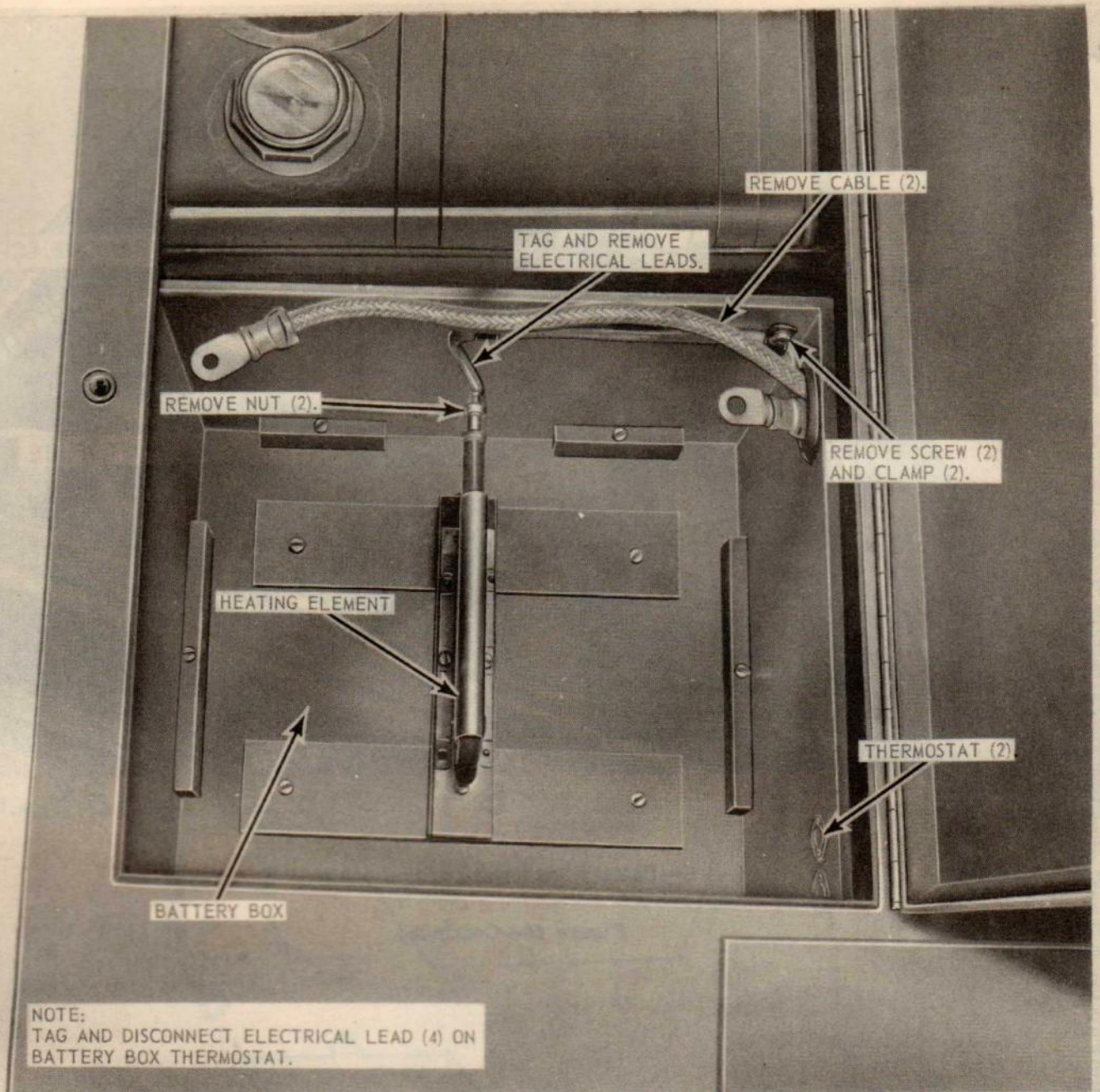


Figure 59. Oil pressure sending unit, removal and installation.



A—Battery removal points
Figure 60. Batteries and battery box, removal and installation.

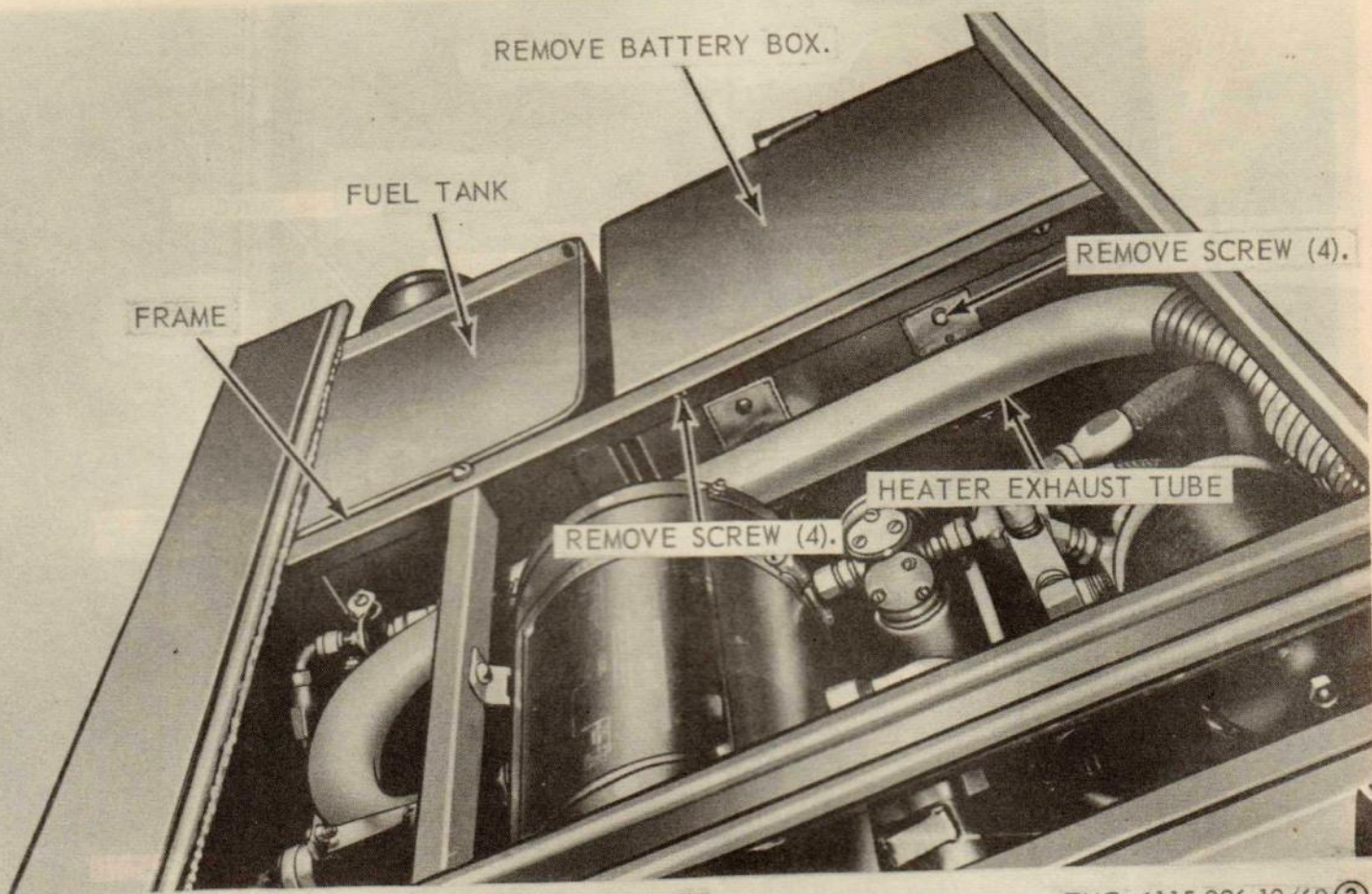


B

EMC 6115-296-12/60 (2)

B—Battery box, top view, removal points

Figure 60—Continued.



C

EMC 6115-296-12/60 ③

C—Battery box lower removal points.

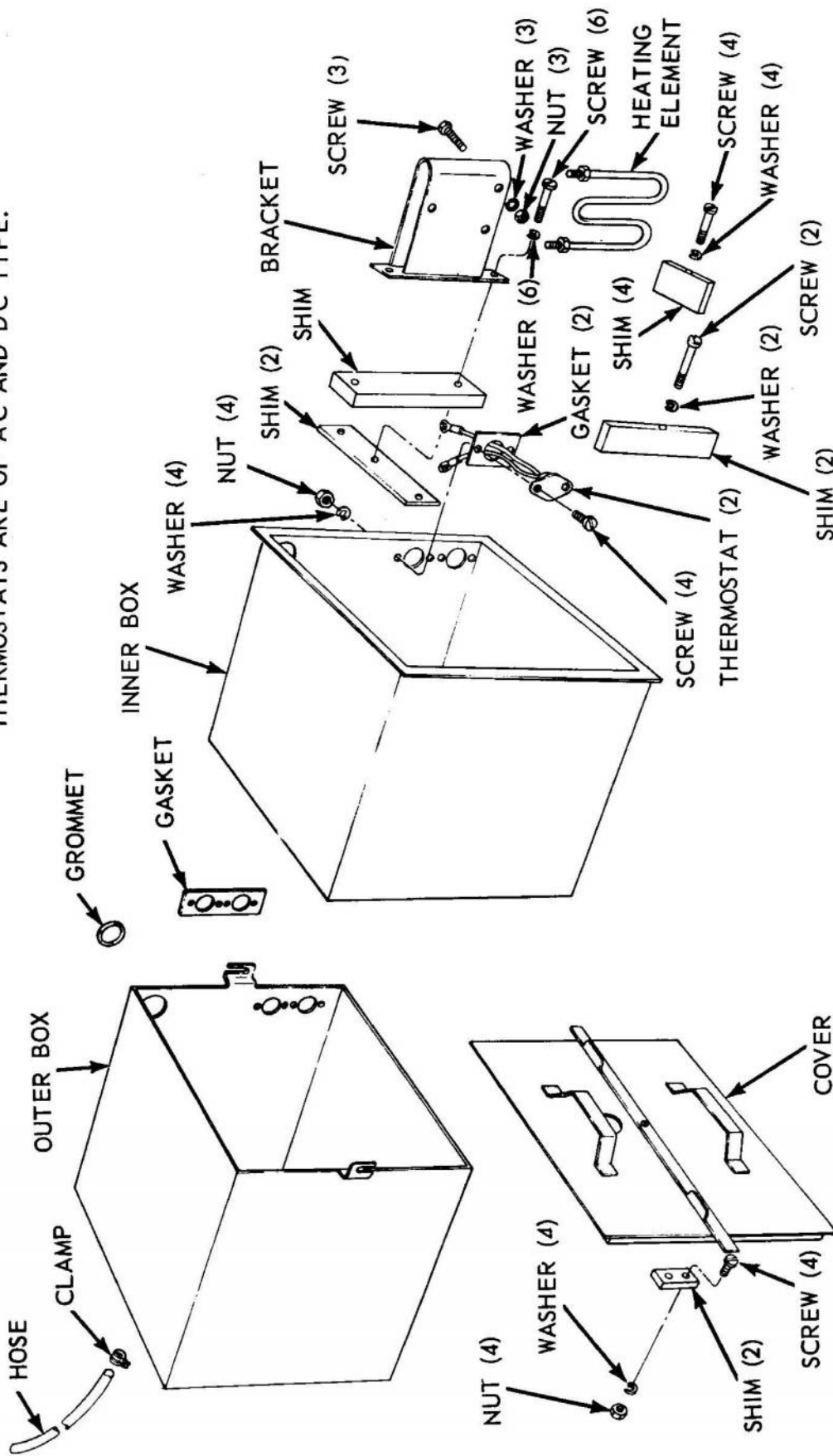
Figure 60—Continued.

B

B—Battery box, top view, removal points

Figure 60—Continued.

NOTE:
THERMOSTATS ARE OF AC AND DC TYPE.



EMC 6115-296-12/61

Figure 61. Battery box, disassembly and reassembly, exploded view.

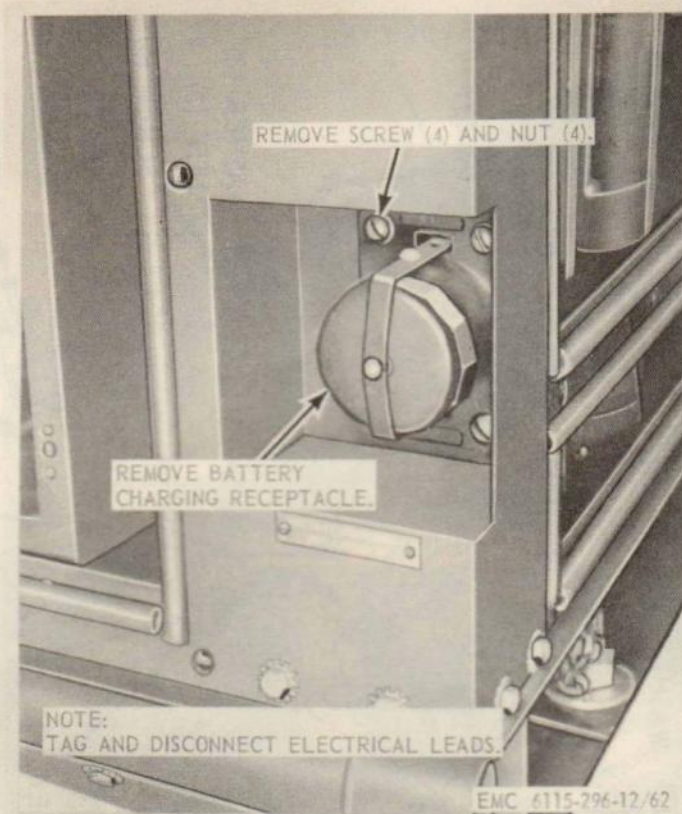


Figure 62. Battery-charging receptacle, removal and installation.

Section XIII. ENGINE

120. General

The four cycle gasoline engine that drives the generator set is equipped with rotating-type valves that can be adjusted after removing the valve cover. The engine is equipped with a governor to maintain constant rpm when load is increased to the rated capacity of the generator set. The main generator is connected directly to the engine flywheel. The engine casting holes are machined and are filled with expansion plugs.

121. Cylinder Head

a. Removal.

- (1) Remove the thermostat housing (par. 102).
- (2) Remove the spark plugs (par. 108).
- (3) Remove the cylinder head as illustrated in figure 63.

b. *Cleaning and Inspection.* Clean and inspect. Replace defective cylinder head. Replace gasket.

c. Installation.

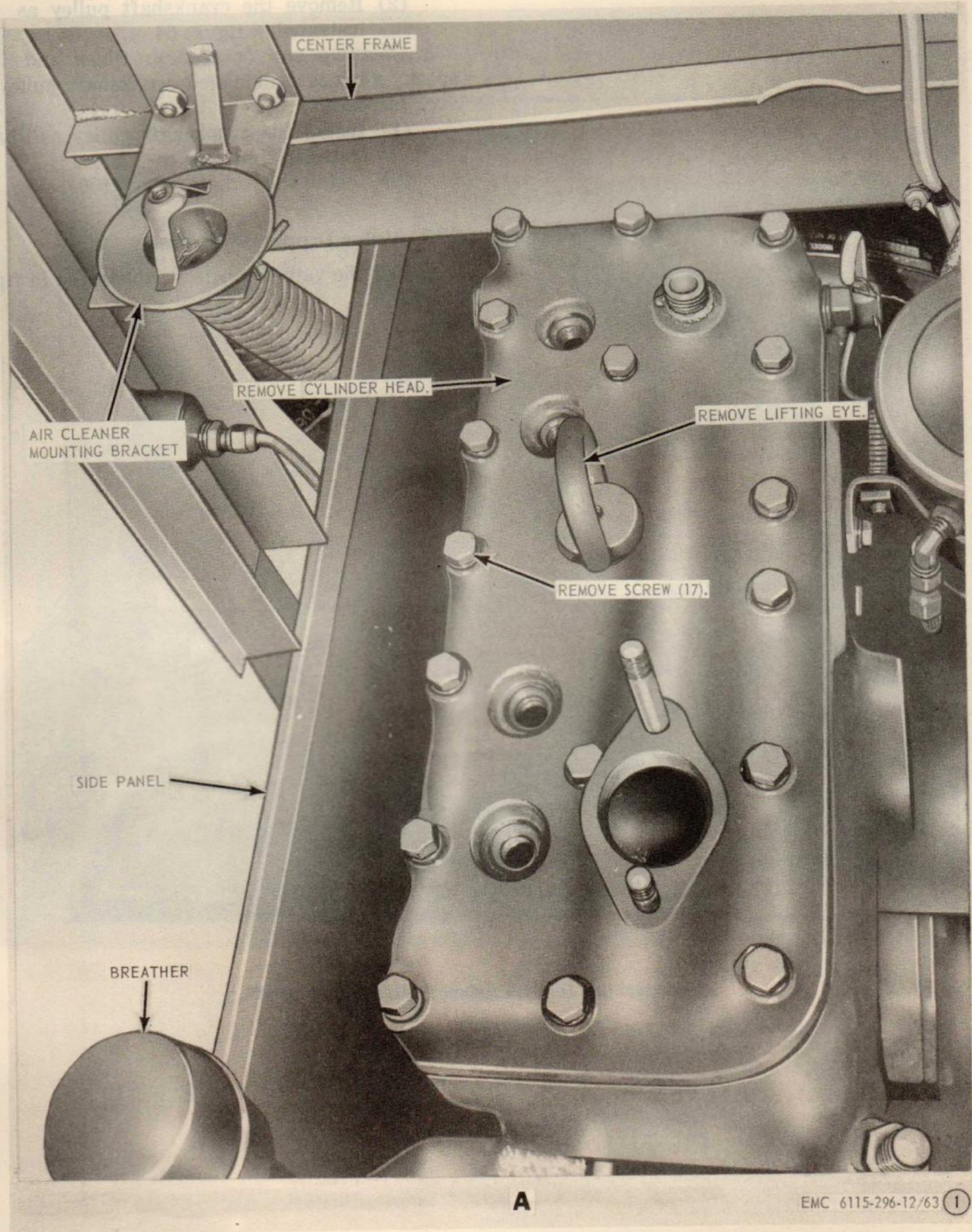
- (1) Install the cylinder head as illustrated in figure 63.
- (2) Install the spark plugs (par. 108).
- (3) Install the thermostat housing (par. 102).

d. *Compression Test.* With the spark plugs removed position a compression gage in the spark plug opening. Crank engine either by hand or starter approximately five or six revolutions. The compression should not vary any more than ten pounds on each cylinder.

122. Crankshaft Pulley

a. Removal.

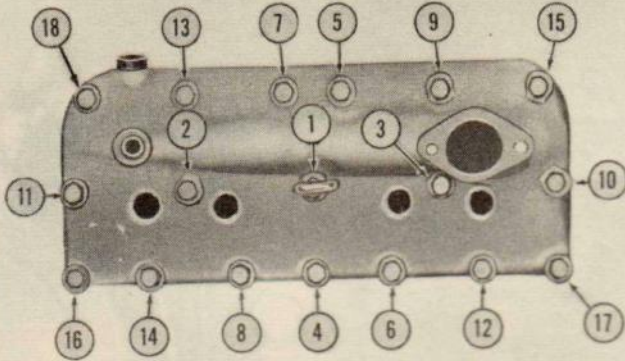
- (1) Remove the radiator (par. 100).



A—Cylinder head removal points

Figure 63. Cylinder head, removal and installation, and tightening sequence.

NOTE:
CYLINDER HEAD
BOLT TORQUE 50 LB.



B EMC 6115-296-12/63 ②

B—Cylinder head tightening sequence

Figure 63—Continued.

- (2) Remove the crankshaft pulley as illustrated in figure 64.
- b. *Cleaning and Inspection.* Clean and inspect. Replace a damaged crankshaft pulley.
- c. *Installation.*
 - (1) Install the crankshaft pulley as illustrated in figure 64.
 - (2) Install the radiator (par. 100).

123. Valve Tappets Adjustment

Adjust the valve tappets as illustrated in figure 65.

NOTE:
REMOVE THE COTTER PIN (2) AND DRIVE PIN FROM CRANKSHAFT PULLEY AND CRANKSHAFT. USE A SUITABLE PULLER TO REMOVE THE PULLEY.

NOTE:
WHEN INSTALLING PULLEY USE A SUITABLE SOFT DRIVING INSTRUMENT TO DRIVE PULLEY ON CRANKSHAFT.

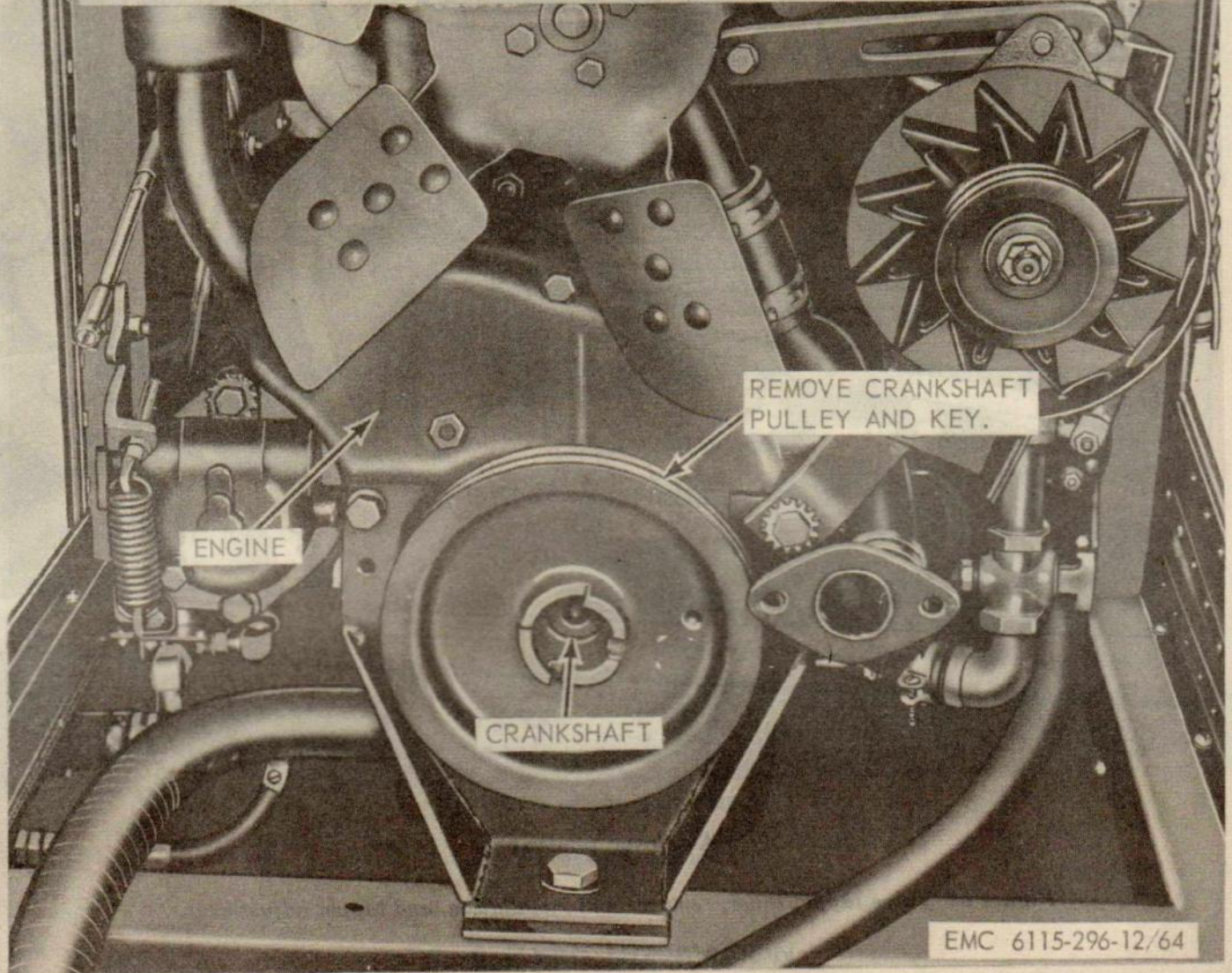


Figure 64. Crankshaft pulley, removal and installation.

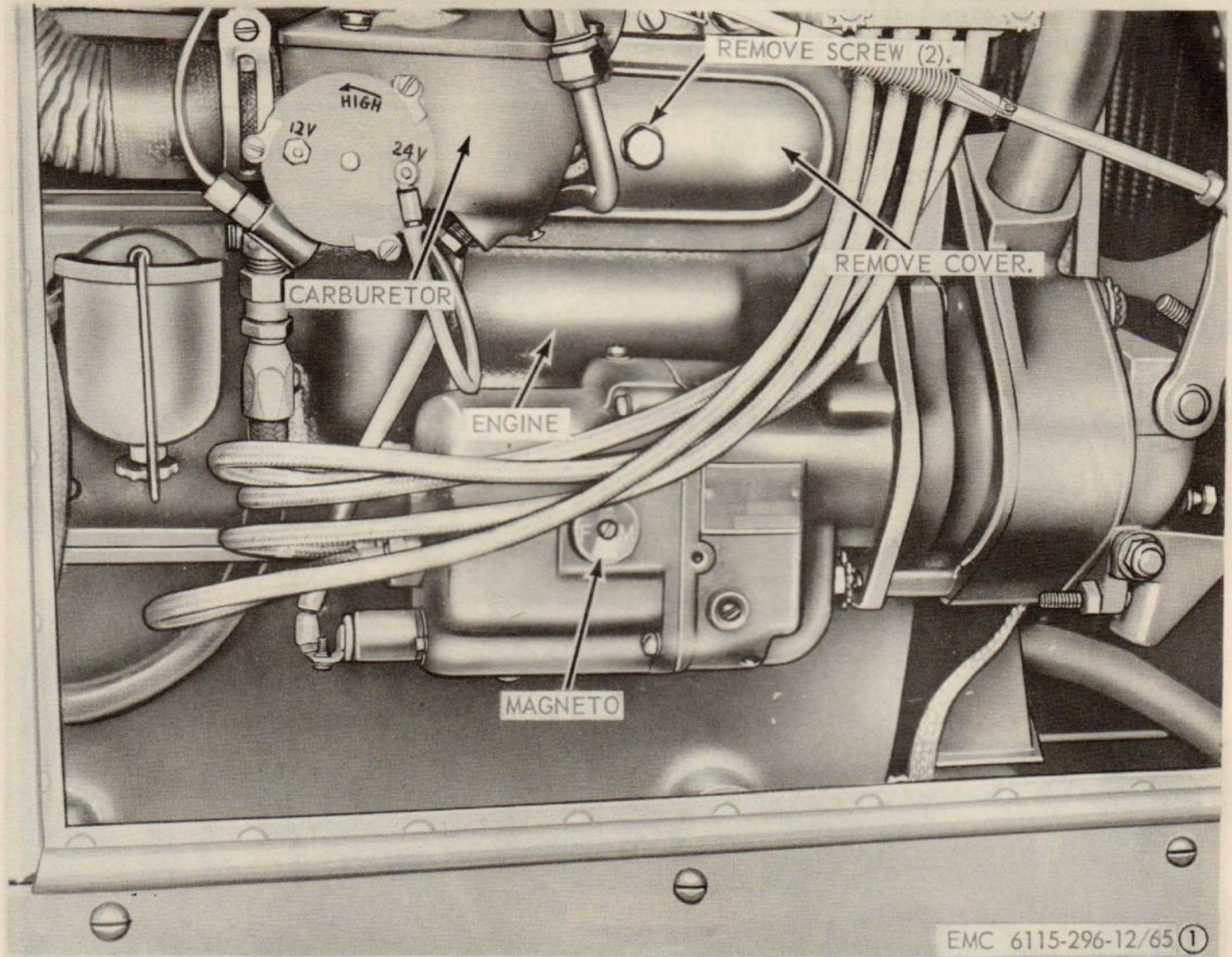
The lubrication system for the engine. Components include a crank case breather, oil filter, and adjustable oil pressure regulator, line assemblies and fittings.

125. Oil Filter

- a. Removal. Remove the oil filter as illustrated in figure 65.
- b. Cleaning and Inspection. Clean and inspect. Replace a defective oil filter.

126. Oil Pressure Regulating Valve

- a. Adjustment. Adjust the oil pressure regulating valve as illustrated in figure 67.
- b. Removal. Remove the oil pressure regulating valve as illustrated in figure 67.
- c. Cleaning and Inspection. Clean and inspect. Replace a defective oil pressure regulating valve.
- d. Installation. Install the oil pressure regulating valve as illustrated in figure 67.

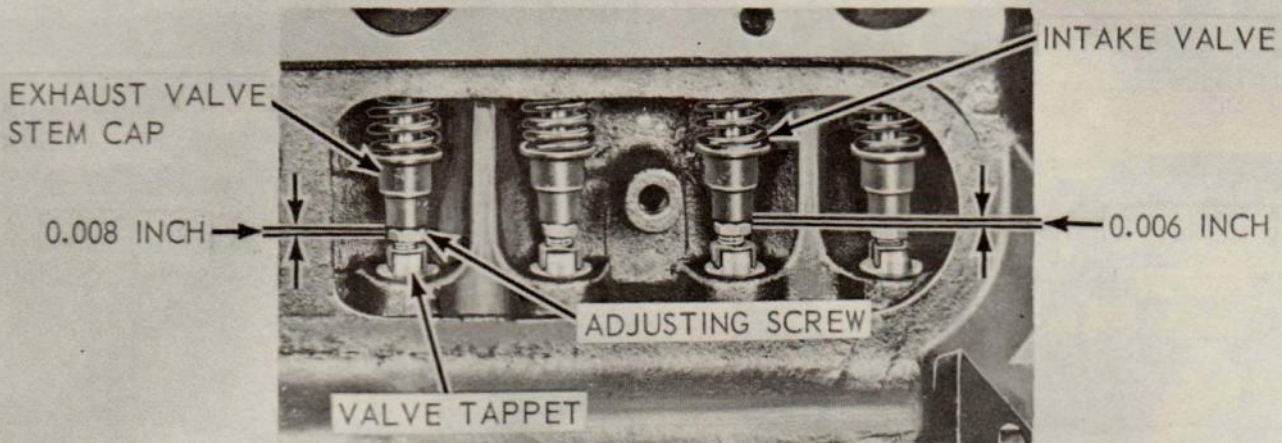


A—Cover removal

Figure 65. Valve tappet cover, removal and installation, and tappet adjustment.

STEP 1.
CRANK THE ENGINE UNTIL NUMBER ONE PISTON IS AT FIRING POSITION WHICH IS INDICATED WHEN BOTH THE INTAKE AND EXHAUST VALVES ARE IN THEIR LOWEST POSITION AND THE VALVE LIFTER MOVES AWAY FROM THE VALVE STEM CAP.

STEP 2.
MEASURE THE CLEARANCE BETWEEN THE VALVE STEM CAP AND THE ADJUSTING SCREW WITH A FEELER GAGE.



STEP 3.
THE PROPER HOT CLEARANCE FOR THE INTAKE VALVE IS 0.006 INCH AND THE EXHAUST VALVE CLEARANCE IS 0.008 INCH.

STEP 4.
ADJUST THE REMAINING VALVES IN A SIMILAR MANNER WITH PISTONS IN PROPER POSITION.

EMC 6115-296-12/65 (2)

B—Valve tappet adjustment

Figure 65—Continued.

Section XIV. LUBRICATION

124. General

The lubrication system provides pressurized lubrication for the engine. Components include a crankcase breather, oil filter, and adjustable oil pressure regulator, line assemblies, and fittings.

125. Oil Filter

a. Removal. Remove the oil filter as illustrated in figure 66.

b. Cleaning and Inspection. Clean and inspect. Replace a defective oil filter.

c. Installation. Install the oil filter as illustrated in figure 66.

126. Oil Pressure Regulating Valve

a. Adjustment. Adjust the oil pressure regulating valve as illustrated in figure 67.

b. Removal. Remove the oil pressure regulating valve as illustrated in figure 67.

c. Cleaning and Inspection. Clean and inspect. Replace a defective oil pressure regulating valve.

d. Installation. Install the oil pressure regulating valve as illustrated in figure 67.

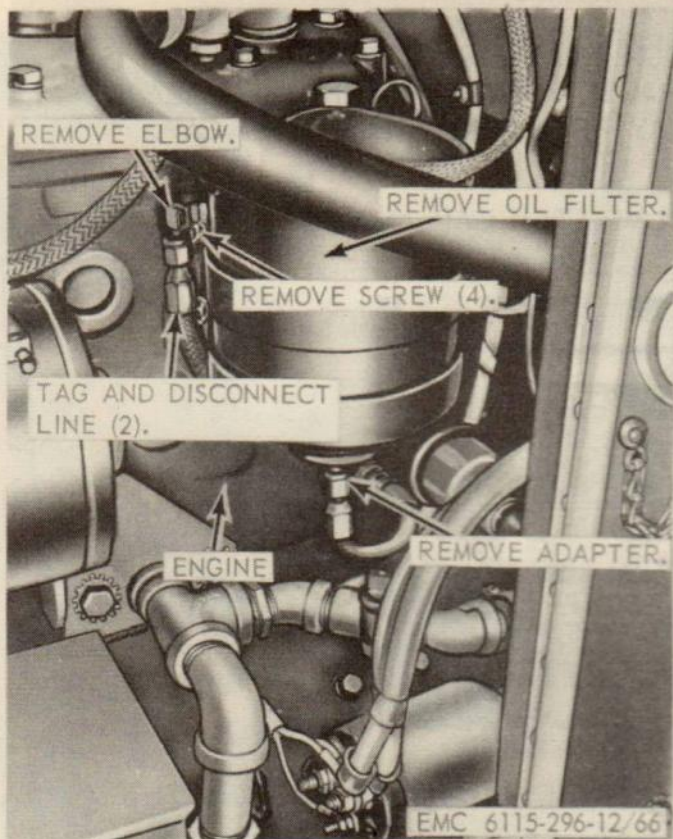


Figure 66. Oil filter, removal and installation.

127. Crankcase Breather

a. *Removal.* Remove the crankcase breather as illustrated in figure 21.

b. *Cleaning and Inspection.* Clean and inspect. Replace a defective breather.

c. *Installation.* Install the crankcase breather as illustrated in figure 21.

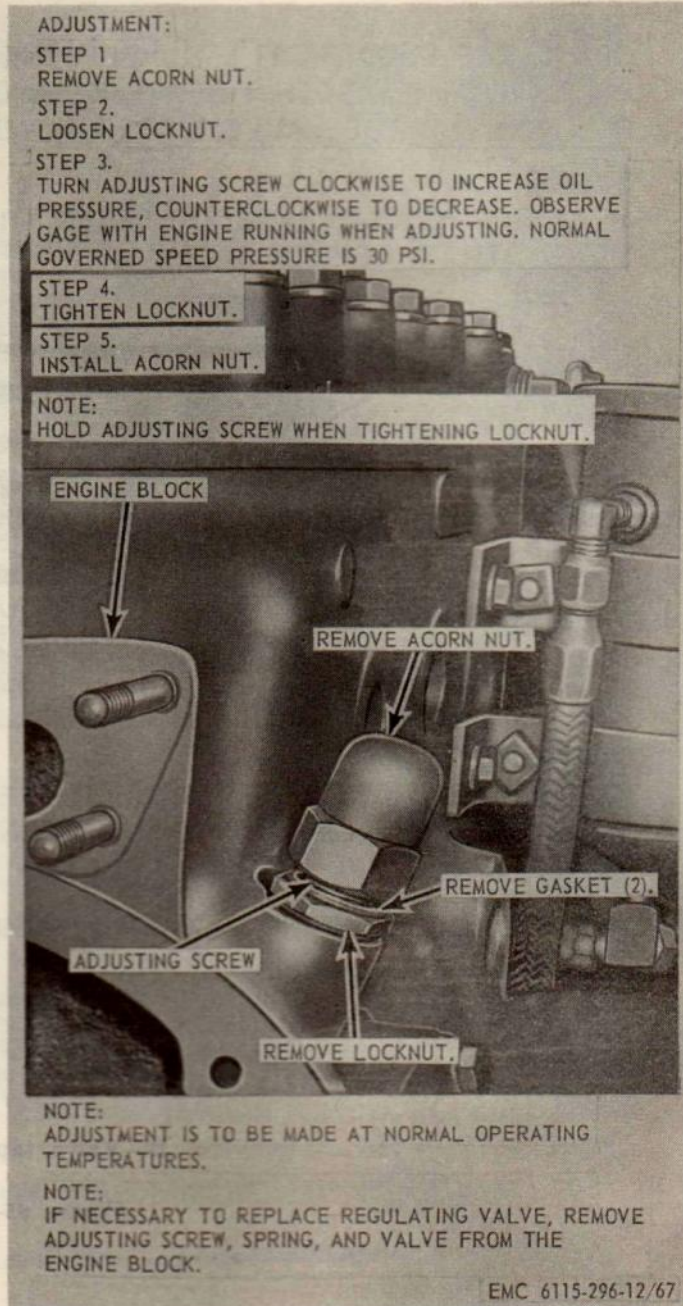


Figure 67. Oil pressure regulating valve adjustment, removal and installation.

Section XV. MISCELLANEOUS AND ACCESSORY ITEMS

128. General

This section covers maintenance procedures on all miscellaneous and accessory items applicable to organizational maintenance.

129. Toolbox and Load Cable Boots

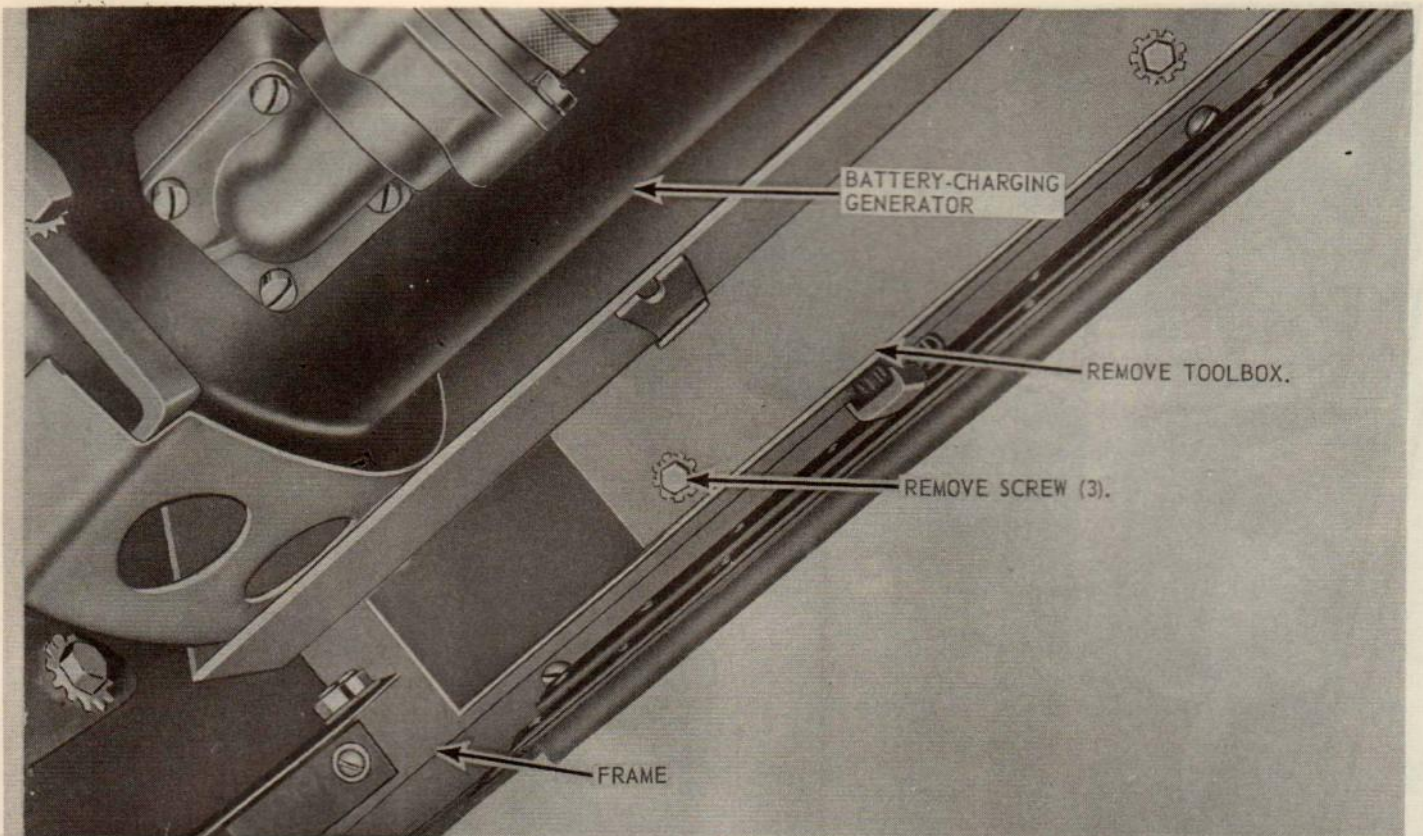
a. *Removal.* Remove the toolbox and load cable boots as illustrated in figure 68.

b. *Cleaning and Inspection.* Clean and inspect. Replace a damaged toolbox or load cable boot.

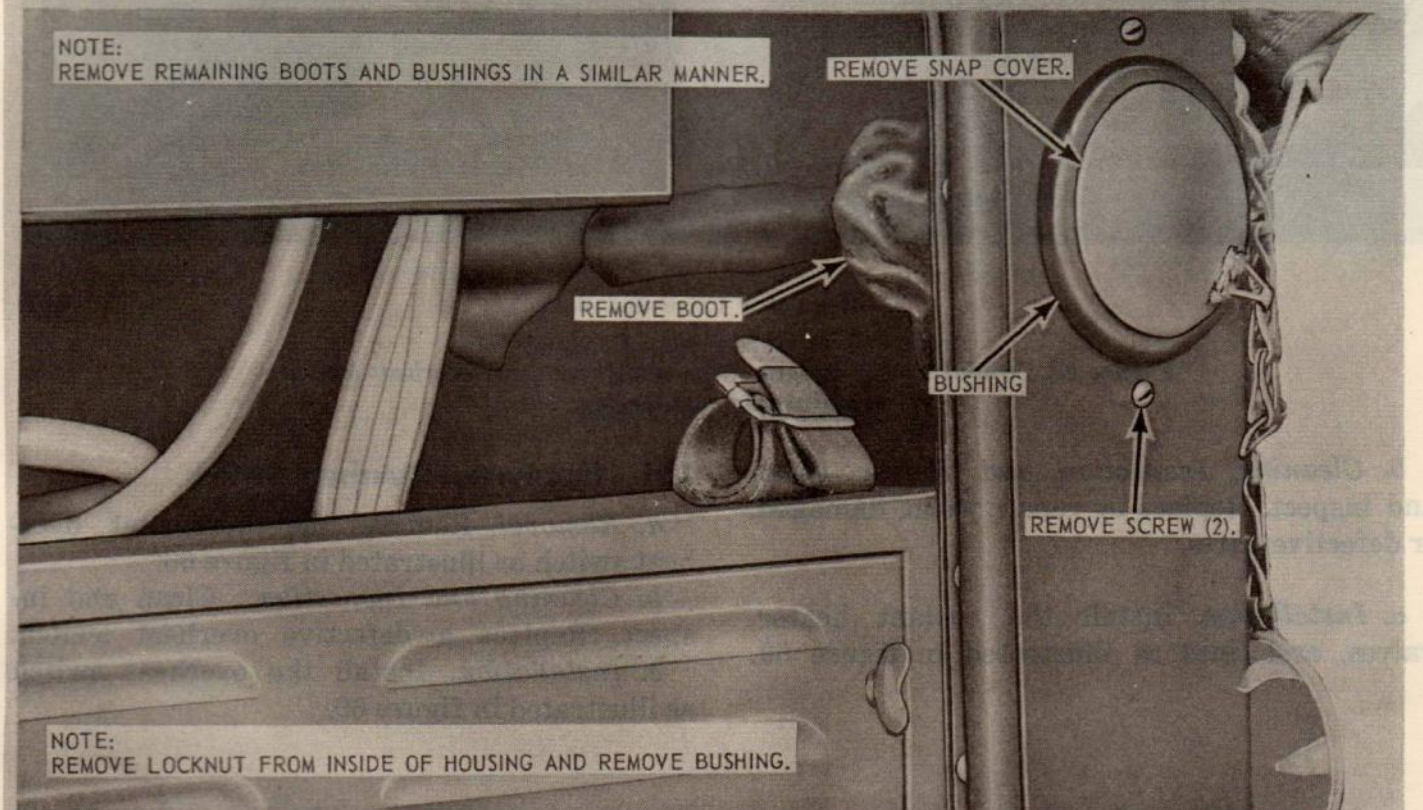
c. *Installation.* Install the toolbox and load cable boots as illustrated in figure 68.

130. Coolant Heater, Valves, and Lines

a. *Removal.* Remove the coolant heater, valves, and lines as illustrated in figure 69.



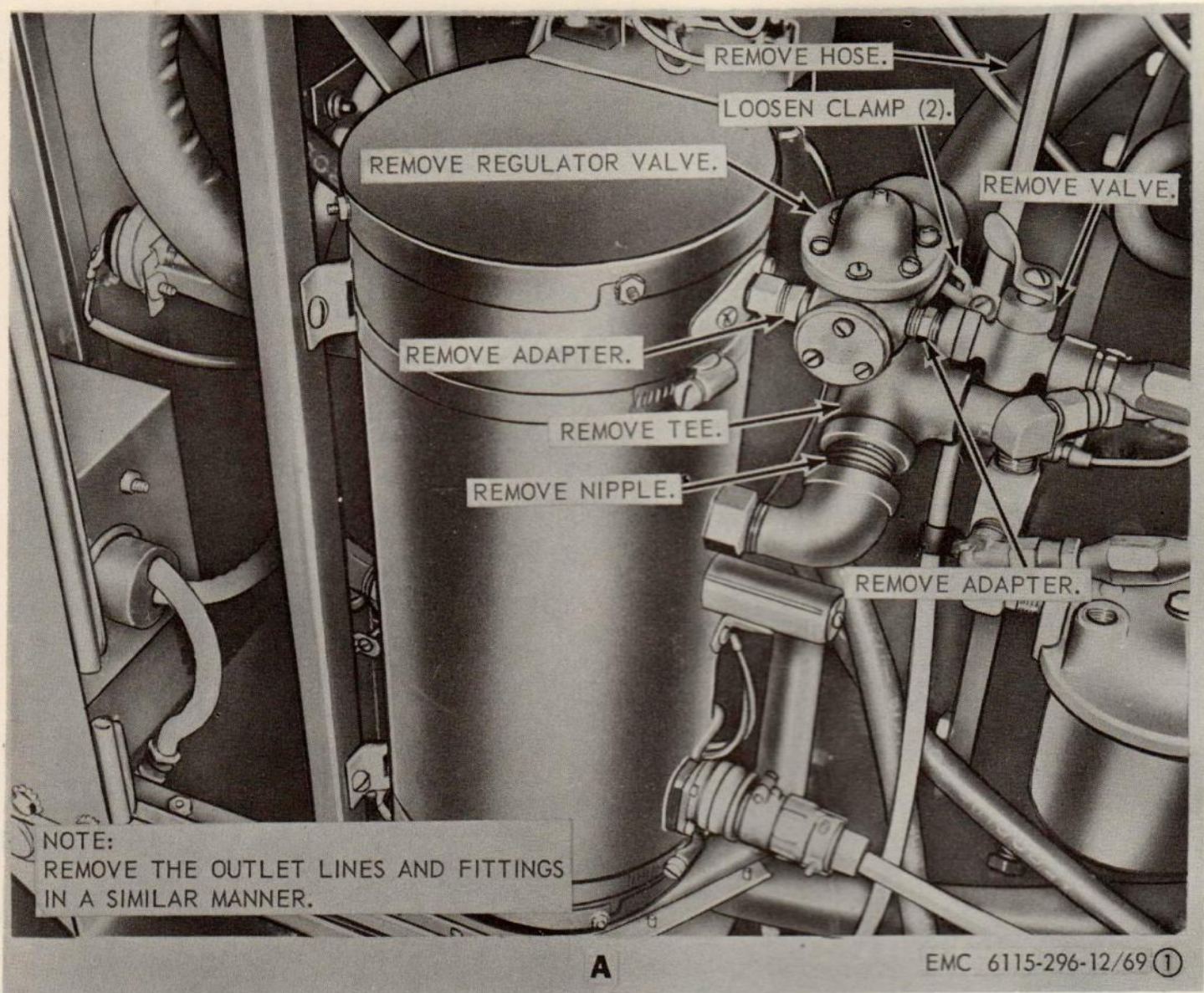
A



B

EMC 6115-296-12/68

A—Toolbox removal points B—Boot removal points
 Figure 68. Toolbox and load cable boots, removal and installation.



A—Regulator valve and lines

Figure 69. Coolant heater, valves, lines, and thermostat overheating switch, removal and installation.

b. *Cleaning, Inspection, and Repair.* Clean and inspect. Replace or repair worn, damaged, or defective parts.

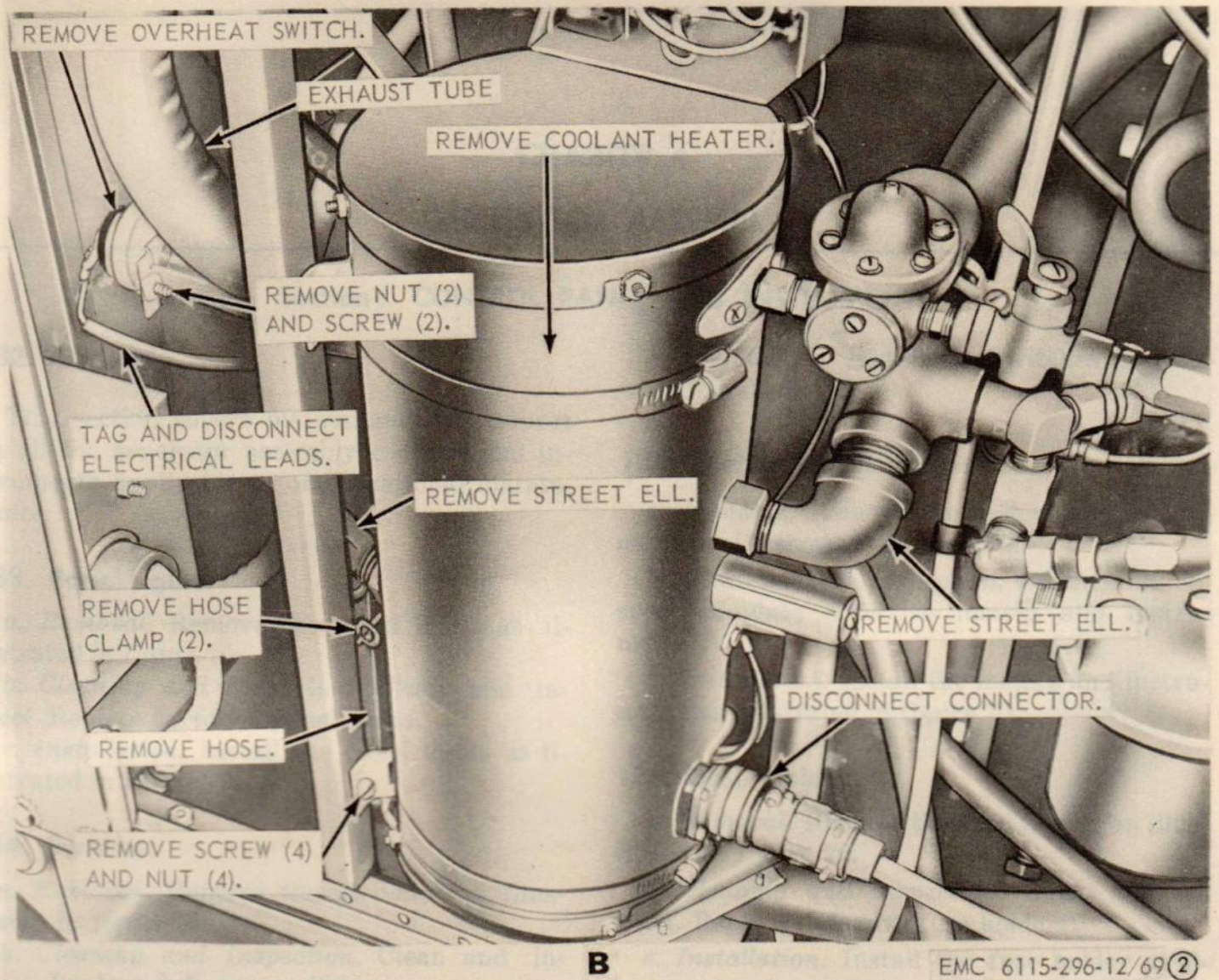
c. *Installation.* Install the coolant heater, valves, and lines as illustrated in figure 69.

131. Thermostat Overheat Switch

a. *Removal.* Remove the thermostat overheat switch as illustrated in figure 69.

b. *Cleaning and Inspection.* Clean and inspect. Replace a defective overheat switch.

c. *Installation.* Install the overheat switch as illustrated in figure 69.



B—Coolant heater and overheated switch

Figure 69—Continued.

CHAPTER 4

GENERATOR ASSEMBLY

Section I. CONTROL PANEL AND INSTRUMENTS

132. General

This section covers maintenance procedures on all the generator assembly controls and instruments applicable to organizational maintenance.

133. Panel Lights

a. Removal. Remove the panel lights as illustrated in figure 70.

b. Cleaning and Inspection. Clean and inspect. Replace defective panel lights.

c. Installation. Install the panel lights as illustrated in figure 70.

134. Switches

a. Removal. Remove the switches as illustrated in figure 70.

b. Cleaning and Inspection. Clean and inspect. Replace defective switches.

c. Installation. Install the switches as illustrated in figure 70.

135. Meters and Instruments

a. Removal. Remove the meters and instruments as illustrated in figure 70.

b. Cleaning and Inspection. Clean and inspect. Replace defective meters and instruments.

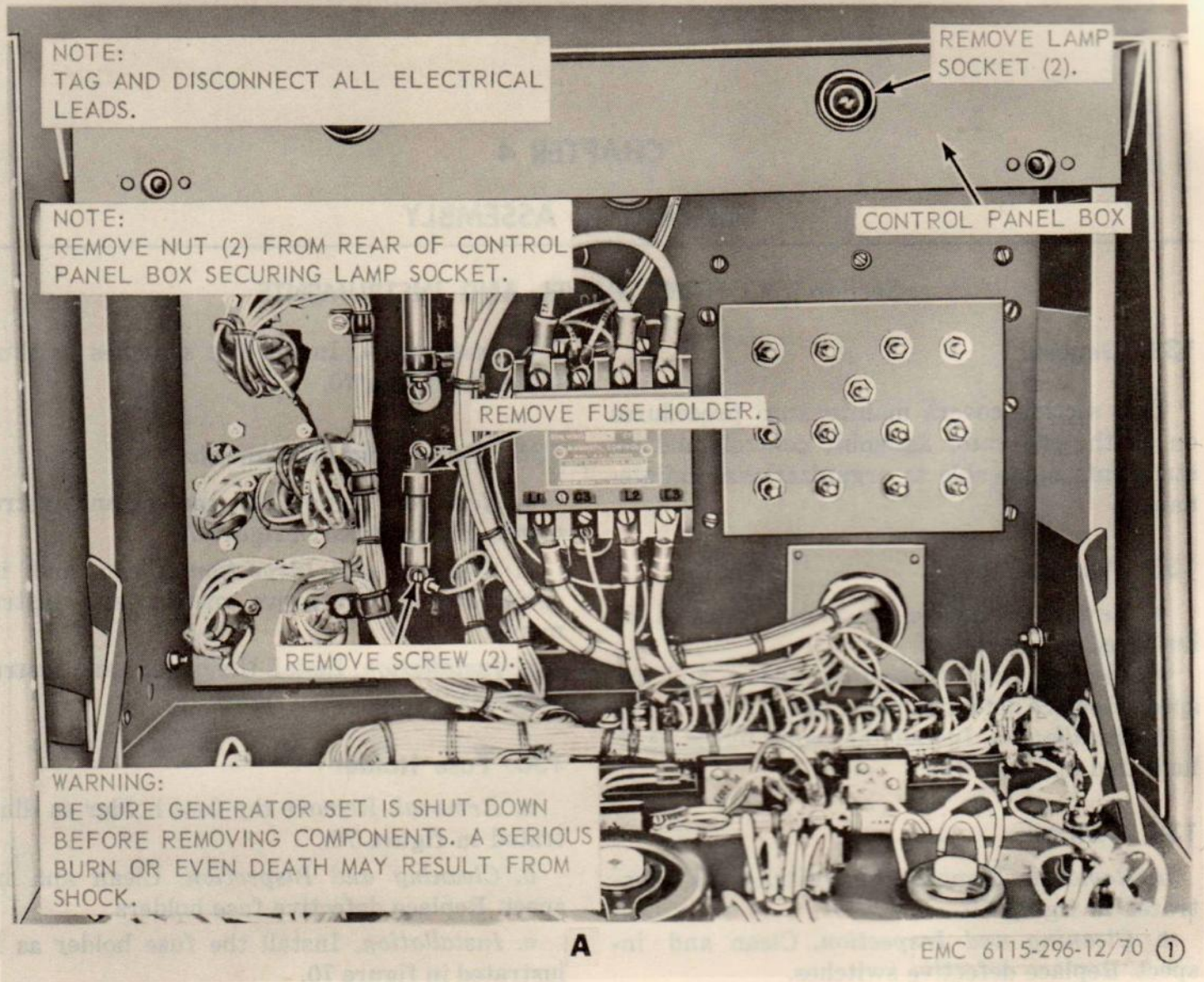
c. Installation. Install the meters and instruments as illustrated in figure 70.

136. Fuse Holder

a. Removal. Remove the fuse holder as illustrated in figure 70.

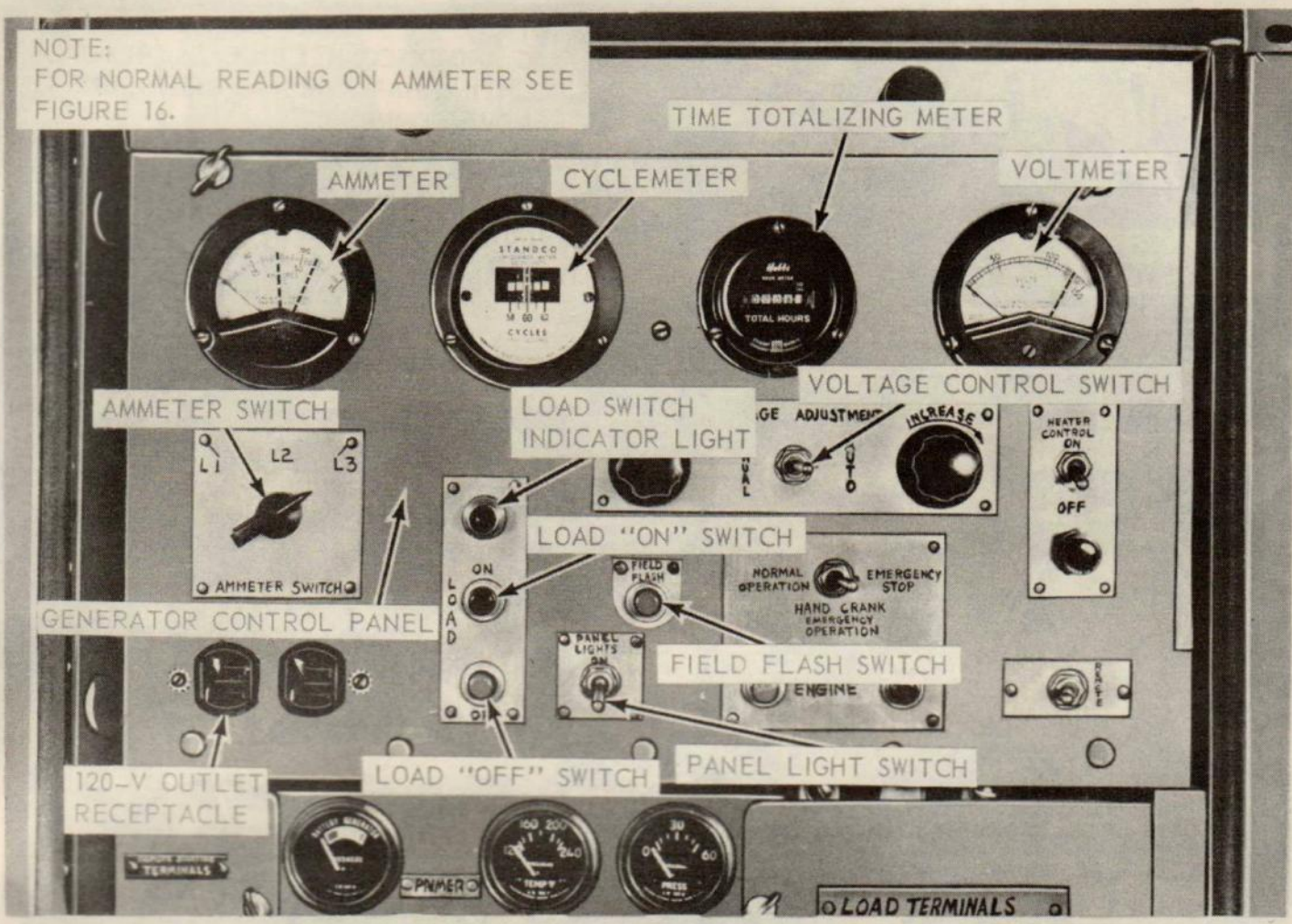
b. Cleaning and Inspection. Clean and inspect. Replace defective fuse holders.

c. Installation. Install the fuse holder as illustrated in figure 70.



A—Fuse holder and panel light removal points

Figure 70. Control panel and instruments, switches, and lights, removal and installation.



B

EMC 6115-296-12/70 (2)

B—Control panel, front view

Figure 70—Continued.

Section II. MAIN GENERATOR

137. General

The main generator is equipped with brushes which are accessible through a generator brush access door at the rear of the unit. The rotor of the main generator is attached through the fan and driving disk to the engine flywheel.

138. Main Generator Brushes

a. Removal Remove the main generator brushes as illustrated in figure 71.

139. Terminal Boards

a. Removal Remove the terminal boards as illustrated in figure 72.

b. Installation Install the main generator brushes as illustrated in figure 71.

c. Adjustment Adjust the main generator brushes as illustrated in figure 71.

Note Use compressed air to clean air filter screen at fan end of fuel and air.

140. Fuel System

a. Cleaning and Inspection Clean and inspect fuel system as follows:

1. Fuel Tank

2. Fuel Lines

3. Fuel Filter

4. Fuel Injector

5. Fuel Pump

6. Fuel Valve

7. Fuel Control Valve

8. Fuel Governor

9. Fuel Injection Pump

10. Fuel Injection Nozzle

11. Fuel Injection Valve

12. Fuel Injection Valve

13. Fuel Injection Valve

14. Fuel Injection Valve

15. Fuel Injection Valve

16. Fuel Injection Valve

17. Fuel Injection Valve

18. Fuel Injection Valve

19. Fuel Injection Valve

20. Fuel Injection Valve

21. Fuel Injection Valve

22. Fuel Injection Valve

23. Fuel Injection Valve

24. Fuel Injection Valve

25. Fuel Injection Valve

26. Fuel Injection Valve

27. Fuel Injection Valve

28. Fuel Injection Valve

29. Fuel Injection Valve

30. Fuel Injection Valve

31. Fuel Injection Valve

32. Fuel Injection Valve

33. Fuel Injection Valve

34. Fuel Injection Valve

35. Fuel Injection Valve

36. Fuel Injection Valve

37. Fuel Injection Valve

38. Fuel Injection Valve

39. Fuel Injection Valve

40. Fuel Injection Valve

41. Fuel Injection Valve

42. Fuel Injection Valve

43. Fuel Injection Valve

44. Fuel Injection Valve

45. Fuel Injection Valve

46. Fuel Injection Valve

47. Fuel Injection Valve

48. Fuel Injection Valve

49. Fuel Injection Valve

50. Fuel Injection Valve

51. Fuel Injection Valve

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62. Fuel Injection Valve

63. Fuel Injection Valve

64. Fuel Injection Valve

65. Fuel Injection Valve

66. Fuel Injection Valve

67. Fuel Injection Valve

68. Fuel Injection Valve

69. Fuel Injection Valve

70. Fuel Injection Valve

71. Fuel Injection Valve

72. Fuel Injection Valve

73. Fuel Injection Valve

74. Fuel Injection Valve

75. Fuel Injection Valve

76. Fuel Injection Valve

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91. Fuel Injection Valve

92. Fuel Injection Valve

93. Fuel Injection Valve

94. Fuel Injection Valve

95. Fuel Injection Valve

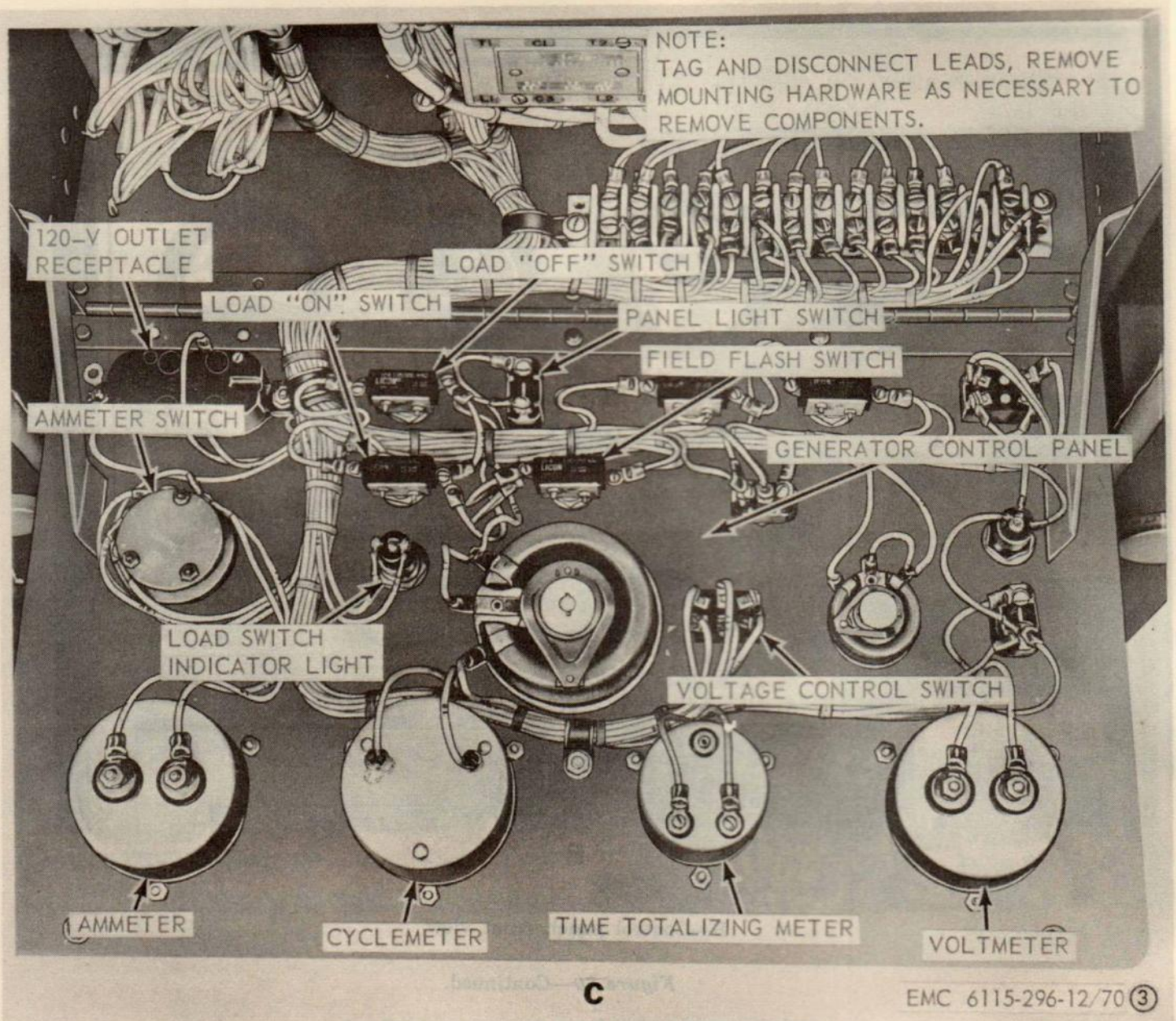
96. Fuel Injection Valve

97. Fuel Injection Valve

98. Fuel Injection Valve

99. Fuel Injection Valve

100. Fuel Injection Valve



C—Control panel, rear view.

Figure 70—Continued

Section II. MAIN GENERATOR

137. General

The main generator is equipped with brushes which are accessible through a generator brush access door at the rear of the unit. The rotor of the main generator is attached through the fan and driving disk to the engine flywheel.

138. Main Generator Brushes

a. Removal. Remove the main generator brushes as illustrated in figure 71.

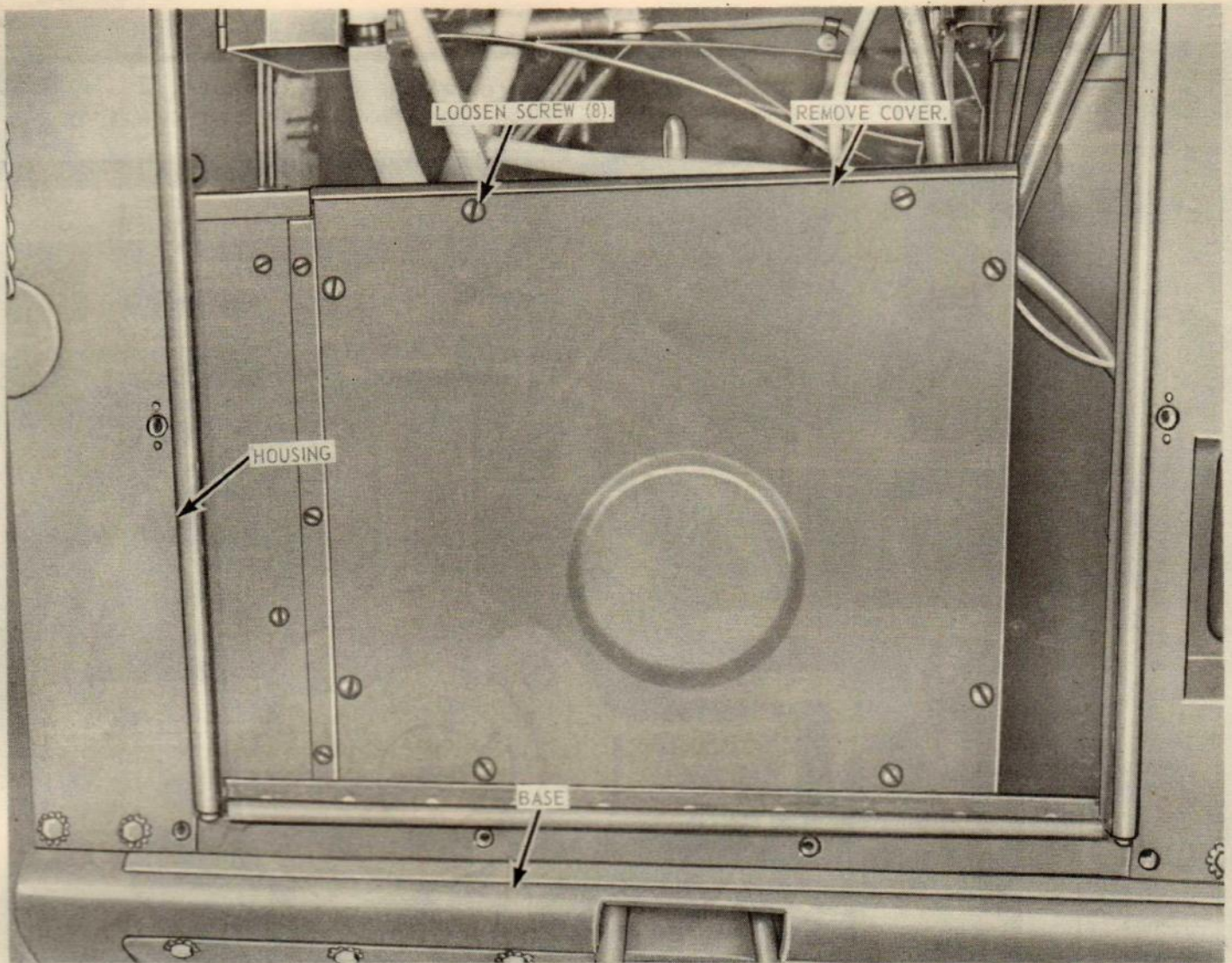
b. Adjustment. Adjust the main generator brushes as illustrated in figure 71.

c. Installation. Install the main generator brushes as illustrated in figure 71.

Note. Use compressed air to clean air inlet screen at fan end of dust and dirt.

139. Terminal Boards

a. Removal. Remove the terminal boards as illustrated in figure 72.



A

EMC 6115-296-12/71 (1)

A—Cover removal

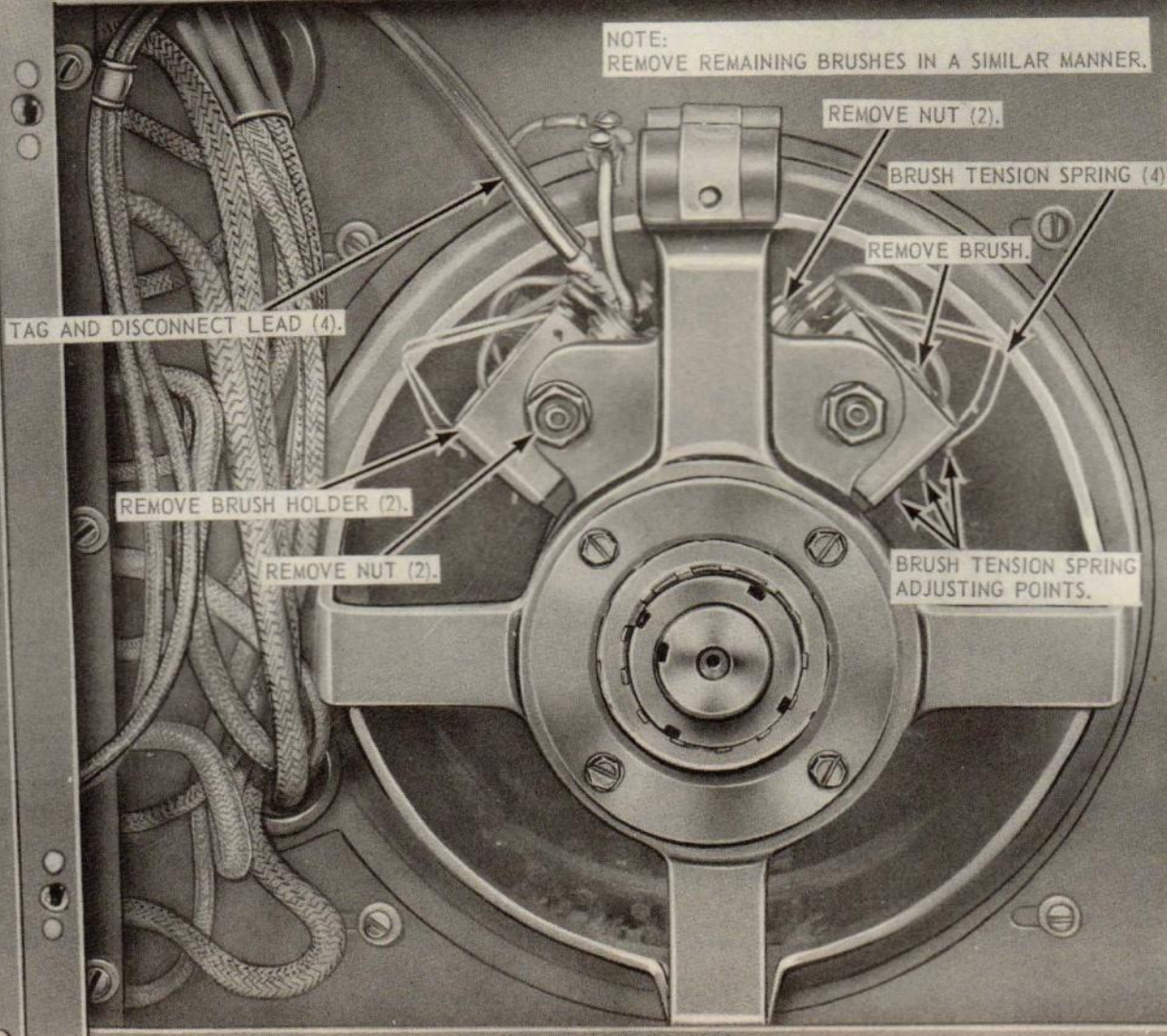
Figure 71. Covers and main generator brush and holder adjustment, removal and installation.

b. Cleaning and Inspection. Clean and inspect. Replace defective terminal boards.

c. Installation. Install the terminal boards as illustrated in figure 72.

NOTE:
TO ADJUST BRUSHES, MOVE BRUSH TENSION SPRINGS INTO NEXT LOWER BRUSH ADJUSTING POINTS AND CHECK FOR CORRECT TENSION WITH SPRING TENSION GAGE. THE PROPER BRUSH SPRING TENSION IS 8-12 OUNCES PER SPRING.

NOTE:
REMOVE REMAINING BRUSHES IN A SIMILAR MANNER.



NOTE:
TO SEAT BRUSHES, POSITION A PIECE OF GRADE 00 FLINT PAPER BETWEEN THE COLLECTOR RING WITH THE FLINT SURFACE FACING THE BRUSH, BEING SURE THAT THE PAPER IS THE SAME WIDTH AS THE COLLECTOR RING, MOVE THE PAPER IN ONE DIRECTION ONLY UNTIL THE PROPER BRUSH SURFACE IS OBTAINED.

B

EMC 6115-296-12/71 (2)

B—Brush and brush holder, removal and spring tension adjustment

Figure 71—Continued.

137. General

The main generator brushes are accessible through a generator brush access door at the rear of the unit. The main generator brush lead of the main generator is attached through the fan and driving disk to the engine flywheel.

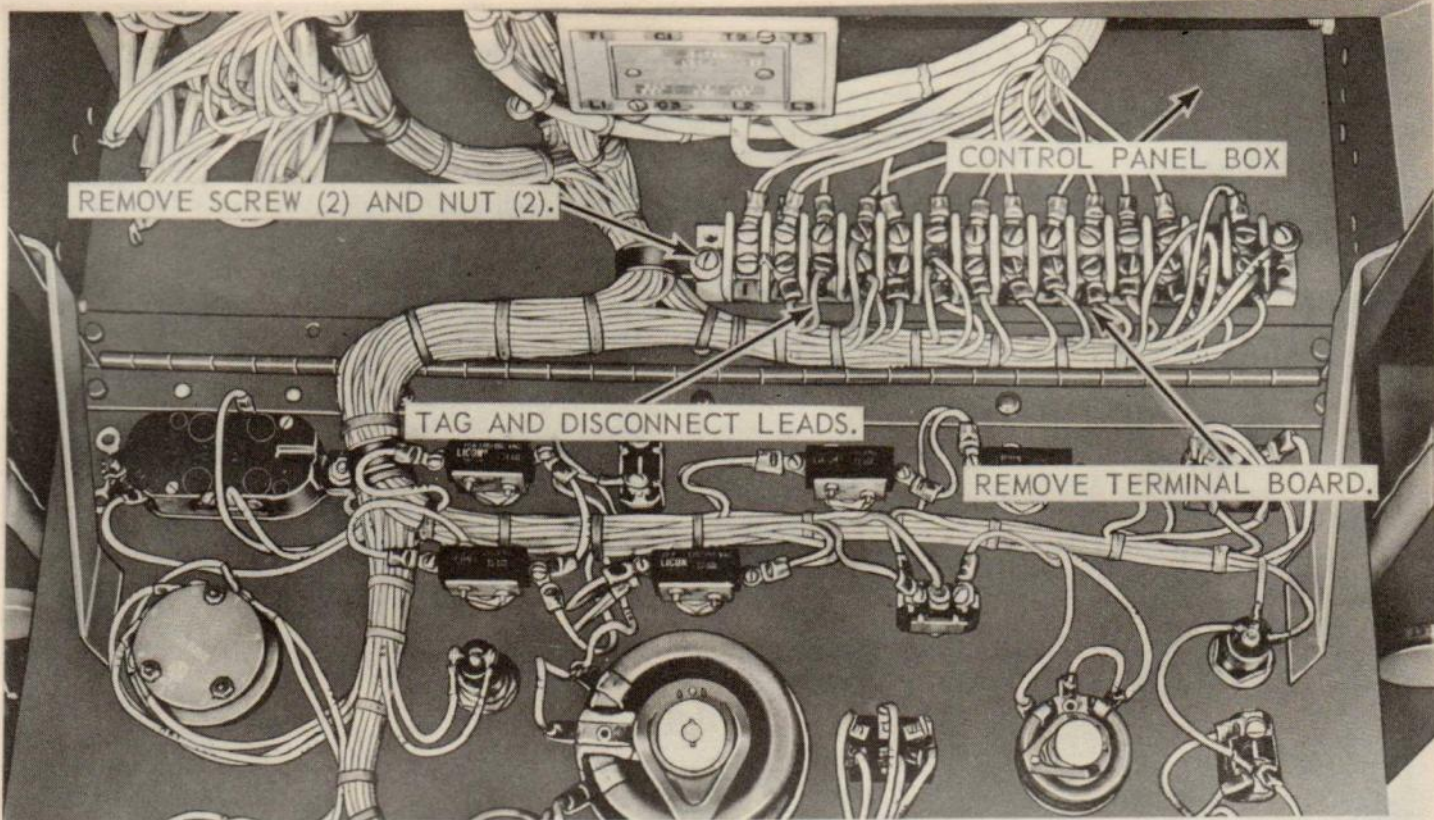
138. Main Generator Brushes

138. Main Generator Brushes

a. Removal. Remove the main generator brushes as illustrated in figure 71.

139. Terminal Boards

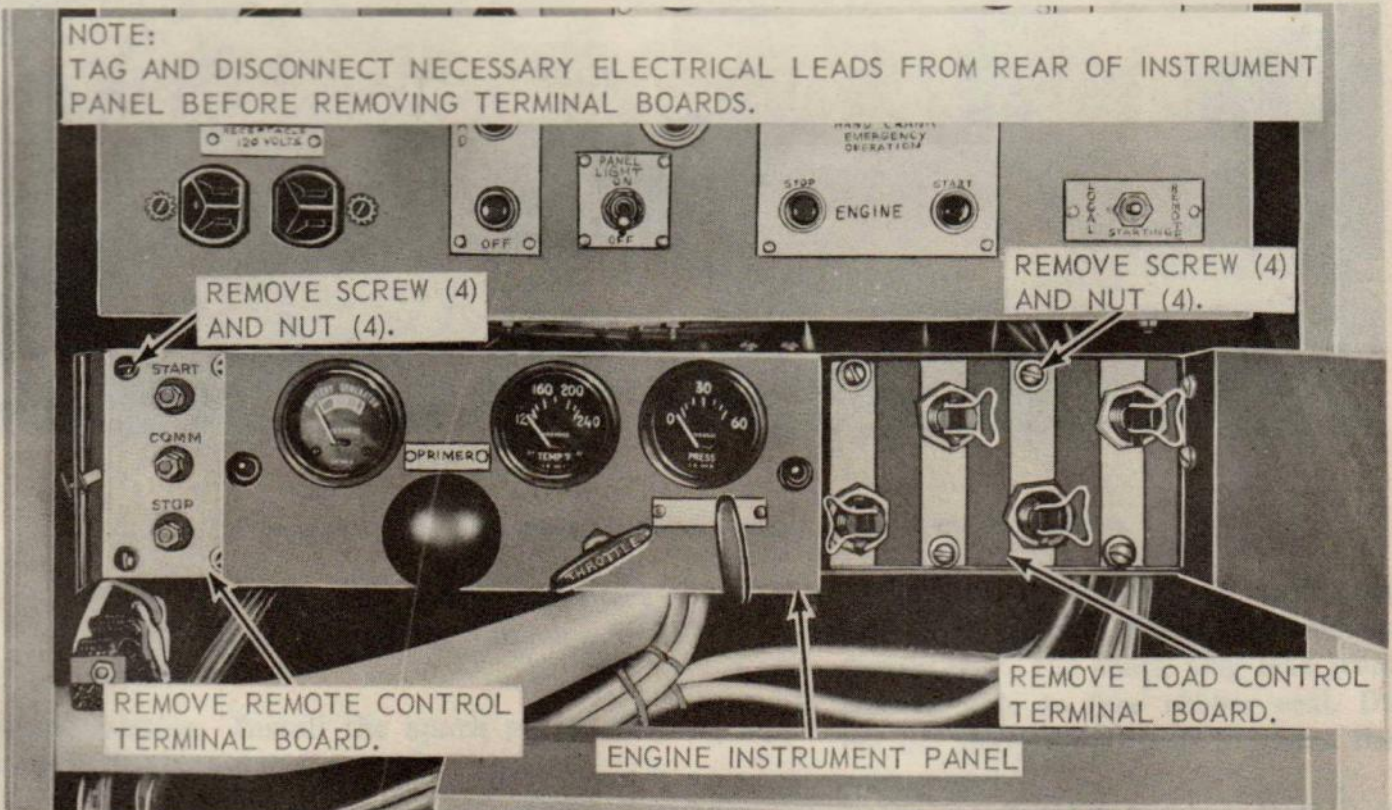
a. Removal. Remove the terminal boards as illustrated in figure 72.



A

NOTE:

TAG AND DISCONNECT NECESSARY ELECTRICAL LEADS FROM REAR OF INSTRUMENT PANEL BEFORE REMOVING TERMINAL BOARDS.



B

EMC 6115-296-12/72

A—Generator control box terminal board

B—Load and remote control terminal board

Figure 72. Terminal boards, removal and installation.

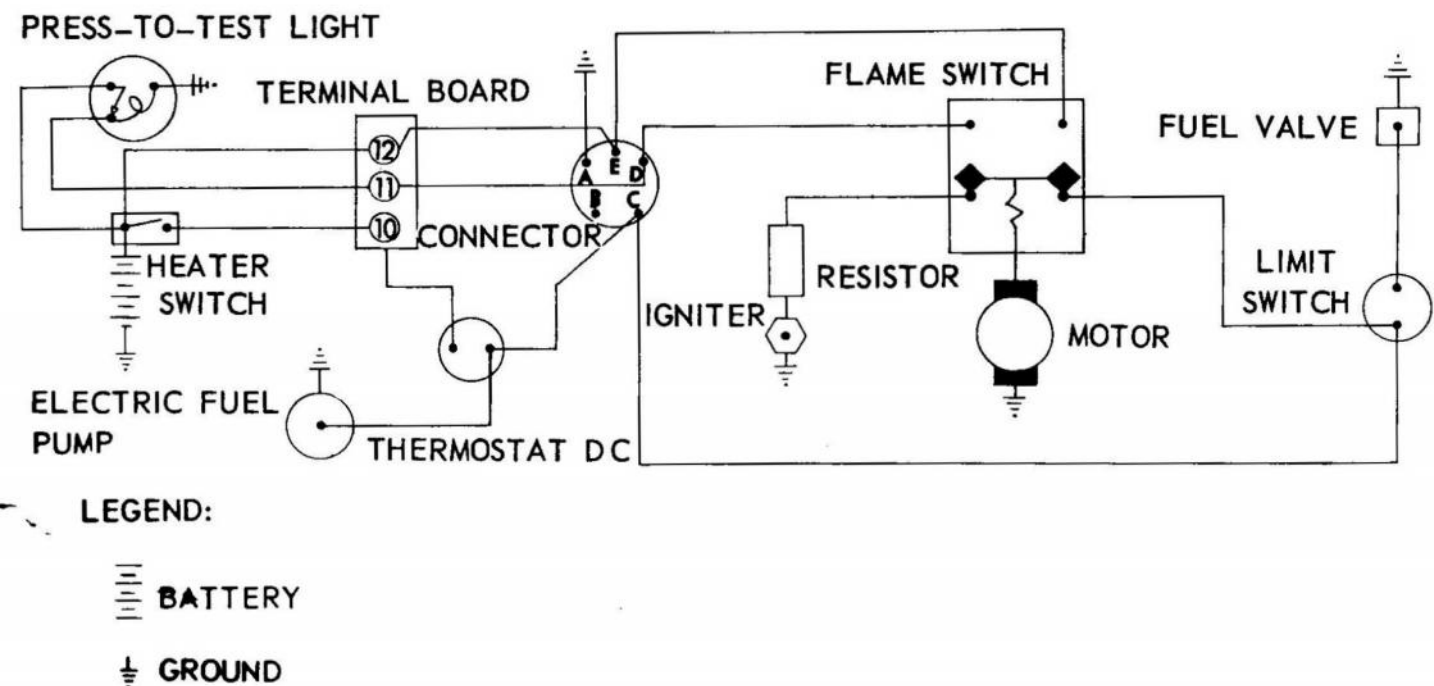
CHAPTER 5 WINTERIZATION

Section I. COOLANT HEATER

40. General

The heater which allows the generator set to operate at low ambient temperature, is mounted at the rear of the generator set below the battery box. Gasoline is fed to the heater from the fuel tank, by means of an electric fuel pump through a three-way valve mounted on the generator set right side. A high-low fuel valve and a fuel solenoid valve are assembled to the top of the coolant heater. An overheat

control located in the coolant line running from the engine to the coolant heater will shut down the coolant heater when the coolant reaches a temperature of 180° F. The heater exhaust is piped to the battery box and passes through a baffle in the oil pan. A thermostat located in the battery box automatically turns off the coolant heater when desired temperature is reached. Refer to figure 73 for heater practical wiring diagram.



EMC 6115-296-12/73

Figure 73. Coolant heater practical wiring diagram.

141. Coolant Heater Assembly

a. Heater Igniter Removal. Remove the igniter as illustrated in figure 74.

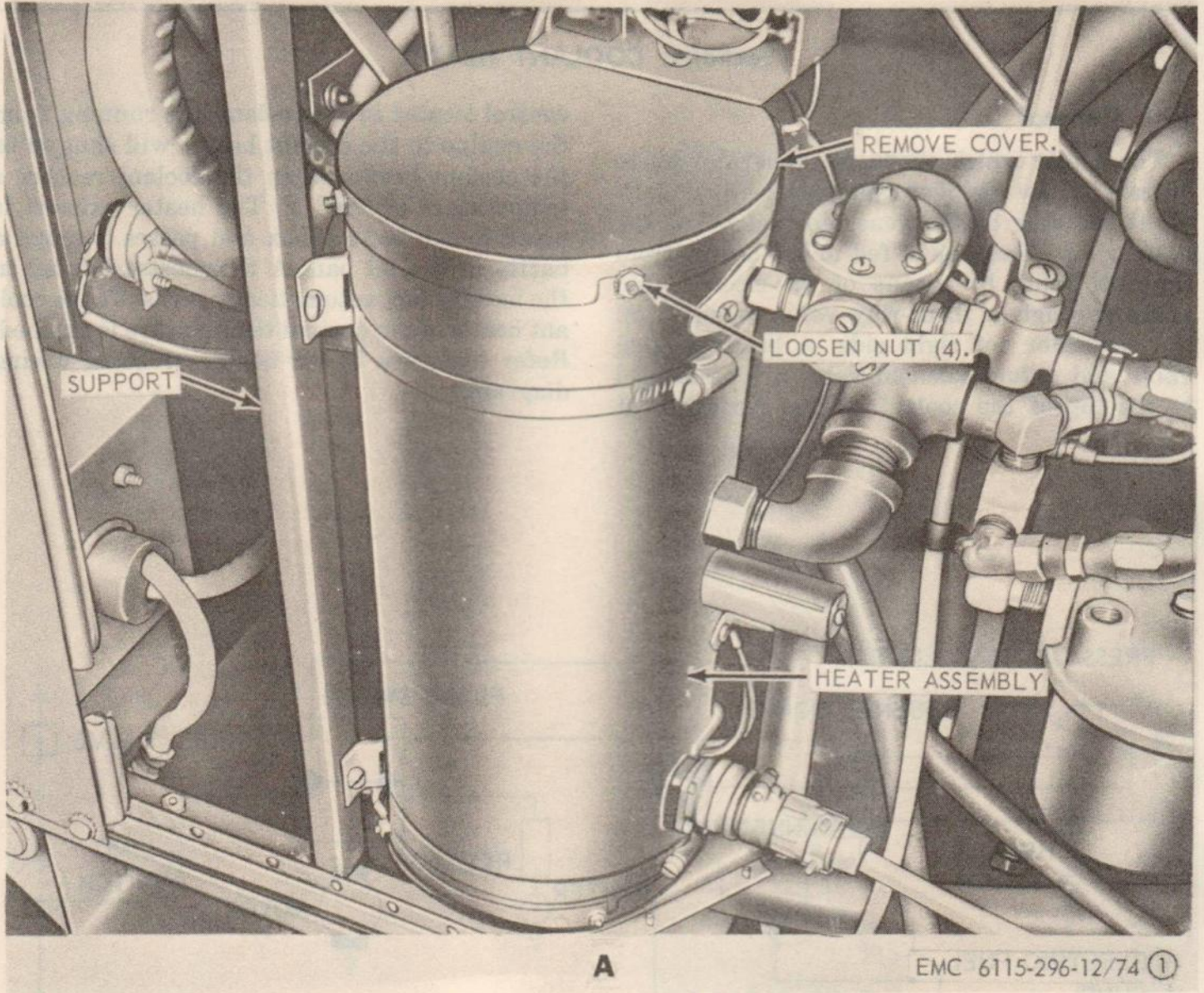
b. Heater Assembly Removal. Remove the heater assembly as illustrated in figure 69.

c. Cleaning and Inspection. Clean and in-

spect heater assembly and igniter. Replace a worn, damaged, or defective igniter or heater assembly.

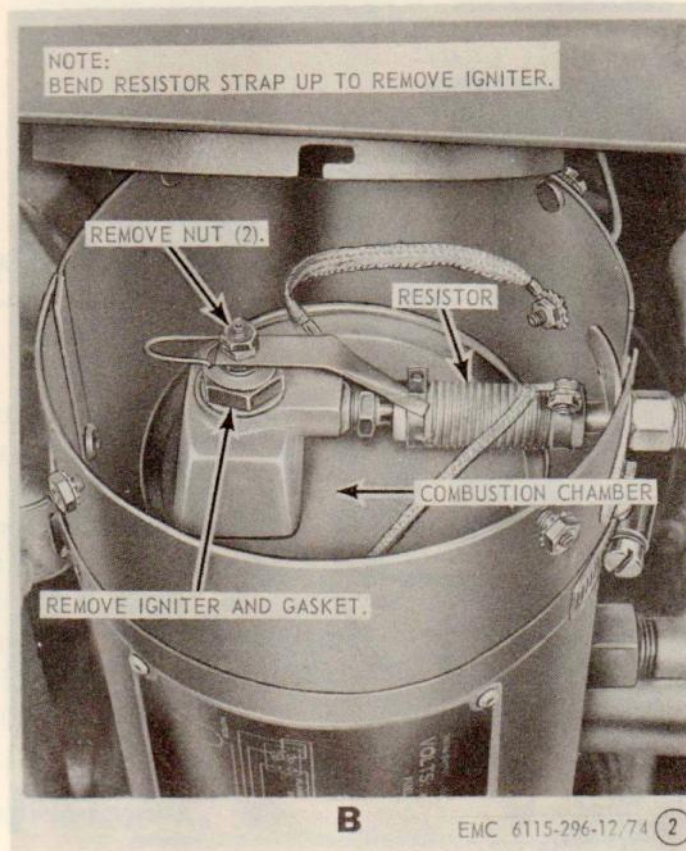
d. Heater Igniter Installation. Install the heater igniter as illustrated in figure 74.

e. Heater Assembly Installation. Install the heater assembly as illustrated in figure 69.



A—Cover removal points

Figure 74. Heater igniter, removal and installation.



B—Igniter removal points

Figure 74—Continued.

Section II. FUEL SYSTEM

142. General

The fuel system for the coolant heater assembly is made up of fuel pump, fuel filter, valves, and lines. The fuel system is segregated from the engine other than as the source of its fuel supply.

143. Heater Fuel Pump

a. Removal. Remove the heater fuel pump as illustrated in figure 75.

b. Cleaning and Inspection. Clean, inspect, and replace a defective heater fuel pump as necessary.

c. Installation. Install the heater fuel pump as illustrated in figure 75.

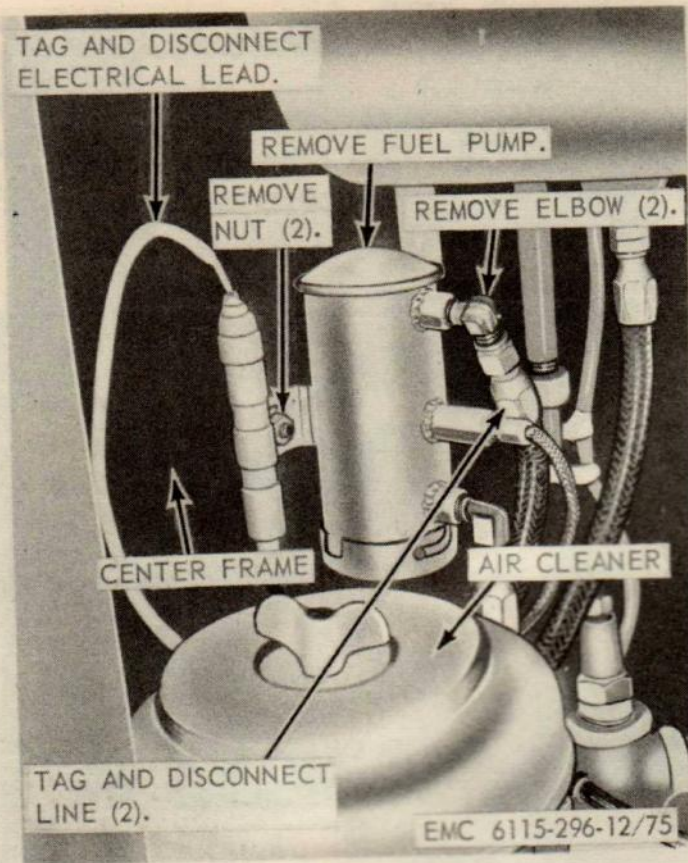


Figure 75. Heater fuel pump, removal and installation.

CHAPTER 6

DEMOLITION OF GENERATOR SET TO PREVENT ENEMY USE

144. General

When capture or abandonment of the generator set to an enemy is imminent, the responsible unit commander must make the decision either to destroy the equipment or to render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. Whatever method of demolition is employed, it is essential to destroy the same vital parts of all generator sets and all corresponding repair parts.

145. Demolition to Render the Engine Inoperative

a. Mechanical Means. Use sledge hammers, crowbars, picks, axes, or any other heavy tools which may be available to destroy the following:

- (1) Engine block and manifold.
- (2) Carburetor, magneto, governor, and water pump.
- (3) Radiator, starter, motor, and generator.

Note. The above steps are minimum requirements for this method.

- (4) All controls and instruments.
- (5) Main generator assembly.

b. Misuse. Perform the following steps to render the engine inoperative.

- (1) Drain radiator and engine crankcase. Put sand, gravel, nuts, bolts, screws, or broken glass in the oil filler tube.
- (2) Disconnect radiator fan and run engine at full throttle.

Note. The above steps are minimum requirements for this method.

146. Demolition by Explosives or Weapons Fire

a. Explosives. Place as many of the following charges (fig. 76) as the situation permits

and detonate them simultaneously with detonating cord and a suitable detonator.

- (1) One 1/2-pound charge on right side of engine between manifold and engine block.
 - (2) One 1/2-pound charge between engine generator and engine block.
- Note.* The above charges are the minimum requirements for this method.
- (3) One 1/2-pound charge inside main generator exciter housing.
 - (4) One 1/2-pound charge between engine and main generator at coupling disk.
 - (5) One 1/2-pound charge in control panel box.

b. Weapons Fire. Fire on the generator set with the heaviest practical weapons available.

147. Other Demolition Methods

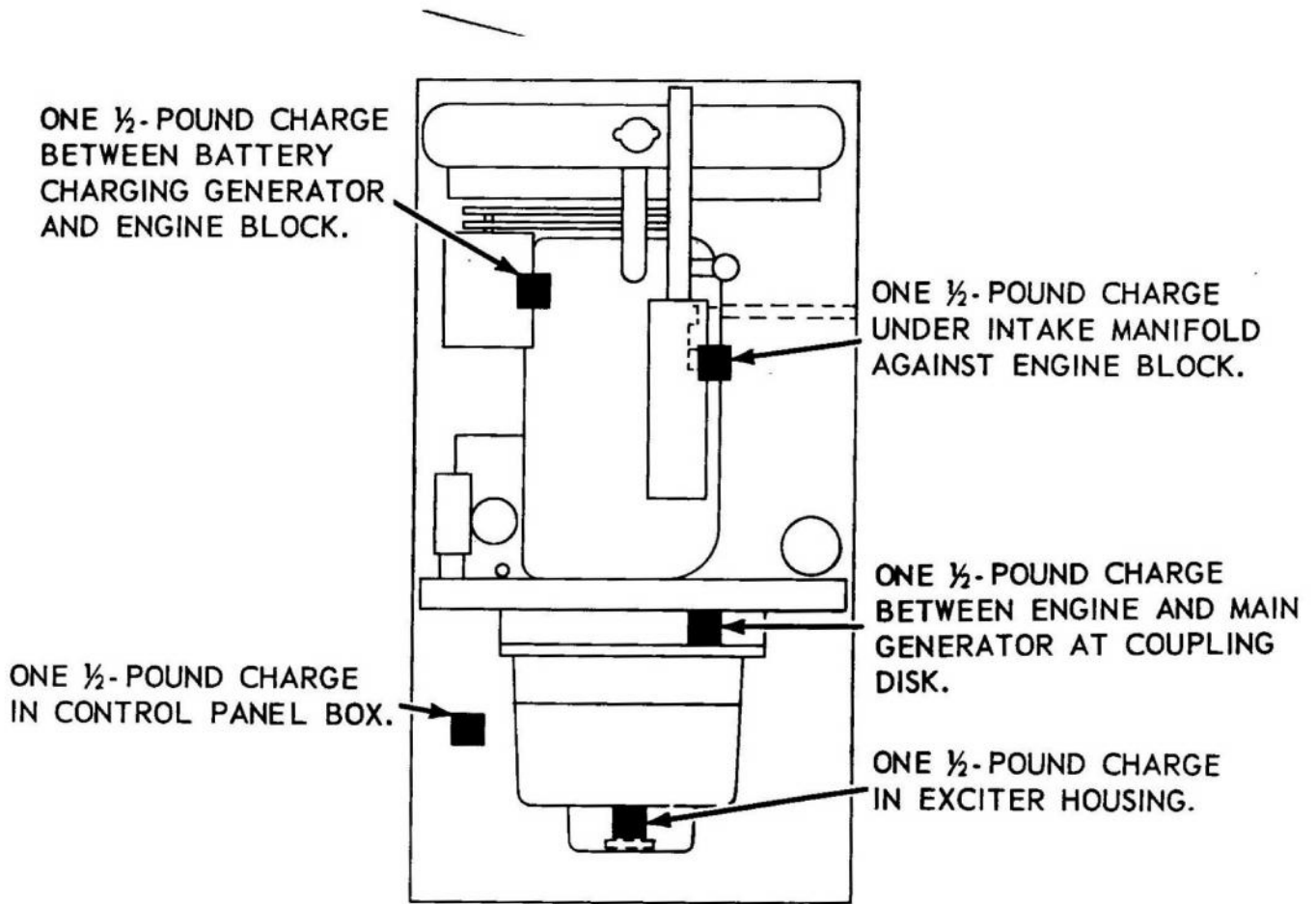
a. Scattering and Concealment. Remove all easily accessible parts such as the carburetor, fuel pump, magneto, governor, generator, and exciter brushes. Scatter them through dense foliage, bury them in dirt or sand, or throw them in a lake, stream, or other body of water.

b. Burning. Pack rags, clothing, or canvas under, around, and inside the generator set. Saturate this packing with gasoline, oil, or diesel fuel and ignite.

c. Submersion. Totally submerge the generator set in a body of water to provide water damage and concealment. Salt water will damage metal parts more than fresh water.

148. Training

All operators should receive thorough training in the destruction of the generator set. Refer to FM 5-25. Simulated destruction, using all



LEGEND ■ ½-POUND CHARGE

EMC 6115-296-12/76

Figure 76. Placement of charges.

of the methods listed above, should be included in the operator training program. It must be emphasized in training, that demolition operations are usually necessitated by critical situations when time available for carrying out de-

struction is limited. For this reason, it is necessary that operators be thoroughly familiar with all methods of destruction of equipment, and be able to carry out demolition instructions without reference to this or any other manual.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE

Section I. SHIPMENT WITHIN ZONE OF INTERIOR

149. Preparation of Equipment for Shipment

a. General. Detailed instructions for the preparation of the generator set for domestic shipment are outlined within this paragraph. Preservation will be accomplished in sequence that will not require the operation of previously preserved components.

b. Inspection. The generator set will be inspected for any unusual conditions such as damage, rusting, accumulation of water, and pilferage. DA Form 464, (Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment) will be executed on the equipment.

c. Cleaning and Drying. Thorough cleaning and drying by an approved technique is the first essential procedure in any effective preservation process. Approved methods of cleaning, drying, types of preservatives, and methods of application are described in TM 38-230.

d. Painting. Paint all surfaces when the paint has been removed or damaged. Refer to TB ENG 60 for detailed cleaning and painting instructions.

e. Depreservation Guide. DA Form 2258, (Depreservation Guide of Engineer Equipment).

- (1) A properly annotated depreservation guide will be completed concurrently with preservation for each item of mechanical equipment, with any peculiar requirements outlined in the remarks column. The completed depreservation guide will be placed with the equipment in a waterproof envelope marked "Depreservation Guide", and fastened in a conspicuous location on or near the operator's controls.

- (2) Prior to placing equipment in operation or to the extent necessary for in-

spection, depreservation of the item shall be performed as outlined on the depreservation guide.

f. Cooling System, Boxed or Crated. Completely drain the cooling system including radiator and block, space heater, or other accessories through which the coolant has circulated. Flush with clean water. Leave draincocks open.

g. Lubrication System (Wet Sump), Boxed or Crated. Check level of lubricant. Operate the engine at a fast idle until lubricant has been circulated throughout the system. The crankcase will then be drained and the drain plugs reinstalled.

h. Sealing of Openings. Openings that will permit the direct entry of water into the interior of gasoline engine-driven equipment, starting motor, generator, electrical inclosures and so on, shall be sealed with pressure-sensitive tape conforming to Specification PPP-T-60, type III, class I.

i. Fuel Tank, Boxed or Crated. Drain fuel tank after engine preservation and fog interior with preservative oil, type P-10, grade 2, conforming to Specification MIL-L-21260.

j. Air Cleaner. Drain the air cleaner and seal all openings that permit the direct entry of water. Use type III, class 1, waterproof pressure-sensitive adhesive tape conforming to PPP-T-60.

k. Exterior Surfaces. Coat exposed machined ferrous metal surfaces with preservative (P-6) conforming to Specification MIL-C-11796, class 3. If preservative is not available, cup grease may be used.

l. Marking. Shall conform to MIL-STD-129.

m. Batteries and Cables. Batteries shall be secured in the battery compartment. Batteries

shall be filled and fully charged. Cables shall be disconnected, vent holes sealed, and all terminals wrapped and secured with type III, class 1, pressure-sensitive tape conforming to Specification PPP-T-60.

n. Disassembly, Disassembled Parts, and Basic Issue Items.

- (1) Disassembly shall be limited to the removal of parts and projecting components that tend to increase the overall profile of the generator set and that which is subject to pilferage.
- (2) Disassembled items shall be packed with the publications in the toolbox if possible. Otherwise, items will be packed in a suitable container and secured to the generator set to prevent loss or pilferage.

Note. If packing is required to provide adequate protection against damage during shipment, refer to TM 38-230 for guidance in crate fabrication.

150. Loading Equipment for Shipment

a. Using suitable hoisting equipment, attach a hook or sling to the lifting eye. When winching the generator set on a flatcar or truck, attach the sling or hook to the towing eyes.

b. Secure the generator set with blocks, wedged tightly against the skid base, and fasten securely to the carrier.

c. Thread a wire cable through the towing eyes and secure to tiedown brackets on the sides of the transporting vehicle to prevent movement in any direction.

Caution: Be careful when using hoisting equipment or working around cable or chain under extreme tension. Do not swing the generator set back and forth when it is suspended in the air. Lower generator set gently to the bed of the carrier.

Section II. LIMITED STORAGE

151. Preparation of Equipment for Storage

a. *General.* Detailed instructions for preserving and maintaining equipment in limited storage are outlined below. Limited storage is defined as storage not to exceed 6 months. Refer to AR 743-505.

b. *Inspection.* Refer to paragraph 149.

c. *Cleaning and Drying.* Refer to paragraph 149.

d. *Painting.* Refer to paragraph 149.

e. *Depreservation Guide.* Refer to paragraph 149.

f. *Sealing of Openings.* Refer to paragraph 149.

g. *Fuel Tank Boxed or Crated.* Refer to paragraph 149.

h. *Air Cleaner.* Refer to paragraph 149.

i. *Exterior Surfaces.* Refer to paragraph 149.

j. *Batteries and Cables.* Refer to paragraph 149.

k. *Disassembly, Disassembled Parts, Basic Issue Items.* Refer to paragraph 149.

152. Inspection and Maintenance of Equipment in Storage

a. *Weatherproofing.* When suitable shelter is not available, select a firm, level, well-drained storage location, protected from prevailing winds. Position the generator set on heavy planking or other solid surface. Cover the equipment with a tarpaulin or other suitable waterproof covering and tie down securely.

b. *Exercising.* Every 30 days the generator set will be inspected as outlined on DA Form 464 and operated long enough to bring it up to its operating temperature and for complete lubrication of gears, bearings, etc. After each exercising period the generator set will be re-preserved.

APPENDIX I

REFERENCES

1. Dictionaries of Terms and Abbreviations

- AR 320-5 **Dictionary of United States Army Terms**
 AR 320-50 **Authorized Abbreviations and Brevity Codes**

2. Fire Protection

- TM 5-687 **Repairs and Utilities: Fire Protection Equipment and Appliances; In-**
 spection, Operations, and Preventive Maintenance
 TM 9-1799 **Ordnance Maintenance: Fire Extinguishers**

3. Lubrication

- LO 5-6115-296- **Generator Set, Gasoline Engine: 10 KW, AC, 120V, 1 and 3 Phase, 120/**
 12 **240 V, Single Phase, 120/208 V, 3 Phase 60 Cycle; Skid Mounted**
 (Kurz & Root Model Fero-1) w/Hercules Engine Model 1 XB3ER

4. Painting and Preservation

- TB ENG 60 **Preservation and Painting of Serviceable Corps of Engineers Equipment**
 TM 9-2851 **Painting Instructions for Field Use**
 TM 38-230 **Preservation, Packaging, and Packing of Military Supplies and Equipment**

5. Preventive Maintenance

- AR 700-38 **Unsatisfactory Equipment Report**
 AR 750-5 **Maintenance Responsibilities and Shop Operation**
 TB ENG 347 **Winterization Techniques for Engineer Equipment**
 TM 5-505 **Maintenance of Engineer Equipment**
 TM 5-764 **Electric Motor and Generator Repair**
 TM 9-207 **Operation and Maintenance of Ordnance Materiel in Extreme Cold**
 Weather (0° to -65° F.)
 TM 9-6140-200- **Storage Batteries, Lead Acid Type**
 15

6. Publication Indexes

- DA Pam 108-1 **Index of Army Motion Pictures, Film Strips, Slides, and Phono—**
 Recording
 DA Pam 310-1 **Index of Administrative Publications**
 DA Pam 310-2 **Index of Blank Forms**
 DA Pam 310-3 **Index of Training Publications**
 DA Pam 310-4 **Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubri-**
 cation Orders, and Modification Work Orders
 DA Pam 310-5 **Index of Graphic Training Aids and Devices**
 DA Pam 310-25 **Index of Supply Manual Corps of Engineers**

7. Radio Interference Suppression

TM 11-483 Radio Interference Suppression

8. Shipment and Limited Storage

AR 743-505 Limited Storage of Engineer Mechanical Equipment
TM 9-200 General Packaging Instructions for Ordnance General Supplies

9. Supply Publications

SM 10-1-C4-1 Petroleum, Petroleum Base Products and Related Material
TM 5-6115-296- Organizational Maintenance Repair Parts and Special Tool Lists Gen-
20P (When erator Set, Gasoline Engine: 10 KW, AC, 120V, 1 and 3 Phase 120/240
published) V, Single Phase, 120/208 V, 3 Phase 60 Cycle; Skid Mounted (Kurz &
Root Model Fero-1) Serial Number Range 560-1001 Thru 560-4600

10. Training Aids

FM 5-25 Explosives and Demolition
FM 21-5 Military Training
FM 21-6 Techniques of Military Instruction
FM 21-30 Military Symbols

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

This appendix contains explanations of all maintenance and repair functions authorized for the various echelons. Section II, contains the maintenance allocation chart.

2. Maintenance

Maintenance is any action taken to keep materiel in a serviceable condition or to restore it to serviceability when it is unserviceable. Maintenance of materiel includes the following:

a. Service. To clean, to preserve, and to replenish fuel and lubricants.

b. Adjust. To regulate periodically to prevent malfunction.

c. Inspect. To verify serviceability and to detect incipient mechanical failure by scrutiny.

d. Test. To verify serviceability and to detect incipient mechanical failure by use of special equipment such as gages, meters and so on.

e. Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

f. Rebuild. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

g. Overhaul. To restore an item to completely serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum

disassembly of the item during the overhaul process.

h. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

3. Explanation of Columns

a. Functional Group. The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes are taken from the Corps of Engineers Functional Grouping Indexes, and appear on the maintenance allocation chart in their correct numerical sequence. These indexes are normally set up according to their proximity to each other and their function.

b. Components and Related Operation. This column contains the functional index group heading, subgroup headings, and a brief description of the part starting with the noun name. It also designates the operations to be performed such as service, adjust, inspect, test, replace, repair, and overhaul.

c. Echelons of Maintenance. This column contains the various echelons of maintenance by number designation. An X placed in the appropriate echelon column and in line with an indicated maintenance function, authorizes the particular echelon to perform the function. The symbol X indicates the lowest echelon responsible for performing that particular function. The X does not necessarily indicate repair parts will be stocked at that level. Echelons higher than the echelon annotated by X are authorized to perform the indicated function.

d. Remarks. The column lists specific maintenance functions, special tools, cross-reference instructions, and the like pertinent to the operation being performed.

Section II. MAINTENANCE ALLOCATION CHART

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
01	ENGINE						
0100	ENGINE ASSEMBLY						
	Engine Assembly						
	Service -----	X					
	Inspect -----	X					
	Test -----	--	X				Compression
	Replace -----	--	--	X			
	Repair -----	--	--	X			
	Overhaul -----	--	--	--	X		
0101	CRANKCASE, BLOCK, CYLINDER HEAD						
	Block Assembly						
	Replace -----	--	--	--	X		
	Repair -----	--	--	X			
	Cylinder Head						
	Replace -----	--	X				
0102	CRANKSHAFT						
	Crankshaft						
	Replace -----	--	--	--	X		
	Bearings and Seals						
	Replace -----	--	--	--	X		
	Pulley						
	Replace -----	--	X				
0103	FLYWHEEL ASSEMBLY						
	Flywheel; Ring Gear; Housing						
	Replace -----	--	--	--	X		
0104	PISTONS, CONNECTING RODS						
	Pistons, Rings, Pins, and Bearings						
	Replace -----	--	--	--	X		
	Rods, Connecting						
	Replace -----	--	--	--	X		
	Repair -----	--	--	--	X		
0105.1	VALVES						
	Guides; Springs; Locks						
	Replace -----	--	--	X			
	Valves and Seats						
	Replace -----	--	--	X			
	Repair -----	--	--	X			
0105.2	ROCKER ARMS, TAPPETS						
	Tappets						
	Adjust -----	--	X				
	Replace -----	--	--	--	X		
	Guides						
	Replace -----	--	--	--	X		
	Cover						
	Replace -----	--	X				
0105.3	CAMSHAFTS						
	Camshaft and Bearings						
	Replace -----	--	--	--	X		
0105.5	TIMING GEARS						
	Gears and Cover						
	Replace -----	--	--	--	X		

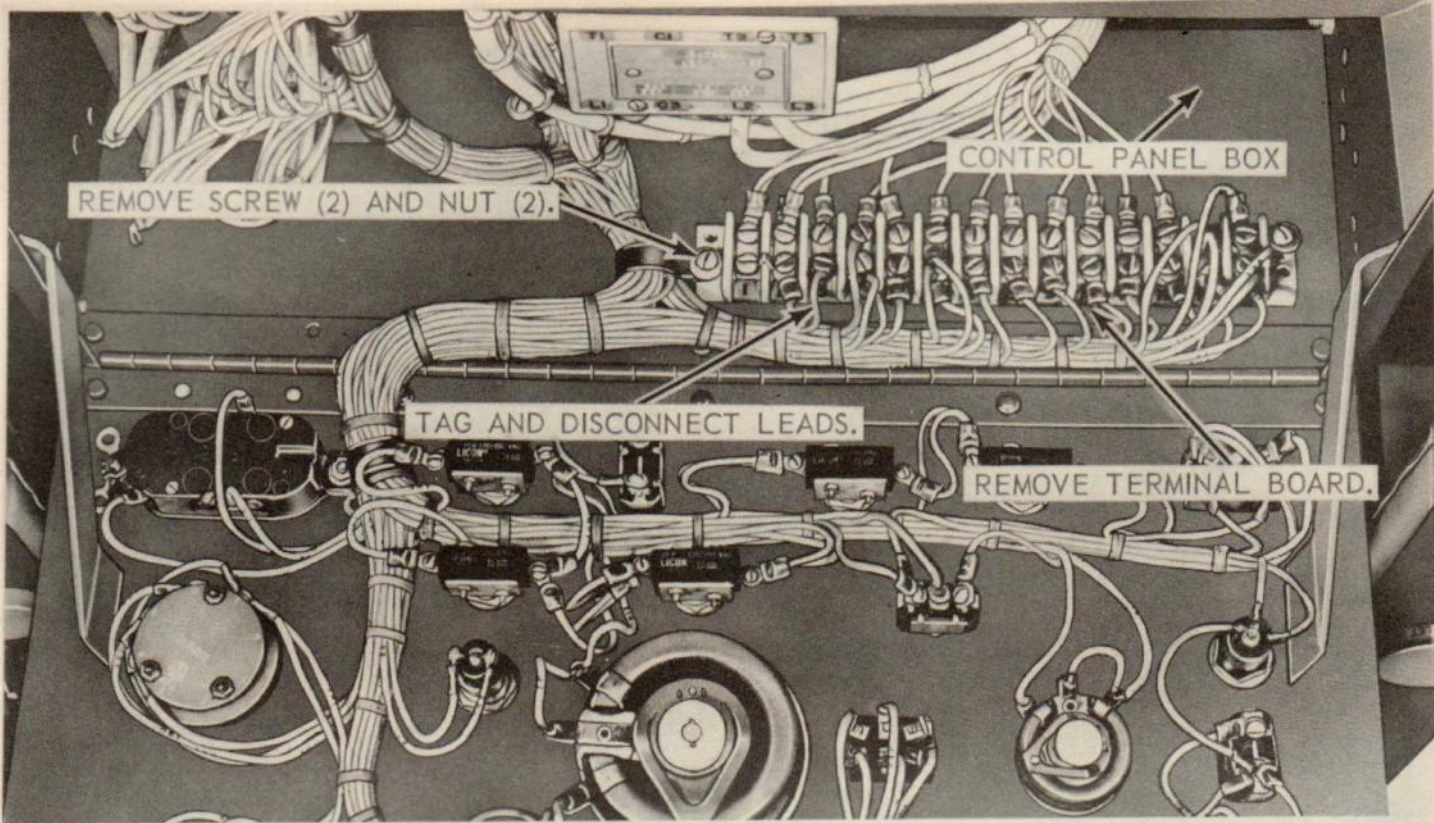
Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
0106.1	OIL PUMP Pump, Oil Replace ----- Repair -----	--	--	X X			
0106.2	OIL FILTERS Oil Filter Assembly Service ----- Replace -----	X --	X				
0106.4	PRESSURE REGULATOR OR RELIEF VALVES Plunger; Springs; Adjusting Screw Replace -----	--	X				
0106.5	CRANKCASE VENTILATION Breather Service ----- Replace -----	X --	X				
0106.6	OIL PAN, LINES, LEVEL GAGE Oil Pan Replace ----- Repair ----- Lines; Fittings Replace ----- Level Gage Replace -----	-- -- -- -- X	-- -- X	X X			
0108	MANIFOLDS Manifold Replace -----	--	X				
0111.1	HAND CRANKING DEVICES Crank, Hand Replace -----	X					
03	FUEL SYSTEM						
0301	CARBURETOR; FUEL INJECTOR Carburetor Adjust ----- Replace ----- Gasket, Bowl Replace -----	X --	X X				
0302.4	FUEL PUMP, GASOLINE Pump, Fuel Service ----- Replace ----- Bowl and Gasket Replace -----	X --	X X				
0304	AIR CLEANER Air Cleaner Assembly Service ----- Replace -----	X --	X				
0306	TANKS, LINES, FITTINGS Tank, Fuel Service ----- Repair ----- Cap, Tank; Fittings; Valves; Lines Replace -----	X --	-- X	X			

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
0308	ENGINE SPEED GOVERNOR Governor Assembly						
	Replace -----	--	X				
	Repair -----	--	--	X			
0311	PRIMING SYSTEM						
	Pump, priming						
	Replace -----	--	X				
	Lines; Fittings						
	Replace -----	--	X				
0312	ACCELERATOR, THROTTLE OR CHOKE CONTROLS						
	Controls, Choke and Throttle						
	Replace -----	--	X				
04	EXHAUST SYSTEM						
0401	MUFFLER AND PIPES						
	Muffler and Pipe						
	Replace -----	--	X				
05	COOLING SYSTEM						
0501	RADIATOR						
	Radiator						
	Service -----	X					
	Inspect -----	X					
	Repair -----	--	--	X			
	Shutter Assembly; Control Assembly						
	Replace -----	--	X				
	Cap, Radiator; Grille						
	Replace -----	--	X				
0502	COWLING, DEFLECTORS, AIR DUCT, SHROUD						
	Shroud						
	Replace -----	--	X				
0503	LINES AND FITTINGS, HOSES, PIPES, CLAMPS						
	Hoses, Pipes, and Clamps						
	Replace -----	--	X				
0504	WATER PUMP						
	Pump Assembly, Water						
	Replace -----	--	X				
	Repair -----	--	--	X			
0505	FAN ASSEMBLY						
	Belts, Fan						
	Adjust -----	X					
	Replace -----	--	X				
	Fan; Guard						
	Replace -----	--	X				
0506	WATER MANIFLODS, HEADERS, THERMOSTATS AND HOUSING, GASKETS						
	Thermostat						
	Test -----	--	X				
	Replace -----	--	X				
	Housing						
	Replace -----	--	X				

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
06	ELECTRICAL SYSTEM (ENGINE AND VEHICULAR)						
0601	GENERATOR						
	Generator						
	Replace -----	--	X				
	Repair -----	--	--	X			
	Brushes						
	Replace -----	--	X				
0602	GENERATOR REGULATOR						
	Voltage Regulator						
	Adjust -----	--	X				
	Test -----	--	X				
	Replace -----	--	X				
0603	STARTER						
	Starter						
	Replace -----	--	X				
	Repair -----	--	--	X			
	Solenoid; Brushes						
	Replace -----	--	X				
0604.2	MAGNETO						
	Magneto						
	Service -----	--	X				
	Adjust -----	--	X				
	Replace -----	--	X				
	Repair -----	--	--	X			
	Points; Condenser						
	Replace -----	--	X				
0604.6	IGNITION COIL: WIRING, SPARK PLUGS						
	Spark Plugs						
	Service -----	--	X				
	Adjust -----	--	X				
	Test -----	--	X				
	Replace -----	--	X				
	Wiring						
	Replace -----	--	X				
0606	ENGINE CONTROLS						
	Switch, Temperature and Oil						
	Replace -----	--	X				
0607	INSTRUMENTS OR ENGINE CONTROL PANEL						
	Panel, Gages						
	Replace -----	--	X				
	Wiring						
	Replace -----	--	X				
	Repair -----	--	X				
0608	MISCELLANEOUS ITEMS						
	Receptacle						
	Replace -----	--	X				
	Wiring						
	Replace -----	--	X				
	Repair -----	--	X				

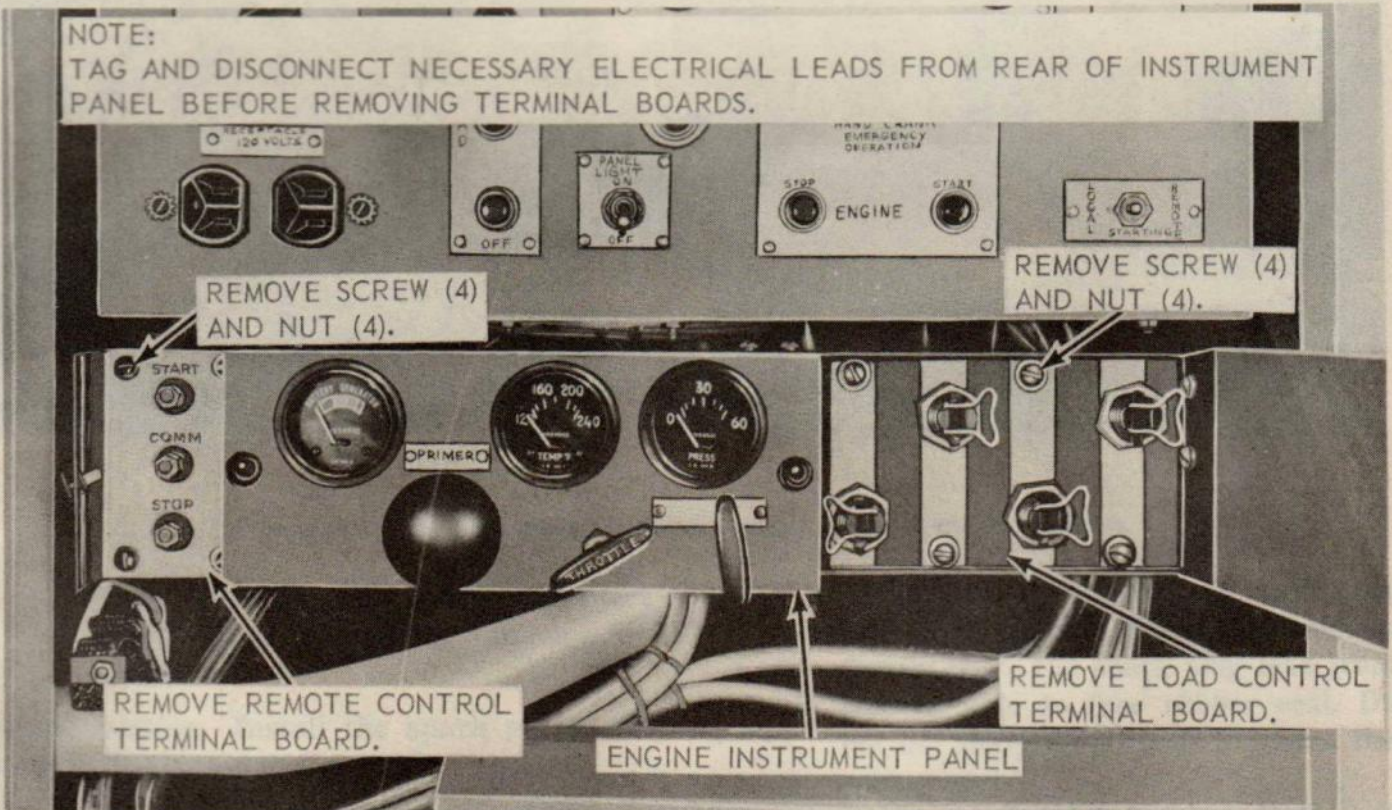
Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
0612	BATTERIES						
	Batteries						
	Service -----	X					
	Test -----	--	X				
	Replace -----	--	X				
	Cables						
	Replace -----	--	X				
	Repair -----	--	X				
	Battery Box						
	Replace -----	--	X				
0615	RADIO SUPPRESSION						
	Components						
	Test -----	--	X				
	Replace -----	--	X				
15	FRAME						
1501	FRAME ASSEMBLY						
	Frame						
	Replace -----	--	--	--	X		
17	BODY CAB; HOOD; HULL						
1708	STOWAGE RACKS, BOXES, STRAPS						
	Box, Tool						
	Replace -----	--	X				
22	MISCELLANEOUS BODY, CHASSIS OR HULL, AND ACCESSORY ITEMS						
2207	WINTERIZATION EQUIPMENT						
	Hoses; Lines, Valves; Control Temperature Overheat; Switches						
	Replace -----	X					
	Pump, Fuel; Filter						
	Service -----	X					
	Replace -----	--	X				
2210	DATA PLATES AND INSTRUCTION HOLDERS						
	Plates, Data						
	Replace -----	--	X				
	Plates, Caution and Instruction						
	Replace -----	X					
26	ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT, AND TOOLS						
2602.1	ACCESSORIES						
	Accessories						
	Replace -----	X					
2602.2	COMMON TOOLS						
	Tools						
	Replace -----	X					
2602.4	PUBLICATIONS						
	Publications						
	Replace -----	X					

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
1	ELECTRIC GENERATORS						
4100	GENERATOR ASSEMBLY						
	Generator						
	Inspect -----	X					
	Test -----	--	--	X			
	Replace -----	--		X			
	Repair -----	--	X				
	Overhaul -----	--	--	--	X		
4100.1	ROTOR ASSEMBLY						
	Rotor						
	Replace -----	--	--	--	X		
	Repair -----	--	--	--	X		
4100.2	STATOR ASSEMBLIES						
	Stator						
	Replace -----	--	--	--	X		
	Repair -----	--	--	--	X		
4100.3	BRUSH HOLDERS						
	Brush, Electrical Contact; Holder, Brush						
	Replace -----	--	X				
	Spring, Brush						
	Adjust -----	--	X				
	Test -----	--	X				
	Replace -----	--	X				
4100.4	VENTILATION SYSTEM						
	Fan						
	Replace -----	--	--	--	X		
4100.5	FRAME SUPPORTS AND HOUSINGS						
	Bearing and Caps						
	Replace -----	--	--	--	X		
4100.6	DRIVE COMPONENTS						
	Disk, Driving						
	Replace -----	--	--	X			
4100.7	CONTROL PANELS, HOUSING, CUBICLES						
	Instruments; Receptacle; Lights						
	Replace -----	--	X				
	Wiring						
	Replace -----	--	--	X			
	Repair -----	--	X				
	Lamps						
	Replace -----	X					
4100.9	CIRCUIT BREAKER ASSEMBLY						
	Circuit Breaker Assembly						
	Replace -----	--	--	X			
	Repair -----	--	--	X			
4100.10	SWITCHES						
	Switches						
	Replace -----	--	X				
4100.11	REGULATOR; VOLTAGE OR CURRENT						
	Regulator Assembly						
	Replace -----	--	--	X			
	Repair -----	--	--	X			



A

NOTE:
TAG AND DISCONNECT NECESSARY ELECTRICAL LEADS FROM REAR OF INSTRUMENT PANEL BEFORE REMOVING TERMINAL BOARDS.



B

EMC 6115-296-12/72

A—Generator control box terminal board

B—Load and remote control terminal board

Figure 72. Terminal boards, removal and installation.

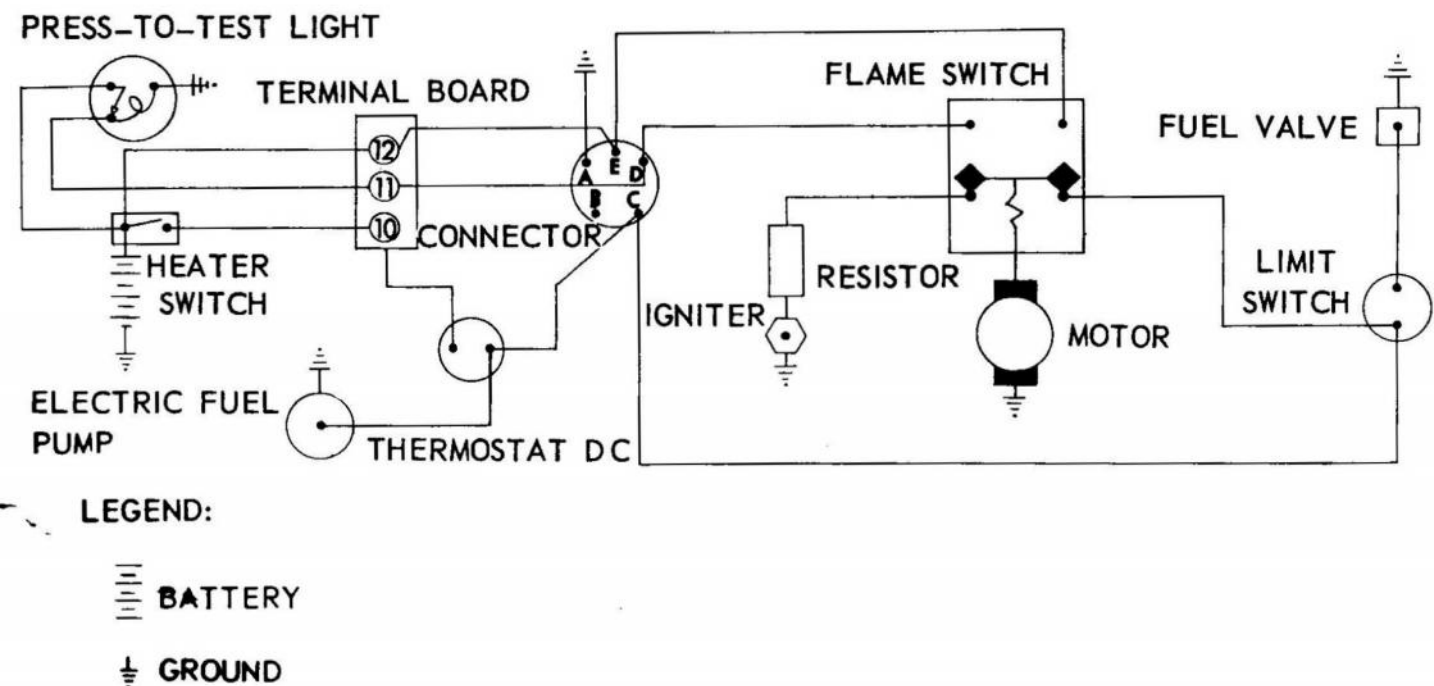
CHAPTER 5 WINTERIZATION

Section I. COOLANT HEATER

40. General

The heater which allows the generator set to operate at low ambient temperature, is mounted at the rear of the generator set below the battery box. Gasoline is fed to the heater from the fuel tank, by means of an electric fuel pump through a three-way valve mounted on the generator set right side. A high-low fuel valve and a fuel solenoid valve are assembled to the top of the coolant heater. An overheat

control located in the coolant line running from the engine to the coolant heater will shut down the coolant heater when the coolant reaches a temperature of 180° F. The heater exhaust is piped to the battery box and passes through a baffle in the oil pan. A thermostat located in the battery box automatically turns off the coolant heater when desired temperature is reached. Refer to figure 73 for heater practical wiring diagram.



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Figure 73. Coolant heater practical wiring diagram.

141. Coolant Heater Assembly

a. Heater Igniter Removal. Remove the igniter as illustrated in figure 74.

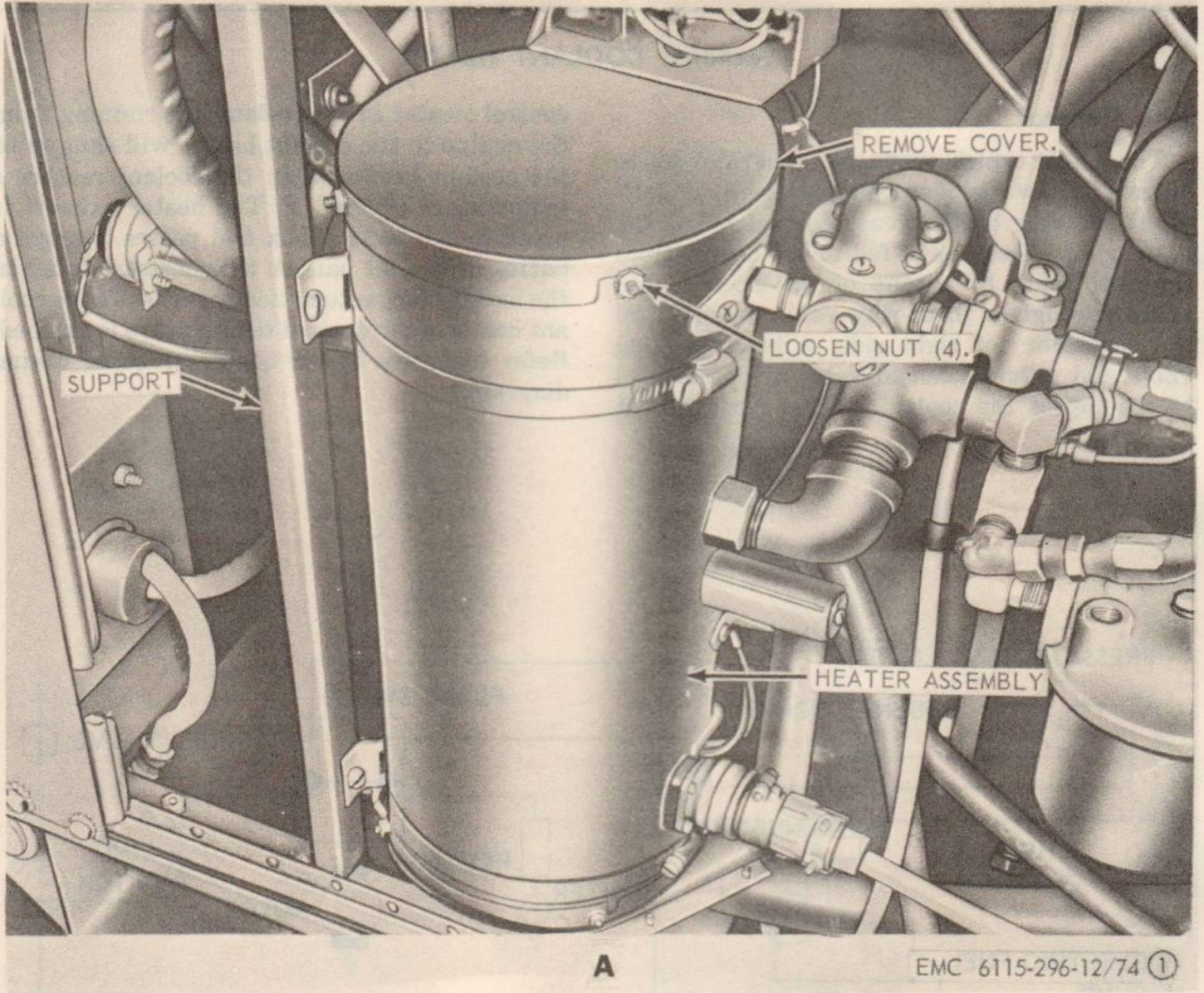
b. Heater Assembly Removal. Remove the heater assembly as illustrated in figure 69.

c. Cleaning and Inspection. Clean and in-

spect heater assembly and igniter. Replace a worn, damaged, or defective igniter or heater assembly.

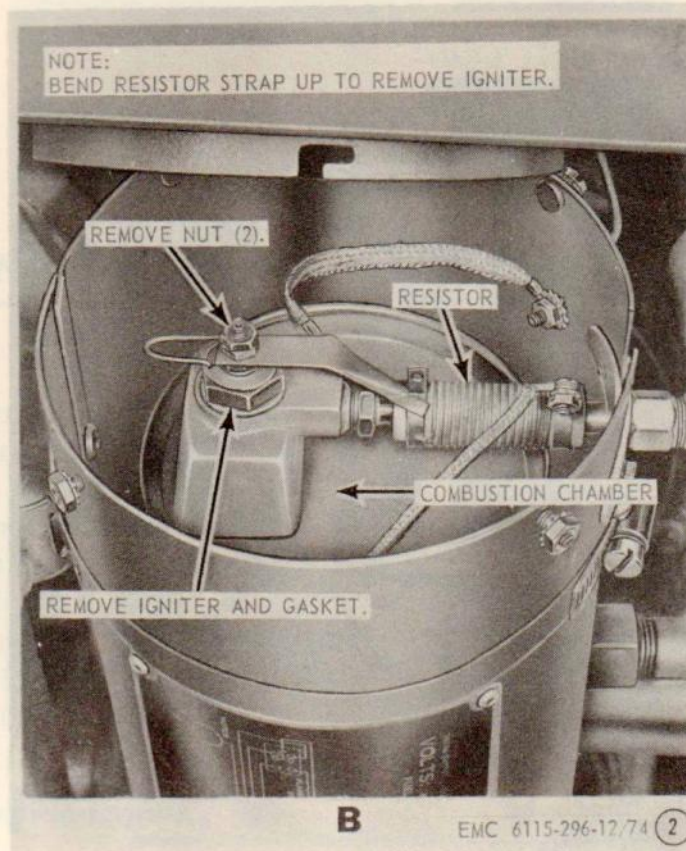
d. Heater Igniter Installation. Install the heater igniter as illustrated in figure 74.

e. Heater Assembly Installation. Install the heater assembly as illustrated in figure 69.



A—Cover removal points

Figure 74. Heater igniter, removal and installation.



B—Igniter removal points

Figure 74—Continued.

Section II. FUEL SYSTEM

142. General

The fuel system for the coolant heater assembly is made up of fuel pump, fuel filter, valves, and lines. The fuel system is segregated from the engine other than as the source of its fuel supply.

143. Heater Fuel Pump

a. Removal. Remove the heater fuel pump as illustrated in figure 75.

b. Cleaning and Inspection. Clean, inspect, and replace a defective heater fuel pump as necessary.

c. Installation. Install the heater fuel pump as illustrated in figure 75.

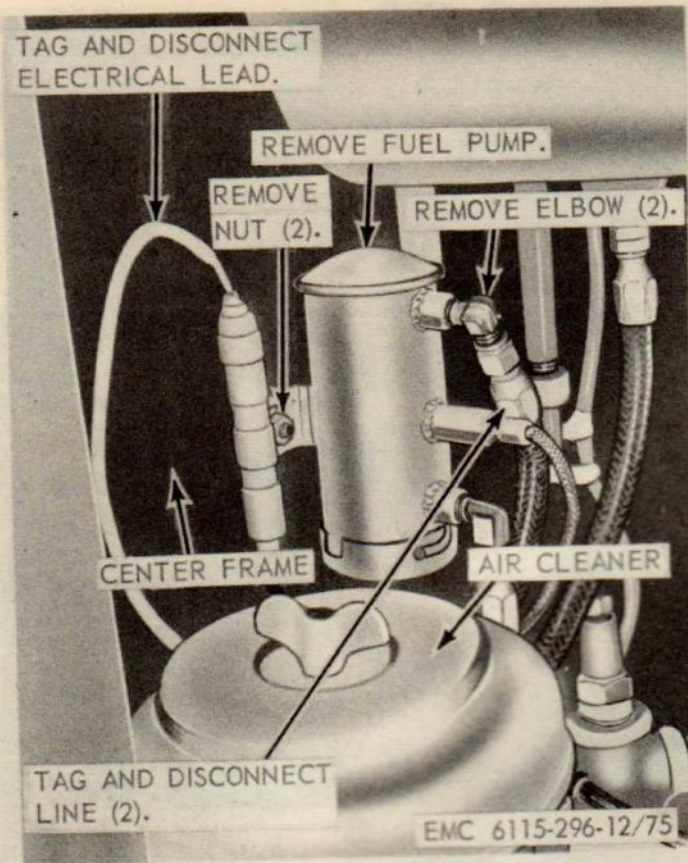


Figure 75. Heater fuel pump, removal and installation.

CHAPTER 6

DEMOLITION OF GENERATOR SET TO PREVENT ENEMY USE

144. General

When capture or abandonment of the generator set to an enemy is imminent, the responsible unit commander must make the decision either to destroy the equipment or to render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. Whatever method of demolition is employed, it is essential to destroy the same vital parts of all generator sets and all corresponding repair parts.

145. Demolition to Render the Engine Inoperative

a. Mechanical Means. Use sledge hammers, crowbars, picks, axes, or any other heavy tools which may be available to destroy the following:

- (1) Engine block and manifold.
- (2) Carburetor, magneto, governor, and water pump.
- (3) Radiator, starter, motor, and generator.

Note. The above steps are minimum requirements for this method.

- (4) All controls and instruments.
- (5) Main generator assembly.

b. Misuse. Perform the following steps to render the engine inoperative.

- (1) Drain radiator and engine crankcase. Put sand, gravel, nuts, bolts, screws, or broken glass in the oil filler tube.
- (2) Disconnect radiator fan and run engine at full throttle.

Note. The above steps are minimum requirements for this method.

146. Demolition by Explosives or Weapons Fire

a. Explosives. Place as many of the following charges (fig. 76) as the situation permits

and detonate them simultaneously with detonating cord and a suitable detonator.

- (1) One 1/2-pound charge on right side of engine between manifold and engine block.
 - (2) One 1/2-pound charge between engine generator and engine block.
- Note.* The above charges are the minimum requirements for this method.
- (3) One 1/2-pound charge inside main generator exciter housing.
 - (4) One 1/2-pound charge between engine and main generator at coupling disk.
 - (5) One 1/2-pound charge in control panel box.

b. Weapons Fire. Fire on the generator set with the heaviest practical weapons available.

147. Other Demolition Methods

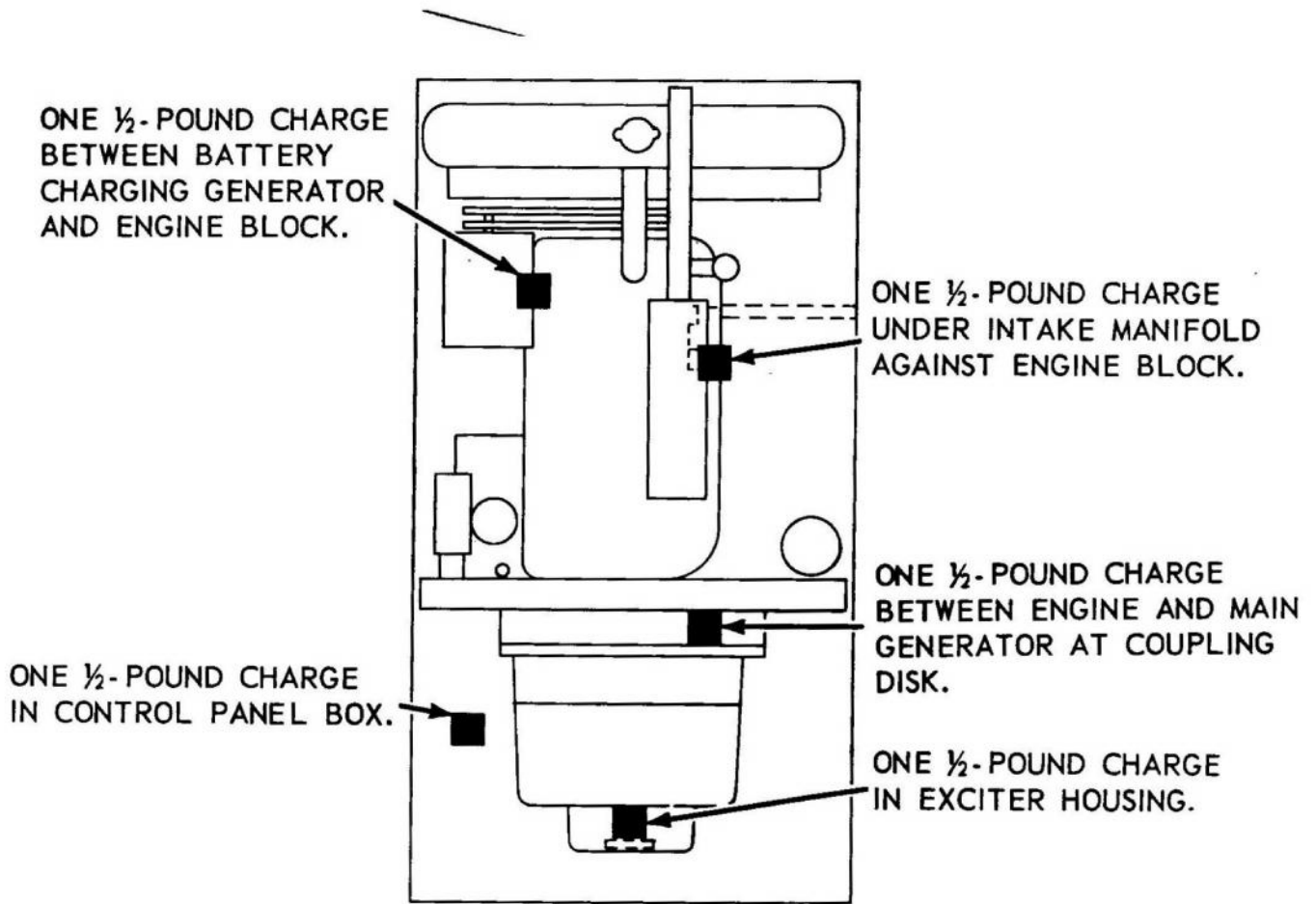
a. Scattering and Concealment. Remove all easily accessible parts such as the carburetor, fuel pump, magneto, governor, generator, and exciter brushes. Scatter them through dense foliage, bury them in dirt or sand, or throw them in a lake, stream, or other body of water.

b. Burning. Pack rags, clothing, or canvas under, around, and inside the generator set. Saturate this packing with gasoline, oil, or diesel fuel and ignite.

c. Submersion. Totally submerge the generator set in a body of water to provide water damage and concealment. Salt water will damage metal parts more than fresh water.

148. Training

All operators should receive thorough training in the destruction of the generator set. Refer to FM 5-25. Simulated destruction, using all



LEGEND ■ ½-POUND CHARGE

EMC 6115-296-12/76

Figure 76. Placement of charges.

of the methods listed above, should be included in the operator training program. It must be emphasized in training, that demolition operations are usually necessitated by critical situations when time available for carrying out de-

struction is limited. For this reason, it is necessary that operators be thoroughly familiar with all methods of destruction of equipment, and be able to carry out demolition instructions without reference to this or any other manual.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE

Section I. SHIPMENT WITHIN ZONE OF INTERIOR

149. Preparation of Equipment for Shipment

a. General. Detailed instructions for the preparation of the generator set for domestic shipment are outlined within this paragraph. Preservation will be accomplished in sequence that will not require the operation of previously preserved components.

b. Inspection. The generator set will be inspected for any unusual conditions such as damage, rusting, accumulation of water, and pilferage. DA Form 464, (Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment) will be executed on the equipment.

c. Cleaning and Drying. Thorough cleaning and drying by an approved technique is the first essential procedure in any effective preservation process. Approved methods of cleaning, drying, types of preservatives, and methods of application are described in TM 38-230.

d. Painting. Paint all surfaces when the paint has been removed or damaged. Refer to TB ENG 60 for detailed cleaning and painting instructions.

e. Depreservation Guide. DA Form 2258, (Depreservation Guide of Engineer Equipment).

- (1) A properly annotated depreservation guide will be completed concurrently with preservation for each item of mechanical equipment, with any peculiar requirements outlined in the remarks column. The completed depreservation guide will be placed with the equipment in a waterproof envelope marked "Depreservation Guide", and fastened in a conspicuous location on or near the operator's controls.

- (2) Prior to placing equipment in operation or to the extent necessary for in-

spection, depreservation of the item shall be performed as outlined on the depreservation guide.

f. Cooling System, Boxed or Crated. Completely drain the cooling system including radiator and block, space heater, or other accessories through which the coolant has circulated. Flush with clean water. Leave draincocks open.

g. Lubrication System (Wet Sump), Boxed or Crated. Check level of lubricant. Operate the engine at a fast idle until lubricant has been circulated throughout the system. The crankcase will then be drained and the drain plugs reinstalled.

h. Sealing of Openings. Openings that will permit the direct entry of water into the interior of gasoline engine-driven equipment, starting motor, generator, electrical inclosures and so on, shall be sealed with pressure-sensitive tape conforming to Specification PPP-T-60, type III, class I.

i. Fuel Tank, Boxed or Crated. Drain fuel tank after engine preservation and fog interior with preservative oil, type P-10, grade 2, conforming to Specification MIL-L-21260.

j. Air Cleaner. Drain the air cleaner and seal all openings that permit the direct entry of water. Use type III, class 1, waterproof pressure-sensitive adhesive tape conforming to PPP-T-60.

k. Exterior Surfaces. Coat exposed machined ferrous metal surfaces with preservative (P-6) conforming to Specification MIL-C-11796, class 3. If preservative is not available, cup grease may be used.

l. Marking. Shall conform to MIL-STD-129.

m. Batteries and Cables. Batteries shall be secured in the battery compartment. Batteries

shall be filled and fully charged. Cables shall be disconnected, vent holes sealed, and all terminals wrapped and secured with type III, class 1, pressure-sensitive tape conforming to Specification PPP-T-60.

n. Disassembly, Disassembled Parts, and Basic Issue Items.

- (1) Disassembly shall be limited to the removal of parts and projecting components that tend to increase the overall profile of the generator set and that which is subject to pilferage.
- (2) Disassembled items shall be packed with the publications in the toolbox if possible. Otherwise, items will be packed in a suitable container and secured to the generator set to prevent loss or pilferage.

Note. If packing is required to provide adequate protection against damage during shipment, refer to TM 38-230 for guidance in crate fabrication.

150. Loading Equipment for Shipment

a. Using suitable hoisting equipment, attach a hook or sling to the lifting eye. When winching the generator set on a flatcar or truck, attach the sling or hook to the towing eyes.

b. Secure the generator set with blocks, wedged tightly against the skid base, and fasten securely to the carrier.

c. Thread a wire cable through the towing eyes and secure to tiedown brackets on the sides of the transporting vehicle to prevent movement in any direction.

Caution: Be careful when using hoisting equipment or working around cable or chain under extreme tension. Do not swing the generator set back and forth when it is suspended in the air. Lower generator set gently to the bed of the carrier.

Section II. LIMITED STORAGE

151. Preparation of Equipment for Storage

a. General. Detailed instructions for preserving and maintaining equipment in limited storage are outlined below. Limited storage is defined as storage not to exceed 6 months. Refer to AR 743-505.

b. Inspection. Refer to paragraph 149.

c. Cleaning and Drying. Refer to paragraph 149.

d. Painting. Refer to paragraph 149.

e. Depreservation Guide. Refer to paragraph 149.

f. Sealing of Openings. Refer to paragraph 149.

g. Fuel Tank Boxed or Crated. Refer to paragraph 149.

h. Air Cleaner. Refer to paragraph 149.

i. Exterior Surfaces. Refer to paragraph 149.

j. Batteries and Cables. Refer to paragraph 149.

k. Disassembly, Disassembled Parts, Basic Issue Items. Refer to paragraph 149.

152. Inspection and Maintenance of Equipment in Storage

a. Weatherproofing. When suitable shelter is not available, select a firm, level, well-drained storage location, protected from prevailing winds. Position the generator set on heavy planking or other solid surface. Cover the equipment with a tarpaulin or other suitable waterproof covering and tie down securely.

b. Exercising. Every 30 days the generator set will be inspected as outlined on DA Form 464 and operated long enough to bring it up to its operating temperature and for complete lubrication of gears, bearings, etc. After each exercising period the generator set will be re-preserved.

APPENDIX I

REFERENCES

1. Dictionaries of Terms and Abbreviations

AR 320-5 **Dictionary of United States Army Terms**
 AR 320-50 **Authorized Abbreviations and Brevity Codes**

2. Fire Protection

TM 5-687 **Repairs and Utilities: Fire Protection Equipment and Appliances; In-**
 spection, Operations, and Preventive Maintenance
 TM 9-1799 **Ordnance Maintenance: Fire Extinguishers**

3. Lubrication

LO 5-6115-296- **Generator Set, Gasoline Engine: 10 KW, AC, 120V, 1 and 3 Phase, 120/**
 12 **240 V, Single Phase, 120/208 V, 3 Phase 60 Cycle; Skid Mounted**
 (Kurz & Root Model Fero-1) w/Hercules Engine Model 1 XB3ER

4. Painting and Preservation

TB ENG 60 **Preservation and Painting of Serviceable Corps of Engineers Equipment**
 TM 9-2851 **Painting Instructions for Field Use**
 TM 38-230 **Preservation, Packaging, and Packing of Military Supplies and Equipment**

5. Preventive Maintenance

AR 700-38 **Unsatisfactory Equipment Report**
 AR 750-5 **Maintenance Responsibilities and Shop Operation**
 TB ENG 347 **Winterization Techniques for Engineer Equipment**
 TM 5-505 **Maintenance of Engineer Equipment**
 TM 5-764 **Electric Motor and Generator Repair**
 TM 9-207 **Operation and Maintenance of Ordnance Materiel in Extreme Cold**
 Weather (0° to -65° F.)
 TM 9-6140-200- **Storage Batteries, Lead Acid Type**
 15

6. Publication Indexes

DA Pam 108-1 **Index of Army Motion Pictures, Film Strips, Slides, and Phono-**
 Recording
 DA Pam 310-1 **Index of Administrative Publications**
 DA Pam 310-2 **Index of Blank Forms**
 DA Pam 310-3 **Index of Training Publications**
 DA Pam 310-4 **Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubri-**
 cation Orders, and Modification Work Orders
 DA Pam 310-5 **Index of Graphic Training Aids and Devices**
 DA Pam 310-25 **Index of Supply Manual Corps of Engineers**

7. Radio Interference Suppression

TM 11-483 Radio Interference Suppression

8. Shipment and Limited Storage

AR 743-505 Limited Storage of Engineer Mechanical Equipment
TM 9-200 General Packaging Instructions for Ordnance General Supplies

9. Supply Publications

SM 10-1-C4-1 Petroleum, Petroleum Base Products and Related Material
TM 5-6115-296-20P (When published) Organizational Maintenance Repair Parts and Special Tool Lists Generator Set, Gasoline Engine: 10 KW, AC, 120V, 1 and 3 Phase 120/240 V, Single Phase, 120/208 V, 3 Phase 60 Cycle; Skid Mounted (Kurz & Root Model Fero-1) Serial Number Range 560-1001 Thru 560-4600

10. Training Aids

FM 5-25 Explosives and Demolition
FM 21-5 Military Training
FM 21-6 Techniques of Military Instruction
FM 21-30 Military Symbols

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

This appendix contains explanations of all maintenance and repair functions authorized for the various echelons. Section II, contains the maintenance allocation chart.

2. Maintenance

Maintenance is any action taken to keep materiel in a serviceable condition or to restore it to serviceability when it is unserviceable. Maintenance of materiel includes the following:

a. Service. To clean, to preserve, and to replenish fuel and lubricants.

b. Adjust. To regulate periodically to prevent malfunction.

c. Inspect. To verify serviceability and to detect incipient mechanical failure by scrutiny.

d. Test. To verify serviceability and to detect incipient mechanical failure by use of special equipment such as gages, meters and so on.

e. Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

f. Rebuild. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

g. Overhaul. To restore an item to completely serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum

disassembly of the item during the overhaul process.

h. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

3. Explanation of Columns

a. Functional Group. The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes are taken from the Corps of Engineers Functional Grouping Indexes, and appear on the maintenance allocation chart in their correct numerical sequence. These indexes are normally set up according to their proximity to each other and their function.

b. Components and Related Operation. This column contains the functional index group heading, subgroup headings, and a brief description of the part starting with the noun name. It also designates the operations to be performed such as service, adjust, inspect, test, replace, repair, and overhaul.

c. Echelons of Maintenance. This column contains the various echelons of maintenance by number designation. An X placed in the appropriate echelon column and in line with an indicated maintenance function, authorizes the particular echelon to perform the function. The symbol X indicates the lowest echelon responsible for performing that particular function. The X does not necessarily indicate repair parts will be stocked at that level. Echelons higher than the echelon annotated by X are authorized to perform the indicated function.

d. Remarks. The column lists specific maintenance functions, special tools, cross-reference instructions, and the like pertinent to the operation being performed.

Section II. MAINTENANCE ALLOCATION CHART

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
01	ENGINE						
0100	ENGINE ASSEMBLY						
	Engine Assembly						
	Service -----	X					
	Inspect -----	X					
	Test -----	--	X				Compression
	Replace -----	--	--	X			
	Repair -----	--	--	X			
	Overhaul -----	--	--	--	X		
0101	CRANKCASE, BLOCK, CYLINDER HEAD						
	Block Assembly						
	Replace -----	--	--	--	X		
	Repair -----	--	--	X			
	Cylinder Head						
	Replace -----	--	X				
0102	CRANKSHAFT						
	Crankshaft						
	Replace -----	--	--	--	X		
	Bearings and Seals						
	Replace -----	--	--	--	X		
	Pulley						
	Replace -----	--	X				
0103	FLYWHEEL ASSEMBLY						
	Flywheel; Ring Gear; Housing						
	Replace -----	--	--	--	X		
0104	PISTONS, CONNECTING RODS						
	Pistons, Rings, Pins, and Bearings						
	Replace -----	--	--	--	X		
	Rods, Connecting						
	Replace -----	--	--	--	X		
	Repair -----	--	--	--	X		
0105.1	VALVES						
	Guides; Springs; Locks						
	Replace -----	--	--	X			
	Valves and Seats						
	Replace -----	--	--	X			
	Repair -----	--	--	X			
0105.2	ROCKER ARMS, TAPPETS						
	Tappets						
	Adjust -----	--	X				
	Replace -----	--	--	--	X		
	Guides						
	Replace -----	--	--	--	X		
	Cover						
	Replace -----	--	X				
0105.3	CAMSHAFTS						
	Camshaft and Bearings						
	Replace -----	--	--	--	X		
0105.5	TIMING GEARS						
	Gears and Cover						
	Replace -----	--	--	--	X		

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
0106.1	OIL PUMP Pump, Oil Replace ----- Repair -----	--	--	X X			
0106.2	OIL FILTERS Oil Filter Assembly Service ----- Replace -----	X --	X				
0106.4	PRESSURE REGULATOR OR RELIEF VALVES Plunger; Springs; Adjusting Screw Replace -----	--	X				
0106.5	CRANKCASE VENTILATION Breather Service ----- Replace -----	X --	X				
0106.6	OIL PAN, LINES, LEVEL GAGE Oil Pan Replace ----- Repair ----- Lines; Fittings Replace ----- Level Gage Replace -----	-- -- -- -- X	-- -- X	X X			
0108	MANIFOLDS Manifold Replace -----	--	X				
0111.1	HAND CRANKING DEVICES Crank, Hand Replace -----	X					
03	FUEL SYSTEM						
0301	CARBURETOR; FUEL INJECTOR Carburetor Adjust ----- Replace ----- Gasket, Bowl Replace -----	X -- --	X X				
0302.4	FUEL PUMP, GASOLINE Pump, Fuel Service ----- Replace ----- Bowl and Gasket Replace -----	X -- --	X X				
0304	AIR CLEANER Air Cleaner Assembly Service ----- Replace -----	X --	X				
0306	TANKS, LINES, FITTINGS Tank, Fuel Service ----- Repair ----- Cap, Tank; Fittings; Valves; Lines Replace -----	X -- --	-- X	X			

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
0308	ENGINE SPEED GOVERNOR Governor Assembly						
	Replace -----	--	X				
	Repair -----	--	--	X			
0311	PRIMING SYSTEM						
	Pump, priming						
	Replace -----	--	X				
	Lines; Fittings						
	Replace -----	--	X				
0312	ACCELERATOR, THROTTLE OR CHOKE CONTROLS						
	Controls, Choke and Throttle						
	Replace -----	--	X				
04	EXHAUST SYSTEM						
0401	MUFFLER AND PIPES						
	Muffler and Pipe						
	Replace -----	--	X				
05	COOLING SYSTEM						
0501	RADIATOR						
	Radiator						
	Service -----	X					
	Inspect -----	X					
	Repair -----	--	--	X			
	Shutter Assembly; Control Assembly						
	Replace -----	--	X				
	Cap, Radiator; Grille						
	Replace -----	--	X				
0502	COWLING, DEFLECTORS, AIR DUCT, SHROUD						
	Shroud						
	Replace -----	--	X				
0503	LINES AND FITTINGS, HOSES, PIPES, CLAMPS						
	Hoses, Pipes, and Clamps						
	Replace -----	--	X				
0504	WATER PUMP						
	Pump Assembly, Water						
	Replace -----	--	X				
	Repair -----	--	--	X			
0505	FAN ASSEMBLY						
	Belts, Fan						
	Adjust -----	X					
	Replace -----	--	X				
	Fan; Guard						
	Replace -----	--	X				
0506	WATER MANIFLODS, HEADERS, THERMOSTATS AND HOUSING, GASKETS						
	Thermostat						
	Test -----	--	X				
	Replace -----	--	X				
	Housing						
	Replace -----	--	X				

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
06	ELECTRICAL SYSTEM (ENGINE AND VEHICULAR)						
0601	GENERATOR						
	Generator						
	Replace -----	--	X				
	Repair -----	--	--	X			
	Brushes						
	Replace -----	--	X				
0602	GENERATOR REGULATOR						
	Voltage Regulator						
	Adjust -----	--	X				
	Test -----	--	X				
	Replace -----	--	X				
0603	STARTER						
	Starter						
	Replace -----	--	X				
	Repair -----	--	--	X			
	Solenoid; Brushes						
	Replace -----	--	X				
0604.2	MAGNETO						
	Magneto						
	Service -----	--	X				
	Adjust -----	--	X				
	Replace -----	--	X				
	Repair -----	--	--	X			
	Points; Condenser						
	Replace -----	--	X				
0604.6	IGNITION COIL: WIRING, SPARK PLUGS						
	Spark Plugs						
	Service -----	--	X				
	Adjust -----	--	X				
	Test -----	--	X				
	Replace -----	--	X				
	Wiring						
	Replace -----	--	X				
0606	ENGINE CONTROLS						
	Switch, Temperature and Oil						
	Replace -----	--	X				
0607	INSTRUMENTS OR ENGINE CONTROL PANEL						
	Panel, Gages						
	Replace -----	--	X				
	Wiring						
	Replace -----	--	X				
	Repair -----	--	X				
0608	MISCELLANEOUS ITEMS						
	Receptacle						
	Replace -----	--	X				
	Wiring						
	Replace -----	--	X				
	Repair -----	--	X				

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
0612	BATTERIES						
	Batteries						
	Service -----	X					
	Test -----	--	X				
	Replace -----	--	X				
	Cables						
	Replace -----	--	X				
	Repair -----	--	X				
	Battery Box						
	Replace -----	--	X				
0615	RADIO SUPPRESSION						
	Components						
	Test -----	--	X				
	Replace -----	--	X				
15	FRAME						
1501	FRAME ASSEMBLY						
	Frame						
	Replace -----	--	--	--	X		
17	BODY CAB; HOOD; HULL						
1708	STOWAGE RACKS, BOXES, STRAPS						
	Box, Tool						
	Replace -----	--	X				
22	MISCELLANEOUS BODY, CHASSIS OR HULL, AND ACCESSORY ITEMS						
2207	WINTERIZATION EQUIPMENT						
	Hoses; Lines, Valves; Control Temperature Overheat; Switches						
	Replace -----	X					
	Pump, Fuel; Filter						
	Service -----	X					
	Replace -----	--	X				
2210	DATA PLATES AND INSTRUCTION HOLDERS						
	Plates, Data						
	Replace -----	--	X				
	Plates, Caution and Instruction						
	Replace -----	X					
26	ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT, AND TOOLS						
2602.1	ACCESSORIES						
	Accessories						
	Replace -----	X					
2602.2	COMMON TOOLS						
	Tools						
	Replace -----	X					
2602.4	PUBLICATIONS						
	Publications						
	Replace -----	X					

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
1	ELECTRIC GENERATORS						
4100	GENERATOR ASSEMBLY						
	Generator						
	Inspect -----	X					
	Test -----	--	--	X			
	Replace -----	--	--	X			
	Repair -----	--	X				
	Overhaul -----	--	--	--	X		
4100.1	ROTOR ASSEMBLY						
	Rotor						
	Replace -----	--	--	--	X		
	Repair -----	--	--	--	X		
4100.2	STATOR ASSEMBLIES						
	Stator						
	Replace -----	--	--	--	X		
	Repair -----	--	--	--	X		
4100.3	BRUSH HOLDERS						
	Brush, Electrical Contact; Holder, Brush						
	Replace -----	--	X				
	Spring, Brush						
	Adjust -----	--	X				
	Test -----	--	X				
	Replace -----	--	X				
4100.4	VENTILATION SYSTEM						
	Fan						
	Replace -----	--	--	--	X		
4100.5	FRAME SUPPORTS AND HOUSINGS						
	Bearing and Caps						
	Replace -----	--	--	--	X		
4100.6	DRIVE COMPONENTS						
	Disk, Driving						
	Replace -----	--	--	X			
4100.7	CONTROL PANELS, HOUSING, CUBICLES						
	Instruments; Receptacle; Lights						
	Replace -----	--	X				
	Wiring						
	Replace -----	--	--	X			
	Repair -----	--	X				
	Lamps						
	Replace -----	X					
4100.9	CIRCUIT BREAKER ASSEMBLY						
	Circuit Breaker Assembly						
	Replace -----	--	--	X			
	Repair -----	--	--	X			
4100.10	SWITCHES						
	Switches						
	Replace -----	--	X				
4100.11	REGULATOR; VOLTAGE OR CURRENT						
	Regulator Assembly						
	Replace -----	--	--	X			
	Repair -----	--	--	X			

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
4100.12	RESISTORS Resistors Replace -----	--	--	X			
4100.13	RELAY OR ASSEMBLY Relays Replace -----	--	--	X			
4100.14	FUSE AND FUSE HOLDERS Holder Replace ----- Fuse Replace -----	--	X				
4100.16	TRANSFORMERS; RECTIFIERS Transformer, Current Replace -----	X		X			
4100.17	TERMINAL BLOCKS; JUNCTION BOXES Boards; Terminals; Panels Replace ----- Board, Change Over Replace -----	--	X				
4100.18	HOUSING OR HULL PANELS AND ATTACHING PARTS Sills; Shells; Panels; Doors; Covers Replace -----	--	X				
4100.19	RADIO INTERFERENCE SUPPRESSION Capacitors; Ground Straps Test ----- Replace -----	--	X				
47	GAGES (NON-ELECTRICAL); WEIGHING AND MEASURING DEVICES						
4705	FUEL GAGES (QUANTITY) Gage, Fuel Replace -----	--	X				
60	STEAM BOILERS; WATER HEATERS; HEATING UNITS; BURNERS						
6000.3	ENGINE OR EQUIPMENT HEATERS Heater Assembly Replace ----- Repair -----	--	X				
6002.1	BURNER ASSEMBLY Burner Replace ----- Repair ----- Igniter Replace -----	--	--	X			
6002.3	BLOWER ASSEMBLY Blower Replace ----- Repair -----	--	--	X			
76	FIRE FIGHTING EQUIPMENT						
7603	FIRE EXTINGUISHERS Extinguisher, Fire Service ----- Replace -----	X					

APPENDIX III

BASIC ISSUE ITEM

Section I. INTRODUCTION

1. General

Section II lists the accessories, tools, and publications required in 1st echelon maintenance and operation, initially issued with, or authorized for the generator set.

2. Explanation of Columns

a. Source Codes. The information provided in each column is as follows:

- (1) *Technical Service.* This column lists the basic number of the technical service assigned supply responsibility for the part. Blank spaces denote Corps of Engineers supply responsibility. General Engineer supply parts are identified by the letters GE in parentheses, following the nomenclature in the description column. Other technical services basic numbers are—

- 9—Ordnance Corps
- 10—Quartermaster Corps
- 11—Signal Corps
- 12—Adjutant General's Corp

- (2) *Source.* The selection status and source of supply for each part are indicated by one of the following code symbols:

- (a) P—applied to high-mortality repair parts which are stocked in or supplied from the technical service depot system, and authorized for use at indicated maintenance echelons.
- (b) P1—applied to repair parts which are low-mortality parts, stocked in or supplied from technical service depots, and authorized for installation at indicated maintenance echelons.
- (c) X2—applied to repair parts which are not stocked. The indicated main-

tenance echelon requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization such repair parts will be requisitioned with supporting justification through normal supply channels.

- (3) *Maintenance.* The lowest maintenance echelon authorized to use, stock, install, or manufacture the part is indicated by the following code symbol:

O—Organizational Maintenance
(1st and 2d echelons)

b. Federal Stock Number. This column lists the 11-digit Federal Stock number used for requisitioning purposes.

c. Description.

- (1) The item name and a brief description of the part are shown.
- (2) A five-digit Federal Supply code for manufacturers and/or other technical services is shown in parentheses followed by the manufacturer's part number. This number shall be used for requisitioning purposes when no Federal stock number is indicated.
Example: (75377) 560PB-4001.
- (3) The letters GE shown in parentheses immediately following the description, indicate General Engineer supply responsibility for the part.

d. Unit of Issue. Where no abbreviation is shown in this column, the unit of issue is each.

e. Expendability. Those items classified as nonexpendable are indicated by letters NX. Items not indicated by NX are expendable.

f. Quantity Authorized. This column lists the quantities of repair parts, accessories, tools,

or publications authorized for issue to the equipment operator or crew as required.

g. Quantity Issued with Equipment. This column lists the quantities of repair parts, accessories, tools, or publications that are initially issued with each item of equipment. Those indicated by an asterisk are to be requisitioned through normal supply channels as required.

h. Illustrations.

- (1) *Figure number.* Provides the identifying number of the illustrations.
- (2) *Item number.* Provides the referenced number for the part shown in the illustration.

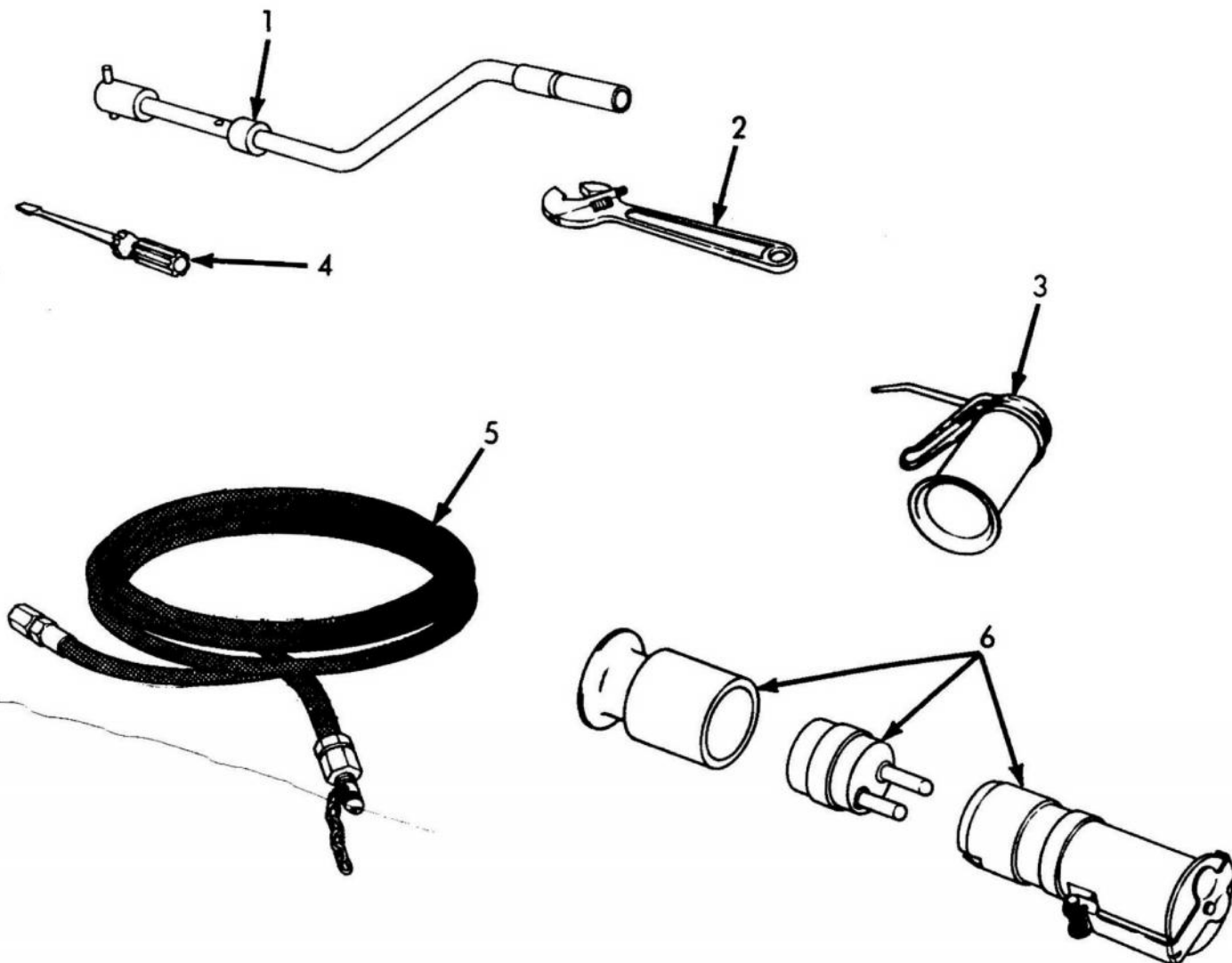
3. Federal Supply Code for Manufacturers

75377—Kurz & Root Company

28265—Hercules Motors Corporation

4. Comments and Suggestions

Suggestions and recommendations for changes to the basic issue items list shall be submitted on DA Form 2028 to the commanding officer, U.S. Army Engineer Maintenance Center Corps of Engineers, ATTN: EMCDM-S, P.O. Box 119, Columbus 16, Ohio. Direct communication is authorized.



EMC 6115-296-12/77

- 1 Crank assembly
- 2 Open end wrench

- 3 Hand oiler
- 4 Flat tip screwdriver

- 5 Auxiliary fuel line
- 6 Adapter assembly

Figure 77. Basic issue items.

Section II. BASIC ISSUE ITEMS LIST

Source codes				Federal stock No.	Description	Unit of issue	Expendability	Quantity authorized	Quantity issued with equipment	Illustration	
Technical service	Source	Maintenance	Recoverability							Fig.	Item
	X2	O	--	-----	GROUP 01--ENGINE 0111.1 HAND CRANKING DEVICES START, CRANK ASSEMBLY (28265) 39069BS	--	--	1	1	77	1
					GROUP 06--ELECTRICAL SYSTEM (ENGINE AND VEHICULAR) 0612 BATTERIES						
11	P	O	--	6140-057-2553	BATTERY, STORAGE 12 volts, 6 cell	--	NX	2	2		
9	P	O	--	6810-264-9063	SULPHURIC ACID: electrolyte	GAL	--	2	2		
					GROUP 26--ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT AND TOOLS 2602.1 ACCESSORIES						
	P1	O	--	2910-739-9951	AUXILIARY FUEL LINE ASSEMBLY (75377) 560PB-4001	--	--	1	1	77	5
	X2	O	--	-----	ADAPTER ASSEMBLY (75377) 560PC- 4002	--	--	1	1	77	6
	X2	O	--	-----	BOARD NO. 1 (75377) 560PD-4069-1	--	--	1	1		
	X2	O	--	-----	BOARD NO. 3 (75377) 560PD-4069-3	--	--	1	1		
	X2	O	--	-----	BOARD NO. 4 (75377) 560PD-4069-4	--	--	1	1		
10	P	O	--	7520-559-9618	CASE: operations and maintenance publi- cations, cotton duck, water repellent and midlew resistant MIL-B-11743B 2602.2 COMMON TOOLS	--	--	1	1		
10	P	O	--	5120-449-8083	WRENCH, OPEN END: adjustable, 10 in.	--	--	1	(*)	77	4
10	P	O	--	5120-277-9491	SCREWDRIVER, FLAT TIP: 1/4 in. tip, 9 in. lg	--	--	1	(*)	77	2
10	P	O	--	4930-273-3644	OILER, HAND: force fed, 8 oz 2602.4 PUBLICATIONS	--	--	1	(*)	77	3
12	--	--	--	-----	DEPARTMENT OF THE ARMY TECH- NICAL MANUAL TM 5-6115-296-12	--	--	2	2		
12	--	--	--	-----	DEPARTMENT OF THE ARMY TECH- NICAL MANUAL TM 5-6115-296-20P	--	--	2	2		
12	--	--	--	-----	DEPARTMENT OF THE ARMY LU- BRICATION ORDER LO 5-6115-296-12	--	--	1	1		
					GROUP 76--FIRE FIGHTING EQUIPMENT 7603 FIRE EXTINGUISHERS						
	P1	O	--	4210-555-8837	EXTINGUISHER, FIRE, DRY CHEMI- CAL MONOBROMOTRIFLUOROME- THANE: charged hand-shatterable cyl- inder, penetrating seal valve, stored pres- sure, w/bracket 2.75 lb (HALON-1301) MIL Spec E-52031 (GE)	--	--	1	1		

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BY ORDER OF THE SECRETARY OF THE ARMY:

G. H. DECKER,
*General, United States Army,
Chief of Staff.*

Official:

J. C. LAMBERT,
*Major General, United States Army,
The Adjutant General.*

Distribution:

To be distributed in accordance with DA Form 12-32, Section II (Unclas) requirements for Corporal, Little John, Redstone, Pershing, Hawk—TM—Power Generating Equipment (Eng).

TECHNICAL MANUAL

Operator and Organizational Maintenance Manual

**GENERATOR SET, GASOLINE ENGINE: 10 KW, AC, 120V, 1 & 3 PHASE,
120 240 V SINGLE PHASE, 120/208 V, 3 PHASE 60 CYCLE; SKID MOUNTED
(KURZ & ROOT MODEL FERO-1) SERIAL NUMBERS: 560-1001 THRU 560-4600
FSN 6115-833-1498**

TM 5-6115-296-12

CHANGES No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., 20 December 1962

TM 5-6115-296-12, 28 February 1962, is changed as follows:

Page 1, change serial number to read as shown above.

Contents, chapter 3, section III, paragraph column. Delete "37" and substitute "36".

Page 3, paragraph 1*d*, lines 4 through 6. Delete "Engineer Maintenance Center, Corps of Engineers, ATTN: EMCDM-S," and substitute "Mobility Support Center, ATTN: SMOMS-MS,".

Paragraph 1*e*, line 3. Delete "AR 700-38." and substitute "AR 750-5."

Paragraph 2. Immediately after paragraph title insert DA Form 2258 (Depreservation Guide of Engineer Equipment).

Line 1. Between "For" and "record" insert "other".

Line 3. Delete "TM 5-505" and substitute "TM 38-750".

Page 11, paragraph 8.

c. (Superseded) Perform the quarterly preventive maintenance services (par. 36).

Page 20, paragraph 17*a*(1), line 1. Delete "before-operation" and substitute "daily preventive maintenance".

Paragraph 18*b*, line 1. Delete "after-operation" and substitute "daily preventive maintenance".

Pages 38 through 43.

Section III. PREVENTIVE MAINTENANCE SERVICES

(Superseded)

34. General

To insure that the generator set is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed are listed and described in paragraphs 35 and 36. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit shall

be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded together with the corrective action taken on DA Form 2404 at the earliest possible opportunity.

35. Daily Preventive Maintenance Services

This paragraph contains an illustrated tab-

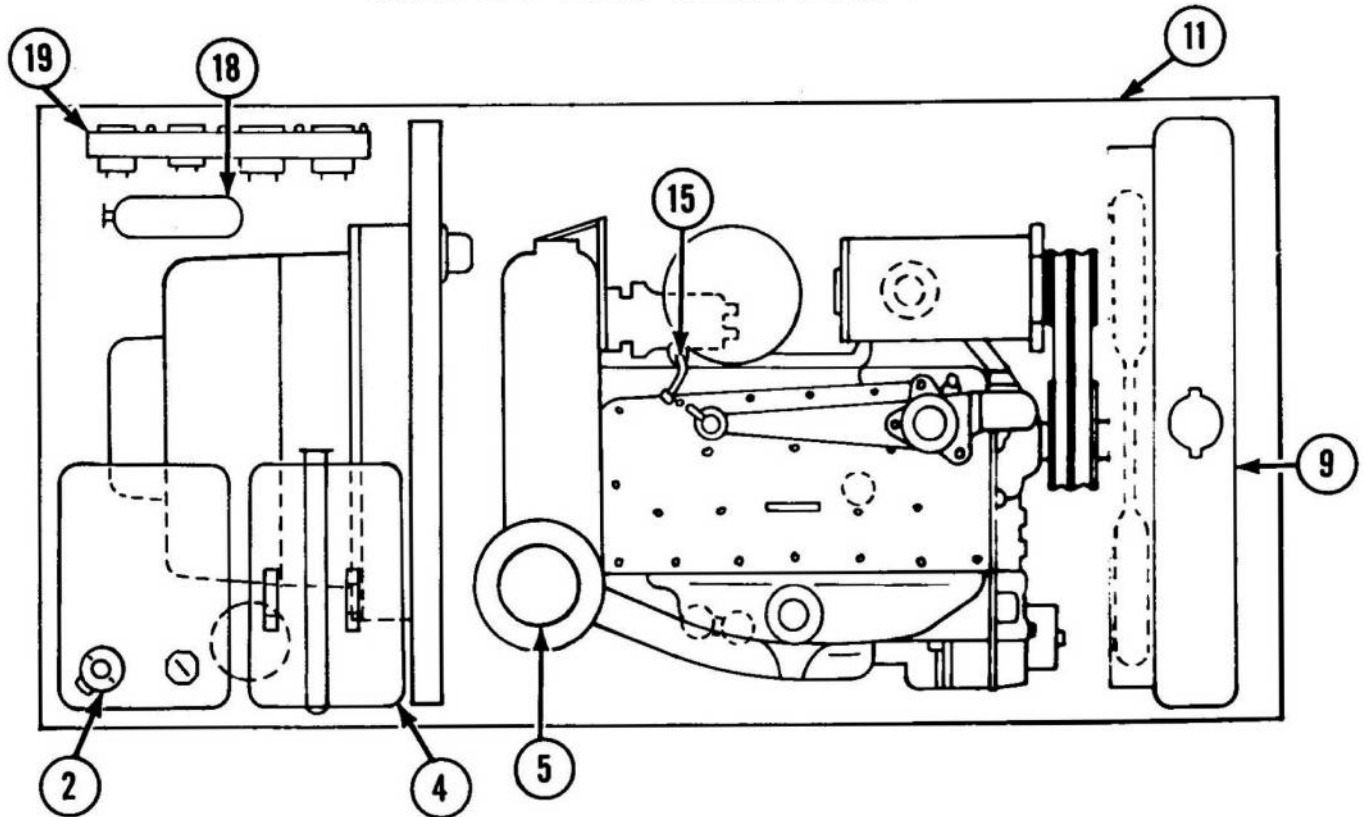
PREVENTIVE MAINTENANCE SERVICES

DAILY

TM 5-6115-296-12

GENERATOR SET

KURZ AND ROOT MODEL FERO-1



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM

PAR. REF

ITEM	PAR. REF
2	FUEL TANK. Service strainer. Check fuel level.
4	BATTERIES. Inspect for leaks, corrosion, secure mounting, and secure cable connections. Fill to 3/8 inch above plates. Clean vent holes in filler caps. In freezing weather run the engine a minimum of one hour after adding water to the batteries. (Weekly)
5	AIR CLEANER. Inspect for cleanliness and secure mounting. Clean oil cup and fill to level mark.
9	RADIATOR. Check coolant level. Proper level is 2 inches below filler neck.

Figure 22. (Superseded) Daily preventive maintenance services.

ITEM		PAR. REF
11	<u>GROUND CONNECTION.</u> Check ground cable at terminal and rod for secure connection.	
15	<u>OIL LEVEL GAGE.</u> Check crankcase oil level. Maintain oil level at "FULL" mark.	
18	<u>FIRE EXTINGUISHER.</u> Inspect for broken seal.	
19	<u>INSTRUMENTS.</u> Check readings frequently during operation. Normal readings are as follows: Cycle meter - 61.5 cycles (no load), Voltmeter - between 110 and 120 volts, Battery charging indicator - in green area, Coolant temperature gage - between 165°F and 180°F, Oil pressure gage - approximately 30 pounds at operating speed.	
	NOTE 1. <u>OPERATION.</u> During operation check all controls and switches to be sure they function properly.	
	NOTE 2. <u>ADJUSTMENTS.</u> Make all adjustments found necessary during operation.	

MSC-6115-296-12/22

Figure 22—Continued.

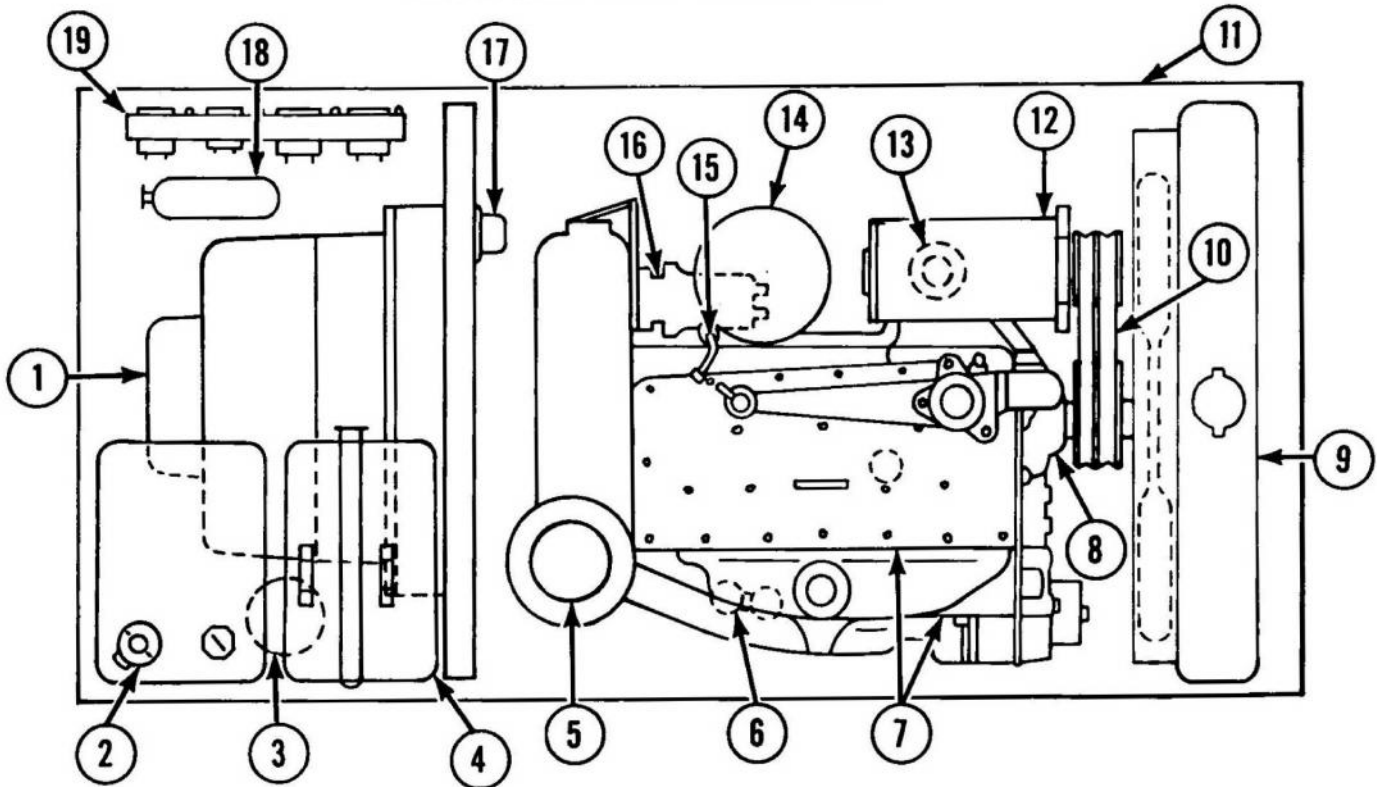
PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-6115-296-12

GENERATOR SET

KURZ AND ROOT MODEL FERO-1



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM

PAR. REF

1	<p>MAIN GENERATOR. Inspect for secure mounting and tight connections. Inspect the sliprings for rough or dirty surfaces. Inspect brushes for wear. Replace brushes that are worn to 1/2 inch in length. Check brush spring tension. Correct tension is 8 to 12 ounces per spring.</p>	
2	<p>FUEL TANK. Inspect for loose mounting hardware and connections. Service strainer. Check fuel level.</p>	
3	<p>COOLANT HEATER. Inspect for leaks, secure mounting, and proper operation.</p>	

Figure 22.1. (Added) Quarterly preventive maintenance services.

ITEM		PAR. REF
4	<u>BATTERIES.</u> Inspect for leaks, corrosion, secure mounting, and secure cable connections. Fill to 3/8 inch above plates. Clean vent holes in filler caps. In freezing weather run the engine a minimum of one hour after adding water to the batteries.	
5	<u>AIR CLEANER.</u> Inspect for damage and secure mounting. Clean oil cup and fill to level mark.	
6	<u>FUEL PUMP.</u> Inspect for leaks and secure mounting. Inspect sediment bowl for accumulation of water and dirt.	
7	<u>CYLINDER HEAD AND MANIFOLDS.</u> Inspect for leaks. Torque cylinder-head nuts to 40 to 45 foot-pounds.	
8	<u>WATER PUMP.</u> Inspect for leaks.	
9	<u>RADIATOR.</u> Inspect core, hose connections, draincock, and cap for defective condition. Check coolant level.	
10	<u>BELTS.</u> Check condition and tension. Correct tension is 1/2-inch deflection midway between pulleys.	
11	<u>GROUND CONNECTION.</u> Check ground cable at terminal and rod for secure connection.	
12	<u>BATTERY-CHARGING GENERATOR.</u> Inspect for secure mounting, tight connections, and frayed wires.	
13	<u>CRANKCASE BREATHER.</u> Check for damage. Clean and re-oil.	
14	<u>OIL FILTER.</u> Inspect for leaks, loose connections, and secure mounting.	
15	<u>OIL LEVEL GAGE.</u> Check crankcase oil level. Maintain oil level at "FULL" mark.	
16	<u>STARTER.</u> Inspect for secure mounting, tight connections, and frayed wires.	
17	<u>GENERATOR REGULATOR.</u> Inspect for secure mounting, tight connections, and frayed wires.	
18	<u>FIRE EXTINGUISHER.</u> Inspect for full charge, secure mounting and broken seal.	

Figure 22.1—Continued.

ITEM		PAR. REF
19	<p><u>INSTRUMENTS.</u> Inspect for damage, secure mountings, and tight connections. Check readings frequently during operation. Normal readings are as follows: Cycle meter - 61.5 cycles (no load), Voltmeter - between 110 and 120 volts, Battery charging indicator - in green area, Coolant temperature gage - between 165°F and 180°F, Oil pressure gage - approximately 30 pounds at operating speed.</p>	

MSC-6115-296-12/22.1

Figure 22.1—Continued.

ulated listing of preventive maintenance services which must be performed by the operator. Daily services retain the same item numbers used in quarterly preventive maintenance services. Therefore, daily preventive maintenance services may not be numbered consecutively but should be performed in the numerical sequence as shown to insure complete coverage. Refer to figure 22 for the daily preventive maintenance services.

36. Quarterly Preventive Maintenance Services

a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum require-

ments. Refer to figure 22.1 for the quarterly preventive maintenance services.

Page 127, paragraph 149b, lines 4 through 7. Delete last sentence and substitute "All deficiencies will be recorded on DA Form 2404, together with corrective action taken."

Page 128, paragraph 152b, line 1. Delete "30" and substitute "90".

Lines 2 and 3. Delete "on DA Form 464" and substitute "in paragraph 36".

Line 7. Delete the period from the last sentence and add "as outlined in paragraph 149."

Page 129, paragraph 5, add TM 38-750, The Army Equipment Records System and Procedures.

Page 140, paragraph 4, lines 4 and 5. Delete "Engineer Maintenance Center, Corps of Engineers, ATTN: EMCDM-S," and substitute "Mobility Support Center, ATTN: SMOMS-MS,".

BY ORDER OF THE SECRETARY OF THE ARMY:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

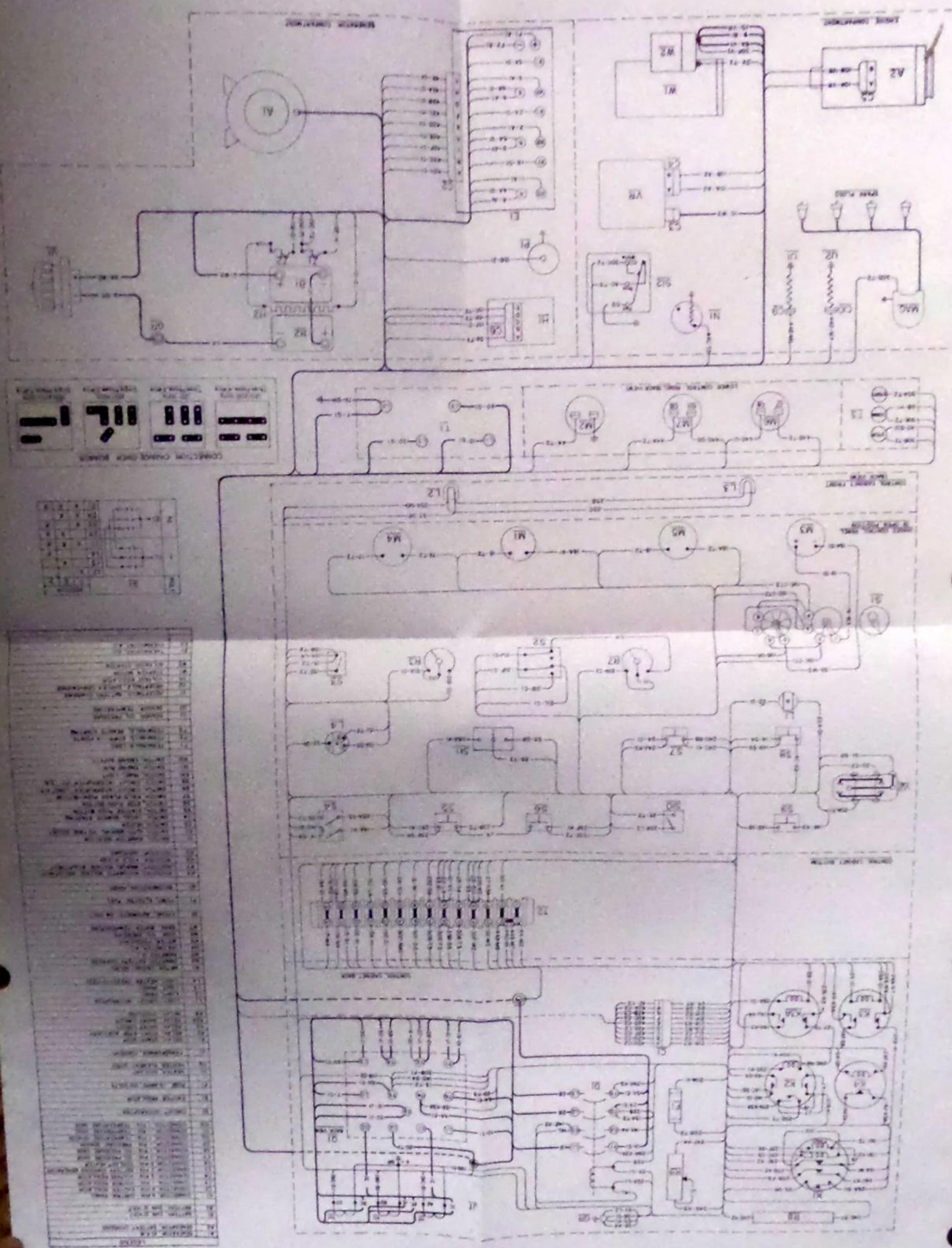
Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-32, Section II (Unclass) requirements for HAWK, Honest John, Little John, Nike-Ajax and Redstone—TM—Power Generating Equipment (Eng).

Figure 1. Printed wiring diagram



WIRE NO.	FROM	TO	FUNCTION
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