

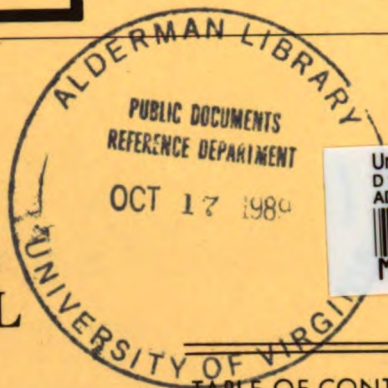
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TECHNICAL MANUAL

OPERATOR/CREW  
AND ORGANIZATIONAL  
MAINTENANCE MANUAL



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GENERATOR SET,  
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SKID MOUNTED, 150 KW,  
ALTERNATING CURRENT,  
TACTICAL  
MODEL D424A, CLASS PRECISE,  
HERTZ 400, NSN 6115-01-113-1093

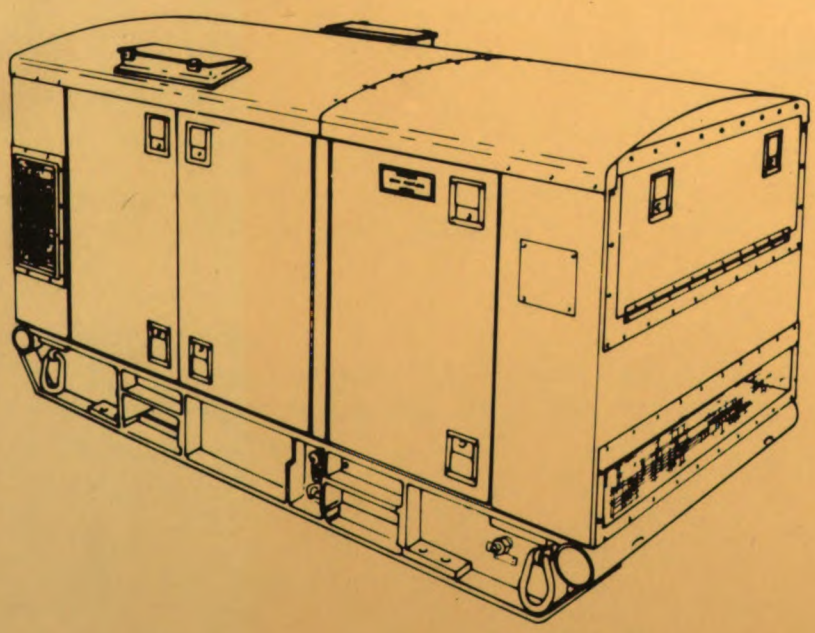


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No. 6 }HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 21 October 1987

## Operator/Crew and Organizational Maintenance Manual

GENERATOR SET, GAS TURBINE ENGINE DRIVEN  
SKID MOUNTED, 150 KW, ALTERNATING CURRENT,  
TACTICAL MODEL D424A, CLASS PRECISE,  
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WASHINGTON, D.C., 19 December 1986

Operator/Crew and  
Organizational Maintenance Manual

GENERATOR SET, GAS TURBINE ENGINE DRIVEN  
SKID MOUNTED, 150 KW, ALTERNATING CURRENT,  
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**Operator/Crew and  
Organizational Maintenance Manual**

**GENERATOR SET, GAS TURBINE ENGINE DRIVEN  
SKID MOUNTED, 150 KW, ALTERNATING CURRENT,  
TACTICAL MODEL D424A, CLASS PRECISE,  
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WASHINGTON, D.C., 17 August 1984

Operator/Crew and  
Organizational Maintenance Manual

GENERATOR SET, GAS TURBINE ENGINE DRIVEN  
SKID MOUNTED, 150 KW, ALTERNATING CURRENT,  
TACTICAL MODEL D424A, CLASS PRECISE,  
HERTZ 400, NSN 6115-01-113-1093

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# URGENT

TM 5-6115-598-12  
C1

CHANGE }  
NO. 1 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 15 April 1983

OPERATOR/CREW AND  
ORGANIZATIONAL MAINTENANCE MANUAL

GENERATOR SET, GAS TURBINE ENGINE DRIVEN  
SKID MOUNTED, 150 KW, ALTERNATING CURRENT,  
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# URGENT



WARNING

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

For Artificial Respiration refer to FM 21-11.

WARNING

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

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components. Emergency fuels are particularly hazardous. Use a fuel catch pan when draining fuel from any fuel line or fuel system component. Be sure that area around fuel atomizer assembly is not contaminated by fuel when testing igniter or ignition exciter.

WARNING

Exhaust heat is created by operation of the generator set. Severe burns may result from attempting to service any exhaust system component before allowing time for cooling after operation.

WARNING

Battery electrolyte must be handled with care to avoid acid burns from spillage of battery electrolyte. Do not add electrolyte to a battery that has been previously filled. Use care not to spill electrolyte on skin when checking liquid level and specific gravity of a battery with a hydrometer.

WARNING

Battery voltage may result in shock and flash burns if battery cables are not disconnected while servicing dc electrical system components. Disconnect battery cables before removing starter relay or starter. Disconnect negative cable first; reconnect positive cable first.

WARNING

This equipment develops noise which can cause permanent hearing loss if suitable ear protection devices are not worn by personnel near the operating generator set.

WARNING

Toxic solvent is used for general cleaning of the generator set. Illness or skin damage may be caused by prolonged breathing of solvent fumes or excessive skin contact with the liquid. Ensure that there is adequate ventilation and avoid open flame or sparks when using flammable solvent.

WARNING

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

WARNING

Do not touch spark igniter or ignition lead while motoring the engine. High voltage spark could cause serious injury or death.

WARNING

Do not operate generator set unless ground terminal stud is connected to a suitable ground. Electrical fault in generator set, load lines, or load equipment can cause severe injury or electrocution from contact with ungrounded system.

**WARNING**

Under no circumstances should anyone walk beneath a suspended generator set. Serious injury or death could result.

**WARNING**

Keep hands well away from cooler fan while engine is running. Serious injury or death could result.

**WARNING**

Lube oils MIL-L-23699 and MIL-L-7808 are highly toxic. Wash at once with soap and water if oil comes in contact with skin. If irritation occurs, get medical attention.

**WARNING**

Use care when removing or installing front roof panel that the panel does not contact the circuit breaker or diode mounted on the bulkhead. Contact between the front roof panel and these components' may cause arcing and result in personal injury.

OPERATOR/CREW AND ORGANIZATIONAL  
MAINTENANCE MANUAL

GENERATOR SET,  
GAS TURBINE ENGINE DRIVEN, SKID MOUNTED  
150 KW, ALTERNATING CURRENT,  
TACTICAL, MODEL D424A, CLASS PRECISE,  
HERTZ 400, NSN 6115-01-113-1093

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U. S. Army Troop Support Command, ATTN: AMSTS-MPS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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## HOW TO USE THIS MANUAL

This manual provides information for use in operating and maintaining the generator set. Maintaining the generator set includes preventive maintenance checks and services, observation of symptoms of trouble, troubleshooting procedures, and maintenance procedures to correct a malfunction.

You must familiarize yourself with the maintenance procedures before beginning the maintenance tasks. Any maintenance task that is not described within this manual is considered a task that must be performed by a higher level of maintenance.

To help you become familiar with this new kind of manual as quickly as possible, spend some time looking through the pages. The manual has a new look that is very different from the look of the manuals you've been using. You'll find that it's a lot easier to use and you'll be able to find what you're looking for a lot faster. We got rid of as many words as we could and put in pictures to show you how to repair, replace, inspect, test, or service those item(s) and component(s) that are the responsibility of the Operator/Crew or Organizational level technician. The following instructions provide a general description of the entire manual, special features and characteristics, and detailed information on how to use this manual.

### MANUAL CONTENT

1. This manual consists of the following:
  - a. Cover page index
  - b. Warning pages
  - c. Table of contents
  - d. How to use this manual
  - e. Chapters 1 through 4
  - f. Appendixes A through E
  - g. Index
  - h. Wiring diagrams and schematics
2. Further explanation of the manual contents follows.
  - a. Chapter 1. Introduction. Contains general information, equipment description and data, along with technical principles of operation regarding the complete generator set.
  - b. Chapter 2. Operating Instructions. Contains operating instructions, both under normal and unusual conditions, and preventive maintenance checks and services (PMCS).

c. Chapter 3. Operator/Crew Maintenance Instructions. Contains detailed maintenance procedures for the operator. This chapter also contains lubrication instructions in the form of a lubrication order.

d. Chapter 4. Organizational Maintenance Instructions. Contains detailed maintenance procedures for the organizational maintenance technician. Also included are instructions for service upon receipt of equipment, movement to a new work-site, organizational preventive maintenance checks and services (PMCS), troubleshooting procedures, radio interference suppression, and preparation for shipment and storage.

e. Appendix A contains references to all forms and publications referred to in this manual.

f. Appendix B contains the Maintenance Allocation Chart (MAC).

g. Appendix C contains Components of End Item List and Basic Issue Items.

h. Appendix D contains the Additional Authorization List.

i. Appendix E contains the Expendable Supplies and Materials List.

j. An Index lists all subjects in the manual in alphabetical order.

k. Wiring diagrams and schematics (foldouts), located in the back of the manual, are valuable aids in troubleshooting. An explanation of their use follows:

(1) Some of the wiring diagrams are too large for all the information to be included on a single sheet. These are separated into more than one sheet. The sheets are numbered accordingly. For example, F01-1, F01-2, and F01-3 are dash numbered to indicate a continuation of F01.

(2) Individual wire numbers are shown at each item location. There is also a symbol that indicates where that wire terminates. Some wires continue to another sheet; they are indicated as to the sheet it is continued to or from.

(3) Both the ac (F03) and the dc (F04) systems are shown. All of the schematics are titled to aid in the identification of its functions.

(4) Further wire aids are included in some troubleshooting malfunctions and some maintenance functions. These are all reflected on the schematics.

3. The intent of this new format is to provide you with a manual that will let you do your job quickly, easily and with a minimum of confusion. The maintenance tasks in chapter 4 are arranged in modules. Each module contains all the information you need to do a complete task. The illustrations associated with the task will be on the same page or a facing page where possible, making it easy for you to match the illustrations with the text.

The following is an example of a task and how the maintenance information is provided.



TECHNICAL MANUAL  
 OPERATOR/CREW  
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 MAINTENANCE MANUAL

GENERATOR SET,  
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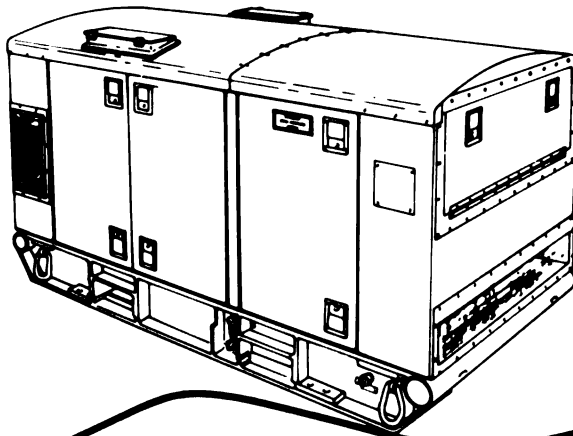


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a. On the right side of the cover you will see an index with black tabs as shown.

b. You then go down the index and find the title "OPERATOR/CREW MAINTENANCE PROCEDURES 3-6".

c. Then you open the manual by using the black tab on the side of the manual that is aligned with the black tab on the cover.

**CHAPTER 4**  
**ORGANIZATIONAL MAINTENANCE INSTRUCTIONS**

WARNING

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

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d. On the first page of the chapter you will see a chapter index (chapter 4 index is reproduced). Notice that the maintenance tasks are listed in alphabetical order.

e. Find the subject "Door Assemblies"; then look to the right and in line with the subject and you will see 4-15 in the Para column.

f. You then turn to paragraph 4-15.

g. Notice that the title of paragraph 4-15 is "Door Assemblies"; then if you look just below the title you will see the block entitled "This task covers: a. Removal, b. Repair, c. Installation." You now know that this paragraph covers the removal, repair, and installation of door assemblies.

h. If you continue down the page to "INITIAL SETUP," you would find any or all of the following headings, depending on which applies to the task being performed:

TM 5-6115-598-12

4-15. DOOR ASSEMBLIES

This task covers:

- a. Removal                      b. Repair                      c. Installation

INITIAL SETUP

Tools

- 6-in. flat tip screwdriver
- 3/8 combination wrench
- Flat tip offset screwdriver (appx D)

References

- Para 1-14.b.(2)
- LO 5-6115-598-12
- Para 3-5, item 2
- Para 4-1.a.(2)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

Equipment Condition

<u>Para</u>	<u>Condition Description</u>
4-17	LH and RH air inlet screen and louvers removed (for removal of the front doors only).

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
<u>REMOVAL</u>			

NOTE

Use the same procedures for each of the six doors.

- |                      |                                   |         |
|----------------------|-----------------------------------|---------|
| 1. Door assembly (1) | a. 10 lock nuts (2)<br>Louver (3) | Remove. |
|----------------------|-----------------------------------|---------|

- (1) Test Equipment
- (2) Tools
- (3) Materials/Parts
- (4) Personnel Required
- (5) References
- (6) Troubleshooting References
- (7) Equipment Condition
- (8) Special Environmental Conditions
- (9) General Safety Instructions

i. Notice that in the "INITIAL SETUP" headings, items (1), (3), (6), (7), and (9) are missing. This means that you do not need any test equipment or special equipment or materials; that the task can be performed by one person, no troubleshooting reference applies to this task, and no special environmental conditions or general safety instructions are required. A troubleshooting reference is inserted only if, while you are performing the task, a troubleshooting procedure would be helpful in solving a problem you could encounter. Special environmental conditions are provided when it is necessary to provide special conditions such as a dust-free, air conditioned area to perform the task. General safety instructions are provided when it is necessary for you to observe any general safety information that applies throughout the procedures. Warnings and cautions are provided in the procedure for special safety information that applies to a particular step.

j. Under "Tools," you see that you will need a 6-in. flat tip screwdriver, and a 3/8 in. combination wrench, and a flat tip offset screwdriver, (appx D). (Appx D refers to the Additional Authorization List (AAL)).

k. Under "Personnel Required," you see that the work is to be done by a Utilities Equipment Repairer, MOS 52C.

l. Under "References," you see para 1-14.b.(2), LO 5-6115-598-12, para 3-5, item 2, and para 4-1.a.(2). These are the additional procedures you will be using when you perform this task.

m. Under "Equipment Condition" you see that the LH and RH air inlet screen and louvers need to be removed for the removal of the two front doors only.

n. After you have the tools at hand, and have performed the procedures to set up the equipment condition, you are ready to go to the REMOVAL, REPAIR, and INSTALLATION procedures located just below the INITIAL SETUP block.

o. The procedures are arranged in four columns with the following headings:

LOCATION, ITEM, ACTION, and REMARKS

p. In the LOCATION column, you will find the location for the parts listed in the ITEM column.

q. In the ITEM column, you will find the part or parts that you will take some action on.

r. In the ACTION column, you will find the action that you are to take on the item or items.

s. The REMARKS will provide you with additional information that will help you to perform the step or to understand better what is being done.

t. Begin by reading under each column heading from left to right. To the far left you will find the number "1". This is step 1 of the REMOVAL procedure. All other steps follow in numerical order.



u. In the LOCATION column, the listing "Door Assembly (1)" tells you that locknuts (2) and screws (3) listed in the ITEM column fasten the door assembly and hinge to the generator set.

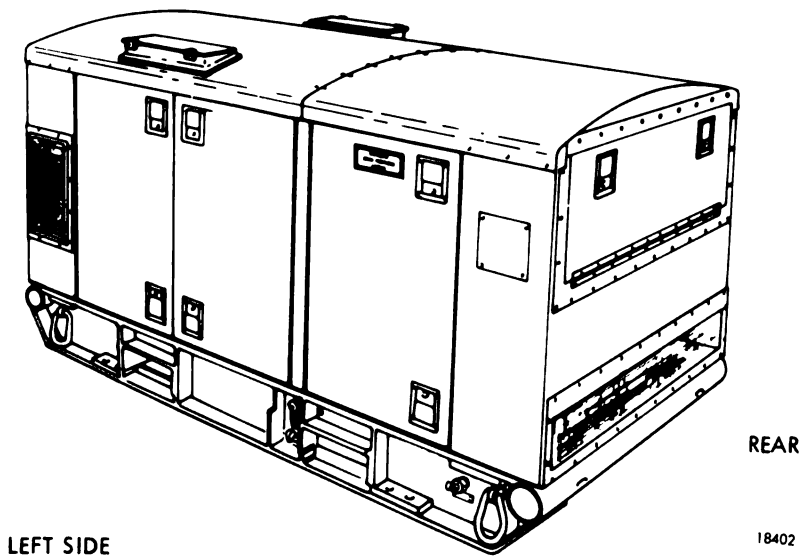
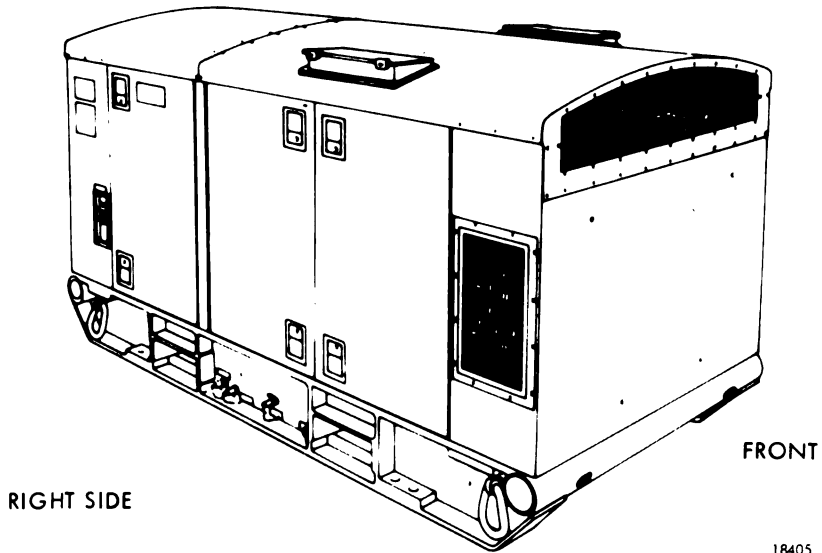
v. In the ACTION column, "Remove" is the action that you will perform on the parts that you have located.

w. Continue on to step 2 and you will see that the next thing you will do is remove the hinge (4) by removing locknuts (5) and screws (6).

x. Notice that on the page opposite the procedure is an illustration that shows you where the items are that you are working on. This illustration is provided to help you see what you are doing in this task.

Now look at the maintenance tasks in this manual and see how the information you need is presented. You will find that all the maintenance tasks are presented in a similar manner.





# CHAPTER 1

## INTRODUCTION

	Para		Para
Administrative Storage . . . . .	1-8	Maintenance Forms and	
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Location and Description of		Tabulated Data. . . . .	1-15
Major Components . . . . .	1-14		

### Section I. GENERAL INFORMATION

---

#### 1-1. SCOPE

---

- a. Type of Manual. Operator/Crew and Organizational Maintenance Manual.
  
- b. Model No. and Equipment Name. Model D424A generator set, electric, trans-  
portable, gas turbine engine driven, skid mounted, 150 kW, 400 Hertz, alternating  
current, tactical, for ground power application.
  
- c. Purpose of Equipment. Generates 400 Hertz, 208 volts ac line-to-line, 120  
volts ac line-to-neutral, 3 phase electric power, 0.8 power factor (pf) (lagging).
  
- d. Special Limitations on Equipment. Rated for 150 kW load, 520 ampere (cur-  
rent) load per phase.

---

#### 1-2. MAINTENANCE FORMS AND RECORDS

---

Maintenance forms and records used by Army personnel are prescribed by TM 38-750, The Army Maintenance System (TAMMS).

---

1-3. REPORTING OF ERRORS

---

Report of errors, omissions, and recommendations for improvement of this publication by the individual user is encouraged. Reports should be submitted as follows: Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual, direct to Commander, U.S. Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120.

---

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's)

---

EIR's can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure, just simply tell why the design is unfavorable or why a procedure is difficult. EIR's may be submitted on SF 368.

Mail directly to Commander, U.S. Army Troop Support and Aviation Materiel Readiness Command, ATTN:DRSTS-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished to you.

---

1-5. LIST OF ABBREVIATIONS

---

AAL	Additional Authorization List	EDS	Engineering Design Specification
AOAP	Army Oil Analysis Program	EIR's	Equipment Improvement Recommendations
approx	approximately	EPP	Electric Power Plant
appx	appendix	ES&ML	Expendable Supplies and Material List
assy	assembly	F	Direct Support
attn	attention	FM	Field Manual
auth	authorization	FSCM	Federal Supply Code of Manufacturers
avg	average	gnd	ground
BII	Basic Issue Items	GS	General Support
CB	circuit breaker	GT	gas turbine
COEIL	Components of End Item List	incr	increase
cont	continued	isoch	isochronous
CT	current transformer	L1	Line 1
DA	Department of the Army	L2	Line 2
decr	decrease	L3	Line 3
DMWR	Depot Maintenance Work Requirement		
DS	Direct Support		
ECA	electronic control assembly		

LH	left hand	recpt	receptacle
LO	Lube Order	rect	rectifier
MAC	Maintenance Allocation Chart	ref	reference
max	maximum	reqd	required
mfg	manufacture	RH	right hand
min	minimum or minute	SYNC	Synchronize
MS	Military Standard	sw	switch
N1	gasifier rotor speed	T/C	thermocouple
N2	power turbine rotor speed	TAMMS	The Army Maintenance Management System
NC	normally closed		
neg	negative	TB	Technical Bulletin
neut	neutral	TBO	time between overhauls
NO	normally open	TD	time delay
No.	number(s)	temp	temperature
NSN	National Stock Number	thd	thread
P/N	part number	TM	Technical Manual
para	paragraph(s)	TMDE	Test Measurement and Diagnostic Equipment
pf	power factor		
ph	phase	T1	compressor inlet temperature
PMCS	Preventive Maintenance Checks and Services	T4	turbine inlet temperature
pos	positive	U/M	unit of measure
qty	Quantity	wt	weight
rcvd	received	xfmr	transformer

---

## 1-6. CATEGORIES OF MAINTENANCE ACCOMPLISHMENT

---

The user shall refer to the Maintenance Allocation Chart (MAC) (appx B) for tasks and categories of maintenance to be performed.

---

## 1-7. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

---

Command decisions, in accordance with the tactical situation, will determine when destruction of the generator set will be accomplished. For general destruction procedures for this equipment, refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

---

1-8. ADMINISTRATIVE STORAGE

---

Administrative storage is short term storage (1 to 45 days) (refer to TM 740-90-1 Administrative Storage of Equipment). (Ref sect. XVII, chapter 4.) Equipment should be able to be readied for mission performance within a 24 hour period.

---

1-9. PREPARATION FOR SHIPMENT AND STORAGE

---

Refer to sect. XVII, chapter 4, organizational maintenance, for these requirements.

## **Section II. EQUIPMENT DESCRIPTION AND DATA**

---

1-10. PURPOSE

---

The generator set is a transportable, electric power generating system. It can be easily moved to a selected site to provide 208/120 volts ac, 3-phase, 400 Hz electric power.

---

1-11. GENERAL CAPABILITIES

---

- a. Self-contained
- b. Skid-mounted
- c. Highly portable
- d. All weather operational
- e. Tactical

---

1-12. APPLICATIONS

---

The generator set is an end item with critical function to furnish electric power for the Patriot Missile System. Two generator sets are furnished with each Electric Power Plant (EPP).

---

**1-13. SPECIAL FEATURES, OPERATIONAL, AND ENVIRONMENTAL FEATURES**

---

- a. Gas turbine engine driven
  - (1) Modular construction
  - (2) Regenerative cycle
  - (3) Two-shaft (gasifier and power turbine rotors) starting with single-shaft operation
  - (4) Electronic control system
  - (5) Inertial air cleaner system
  - (6) Low emission
  - (7) Multifuel capability
- b. Direct flexible coupled alternator
  - (1) Brushless
  - (2) Rotating field
  - (3) Sealed bearing
  - (4) Built in rectifier
  - (5) Self-excitation
  - (6) Aluminum frame
  - (7) Fan cooled
- c. Automatic starting and operation
- d. Auxiliary power capability
- e. Parallel operating mode capability



---

## 1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

---

a. The following definitions apply to orientation and locations on the generator set.

(1) FRONT - The grill end (engine compartment)

(2) REAR - The control panel end

(3) RIGHT and LEFT SIDES - Determined by standing at the rear, facing the control panel.

b. Frame and housing

(1) AIR INLET SCREEN AND LOUVERS, LH AND RH. There are two air inlet screen and louvers. There is one on each side of the air inlet plenum and outside each air cleaner. They consist of a frame with a screen and louvers. They screen out larger pieces of debris and shed moisture to the outside.

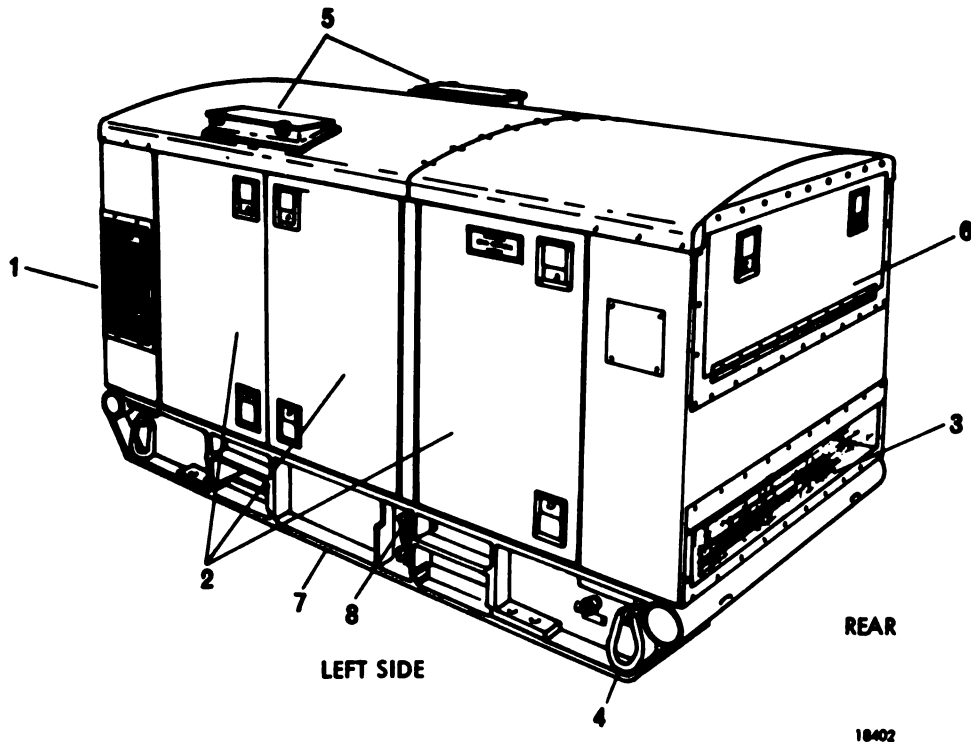
(2) DOOR ASSEMBLIES. The six access doors provide access to the engine and alternator and their supporting systems. There are three on each side of the enclosure. All doors should be closed during operation to keep the elements outside and also to aid the air flow through the set.

(3) COOLING AIR INLET SCREEN ASSEMBLY. The cooling air inlet screen is located at the lower rear of the generator set. It provides for screening the cooling air of large debris and an inlet for cooling air to enter the interior of the set.

(4) CARGO RINGS. The four cargo rings provide attaching points for a lifting device and for tie down during transportation. They are located at the four outer corners of the base.

(5) EXHAUST DUCTS. The covers are opened by air cylinders when the engine is started. Air cylinders close the duct covers on engine shutdown. These covers prevent rain, snow, dirt, and foreign objects from entering the engine through the exhausts ducts when the engine is not operating.

(6) CONTROL CABINET OUTER DOOR. The outer door provides access to the generator set controls. It also protects the switches and meters from damage and the elements.



(7) **BASE ASSEMBLY (SKID).** The base assembly, or skid, is the main structural member of the generator set. It provides the mounting structure on which the air inlet plenum, engine, generator, control cabinet and enclosure are assembled. The base also provides facilities for storage of the ground rod and lifting rings. It also provides facilities for attachment of generator set to vehicle as well as electrical slave and grounding connectors, fuel inlet, engine oil, and fuel drain connections.

(8) **SLAVE RECEPTACLE.** The slave receptacle is located in the left side of the base. This allows auxiliary 24 Vdc starting and running capabilities from any external source in case of battery failure.

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1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

---

(9) AIR CLEANERS, LH AND RH. Two air cleaners filter the inlet air to the engine. They are located one on each side of the air inlet plenum. The air cleaners consist of a series of axially-aligned, parallel tubes and swirl vanes. The vanes cause the inlet air flow to swirl. The swirling action centrifugally separates dirt particles from the engine inlet air. The dirt particles are then drawn off and ejected out the bottom through eductor tubes.

(10) BATTERY TRAYS, LH AND RH. Two battery trays are located, one on each side of the alternator, on the floor of the base (skid). They support the four batteries that are needed to operate the generator set. The hold down bars are used to secure the batteries and are attached to the trays with studs.

(11) MAIN AC CONTACTOR. The main ac contactor is a relay that interrupts the electric current between the alternator and the load. The contactor is mounted on the main contactor and current transformers support assembly on the alternator.

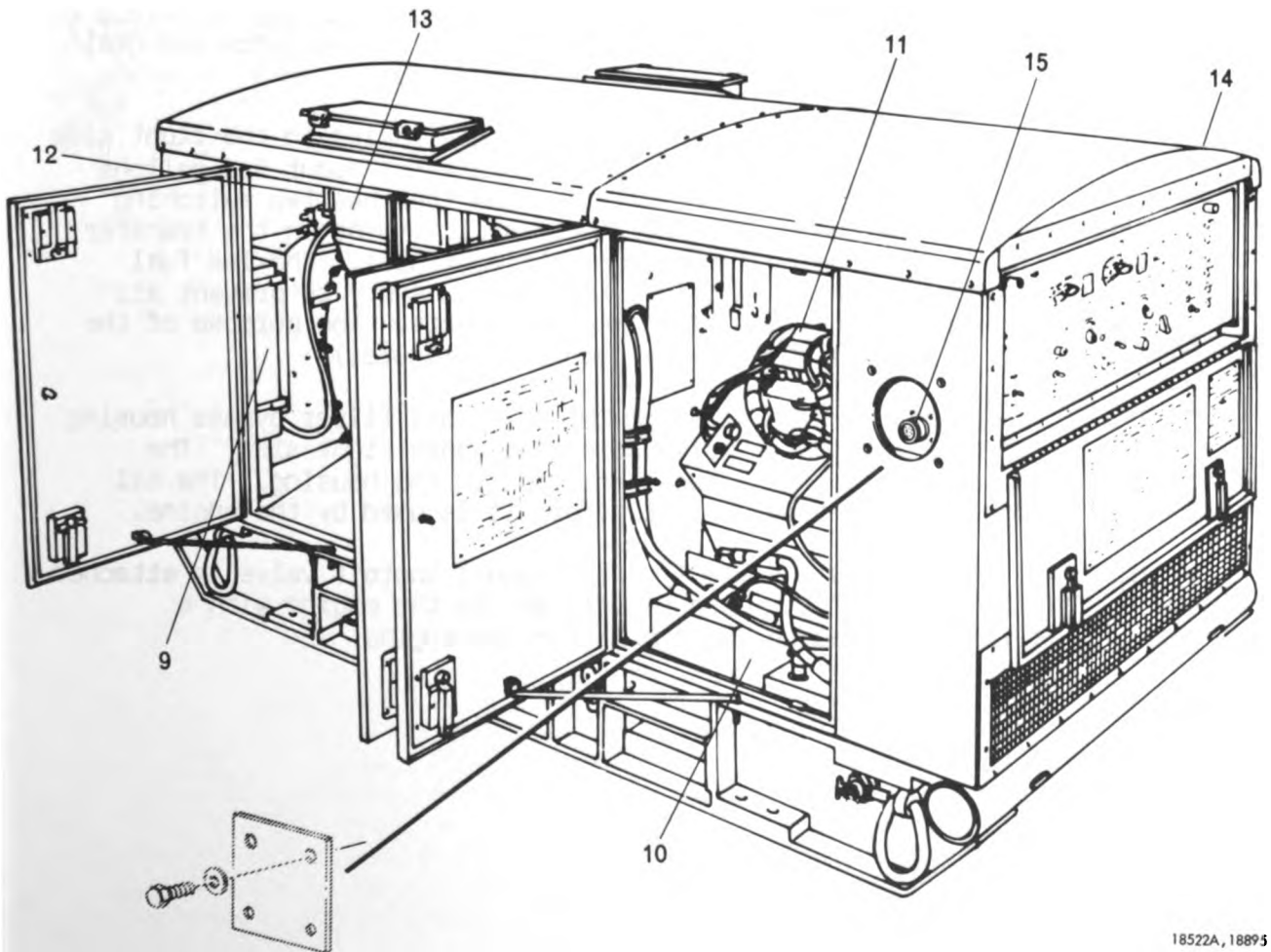
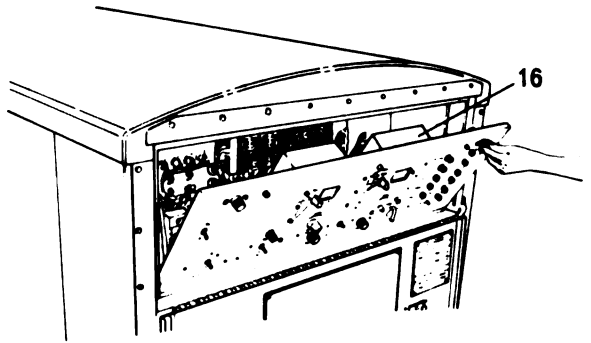
(12) AIR CYLINDERS, LH AND RH. One air cylinder is attached to each exhaust duct cover. They are connected by air lines to sense engine pressure when the engine is operating. Engine pressure is sensed by the cylinder causing it to open the duct covers when engine is running. A spring in the cylinders assists in closing the covers when engine is shut down.

(13) EXHAUST ELBOWS, LH AND RH. Two exhaust elbows are attached to the engine and divert the exhaust gases through the exhaust ducts to atmosphere. They are attached to the regenerator housing on the engine and to the exhaust ducts with bolts. The left duct has a tubular opening, to which the gearbox oil vent hose is attached.

(14) CONTROL CABINET. The control cabinet houses the controls, switches, indicators, and lights. The outer door must be opened in order to operate the engine and generator.

(15) A7J4 TEST RECEPTACLE. The A7J4 receptacle provides an easily accessible point to test key electrical circuits on the generator set.

(16) VOLTAGE REGULATOR AND MONITOR ASSEMBLY. The voltage regulator and monitor assembly is a solid state device mounted in the rear of the inner door. It receives generator output signals of watts, Hertz, volts and amps. When a change in generator load occurs the regulator and monitor assembly will automatically adjust exciter field current. This will change the generator output to accommodate the load.



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#### 1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

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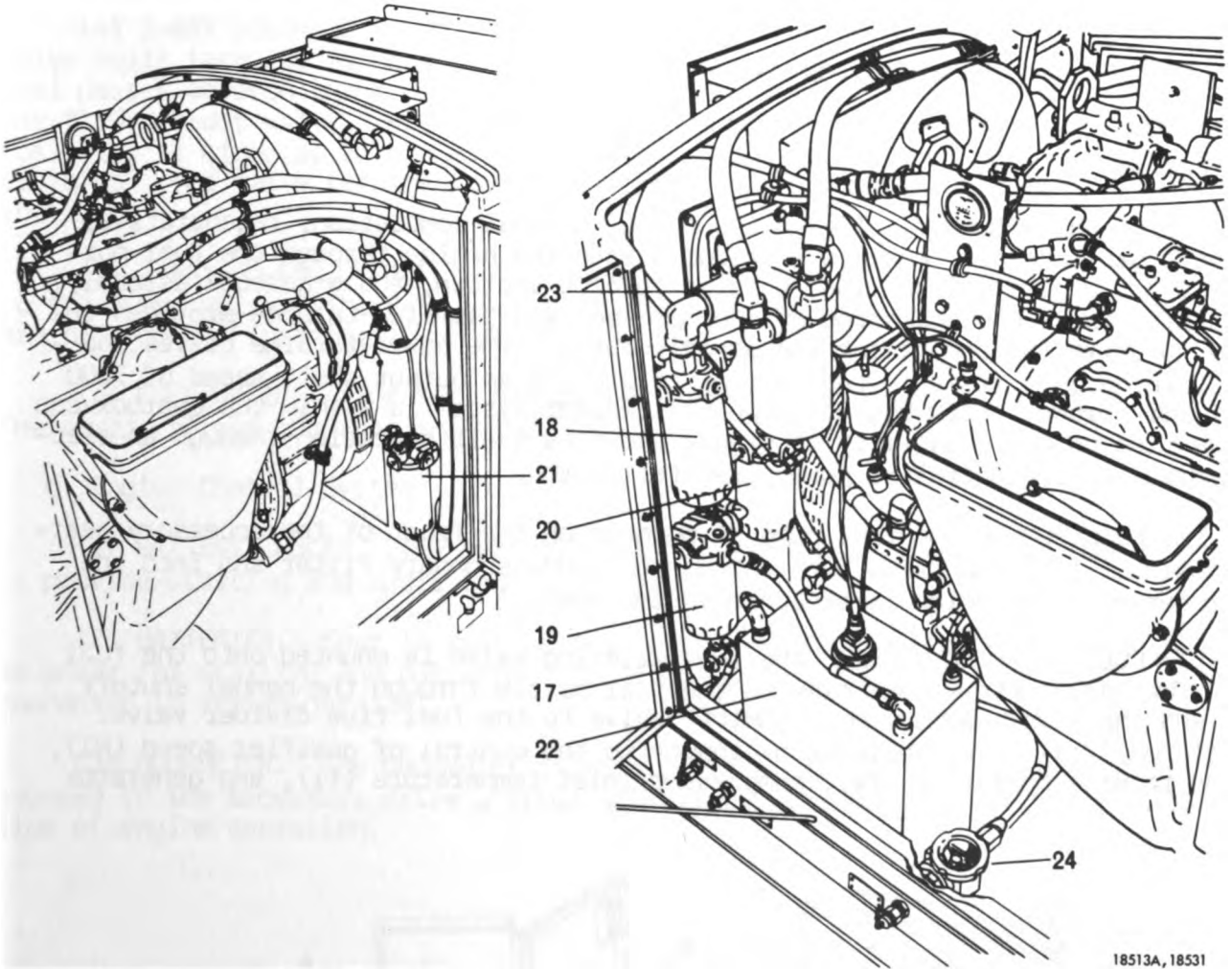
(17) FUEL TRANSFER PUMP. The fuel transfer pump, with a filtering inlet screen, is mounted on the center bulkhead. The transfer pump keeps the fuel system full. It pumps fuel through a primary (18) and first-secondary (19) filter and into the set day tank (22) from the external fuel supply.

(18, 19, 20, and 21) FUEL FILTERS PRIMARY (18), FIRST-SECONDARY (19), SECOND- SECONDARY (20), AND PRIMARY (catch and drain) (21). All four of these filters are mounted on the center bulkhead. Fuel is drawn from the external supply and pumped through the primary fuel filter (18) and the first-secondary (19) to the day tank. Fuel from the tank is pushed by the engine-driven pump through the second-secondary fuel filter (20). Filtered fuel is then delivered to the fuel metering valve. At engine shutdown, fuel is sent to the catch and drain filter (21) via the 3-way solenoid and 2-way solenoid valves.

(22) DAY TANK. The day tank is mounted on the base (skid) in the right side of the engine compartment. It provides auxiliary storage for about 5.6 gallons (21.2 liters) of fuel. A float switch installed in the tank has two switching functions; fuel level and low fuel. The fuel level switch turns on the transfer pump when the fuel level drops below the switch setting (full). The low fuel switch initiates an automatic shutdown before the tank runs dry to prevent air from being pumped into the engine fuel lines and components. The purpose of the day tank is to provide a reserve fuel supply (approx 15 minutes).

(23) OIL FILTER BYPASS HOUSING WITH ELEMENT. The oil filter bypass housing with element is mounted on the center bulkhead on the upper right side. The filter element is enclosed in an outer shell attached to the housing. The oil filter removes foreign material from the oil before it is used by the engine.

(24) OIL DRAIN VALVE (MANUAL SHUTOFF). The manual shutoff valve is attached to fittings in the right side of the base (skid), and to the engine with a flexible hose. The valve is used to drain oil from the engine.



18513A, 18531

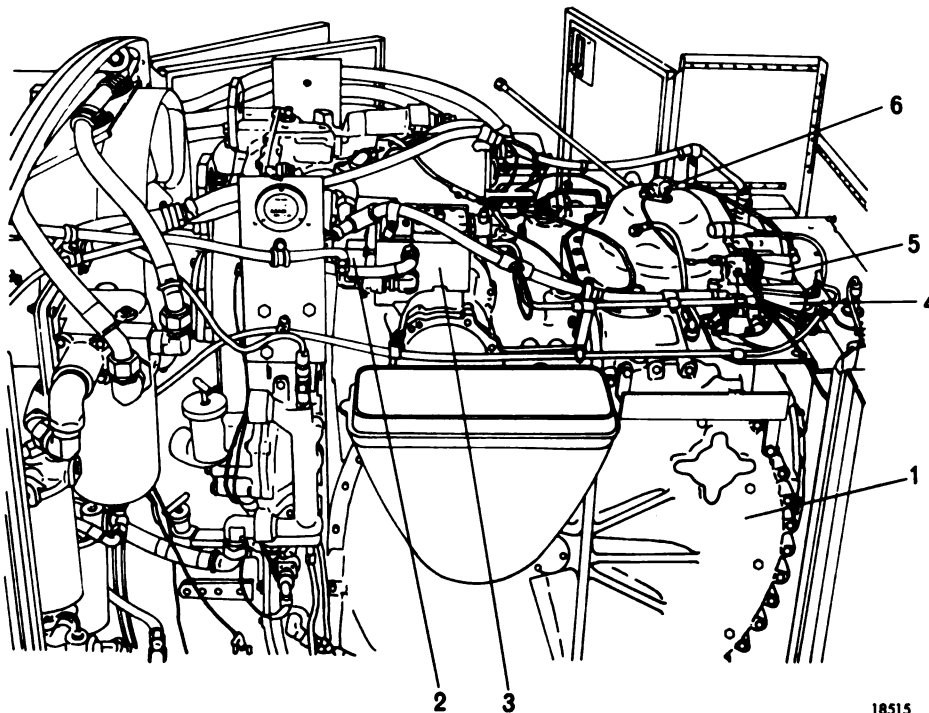
1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

c. Engine

(1) ENGINE ASSEMBLY. The engine is an internal combustion, regenerative, two-shaft gas turbine. Fuel is introduced into the engine through the fuel nozzle. It has a gasifier section, a power turbine section, and a gearbox assembly. The gasifier section consisting of a compressor and gasifier turbine provides the energy to drive the compressor and power turbine. The power turbine drives the power turbine gear train in the gearbox to provide an output shaft speed of 3000 rpm at 100 percent rated speed. A power transfer system is within the gearbox and provides the unique capability of single and free shaft operation through an electro-hydraulically-controlled power transfer clutch.

(2) FUEL PUMP. The fuel pump is mounted on the front of the accessory gearbox housing. The pump draws fuel through the 2nd-secondary filter and into the fuel metering valve which is attached to the pump.

(3) FUEL METERING VALVE. The fuel metering valve is mounted onto the fuel pump. The valve meters fuel flow to the fuel nozzle through the manual shutoff valve and the three-way solenoid shutoff valve to the fuel flow divider valve. Rate of fuel flow is established by inputs to the control of gasifier speed (N1), turbine inlet temperature (T4), compressor inlet temperature (T1), and generator load.



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(4) **3-WAY SOLENOID VALVE.** The 3-way solenoid valve, with the manual shutoff valve built into it, is mounted on the upper right corner of the engine. Metered fuel passes through the manual shutoff valve and 3-way solenoid shutoff valve to the flow divider valve. Pilot fuel flow is sent directly to the fuel nozzle; main fuel flow is directed to the nozzle via the divider valve when pilot flow exceeds 25 lb/hr. The valve returns fuel to the final filter (catch and drain) at engine shutdown.

(5) **2-WAY SOLENOID VALVE.** The 2-way solenoid valve is mounted with plumbing to the 3-way valve. The 2-way valve returns fuel to the final filter (catch and drain) from the fuel nozzle at engine shutdown.

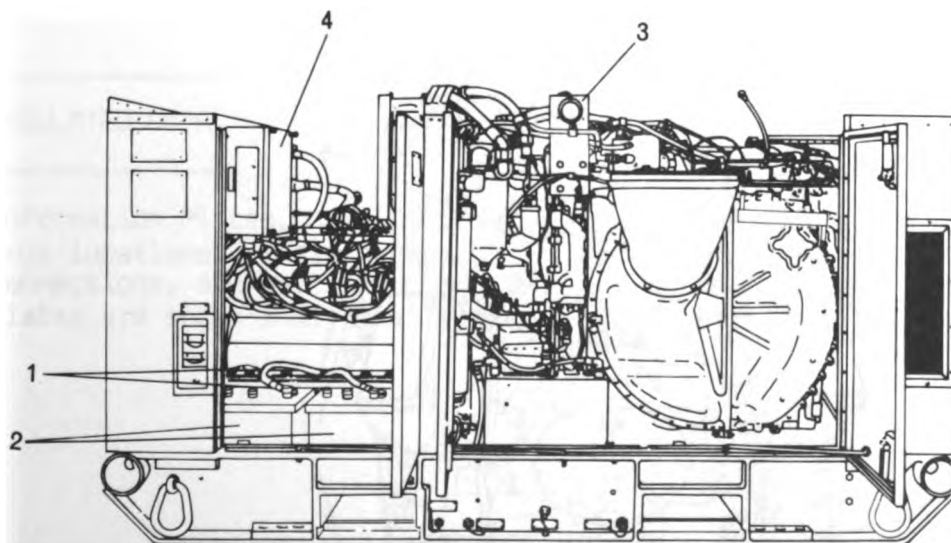
(6) **FUEL NOZZLE.** The fuel nozzle is mounted in the top of the burner cover. The nozzle sprays the fuel into the burner.

#### d. Engine Control System

(1) **BATTERY CABLES.** The battery cables connect the batteries to the starter to provide starting and operating dc voltage.

(2) **BATTERIES.** Four 12 volt lead-acid type storage batteries provide 24 volt dc power for starting and operation of the dc control systems. The batteries are connected in series-parallel.

(3) **HOURMETER.** The hourmeter is mounted in a dampener and bracket which is mounted to the accessory drive gearbox splitline. The meter records the total time of engine operation.



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1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

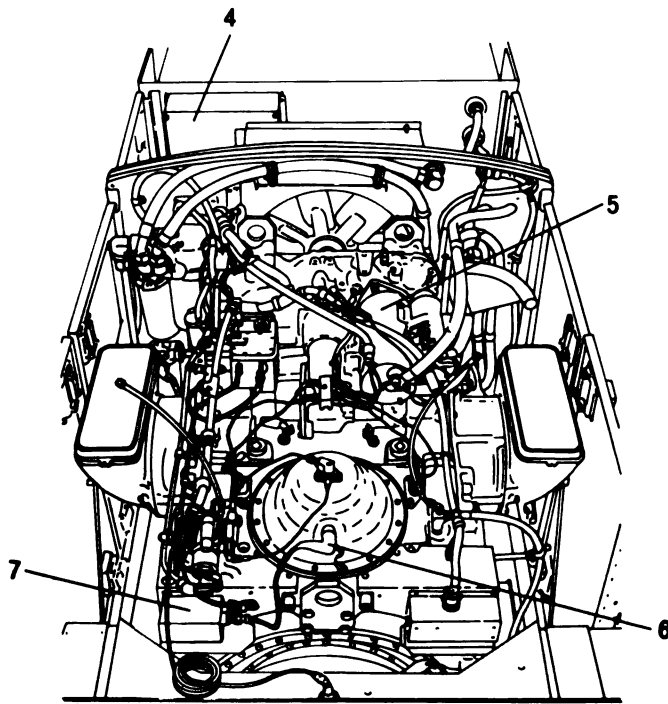
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(4) ELECTRONIC CONTROL ASSEMBLY (ECA). The ECA provides automatic starting and operation of the engine. It receives demand signals from controls in the control cabinet and condition signals from the engine. It provides start logic to ensure that all systems are GO prior to and during starting, automatic control of the order of engine events during starting and operation in the run mode. It monitors engine operation and provides warning and/or automatic shutdown if engine operating limits are exceeded.

(5) STARTER. The starter is the cranking motor for the engine and is mounted on the engine gearbox.

(6) SPARK IGNITER. Voltage is discharged across the ionized gap of the spark igniter to produce a spark. The spark igniter is similar to an automotive type spark plug. It has a lengthened steel barrel to extend the electrode into the burner assembly. The center electrode and ceramic insulation extends to the end of the barrel. The end of the barrel is scalloped. Three small holes in the barrel provide cooling air flow which blows the spark out from the tip and prevents carbon buildup.

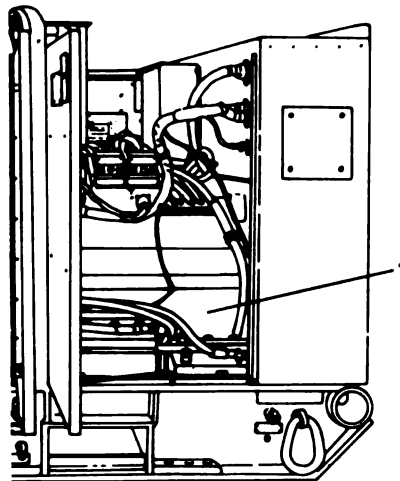
(7) IGNITION EXCITER. The ignition exciter consists of a transistorized inductance-capacitance circuitry enclosed in an aluminum and steel housing. The exciter oscillates and excites the low-input current through inductance-capacitance circuitry to produce a high voltage output current.



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## e. 150 kW Alternator.

(1) AC ALTERNATOR. The ac alternator is a brushless type having a rotating field with a rotating exciter assembly. Its aluminum frame and compact design forms a light weight unit. Between the exciter armature output and the rotating field input is a rotating rectifier assembly. The rotating rectifier assembly is used to convert the exciter armature alternating current to direct current for the rotating field assembly. A shielded bearing eliminates the need for periodic maintenance. The alternator housing is rigidly bolted to the gearbox housing. The alternator rotor assembly is connected to the engine output shaft through a flexible drive disc assembly. The engine output shaft bearings support the drive end of the alternator rotor assembly.



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 1-15. TABULATED DATA
 

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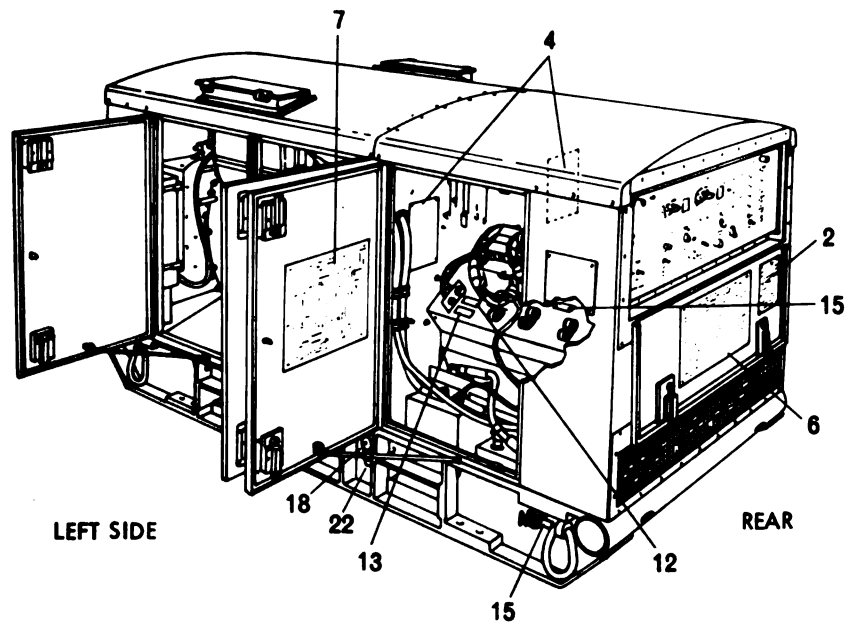
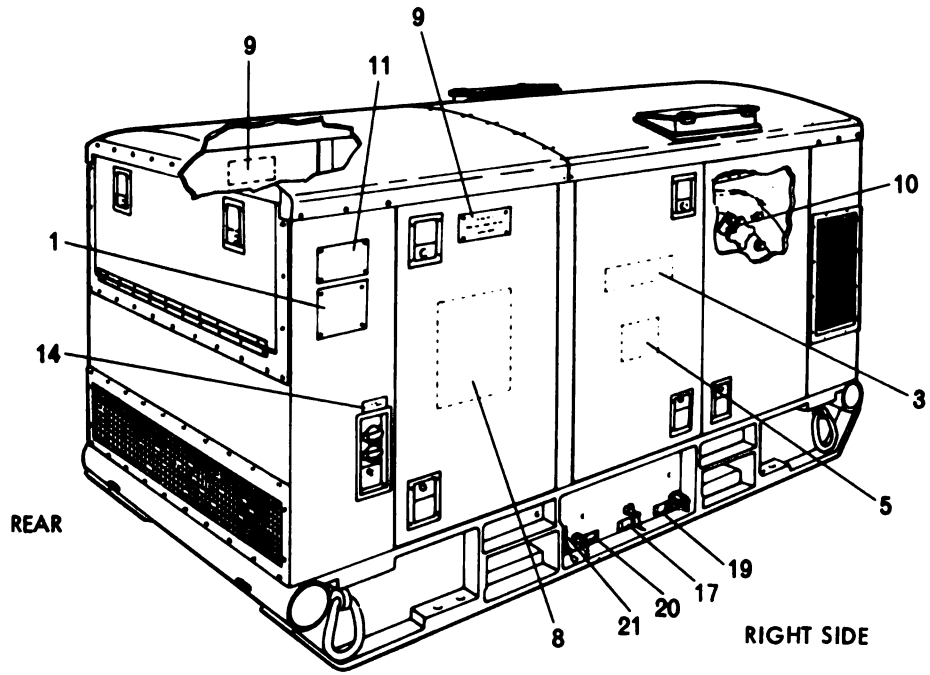
a. Information Plates. The information plates are affixed to the generator set at various locations. These plates give information, instructions, identification, connections, and parts for operating and maintaining the generator set. These plates are shown individually following the locator views.

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1-15. TABULATED DATA (cont)

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1. Information Plate - Generator Set Ratings
2. Instruction Plate - Service Instructions
3. Information Plate - Fuel System Diagram (inside of door)
4. Information Plate - Battery Arrangements and Connections (2 reqd)
5. Information Plate - Lifting and Tie Down (inside of door)
6. Instruction Plate - Operating Instructions
7. Information Plate - AC Schematic
8. Information Plate - DC Schematic
9. Warning Plate - Danger High Voltage Inside (2 reqd)
10. Data Plate (Corrected T4 temp)
11. Identification Plate - Generator Set
12. Information Plate - Remote Operation
13. Information Plate - Paralleling Receptacle
14. Information Plate - 120 Volts AC/400 Hz
15. Information Plate - Ground (2 reqd)
16. Identification Plate - Engine Blank
17. Information Plate - Fuel Tank Drain
18. Information Plate - Slave Receptacle
19. Information Plate - Engine Oil Drain
20. Information Plate - Fuel Tank Vent
21. Information Plate - Fuel Inlet
22. Information Plate - Fuel Nozzle Vent



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1-15. TABULATED DATA (cont)

SET RATING		
KW	ALTITUDE	TEMP
150	SEA LEVEL (760.0 mm Hg)	120 F (48.9 C)
150	5000 FEET (632.4 mm Hg)	107 F (41.7 C)
138	8000 FEET (564.9 mm Hg)	95 F (35 C)
FREQUENCY RATING		400 HERTZ
RATED VOLTAGE AND PHASES		
120/208V-400 Hz. 3PH		
VOLTAGE ADJUSTMENT RANGE		
197/219 V-400 Hz. 3 PH		
POWER FACTOR	0.80 LAGGING	

MFG 73342 P/N 23001277

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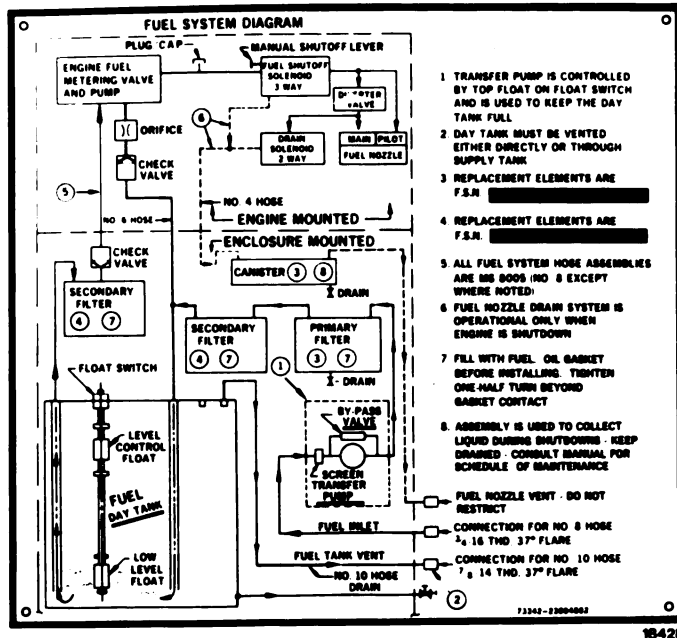
SERVICE INSTRUCTIONS 150 KW GENERATOR				
AMBIENT TEMP	FUEL AND OIL			
	DIESEL	TURBINE FUEL	FUEL OIL	LUBE OIL
50 TO 25 F	VV-F-800 GRADE DFA	MIL-T-5624 JP4	---	MIL-L-7808
25 TO 30 F	VV-F-800 GRADE DF1	MIL-T-5624 JP4, JP5	---	MIL-L-7808 OR MIL-L-23699
30 TO 125 F	VV-F-800 GRADE DF2	MIL-T-5624 JP4, JP5	MIL-F-16884 DIESEL MARINE	MIL-L-7808 OR MIL-L-23699
EMERGENCY FUELS - LIMITED USAGE ONLY - SEE TECHNICAL MANUAL				
SYSTEM CAPACITIES				
LUBRICATION	ENGINE SUMP	15 QUARTS		
FUEL SYSTEM	DAY TANK	5.6 GALLONS		

MFG 73342 P/N 23004422

18421

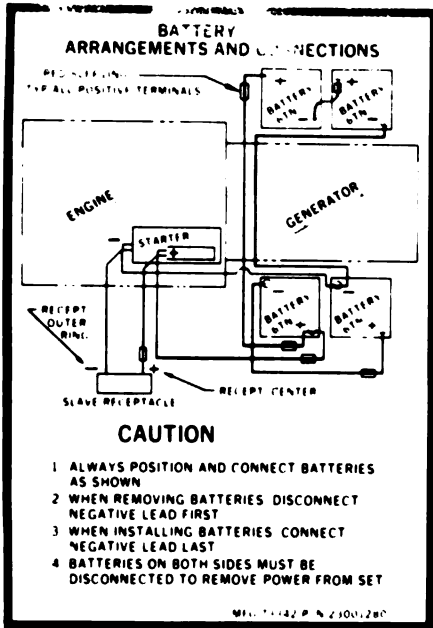
1--Information Plate - Generator Set Ratings

2--Instruction Plate - Service Instructions

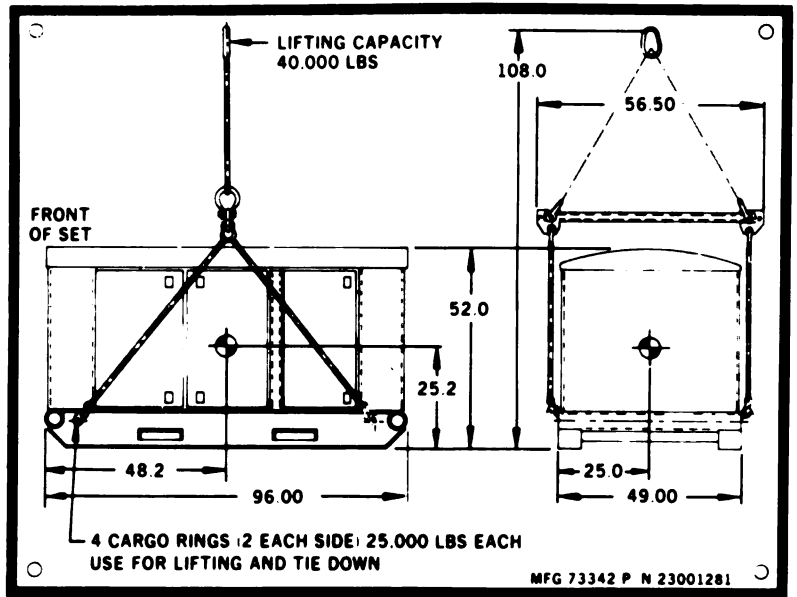


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3--Information Plate - Fuel System Diagram



4--Information Plate - Battery Arrangements and Connections



5--Information Plate - Lifting and Tie Down

**OPERATING INSTRUCTIONS**

**WARNING: DO NOT OPERATE GENERATOR SET UNLESS GROUND TERMINAL STUD IS CONNECTED TO SUITABLE GROUND. ELECTRICAL FAULTS IN GENERATOR SET, LOAD LINES, OR LOAD EQUIPMENT CAN CAUSE INJURY OR ELECTROCUTION FROM CONTACT WITH UNGROUNDED SYSTEM.**

**1. PRESTART CHECKS**

- CHECK THAT FUEL BEING USED IS SUITABLE FOR USE AT EXISTING AMBIENT CONDITIONS. REFER TO SERVICE INSTRUCTIONS DATA PLATE.
- CHECK ENGINE OIL FOR PROPER LEVEL.
- CHECK FOR FUEL AND OIL LEAKS.
- CHECK AIR INLET SCREENS FOR FREEDOM FROM BLOCKAGE.
- CHECK BATTERIES FOR CORRECT ELECTROLYTE LEVEL AND CABLES FOR PROPER CONNECTION. BATTERY SYSTEM IS 24 VDC, NEGATIVE GROUNDING.
- PLACE MASTER SWITCH TO RUN. IF LOW FUEL INDICATOR LAMP COMES ON, LEAVE MASTER SWITCH ON UNTIL TWO MINUTES. PLACE MASTER SWITCH OFF.
- CLOSE ALL DOORS EXCEPT CONTROL PANEL OUTER DOOR. CONTROL PANEL OUTER DOOR MAY BE CLOSED AFTER OPERATING MODE IS ESTABLISHED.
- CHARGE VOLTAGE AND FREQUENCY REQUIREMENTS OF LOAD AGAINST VOLTAGE AND FREQUENCY RATINGS OF GENERATOR SET.

**2. STARTING WHEN AMBIENT TEMPERATURE IS ZERO°F (MINUS 18°C) OR ABOVE**

- CHECK THAT ALL CONTROL PANEL SWITCHES ARE IN DOWN POSITION EXCEPT AC INTERRUPT IS SPRING LOADED TO CENTER.
- ALL INDICATOR LAMPS MUST BE OFF.
- HOLD MASTER SWITCH IN START POSITION. WHEN ENGINE STARTS CRANKING, RELEASE TO RUN POSITION. ENGINE WILL START, ACCELERATE AND STABILIZE AT OPERATING SPEED AUTOMATICALLY.
- AFTER STABILIZING FOR 10 SECONDS, CHECK ALL PRESS-TO-TEST INDICATOR LAMPS.

**3. STARTING WHEN AMBIENT TEMPERATURE IS BELOW ZERO°F (MINUS 18°C), AND ABOVE MINUS 20°F (MINUS 32°C)**

- PLACE IDLE RUN SWITCH (INSIDE PANEL) IN IDLE POSITION.
- CHECK THAT ALL CONTROL PANEL SWITCHES ARE IN DOWN POSITION EXCEPT AC INTERRUPT IS SPRING LOADED TO CENTER.
- ALL INDICATOR LAMPS MUST BE OFF.
- HOLD MASTER SWITCH IN START POSITION. WHEN ENGINE STARTS CRANKING, RELEASE TO RUN POSITION. ENGINE WILL START, ACCELERATE AND STABILIZE AT OPERATING SPEED.
- AFTER STABILIZING 4 MINUTES, SHUTDOWN BY PLACING MASTER SWITCH TO OFF.
- PLACE IDLE RUN SWITCH (INSIDE PANEL) IN RUN POSITION.
- CHECK THAT ALL CONTROL PANEL SWITCHES ARE IN DOWN POSITION EXCEPT AC INTERRUPT IS SPRING LOADED TO CENTER.

**4. STARTING WHEN AMBIENT TEMPERATURE IS BELOW MINUS 20°F (MINUS 32°C)**

- CONNECT 24VDC NEGATIVE GROUND AUXILIARY POWER SOURCE TO SLAVE RECEPTACLE.
- AFTER STABILIZING FOR 10 SECONDS, CHECK ALL PRESS-TO-TEST INDICATOR LAMPS.

**5. SINGLE UNIT OPERATION**

- PLACE SCAN-HOLD SWITCH TO SCAN POSITION. WHEN HERTZ INDICATOR LAMP COMES ON, RETURN TO HOLD POSITION.
- ADJUST VOLTAGE AND FREQUENCY TO MEET LOAD REQUIREMENTS. VOLTAGE ON ALL THREE PHASES SHOULD BE EQUAL WITHIN ±2 VOLTS.
- RESET FAULT INDICATOR LAMPS IF ANY ARE ON. IF ANY LAMP COMES ON AFTER RESET, CORRECT FAULT BEFORE PROCEEDING.
- CLOSE AC INTERRUPT CONTACTOR BY MOMENTARILY HOLDING AC INTERRUPT SWITCH TO CLOSE POSITION. RELEASE SWITCH WHEN LAMP COMES ON.
- PLACE SCAN-HOLD SWITCH TO SCAN POSITION. WHEN AMPS INDICATOR LAMP COMES ON, RETURN SWITCH TO HOLD POSITION. CHECK AMPS ON ALL THREE PHASES FOR A BALANCED LOAD. DIFFERENTIAL BETWEEN LOWEST AND HIGHEST SHOULD NOT EXCEED 10 AMPS.

**6. PARALLEL OPERATION (IDENTICAL GENERATOR SETS)**

- RUNE PRESTART CHECKS AND START GENERATOR SET TO BE PARALLELED.
- PLACE SCAN-HOLD SWITCH TO SCAN POSITION. WHEN HERTZ INDICATOR LAMP COMES ON, RETURN TO HOLD POSITION.
- ADJUST FREQUENCY TO SIX HERTZ HIGHER THAN OPERATING GENERATOR SET. ADJUST VOLTAGE TWO VOLTS HIGHER THAN OPERATING GENERATOR SET. VOLTAGE ON ALL THREE PHASES SHOULD BE EQUAL WITHIN ±2 VOLTS.
- RESET FAULT INDICATOR LAMPS IF ANY ARE ON. IF LAMP COMES ON AFTER RESET, CORRECT FAULT BEFORE PROCEEDING.
- PLACE UNIT - PARALLEL SWITCH ON BOTH SETS TO PARALLEL OPERATION.

**7. STOPPING (SHUTDOWN)**

- OPEN AC INTERRUPT CONTACTOR BY MOMENTARILY HOLDING AC INTERRUPT SWITCH TO OPEN. RELEASE SWITCH WHEN LAMP GOES OFF.
- PLACE MASTER SWITCH TO OFF.
- IF SET WAS OPERATING IN PARALLEL, PLACE UNIT - PARALLEL SWITCHES ON BOTH SETS TO SINGLE UNIT OPERATION.

**8. REFER TO APPLICABLE TECHNICAL MANUAL FOR DESCRIPTION AND USE OF FOLLOWING CONTROLS:**

- BATTLE SHOOT SWITCH
- FAULT INDICATOR LAMPS
- REMOTE OPERATION

**9. IF THE SET DOES NOT START, AND OPERATE BY FOLLOWING THESE INSTRUCTIONS, REFER TO THE APPLICABLE TECHNICAL MANUAL FOR TROUBLESHOOTING PROCEDURES.**

NOTE

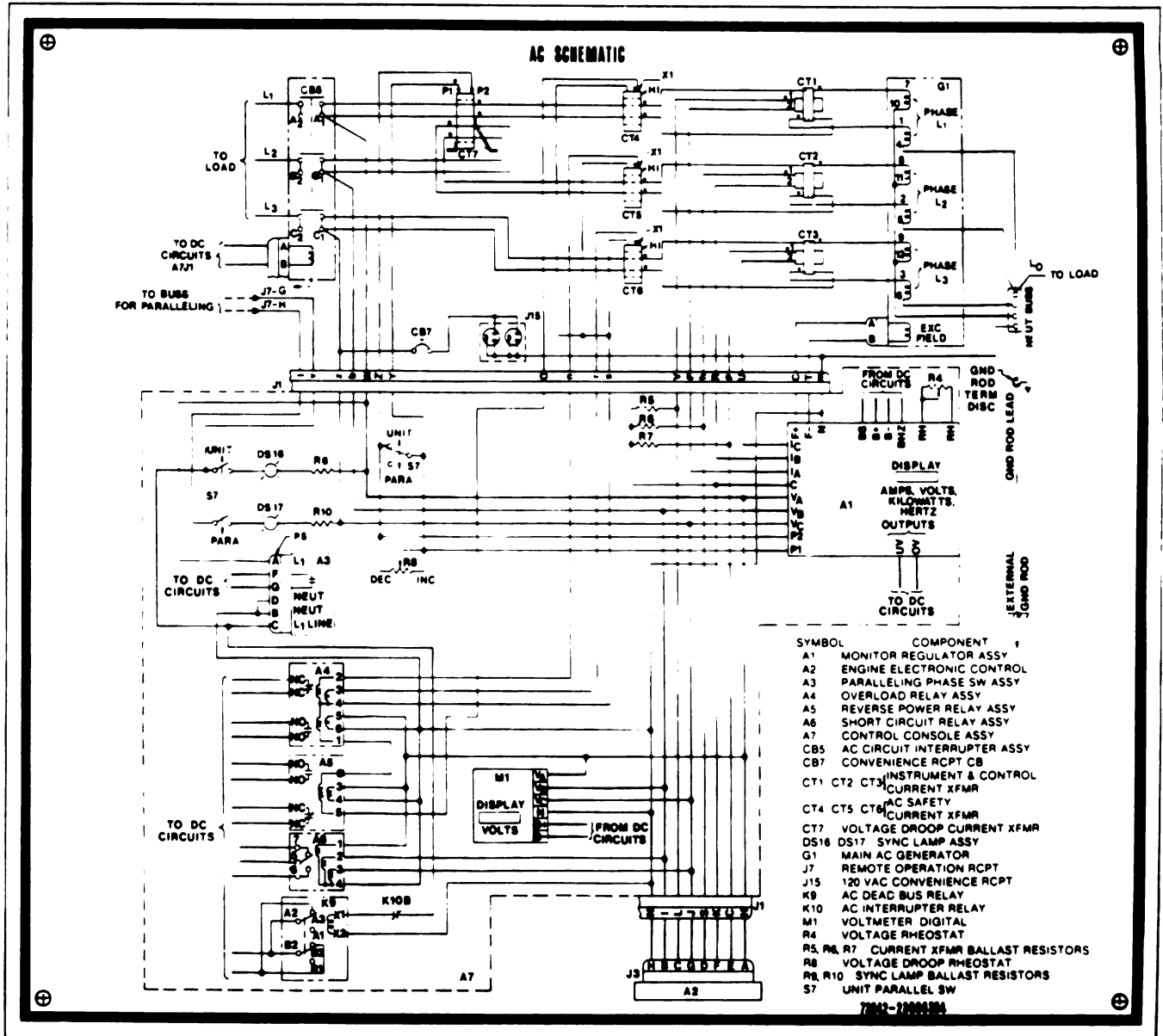
IF GENERATOR SETS ARE TO CONTINUE OPERATING IN PARALLEL, PERFORM STEPS H THROUGH L.

- PLACE SCAN-HOLD SWITCH TO SCAN POSITION. WHEN HERTZ INDICATOR LAMP COMES ON, RETURN TO HOLD POSITION.
- MAKE FINE FREQUENCY ADJUSTMENTS UNTIL GENERATOR SETS EQUALLY SHARE RATED WATT'S LOAD.
- PLACE BOTH PHASE SELECT SWITCHES ON BOTH GENERATOR SETS TO PHASE 1,3.
- PLACE SCAN-HOLD SWITCH TO SCAN POSITION. WHEN AMPS INDICATOR LAMP COMES ON, RETURN TO HOLD POSITION.
- MAKE FINE VOLTAGE ADJUSTMENTS UNTIL GENERATOR SETS EQUALLY SHARE AMPS LOAD.

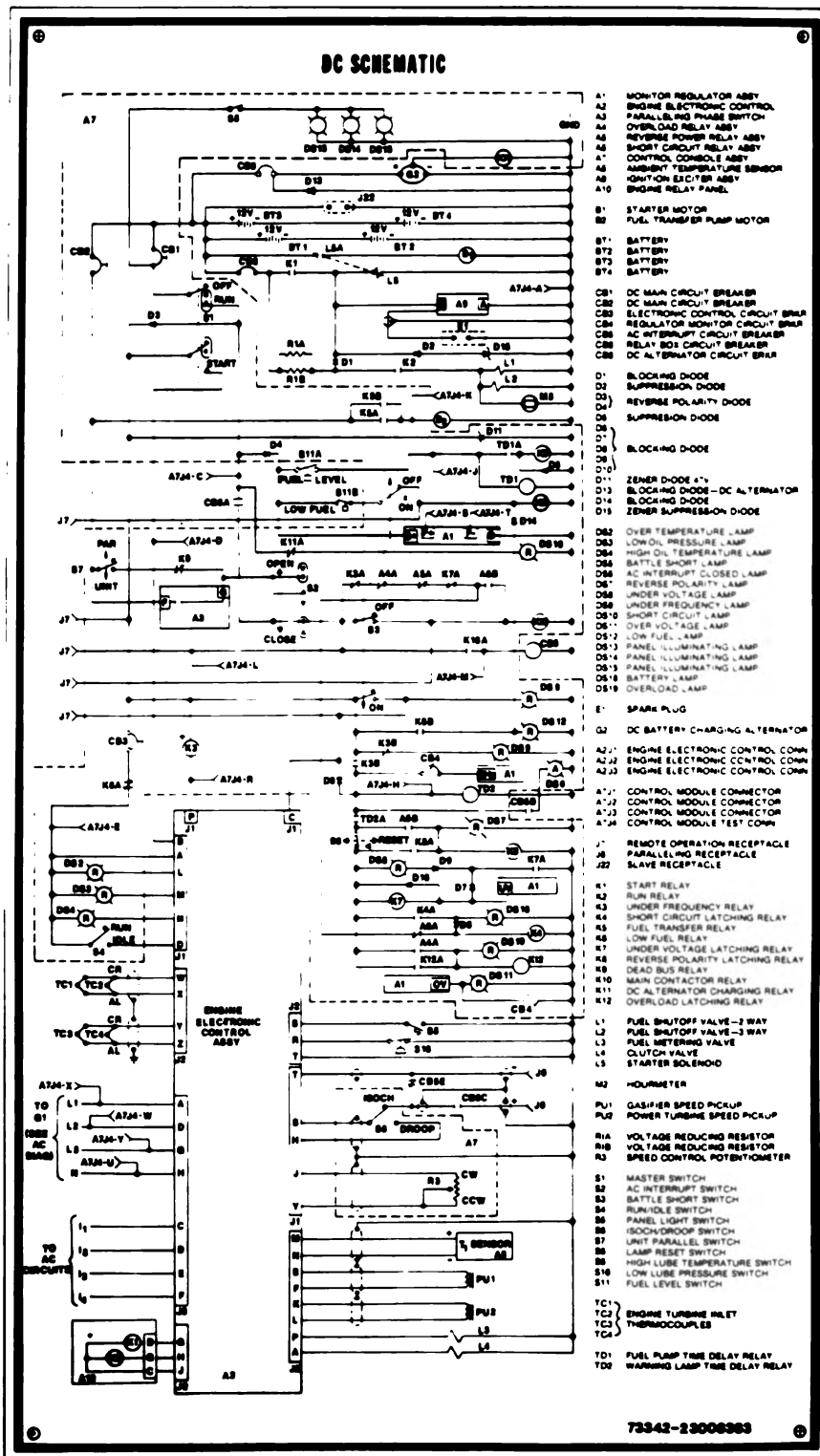
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6--Instruction Plate - Operating Instructions

1-15. TABULATED DATA (cont)



7--Information Plate - AC Schematic



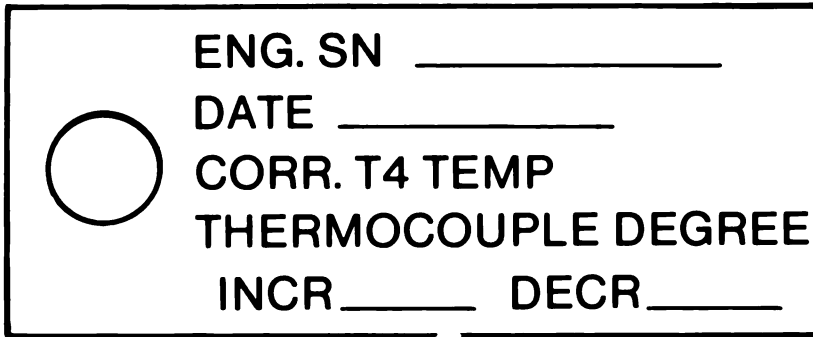
8--Information Plate - DC Schematic



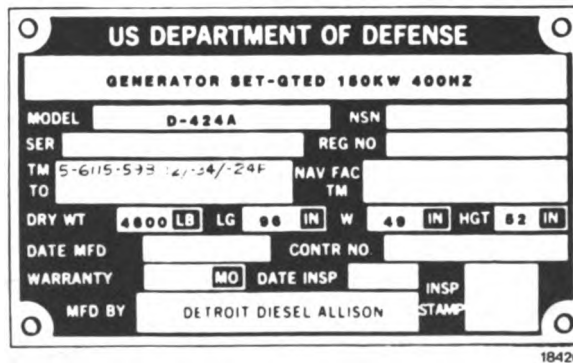
1-15. TABULATED DATA (cont)



9--Warning Plate - Danger High Voltage Inside



10--Data Plate (Corrected T4 Temp)



11--Identification Plate - Generator Set



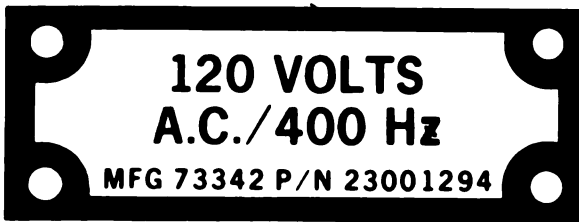
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12--Information Plate - Remote Operation



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13--Information Plate - Paralleling Receptacle



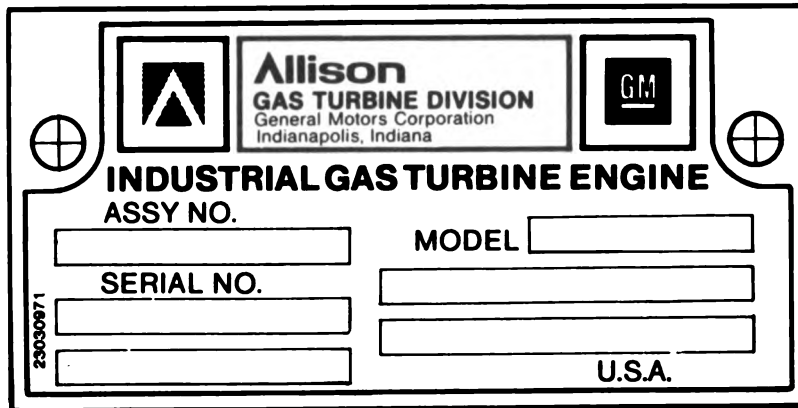
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14--Information Plate - 120 Volts AC/400 Hz



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15--Information Plate - Ground



16--Identification Plate, Engine Blank



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17--Information Plate - Fuel Tank Drain



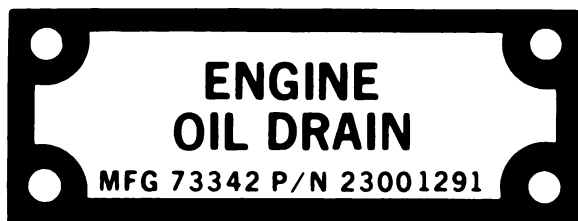
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18--Information Plate - Slave Receptacle

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1-15. TABULATED DATA (cont)

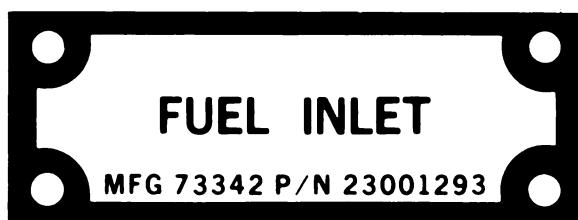
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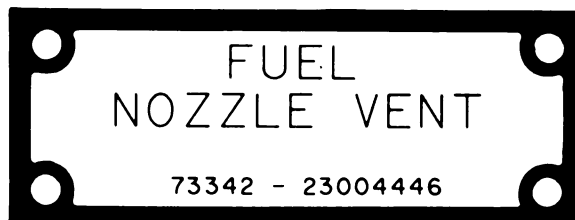
19--Information Plate - Engine Oil Drain



20--Information Plate - Fuel Tank Vent



21--Information Plate - Fuel Inlet



22--Information Plate - Fuel Nozzle Vent

b. Listing of data on equipment and components (see table 1-1).

Table 1-1. Equipment and Components

---

GENERATOR SET

Model No.	D424A
Engine	Allison gas turbine
Generator	Delco brushless alternator
Power Output	150 kW, 3 phase, 0.8 pf lagging
Voltage	208 volts line-to-line 120 volts line-to-neutral
Frequency	400 Hz
Watts	150,000 maximum
Amperes	520 each phase

Table 1-1. Equipment and Components Data (cont)

**GENERATOR SET (cont)****Dimensions:**

Length	96 in. (2 438 mm)
Width	49 in. (1 245 mm)
Height	52 in. (1 321 mm)
Dry Weight	4600 lb (2 086 kg)
Wet Weight	4850 lb (2 200 kg)

**ALTERNATOR**

Model No.	Delco 2E-7023
Rated speed at 400 Hz	3000 rpm
Rotation (as viewed from rear)	Left (counterclockwise)

**Dimensions:**

Length	31 in. (787 mm)
Width	23 in. (584 mm)
Height	23 in. (584 mm)
Weight	1050 lb (472 kg)

**ENGINE**

Model No.	Allison 04043B02
*Max Rated Power	360 bhp (269 kW)
*Max Fuel Consumption	130 lb/hr (59 kg/hr) 18.6 gal/hr (70.4 l/hr)
*Max Rated Torque	655 lb ft (890 N•m)
*Rated Turbine Inlet Temp	1800°F (982°C)

Table 1-1. Equipment and Components Data (cont)

## ENGINE (cont)

## Design Speeds:

Gasifier Turbine	36,826 rpm at 100%
Power Turbine	28,774 rpm at 100%
Output Shaft	3,000 rpm at 100%
Rated Airflow	4 lb/sec (1.8 kg/sec)
Rated Pressure Ratio	4:1

## Rotation (as viewed from rear):

Gasifier Turbine	Left (counterclockwise)
Power Turbine	Right (clockwise)
Output Shaft	Left (counterclockwise)

## Oil Specifications:

## Primary Oil

MIL-L-23699	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
-------------	---

## Alternate Oil

MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
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## Fuel Specifications:

## Primary Fuels

VV-F-800 Fuel Oil, Diesel, Types DF-1, DF-2, DF-A
MIL-T-5624 Turbine Fuel, Aviation, Grades JP-4, JP-5
MIL-F-16884 Fuel Oil, Diesel, Marine

Table 1-1. Equipment and Components Data (cont)

## ENGINE (cont)

## \*\*Emergency Fuels

MIL-G-3056, Gasoline, Automotive, Combat

MIL-G-5572, Gasoline, Aviation, Grades 80/87, 100/130, &amp; 115/125

VV-G-76, Gasoline, Automotive

## Dimensions:

Length	46.7 in. (1 186 mm)
Width	32.4 in. (823 mm)
Height	40.4 in. (1 026 mm)
Weight (approximate)	1800 lb (816 kg)

---

\*Ratings are based on Standard Day, Sea Level, 59°F (15°C) ambient conditions.

\*\*Emergency fuels will shorten engine life and should be used only when absolutely necessary.

---

## Section III. TECHNICAL PRINCIPLES OF OPERATION

---

### 1-16. GENERAL

---

Operation of the generator set is essentially automatic. Operator duties consist of turning the set on, initiating a start, and placing the set on the line. The engine electronic control and generator regulator/monitor automatically control the operation of the generator set once it is on the line. The generator regulator/monitor senses generator output voltage and maintains it at a constant value. The engine electronic control senses generator output frequency and controls engine speed to maintain a constant output frequency.

---

### 1-17. AUTOMATIC START CONTROLLING

---

The engine electronic control provides automatic control of the order of engine events during the start cycle. When a start is initiated, the starter engages and starts cranking the engine and fuel and ignition are turned on. When engine speed reaches a preset value, ignition and starter cutoff occurs. The engine continues to accelerate and stabilizes at rated speed.

---

### 1-18. LOADING THE GENERATOR SET

---

After the engine has been started and stabilizes at rated speed (normally within 25 seconds), output voltage and frequency must be manually adjusted and locked to the desired levels by the operator. Once these values have been set, the generator set may be switched on the line (loaded).

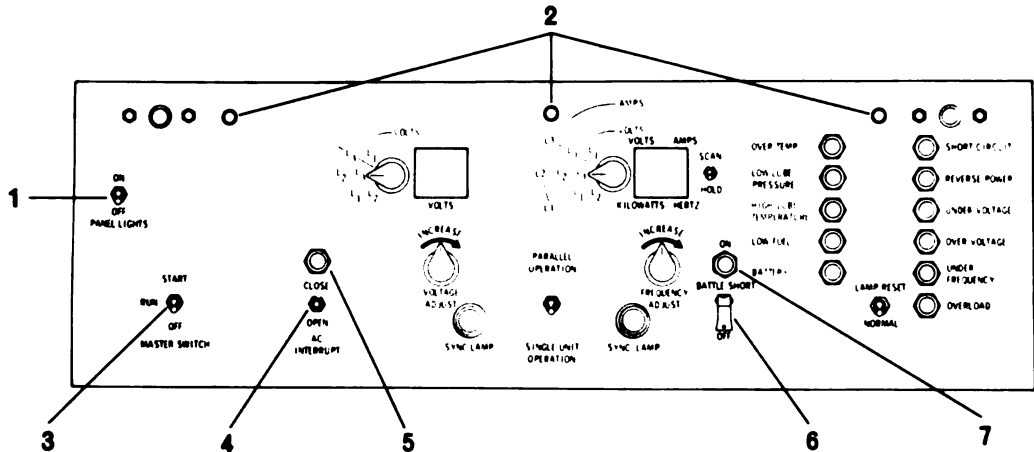
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### 1-19. CONTROL AND INDICATOR FUNCTIONS

---

A list of the controls and indicators located on the generator set control panel and the description of use and function of each are shown.

- |                        |  |
|------------------------|--|
| 1. PANEL LIGHTS Switch | Turns the three control panel illumination lights (2) ON and OFF.  |
| 2. Panel Lights        | Illuminate the control panel.  |
| 3. MASTER SWITCH       | This switch has positions OFF, RUN, and START. Momentarily placing the switch to START and releasing it to RUN will energize the start and the run circuits. |



16268D

3. MASTER SWITCH (cont)

NOTE

MASTER switch is spring-returned to RUN from the START position.

The engine will start automatically and stabilize at operating speed or at idle speed if pre-selected before a start. Placing the switch to OFF will shut down the generator set.

4. AC INTERRUPT Switch

This switch has positions OPEN and CLOSE with spring return to neutral. It is used to open and close the AC main contactor to place the generator set on and off the line. Placing the switch to CLOSE will close the main contactor.

5. Indicator Lamp

The AC INTERRUPT amber indicator lamp will come ON when the main contactor is closed. Placing the switch (4) to OPEN will open the main contactor and take the generator off the line. The indicator lamp will go OFF when the main contactor opens. Push to test bulb; turn right to dim for blackout operation.

6. BATTLE SHORT Switch

The switch has a red guard and has two positions, BATTLE SHORT and OFF. Its normal position is OFF. Raising the red guard and placing the switch to BATTLE SHORT prevents an automatic shutdown from being initiated. Placing the red guard down will put the switch in the OFF position.

7. BATTLE SHORT Indicator Lamp

The BATTLE SHORT indicator lamp will be ON when switch (6) is in BATTLE SHORT. Push to test bulb; turn right to dim for blackout operation.

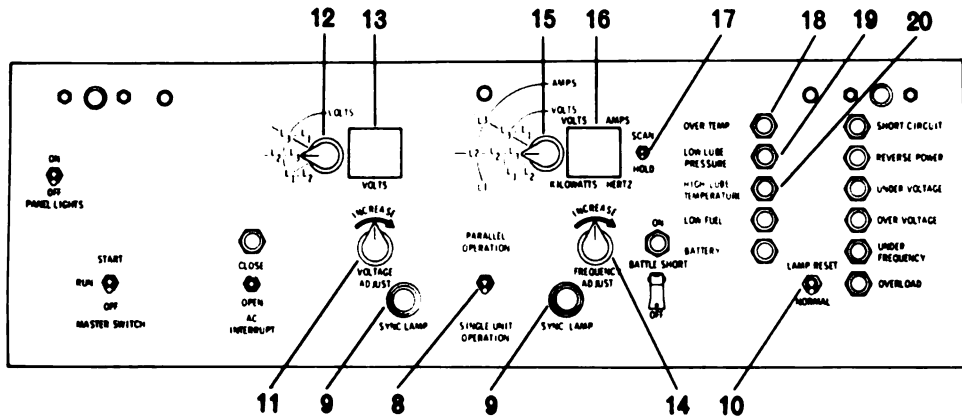


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1-19. CONTROL AND INDICATOR FUNCTIONS (cont)

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- |  |   |
|--|---|
| 8. PARALLEL-SINGLE UNIT OPERATION Switch | This switch has two positions, PARALLEL and SINGLE UNIT. In the SINGLE UNIT position, the main ac contactor may be closed at any time as long as all operating conditions are normal and it is the only generator set that is supplying power. This switch must be in the PARALLEL position to operate both sets together.                              |
| 9. SYNC LAMPS                            | The two lamps indicate the phase relationship between the two paralleling generator sets. Both lamps are OFF when the generators are in phase and will flash ON when they are out of phase.   |
| 10. LAMP RESET Switch                    | This switch has two positions, LAMP RESET and NORMAL and is spring-returned to NORMAL. Moving the switch to the LAMP RESET position releases the latching circuit and turns OFF the fault indicated lamp(s).  |
| 11. VOLTAGE ADJUST Rheostat              | This rheostat is used to increase or decrease voltage output of the generator set. Turn the knob to the right to increase voltage output; to the left to decrease voltage output. A locking ring behind the knob locks it in position after it is set. Voltage output is indicated on the VOLTS meter (13).   |
| 12. Phase Select Switch                  | The Phase Select Switch selects the generator phase (L3-L1, L2-L3, or L1-L2).   |
| 13. VOLTS Digital Meter                  | The VOLTS meter indicates the voltage output of the selected phase of the generator.  |
| 14. FREQUENCY ADJUST Rheostat            | This rheostat is used to increase or decrease the output frequency of the generator set. A locking ring behind the knob locks it in position after it is set. Turn the knob to the right to increase and to the left to decrease frequency. Volts, amps, Hertz (frequency), or kilowatts output is indicated on the meter (16) above the rheostat (14). |
| 15. Phase Select Switch                  | The Phase Select Switch selects the generator phase volts (L3-L1, L2-L3, or L1-L2), or amps (L3, L2, or L1).  |



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16. Monitor

The meter indicates the volts, amps, Hertz (frequency), or kilowatts of the selected parameter of the generator.

17. SCAN-HOLD Switch

Placing this switch to SCAN causes the monitor (16) to scan volts, amps, Hertz (frequency) and kilowatts of the selected generator phase. An indicator light in each corner of the meter will come ON to indicate which parameter is being indicated. Placing the switch to the HOLD position will stop the scan; a light in a corner of the meter will continue to indicate the parameter displayed at the time the switch was placed to HOLD.

18. OVER TEMP Indicator Lamp

This amber lamp will come ON to provide an engine overtemperature warning. The lamp will remain ON if T4 exceeds 1975°F (1079°C) for 6 seconds then it will indicate an automatic over temperature shutdown. The shutdown will also occur during a start if engine temperature (T4) exceeds 2000°F (1093°C) for over 0.1 second. The shutdown will occur during run if T4 exceeds 2100°F (1149°C) for over 0.1 second. Push to test bulb; turn right to dim for blackout operation.

19. LOW LUBE PRESSURE Indicator Lamp

This lamp will come ON and an automatic shutdown will occur if engine oil pressure drops below 30 psi (207 kPa) for 10 seconds. Push to test bulb; turn right to dim for blackout operation.

20. HIGH LUBE TEMPERATURE Indicator Lamp

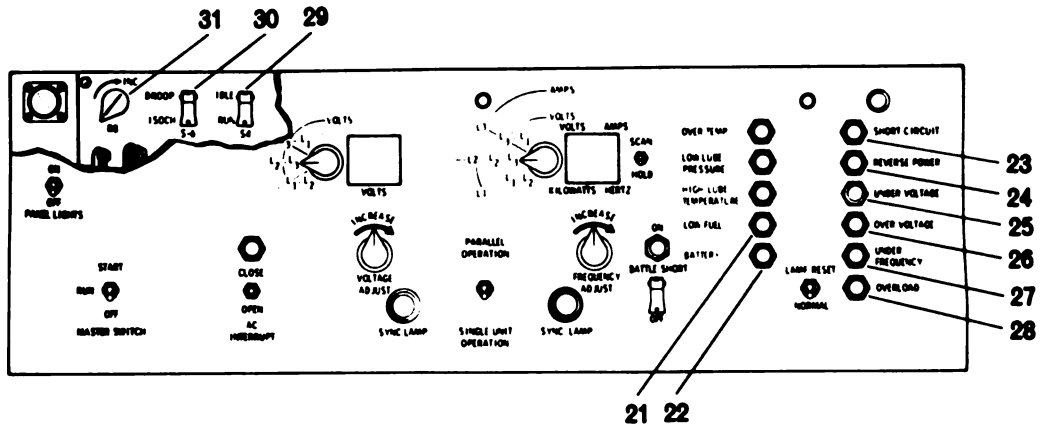
This lamp will come ON and an automatic shutdown will occur if engine oil temperature exceeds 265°F (130°C). Push to test bulb; turn right to dim for blackout operation.

---

1-19. CONTROL AND INDICATOR FUNCTIONS (cont)

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- |                                       |   |
|---------------------------------------|---|
| 21. LOW FUEL Indicator<br>Lamp        | This lamp will come ON and an automatic shutdown will occur if fuel in the day tank drops below a preset level. Also, under remote operation this lamp will indicate a remote shutdown. Push to test bulb; turn right to dim for blackout operation.  |
| 22. BATTERY Indicator<br>Lamp         | This lamp will come ON momentarily when a start is initiated and will go OFF shortly after the engine starts cranking and the battery charging alternator starts delivering power. The lamp will come ON during operation if a fault exists in the battery charging circuit and the alternator stops charging. Push to test bulb; turn right to dim for blackout operation. |
| 23. SHORT CIRCUIT Indicator<br>Lamp   | This lamp will come ON and the generator will trip off the line if a short circuit exists in the line. Push to test bulb; turn right to dim for blackout operation.   |
| 24. REVERSE POWER Indicator<br>Lamp   | This lamp will come ON and the generator will trip off the line if line power tends to drive the generator. Push to test bulb; turn right to dim for blackout operation.  |
| 25. UNDER VOLTAGE Indicator<br>Lamp   | This lamp will come ON and the generator will trip off the line if generator output voltage decreases below a preset value. Push to test bulb; turn right to dim for blackout operation.  |
| 26. OVER VOLTAGE Indicator<br>Lamp    | This lamp will come ON and the generator will trip off the line if generator output or line voltage increases above a preset value. Push to test bulb; turn right to dim for blackout operation.  |
| 27. UNDER FREQUENCY Indicator<br>Lamp | This lamp will come ON and the generator will trip off the line if generator output frequency decreases below a preset value. Push to test bulb; turn right to dim for blackout operation.  |
| 28. OVERLOAD Indicator Lamp           | This lamp will come ON and the generator will trip off the line if the electrical load on the generator exceeds a preset value. Push to test bulb; turn right to dim for blackout operation.  |



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29. IDLE RUN Switch

The switch has a guard and has two positions, IDLE and RUN. Its normal position is RUN. Raising the red guard and placing the switch to IDLE will maintain an idle condition. Placing the guard down will put the switch in the run position.

30. DROOP ISOCH Switch

The switch has a guard and has two positions, DROOP and ISOCH. Its normal position is ISOCH. The switch governs from Isochronous to droop governing. Causes governing to become sluggish so that the set coming on line will not become the master set. Prevents power hunting of set coming on the line. Provides load sharing and maintains constant load.

CAUTION

Do not raise the guard or change the position of this switch. It must remain in ISOCH position. Selecting droop can cause 150 KW to exceed precise power specification.

The switch is only to parallel this unit to another type or unit unlike this one.

31. DROOP ADJ Rheostat

The rheostat is used to balance reactive loads between paralleled generator sets. It is factory set and does not require adjusting unless set is paralleled to an unlike unit or different type of equipment.



## CHAPTER 2

### OPERATING INSTRUCTIONS

	Para		Para
Battle Short Operation. . . . .	2-9	Prestart Procedures. . . . .	2-2
General (Operating Procedures). . .	2-1	Remote Operation . . . . .	2-8
General (Operator/Crew Preventive Maintenance Checks and Services). .	2-19	Single Unit Operation. . . . .	2-4
Operation In:		Starting Procedures. . . . .	2-3
Dust and Sand Areas . . . . .	2-15	Starting When Ambient Tempera- ture is Below 0°F (minus 18°C) and Above Minus 25°F Minus 18°C). . . . .	2-12
Extreme Cold Climate. . . . .	2-11	Starting When Ambient Tempera- ture is below Minus 25°F (Minus 32°C) . . . . .	2-13
Extreme Heat. . . . .	2-10	Stopping (Shutdown) of Single Unit . . . . .	2-7
Heavy Snow Fall (Blizzard Conditions) . . . . .	2-17	Stopping (Shutdown) Parallel Operation. . . . .	2-6
High Humidity Environment . . . .	2-14		
High Winds. . . . .	2-18		
Salt Water Areas. . . . .	2-16		
Operator/Crew PMCS Procedure. . . .	2-20		
Parallel Operation. . . . .	2-5		

### Section I. OPERATING PROCEDURES (Under Normal Conditions)

---

#### 2-1. GENERAL

---

a. Before attempting to operate the generator set, read these instructions carefully.

#### WARNING

- o Attempting to operate the unit before becoming familiar with these instructions may result in injury to personnel or serious damage to the generator set.
- o Do not operate generator set unless ground terminal stud is connected to a suitable ground. Electrical fault in generator set, load lines, or load equipment can cause severe injury or electrocution from contact with un-grounded system.
- o This equipment develops noise which can cause permanent hearing loss if suitable ear protection devices are not worn by personnel near the operating generator set.

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2-1. GENERAL (cont)

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CAUTION

Before operating the generator set, check the voltage and frequency requirements of the load against the voltage and frequency ratings of the generator set. If the voltage and frequency requirements do not match the generator set ratings, DO NOT attempt to operate the generator set.

b. Perform all Before Operation (B) PMCS (table 2-1) before attempting to start the generator set.

NOTE

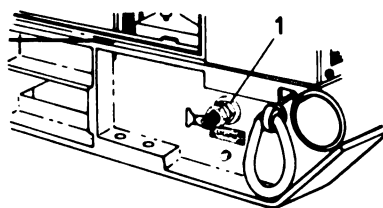
A generator set operating instructions plate is attached to the inside surface of the control cabinet outer door.

---

2-2. PRESTART PROCEDURES

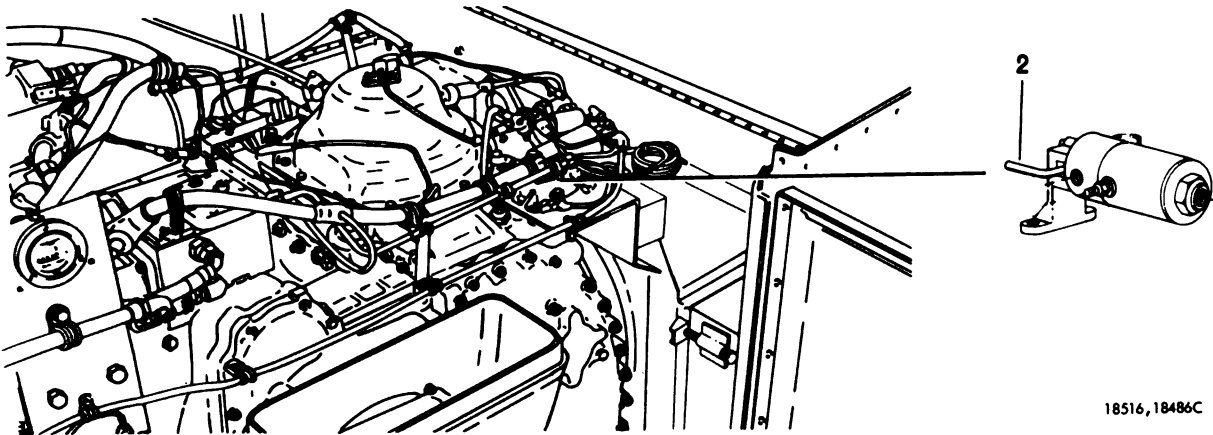
---

- a. Check that generator set is grounded through the ground terminal (1).
- b. Check that adequate auxiliary fuel supply is available.

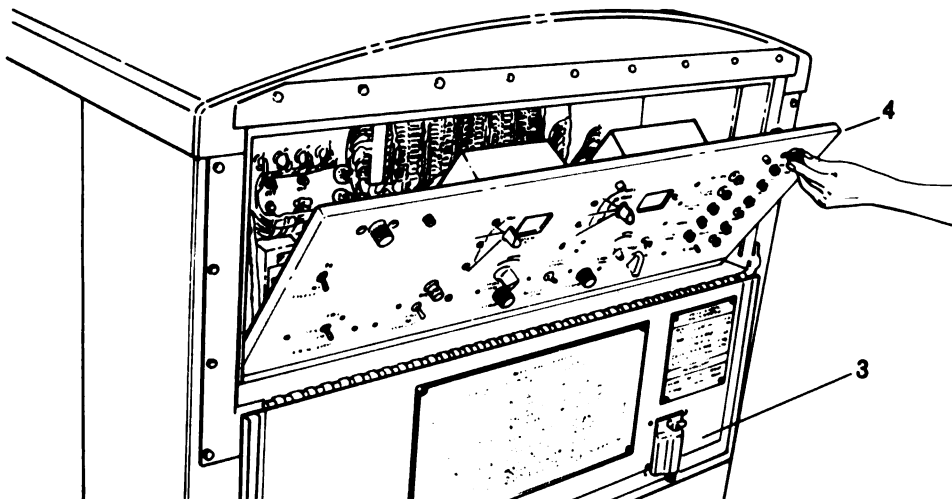


184088

c. Check that fuel manual shutoff valve (2) is in the open (in) position.



d. Unlatch and open control cabinet outer door (3) and turn knobs to right and open inner door (4).

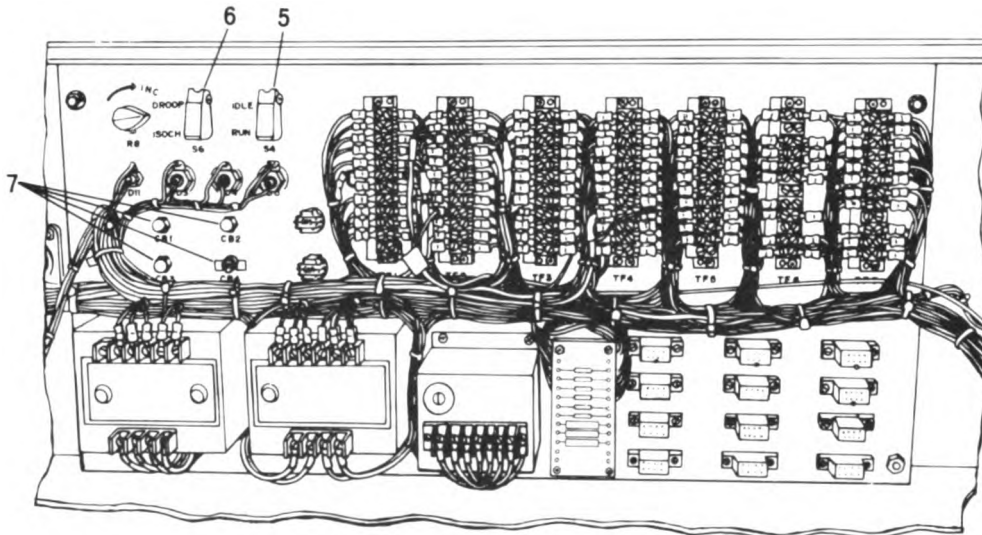




2-2. PRESTART PROCEDURES (cont)

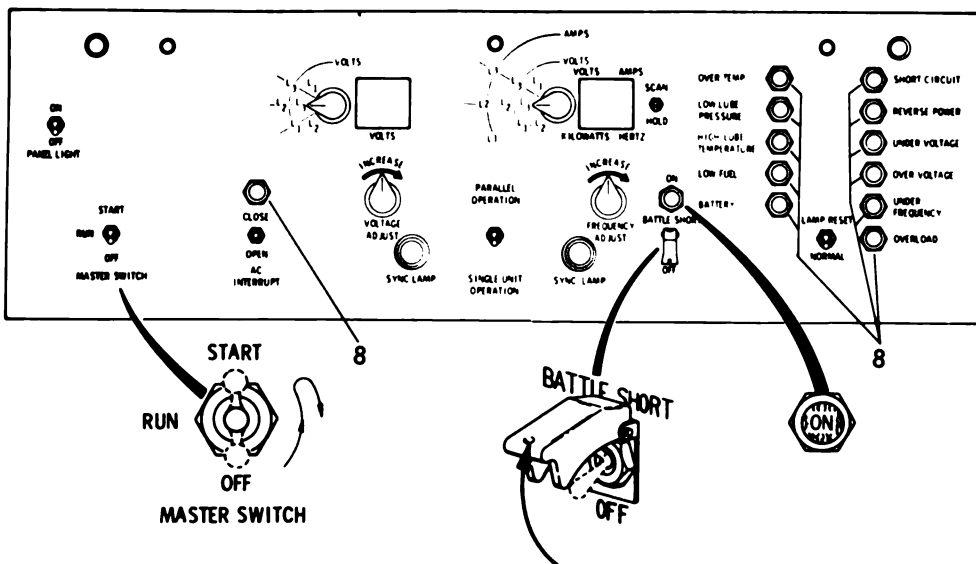
e. Check that IDLE RUN switch (5) and ISOCH DROOP switch (6) are in the down position.

f. Check that all four circuit breakers (7) on chassis assembly are closed (in or on) position.



18493A

g. Close inner door and turn knobs to left to lock.



18442, 18466

h. Check press-to-test lamps on inner door as follows:

(1) Place MASTER switch to RUN position.

(2) Place BATTLE SHORT switch to battle short (ON) position. Three indicator lamps should come on, the BATTLE SHORT, BATTERY, and UNDER FREQUENCY lamps. Wait ten seconds.

(3) Check each press-to-test lamp (8) on inner door. Replace lamp bulb if defective.

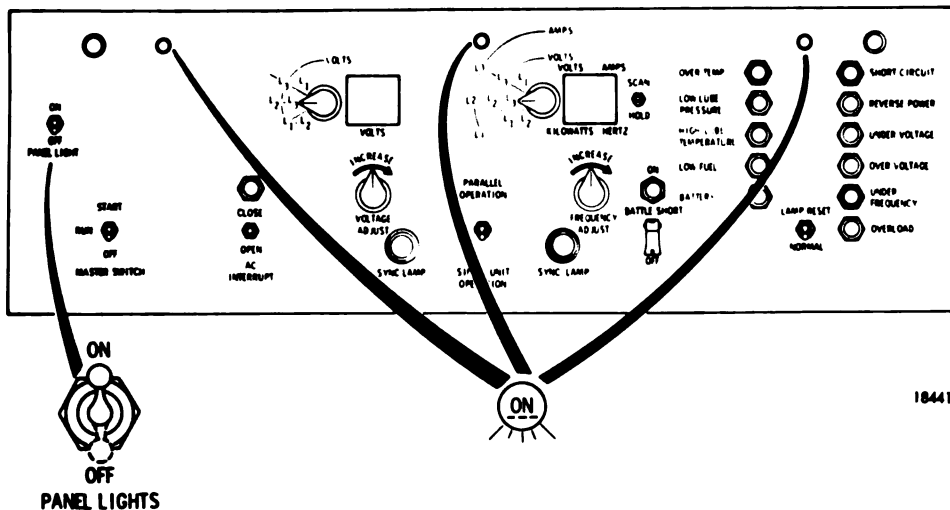
(4) Return BATTLE SHORT switch and MASTER switch to OFF position.

### 2-3. STARTING PROCEDURE

#### NOTE

For normal operation, the six access doors should be closed.

a. If inner door lighting is needed, place PANEL LIGHT switch in ON position. The three panel lights should come ON.



2-3. STARTING PROCEDURE (cont)

CAUTION

Be sure BATTLE SHORT switch is in the OFF position, as this locks out all shutdown safety circuits, which could cause damage to the set if allowed to run.

b. All other inner door switches should be in down position, except the AC INTERRUPT switch, which is spring loaded to center (neutral) position. All inner door indicator lamps must be OFF.

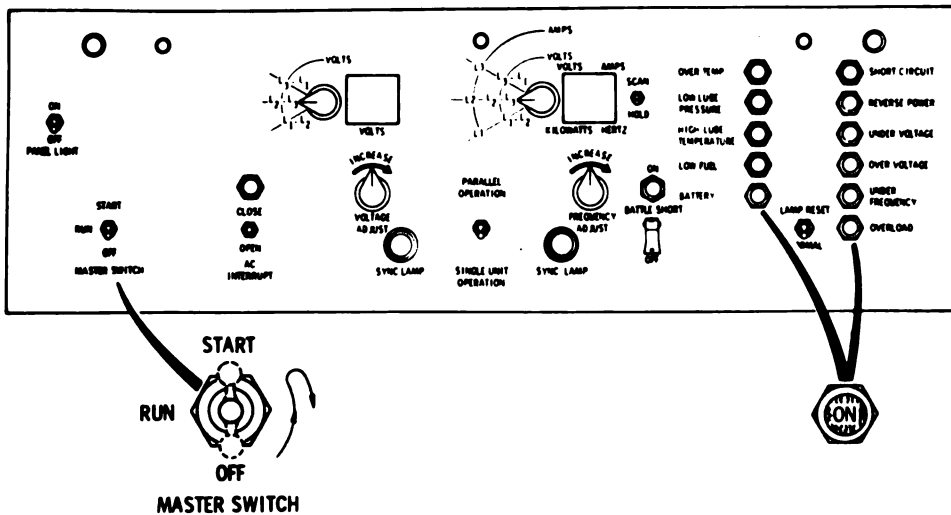
CAUTION

Shut down generator set in case of fire or unusual noise, notify next higher level of maintenance.

c. Hold MASTER switch to START (up) position. When engine starts cranking, release switch to RUN (center) position. Engine will start, accelerate, and stabilize at operating speed automatically. BATTERY and UNDER FREQUENCY lamps will be on at initial start and should go off when engine reaches operating speed. All other fault lamps should be off. Check that both exhaust duct caps open shortly after engine starts cranking.

CAUTION

If caps do not open, place MASTER switch to OFF position to abort the start. Notify next higher level of maintenance.



18442M

NOTE

- Engine starting is fully automatic. Light-off should occur within two seconds after starter engages. Engine will accelerate and starter will cut off at about 50 percent gasifier rotor (N1) speed. Engine will continue to accelerate and pause at about 70 percent N1 speed until gasifier (N1) and power turbine (N2) rotors reach same percent of rated speed. Power transfer clutch lockup occurs and the engine and generator continue to accelerate and stabilize at operating speed.
- After an automatic shutdown, the MASTER switch should be left ON to see the indication of the fault. If it is turned OFF before fault is noted the fault indication will be lost.

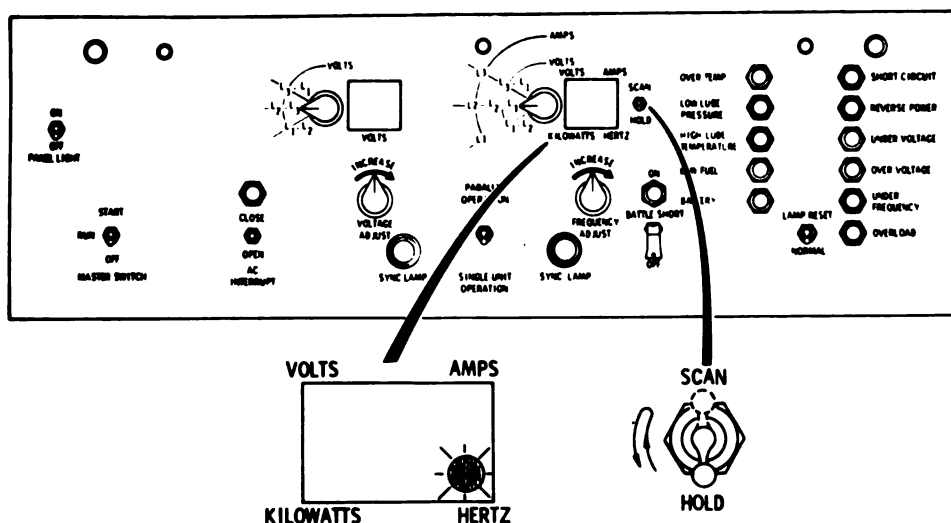
d. If engine automatic shutdown occurs, leave MASTER switch on RUN. Observe and note any fault then place MASTER switch to OFF.

NOTE

MASTER Switch must be placed to OFF (down) position, before attempting to start the engine again.

2-4. SINGLE UNIT OPERATION

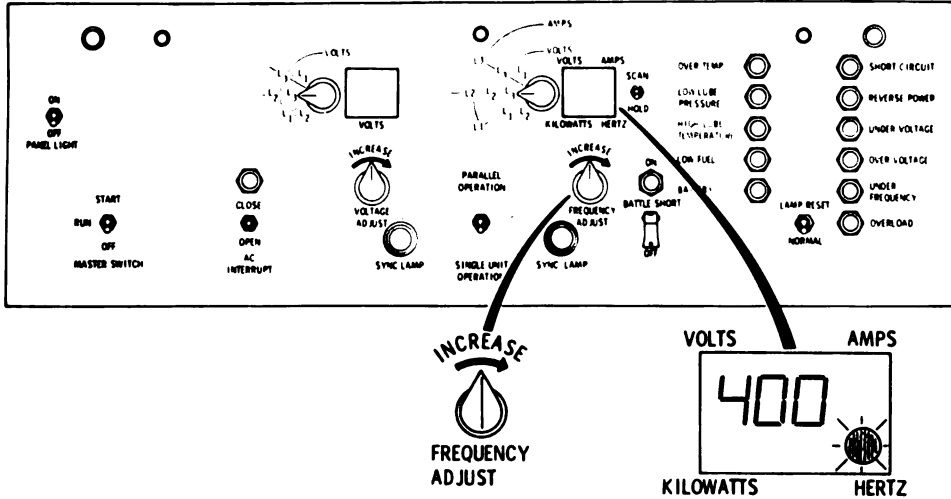
a. Place SCAN-HOLD switch to SCAN (up) position. When HERTZ lamp in frequency meter comes ON; return switch to HOLD (down) position.



18443

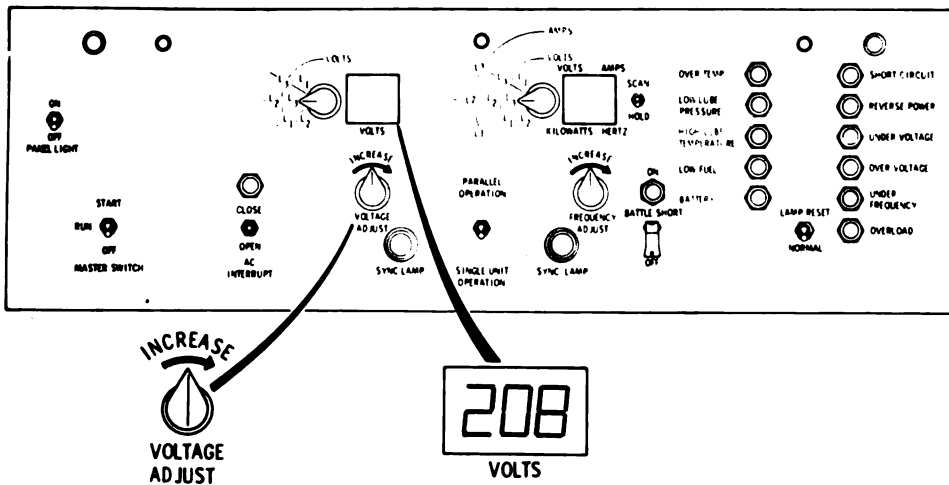
2-4. SINGLE UNIT OPERATION (cont)

b. Read Hertz on meter. Turn locking ring to left to loosen and adjust FREQUENCY ADJUST rheostat to meet load frequency requirements  $400 \pm 1$  Hertz (turn knob right to increase; left to decrease). Tighten locking ring.



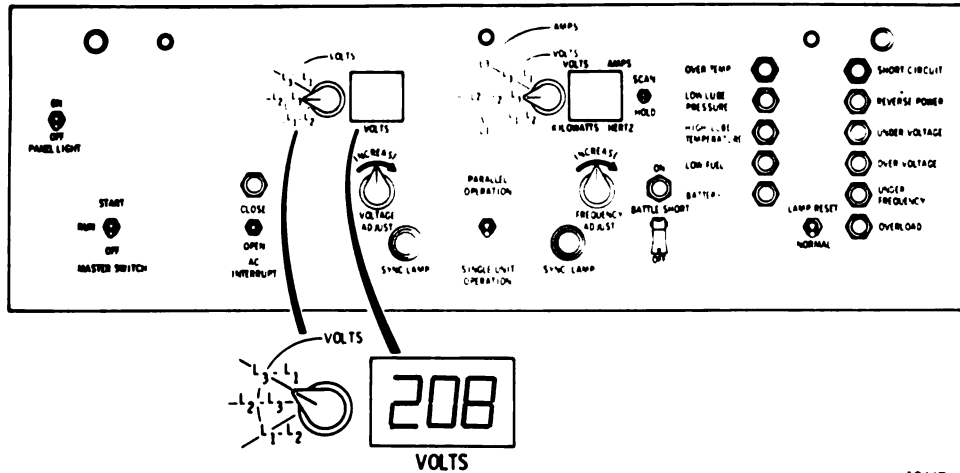
18444

c. Read voltage on VOLTS meter. Turn locking ring to left to loosen and adjust VOLTAGE ADJUST rheostat to meet load voltage requirements of 208 volts. Turn knob right to increase, left to decrease. Tighten locking ring.



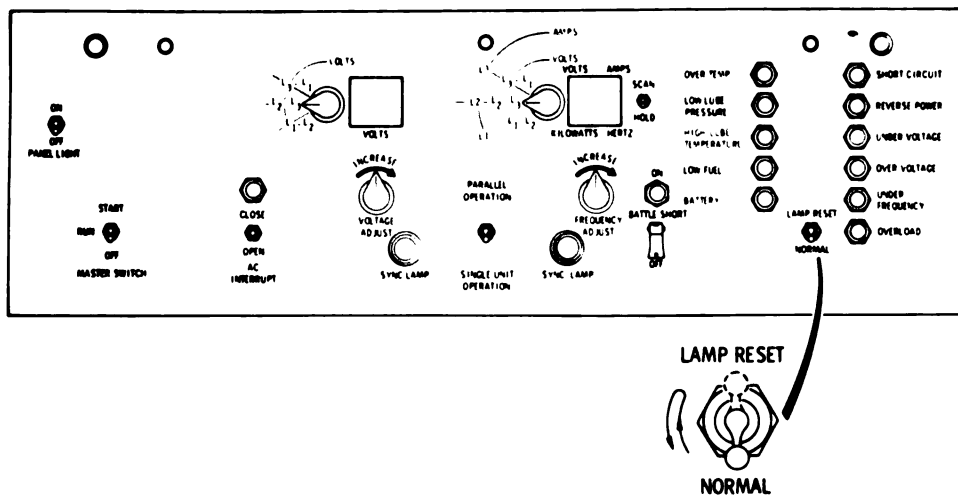
18445

d. Rotate Phase Select switch adjacent to VOLTS meter through all three positions L3-L1, L2-L3, and L1-L2. Read voltage on VOLTS meter at all three positions. Readings should be equal within  $\pm 2$  volts on all three phases.



18447

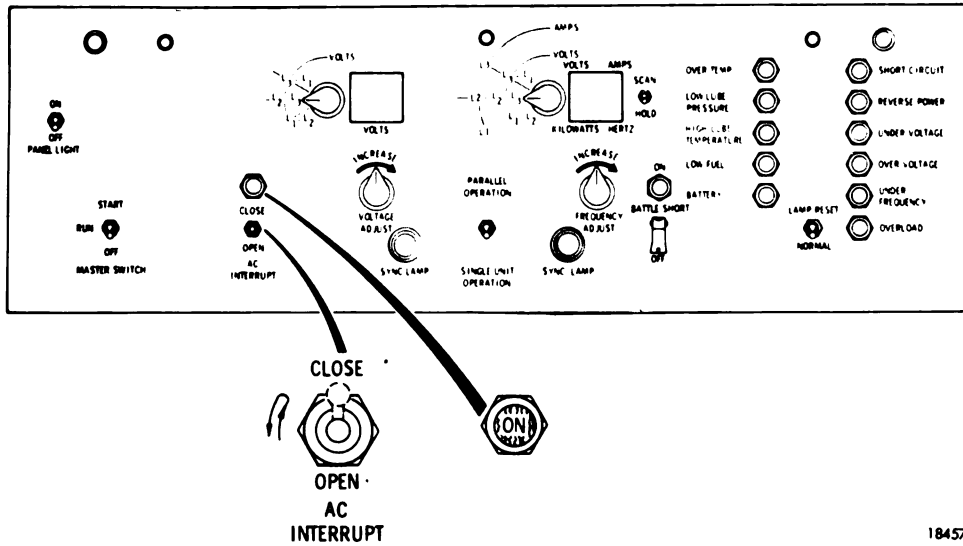
e. If any fault indicator lamp is ON or comes ON during operation, place LAMP RESET switch to LAMP RESET (up) and release to NORMAL (down). If any lamp comes ON after reset, shutdown set and correct fault before proceeding.



18448

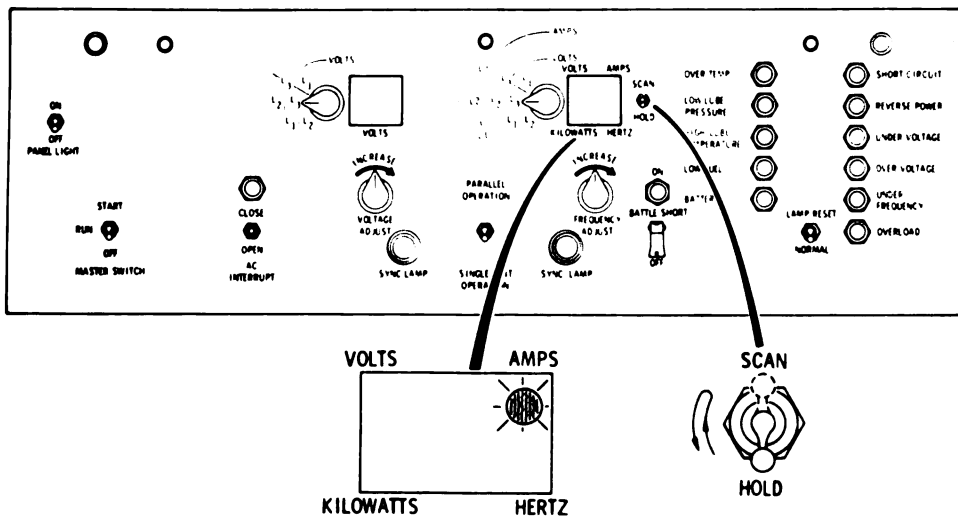
2-4. SINGLE UNIT OPERATION (cont)

f. Close main ac contactor by momentarily holding AC INTERRUPT switch to CLOSE (up) until AC INTERRUPT lamp comes ON; then release switch.



18457

g. Place SCAN-HOLD switch to SCAN (up). When AMPS lamp in meter comes ON, re- turn switch to HOLD (down) position. Any electrical load on generator should cause AMPS reading on the meter.

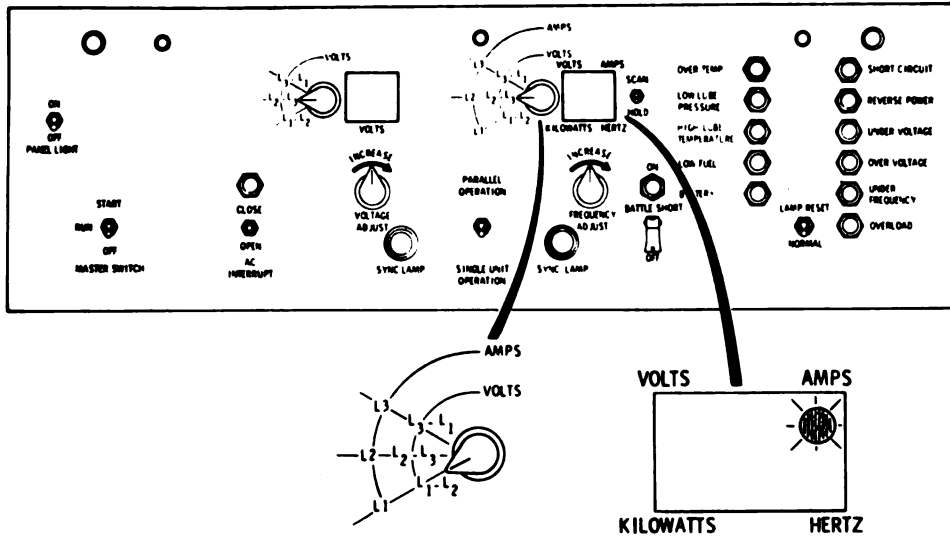


18450

CAUTION

A serious load unbalance exists if either of the limits in step h. is exceeded. Shut down and notify the next higher level of maintenance.

h. Rotate Phase Select switch next to the meter through all three positions L3, L2, and L1. Read amps on meter at all three positions. Differential between lowest and highest readings should not exceed 78 amps. Amps should not exceed 520 amps in any phase.



18451

i. Perform all During Operation (D) PMCS (table 2-1).

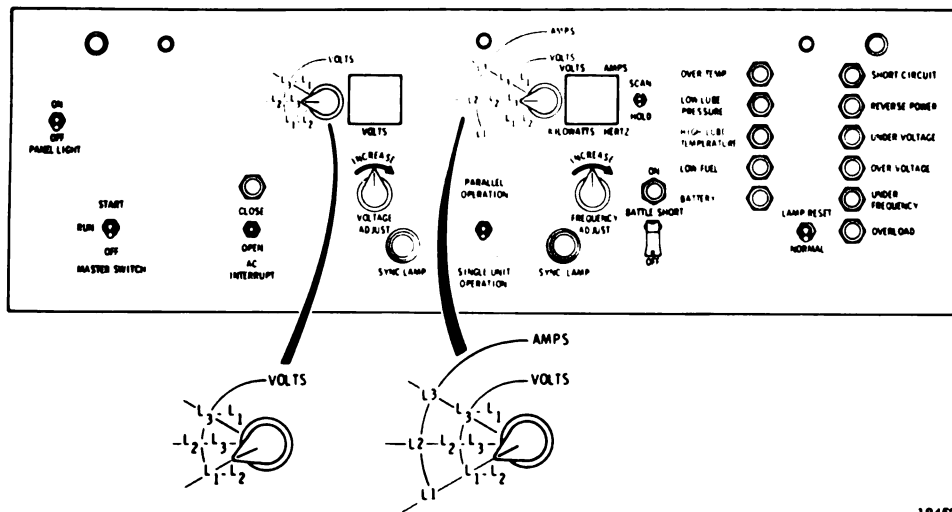
2-5. PARALLEL OPERATION

a. Start generator set to be paralleled. (Refer to Prestart Procedures para 2-2 and Starting Procedures para 2-3.)



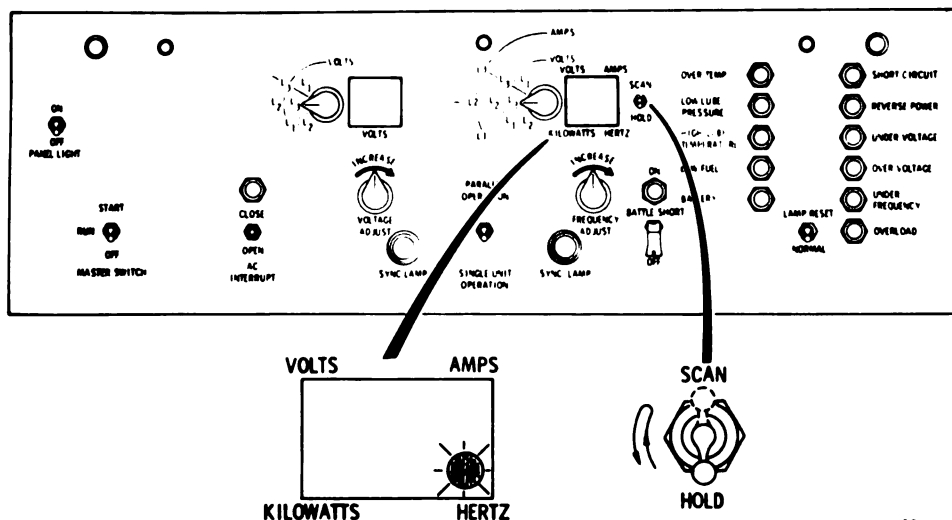
2-5. PARALLEL OPERATION (cont)

b. Place both Phase Select switches on both generator sets to phase L1-L2.



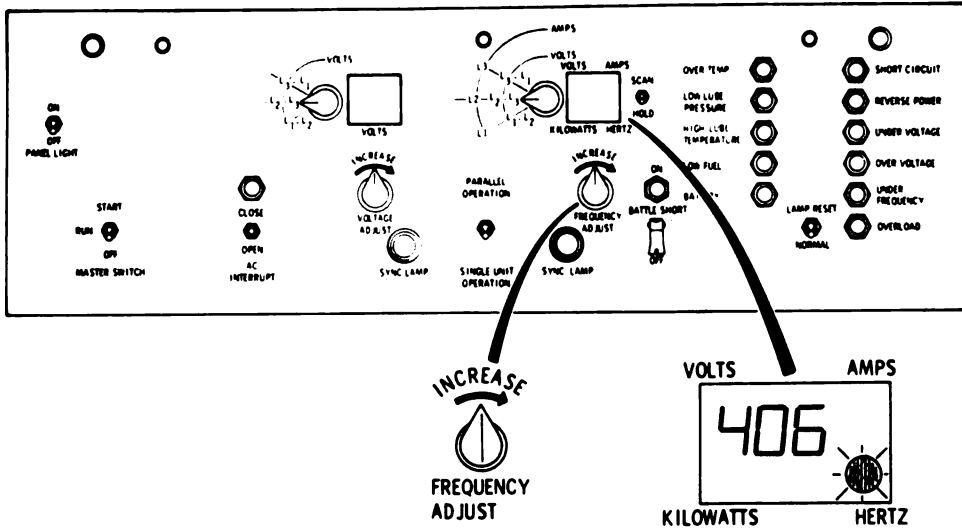
18452

c. Place SCAN-HOLD switch to SCAN (up) until HERTZ lamp in meter comes ON; then return switch to HOLD (down).



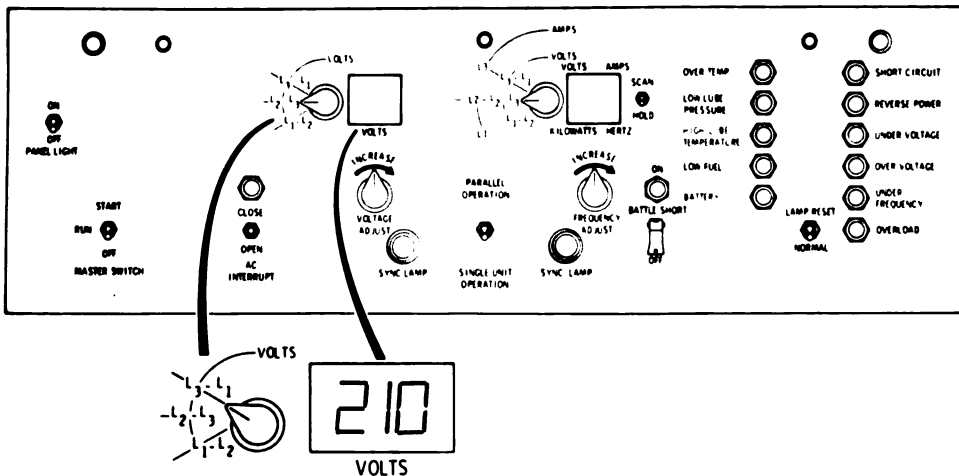
18443

d. Read frequency on meter. Turn locking ring to left to loosen and adjust FREQUENCY ADJUST rheostat so that generator set runs about 6 Hertz higher than set that is on line. Tighten locking ring.



18453

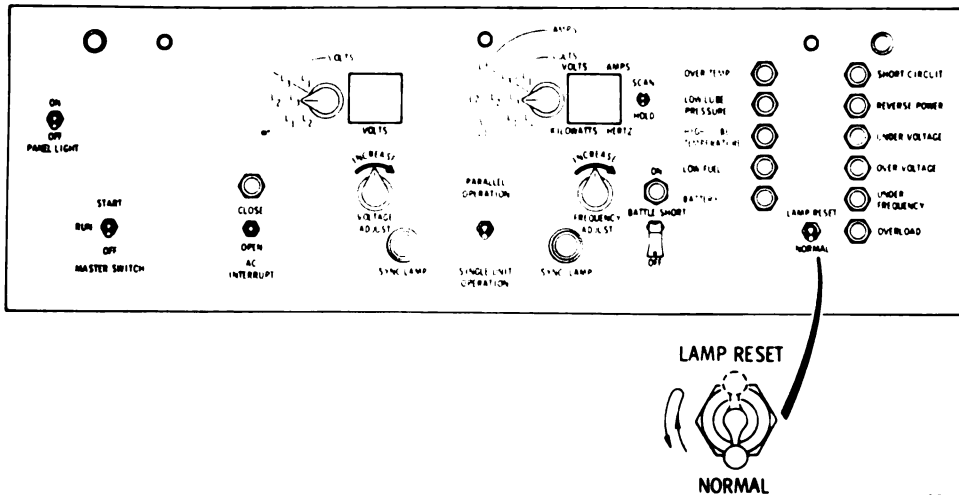
e. Rotate Phase Select switch adjacent to VOLTS meter to position L3-L1. Read volts, turn locking ring to left to loosen, and adjust VOLTAGE ADJUST rheostat to 2 volts higher than the generator set that is on line. Turn switch right to increase; left to decrease. Voltages on all three phases should be equal within  $\pm 2$  volts. Tighten locking ring.



18454

2-5. PARALLEL OPERATION (cont)

f. If any fault indicator lamps on the generator set to be parallel are ON, place LAMP RESET switch to RESET (up) and release to NORMAL (down). If any lamp comes ON after reset, shut down generator set and notify the next higher level of maintenance.

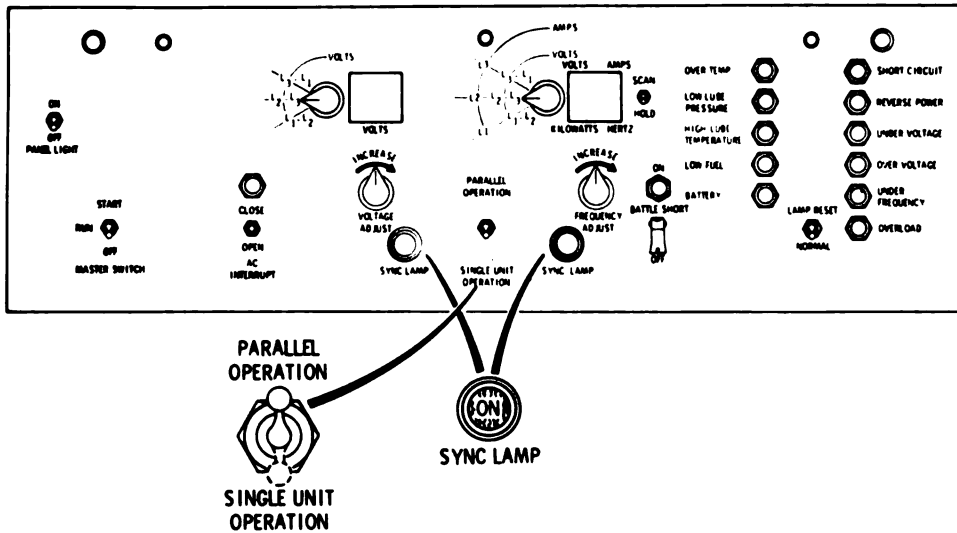


18448

CAUTION

If the SYNC LAMPS do not flash ON and OFF together, the phase relationship between the generator and load is not correct. DO NOT attempt to place the generator set on line until the phase relationship problem is corrected. Notify the next higher maintenance level.

g. Place PARALLEL - SINGLE UNIT OPERATION switch on both generator sets to PARALLEL OPERATION (up). SYNC LAMPS on the generator set to be paralleled should flash on and off together.

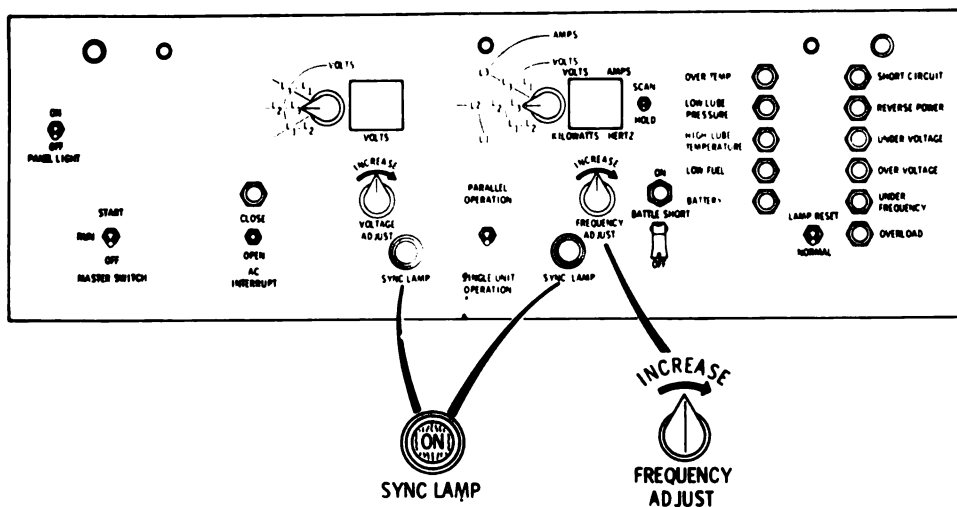


18455

NOTE

The SYNC LAMPS will go from OFF to ON (dim), then the light will increase and decrease in intensity and then go OFF to indicate phase relationship between the two generator sets. The generators are in phase when the SYNC LAMPS are OFF.

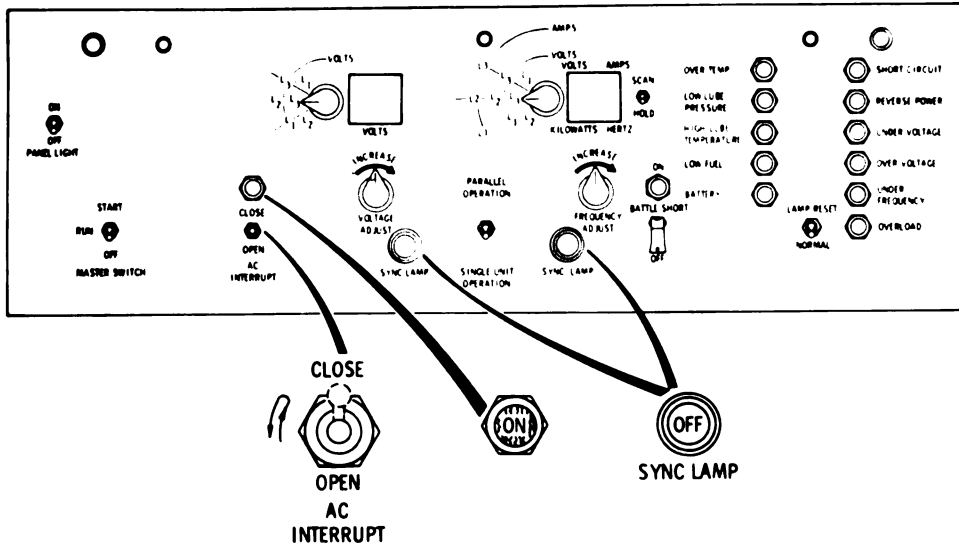
h. Decrease FREQUENCY ADJUST rheostat of set coming on the line until the SYNC LAMPS flash in unison at their slowest possible rate. Tighten locking ring.



18456

2-5. PARALLEL OPERATION (cont)

i. When SYNC LAMPS go off on generator set to be paralleled, close AC main contactor by momentarily holding AC INTERRUPT switch to CLOSE (up). When AC INTERRUPT lamp comes ON, release switch to neutral (center). If contactor does not close and if SYNC LAMPS start to come back ON, release switch to neutral (center) and repeat steps (h) and (i).

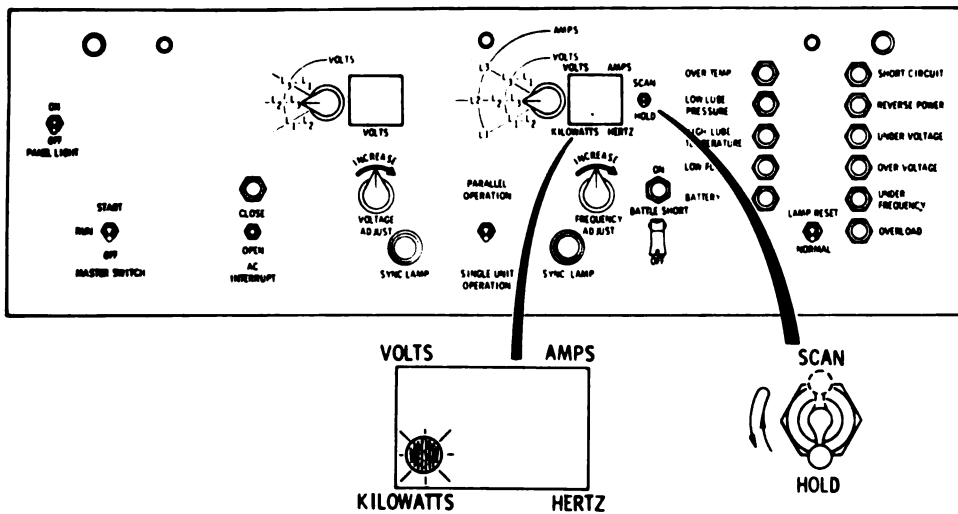


18457

NOTE

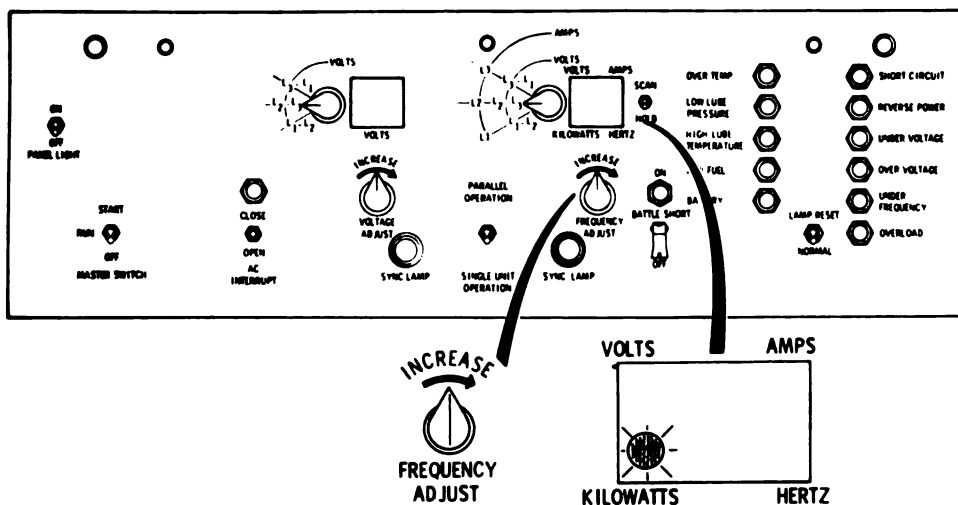
If generator sets are to continue operating in parallel, perform steps (j) through (m); if not proceed to para 2-6.

j. Place SCAN-HOLD switch to SCAN (up) position until KILOWATTS lamp comes ON; then quickly return to HOLD (down) position. Repeat this step on the other generator set.



18458

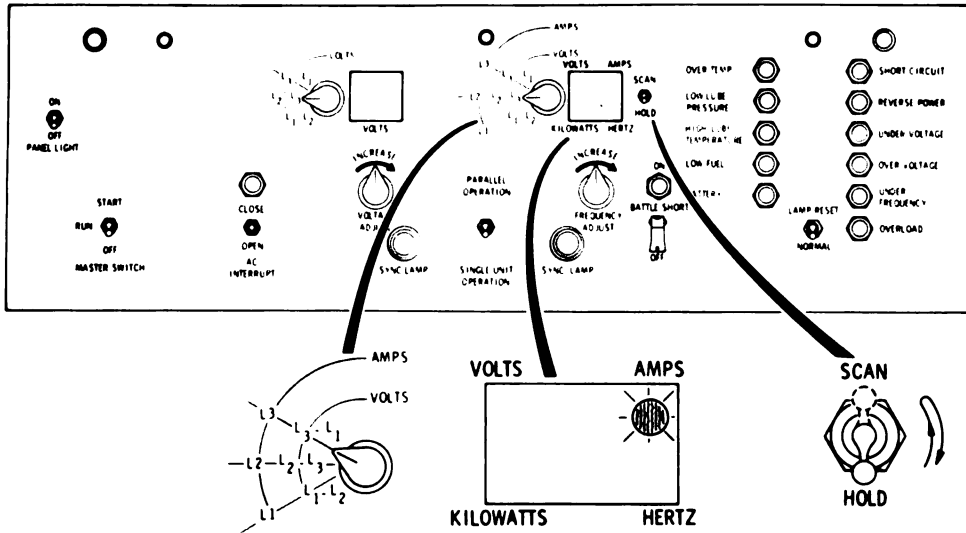
k. Turn locking ring to left to loosen and make fine adjustment on FREQUENCY ADJUST rheostat until generator set brought on line equally shares kilowatts load. Tighten locking ring.



18459

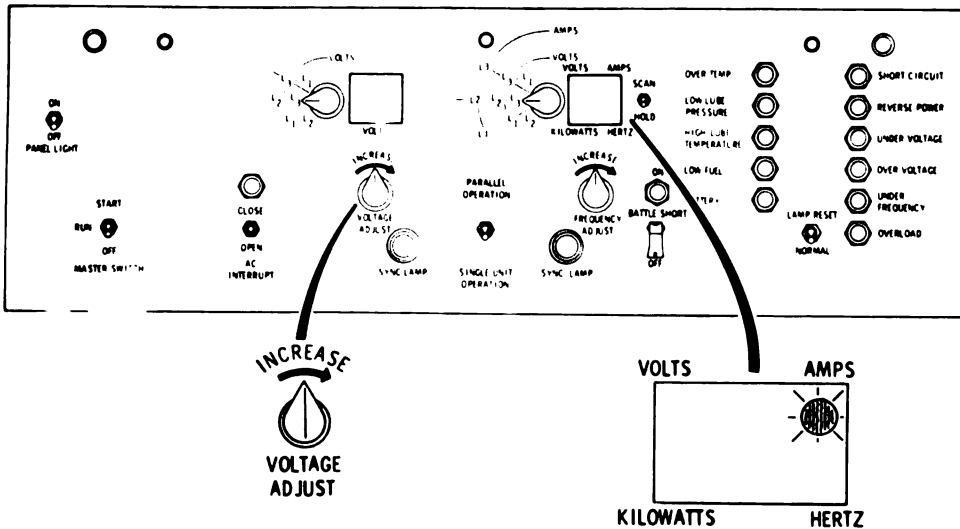
1. Make sure phase select switches on both generator sets are selected to phase L3. Place SCAN-HOLD switch to SCAN (up) until AMPS lamp comes ON; then quickly return to HOLD (down). Repeat this step on the other generator set.

2-5. PARALLEL OPERATION (cont)



18460

m. Turn locking ring to left to loosen and make fine adjustments on VOLTAGE ADJUST rheostat until generator set brought on line equally shares amps load. Tighten locking ring.

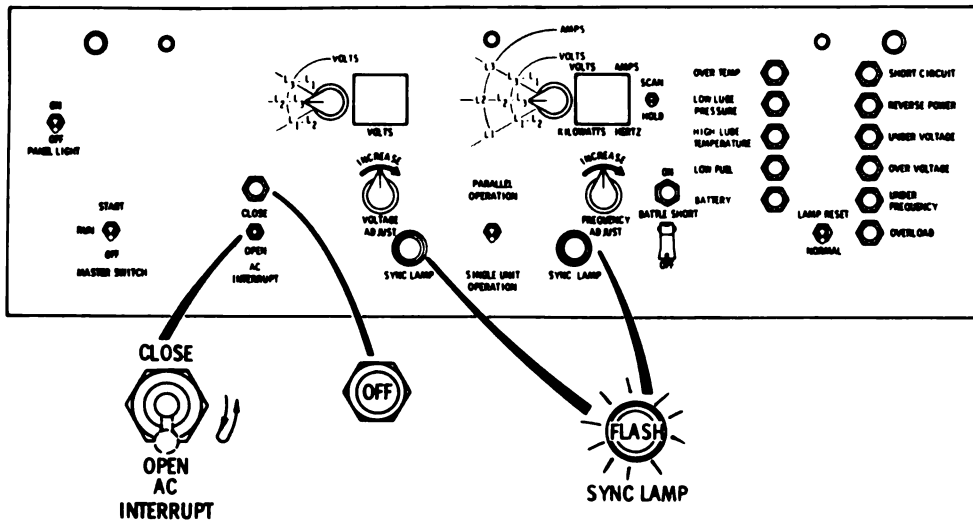


18461

n. Perform During Operation (D) PMCS (table 2-1).

2-6. STOPPING (SHUTDOWN) PARALLEL OPERATION

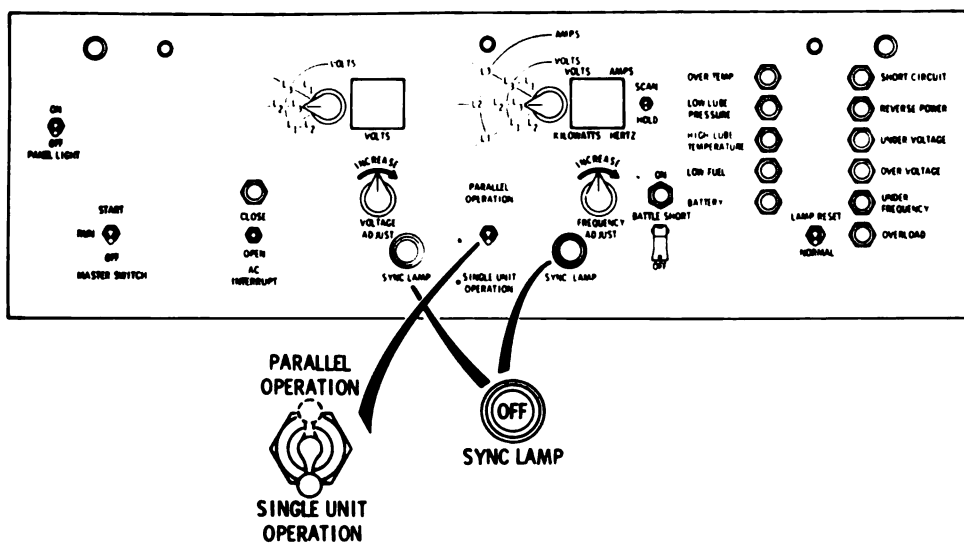
a. Open AC main contactor by placing AC INTERRUPT switch on the unit going off the line to OPEN (down). When AC INTERRUPT lamp goes OFF, release switch to neutral (center) position. Sync lamps should flash.



18462A

b. Place PARALLEL-SINGLE UNIT OPERATION switch to SINGLE UNIT OPERATION (down). SYNC LAMPS will go OFF.

c. Place PARALLEL-SINGLE UNIT OPERATION switch on operating generator set still on the line to SINGLE UNIT OPERATION (down). SYNC LAMPS will go OFF.

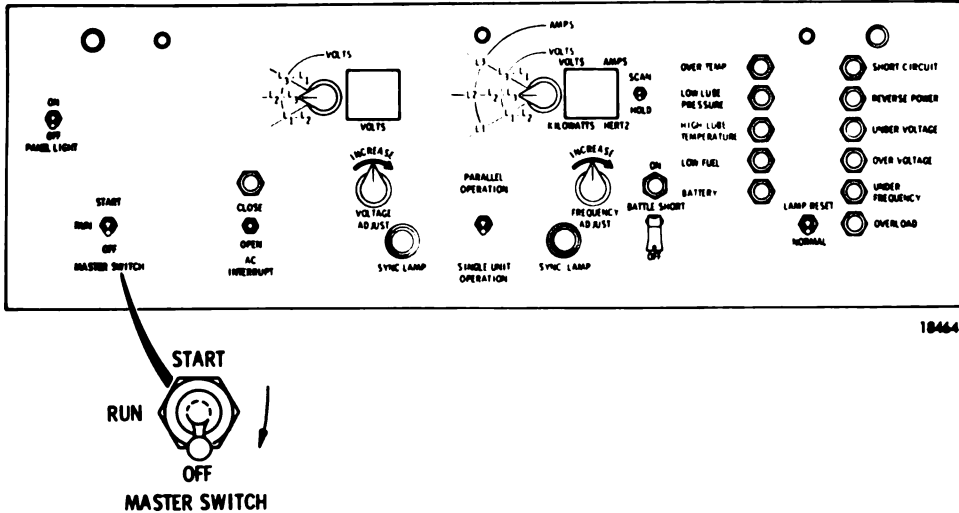


18463

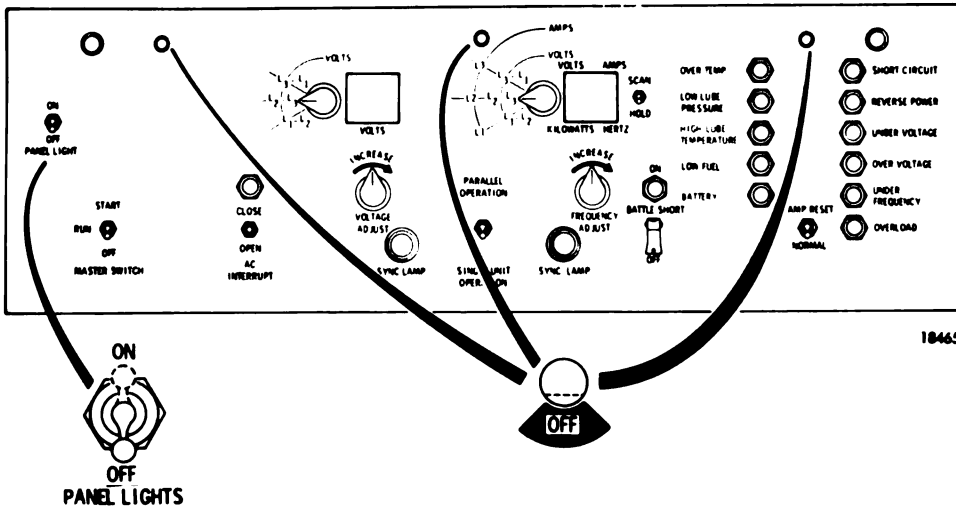


2-6. STOPPING (SHUTDOWN) PARALLEL OPERATION (cont)

d. Place MASTER switch to OFF. Engine and generator will coast to a stop.



e. Place PANEL LIGHTS switch OFF if lights were ON. Three panel lights will go OFF.



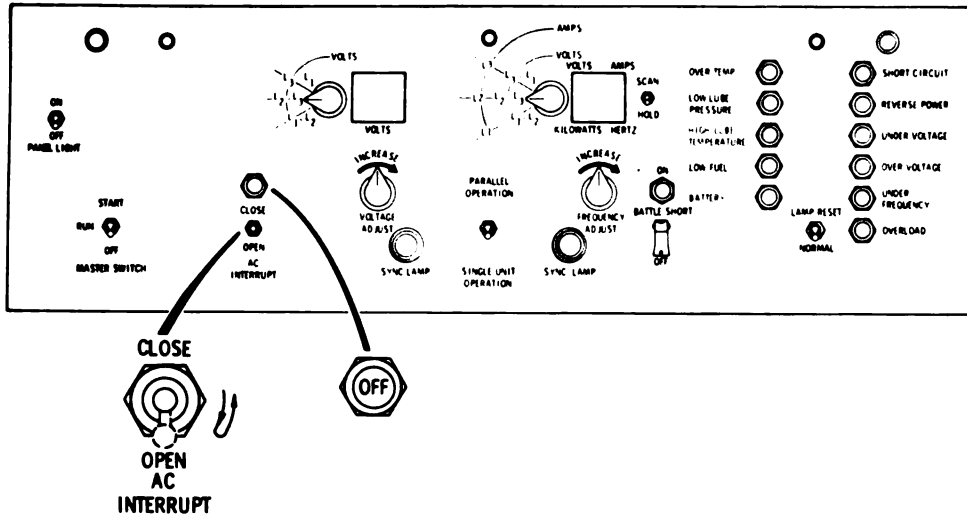
f. Close control cabinet outer door.

g. Perform all After Operation (A) PMCS (table 2-1).

h. Refer to paragraph 2-7 to shut down the generator still on the line.

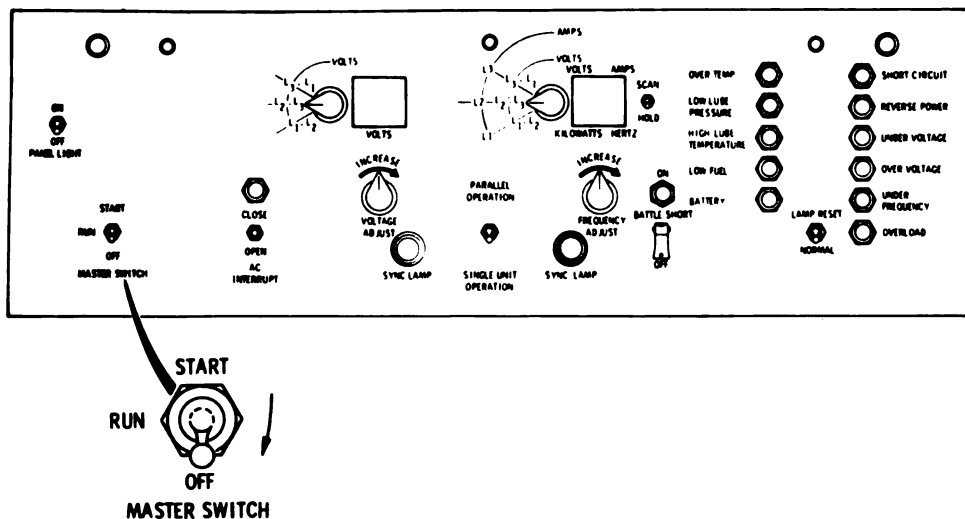
2-7. STOPPING (SHUTDOWN) OF SINGLE UNIT

a. Open AC main contactor by placing AC INTERRUPT switch to OPEN (down). When AC INTERRUPT lamp goes OFF, release switch to neutral (center) position.



18462

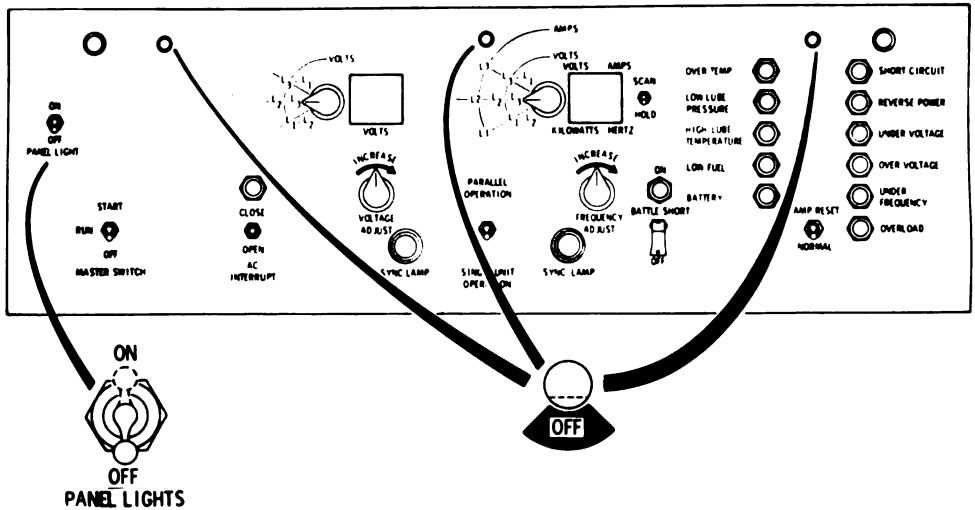
b. Place MASTER SWITCH to OFF. Engine and generator will coast to a stop.



18464

2-7. STOPPING (SHUTDOWN) OF SINGLE UNIT (cont)

c. Place PANEL LIGHTS switch OFF if lights were ON. Three panel lights will go OFF.



18465

d. Close control cabinet outer door.

e. Perform all After Operation (A) PMCS (table 2-1).

2-8. REMOTE OPERATION

a. Controls for remote operation consist of a remote SHUTDOWN switch and a BATTLE SHORT switch.

b. The remote SHUTDOWN switch should be in NORMAL position and placed to SHUTDOWN when remote shutdown is desired. Following shutdown, the switch must be returned to the NORMAL position. A remote shutdown will be indicated on the low fuel shutdown lamp.

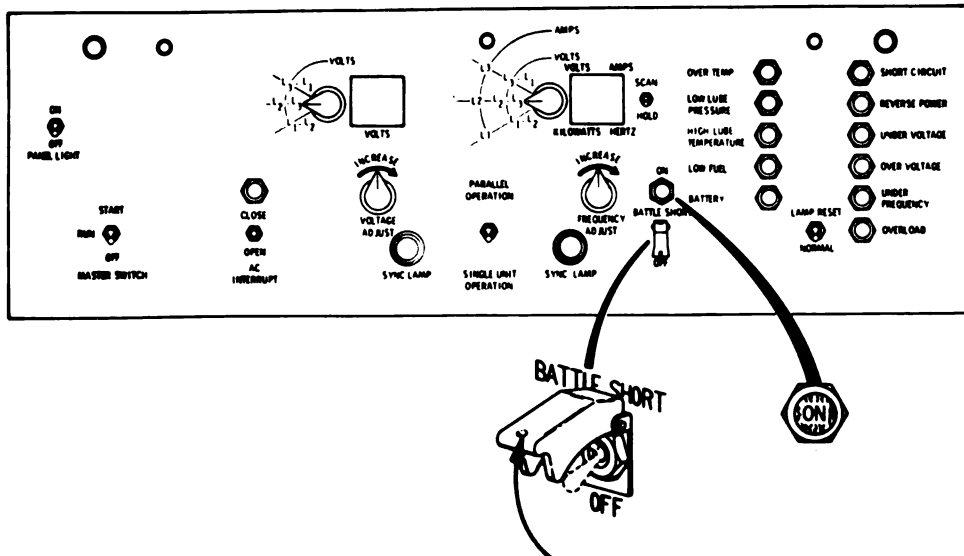
c. The remote BATTLE SHORT switch should be in OFF position and placed to BATTLE SHORT when remote battle short operation is desired. As soon as battle condition is past, return switch to OFF. (Refer to battle short operation, para 2-9.)

2-9. BATTLE SHORT OPERATION

**WARNING**

In the Battle Short mode, all generator set protective devices are rendered inoperative. This operating mode should be used only in battle conditions. Extensive damage to equipment or injury to personnel may result when operating in BATTLE SHORT mode.

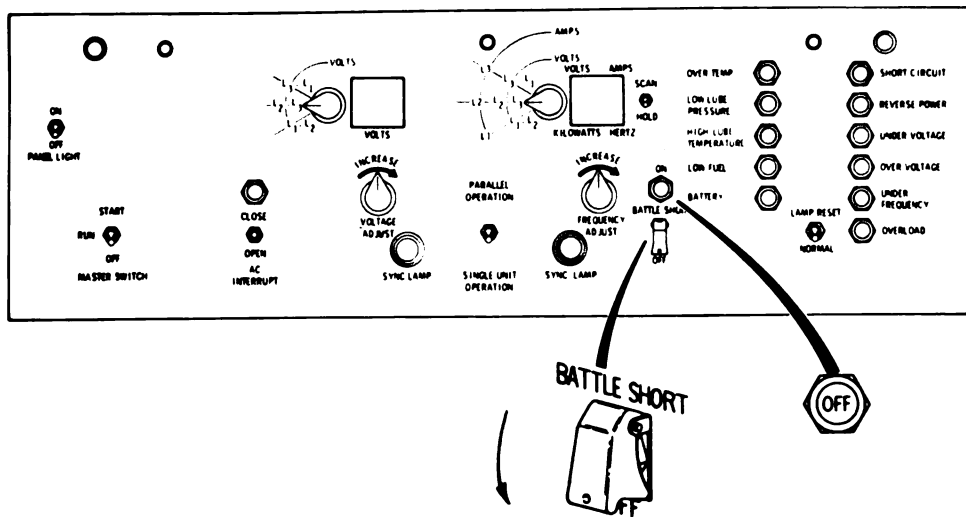
- a. Raise red switch guard on BATTLE SHORT switch. Place BATTLE SHORT switch to BATTLE SHORT ON (up) position. BATTLE SHORT lamp should come on.



18466

2-9. BATTLE SHORT OPERATION (cont)

b. As soon as battle condition is past, return BATTLE SHORT red switch guard to OFF (down). BATTLE SHORT lamp should go OFF.



NOTE

All generator set protective devices are reactivated, when BATTLE SHORT switch is turned off.

## Section II. OPERATING UNDER UNUSUAL CONDITIONS

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### 2-10. OPERATION IN EXTREME HEAT

---

Frequently check air inlet screens and filters and the oil cooler for clogging when operating in extreme heat, as a maximum of circulated air is required for maximum engine and oil cooling. If there is evidence of clogging or blockage, the generator set should be shut down to permit removal of any clogging or blockage material. Operating with inlet screens, filter, or oil cooler air flow restrictions could cause an overtemperature or high lube temperature shutdown.

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### 2-11. OPERATION IN EXTREME COLD CLIMATE

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Use of DF-A arctic or JP4 fuels is recommended for operation in extremely cold climates. Starting difficulties may be encountered with other fuels. At temperatures of 0° to minus 25°F (minus 18° to minus 32°C), a four minute idle period is required prior to acceleration to run speed. At temperatures below minus 25°F (minus 32°C), a ten minute idle period is required prior to acceleration to run speed. Also, an auxiliary 24 Vdc power supply is required for starting. Connect the auxiliary power supply to the slave receptacle before starting and disconnect when the start is completed.

#### CAUTION

At temperatures below minus 25°F (minus 32°C) MIL-L-23699 lubrication oil shall not be used.

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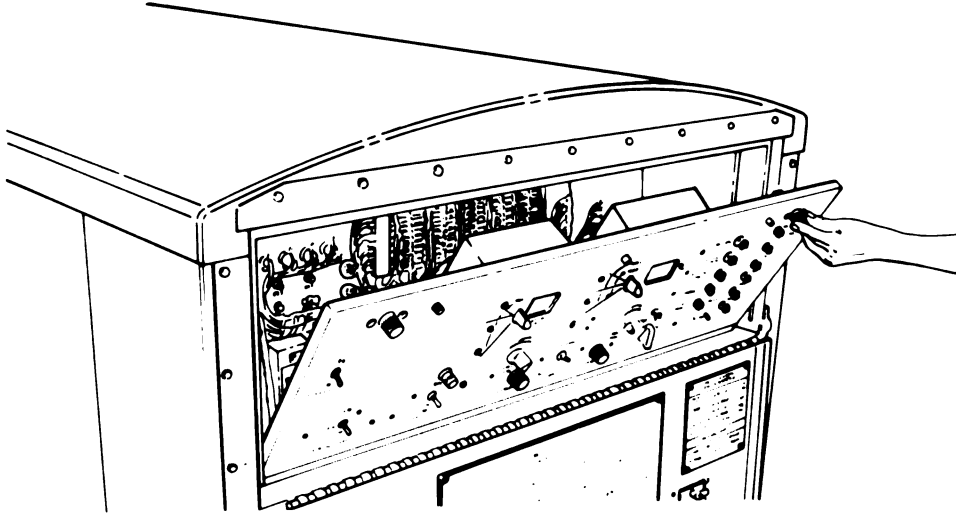
### 2-12. STARTING WHEN AMBIENT TEMPERATURE IS BELOW 0°F (MINUS 18°C) AND ABOVE MINUS 25°F (MINUS 32°C)

---

- a. Complete procedures in para 2-2.

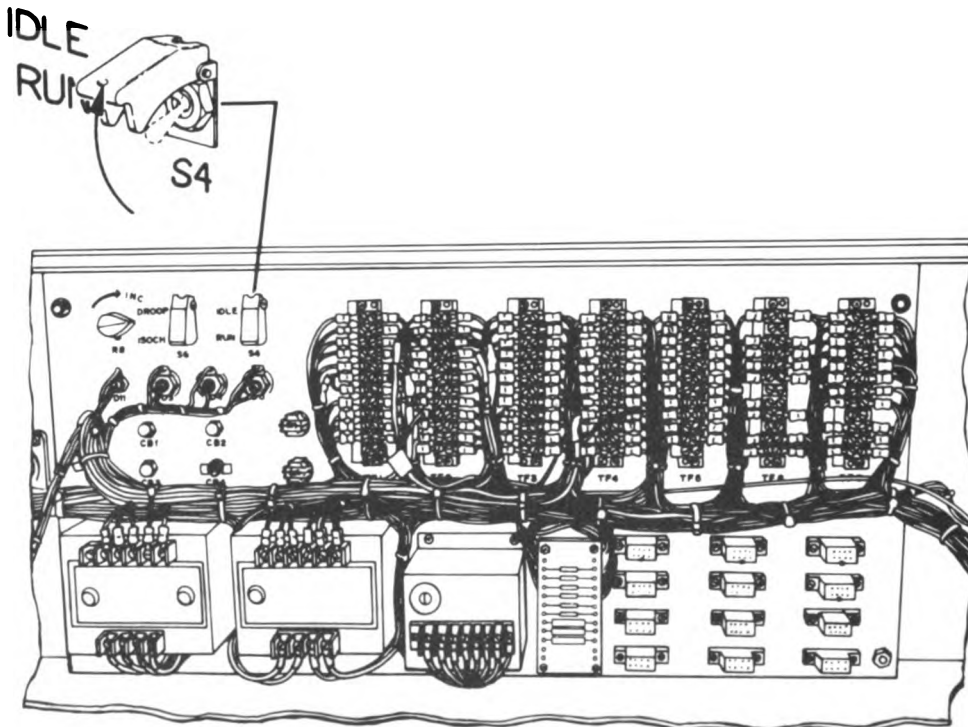
2-12. STARTING WHEN AMBIENT TEMPERATURE IS BELOW 0°F (MINUS 18°C) AND ABOVE MINUS 25°F (MINUS 32°C) (cont)

b. Turn screw latches to the right to unlock inner door. Open door to get access to the IDLE RUN switch located on the chassis assembly of the control cabinet.



18522A

c. Raise the guard and place IDLE RUN switch in IDLE (up) position.

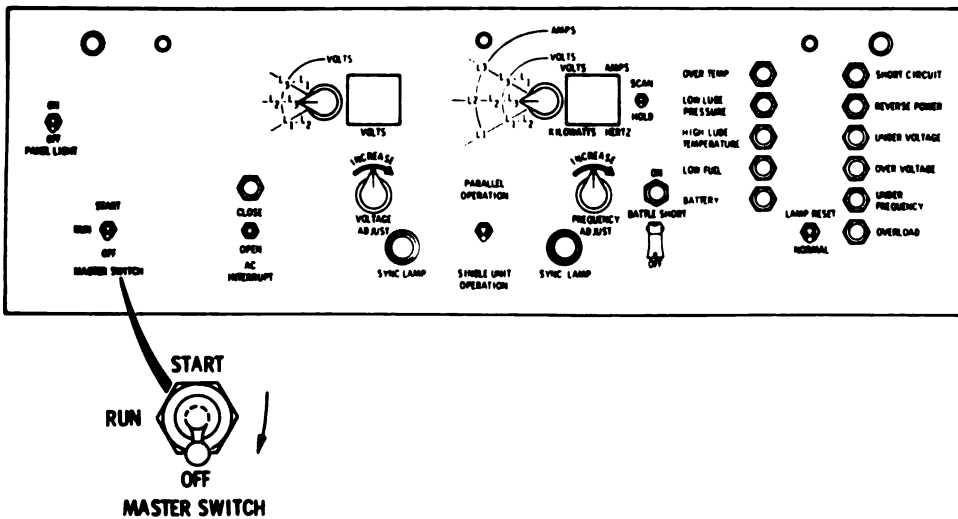


18941

**WARNING**

Be sure the inner door is secured in the closed position before attempting to start the set. A person will receive a harmful shock, due to the high voltage, if contact is made inside the control cabinet while set is running.

- d. Close and secure the inner door by turning screw latches to the left.
- e. Complete procedures in para 2-3 and start generator set.
- f. After idling for 4 minutes, shut down the generator set by placing the MASTER switch to the OFF position.

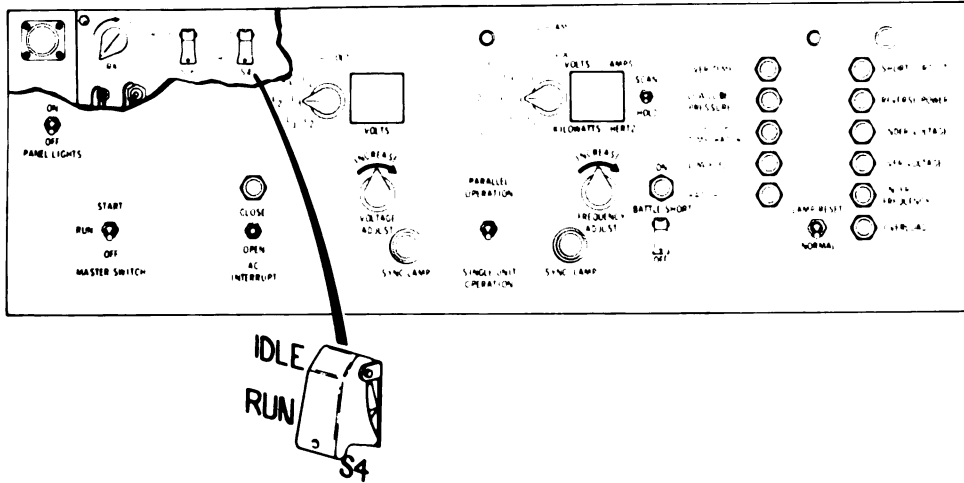


18464



2-12. STARTING WHEN AMBIENT TEMPERATURE IS BELOW 0°F (MINUS 18°C) AND ABOVE MINUS 25°F (MINUS 32°C) (cont)

g. Turn screw latches to the right to unlock inner door and open to gain access to the IDLE RUN switch. Place the guard down. This will put the IDLE RUN switch in the RUN position.



18446A

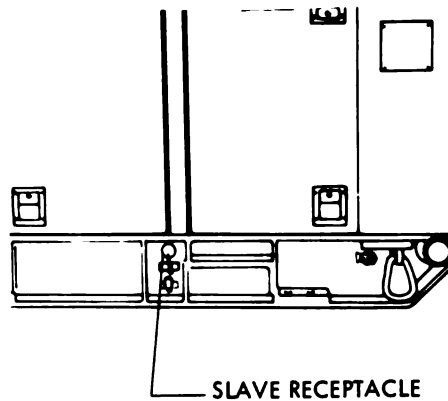
- h. Close and secure the inner door by turning screws latches to the left.
- i. Complete procedures in para 2-3.

---

### 2-13. STARTING WHEN AMBIENT TEMPERATURE IS BELOW MINUS 25°F (MINUS 32°C)

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- a. Plug in a 24 Vdc negative ground auxiliary power source to slave receptacle.



18409

- b. Complete preceding steps 2-12.a. thru i. except in step f. stabilize at idle for 10 minutes.

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### 2-14. OPERATION IN HIGH HUMIDITY ENVIRONMENT

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High humidity ambient conditions can cause condensation to form inside the generator set enclosure. This condition will normally occur on cool nights following a warm day. If condensation is allowed to remain in the enclosure, rust and corrosion will start to form. Start the engine and run for 5 to 10 minutes or until the generator set is completely dried out.

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### 2-15. OPERATION IN DUST AND SAND AREAS

---

Frequently check air inlet screens and filters and the oil cooler for clogging when operating in dust or sand areas. If there is evidence of clogging, the generator set should be shut down to permit removal of the dust and sand. Operating with inlet screens and filters restricted will cause loss of power and possible engine surge. Operating with the oil cooler restricted will cause oil temperature to increase and possibly a high oil temperature shutdown.

---

2-16. OPERATION IN SALT WATER AREAS

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Operating in salt water area can cause residue on screens and filters. Operating with restricted screens and filters can cause loss of power and possible engine surge. Frequently check the screens and filters for any restrictions. The generator set should be shut down while cleaning the screens or filters. Also unpainted areas may be attacked by the salt and may rust. Keep all areas painted and keep all hinges well oiled.

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2-17. OPERATION IN HEAVY SNOWFALL (BLIZZARD CONDITIONS)

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CAUTION

Do not damage equipment attempting to remove snow or ice.

Operating in heavy snowfall can clog air inlet screens and filters with snow and ice. Operating with inlet screens and filters restricted can cause loss of power and possible engine surge. Frequently check the screens and filters for snow and ice clogging. If there is evidence of clogging, the generator set should be shut down while snow and ice is removed or melted away.

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2-18. OPERATION IN HIGH WINDS

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Wind-blown litter can collect on air inlet screens when operating in high winds. Restricting airflow through the inlet screens can cause loss of power and possible engine surge. Frequently check the screens and remove wind-blown litter.

## Section III. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

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### 2-19. GENERAL

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a. To ensure that the generator set is ready for operation at all times, it must be inspected systematically so defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services (PMCS) that are to be performed by operator/crew personnel are listed and described in table 2-1.

#### WARNING

Do not smoke or have open flame when inspecting the generator set. Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components. Emergency fuels are particularly hazardous. Use a fuel catch pan when draining fuel from any fuel line or fuel system component.

b. Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your Before (B) PMCS.

c. While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your During (D) PMCS.

d. After You Operate. Be sure to perform your After (A) PMCS.

e. If your equipment fails to operate, troubleshoot with proper equipment. Report any deficiencies using the proper forms. (See TM 38-750.)

---

### 2-20. OPERATOR/CREW PMCS PROCEDURES

---

a. General. To extend the service life and obtain maximum performance of the generator set, the operator/crew must adhere to the schedule and instructions in table 2-1.

b. Item Number Column. Item numbers in this column indicate the order in which PMCS should be performed. These numbers shall also be used as the item numbers for the TM NUMBER column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

c. Interval Column. Items to be inspected are indicated by an X in the appropriate interval column. If items are to be inspected in two or more intervals, they will be indicated by an X in the appropriate interval columns, i.e. before, during, or after operation.

2-20. OPERATOR/CREW PMCS PROCEDURES (cont)

d. Equipment is Not Ready/Available If: Column. This column contains the criteria that will cause the equipment to be classified as not ready/available because of inability to perform its primary mission. An entry in this column:

(1) Identifies conditions that make the equipment not ready/available for readiness reporting purposes.

(2) Denies use of the equipment until corrective maintenance has been performed.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services

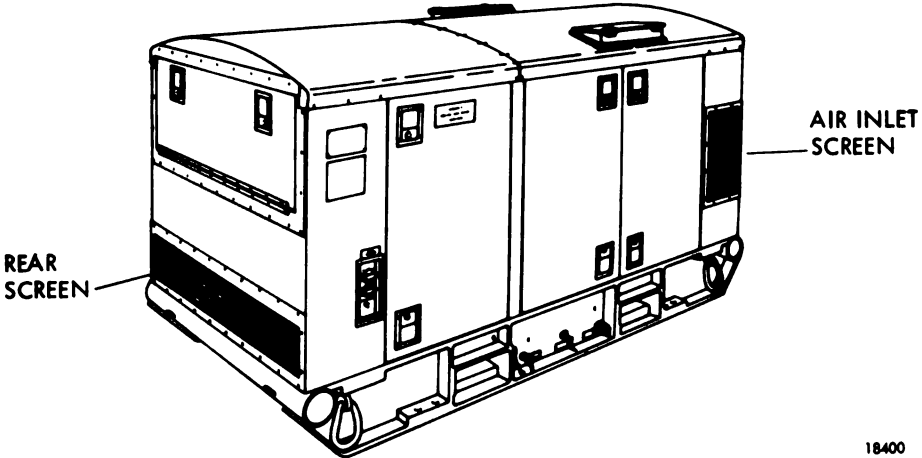
NOTE

If the generator set must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the generator set can be shut down.

B - Before Operation D - During Operation A - After Operation

ITEM NO.	INTERVAL			ITEM TO BE INSPECTED PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A		
1				<u>Air Inlet Screen and Louvers (LH and RH)</u> <u>(para 1-14.b.1)</u>  Inspect for wind-blown debris blocking airflow. Remove debris.  <p style="text-align: center;"><u>WARNING</u></p> Toxic solvent is used for general cleaning of the generator set. Illness or skin damage may be caused by prolonged breathing of solvent fumes or excessive skin contact with the liquid. Avoid open flame or sparks while using flammable solvent.	Air flow is blocked.
	x	x		Inspect for heavy dirt and dust contamination. Clean with approved cleaning solvent and rags (items 15 and 14, appx E).	

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL			ITEM TO BE INSPECTED PROCEDURE	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A		
2				 <p style="text-align: right;">18400</p> <p style="text-align: center;">NOTE</p> <p>It may be necessary to clean air inlet screen more often if the generator set is being operated in dusty, dirty, or salty areas.</p>	
	x			<p>Inspect for damage or missing components, notify next higher level of maintenance.</p> <p><u>Rear Air Inlet Screen (para 1-14.b.3)</u></p> <p style="text-align: center;"><u>WARNING</u></p> <p>Solvent is toxic. Ensure that there is adequate ventilation. Avoid open flame or spark while using.</p>	Component is damaged or missing.
	x	x		<p>Inspect for wind-blown debris, heavy dirt and dust contamination. Remove debris or clean with approved cleaning solvent and rags (items 15 and 14, appx E) (para 3-6).</p>	Airflow is blocked.

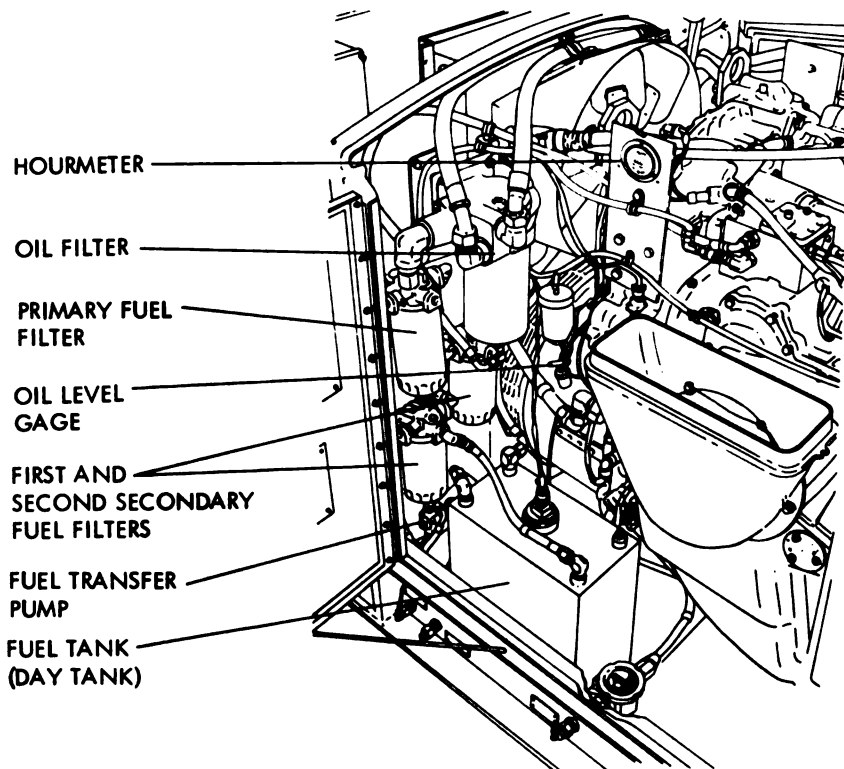
2-20. OPERATOR/CREW PMCS PROCEDURES (cont)

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL			ITEM TO BE INSPECTED PROCEDURE	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A		
				NOTE  It may be necessary to clean screen more often if the generator set is being operated in dusty or dirty areas.	
3	x	x		Inspect for damage or missing components, notify next higher level of maintenance.  <u>Fuel, Air, and Oil Lines and Fittings</u>	
4	x		x	Inspect for leaks, seeps, and damaged lines or fittings, notify next higher level of maintenance.  <u>Oil Level Gage</u>	Fuel, air, or oil is leaking.
				NOTE  Always allow a minimum of five minutes after shutdown before checking the oil. This is to allow oil to drain-down.	
5	x		x	Check for proper oil levels, notify next higher level of maintenance.  <u>Hourmeter</u>	Oil level is at or below ADD mark.
	x		x	Inspect for broken glass, damaged components, or readout is not advancing during operation, notify next higher level of maintenance.	
6	x		x	<u>Fuel Tank (Day Tank) (para 1-14.b.22)</u>  Inspect for corrosion, cracks, breaks, leakage or any other damage, notify next higher level of maintenance.	Fuel is leaking.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL			ITEM TO BE INSPECTED PROCEDURE	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A		
7				<u>Fuel Transfer and Mechanical Fuel Pumps</u> (para 1-14.b.17 and c.2)	
	x		x	Inspect for oil or fuel leaks - indicated by puddling, under pumps or seal drain tube, in bottom of engine compartment, notify next higher level of maintenance.	Pump is inoperable, fuel or oil is leaking.
8				<u>Primary and both Secondary Fuel Filters</u> (para 1-14.b.18, 19, 20)	
	x			Using a suitable container to catch fuel, open drain cock on primary canister and catch any drainage. Inspect drainage for dirt or contamination.	Fuel is dirty or contaminated.
	x		x	Inspect all filters for leakage, seepage, or damaged canister, notify next higher level of maintenance.	Fuel is leaking.



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2-20. OPERATOR/CREW PMCS PROCEDURES (cont)

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL			ITEM TO BE INSPECTED PROCEDURE	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A		
9				<u>Oil Filter (para 1-14.b.23)</u> Inspect for leaks, seeps, loose items or damage to housing or canister, notify next higher level of maintenance.	Oil is leaking.
10	x			<u>Battery Cables (para 1-14.d.1)</u> Inspect for cracked insulation, broken terminals, corrosion at cable terminals, loose, damaged, or missing components, notify next higher level of maintenance.	Terminals are loose, corroded or broken.
11				<u>Batteries (para 1-14.d.2)</u>  <p style="text-align: center;"><u>WARNING</u></p> Battery electrolyte must be handled with care to avoid acid burns from spillage. Do not add electrolyte to a battery that has been previously filled. Use care not to splash electrolyte on skin when checking liquid level. Always use gloves and an apron to avoid burns when handling electrolyte. If electrolyte contacts skin or clothes, wash immediately. If electrolyte gets in eyes, flush with water immediately and seek medical attention.	
	x			Inspect for cracked or leaking case, broken, loose, or bent posts, damaged hold down clamps or studs, or missing battery caps, notify next higher level of maintenance.	Battery is damaged.
	x			Inspect for proper fluid level, add distilled water (item 18, appx E) as needed to fill battery to bottom of fill neck (para 3-7).	
	x			Check that battery tops are clean and dry. Wipe with a rag (item 14, appx E), then dispose of rag.	

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL			ITEM TO BE INSPECTED PROCEDURE	EQUIPMENT IS NOT READY/ AVAILABLE IF:
	B	D	A		
12	x			<u>AC Wiring Harness</u>	Wiring is damaged or loose connections.
				Inspect for breaks, loose or broken connections and terminals, also for frayed or burned areas, notify next higher level of maintenance.	
13	x	x	x	<u>Primary Fuel Filter (Catch and Drain)</u> <u>(para 1-14.b.21)</u>	Fuel is leaking.
				<u>WARNING</u>	
				Battery voltage may result in shock and flash burns. Be sure to not make any contact with slave cables while draining the filter.	
	x			Inspect for leakage, seepage, or damaged canister, notify next higher level of maintenance.	
	x			Using a suitable container and rags (item 14, appx E), open drain cock and catch any drainage from the canister.	



## CHAPTER 3

### OPERATOR/CREW MAINTENANCE INSTRUCTIONS

	Para		Para
Batteries, Service. . . . .	3-7	Lubrication Order. . . . .	3-1
General (COEIL, AAL, and ES&ML) .	3-2	Operator/Crew Generator Set	
General (Operator/Crew		Inspections. . . . .	3-5
Troubleshooting) . . . . .	3-3	Rear Cabinet Cooling Air	
Introduction (Maintenance		Inlet Screen Service . . . .	3-6
Procedures) . . . . .	3-4		

### Section I. LUBRICATION INSTRUCTIONS

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#### 3-1. LUBRICATION ORDER

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A reproduction of LUBRICATION ORDER LO 5-6115-598-12 follows.

**LUBRICATION ORDER**

# LO 5-6115-598-12

(Supersedes LO 5-6115-598-12, 16 February 1987)

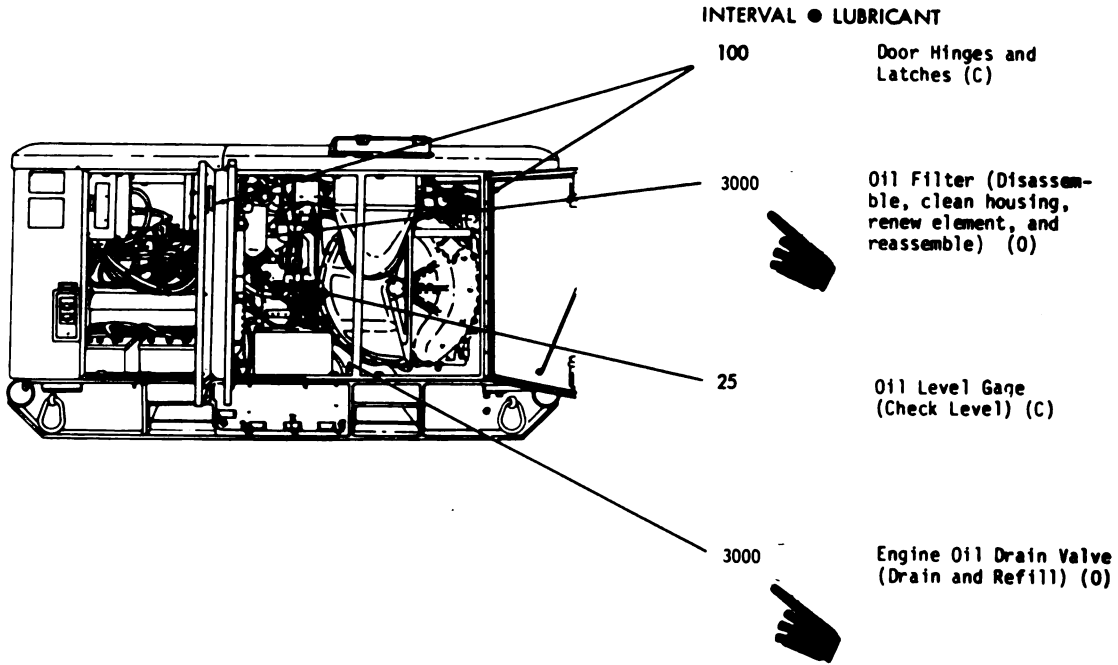
**GENERATOR SET, GAS TURBINE ENGINE DRIVEN,  
TACTICAL SKID MOUNTED, 150 KW  
400 HERTZ, ALTERNATING CURRENT**

Reference TM 5-6115-598-12

Intervals (on-condition or hard time) and the related man-hour times are based on normal operation. The man-hour time specified is the time you need to do all the services prescribed for a particular interval. On-condition (OC) oil sample intervals shall be applied unless changed by the Army Oil Analysis Program (AOAP) laboratory. Change the hard time interval if your lubricants are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours. The hard time interval may be extended during periods of low activity. If extended, adequate preservation precautions must be taken. Hard time intervals will be applied in the event AOAP laboratory support is not available.

Relubricate after washing or fording. Clean parts with dry-cleaning solvent (SD), type 11 or equivalent. Drain crankcase when hot. Fill and check level. The lowest level of maintenance authorized to lubricate a point is indicated by one of the following (C) Operator/Crew or (O) Organizational Maintenance.

Reporting errors and recommending improvements. You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank forms) direct to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished to you.




TOTAL TASK HOURS	
INTERVAL	TASK HOURS
25	0.1
100	0.3
3000	0.5

- KEY -

**CAUTION**

Mixing lube oils MIL-L-23699 and MIL-L-7808 will damage the equipment. Always check the log book before adding oil to ensure that you add the same type of oil as is in the engine. If you switch from one type of oil to the other when changing the engine oil, flush the lubrication system by performing the actions in NOTE 5 below.

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURE		INTERVALS
		ABOVE -25°F (-32°C)	BELOW -25°F (-32°C)	
MIL-L-23699 Lubricating oil, air-craft turbine engine, synthetic base or MIL-L-7808	15 quarts (14 liters)	MIL-L-23699	MIL-L-7808	3000 hours 

NOTES:

1. FOR OPERATION OF EQUIPMENT PROTRACTED COLD TEMPERATURES BELOW -25°F (-32°C). Relubricate with lubricant specified in the key for temperatures below -25°F (-32°C).

2. OIL CAN POINTS. Every 100 hours clean and lightly coat door hinges, latches, and all exposed adjusting threads with oil.

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

Oil filter replacement shall align with oil change requirements.

4. ENGINE. Check oil level with engine in a static condition.

NOTE

Perform the actions in Note 5 only if you switched from one type of lube oil to another when changing the engine oil.

5. FLUSHING THE LUBRICATION SYSTEM. After changing the oil and filters, operate engine for 30 minutes. Stop engine and change oil and filters.

6. LUBRICANTS. The following is a list of lubricants with the Military Symbols and application specification numbers.

MIL-L-23699

MIL-L-7808

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

By Order of the Secretary of the Army:

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

Official:

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-25A Operator and Organizational Maintenance requirements for Generator Set, Gas Turbine Engine, Tactical, Skid Mounted, 150KW, AC (D424A).

**Section II. COMPONENTS OF END ITEM LIST (COEIL), ADDITIONAL  
AUTHORIZATION LIST (AAL), AND EXPENDABLE SUPPLIES  
AND MATERIALS LIST (ES&ML)**

---

3-2. GENERAL

---

Refer to Appendices for this data as follows:

Appendix C -- COMPONENTS OF END ITEM LIST (COEIL)

Appendix D -- ADDITIONAL AUTHORIZATION LIST (AAL)

Appendix E -- EXPENDABLE SUPPLIES LIST

## Section III. OPERATOR/CREW TROUBLESHOOTING

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### 3-3. GENERAL

---

- a. If you suspect a malfunction you should:
  1. Perform the PMCS (table 2-1).
  2. Perform the prestart procedures (para 2-2).
- b. If you are satisfied that the generator set has a malfunction, notify the next higher level of maintenance.



## Section IV. OPERATOR/CREW MAINTENANCE PROCEDURES

### 3-4. INTRODUCTION

This section presents maintenance procedures to be performed by the operator/crew. Operator/crew maintenance tasks are limited to those tasks which can be performed without tools or test equipment.

### 3-5. OPERATOR/CREW GENERATOR SET INSPECTIONS

This task covers:

Inspection

#### INITIAL SETUP

##### Personnel Required

Utilities Equipment Repairer  
MOS 52C

##### References

Items 1 through 13, table 2-1.

LOCATION	ITEM	ACTION	REMARKS
<b><u>INSPECTION</u></b>			
1. Front cabinet panel		Inspect for cracks, dents, loose bolts or nut plates, and loose or worn data plates.	Notify the next higher level of maintenance.
2. Doors		Inspect for cracks, dents, and loose or damaged hinge or latches.	Notify the next higher level of maintenance.
3. Data plates		Inspect for faded, damaged, or loose plates.	Notify the next higher level of maintenance.

LOCAT ION	ITEM	ACTION	REMARKS
<u>INSPECTION (cont)</u>			
	4. Cylinder assemblies	Inspect for loose hose connections, bent or broken rods, or any damage.	Notify the next higher level of maintenance.
	5. Duct assemblies	Inspect for loose or broken caps and hinges or any missing components.	Notify the next higher level of maintenance.
	6. Exhaust elbows	Inspect for leaks, cracks, or broken bolts and lock down tabs.	Notify the next higher level of maintenance.
	7. Fuel drain valve	Inspect for damaged, broken, inoperative, clogged, or plugged valve.	Notify the next higher level of maintenance.
	8. Oil drain manual shutoff valve	Inspect for leaks, loose hose connections, or missing components.	Notify the next higher level of maintenance.

3-6. REAR CABINET COOLING AIR INLET SCREEN

This task covers:

- a. Inspection      b. Service

INITIAL SETUP

Materials/Parts

Paint brush (item 2, appx E)  
 Paint (item 13, appx E)  
 Rags (item 14, appx E)  
 Solvent (item 15, appx E)

Personnel Required

Utilities Equipment Repairer  
 MOS 52C

References

Item 2, table 2-1

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

1. Cabinet screen (1)		Inspect for cracks, breaks, or other damage or missing components or paint.	Notify the next higher level of maintenance.
-----------------------	--	---	--

SERVICE

WARNING

Solvent is toxic. Illness or skin damage may be caused by prolonged breathing of solvent fumes or excessive skin contact with the liquid. Ensure that there is adequate ventilation and avoid open flame or sparks when using flammable solvent.

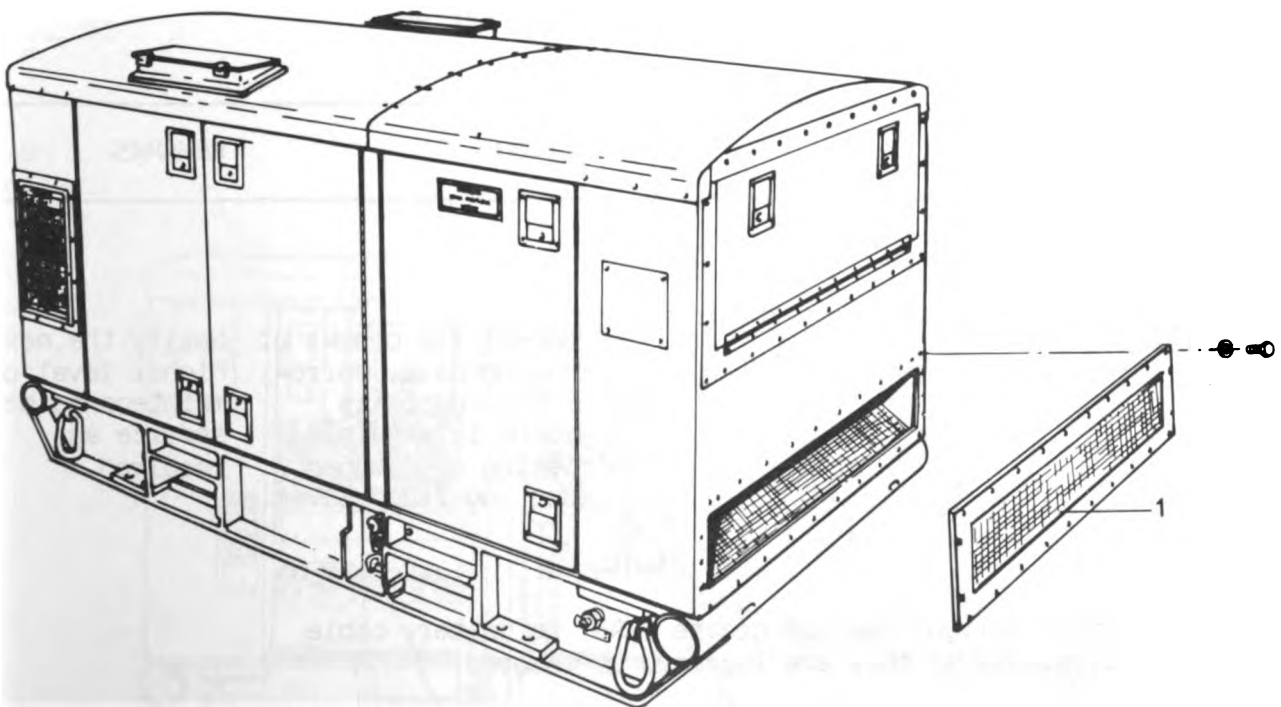
1. Cabinet screen	a. Clean with a rag dampened with solvent.
	b. Paint as reqd.

LOCATION	ITEM	ACTION	REMARKS
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SERVICE (cont)

NOTE

It may be necessary to clean the screen more often if the generator set is being operated in dusty or dirty areas.



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3-7. BATTERIES (4)

This task covers:

- a. Inspection      b. Service

INITIAL SETUP

Tools

- Battery filler (appx D)
- Rubber apron (appx D)
- Rubber gloves (appx D)

Materials/Parts

- Baking soda (item 1, appx E)
- Grease (GAA) (item 8, appx E)
- Rags (item 14, appx E)
- Distilled water (item 18, appx E)

Personnel Required

Utilities Equipment Repairer MOS 52C

References

Item 11, table 2-1

General Safety Instructions

Rubber apron and rubber gloves shall be worn when servicing batteries.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

1. Batteries

Inspect for cracks or leaking case, corrosion or deposits around terminals, missing or damaged caps and fluid level.	Notify the next higher level of maintenance or service as required.
--	---

NOTE

Apply a light coat of grease (GAA) to battery cable terminals if they are loosened or removed.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

SERVICE

WARNING

Battery electrolyte must be handled with care to avoid acid burns from spillage. Do not add electrolyte to a battery that has been previously filled. Use care not to splash electrolyte on skin when checking liquid level. Always use gloves and an apron to avoid burns when handling electrolyte. If electrolyte contacts skin or clothes, wash immediately. If electrolyte gets in eyes, flush with water immediately and seek medical attention.

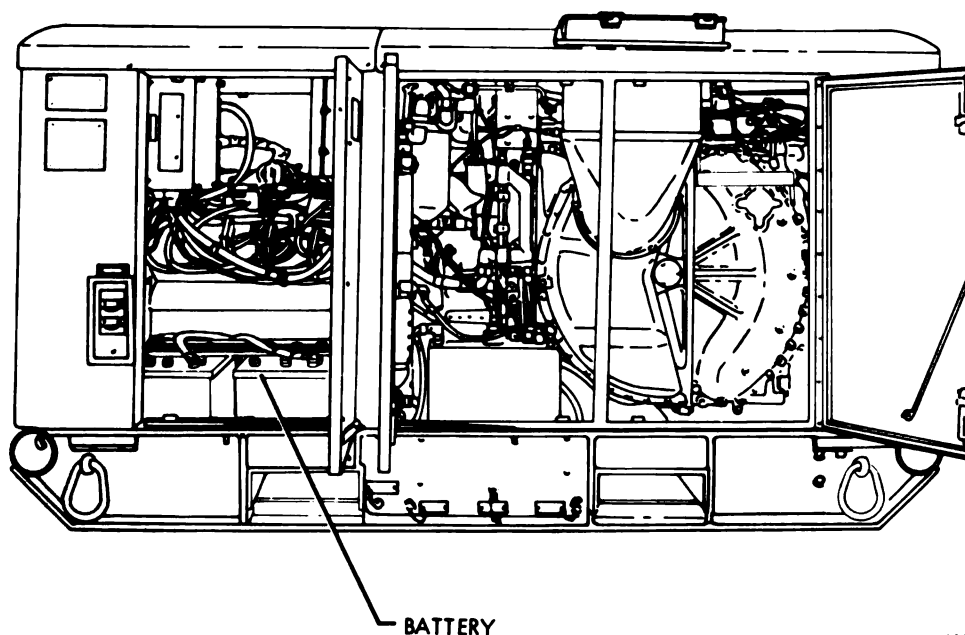
CAUTION

Over filling battery may cause damage to equipment.

2. Batteries

Add distilled water to level of bottom ring in filler neck.

If acid is splashed from battery, clean using a baking soda/water solution. Rinse with clean water. Dry with rags. Discard rags.



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## CHAPTER 4

### ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

#### WARNING

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

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## Section I. SERVICE UPON RECEIPT OF EQUIPMENT

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### 4-1. INSPECTING AND SERVICING THE GENERATOR SET

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a. Prior to installation and use, make the following checks and inspections:

(1) Manually check that exhaust duct covers (1) open and close freely. If damaged or not operating properly, replace (para 4-47).

(2) Check that enclosure doors (2) and outer panel (3) open and close properly. Repair or replace as required (para 4-15).

(3) Check 15-amp duplex receptacle (4) for security and damaged or missing components. Replace as required (para 4-30).

(4) Check engine and generator electrical wiring, harnesses, and terminals for proper installation and security. Tighten loose connections as required.

(5) Check batteries (5), battery cables, and terminals (6) for proper installation and security. Tighten or reconnect as required (para 4-21 or 4-22).

(6) Check battery fluid levels. Service as required (para 3-7).

#### CAUTION

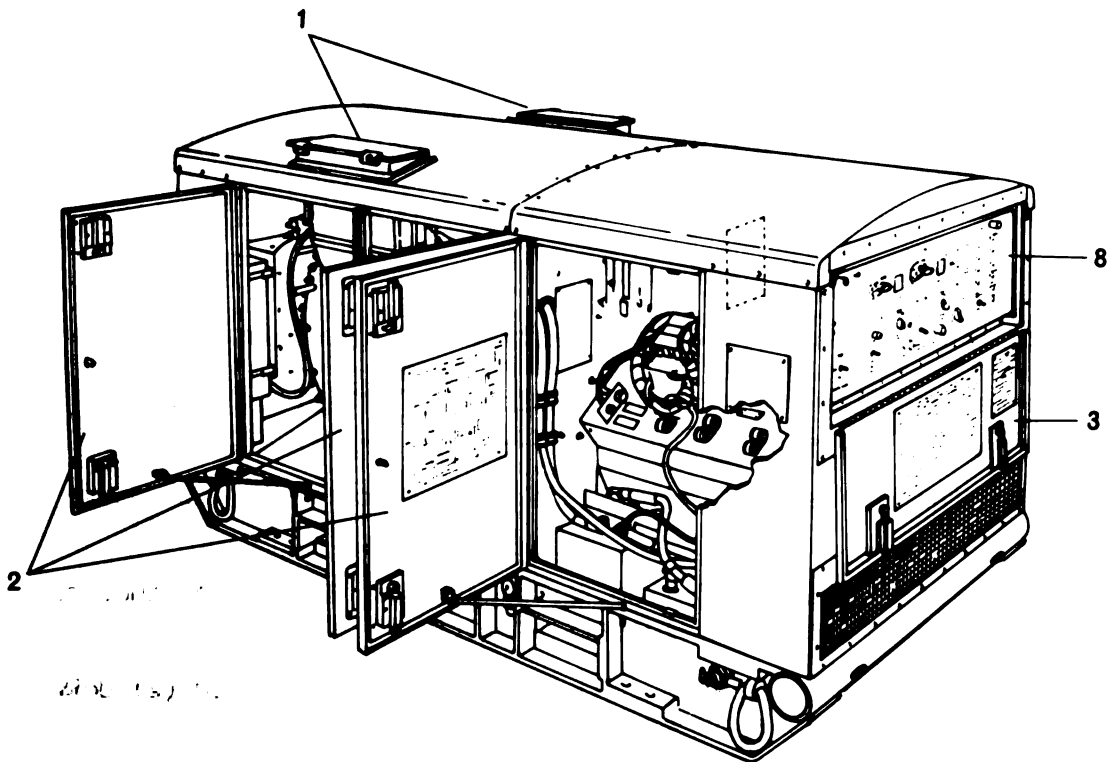
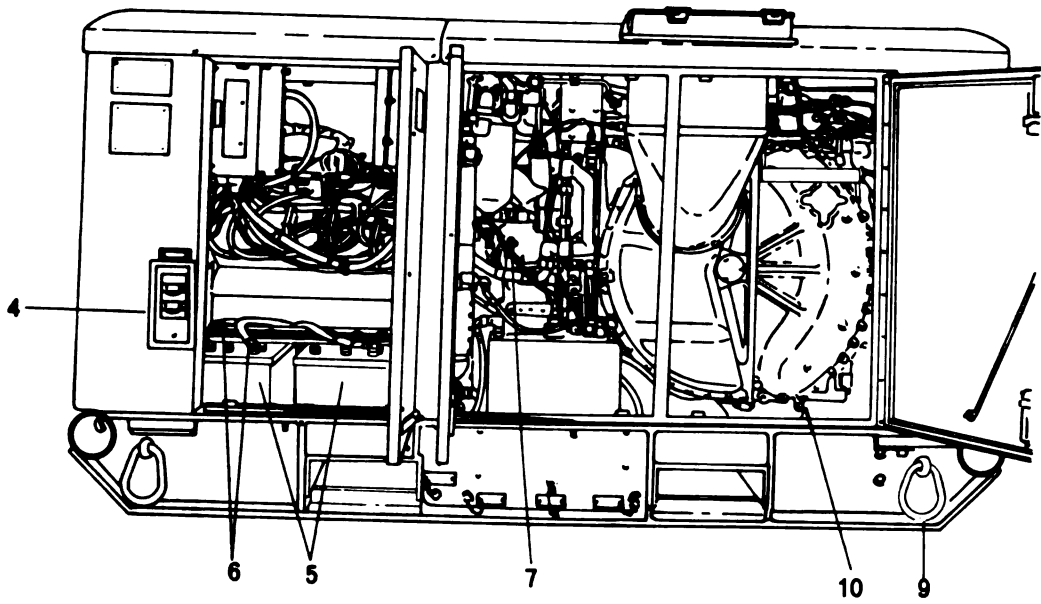
Before adding oil, check logbook to determine type of oil being used. Mixing oil types can damage equipment.

(7) Check engine oil level. Fill, as required, to the FULL mark on oil level gage (dip stick) (7) (para 4-45).

(8) Check the inner panel (8) for loose, damaged, or missing components.

(9) Inspect cargo rings (9) for damaged or missing components. Replace cargo rings, as required (para 4-20).

(10) Check sling and spreader bar (10) for damage and security in the base. Tighten hold-down nuts or replace sling as required (para 4-4 and appx C).



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4-2. INSTALLATION

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a. Set up requirements are as follows:

(1) Check all external air inlet and exit screens for blockage or damage. Remove any blockage or replace screens, as required (para 4-16 or 4-17).

(2) Check ground terminal stud (1) for security or damage. Tighten or replace, as required (para 4-28).

(3) Remove grounding rod (2) (appx C) and assemble as follows:

NOTE

Proper grounding of the set is one of the most important steps you will perform when installing the generator set. A properly grounded set helps to protect the operator from electrical shock hazard and is an important step to reduce any radio interference caused by operating the set. The ground terminal of the set may be grounded to an underground metallic water system, a driven metal rod, or a buried metal plate. A ground rod must have a minimum diameter of 5/8 inch (15.9 mm) if solid, or 3/4 inch (19 mm) if pipe, and must be driven to a minimum depth of 8 feet (2.44 m). A ground plate must have a minimum area of 9 square feet (0.86 m<sup>2</sup>) and be buried to a minimum depth of 4 feet (1.22 m). The ground lead must be at least No. 6 AWG copper wire.

(a). Loosen wing nut (3) and remove.

(b). Remove hold down clip (4) and lift grounding rod from set.

(c). Install driving stud (5) in coupling on one section of ground rod making sure that driving stud seats properly on rod section.

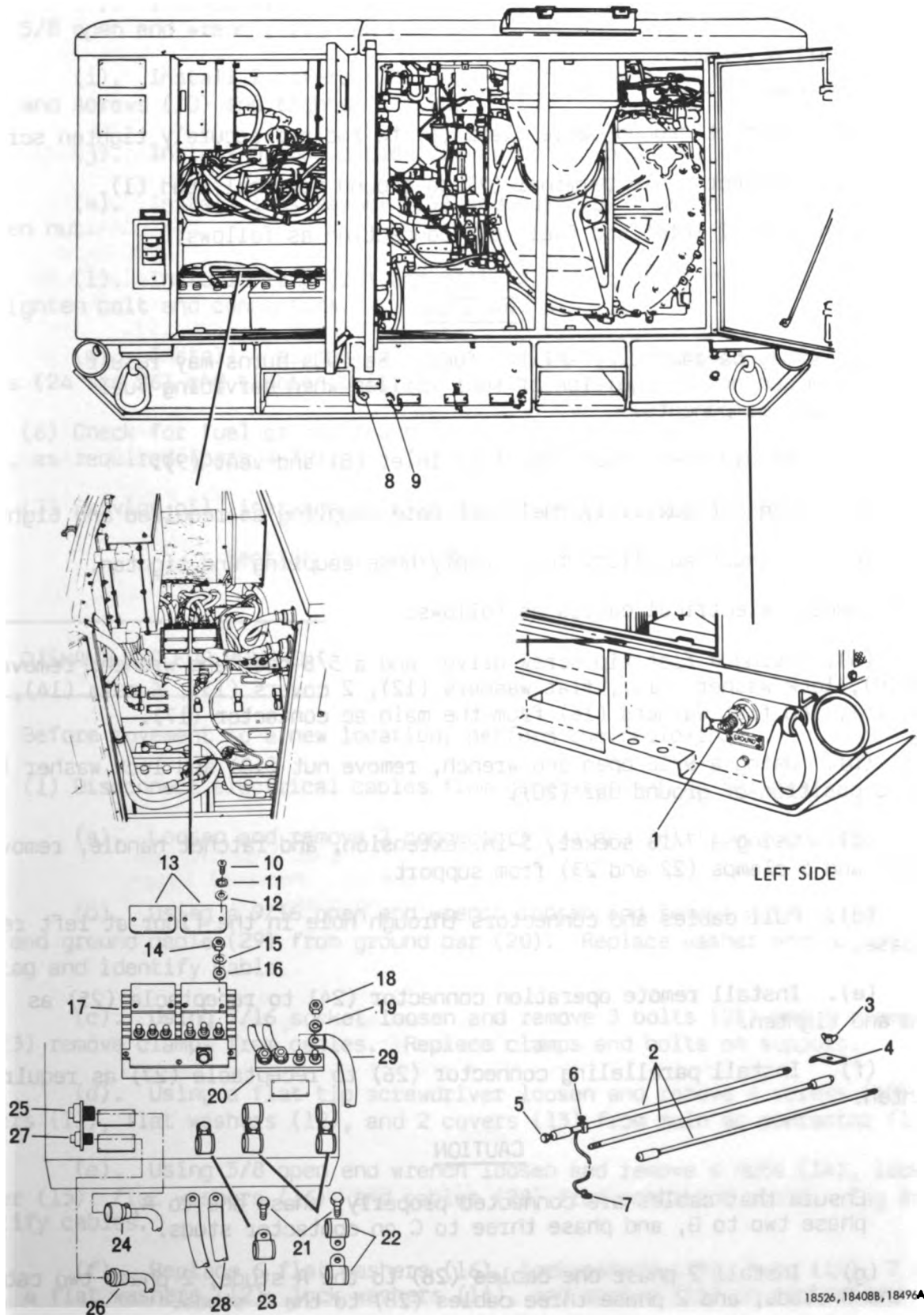
(d). Drive the rod section into ground until coupling is just above surface.

(e). Remove driving stud (5) from first section. Install another rod section on the first, making sure that it seats properly.

(f). Install driving stud on second section. Drive the rod (2) down until the second coupling is just above ground surface.

(g). Use a minimum of three sections of three foot (0.91 m) length ground rod. Add sections until rod (2) has been driven to a minimum depth of eight feet (2.44 m).

(h). Remove driving stud (5) and coupling from final section.



---

4-2. INSTALLATION (cont)

---

(i). Connect ground cable clamp (6) to rod and securely tighten screw.

(j). Connect cable terminal (7) to ground terminal stud (1).

(4) Connect fuel inlet and fuel vent connection as follows:

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

(a). Remove the 2 caps from fuel inlet (8) and vent (9).

(b). Connect auxiliary fuel vent hose coupling as required and tighten.

(c). Connect auxiliary fuel supply hose coupling and tighten.

(5) Connect electrical cables as follows:

(a). Using a flat tip screw driver and a 5/8 open end wrench, remove 4 screws (10), lock washers (11), flat washers (12), 2 covers (13), 6 nuts (14), lock washers (15), and flat washers (16) from the main ac contactor (17).

(b). Using a 9/16 open end wrench, remove nut (18) and lock washer (19) from third position of ground bar (20).

(c). Using a 7/16 socket, 5-in. extension, and ratchet handle, remove 3 bolts (21) and 5 clamps (22 and 23) from support.

(d). Pull cables and connectors through hole in the floor at left rear of set base.

(e). Install remote operation connector (24) to receptacle (25) as required and tighten.

(f). Install paralleling connector (26) to receptacle (27) as required and tighten.

CAUTION

Ensure that cables are connected properly, phase one to A, phase two to B, and phase three to C on contactor studs.

(g). Install 2 phase one cables (28) to the A studs, 2 phase two cables (28) to the B studs, and 2 phase three cables (28) to the C studs.

(n). Install six flat washers (16), lock washers (15) and nuts (14). Using 5/8 open end wrench, tighten nuts.

(i). Install 2 covers (13) and 4 flat washers (12), and lock washers (11), and screws (10) and tighten screws.

(j). Install ground cable (29) to ground bar (20) (third position) stud.

(k). Install lock washer (19) and nut (18). Using 9/16 open end wrench tighten nut.

(l). Install clamp (23) and bolt (21) on connector cables (24 and 26) and tighten bolt and connectors.

(m). Install 4 clamps (22) and 2 bolts (21) on cables (28) and connector cables (24 and 26) and tighten bolts.

(6) Check for fuel or oil leaks. Tighten or replace fuel fittings and/or lines, as required (para 4-39).

(7) Service oil lines and/or fittings as required (para 4-45).

## Section II. MOVEMENT TO A NEW WORKSITE

---

### 4-3. DISMANTLING FOR MOVEMENT

---

a. Before movement to a new location, perform the following:

(1) Disconnect electrical cables from generator set as follows:

(a). Loosen and remove 2 connectors (24 and 26) from receptacles (25 and 24).

(b). Using a 9/16 open end wrench loosen and remove nut (18) and washer (19) and ground cable (29) from ground bar (20). Replace washer and nut on stud and tag and identify cable.

(c). Using 7/16 socket loosen and remove 3 bolts (21) and 5 clamps (22 and 23) remove clamps from cables. Replace clamps and bolts on support.

(d). Using a flat tip screwdriver loosen and remove 4 screws (10), lock washers (11), flat washers (12), and 2 covers (13) from main ac contactor (17).

(e). Using 5/8 open end wrench loosen and remove 6 nuts (14), lock washer (15), flat washers (16), and cables (28) from contactor studs. Tag and identify cables.

(f). Replace 6 flat washers (16), lockwashers (15), nuts (14), 2 covers (13), 4 flat washers (12), lock washers (11), and screws (10) on contactor.

---

3. DISMANTLING FOR MOVEMENT (cont)

---

et. (g). Push disconnected cables (28 and 29) down through hole in bottom of

(2) Disconnect fuel supply line and fuel vent connections as follows:

(a). Disconnect auxiliary fuel supply hose coupling and replace cap (8).

(b). Disconnect fuel vent hose coupling and replace cap (9).

(3) Disconnect ground rod and cable terminal (7) from generator set.

(4) Remove ground rod (2) from ground, if at all possible. Disassemble ground and stow rod in the base of the generator set and secure with clip (4) and wing nut (3).

(5) Be sure all 6 access doors are closed and latched.

(6) Be sure inner and outer panels are both closed and latched.

b. Generator set is now ready for movement to a new worksite.

---

4-4. MOVEMENT OF GENERATOR SET

---

WARNING

Ensure that personnel stay clear of lifting or lowering operation where a lifting device is required. Personal injury or death may occur if object falls during operation.

CAUTION

Ensure that any equipment used to lift the generator set is rated at over 4850 lb (2200 kg). When handling the set with a fork lift, fork from side and at proper location only. Attempting to fork lift elsewhere could cause damage to the set.

NOTE

Two technicians required for this procedure.

a. Remove 4 nuts (from underneath) and the 4 generator mounting bolts from the skid.

**NOTE**

The 4 nuts and generator mounting bolts may not appear in all generator applications. They are not basic issue items or components of the generator set. The nuts and bolts are components of whatever system the generator set is used on.

b. Attach suitable lifting device to generator set as follows:

- (1) Attach suitable hoist (6) to lifting device and raise to proper height over set.
- (2) Attach 2 tie rope guide lines (11) to an opposite front and rear cargo rings (10).

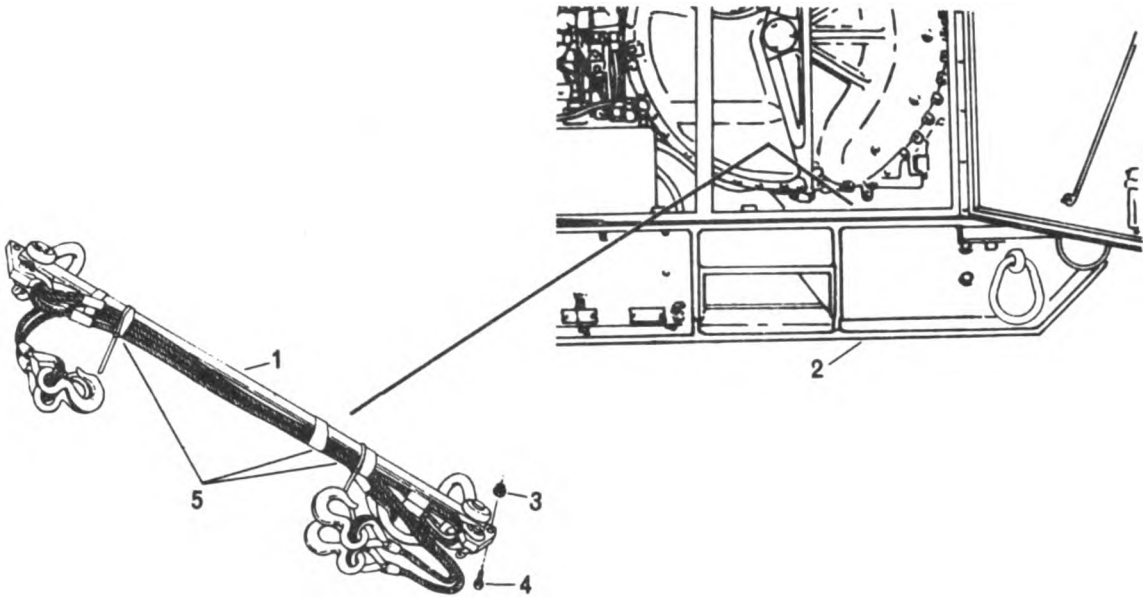
**WARNING**

Ensure that personnel stay clear of lifting or lowering operation where a lifting device is required. Personal injury or death may occur if object fails during operation.

- (3) Lift with hoist (6), using guide lines (11) to control swing.

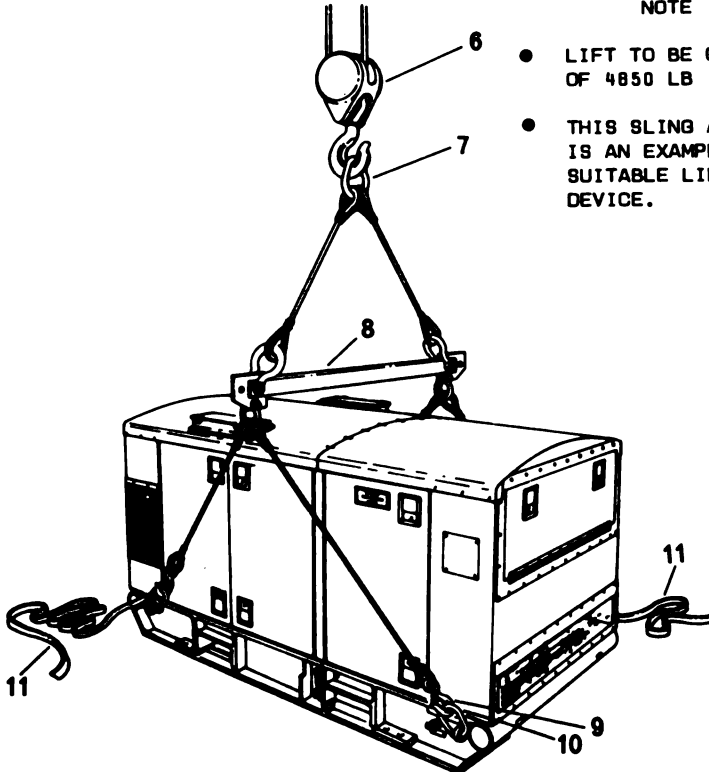


4-4. MOVEMENT OF GENERATOR SET (cont)



NOTE

- LIFT TO BE CAPABLE OF 4850 LB (2200 KG)
- THIS SLING ASSEMBLY IS AN EXAMPLE OF A SUITABLE LIFTING DEVICE.



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(5) Move to desired location.

(6) Tie down as required.

---

4-5. REINSTALLATION AFTER MOVEMENT

---

For reinstallation after movement see para 4-2.

### **Section III. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SPECIAL SUPPORT EQUIPMENT**

---

#### **4-6. TOOLS AND EQUIPMENT**

---

All tools used for organizational maintenance, except additionally authorized tools, are in the General Mechanic's Automotive Tool Kit SC 5180-90-C1-N26 (NSN 5180-00-177-7033). Additionally authorized tools are listed in appx D, additional authorization list. There are no special tools or test equipment required for organizational maintenance.

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#### **4-7. MAINTENANCE REPAIR PARTS**

---

Repair parts and equipment are listed and illustrated in TM 5-6115-598-24P.

### **Section IV. LUBRICATION INSTRUCTIONS**

---

#### **4-8. GENERAL**

---

Army personnel should refer to DA Pam 310-4 to ensure the latest edition of the LUBRICATION ORDER (LO 5-6115-598-12) is used.

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

---

#### **4-9. GENERAL**

---

a. To obtain long life and best performance from the generator set, you must adhere to the following PMCS. The time intervals given in table 4-1 are actual operating hours of the unit. Disarm battery power per para 4-21 and remove front roof per para 4-13 before performing any 1000-hours inspection.

b. Item Number Column. Item numbers in this column indicate the order in which PMCS should be performed. These numbers shall also be used as the item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

c. Interval Column. Times in the first column (H) are actual operating hours of the unit between inspections. An X in the second column(s) indicates a semiannual inspection.

d. Item to Be Inspected Column. Items to be inspected are listed in this column.

e. Procedures Column. The procedures column contains a brief description of the procedure by which the check is to be performed. This column contains the information required to accomplish the checks and services, including appropriate tolerances, adjustment limits, and instrument and gage readings, as required.

NOTE

If the checks and services indicate the equipment is not ready and the repairer cannot correct the condition, notify the next higher level of maintenance.

Table 4-1. Organizational Preventive Maintenance Checks and Services

H -- Hours

S -- Semiannually

Item No.	Interval		Items to Be Inspected	Procedures
	H	S		
1	100		Fuel Filters	Replace primary (para 4-33) and first and second secondary (para 4-34) fuel filters.

NOTE

The primary (catch and drain) fuel filter needs to be changed only as required.

2.	500		Fuel Transfer Pump	Service pump (para 4-32) by removing and cleaning or replacing the inlet filter screen as required.
3.	300		Fuel Nozzle	Replace nozzle (para 4-36) if nozzle orifices are clogged or damaged.
4.		X	Batteries	Clean terminals and battery posts.
5.	1000		T4 Thermocouple	Notify next higher level of maintenance for inspection and test.
5.1.	1500		T4 Thermocouple	Notify next higher level of maintenance for replacement.
6.	1000		Spark Igniter	Remove per para 4-41. Replace igniter if ceramic is cracked or broken. Replace igniter if center electrode is eroded to level of surrounding ceramic. Replace igniter if center electrode is excessively burned or has buildup of carbon deposits.

4-9. GENERAL (cont)

Table 4-1. Organizational Preventive Maintenance Checks and Services (cont)

Item No.	Interval		Items to be Inspected	Procedures
	H	S		
7.		X	Oil Cooler	Inspect for oil leaks and damaged or missing components. Blow out dirt and debris with compressed air.
NOTE				
It may be necessary to clean oil cooler more often if the generator set is being operated in dusty or dirty areas.				
8.	1000		Burner Assy	Notify next higher level of maintenance for inspection.
<u>CAUTION</u>				
Lube oils MIL-L-23699 and MIL-L-7808 will not mix. Engine failure may occur if the lubrication system is not properly flushed when changing from one type oil to the other.				
9.	3000		Engine Oil and Filter Element Change	Change oil per para 4-45. Change filter per para 4-42.  If the lube oil is being replaced with a different type oil, flush the lubrication system per para 4-45.  If the engine has been changed due to a suspected internal failure, replace the oil filter after four hours of normal operation per para 4-42. Inspect the old filter for metal particles. If particles are found, change the oil per para 4-45. Repeat the procedure every four hours of engine operation until no particles are found in the filter. If metal particles are still found after 20 hours of operation, notify the next higher level of maintenance.
NOTE				
Drain oil immediately after a unit has been run for some time. Most of the sediment will be in suspension and, therefore, will drain readily.				

## Section VI. ORGANIZATIONAL TROUBLESHOOTING

### 4-10. GENERAL

a. This section consists of an organizational troubleshooting table 4-2 and a troubleshooting index. The index lists malfunctions in alphabetical order and the number of each malfunction. Table 4-2 lists these malfunctions by malfunction number. Troubles observed during operation of the generator set may be found by locating malfunction symptoms in the alphabetical index. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or cannot be corrected by listed corrective actions, notify your supervisor.

#### NOTE

Before you use this table, be sure you have performed all applicable operating checks and verified that a malfunction exists. When a corrective action is performed, verify that the action has corrected the malfunction.

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Table 4-2. Organizational Troubleshooting

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MALFUNCTION  
 TEST OR INSPECTION  
 CORRECTIVE ACTION

---

WARNING

Remove watches, rings, and all other jewelry while working on or near this equipment.

1. PANEL LAMP(S) DO(ES) NOT COME ON WHEN PANEL LIGHTS SWITCH IS MOVED TO ON POSITION

Check panel light bulb(s).

- a. If bulb is does not light, replace bulb (para 4-49).
- b. If bulb is normal, notify next higher level of maintenance.

2. ENGINE CRANKS WHEN MASTER SWITCH IS MOVED TO RUN POSITION

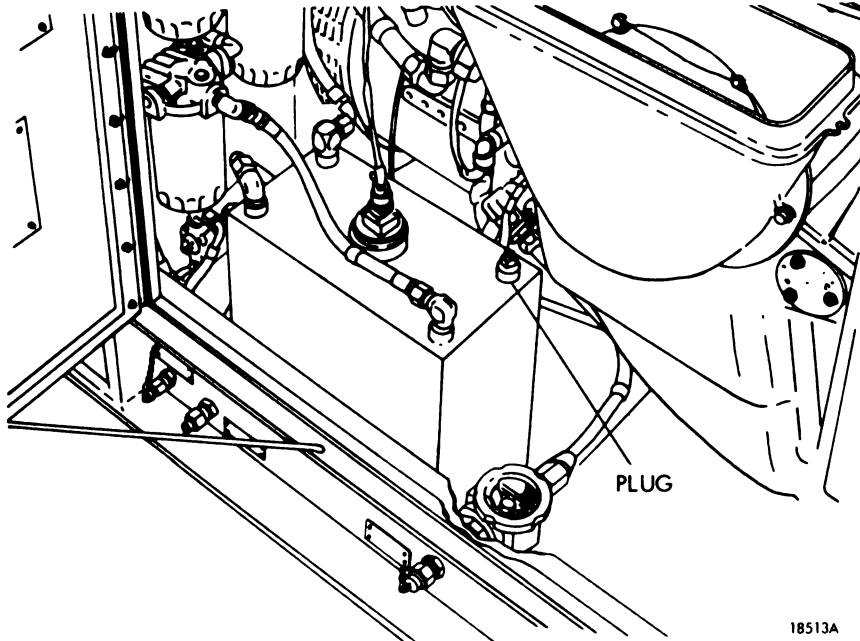
Move MASTER switch (S1) to OFF position to stop cranking and notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3. OVER TEMP LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION		Move MASTER switch (S1) to OFF position and notify next higher level of maintenance.
4. LOW LUBE PRESSURE LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION		Move MASTER switch (S1) to OFF position and notify next higher level of maintenance.
5. LOW FUEL LAMP IS ON WHEN MASTER SWITCH IS IN RUN POSITION		<p>Step 1. Disconnect REMOTE OPERATION harness connector from receptacle (J7). Move MASTER switch (S1) to OFF position, then to RUN position.</p> <ul style="list-style-type: none"> <li>a. If the LOW FUEL lamp (DS12) is off, the problem is external of the generator set.</li> <li>b. If the LOW FUEL lamp is on, do step 2.</li> </ul> <p>Step 2. Check fuel supply to the generator set.</p> <ul style="list-style-type: none"> <li>a. If fuel supply is low, do step 3.</li> <li>b. If fuel supply is normal, do step 4.</li> </ul> <p>Step 3. Refill fuel supply tank. Turn MASTER switch (S1) to RUN position and wait two minutes for day tank to fill above low fuel level float. Move MASTER switch to OFF position, then to RUN position.</p> <p>If low fuel lamp is on, move MASTER switch (S1) to OFF position, do step 4.</p> <p>Step 4. Check for clogged inlet screen at the fuel transfer pump (para 4-32).</p> <ul style="list-style-type: none"> <li>a. If clogged, clean inlet screen.</li> <li>b. If inlet screen is clean, do step 5.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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18513A

Step 5. Move MASTER switch (S1) to RUN position. Wait 10 seconds; then place one hand on the fuel transfer pump to determine if it is running.

- a. If fuel transfer pump is running, do step 6.
- b. If fuel transfer pump is not running, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

Step 6. Using a 3/8-in. allen head wrench, remove plug from top right of day tank. Verify that there is fuel in the day tank.

- a. If there is no fuel in the day tank, change primary and 1st secondary fuel filters (para 4-33 and para 4-34).
- b. If there is fuel in day tank, replace plug in top of day tank and tighten. Notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
6. SHORT CIRCUIT LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION	Step 1. Determine if UNDER FREQUENCY lamp (DS9) is off.	<ul style="list-style-type: none"> <li>a. If UNDER FREQUENCY lamp is on, do step 2.</li> <li>b. If UNDER FREQUENCY lamp is off, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
	Step 2. Determine if BATTLE SHORT switch (S3) is in OFF position.	<ul style="list-style-type: none"> <li>a. If BATTLE SHORT switch is in ON position, move to OFF position.</li> <li>b. If BATTLE SHORT switch is in OFF position, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
7. REVERSE POWER LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION	Move LAMP RESET switch (S8) to RESET position.	<ul style="list-style-type: none"> <li>a. If REVERSE POWER lamp (DS7) is off, there is no malfunction.</li> <li>b. If REVERSE POWER lamp (DS7) is on, notify next higher level of maintenance.</li> </ul>
8. UNDER VOLTAGE LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION	Step 1. Move LAMP RESET switch (S8) to RESET position.	<ul style="list-style-type: none"> <li>a. If UNDER VOLTAGE lamp (DS8) is off, there is no malfunction.</li> <li>b. If UNDER VOLTAGE lamp is on, do step 2.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
8. UNDER VOLTAGE LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION (cont)	Step 2. Determine if UNDER FREQUENCY lamp (DS9) is off.	<ul style="list-style-type: none"> <li>a. If UNDER FREQUENCY lamp is on, do step 3.</li> <li>b. If UNDER FREQUENCY lamp is off, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
	Step 3. Determine if BATTLE SHORT switch (S3) is in OFF position.	<ul style="list-style-type: none"> <li>a. If BATTLE SHORT switch is in ON position, move to OFF position.</li> <li>b. If BATTLE SHORT switch is in OFF position, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
9. OVER VOLTAGE LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION		Move MASTER switch (S1) to OFF position and notify next higher level of maintenance.
10. OVERLOAD LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION		Move MASTER switch (S1) to OFF position and notify next higher level of maintenance.
11. AC INTERRUPT LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION		Move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
12. BATTLE SHORT LAMP COMES ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION	Step 1. Disconnect REMOTE OPERATION harness connector from receptacle (J7). Move MASTER switch (S1) to OFF position, then to RUN position.	<ul style="list-style-type: none"> <li>a. If BATTLE SHORT lamp (DS5) is off, the problem is external of the generator set.</li> <li>b. If BATTLE SHORT lamp stays on, do step 2.</li> </ul>
	Step 2. Move MASTER switch (S1) to OFF position. Remove wires 39A, 39B, and 39C from BATTLE SHORT switch (S3), terminal 3. Move BATTLE SHORT switch to OFF position and MASTER switch to RUN position. Check voltage at terminal 3 of BATTLE SHORT switch. There should be no voltage.	<ul style="list-style-type: none"> <li>a. If there is voltage, replace BATTLE SHORT switch (para 4-48).</li> <li>b. If there is no voltage, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
13. BATTERY LAMP DOES NOT COME ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
14. UNDER FREQUENCY LAMP DOES NOT COME ON WHEN MASTER SWITCH IS MOVED TO RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

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MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

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15. OVER TEMP LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS MOVED TO RUN POSITION

Check press-to-test lamp bulb.

- a. If bulb does not light, replace bulb (para 4-49).
- b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

16. LOW LUBE PRESSURE LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION

Check press-to-test lamp bulb.

- a. If bulb does not light, replace bulb (para 4-49).
- b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

17. HIGH LUBE TEMPERATURE LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION

Check press-to-test lamp bulb.

- a. If bulb does not light, replace bulb (para 4-49).
- b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

18. LOW FUEL LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION

Check press-to-test lamp bulb.

- a. If bulb does not light, replace bulb (para 4-49).
- b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
19. BATTERY LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION--ENGINE RUNNING	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
20. SHORT CIRCUIT LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
21. REVERSE POWER LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
22. UNDER VOLTAGE PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Move BATTLE SHORT switch (S3) to the ON position. Wait 10 seconds for time delay relay (TD2) to time out. (Check press-to-test lamp bulb.)	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move BATTLE SHORT switch and MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>



Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
23. OVER VOLTAGE LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
24. UNDER FREQUENCY LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
25. OVERLOAD LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulo is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
26. AC INTERRUPT LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
27. BATTLE SHORT LAMP PRESS-TO-TEST DOES NOT OPERATE WHEN MASTER SWITCH IS IN RUN POSITION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
28. ENGINE DOES NOT CRANK	Step 1. Check if oil cooler fan can be turned freely by hand.	<ul style="list-style-type: none"> <li>a. If oil cooler fan can be turned freely, do step 2.</li> <li>b. If fan cannot be turned, notify next higher level of maintenance.</li> </ul>
	Step 2. Move MASTER switch (S1) to RUN position. Check input voltage to circuit breaker (CB8) (para 4-27). Voltage should be 24 Vdc minimum.	<ul style="list-style-type: none"> <li>a. If voltage is correct do step 3.</li> <li>b. If voltage is not correct, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>
	Step 3. Check output voltage at circuit breaker (CB8) (para 4-27). Voltage should be 24 Vdc minimum.	<ul style="list-style-type: none"> <li>a. If voltage is correct, do step 4.</li> <li>b. If voltage is not correct, replace circuit breaker (CB8) (para 4-27).</li> </ul>
	Step 4. Move MASTER switch (S1) to OFF position. Check voltage at starter solenoid battery positive terminal (para 4-40). Voltage should be 24 Vdc minimum.	<ul style="list-style-type: none"> <li>a. If voltage is correct, do step 5.</li> <li>b. If voltage is low, refer to malfunction 29.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

## MALFUNCTION

## TEST OR INSPECTION

## CORRECTIVE ACTION

## 28. ENGINE DOES NOT CRANK (cont)

Step 5. Hold MASTER switch (S1) in START position. Check voltage at starter solenoid output post (para 4-40). Voltage should be 10 Vdc minimum.

- a. If voltage is correct, replace starter (para 4-40) and attempt another start.
- b. If voltage is low, or starter solenoid chatters on and off, go to malfunction 29.
- c. If voltage is 0, do step 6.

Step 6. Hold MASTER switch (S1) in START position. Check voltage at starter solenoid switch post (wire 8A) (para 4-40). Voltage should be 10 Vdc minimum.

- a. If voltage is correct, replace starter (para 4-40) and attempt another start.
- b. If voltage is not correct, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

## 29. ENGINE CRANKS WHEN SLAVE CABLE IS PLUGGED IN

Step 1. Connect a 24 Vdc external power source to slave receptacle (J11) and start engine.

- a. If engine starts, remove external power source and run engine for 30 minutes to charge batteries.
- b. If engine does not crank, move MASTER switch (S1) to OFF position, remove external power source, and do step 2.

Step 2. Disarm battery power (para 4-21). Disconnect diode (D13) from circuit breaker (CB8) input terminal (para 4-21) (F01-3). Check resistance across circuit breaker (CB8) (para 4-27).

- a. If circuit breaker (CB8) is open, replace breaker (para 4-27).
- b. If circuit breaker (CB8) is normal, notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

## MALFUNCTION

## TEST OR INSPECTION

## CORRECTIVE ACTION

## 30. ENGINE CRANKS WHEN SLAVE CABLE IS PLUGGED IN--MASTER SWITCH IN OFF OR RUN POSITION

- Step 1. Remove 24 Vdc external power source from slave receptacle (J11) to stop cranking. Disconnect engine harness connection (P13) at engine relay panel (A10). Connect 24 Vdc external power source to slave receptacle (J11).
- a. If engine cranks, remove external power supply and do step 2.
  - b. If engine does not crank, remove external power supply and notify next higher level of maintenance.
- Step 2. Disconnect wire 8A from starter solenoid switch post (para 4-40). Correct 24 Vdc external power source to slave receptacle (J11).
- a. If engine cranks, remove external power supply and replace starter assembly (para 4-40).
  - b. If engine does not crank, remove external power supply and notify next higher level of maintenance.

## 31. ENGINE CRANKS--THEN SHUTS DOWN (NO LIGHTOFF)

WARNING

Do not touch spark igniter or igniter lead while motoring engine. High voltage spark could cause serious injury.

- Step 1. Remove spark igniter (E1) (para 4-41). Reconnect igniter lead (W11) and lay spark igniter on engine block such that body of igniter is grounded. Close manual fuel shutoff valve. Start engine and look for bright blue arc at tip of igniter.
- a. If there is no arc, move MASTER switch (S1) to OFF position and do step 2.
  - b. If there is an arc, move MASTER switch (S1) to OFF position and do step 3.
- Step 2. Disconnect engine harness connector (P16) from ignition exciter (A9). Check input voltage to ignition exciter at connector P16, pin B (positive) and pin A (negative). Voltage should be 10-30 Vdc when cranking.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
31. ENGINE CRANKS--THEN SHUTS DOWN (NO LIGHTOFF) (cont)	<ul style="list-style-type: none"> <li>a. If voltage is correct, individually replace spark igniter, ignition lead and ignition exciter until arc is observed (para 4-41).</li> <li>b. If voltage is not correct, move MASTER switch (S1) to OFF position, open manual fuel shutoff valve and notify next higher level of maintenance.</li> </ul>	NOTE
	Voltage to the 3-way fuel solenoid valve is only present for approximately six seconds after engine start before timing out on no lightoff shutdown.	
	Step 3. Hold MASTER switch (S1) in START position and check voltage at 3-way fuel solenoid valve (L2). Voltage should be 10 Vdc minimum.	<ul style="list-style-type: none"> <li>a. If voltage is correct, do step 4.</li> <li>b. If voltage is not correct, move MASTER switch (S1) to OFF position, open manual fuel shutoff valve and notify next higher level of maintenance.</li> </ul>
	Step 4. Check for fuel flow at fuel metering valve outlet -- Disconnect fuel line at inlet of the 3-way solenoid valve. Place a suitable container under open line. Crank engine until a no lightoff shutdown occurs. Total fuel flow should be 40-85 cc (1.4-2.9 fl oz).	<ul style="list-style-type: none"> <li>a. If fuel flow is correct, do step 5.</li> <li>b. If fuel flow is low, replace 2nd secondary fuel filter element (para 4-34) and do step 8.</li> <li>c. If fuel flow is high, notify next higher level of maintenance.</li> </ul>
	Step 5. Check fuel flow at outlet of 3-way solenoid valve -- Reconnect fuel line at inlet. Disconnect pilot fuel line from union. Loosen other end of fuel line. Connect drain hose and route to a suitable container. Crank engine until no lightoff shutdown occurs. Total fuel flow should be 40-85 cc (1.4-2.9 fl oz).	

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
31. ENGINE CRANKS--THEN SHUTS DOWN (NO LIGHTOFF) (cont)		
		<ul style="list-style-type: none"> <li>a. If fuel flow is correct, do step 6.</li> <li>b. If fuel flow is low or there is no flow, replace 3-way solenoid valve (para 4-35).</li> </ul>
	<p>Step 6. Check fuel flow from flow divider valve -- Disconnect pilot and main fuel lines. Cap union on the valve. Connect drain hose to elbow on valve and route to a suitable container. Crank engine until no lightoff shutdown occurs. There should be no flow.</p>	<ul style="list-style-type: none"> <li>a. If there is no flow, do step 7.</li> <li>b. If there is fuel flow, replace flow divider valve (para 4-35).</li> </ul>
	<p>Step 7. Remove the fuel line between the 2-way and 3-way solenoid valves. Attach a drain hose to each open fitting and route to suitable container. Crank the engine and check for fuel drainage while cranking as follows:</p>	<p>NOTE</p>
		<p>Drainage is normal after cranking.</p>
		<ul style="list-style-type: none"> <li>a. If fuel flows through the 2-way solenoid valve while the engine is cranking, replace the valve (para 4-35).</li> <li>b. If fuel flows through the 3-way solenoid valve while the engine is cranking, replace the valve (para 4-35).</li> <li>c. If there is no flow through either valve while the engine is cranking, replace the fuel nozzle (para 4-36).</li> </ul>
	<p>Step 8. Remove and test inlet check valve (para 4-38). Check fuel metering valve flow per step 4.</p>	<ul style="list-style-type: none"> <li>a. If fuel flow is correct, do step 9.</li> <li>b. If fuel flow is not correct, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

31. ENGINE CRANKS--THEN SHUTS DOWN (NO LIGHTOFF) (cont)

Step 9. Replace the flow divider valve (para 4-35). Start engine.

If engine will not start, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.

32. ENGINE CRANKS--THEN SHUTS DOWN AFTER LIGHTOFF WITH NO INDICATOR LIGHTS ON

CAUTION

More than three unsuccessful start attempts in a row can cause starter damage. Wait 15 minutes to allow starter to cool before repeating start attempts.

NOTE

Try several start attempts, especially after fuel filter servicing to eliminate air from the fuel system.

Check fuel system per malfunction 31, steps 4 through 8.

33. ENGINE CRANKS--BOOMS AT LIGHTOFF

Step 1. Disconnect pilot flow fuel line at fuel nozzle. Loosen fitting on other end and position line to drain into a cup or other container. Place the MASTER switch to START and crank the engine until a shutdown occurs (approximately 6 seconds). Total fuel flow into cup from pilot fuel line should be 40-85 cc (1.4-2.9 fl oz).

- a. If fuel flow is normal, do step 2.
- b. If fuel flow is high, notify next higher level of maintenance.

Step 2. Remove fuel nozzle (para 4-36) and check for damage or heavy carbon deposits.

- a. If damaged or heavily carboned, replace fuel nozzle (para 4-36).
- b. If nozzle is normal, notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
34. ENGINE HAS EXCESSIVE NOISE AND/OR VIBRATION DURING START		
Check for clogged or damaged air inlets which could cause stalling or surging of compressor.		
<ul style="list-style-type: none"> <li>a. If clogged, remove material causing restriction.</li> <li>b. If damaged or if condition remains, notify next higher level of maintenance.</li> </ul>		
35. ENGINE FAILS TO ACCELERATE OR LAGS DURING START		
Step 1. Connect a 24 Vdc external power source to slave receptacle (J11) and start engine.		
<ul style="list-style-type: none"> <li>a. If engine starts, run engine for 30 minutes to charge batteries.</li> <li>b. If engine does not start, do step 2.</li> </ul>		
Step 2. Replace primary and secondary fuel filter elements (para 4-33 and para 4-34). Start engine.		
If condition has not been corrected, move MASTER switch (S1) to OFF position and notify next higher level of maintenance.		
Step 3. Remove fuel nozzle (para 4-36). Inspect nozzle for carbon deposits or damage.		
<ul style="list-style-type: none"> <li>a. If fuel nozzle is damaged or has carbon deposits, replace fuel nozzle (para 4-36).</li> <li>b. If fuel nozzle is normal, reinstall fuel nozzle (para 4-36) and do step 4.</li> </ul>		
Step 4. Test 3-way and 2-way fuel solenoid valves (para 4-35).		
<ul style="list-style-type: none"> <li>a. If fuel solenoid valve(s) are at fault, replace valve(s) (para 4-35).</li> <li>b. If fuel solenoid valves are normal, notify next higher level of maintenance.</li> </ul>		



Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
36. ENGINE ACCELERATES TO 100% SPEED WHEN IDLE RUN SWITCH IS IN IDLE POSITION		Shut down the generator set and notify next higher level of maintenance.
37. ENGINE FAILS TO ACCELERATE PAST IDLE--IDLE RUN SWITCH IN RUN POSITION		Shut down the generator set and notify next higher level of maintenance.
38. ENGINE SHUTS DOWN--OVER TEMP LAMP COMES ON		<p>Step 1. Check air inlet screens for blockage.</p> <ul style="list-style-type: none"> <li>a. Remove blockage.</li> <li>b. If no blockage, do step 2.</li> </ul> <p>Step 2. Check for dirty engine inlet air cleaners.</p> <ul style="list-style-type: none"> <li>a. If heavy deposits are detected, replace air cleaner(s) (para 4-18).</li> <li>b. If no deposits are detected, do step 3.</li> </ul>
NOTE		
If ambient air temperature increases, it can change engine performance.		
		<p>Step 3. Check system load (kW) on generator set.</p> <ul style="list-style-type: none"> <li>a. If load is above 150 kW, reduce load or parallel with another generator set.</li> <li>b. If load is below 150 kW, do step 4.</li> </ul>
		<p>Step 4. Check for loose thermocouple harness connection.</p> <ul style="list-style-type: none"> <li>a. If loose, tighten harness connection.</li> <li>b. If connection is normal, do step 5.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

## MALFUNCTION

## TEST OR INSPECTION

## CORRECTIVE ACTION

## 38. ENGINE SHUTS DOWN--OVER TEMP LAMP COMES ON (cont)

- Step 5. Check for binding of gasifier rotor system by turning oil cooler fan by hand. It should turn freely and coast to a stop.
- a. If oil cooler fan does not turn freely, an engine failure is indicated. Notify next higher level of maintenance.
  - b. If fan turns freely, notify next higher level of maintenance.

## 39. ENGINE SHUTS DOWN--LOW LUBE PRESSURE LAMP COMES ON

Step 1. Check engine oil level.

- a. If oil level is low, add oil as required (para 4-45).
- b. If oil level is normal, do step 2.

Step 2. Check for oil leaks.

- a. If there are oil leaks, repair as necessary.
- b. If there are no oil leaks, do step 3.

Step 3. Check resistance of low oil pressure switch from pin A to pin B with engine shut down (para 4-25). Resistance should be 0 to 1 ohm. Check for short circuit from pin A to ground (body of switch). Resistance should be 10,000 ohms minimum. Start engine and repeat continuity test from pin A to pin B. Resistance should be infinity.

- a. If defective, replace low oil pressure switch (para 4-25).
- b. If low oil pressure switch is normal, do step 4.

Step 4. Replace oil filter element (para 4-42).

If low lube pressure shutdown occurs, notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
40. ENGINE SHUTS DOWN--HIGH LUBE TEMPERATURE LAMP COMES ON		
	Step 1. Check for blockage of the ventilation air inlet screen.	<ul style="list-style-type: none"> <li>a. Remove blockage.</li> <li>b. If no blockage, do step 2.</li> </ul>
	Step 2. Check for debris on oil cooler.	<ul style="list-style-type: none"> <li>a. Clean cooler (para 4-43).</li> <li>b. If cooler is normal, do step 3.</li> </ul>
	Step 3. Check that oil level is not over the full mark.	<ul style="list-style-type: none"> <li>a. Drain oil to bring to correct level (para 4-45).</li> <li>b. If oil level is normal, do step 4.</li> </ul>
	Step 4. Check that oil hoses to oil filter and cooler are not twisted or kinked, thus restricting flow.	<ul style="list-style-type: none"> <li>a. If there are restrictions, notify next higher level of maintenance.</li> <li>b. If there are no restrictions, do step 5.</li> </ul>
	Step 5. Check resistance to ground on oil temp switch electrical connector stud after it cools to handling temperature. Resistance to ground should be infinity.	<ul style="list-style-type: none"> <li>a. If resistance is less than 10,000 ohms, replace thermo switch (para 4-26).</li> <li>b. If no resistance is correct, note fault lamp and notify next higher level of maintenance.</li> </ul>
41. VOLTMETER SHOWS IMPROPER VOLTAGE--DIGITAL VOLTMETER AND VOLTAGE REGULATOR AND MONITOR ASSEMBLY READINGS DIFFER MORE THAN 6 VOLTS		Shut down the generator set and notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
42. VOLTAGE REGULATOR AND MONITOR ASSEMBLY WILL NOT SCAN WHEN SCAN IS SELECTED		Shut down the generator set and notify next higher level of maintenance.
43. VOLTAGE REGULATOR AND MONITOR ASSEMBLY SCANS WHEN HOLD IS SELECTED		Shut down the generator set and notify next higher level of maintenance.
44. VOLTAGE REGULATOR AND MONITOR ASSEMBLY SHOWS IMPROPER FREQUENCY (HZ)--FREQUENCY LESS THAN 380 HZ--UNDER FREQUENCY LAMP COMES ON.		<p>Step 1. Shut down the generator set.</p> <ul style="list-style-type: none"> <li>a. Replace primary and two secondary fuel filter elements (para 4-33 and para 4-34).</li> <li>b. If malfunction is not corrected, do step 2.</li> </ul> <p>Step 2. Remove and inspect fuel nozzle (para 4-36).</p> <ul style="list-style-type: none"> <li>a. Replace fuel nozzle if damaged or has carbon deposits (para 4-36).</li> <li>b. If malfunction is not corrected, do step 3.</li> </ul> <p>Step 3. Remove the fuel line between the 2-way and 3-way solenoid valves. Attach a drain hose to each open fitting and route to suitable container. Start the engine and check for fuel drainage as follows:</p> <ul style="list-style-type: none"> <li>a. If fuel flows through the 2-way solenoid valve while the engine is running, replace the valve (para 4-35).</li> <li>b. If fuel flows through the 3-way solenoid valve while the engine is running, replace the valve (para 4-35).</li> <li>c. If there is no leakage from either valve, notify next higher level of maintenance.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
45. VOLTAGE REGULATOR AND MONITOR ASSEMBLY SHOWS IMPROPER FREQUENCY (HZ)--FREQUENCY 380-410 HZ		<p>Step 1. Using frequency adjust rheostat, attempt to adjust frequency to 400 Hz.</p> <p>If unable to adjust frequency to 400 Hz, do step 2.</p> <p>Step 2. Replace primary and two secondary fuel filters (para 4-33 and 4-34).</p> <p>If malfunction is not corrected, do step 3.</p> <p>Step 3. Remove and inspect fuel nozzle (para 4-36).</p> <p>a. Replace fuel nozzle if damaged or has carbon deposits (para 4-36).</p> <p>b. If malfunction is not corrected, do step 4.</p> <p>Step 4. Remove the fuel line between the 2-way and 3-way solenoid valves. Attach a drain hose to each open fitting and route to suitable container. Start the engine and check for fuel drainage as follows:</p> <p>a. If fuel flows through the 2-way solenoid valve while the engine is running, replace the valve (para 4-35).</p> <p>b. If fuel flows through the 3-way solenoid valve while the engine is running, replace the valve (para 4-35).</p> <p>c. If there is no leakage from either valve, shut down generator set and notify next higher level of maintenance.</p>
46. VOLTAGE REGULATOR AND MONITOR ASSEMBLY READOUT HUNTS OR FLUCTUATES MORE THAN ONE (1) HZ		<p>Step 1. Replace primary and two secondary fuel filters (para 4-33 and para 4-34).</p> <p>If malfunction is not corrected, do step 2.</p>

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
46. VOLTAGE REGULATOR AND MONITOR ASSEMBLY READOUT HUNTS OR FLUCTUATES MORE THAN ONE (1) HZ (cont)	Step 2. Remove and inspect fuel nozzle (para 4-36).	<ul style="list-style-type: none"> <li>a. Replace fuel nozzle if damaged or has carbon deposits (para 4-36).</li> <li>b. If malfunction is not corrected, do step 3.</li> </ul>
	Step 3. Remove the fuel line between the 2-way and 3-way solenoid valves. Attach a drain hose to each open fitting and route to suitable container. Start the engine and check for fuel drainage as follows:	<ul style="list-style-type: none"> <li>a. If fuel flows through the 2-way solenoid valve while the engine is running, replace the valve (para 4-35).</li> <li>b. If fuel flows through the 3-way solenoid valve while the engine is running, replace the valve (para 4-35).</li> <li>c. If there is no leakage from either valve, shut down generator set and notify next higher level of maintenance.</li> </ul>
47. VOLTAGE REGULATOR AND MONITOR ASSEMBLY AND DIGITAL VOLTMETER SHOW NO OR LOW VOLTAGE (LESS THAN 25-30 VOLTS)		Shut down generator set and notify next higher level of maintenance.
48. VOLTAGE REGULATOR AND MONITOR ASSEMBLY AND DIGITAL VOLTMETER SHOW SAME BUT IMPROPER VOLTAGE		Shut down generator set and notify next higher level of maintenance.
49. VOLTMETER REGULATOR AND MONITOR ASSEMBLY SHOWS IMPROPER KW LOAD		Note reading on meter and shut down generator set and notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
50. AC INTERRUPT LAMP DOES NOT COME ON (OR WILL NOT LATCH ON) WHEN AC INTERRUPT SWITCH IS MOVED TO CLOSE POSITION--SINGLE UNIT OPERATION	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, shut down generator set and notify next higher level of maintenance.</li> </ul>
51. AC INTERRUPT LAMP COMES ON BUT GOES OUT WHEN AC INTERRUPT SWITCH IS RELEASED FROM CLOSE TO CENTER POSITION	Shut down the generator set and notify next higher level of maintenance.	
52. MAIN AC CONTACTOR CLOSES--BUT EXCESSIVE NOISE, VIBRATION, OR SMOKE IS NOTICED	Shut down the generator set immediately and notify next higher level of maintenance.	
53. ENGINE SPEED DROOPS WHEN MAIN AC CONTACTOR IS CLOSED	Refer to malfunction 45.	
54. MAIN AC CONTACTOR CLOSES--BUT AN UNBALANCED AMP LOAD IS INDICATED	If unbalance exceeds 78 amps, shut down generator set and notify next higher level of maintenance.	
55. AC INTERRUPT LAMP GOES OUT WHILE GENERATOR SET IS ON THE LINE--NO OTHER FAULTS INDICATED	Check press-to-test lamp bulb.	<ul style="list-style-type: none"> <li>a. If bulb does not light, replace bulb (para 4-49).</li> <li>b. If bulb is normal, notify next higher level of maintenance.</li> </ul>

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
56. AC INTERRUPT LAMP GOES OUT WHILE GENERATOR SET IS ON THE LINE--SHORT CIRCUIT LAMP COMES ON		Shut down generator set and notify next higher level of maintenance.
57. MAIN AC CONTACTOR OPENS DURING SINGLE UNIT OPERATION--REVERSE POWER LAMP COMES ON		Shut down generator set and notify next higher level of maintenance.
58. MAIN AC CONTACTOR OPENS DURING PARALLEL OPERATION--REVERSE POWER LAMP COMES ON.		<p>Check operating procedures (para 2-4 or 2-5) to ensure that proper procedures are being followed. Recheck voltage and frequency requirements of load.</p> <p>If unable to adjust volts and Hertz to meet load requirements, shut down generator set and notify next higher level of maintenance.</p>
59. MAIN AC CONTACTOR OPENS DURING OPERATION--UNDER VOLTAGE LAMP COMES ON		<p>Check operating procedures (para 2-4 or 2-5) to ensure that proper procedures are being followed.</p> <p>If unable to adjust volts to meet load requirements, shut down generator set and notify next higher level of maintenance.</p>
60. MAIN AC CONTACTOR OPENS DURING OPERATION--OVER VOLTAGE LAMP COMES ON		<p>Check operating procedures (para 2-4 or 2-5) to ensure that proper procedures are being followed.</p> <p>If unable to adjust volts to meet load requirements, shut down generator set and notify next higher level of maintenance.</p>



Table 4-2. Organizational Troubleshooting (cont)

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MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

61. MAIN AC CONTACTOR OPENS DURING OPERATION--UNDER FREQUENCY LAMP COMES ON

Check operating procedures (para 2-4 or 2-5) to ensure that proper procedures are being followed.

If unable to adjust frequency to meet load requirements, refer to malfunction 45.

62. MAIN AC CONTACTOR OPENS DURING OPERATION--OVERLOAD LAMP COMES ON

Check system load (kw) on generator set.

- a. If load exceeds 150 kw, reduce load or parallel with another generator set.
- b. If load does not exceed 150 kw, shut down generator set and notify next higher level of maintenance.

63. VOLTAGE READOUT ON VOLTAGE REGULATOR AND MONITOR ASSEMBLY IS UNSTABLE UNDER LOAD.

Shut down generator set and notify next higher level of maintenance.

64. GENERATOR SET SHUTS DOWN--NO FAULT LAMP COMES ON

Notify next higher level of maintenance.

65. MAIN AC CONTACTOR WILL NOT OPEN WHEN AC INTERRUPT SWITCH IS MOVED TO OPEN POSITION

Shut down generator set and notify next higher level of maintenance.

66. GENERATOR SET WILL NOT SHUT DOWN WHEN MASTER SWITCH IS MOVED TO OFF POSITION

Shut down generator set by closing the engine manual shutoff valve on the 3-way solenoid valve (push in) and notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
67. BATTLE SHORT LAMP FAILS TO COME ON WHEN BATTLE SHORT SWITCH IS MOVED TO ON POSITION AND MAIN AC CONTACTOR IS CLOSED	<p>Step 1. Move MASTER switch (S1) to RUN position. Check input voltage to BATTLE SHORT switch (S3), terminal 11, wire number 22. Voltage should be 24 Vdc minimum.</p> <ul style="list-style-type: none"> <li>a. If voltage is correct, do step 2.</li> <li>b. If voltage is not correct, notify next higher level of maintenance.</li> </ul>	
	<p>Step 2. Move MASTER switch (S1) to OFF position. Remove wire number 34A from BATTLE SHORT switch (S3), terminal 12. Move BATTLE SHORT switch to ON position and MASTER switch to RUN position. Check voltage at terminal 12 of switch (S3). Voltage should be 24 Vdc minimum.</p> <ul style="list-style-type: none"> <li>a. If there is no voltage, replace switch (S3) (para 4-48).</li> <li>b. If voltage is correct, move MASTER switch to OFF position, connect wire number 34A to switch (S3), terminal 12, and notify next higher level of maintenance.</li> </ul>	
68. SYNC LAMPS DO NOT COME ON WHEN PARALLELING SWITCH IS MOVED FROM UNIT TO PARALLEL POSITION--PARALLEL OPERATION	<p>Step 1. Check SYNC lamp bulbs (DS16 and DS17).</p> <ul style="list-style-type: none"> <li>a. If bulbs do not light, replace bulbs (para 4-49).</li> <li>b. If bulbs are normal, do step 2.</li> </ul>	
	<p>Step 2. Check that generator set parallel operation cable is serviceable and properly connected.</p> <ul style="list-style-type: none"> <li>a. If not connected, connect parallel cable.</li> <li>b. If parallel cable is properly connected, notify next higher level of maintenance.</li> </ul>	

Table 4-2. Organizational Troubleshooting (cont)

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MA:FUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

69. SYNC LAMPS DO NOT FLASH TOGETHER WHEN UNIT--PARALLEL SWITCH IS IN PARALLEL OPERATION POSITION--PARALLEL OPERATION

CAUTION

Sync lamps that flash in an alternating sequence indicate improper phase connections. This indicates a serious wiring fault. Do not attempt any additional running or troubleshooting until the wiring fault is corrected.

Check to determine if main ac contactor (CB5) is connected properly.

- a. If main ac contactor is improperly connected, connect in accordance with instructions in para 4-3.a.(1).
- b. If main ac contactor is properly connected, notify next higher level of maintenance.

70. MAIN AC CONTACTOR WILL NOT CLOSE--PARALLEL OPERATION

Step 1. Check press to test AC INTERRUPT (DS6) lamp bulb.

- a. If bulb does not light, replace bulb (para 4-49).
- b. If lamp bulb is normal, do step 2.

Step 2. Check proper paralleling procedure (para 2-5).

- a. If procedure is not correct, use correct procedure.
- b. If procedure is correct, notify next higher level of maintenance.

71. GENERATOR SETS WILL NOT LOAD-SHARE IN PARALLEL OPERATION

Check to determine if correct paralleling procedures have been followed (para 2-5).

- a. If procedures were not correct, use correct procedures.
- b. If procedures were correct, notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
72. BATTERY OR BATTERIES REQUIRE EXCESSIVE AMOUNT OF WATER CONTINUALLY	<p>Step 1. If one battery requires excessive amount of water, replace battery (para 4-22).</p> <p>Step 2. If all batteries require excessive amount of water, check battery charging voltage at positive (+) battery lead to ground with engine running (para 4-24). Voltage should be 27.5 to 29.5 volts.</p>	<p>a. If voltage is correct, replace batteries (para 4-22).</p> <p>b. If voltage is high, shut down generator set and notify next higher level of maintenance.</p>
73. GENERATOR SET REQUIRES EXCESSIVE SLAVE STARTS		Notify next higher level of maintenance.
74. NO VOLTAGE IS AVAILABLE AT 110V CONVENIENCE RECEPTACLE	<p>Step 1. Check if circuit breaker CB7 is open (located below convenience receptacle).</p>	<p>a. If open, close circuit breaker (push in).</p> <p>b. If closed, do step 2.</p>
Step 2. With engine running, check input voltage to circuit breaker (CB7), wire 83B (F01-2). Voltage should be $120 \pm 5$ Vac.		<p>a. If voltage is correct, do step 3.</p> <p>b. If voltage is not correct, notify next higher level of maintenance.</p>

Table 4-2. Organizational Troubleshooting (cont)

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MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

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74. NO VOLTAGE IS AVAILABLE AT 110 V CONVENIENCE RECEPTACLE (cont)

Step 3. With engine running, check output voltage of circuit breaker (CB7), wire W17 (F01-2). Voltage should be  $120 \pm 5$  Vac.

a. If voltage is correct, do step 4.

b. If voltage is not correct, replace CB7, circuit breaker (para 4-30).

Step 4. With engine running, measure AC voltage between two flat bladed openings on each receptacle. Voltage at each receptacle should be  $120 \pm 5$  Vac.

If voltage is not correct, replace duplex receptacle assembly (para 4-30).

75. ENGINE OIL CONSUMPTION IS EXCESSIVE

NOTE

Average oil consumption is 1 quart/50  $\pm$  20 hours. Excessive oil consumption is 1 quart/10 hours, averaged over a 30 hour period.

Step 1. Check oil system for leaks.

If oil system lines and fittings must be replaced, notify next higher level of maintenance.

Step 2. Check air/oil vent hoses and elbow for serviceable condition or restrictions (para 4-47).

If unserviceable, notify next higher level of maintenance.

76. ENGINE EXHAUST COVER MALFUNCTION--COVER IS STUCK OPEN OR CLOSED

After engine cools off, attempt to free the stuck door by hand.

If unable to free exhaust duct door, notify next higher level of maintenance.

Table 4-2. Organizational Troubleshooting (cont)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
77. HOURMETER DOES NOT RECORD CORRECT HOURS OF OPERATION WHILE ENGINE IS RUNNING	Step 1. Check input voltage to hourmeter (M2) wire number W9 (positive). Voltage should be 10 volts minimum (para 4-23 and F01-3).	<ul style="list-style-type: none"> <li>a. If voltage is correct, do step 2.</li> <li>b. If voltage is not correct, notify next higher level of maintenance.</li> </ul>
	Step 2. Check ground lead wire number W21 (negative) for continuity (para 4-23).	<ul style="list-style-type: none"> <li>a. If continuity to ground is normal, replace the hourmeter (para 4-23).</li> <li>b. If no continuity, notify next higher level of maintenance.</li> </ul>
78. FUEL TRANSFER PUMP RUNS AFTER SHUTDOWN		Open control panel and pull circuit breaker (CB2) and notify next higher level of maintenance.
79. FUEL DRIPPING OR FLOWING FROM FUEL CATCH AND DRAIN CANISTER VENT WHILE OPERATING	Check fuel drain lines from 3-way and 2-way solenoid valves while engine is running per step 3, malfunction 44.	If fuel drains from either of drain valves, replace the valve that is leaking (para 4-35).
80. BATTERY LAMP COMES ON WHILE GENERATOR SET IS OPERATING		Shut down generator set and notify next higher level of maintenance.
81. DC CIRCUIT BREAKERS (CB1, CB2, CB3, AND CB4) WILL NOT RESET		Notify next higher level of maintenance.

## Section VII. RADIO INTERFERENCE SUPPRESSION

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### 4-11. GENERAL

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Interference suppression is obtained by providing a low resistance path to ground for stray electrical current. Methods used include shielding ignition, grounding the unit to ground and bonding between doors and panels to cabinet.

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### 4-12. INTERFERENCE SUPPRESSION COMPONENTS

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a. The primary suppression components are the knitted mesh covered foam sealing strips between the six cabinet doors and two control panel doors and the cabinet. Door edges are unpainted and specially treated to improve conductivity between doors and cabinet.

b. The secondary suppression component is the grounding connection between the skid and grounding rod buried next to the unit. The grounding rod is a three piece assembly furnished with the generator set.

## ORGANIZATIONAL MAINTENANCE PROCEDURES

### NOTE

All tools used in the following organizational maintenance sections, are in the General Mechanic's Automotive Tool Kit (NSN 5180-00-177-7033) SC 5180-90-CL-N26 or Appendix D Additional Authorization List (AAL). There are no special tools or test equipment required for organization maintenance.



## Section VIII. MAINTENANCE OF FRAME AND HOUSING

### 4-13. GENERATOR FRONT AND REAR COMPARTMENT ROOF PANELS

This task covers:

- a. Removal                      b. Installation

#### INITIAL SETUP

##### Tools

6-in. No. 3 cross tip screwdriver  
 7/16 socket  
 9/16 socket  
 Ratchet handle  
 5-in. extension  
 7/16 combination wrench  
 3/8 combination wrench  
 Speed handle  
 Center punch  
 Plastic face hammer with inserts  
 (appx D)

##### Personnel Required

Utilities Equipment Repairer  
 MOS 52C

##### Equipment Condition

<u>Para</u>	<u>Condition Descriptor</u>
4-47	LH and RH ducts removed for front roof only.

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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#### REMOVAL

#### WARNING

Use care when removing front roof panel that panel does not contact the circuit breaker or diode mounted on the bulkhead. Contact between front roof panel and these components may cause arcing and result in personal injury.

- |                   |                                      |   |                     |
|-------------------|--------------------------------------|---|---------------------|
| 1. Front roof (1) | a. 4 bolts (2)                       | Loosen.                                       |                     |
|                   | b. 4 screws (3)                      | Remove.                                       |                     |
|                   | c. 29 bolts (4) and flat washers (5) | Remove.                                       |                     |
|                   | d. Roof (1)                          | Tap with hammer as reqd to loosen and remove. | 2 technicians reqd. |



4-13. GENERATOR FRONT AND REAR COMPARTMENT ROOF PANELS (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
2. Pillars (6)	a. 4 bolts (2) and flat washers (7)	Remove.	
	b. 2 pillars (6)	Remove.	
3. Screen (8)	a. 20 nuts (9), flat washers (10), and bolts (11).	Remove.	
	b. Screen (8)	Remove.	
4. Rear roof (12)	a. 25 bolts (13) and flat washers (14)	Remove.	
	b. Roof (12)	Tap with hammer as reqd to loosen.	2 technicians reqd.
	c. 4 screws (15)	Loosen and remove.	
	d. Nut channel (16)	Remove.	
	e. 6 bolts (17) and nuts (18)	Remove door and hinge from cabinet.	
	f. 6 bolts (17) and nuts (18)	Remove.	
	g. Hinge (19)	Remove.	
	h. 2 bolts (17) and nuts (18)	Remove from door latch.	
	i. Latch knob (20)	Loosen and remove.	
	j. Latch (21)	Remove.	

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 4-13. GENERATOR FRONT AND REAR COMPARTMENT ROOF PANELS (cont)
 

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LOCATION	ITEM	ACTION	REMARKS
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INSTALLATION

5. Rear roof (12)	a. Latch (21) and knob (20)	Install and tighten.	
	b. 2 bolts (17) and nuts (18)	Install in latch and tighten.	
	c. Hinge (19)	Mount hinge on door.	
	d. 6 bolts (17) and nuts (18)	Install and tighten.	
	e. 6 bolts (17) and nuts (18)	Mount door and hinge on cabinet and install and tighten nuts and bolts.	
	f. Nut channel (16)	Install.	
	g. 4 screws (15)	Install and tighten.	



LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
	h. Roof (12)	Install and tap with hammer and align bolt holes with center punch as reqd.	2 technicians reqd.
	i. 25 flat washers (14) and bolts (13)	Install and tighten.	
6. Screen (8)	a. Screen (8)	Install on front roof.	
	b. 20 flat washers (10), bolts (11), and nuts (9).	Install and tighten.	
7. Pillars (6)	a. 2 pillars (6)	Install.	
	b. 4 flat washers (7) and bolts (2)	Install but do <u>not</u> tighten.	

WARNING

Use care when installing front roof panel that the panel does not contact the circuit breaker or diode mounted on the bulkhead. Contact between the front roof panel and these components may cause arcing and result in personal injury.

8. Front roof (1)	a. Roof (1)	Install and tap with hammer and align bolt holes with center punch as reqd.	2 technicians reqd.
	b. 29 flat washers (5) and bolts (4)	Install and tighten.	
	c. 4 screws (3)	Install and tighten.	
	d. 4 bolts (2) (previously installed)	Tighten.	

4-14. FRONT CABINET PANEL ASSEMBLY

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools

- 7/16 socket
- 9/16 socket
- Ratchet handle
- Speed handle
- 10-in. extension
- 6-in. No. 3 cross tip screwdriver

Personnel Required

Utilities Equipment Repairer  
MOS 52C

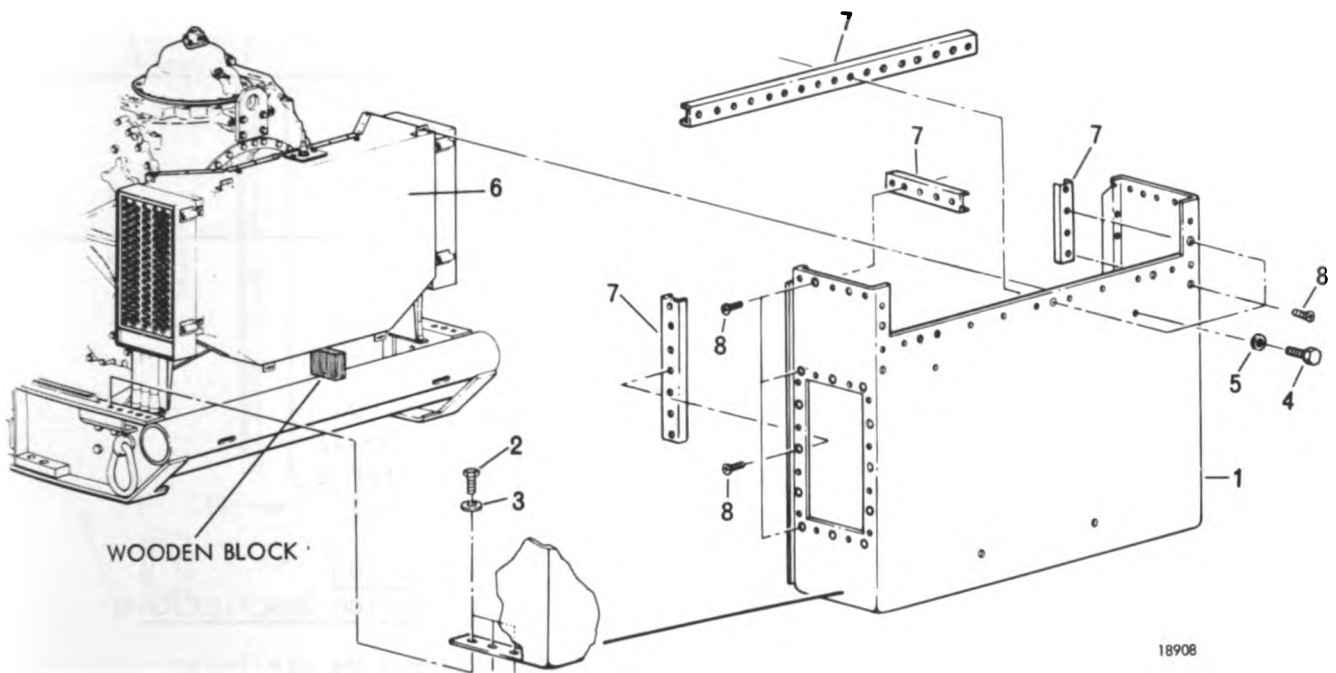
References

Para 3-5, item 1

Equipment Condition

<u>Para</u>	<u>Condition Description</u>
4-13	Front roof removed.
4-15	Two front doors removed.

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
1. Front panel (1)	a. 6 bolts (2) and flat washers (3)	Remove.	
	b. 4 bolts (4) and flat washers (5)	Remove.	
2. Plenum (6)	Plenum (6)	Block up front end with block of wood or equivalent.	Should remove any strain on air seal and clamps at inlet bell.
3. Front Panel (1)	Panel (1)	Remove.	2 technicians reqd.
4. 13 nut channels (7)	a. 35 screws (8)	Remove.	
	b. Channels (7)	Remove.	



LOCATION	ITEM	ACTION	REMARKS
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**INSTALLATION**

5. 13 nut channels (7)	a. Channels (7)	Install.	
	b. 35 screws (8)	Install and tighten.	
6. Front panel (1)	a. Panel (1)	Install.	
	b. 4 flat washers (5) and bolts (4)	Install and tighten.	
7. Plenum (6)	Plenum (6)	Remove block supporting plenum.	
8. Front panel (1)	6 flat washers (3) and bolts (2)	Install and tighten.	



4-15. DOOR ASSEMBLIES

This task covers:

- a. Removal                      b. Repair                      c. Installation

INITIAL SETUP

Tools

- 6-in. flat tip screwdriver
- 3/8 combination wrench
- Flat tip offset screwdriver (appx D)

References

- Para 1-14.b.(2)
- LO 5-6115-598-12
- Para 3-5, item 2
- Para 4-1.a.(2)

Personnel Required

- Utilities Equipment Repairer
- MOS 52C

Equipment Condition

<u>Para</u>	<u>Condition Description</u>
4-17	LH and RH air inlet screen and louvers removed (for removal of the front doors only).

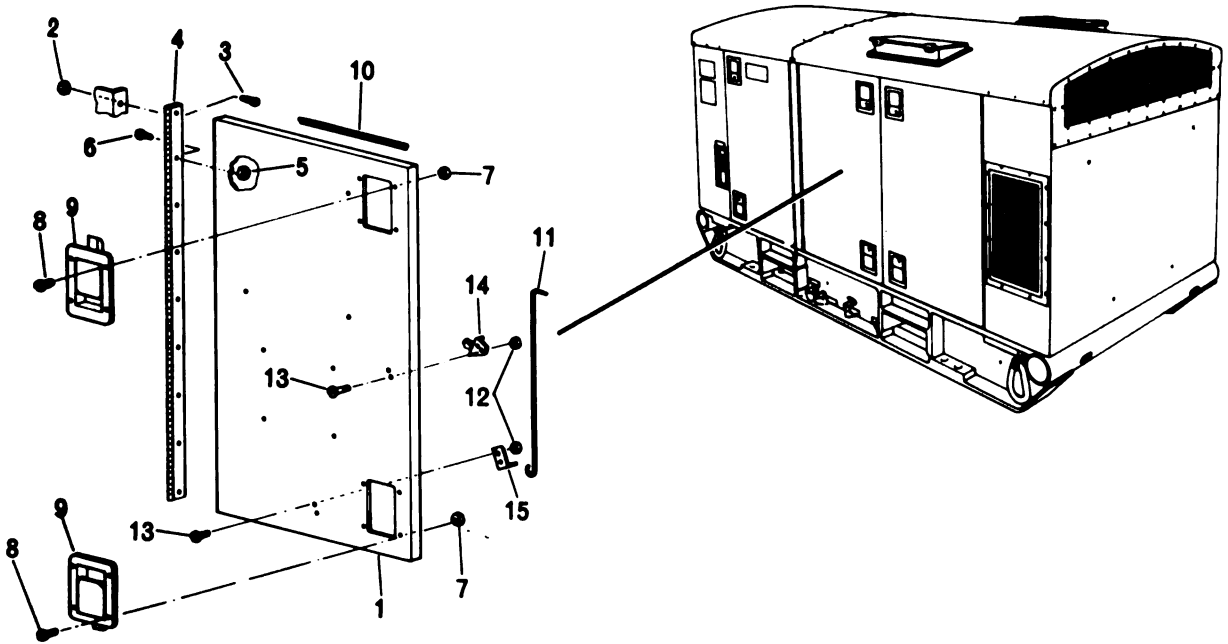
<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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REMOVAL

NOTE

Use the same procedures for each of the six doors.

1. Door assembly (1)	a. 10 lock nuts (2) and screws (3)	Remove.	
	b. Door (1)	Remove door with hinge.	
2. Hinge (4)	a. 9 lock nuts (5) and screws (6)	Remove.	Remove only if damaged.
	b. Hinge (4)	Remove.	



18582, 18405

LOCATION	ITEM	ACTION	REMARKS
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REPAIR

NOTE

The door assembly may be repaired by the replacement of a damaged paddle lock, rod, rod clip, or seal as required.

3. Door assembly (1)	a. 4 lock nuts (7) and screws (8)	Remove.	
	b. Paddle lock (9)	a. Remove. b. Install replacement.	
	c. 4 screws (8) and lock nuts (7)	Install and tighten.	
	d. Mesh gasket seal (10)	a. Remove. b. Install replacement.	

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4-15. DOOR ASSEMBLY (cont)

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LOCATION	ITEM	ACTION	REMARKS
<u>REPAIR (cont)</u>			
3. Door assembly (1) (cont)	e. Rod (11)	Open loop and remove.	Be careful not to damage clip.
	f. 4 nuts (12) and screws (13)	Remove.	
	g. 2 clips (14 and 15)	a. Remove. b. Install replacement.	
	h. 4 nuts (12) and screws (13)	Install and tighten.	
	i. Rod (11)	Install and close loop.	

INSTALLATION

4. Hinge (4)	a. Hinge (4)	Install.	
	b. 9 screws (6) and lock nuts (5)	Install and tighten.	
5. Door assembly (1)	a. Door (1)	Install on hinge.	
	b. 10 screws (3) and lock nuts (2)	Install and tighten.	

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4-16. REAR CABINET COOLING AIR INLET SCREEN

This task covers:

- a. Removal                      b. Installation

INITIAL SETUP

Tools

7/16 socket  
Speed handle

References

Para 1-14.b.(3)  
Item 2, table 2-1  
Para 4-2.a.(1)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

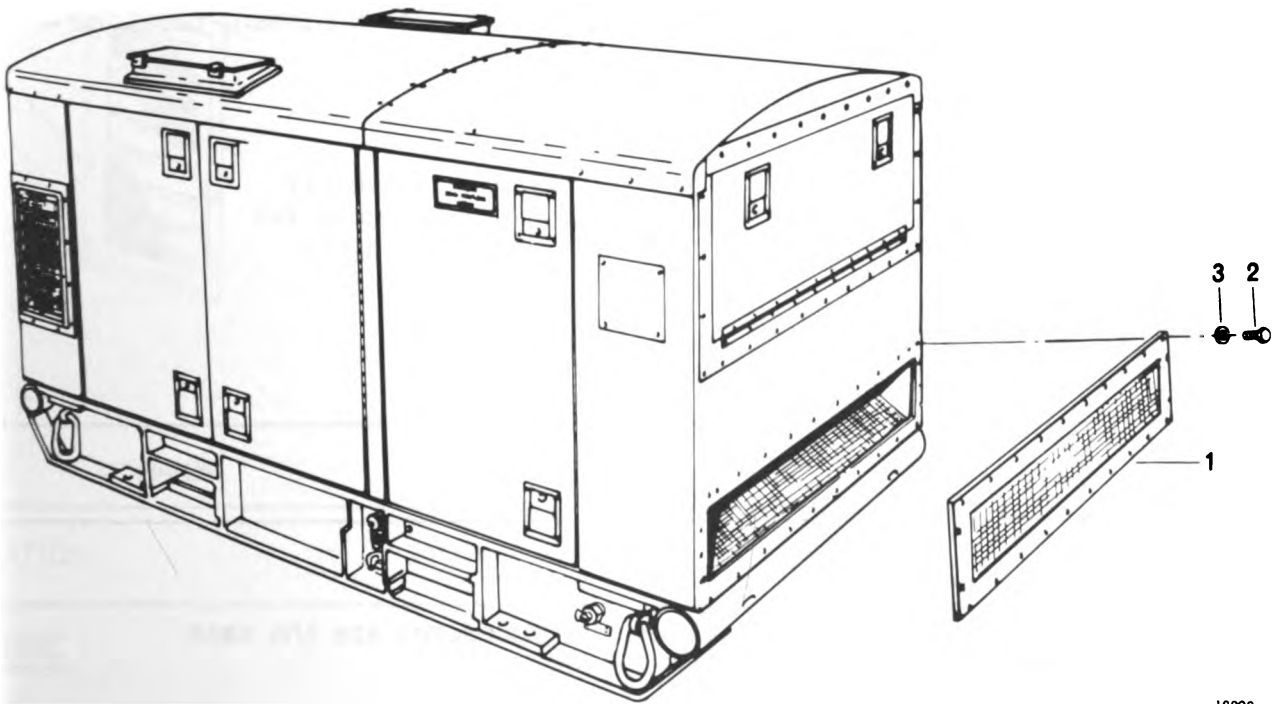
LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

- |                       |   |         |  |
|-----------------------|---|---------|--|
| 1. Rear screen<br>(1) | a. 24 bolts (2) and<br>flat washers (3) | Remove. |  |
|                       | b. Rear screen (1)                      | Remove. |  |

INSTALLATION

- |                       |   |                      |  |
|-----------------------|---|----------------------|--|
| 2. Rear screen<br>(1) | a. Rear screen (1)                      | Install.             |  |
|                       | b. 24 flat washers (3)<br>and bolts (2) | Install and tighten. |  |



18898

4-17. LH OR RH AIR INLET SCREEN AND LOUVER ASSEMBLY

This task covers:

- a. Service                      b. Removal                      c. Installation

INITIAL SETUP

Tools

7/16 socket  
Speed handle

Personnel Required

Utilities Equipment Repairer  
MOS 52C

Materials/Parts

Paint brush (item 2, appx E)  
Bucket (item 3, appx E)  
Paint (item 13, appx E)  
Rags (item 14, appx E)  
Solvent (item 15, appx E)

References

Para 1-14.b.(1)  
Item 1, table 2-1  
Para 4-2.a.(1)

LOCATION	ITEM	ACTION	REMARKS
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NOTE

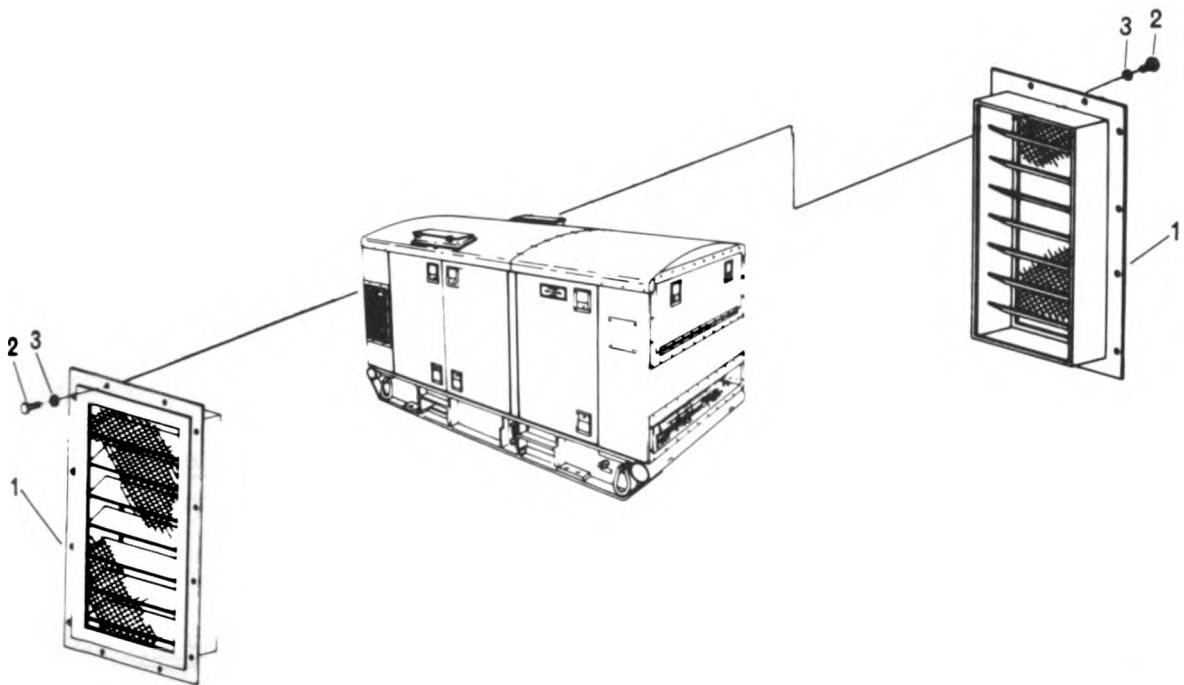
Service, removal, and installation procedures are the same for both RH or LH screen and louver.

WARNING

Solvent is toxic. Illness or skin damage may be caused by prolonged breathing of solvent fumes or excessive skin contact with the liquid. Ensure that there is adequate ventilation and avoid open flame or sparks when using flammable solvent.

SERVICE

- |                          |                   |                             |
|--------------------------|-------------------|-----------------------------|
| 1. Screen and louver (1) | a. Clean and dry. | Use solvent, brush and rag. |
|                          | b. Paint as reqd. |                             |



18402, 18490C

LOCATION	ITEM	ACTION	REMARKS
<b><u>REMOVAL</u></b>			
2. Screen and louver (1)	a. 12 bolts (2) and flat washers (3).	Remove.	
	b. Screen and louver (1)	Remove.	
<b><u>INSTALLATION</u></b>			
3. Screen and louver (1)	a. Screen and louver (1)	Install.	Louver installed with outer edges down.
	b. 12 flat washers (3) and bolts (2)	Install and tighten.	



4-18. LH OR RH AIR CLEANER

This task covers:

- a. Removal                      b. Inspection                      c. Service                      d. Installation

INITIAL SETUP

Tools

- 1/2 combination wrench
- 7/8 combination wrench

References

Para 1-14.b.(9)

Materials/Parts

- Paint brush (item 2, appx E)
- Bucket (item 3, appx E)
- Rags (item 14, appx E)
- Solvent (item 15, appx E)
- Compressed air
- Cleaner fitting packing (2 reqd)

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
38	2	4-2

Equipment Condition

Para                      Condition Description

4-17                      LH or RH air inlet screen and louvers removed.

Personnel Required

Utilities Equipment Repairer  
MOS 52C

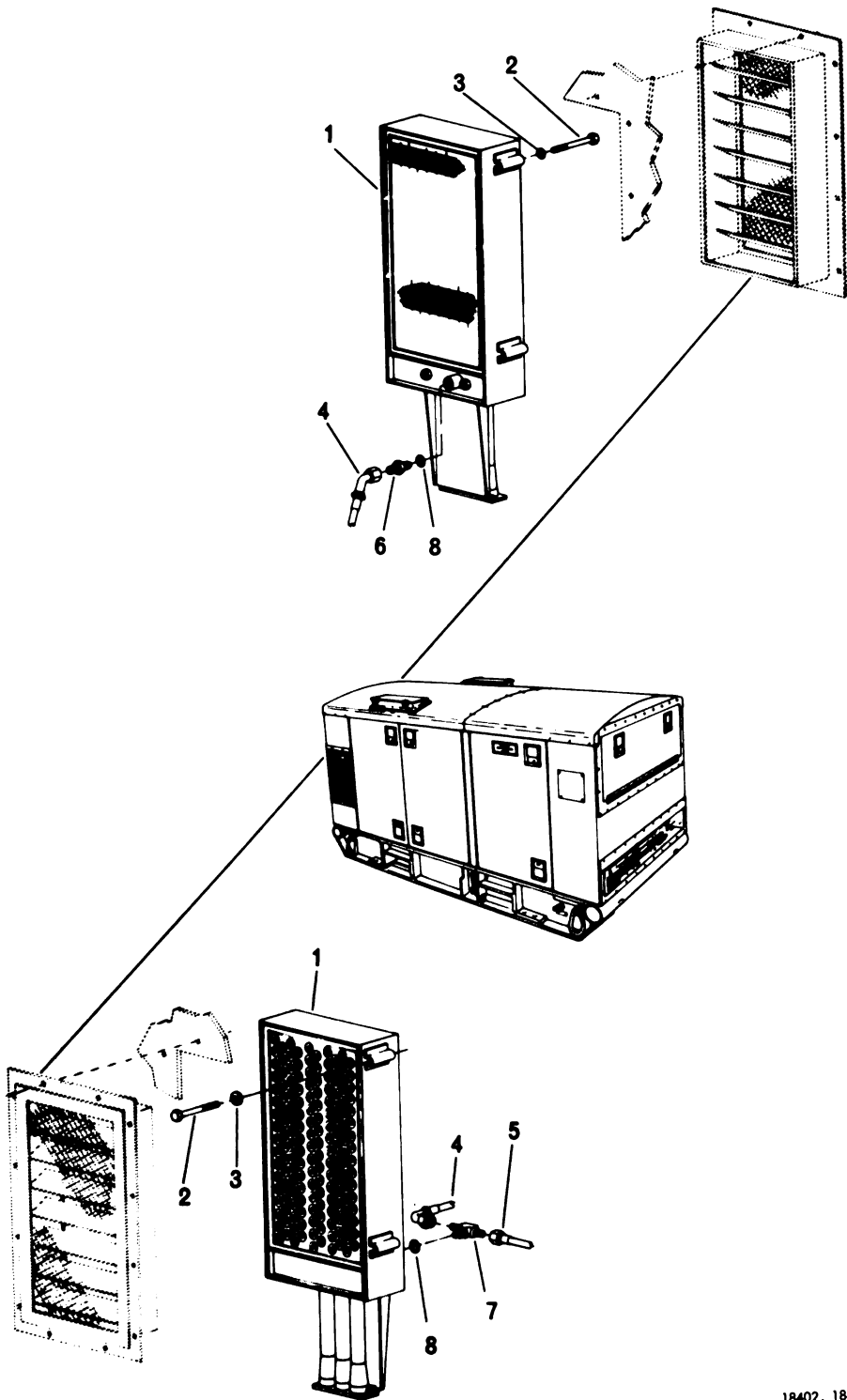
<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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NOTE

Use the same procedures for either RH or LH air cleaner.

REMOVAL

- |                       |                                |             |
|-----------------------|--------------------------------|-------------|
| 1. Air cleaner<br>(1) | a. 4 bolts (2) and washers (3) | Remove.     |
|                       | b. Hose fittings (4 or 5)      | Disconnect. |
|                       | c. Cleaner (1)                 | Remove.     |



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4-18. LH OR RH AIR CLEANER (cont)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REMOVAL (cont)

1. Air cleaner (1) (cont)	d. Fittings (6 or 7) and 2 packings (8)	Remove from cleaner. Discard packings.	Note position of tee fitting (left cleaner).
------------------------------	--	---	--

INSPECTION

2. Air cleaner (1)	a. Inspect for dirty or clogged ports.	Service per step 3.
	b. Inspect for damaged or missing compon- ents.	Replace.

SERVICE

WARNING

Solvent is toxic. Illness or skin damage may be caused by prolonged breathing of solvent fumes or excessive skin contact with the liquid. Ensure that there is adequate ventilation and avoid open flame or sparks when using flammable solvent.

3. Air cleaner (1)	Cleaner (1)	a. Clean.	Use solvent and rag.
		b. Air dry.	Use compressed air.

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION</u>			
4. Air cleaner (1)	a. 2 new packings (8) and fittings (6 or 7)	Install packings on fitting. Install fitting on cleaner and tighten.	Position tee fitting as noted in step 1.
	b. Hose fittings (4 or 5)	Connect and tighten.	
	c. Cleaner (1)	Install.	
	d. 4 bolts (2) and washers (3)	Install and tighten.	

4-19. LH OR RH BATTERY TRAY ASSEMBLY

This task covers:

- a. Removal                      b. Inspection                      c. Service                      d. Installation

INITIAL SETUP

Tools

- 9/16 socket
- 5-in. extension
- 1/2 open end wrench
- 5/8 open end wrench
- 9/16 open end wrench
- Ratchet handle
- Wire brush (appx D)
- Rubber apron (appx D)
- Rubber gloves (appx D)
- Stud remover and setter (appx D)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

References

Para 1-14.b.(10)

Equipment Condition

<u>Para</u>	<u>Condition Description</u>
4-22	LH or RH batteries removed.

Materials/Parts

- Baking soda (item 1, appx E)
- Paint brush (item 2, appx E)
- Face shield (item 7, appx E)
- Grease (item 8, appx E)
- Paint (item 13, appx E)

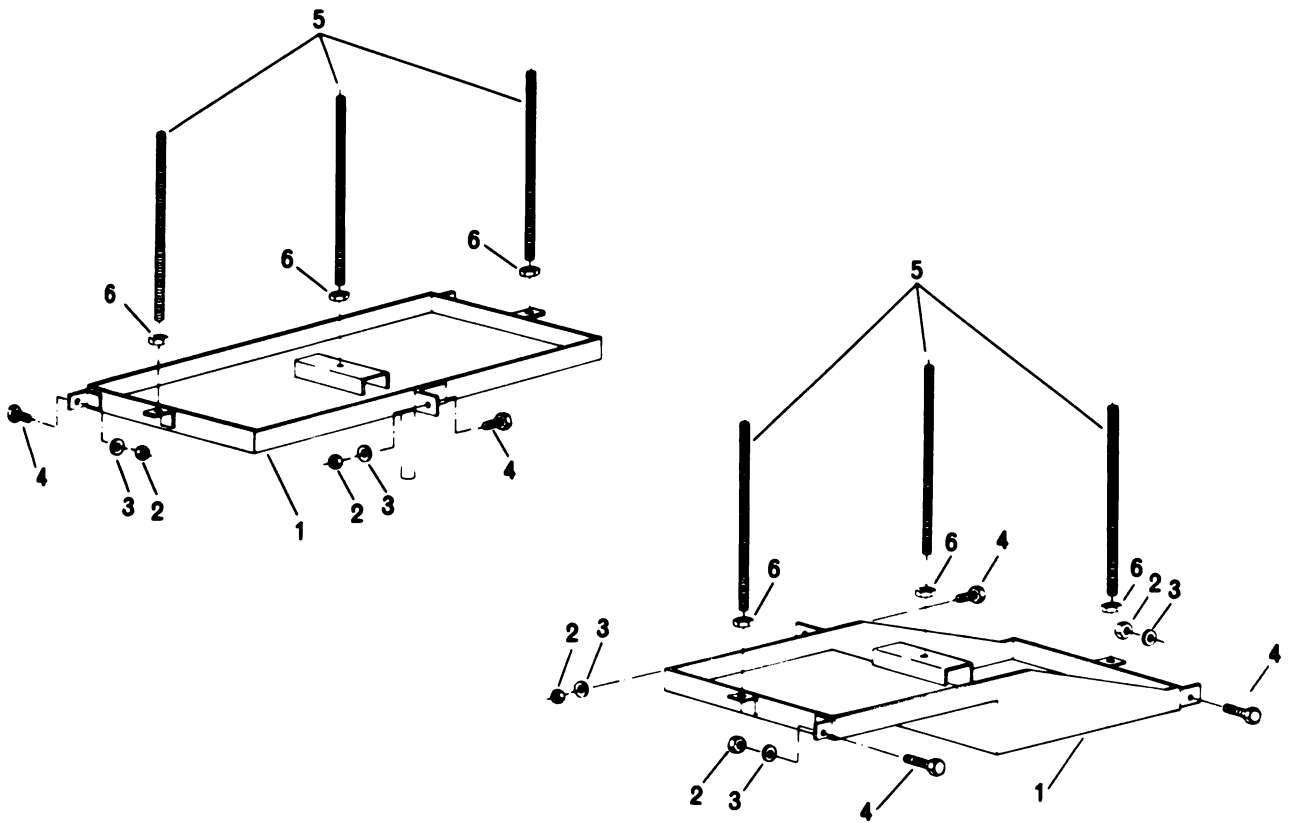
<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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NOTE

Use the same procedures for either RH or LH battery tray except where noted.

REMOVAL

- |                        |  |         |
|------------------------|--|---------|
| 1. Battery tray<br>(1) | a. 3 nuts (2), flat washers (3), and bolts (4) | Remove. |
|                        | b. Tray (1)                                    | Remove. |



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LOCATION	ITEM	ACTION	REMARKS
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REMOVAL (cont)

- |              |                |         |
|--------------|----------------|---------|
| 2. Studs (5) | a. 3 studs (5) | Remove. |
|              | b. 3 nuts (6)  | Remove. |

4-19. LH OR RH BATTERY TRAY ASSEMBLY (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>INSPECTION</u>			
3. Battery tray (1)		Inspect for:	
		a. Paint.	Service as reqd.
		b. Damage or missing components.	Replace as reqd.
<u>SERVICE</u>			
4. Battery tray (1)	a. Tray (1), 3 studs (5) and nuts (2 and 6).	Clean tray and studs and grease studs.	Use baking soda and water solution to clean.
	b. Tray (1)	Paint as reqd.	
<u>INSTALLATION</u>			
5. Studs (5)	a. 3 studs (5)	Install.	
	b. 3 nuts (6)	Install and tighten.	
6. Battery tray (1)	a. Tray (1)	Install.	
	b. 3 bolts (4), flat washers (3), and nuts (2)	Install and tighten.	

Page 4-71 is a blank page.





4-20. CARGO RINGS (4)

This task covers:

- a. Inspection                      b. Removal                      c. Installation

INITIAL SETUP

Tools

Pry bar

References

Para 1-14.b.(4)  
Para 4-1.a.(9)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

LOCATION	ITEM	ACTION	REMARKS
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NOTE

Use same procedures for each of the four cargo rings.

INSPECTION

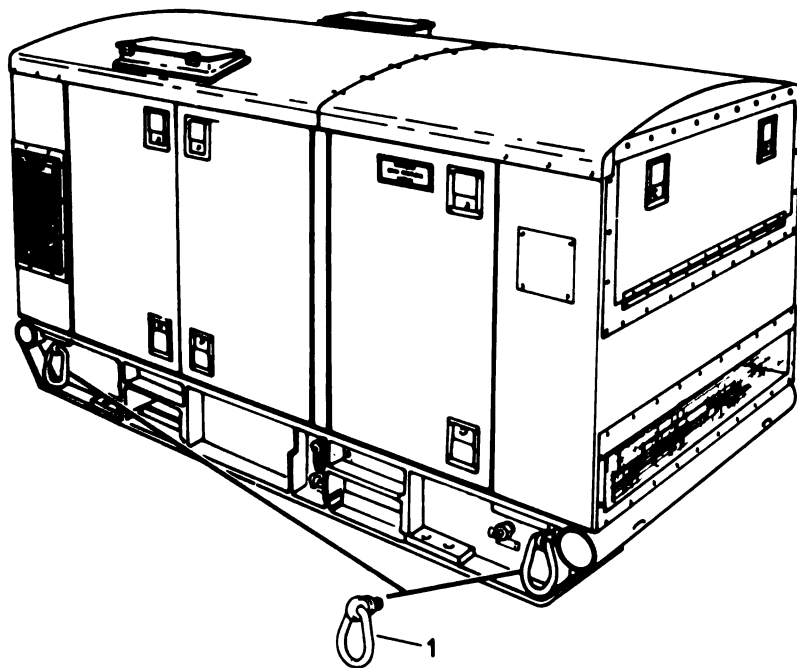
1. Cargo ring (1)		Inspect for cracked or broken component.	Replace if cracked or broken.
-------------------	--	--	-------------------------------

REMOVAL

2. Cargo ring (1)		Unscrew from base.	Use pry bar as reqd.
-------------------	--	--------------------	----------------------

INSTALLATION

3. Cargo ring (1)		Screw into base and tighten.	
-------------------	--	------------------------------	--



18402, 18496A

**Section IX.**

**MAINTENANCE OF DC ELECTRICAL AND CONTROL SYSTEM**

4-21. BATTERY CABLE ASSEMBLIES (11)

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools

- 7/16 socket
- 5-in extension
- 3/4 combination wrench
- 1/2 combination wrench
- 9/16 combination wrench
- 1-in. combination wrench
- Ratchet handle
- 1 1/4 open end wrench (appx D)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

References

- Para 1-14.d.(1)
- Item 10, table 2-1
- Para 4-1.a.(5)

Materials/Parts

- Grease (item 8, appx E)
- Rags (item 14, appx E)
- Tags (item 16, appx E)
- Tape (item 17, appx E)

General Safety Instructions

Avoid grounding positive battery terminals.

LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

WARNING

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

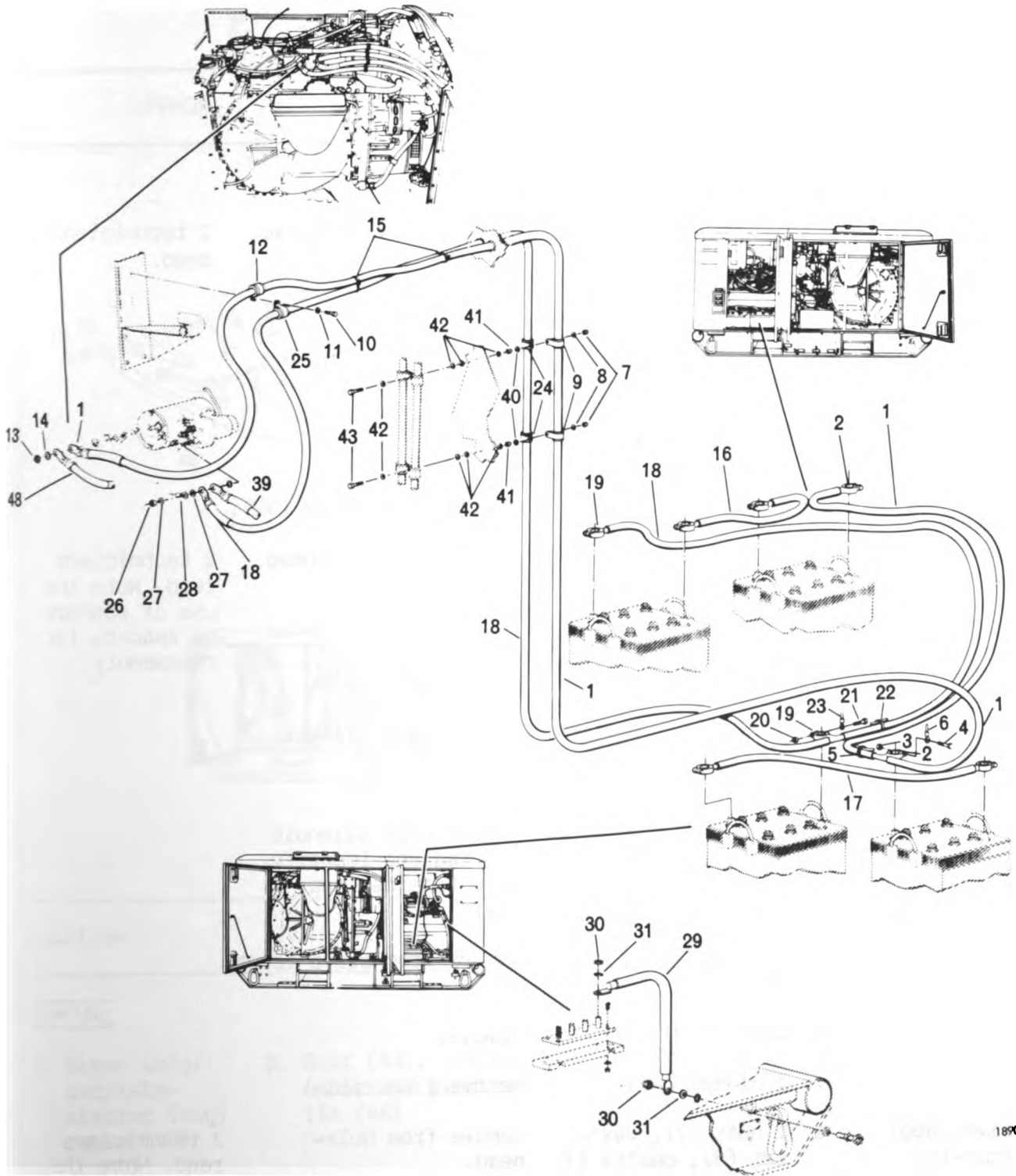
CAUTION

Always disconnect both terminals (2) of the battery-to-battery negative cable (1) to kill any battery power before removal of any other battery cables. Exercise care to avoid grounding any battery positive terminals. Tape all terminals as they are removed. Tape all bare battery posts.

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
1. Battery-to-battery (neg)-to-starter (neg) cable (1)	a. 2 terminals (2)	a. Loosen and remove from battery posts.	This disarms the battery power from the set.
		b. Tape terminals (2) and battery posts.	
	b. Nut (3), bolt (4), and plastic tie (5)	Remove.	
	c. Wire terminal (6)	Remove, tag, and identify.	
	d. Bolt (4) and nut (3)	Reassemble on LH battery terminal (2).	
	e. 2 nuts (7), washers (8), and clamps (9)	Remove from bulkhead.	
	f. Bolt (10), washer (11), and clamp (12)	Remove from bracket.	
	g. Nut (13), washer (14), and cable (1)	Remove from starter neg posts.	
	h. Clamp (12), 2 clamps (9), and plastic ties (15)	Remove from cable.	
	i. Cable (1)	Pull rearward thru bulkhead and remove.	
2. RH or LH battery-to-battery (neg-pos) cable (16 or 17)	4 terminals (2 each cable)	a. Loosen and remove from battery posts.	
		b. Tape terminals and battery posts.	

4-21. BATTERY CABLE ASSEMBLIES (11) (cont)

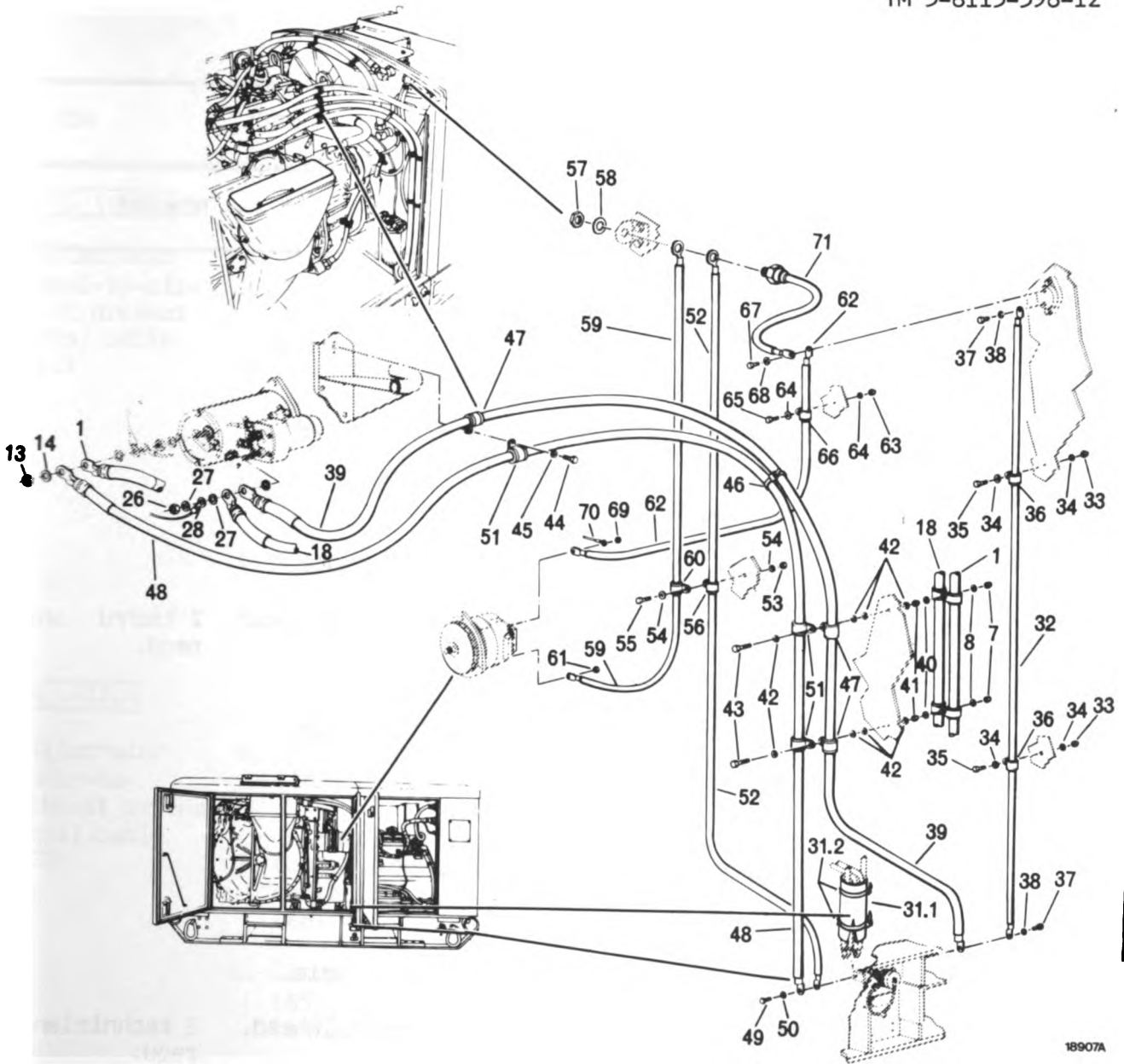
LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
3. Battery-to-battery (pos) cable to starter (pos) (18)	a. 2 terminals (19)	a. Loosen and remove from battery posts.	
		b. Tape terminals and battery posts.	
	b. Nut (20), bolt (21) and plastic tie (22)	Remove.	
	c. Wire terminal (23)	Remove, tag, and identify.	
	d. Bolt (21) and nut (20)	Reassemble on LH battery terminal (19).	
	e. 2 nuts (7), washers (8), and clamps (24)	Remove from bulkhead.	
	f. Bolt (10), washer (11), clamp (25)	Remove from bracket.	
	g. Nut (26), 2 washers (27), and wire terminal (28)	Remove from solenoid post and tag and identify wire terminal.	
	h. Cable (18)	Remove from solenoid.	
	i. Clamp (25), 2 plastic ties (15), and clamps (24)	Remove from cable (18).	
	j. Cable (18)	Pull rearward thru bulkhead and remove.	
4. Load terminal-to-ground lug cable (29)	a. 2 nuts (30) and washers (31)	Remove.	
	b. Cable (29)	Remove.	
4.1. Electrical insulation sleeve (31.1)	a. 2 plastic ties (31.2)	Remove.	
	b. Sleeve (31.1)	Remove.	



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4-21. BATTERY CABLE ASSEMBLIES (11) (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
5. Slave (pos) recpt-to-circuit breaker (neg) cable (32)	a. 2 nuts (33), 4 washers (34), 2 bolts (35), and clamps (36)	Remove from bulkhead.	2 technicians reqd.
	b. 2 bolts (37) and washers (38)	Remove from circuit breaker and slave recpt.	
	c. Cable (32)	Remove.	
	d. 2 clamps (36)	Remove from cable (32).	
6. Slave (pos) recpt-to-starter solenoid (pos) cable (39)	a. 2 nuts (7), washers (8) cables (1 and 18), washers (40), nuts (41), 8 washers (42), and 2 bolts (43)	Remove from bulkhead.	2 technicians reqd. Note the use of washers as spacers for reassembly.
	b. Bolt (44), washer (45), and plastic tie (46)	Remove from bracket.	
	c. Nut (26), 2 washers (27), wire terminal (28), and cable (18)	Remove from solenoid and tag and identify wire terminal and cable.	
	d. Bolt (37) and washer (38)	Remove from slave recpt.	
	e. Cable (39)	Remove.	
	f. 3 clamps (47)	Remove from cable.	
7. Slave (neg) recpt-to-starter (neg) cable (48)	a. 2 nuts (7), washers (8), cables (1 and 18), washers (40), nuts (41), 8 washers (42), and 2 bolts (43)	Remove from bulkhead.	2 technicians reqd. Note the use of washers as spacers for reassembly.



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LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

- |   |  |                             |
|---|--|-----------------------------|
| <p>7. Slave (neg)<br/>recpt-to-<br/>starter (neg)<br/>cable (48)<br/>(cont)</p> | <p>b. Bolt (44), washer<br/>(45), and plastic<br/>tie (46)</p> | <p>Remove from bracket.</p> |
|---|--|-----------------------------|



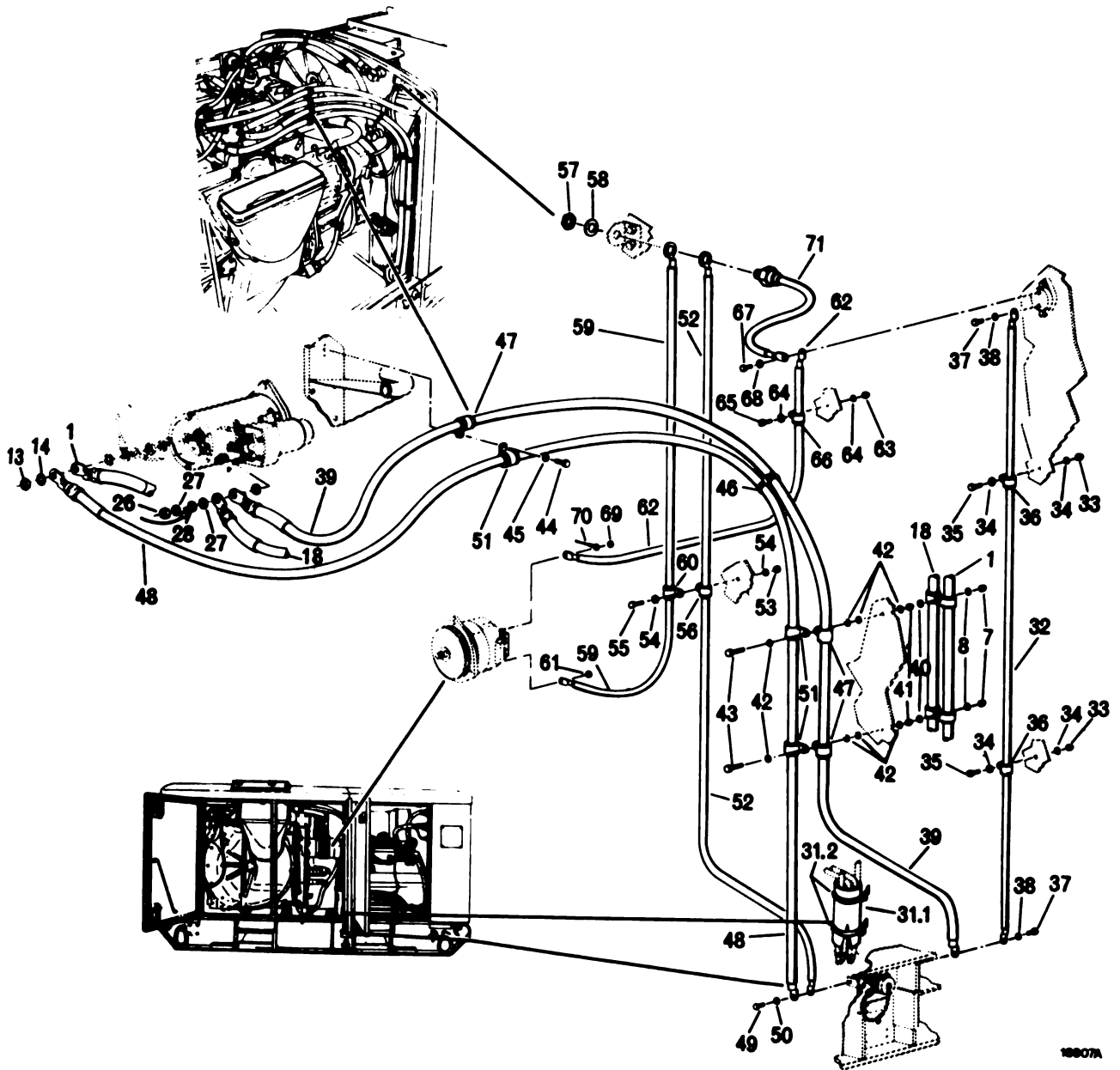
4-21. BATTERY CABLE ASSEMBLIES (11) (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
7. Slave (neg) recpt-to-starter (neg) cable (48) (cont)	c. Nut (13) and washer (14)	Remove from starter neg post.	
	d. Bolt (49) and washer (50)	Remove from slave recpt.	
	e. Cable (48)	Remove.	
	f. 3 clamps (51)	Remove from cable.	
8. Slave (neg) recpt-to-rect (neg) stud cable (52)	a. Nut (53), 2 washers (54), bolt (55), and clamps (56)	Remove from bulkhead.	2 technicians reqd.
	b. Bolt (49), washer (50), and cable (48).	Remove from slave recpt.	
	c. Nut (57), washer (58), and cable (59)	Remove from rect (neg) post.	
	d. Cable (52)	Remove.	
	e. Clamp (56)	Remove from cable.	
9. Alternator (neg)-to-rect (neg) cable (59)	a. Nut (53), 2 washers (54), bolt (55), and clamp (60)	Remove from bulkhead.	2 technicians reqd.
	b. Nut (61)	Remove from alternator.	
	c. Nut (56) and washer (57)	Remove from rect (neg) post.	
	d. Cable (59)	Remove.	
	e. Clamp (60)	Remove from cable.	

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
10. Alternator (pos)-to-circuit breaker (pos) cable (62)	a. Nut (63), 2 washers (64), bolt (65), and clamp (66)	Remove from bulkhead.	2 technicians reqd.
	b. Bolt (67), washer (68), and 2 cables (62)	Remove from circuit breaker (pos).	
	c. Nut (69) and lead (70)	Remove from alt (pos). Tag and identify lead.	
	d. Cable (62)	Remove.	
	e. Clamp (66)	Remove from cable.	
<u>INSTALLATION</u>			
11. Alternator (pos)-to-circuit breaker (pos) cable (62)	a. Cable (62), lead (70), and nut (69)	Remove tag, install on alternator (pos), and tighten nut.	
	b. Cable (62), rect cable (71), washer (68), and bolt (67)	Install on circuit breaker (pos) and tighten bolt.	
	c. Clamp (66), bolt (65), 2 washers (64), and nut (63)	Install clamp on cable, secure to bulkhead, and tighten nut.	2 technicians reqd.
12. Alternator (neg)-to-rect (neg) cable (59)	a. Cable (59) and nut (61)	Install on alternator (neg) and tighten nut.	
	b. 2 cables (52 and 59), washer (58), and nut (57)	Install on rect (71), secure to bracket, and tighten nut.	
	c. 2 clamps (60 and 56), bolt (55), 2 washers (54), and nut (53)	Install clamp (61) on cable, secure to bulkhead, and tighten nut.	2 technicians reqd.

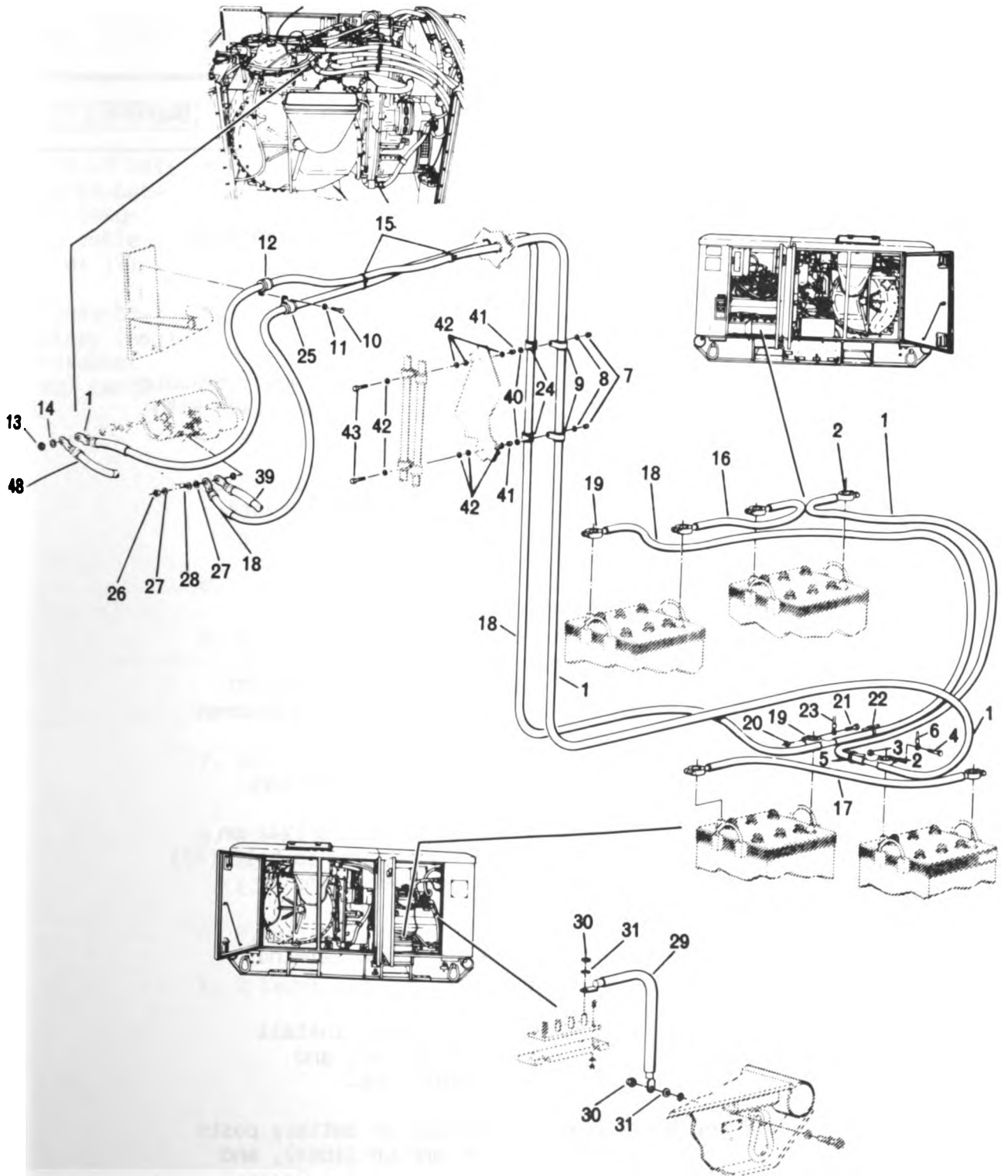
4-21. BATTERY CABLE ASSEMBLIES (11) (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
13. Slave (neg) recpt-to-rect (neg) stud cable (52)	a. 2 cables (52 and 48), washer (50), and bolt (49)	Install on slave recpt (neg) and tighten bolt.	
	b. 2 cables (52 and 59), washer (58), and nut (57)	Install on rect (neg) post, secure to bracket, and tighten nut.	
	c. 2 clamps (56 and 60), bolt (55), 2 washers (54) and nut (53).	Install clamp (58) on cable, secure to bulkhead, and tighten nut.	2 technicians reqd.
14. Slave (neg) recpt-to-starter (neg) cable (48)	a. Cable (48), washer (50), and bolt (49)	Install on slave (neg) recpt and tighten bolt.	
	b. Cable (48), washer (14), and nut (13)	Install on starter (neg) post and tighten nut.	
	c. 2 clamps (51 and 47), washer (45), and bolt (44)	Install clamp (51) on cable and secure to bracket and tighten bolt.	
	d. 2 each of clamps (51 and 37), bolts (43), 8 washers (42), and 2 nuts (41)	Install clamps (51) on cable, secure to bulkhead and tighten nuts.	2 technicians reqd. Note the use of washers as spacers for assembly.
	e. 2 washers (40), 2 each of clamp (24 and 9), washers (8) and nuts (7)	Install on bolt (43) and tighten nuts.	
	f. Plastic tie (46)	Install and tighten.	



4-21. BATTERY CABLE ASSEMBLIES (11) (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
15. Slave (pos) recpt-to-starter solenoid (pos) cable (39)	a. 2 cables (39 and 18), washer (38), and bolt (37)	Remove tag from lead. Install on slave (neg) recpt and tighten nut.	
	b. 2 cables (39 and 18), washers (27), lead (28), and nut (26)	Install on start solenoid and tighten nut.	
	c. 2 clamps (47 and 51), washer (45), and bolt (44)	Install clamp (47) on cable and tighten bolt.	
	d. 2 each of clamps (51 and 47), bolts (43), 8 washers (42), and 2 nuts (41)	Install 2 clamps (51) on cable, secure to bulkhead and tighten nuts.	2 technicians reqd. Note the use of washers as spacers for assembly.
	e. 2 washers (40), 2 each of clamps (24 and 9), washers (8), and nuts (7)	Install on bolt (43) and tighten nuts.	
	f. Plastic tie (46)	Install and tighten.	
16. Slave (pos) recpt-to-circuit breaker (neg) cable (32)	a. Cables (32 and 39), washer (38), and bolt (37)	Install on slave (pos) recpt and tighten bolt.	
	b. Cable (32), washer (38), and bolt (37)	Install on circuit breaker (neg) and tighten bolt.	
	c. 2 clamps (36), bolts (35), 4 washer (34), and 2 nuts (33)	Install clamps on cable, secure to bulkhead, and tighten nuts.	2 technicians reqd.
16.1. Electrical insulation sleeve (31.1)	a. Sleeve (31.1)	Install.	
	b. 2 plastic ties (31.2)	Install.	



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4-21. BATTERY CABLE ASSEMBLIES (11) (cont)

LOCATION	ITEM	ACTION	REMARKS
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INSTALLATION (cont)

- |   |  |                           |  |
|---|--|---------------------------|--|
| 17. Load terminal-<br>to-ground lug<br>cable (29) | a. Cable (29), 2 wash-<br>ers (31), and nuts<br>(30) | Install and tighten nuts. |  |
|---|--|---------------------------|--|

CAUTION

Accidentally reversing the battery connections must be avoided. Check polarity to be sure battery is not reversed with respect to generating system.

- |   |   |  |  |
|---|---|--|--|
| 18. Battery-to-<br>battery (pos)<br>cable to<br>starter (pos)<br>(18) | a. Cable (18)   | Insert into hole in bulk-<br>head and pull forward.  |  |
|   | b. Cables (18 and 39),<br>2 washers (27),<br>lead (28), and nut<br>(26) | Remove tag from<br>terminal, install<br>and tighten nut.   |  |
|   | c. 2 clamps (25 and<br>12), washer (11),<br>and bolt (10)               | Install clamp (25) on<br>cable, secure to bracket<br>and tighten bolt.                             |  |
|   | d. 2 plastic ties (15)  | Install and tighten.   |  |
|   | e. 2 each of clamps<br>(24 and 9), washers<br>(8) and nuts (7)          | Install clamps (24) on<br>cable, secure to bolt (43)<br>at bulkhead, and<br>tighten nuts.          |  |
|   | f. Nut (20) and bolt<br>(21)  | Remove from terminal<br>(19).  |  |
|   | g. Wire terminal (23),<br>bolt (21), and nut<br>(20)                    | Remove tag, install<br>on terminal, and<br>tighten nut.  |  |
|   | h. 2 terminals (19)   | Install on battery posts<br>(RH and LH sides), and<br>tighten nuts. Grease<br>terminals and posts. |  |

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
19. RH or LH battery-to-battery (neg-pos) cable (16 or 17)	4 terminals (2 each cable)	Install on battery posts, tighten, and grease terminals and posts.	
20. Battery-to-battery (neg)-to-starter (neg) cable (1)	a. Cable (1)	Insert into hole in bulkhead and pull forward.	
	b. 2 cables (1 and 48), washer (14), and nut (13)	Install on starter (neg) post and tighten nut.	
	c. 2 clamps (12 and 25), washer (11), and bolt (10)	Install clamp (12) on cable, secure to bracket and tighten bolt.	
	d. 2 plastic ties (15)	Install and tighten.	
	e. 2 each of clamps (9 and 24), washers (8), and nuts (7)	Install clamps (9) on cable, secure to bolt (43) at bulkhead, and tighten nuts.	
	f. Nut (3) and bolt (4)	Remove from terminal (2).	
	g. Wire terminal (6), bolt (4), and nut (3).	Remove tag, install on terminal (2), and tighten nut.	
	h. Plastic tie (5)	Install and tighten.	
	i. 2 terminals (2)	Install on battery posts (RH and LH sides), tighten, and grease terminal and post.	This arms the battery power in the set.



4-22. BATTERY (4)

This task covers:

- a. Removal                      b. Service                      c. Installation

INITIAL SETUP

Tools

- 1/2 combination wrench
- 5/8 combination wrench
- Apron (appx D)
- Rubber gloves (appx D)

References

- Para 1-14.d.(2)
- Item 10, table 2-1
- Para 3-7.
- Para 4-1.a.(5)
- Para 4-21.

Materials/Parts

- Baking soda (item 1, appx E)
- Paint brush (item 2, appx E)
- Face shield (item 7, appx E)
- Grease (GAA) (item 8, appx E)
- Rags (item 14, appx E)
- Tags (item 16, appx E)
- Electrical tape (item 17, appx E)
- Distilled water (item 18, appx E)

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
72	1,2	4-2

General Safety Instructions

Avoid grounding positive battery terminals.

Personnel Required

Utilities Equipment Repairer  
MOS 52C

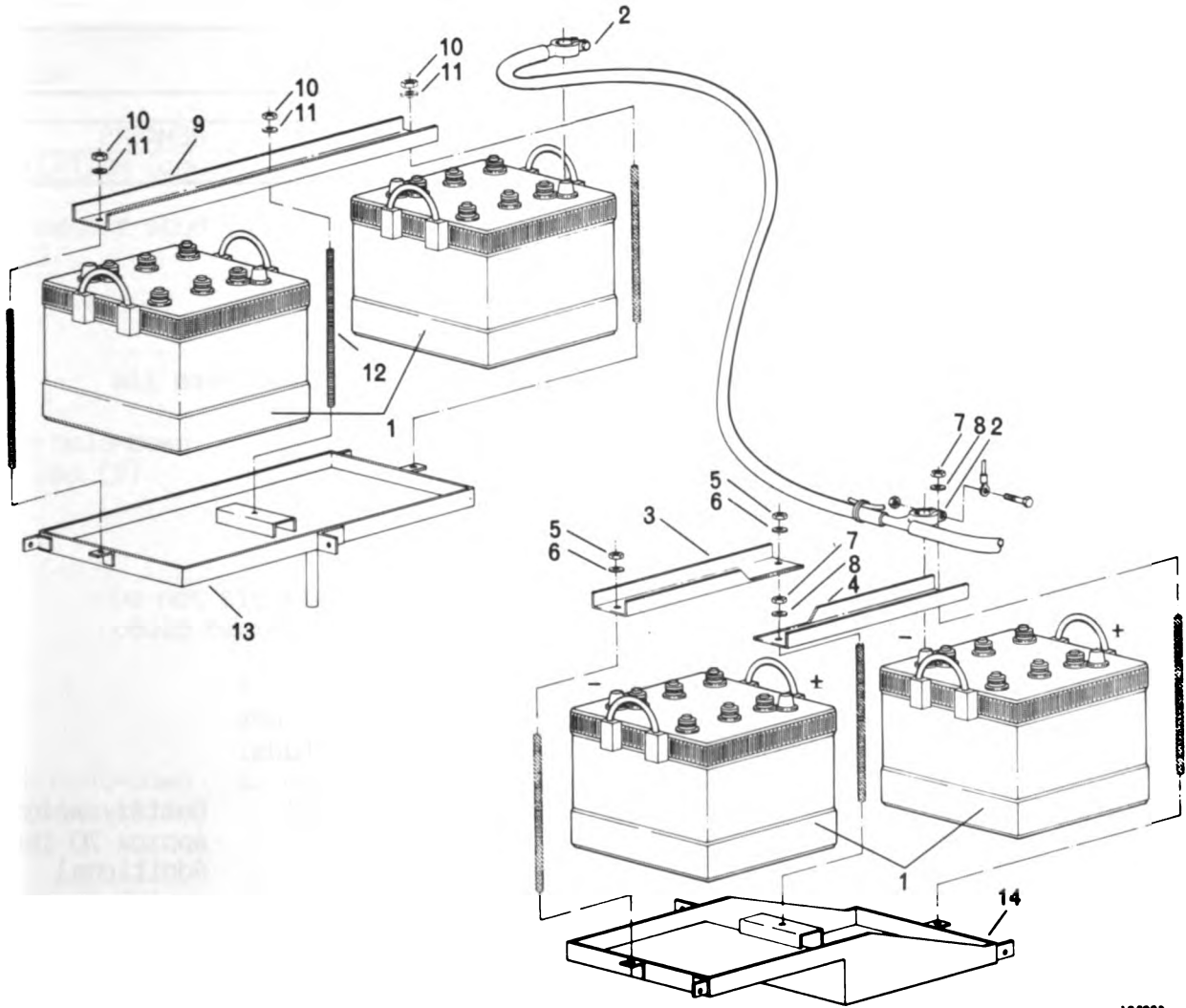
LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

1. Battery (1)

WARNING

Lead-acid batteries contain sulfuric acid which can cause severe burns. Avoid contact with skin, eyes or clothing. If battery electrolyte is spilled, take immediate action to stop its corrosive (burning) effects. Lead-acid battery gases can explode. Don't smoke, have open flames, or make sparks around a battery, especially if the caps are off.



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LOCATION	ITEM	ACTION	REMARKS
<b>REMOVAL (cont)</b>			
2. Cable (2)	a. Battery-to-battery neg cable (2)	Disarm by disconnecting.	This disarms the battery power.
	b. All other battery cables	Disconnect tag and identify.	
3. LH hold-down clamps (3 and 4)	a. 2 nuts (5) and flat washers (6)	Remove.	
	b. Hold-down clamp (3)	Remove.	

4-22. BATTERY (4) (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
3. LH hold-down clamps (3 and 4) (cont)	c. 2 nuts (7) and flat washers (8)	Remove.	
	d. Hold-down clamp (4)	Remove.	
4. RH hold-down clamp (9)	a. 3 nuts (10) and flat washers (11)	Remove.	
	b. Hold-down clamp (9)	Remove.	
5. RH center stud (12)		Remove.	

CAUTION

Do not allow battery to rest on hold down clamp studs.

6. Battery (1)		Remove.	Battery weighs approx 70 lbs. Additional assistance may be reqd to lift.
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SERVICE

CAUTION

Do not allow baking soda solution to enter the battery cells; it will neutralize the electrolyte and damage the battery.

7. Batteries, cables, and trays (13 or 14)		Clean and dry.	Use baking soda, water and brush.
--	--	----------------	-----------------------------------

CAUTION

Do not allow battery to rest on hold down clamp studs.

INSTALLATION

8. Battery (1)		Install.	Ref to data plate for installation.
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LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
9. RH center stud (12)		Install and tighten.	
<u>NOTE</u>			
All positive posts are outboard when installed in the set.			
10. RH hold-down clamp (9)		Install.	
<u>CAUTION</u>			
Do not tighten hold-down clamps unevenly or too tight; this could cause battery case to become distorted or even cracked.			
	3 flat washers (11) and nuts (10)	Install and tighten.	
11. LH hold-down clamps (3 and 4)	a. Hold-down clamp (4)	Install.	
<u>CAUTION</u>			
Do not tighten hold-down clamps unevenly or too tight; this could cause battery case to become distorted or even cracked.			
	b. 2 flat washers (8), and nuts (7)	Install and tighten.	
	c. Hold-down clamp (3)	Install.	
	d. 2 flat washers (6) and nuts (5)	Install and tighten.	
<u>CAUTION</u>			
Accidentally reversing the battery connections must be avoided. Check polarity to be sure battery is not reversed with respect to battery charging system.			
12. Cables	a. Battery cables (positive cables)	Remove tags, install, and tighten.	Ref to data plate or para 4-21 for installation.

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4-22. BATTERY (4) (cont)

---

LOCATION	ITEM	ACTION	REMARKS
12. Cables (cont)	b. Battery cables (negative cables except for the battery-to-battery neg cable)	Remove tags, install, and tighten.	Ref to data plate or para 4-21 for installation.
	c. Battery-to-battery neg cable (2)	Remove tags, install, and tighten.	This should arm battery power to the set.
13. Cables and terminals		Grease.	

Page 4-93 is a blank page.



4-23. HOURMETER

This task covers:

- a. Test                                      b. Removal                                      c. Installation

INITIAL SETUP

Test Equipment

Multimeter (appx D)

Tools

4-in. flat tip screwdriver

Personnel Required

Utilities Equipment Repairer  
MOS 52C

References

Para 1-14.d.(3)  
Item 5, table 2-1

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
77	1,2	4-2

Equipment Condition

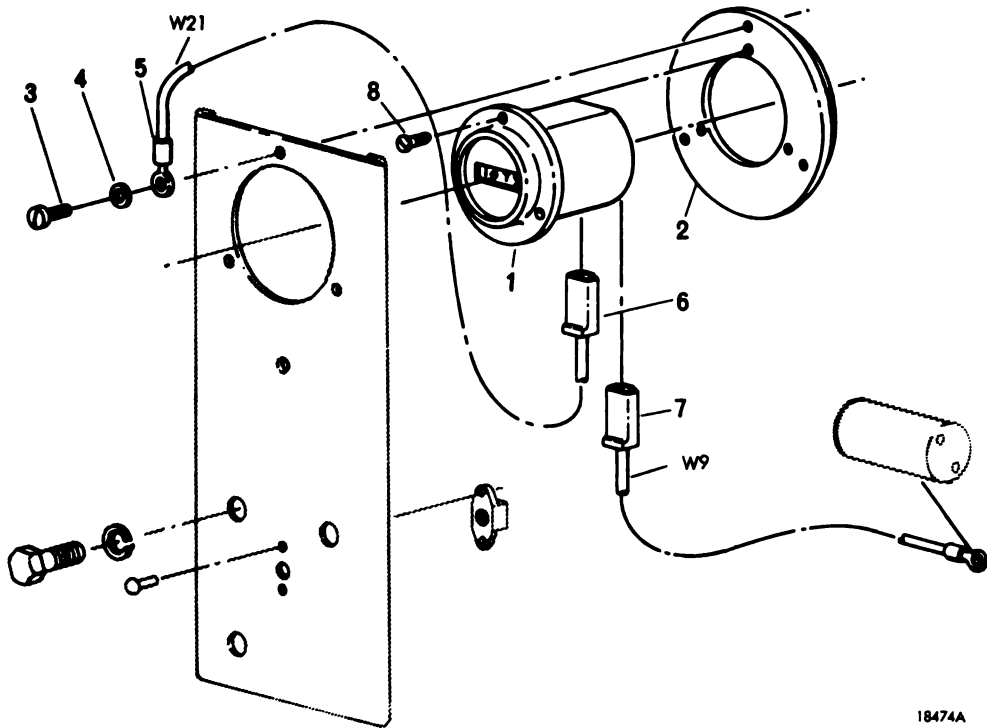
Para                      Condition Description

4-21                      Disarm battery power  
after test.

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
-----------------	-------------	---------------	----------------

REMOVAL

- |   |  |                        |
|---|--|------------------------|
| 1. Hourmeter (1)<br>and dampener<br>(2) | a. 3 screws (3),<br>washers (4), and<br>ground lug (5) | Remove.                |
|   | b. Dampener (2) and<br>hourmeter (1)                   | Remove from bracket.   |
|   | c. Connector pins<br>(6 and 7)                         | Remove from hourmeter. |
| 2. Hourmeter (1)                        | a. 3 screws (8)  | Remove.                |
|   | b. Hourmeter (1)                                       | Remove from dampener.  |



LOCATION	ITEM	ACTION	REMARKS
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TEST

NOTE

Hourometer does not have to be separated from dampener (6) for test only. Wire W21 does not have to be disconnected from hourometer for test only.

3. Wire W9

- |   |  |
|---|--|
| <p>a. Carefully install positive multimeter lead to wire W9 and negative multimeter lead to ground.</p> | <p>2 technicians reqd. Set multimeter to DC scale.</p> |
|---|--|



4-23. HOURMETER (cont)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

TEST (cont)

3. Wire W9  
(cont)

WARNING

Keep hands well away from cooler fan while engine is running. Serious injury or death could result.

NOTE

The purpose of this test is to energize the K2 relay by starting the generator. The K2 relay will allow 10-12 volts dc to the hourmeter.

	b. Start engine.	Para 2-2 and 2-3.
	c. Shut down engine.	Para 2-7.
	d. Check input voltage to hourmeter.	Voltage should be 10 Vdc minimum.
4. Wire W21	Check for continuity.	Set multimeter RX1 scale. Reading should be 0-1 ohm.

INSTALLATION

5. Hourmeter (1)	a. Hourmeter (1)	Install in dampener (2).
	b. 3 screws (8)	Install and tighten.
6. Dampener (2) and hourmeter (1)	a. Connector pins (7 and 6)	Install.
	b. Dampener (2) and hourmeter (1)	Install in bracket.
	c. Ground lug (5)	Install under top screw.
	d. 3 washers (4) and screws (3)	Install and tighten.
7. Electrical lead	2 wire terminals (2 and 3)	Remove tags and install on hourmeter.

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4-24. 24 VOLT ALTERNATOR

---

This task covers:

- a. Inspection                      b. Test                              c. Adjustment
- 

INITIAL SETUP

Test Equipment

Multimeter (appx D)

Reference

Para 2-2, 2-3, and 2-7

Tools

4-in. Flat Tip Screwdriver

Personnel Required

Utilities Equipment Repairer  
MOS 52C

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
72	2	4-2

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<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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INSPECTION

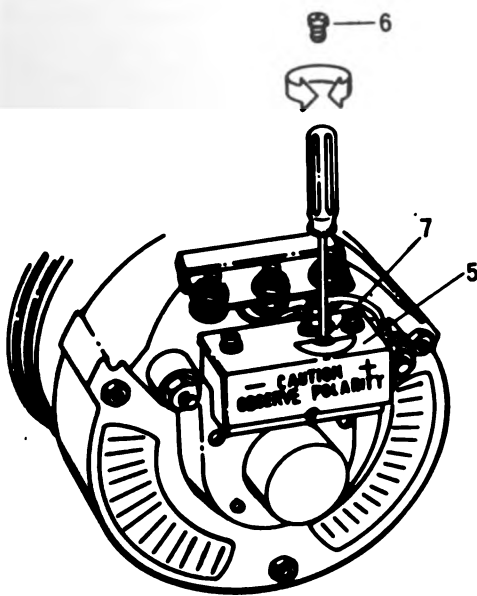
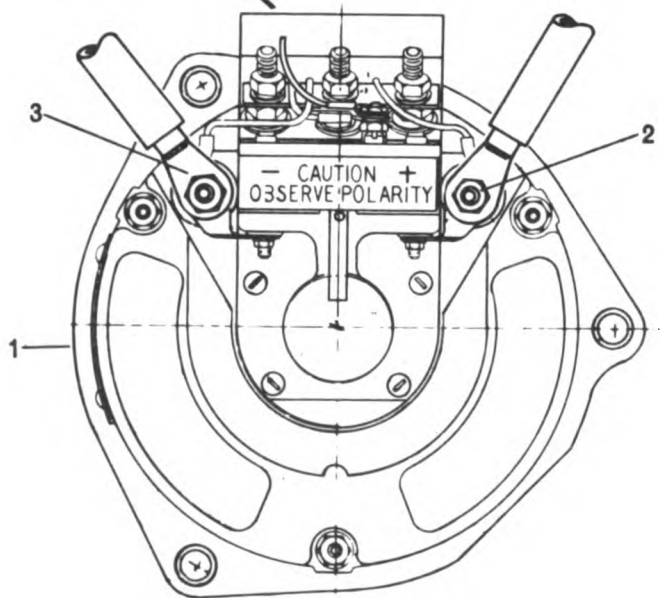
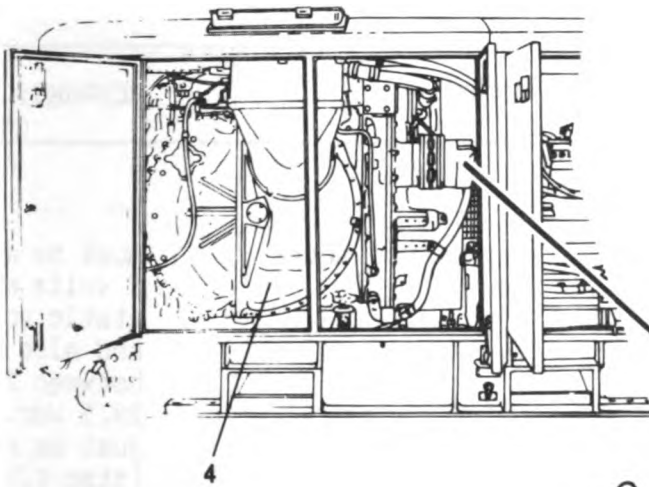
1. Alternator (1)		Inspect for damaged or missing parts, noisy, or otherwise inoperative condition.	
	Insert flexible coupling	Inspect the insert flexible coupling annually for signs of wear or breakage.	Replace if wear or damage is evident.

TEST

2. Alternator (1)	Positive terminal (2) and negative terminal (3)	Measure voltage	Engine shutdown. Set multimeter 0-50 Vdc voltage scale, should read 22-26V. Leave meter connected for the next test.
3. Engine (4)		Start.	Para 2-2 and 2-3.

NOTE

Do not attempt to adjust the voltage regulator if the batteries are in a low state of charge. System voltage will rise as the batteries receive charge, resulting in improper regulator setting.



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4-24. 24 VOLT ALTERNATOR (cont)

---

LOCATION	ITEM	ACTION	REMARKS
<u>TEST (cont)</u>			
	4. Alternator (1)	Repeat the above test.	Must be a min of 2 volts above static voltage and also be between 27.5 and 29.5 Vdc. Adjust as required (step 6.).
	5. Engine (4)	Shut down.	Para 2-7.

ADJUSTMENT

	6. Regulator (5)	Check alternator output voltage after engine runs for 30 minutes. If voltage output is not correct, adjust regulator (5).	Set multimeter on dc scale. Voltage should stabilize at 27.8-28 Vdc.
	a. Regulator cover screw (6)	Remove.	

CAUTION

Do not force adjusting screw past internal stops. This could damage the regulator assembly.

	b. Regulator adjusting screw (7)	a. Insert a small screwdriver into regulator cover and turn screw to correct regulator setting.	Turn screw clockwise to increase voltage and counterclockwise to decrease voltage.
--	----------------------------------	---	--

LOCATION	ITEM	ACTION	REMARKS
6. Regulator (5) (cont)		b. Regulator responds normally--adjust to correct setting.	No further adjusting is required.
		c. Regulator does not respond normally--cannot correct setting	Faulty regulator. Notify next higher level of maintenance.
		d. Remove screwdriver.	
	c. Regulator cover screw (6)	Install.	
7. Engine (4)		Shut down.	

4-25. LOW OIL PRESSURE SWITCH

This task covers:

- a. Test                      b. Removal                      c. Installation

INITIAL SETUP

Test Equipment

Multimeter (appx D)

Tools

3/4 open end wrench

Materials/Parts

Loctite pipe sealant with teflon  
(item 9, appx E)  
Rags (item 14, appx E)

References

Para 2-2, 2-3, and 2-7

Personnel Required

Utilities Equipment Repairer  
MOS 52C

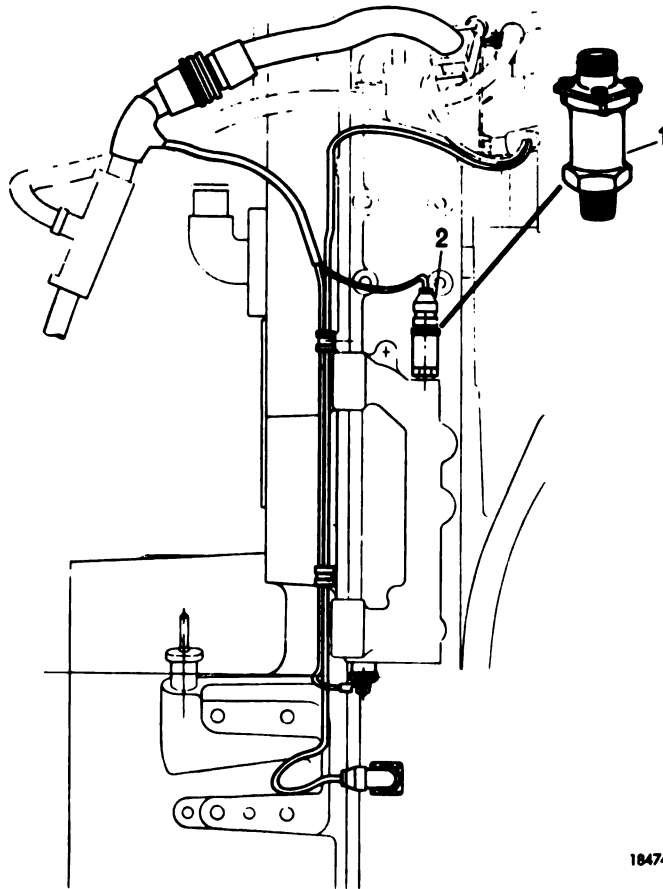
Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
39	3	4-2

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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TEST

1. Low oil pressure switch (1)	a. Disconnect cannon plug P14 from switch, and measure continuity from pin A to pin B of switch.	Engine shutdown. Set multimeter RX1 scale. Resistance to be 0 to 1 ohm.
	b. Measure for short circuit from pin A to ground (body of switch).	Set multimeter RX10 scale. Resistance should be 10,000 ohms minimum.
	c. Start engine.	Para 2-2 and 2-3.
	d. Measure resistance from pin A to pin B.	Set multimeter RX10 scale. Resistance should be 10,000 ohms minimum.
	e. Shut down engine.	Para 2-7.



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LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL</u>			
2. Electrical lead	Wire connector (2)	Disconnect.	
3. Low oil pressure switch (1)	Switch (1)	Unscrew and remove.	Wipe off dirt or debris prior to removal.
<u>INSTALLATION</u>			
4. Low-oil pressure switch (1)	Switch (1)	Screw in and tighten.	Apply pipe sealant to switch threads.
5. Electrical lead	Wire connector (2)	Connect.	



4-26. THERMO SWITCH ASSEMBLY (OIL TEMPERATURE)

This task covers:

- a. Test                      b. Removal                      c. Installation

INITIAL SETUP

Test Equipment

Multimeter (appx D)

Tools

15/16 socket  
3/8 box end wrench  
Ratchet handle

Personnel Required

Utilities Equipment Repairer  
MOS 52C

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
40	5	4-2

Materials/Parts

Loctite pipe sealant with teflon  
(item 9, appx E)  
Rags (item 14, appx E)

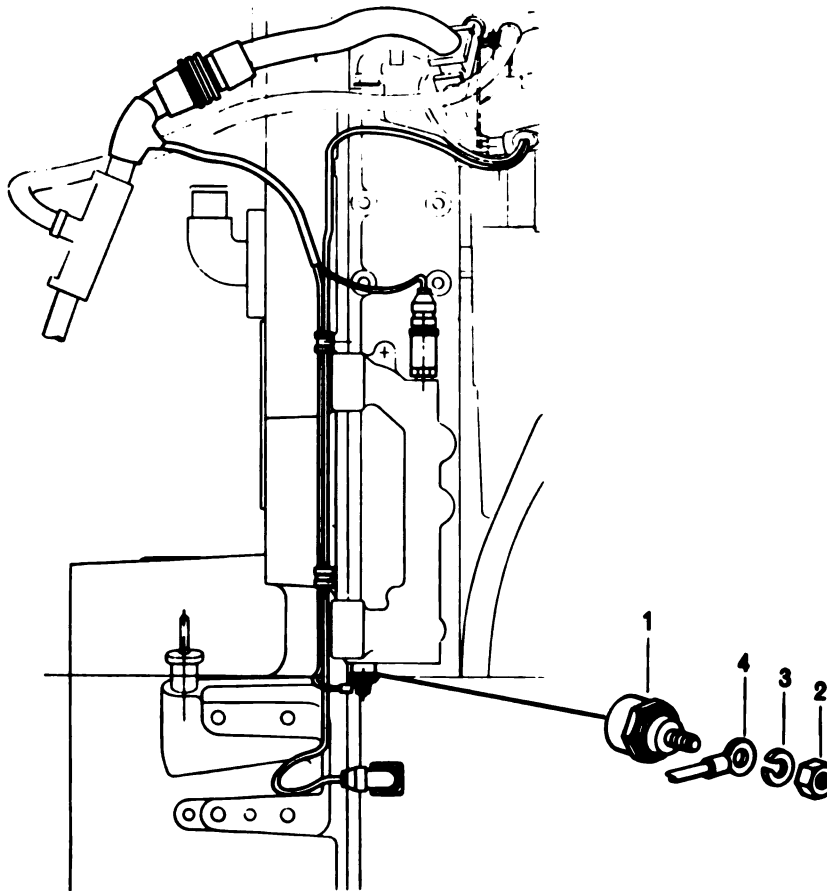
LOCATION	ITEM	ACTION	REMARKS
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TEST

1. Thermo switch (1)	a. Nut (2) washer (3), and terminal (4)	Remove.	
	b. Switch terminal (1)	Measure resistance to ground from electrical terminal stud.	Engine not running. Set multimeter RX10 scale. Resis- tance should be infinity.
	c. Terminal (4), wash- er (3), and nut (2)	Install and tighten nut.	

REMOVAL

2. Electrical lead	Nut (2), washer (3), and terminal (4)	Remove.
-----------------------	--	---------



LOCATION	ITEM	ACTION	REMARKS
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REMOVAL (cont)

WARNING

Lube oils MIL-L-23699 and MIL-L-7808 are highly toxic. Wash at once with soap and water if oil comes in contact with skin. If irritation occurs, get medical attention.

3. Thermo switch (1)		Unscrew and remove.	Use suitable container to catch drainage.
----------------------	--	---------------------	---

INSTALLATION

4. Thermo switch (1)		Screw in and tighten.	Apply pipe sealant compound to switch threads.
5. Electrical lead	Terminal (4), washer (3), and nut (2)	Install and tighten nut.	

Change 3 4-103

4-27. AUTOMATIC RESET 150 AMPERE CIRCUIT BREAKER

This task covers:

- a. Test                      b. Removal                      c. Installation

INITIAL SETUP

Test Equipment

Multimeter (appx D)

Tools

- 3/8 socket
- 7/16 socket
- 5-in. extension
- Ratchet handle
- 3/8 combination wrench
- 7/16 combination wrench

Personnel Required

Utilities Equipment Repairer  
MOS 52C

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
28	2,3	4-2

Equipment Condition

Para                      Condition Description

4-21                      Disarm battery power  
(after test).

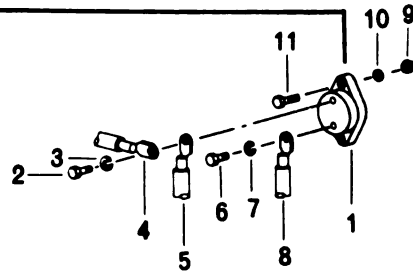
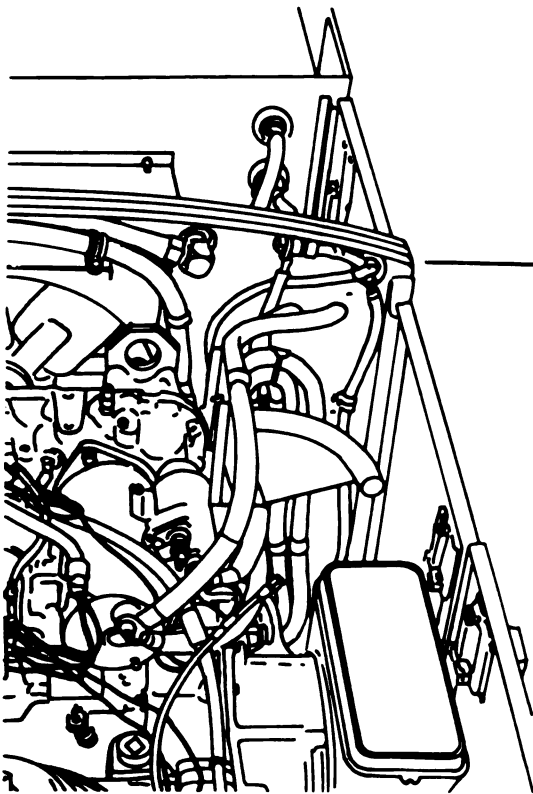
<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
-----------------	-------------	---------------	----------------

TEST

1. Circuit breaker (1)		Measure voltage (battery) on both sides to ground.	Set multimeter low dc scale. If no voltage on either side, replace breaker.
------------------------	--	--	---

REMOVAL

2. Circuit breaker (1)	a. Bolt (2) and washer (3)	Remove.	
	b. 2 leads (4 and 5)	Disconnect, tag, and identify.	
	c. Bolt (6) and washer (7)	Remove.	
	d. Lead (8)	Disconnect, tag, and identify.	



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LOCATION	ITEM	ACTION	REMARKS
<b>REMOVAL (cont)</b>			
2. Circuit breaker (1) (cont)	e. 2 nuts (9), washers (10), and bolts (11)	Remove.	
	f. Circuit breaker (1)	Remove.	
<b>INSTALLATION</b>			
3. Circuit breaker (1)	a. Circuit breaker (1)	Install.	
	b. 2 bolts (11), washers (10), and nuts (9)	Install and tighten.	
	c. Lead (8)	Remove tag and install.	
	d. Washer (7) and bolt (6)	Install and tighten.	
	e. 2 leads (5 and 4)	Remove tag and install.	
	f. Washer (3) and bolt (2)	Install and tighten.	

4-28. LOAD TERMINAL (GROUND STUD)

This task covers:

- a. Inspection                      b. Service                      c. Removal                      d. Installation

INITIAL SETUP

Tools

- 3/4 combination wrench
- 1-in. open end wrench
- Scratch wire brush (appx D)

Reference

Para 4-2.a.(2)

Equipment Condition  
Para                      Condition Description

Personnel Required

Utilities Equipment Repairer  
MOS 52C

4-21                      Disarm battery power.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

1. Load terminal (1)		Inspect for corrosion, damaged or missing parts, or loose mounting.	
-------------------------	--	---	--

SERVICE

2. Load terminal (1)	Terminal (1)	Clean.	Use wire brush.
-------------------------	--------------	--------	-----------------

REMOVAL

3. Load terminal (1)	a. Nut (2), ground cable (3), flat washer (4), and packing (5)	Remove.	
	b. Terminal (1)	Remove.	
	c. Washer (6) and nut (7)	Remove.	

428.1. TERMINAL CLIP (RETAINER, SAFETY CLIP)

This task covers: replace

INITIAL SETUP

Tools

Wire Cutter

Personnel Required

MOS 52C

MATERIALS/PARTS

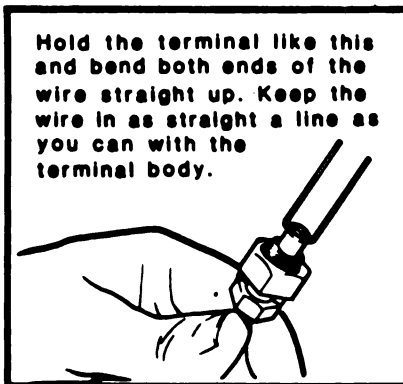
Wire (item 19, appx E)

LOCATION	ITEM	ACTION	REMARKS
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REPLACE

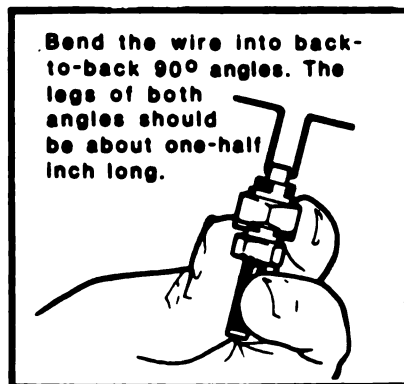
1. Ground Stud	Terminal Clip	If terminal clip is lost or broken, fabricate as follows.	
----------------	---------------	---	--

Cut off above 3 1/4 inches of wire. Cut the wire short enough to keep the clips from touching the generator frame in the open or closed position. Slip the wire through the hole in the terminal and proceed as shown in the following views:



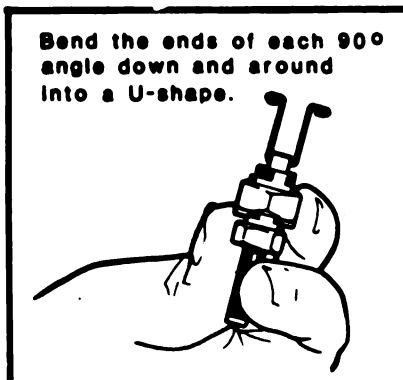
Hold the terminal like this and bend both ends of the wire straight up. Keep the wire in as straight a line as you can with the terminal body.

VIEW 1.



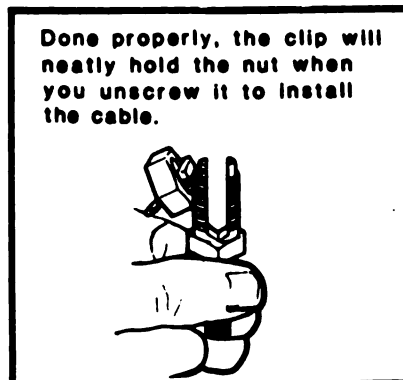
Bend the wire into back-to-back 90° angles. The legs of both angles should be about one-half inch long.

VIEW 2.



Bend the ends of each 90° angle down and around into a U-shape.

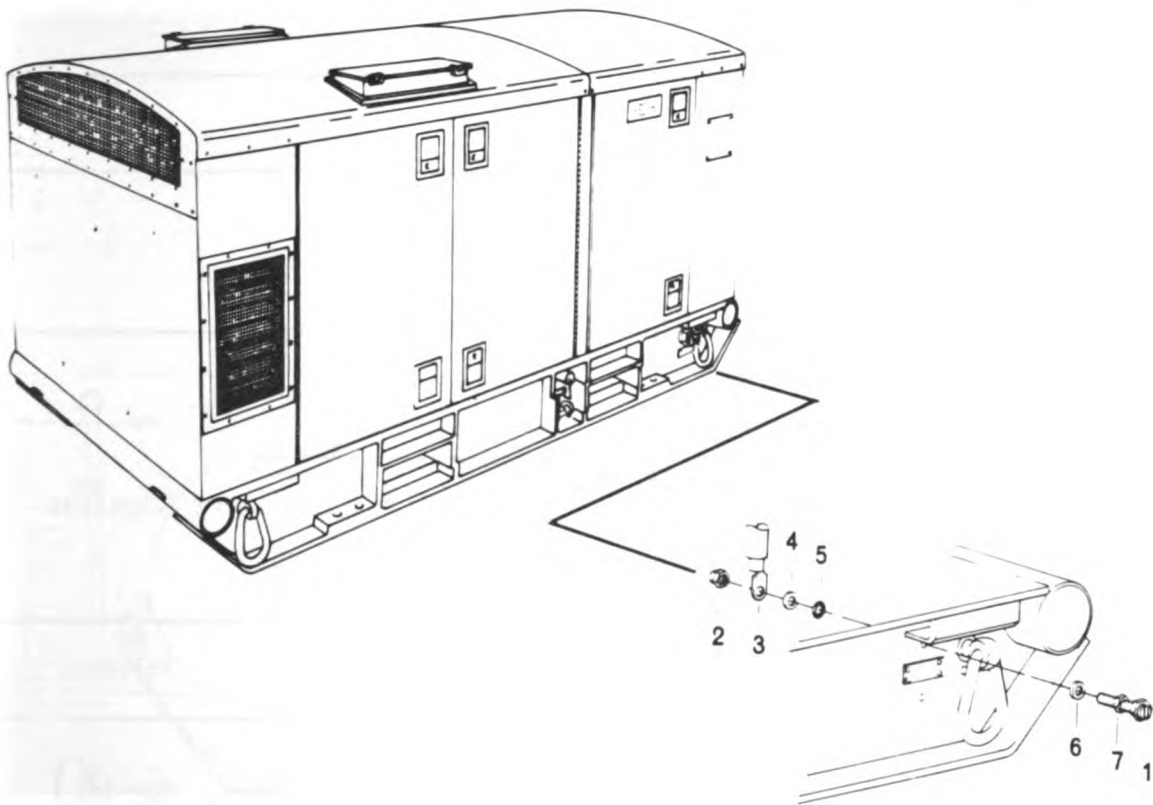
VIEW 3.



Done properly, the clip will neatly hold the nut when you unscrew it to install the cable.

VIEW 4.





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LOCATION	ITEM	ACTION	REMARKS
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INSTALLATION

4. Load terminal (1)	a. Nut (7) and washer (6)	Install.	
	b. Terminal (1)	Install.	
	c. Packing (5) and washer (4)	Install.	
	d. Ground cable (3)	Install.	
	e. Nut (2)	Install and tighten.	



4-29. DC ELECTRICAL WIRING

This task covers:

Inspection

INITIAL SETUP

Material/Parts

Rags (item 14, appx E)  
Tape (item 17, appx E)

Personnel Required

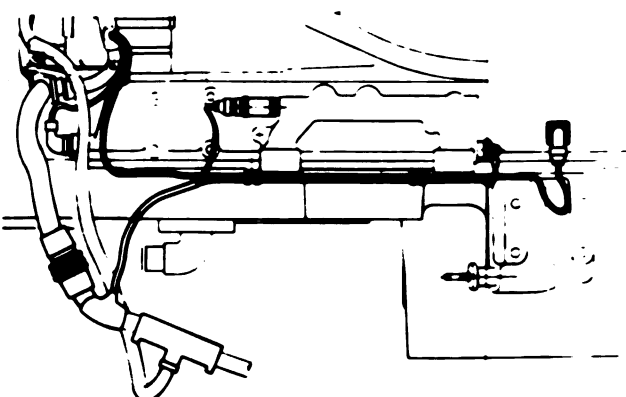
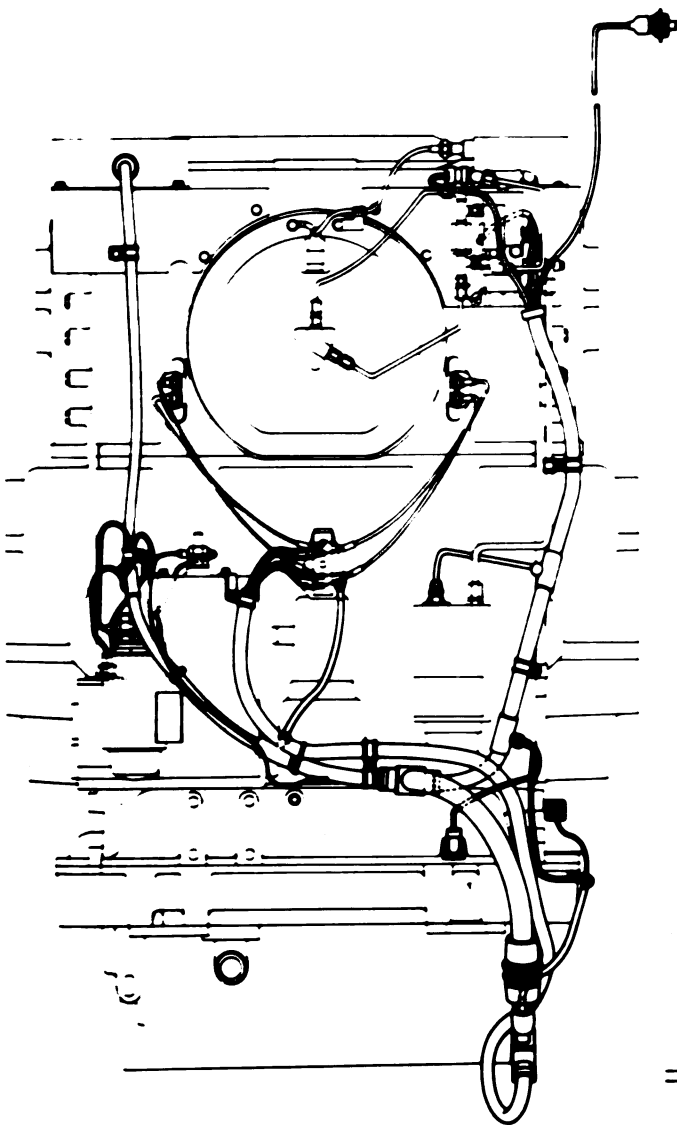
Utilities Equipment Repairer  
MOS 52C

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Wiring and harness

Inspect for loose or oily connections or chafed wiring. Tighten loose connections, wipe off oil, and tape chafed areas.



## Section X. MAINTENANCE OF ELECTRICAL POWER GENERATOR AND CONTROLS SYSTEM

### 4-30. DUPLEX RECEPTACLE AND 15-AMP CIRCUIT BREAKER

This task covers:

- a. Test                      b. Removal                      c. Installation

#### INITIAL SETUP

##### Test Equipment

Multimeter (appx D)

##### Tools

- 4-in. cross tip screwdriver
- 4-in. flat tip screwdriver
- 9/16 socket
- Ratchet handle
- 2-in. extension

##### Materials/Parts

Tags (item 16, appx E)

##### Personnel Required

Utilities Equipment Repairer  
MOS 52C

##### References

Para 2-2, 2-3, and 2-7  
Para 4-1.a.(3)

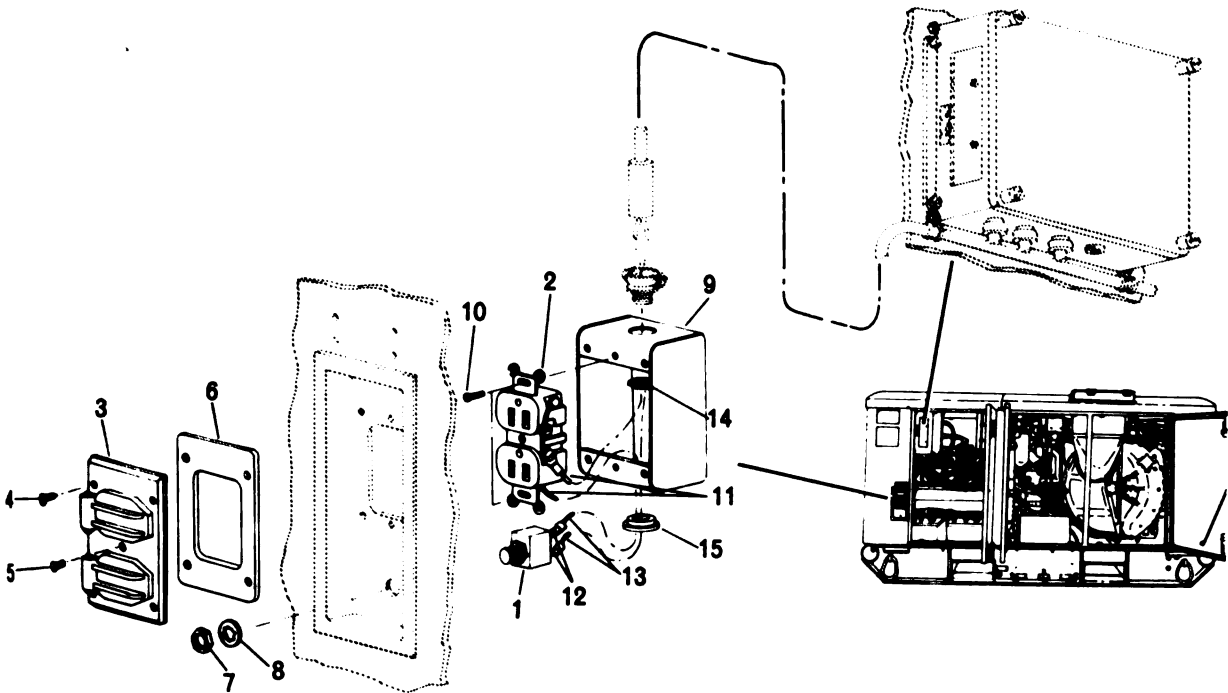
##### Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
74	3,4	4-2

LOCATION	ITEM	ACTION	REMARKS
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#### TEST

1. Duplex receptacle assembly	a. Start engine.	Para 2-2 and 2-3.
	b. Measure AC voltage between two flat bladed openings on each receptacle with circuit breaker pressed in.	Set multimeter to ac scale. Reading should be 120 $\pm$ 5 Vac.
	c. Pull out circuit breaker (1) and repeat step a.	Reading should be 0 Vac. Replace circuit breaker if any voltage is indicated.



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LOCATION	ITEM	ACTION	REMARKS
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TEST (cont)

1. Duplex receptacle assembly (cont)		d. Remove.	See step 3.
		e. Check for voltage at circuit breaker terminals.	Reading should measure $120 \pm 5$ Vac.
		f. Check for voltage at side terminals on receptacle (2).	Reading should measure $120 \pm 5$ Vac.
		g. Shut down engine.	Para 2-7.
		h. Install.	See step 8.

4-30. DUPLEX RECEPTACLE AND 15-AMP CIRCUIT BREAKER (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL</u>			
2. Cover (3)	a. 4 screws (4) and screw (5)	Remove.	
	b. Cover (3)	Remove.	
	c. Gasket (6)	Remove.	
	d. Nut (7) and washer (8)	Remove.	
	e. Junction box assy (9 and 1)	Pull out for access.	
3. Receptacle (2)	a. 2 screws (10)	Remove and pull receptacle from junction box.	
	b. Electrical leads (11)	Disconnect, tag, and identify.	
	c. Receptacle (2)	Remove.	
4. Circuit breaker (1)	a. 2 screws (12)	Remove.	
	b. Electrical leads (13)	Disconnect, tag, and identify.	
	c. Circuit breaker (1)	Remove.	
5. Junction box (9)	a. Nut (14)	Remove.	
	b. Electrical leads (11) and (13)	Remove from box.	
	c. Grommet (15)	Remove.	
	d. Junction box (9)	Remove.	

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION</u>			
6. Junction box (9)	a. Grommet (15)	Install.	
	b. Electrical leads (11) and (13)	Install in box.	
	c. Nut (14)	Install and tighten.	
7. Circuit breaker (1)	a. Electrical leads (13)	Remove tag and install.	
	b. 2 screws (12)	Install and tighten.	
8. Receptacle (2)	a. Electrical leads (11)	Remove tag and connect.	
	b. Receptacle (2)	Install in box.	
	c. 2 screws (10)	Install and tighten.	
9. Cover (3)	a. Junction box assy (1 and 9)	Install.	
	b. Washer (8) and nut (7)	Install and tighten.	
	c. Gasket (6)	Install.	Replace if damaged.
	d. Cover (3)	Install.	
	e. 4 screws (4) and screw (5)	Install and tighten.	Hold junction box in place when installing screws.

4-31. AIR COOLED BRUSHLESS 150 KW AC ALTERNATOR

This task covers:

Inspection

INITIAL SETUP

Personnel Required

Utilities Equipment Repairer  
MOS 52C

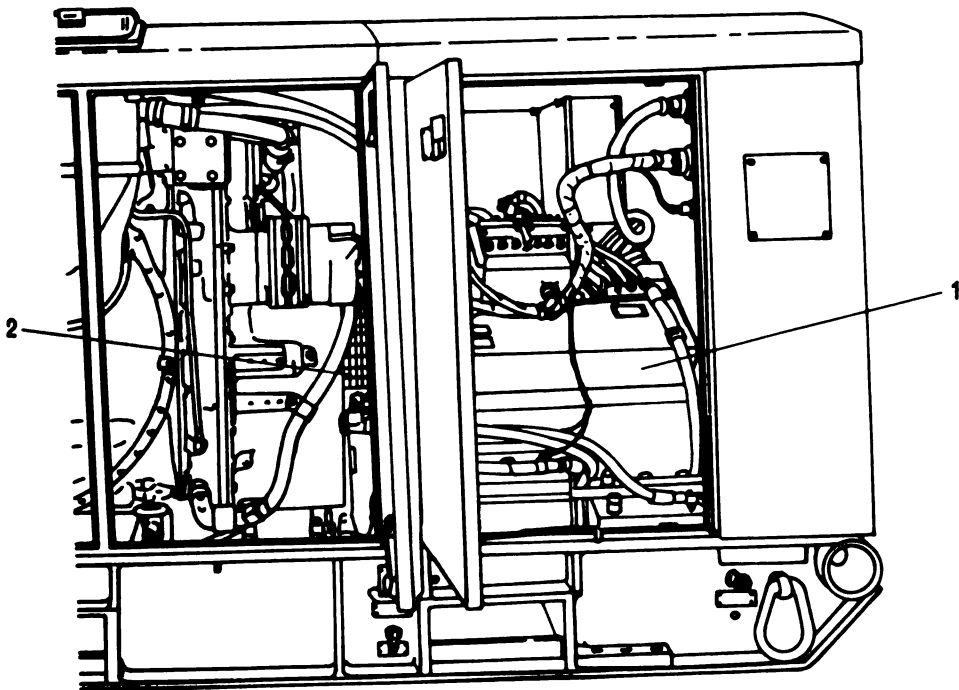
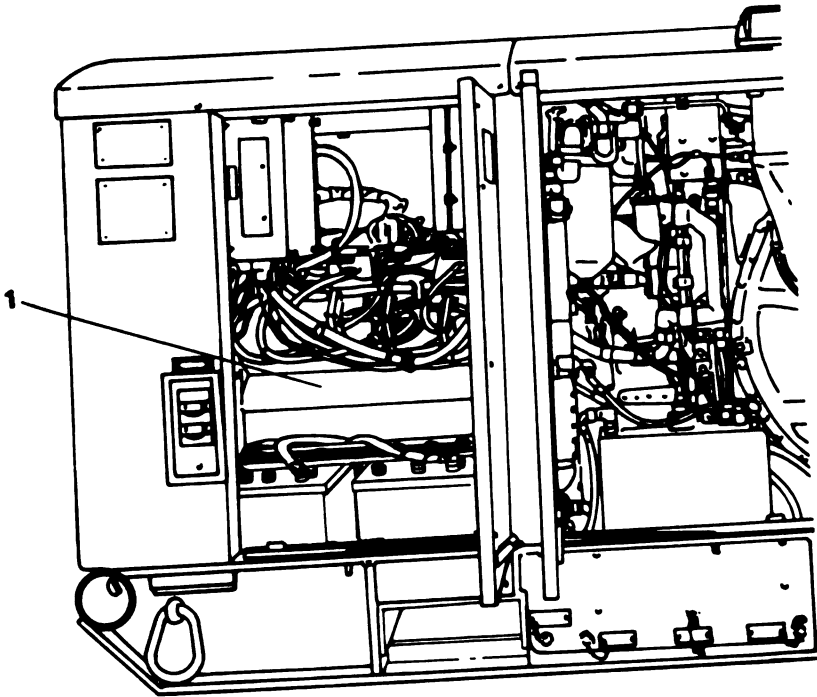
References

Para 1-14.e.(1)  
Table 1-1  
Para 4-1.a.(4)

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Alternator (1)		Inspect for: 1. Excess dirt. 2. Moisture. 3. Broken, burned leads. 4. Cracks, broken, or missing components. 5. Broken bolts or flanges of driving disc (2) (behind screen).	Notify next higher level of maintenance if any of these conditions are found
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18526, 18527



## Section XI. MAINTENANCE OF FUEL SYSTEM

### 4-32. FUEL TRANSFER PUMP

This task covers:

Service

#### INITIAL SETUP

##### Tools

3/4 open end wrench  
7/8 open end wrench

##### References

Para 1-14.b.(16)  
Item 7, table 2-1  
Item 2, table 4-1

##### Materials/Parts

Inlet filter assy  
Inlet filter seal  
Rags (item 14, appx E)  
Solvent (item 15, appx E)

##### Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
5	4	4-2

##### Personnel Required

Utilities Equipment Repairer  
MOS 52C

##### General Safety Instructions

No smoking or open flame.

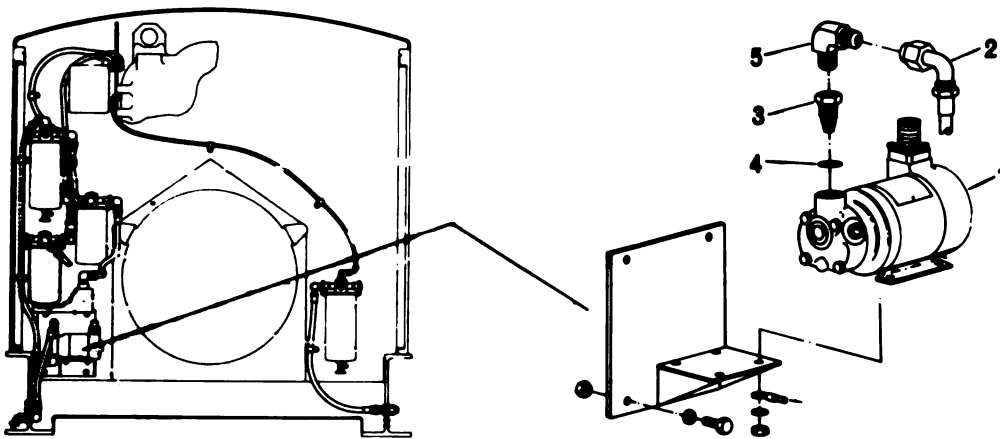
LOCATION	ITEM	ACTION	REMARKS
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#### SERVICE

##### WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

- |                         |                                     |                                |
|-------------------------|-------------------------------------|--------------------------------|
| 1. Transfer pump<br>(1) | a. Fuel line (2)                    | Remove from elbow.             |
|                         | b. Inlet filter (3)<br>and seal (4) | a. Remove and discard<br>seal. |



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LOCATION	ITEM	ACTION	REMARKS
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SERVICE (cont)

1. Transfer pump  
(1) (cont)

WARNING

Solvent is toxic. Illness or skin damage may be caused by prolonged breathing of solvent fumes or skin contact with the liquid. Ensure that there is adequate ventilation and avoid open flame or sparks when using flammable solvent.

b. Clean and air dry filter.

NOTE

If filter is damaged, it should be replaced. Complete step c. only for replacement of filter.

c. Elbow (5)	Remove from damaged filter and install in new filter.	
d. New seal (4)	Install on filter.	
e. Filter (3)	Install and tighten (elbow should be pointed out).	Do not over tighten.
f. Fuel line (2)	Install on elbow and tighten.	Do not over tighten.

4-33. PRIMARY AND CATCH AND DRAIN FUEL FILTERS

This task covers:

- a. Service                      b. Removal                      c. Installation

INITIAL SETUP

Tools

- Socket head screw key set
- Ratchet handle
- 7/8 open end wrench
- 9/16 socket
- 9/16 combination wrench
- 5/8 open end wrench
- 1/2 open end wrench
- 3/4 open end wrench
- 5-in. extension
- Strap style pipe wrench (appx D)

References

- Para 1-14.b.(18 and 21)
- Para 2-2, 2-3, and 2-7
- Item 8 and 13, table 2-1
- Item 1, table 4-1

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
5	6	4-2
34	2	4-2
44	1	4-2
45	2	4-2
46	1	4-2

Materials/Parts

- Drain cock
- Filter element
- Bucket (item 3, appx E)
- Rags (item 14, appx E)

General Safety Instructions

No smoking or open flame.

Personnel Required

Utilities Equipment Repairer  
MOS 52C

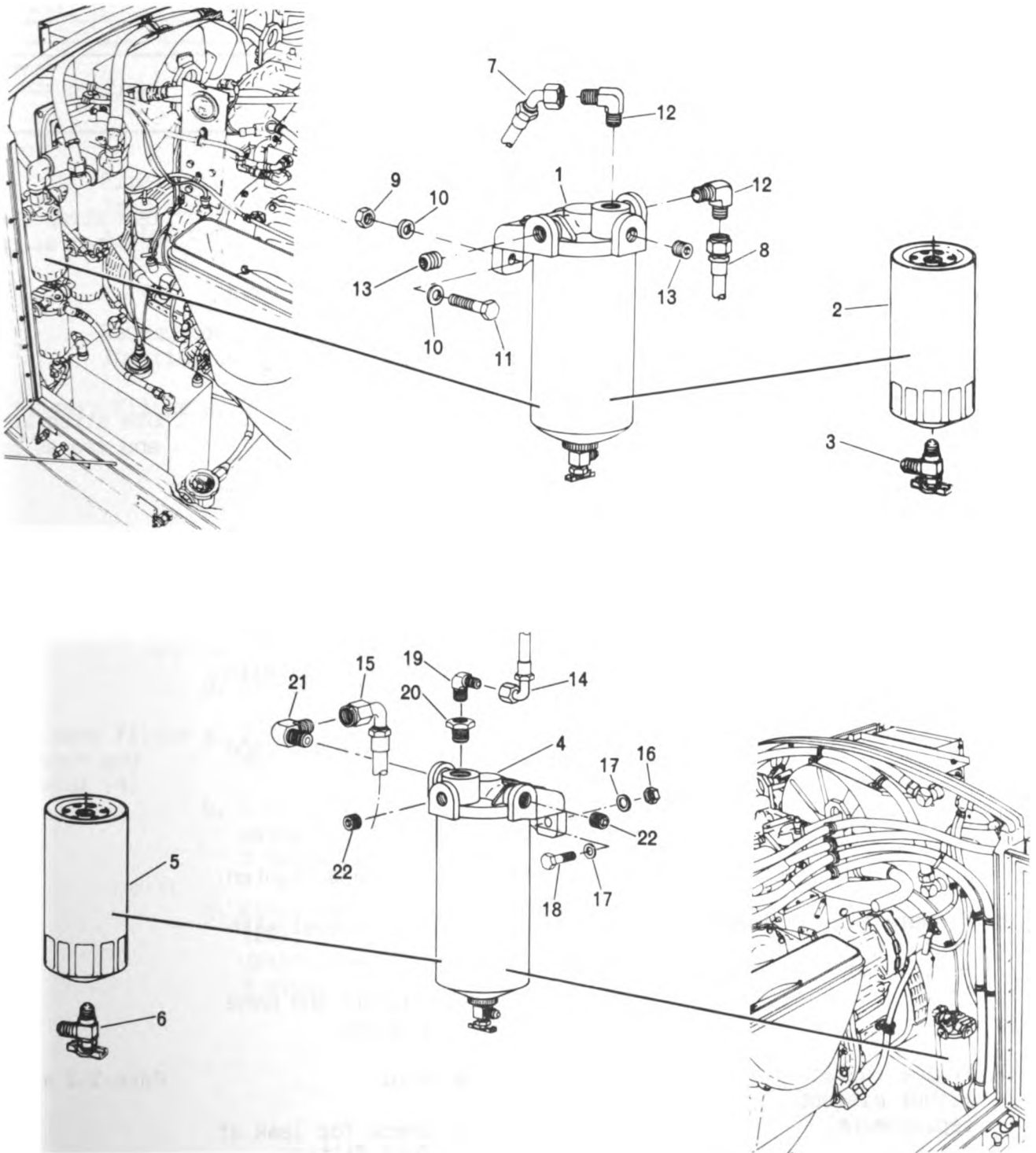
<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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SERVICE

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

- |  |   |
|--|---|
| <p>1. Primary filter Element (2)<br/>(1)</p> | <p>a. Drain fuel from<br/>drain cock (3).</p> |
|--|---|



18513A, 18483A, 18414, 18413, 18484A, 18531

4-33. PRIMARY AND CATCH AND DRAIN FUEL FILTERS (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>SERVICE (cont)</u>			
		b. Remove.	Use strap wrench and rag as reqd.
2. Element (2)	Drain cock (3)	Remove from element.	
3. Primary filter (catch and drain) (4)	Element (5)	a. Drain fuel from drain cock (6). b. Remove.	Use strap wrench and rag as reqd.
4. Element (5)	Drain cock (6)	Remove from element.	
5. Element (2)	a. Shipping plug b. Drain cock (3)	Remove. Install and tighten.	
6. Primary filter	Element (2)	a. Dampen seal with fuel. b. Install and hand tighten.	
7. Element (5)	a. Shipping plug b. Drain cock (6)	Remove. Install and tighten.	
8. Primary filter (catch and drain) (4)	Element (5)	a. Dampen seal with fuel. b. Install and hand tighten.	
9. Engine (after either element replacement)		a. Run. b. Check for leak at fuel filters. c. Shut down. d. Tighten elements as reqd to stop leaks.	Para 2-2 and 2-3. Para 2-7

LOCATION	ITEM	ACTION	REMARKS
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REMOVALWARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

NOTE

Record position of fittings in filter adapter to assist in locating correct position during installation.

- |  |   |                     |                     |
|--|---|---------------------|---------------------|
| 10. Primary filter (1)                   | a. 2 fuel lines (7 and 8)   | Remove from elbows. |                     |
|  | b. 2 nuts (9), 4 washers (10), and 2 bolts (11)                           | Remove.             | 2 technicians reqd. |
|  | c. 2 elbows (12), plugs (13), and drain cock (3)                          | Remove.             |                     |
|  | d. Element (2)  | Remove.             |                     |
| 11. Primary filter (catch and drain) (4) | a. 2 fuel lines (14 and 15)   | Remove from elbows. |                     |
|  | b. 2 nuts (16), 4 washers (17), and 2 bolts (18)                          | Remove.             |                     |
|  | c. Elbow (19), reducer (20), elbow (21), drain cock (6), and 2 plugs (22) | Remove.             |                     |

---

4-33. PRIMARY AND CATCH AND DRAIN FUEL FILTERS (cont)

---

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION</u>			
<u>CAUTION</u>			
Do not over tighten fittings or lines. Over tightening may damage the equipment.			
<u>NOTE</u>			
Replace any damaged fitting, but make sure they are replaced to the same position as noted in the removal.			
12. Primary filter (catch and drain) (4)	a. 2 plugs (22), elbow (21), reducer (20), and elbow (19)	Install and tighten in positions as shown.	Do not over tighten.
	b. 2 bolts (18), 4 washers (17), and 2 nuts (16)	Install and tighten.	2 technicians reqd.
	c. 2 fuel lines (15 and 14)	Install and tighten.	Do not over tighten.
	d. Element (5)	Repeat steps 7, 8, and 9.	
13. Primary filter (1)	a. 2 elbows (12), plugs (13), and drain cock (3)	Install and tighten in positions as shown.	Do not over tighten.
	b. 2 bolts (11), 4 washers (10), and 2 nuts (9)	Install and tighten.	2 technicians reqd.
	c. 2 fuel lines (7 and 8)	Install and tighten.	Do not over tighten.
	d. Element (2)	Repeat steps 5, 6, and 9.	

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4-34. FIRST SECONDARY AND SECOND SECONDARY FUEL FILTERS

This task covers:

- a. Service                      b. Removal                      c. Installation

INITIAL SETUP

Tools

- 10-in. adjustable wrench
- Socket head screw key set
- 9/16 combination wrench
- 11/16 open end wrench
- 7/8 open end wrench
- 3/4 open end wrench
- 9/16 socket
- Ratchet handle
- 5-in. extension
- Strap style pipe wrench (appx D)

References

- Para 1-14.b.(18 and 19)
- Para 2-2, 2-3, and 2-7
- Item 8, table 2-1
- Item 1, table 4-1

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
5	6	4-2
31	4	4-2
35	2	4-2
44	1	4-2
45	2	4-2
46	1	4-2

Materials/Parts

- Filter element
- Bucket (item 3, appx E)
- Rags (item 14, appx E)

General Safety Instructions

Personnel Required

No smoking or open flame.

Utilities Equipment Repairer  
MOS 52C

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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SERVICE

WARNING

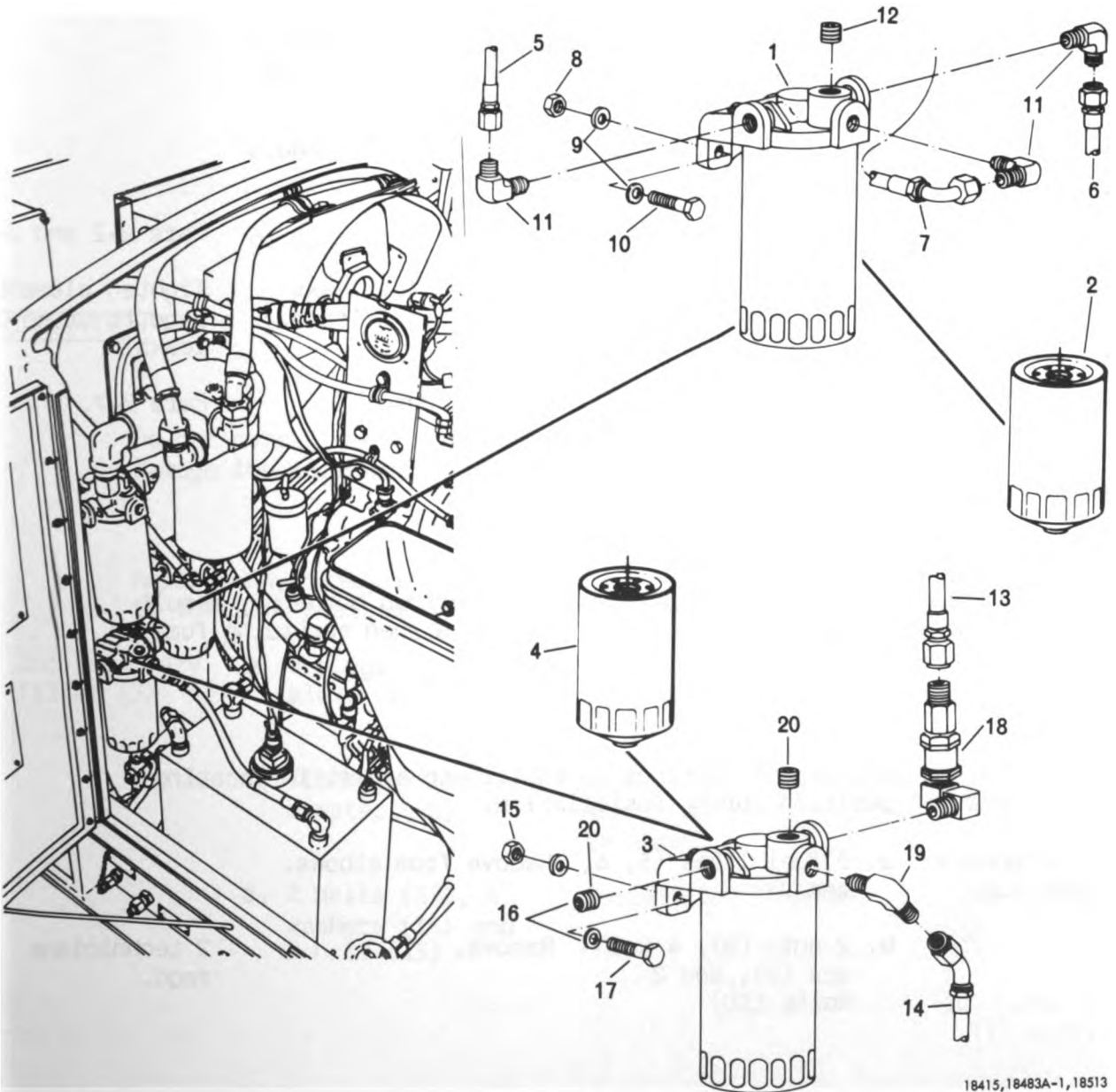
Fire may be caused by spilled fuel. Serious burns may result from accidental ignitin of fuel spilled when servicing fuel system components.

1. 1st secondary filter (1)	Element (2)	Remove.	Use strap wrench and rag as reqd.
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LOCATION	ITEM	ACTION	REMARKS
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**SERVICE**

2. 2nd secondary filter (3)	Element (4)	Remove.	Use strap wrench and rag as reqd.
3. 1st secondary filter (1)	Element (2)	a. Dampen seal with fuel.	



4-34. FIRST SECONDARY AND SECOND SECONDARY FUEL FILTERS (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>SERVICE (cont)</u>			
3. 1st secondary filter (1) (cont)		b. Install and hand tighten.	
4. 2nd secondary filter (3)	Element (4)	a. Fill with clean fuel; dampen seal with fuel. b. Install and hand tighten.	
5. Engine		a. Run. b. Check for leaks at fuel filters. c. Shut down.	Para 2-2 and 2-3. Tighten elements reqd to stop leaks. Para 2-7.

REMOVAL

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

NOTE

Record position of fittings in filters to assist in locating correct position during installation.

6. 1st secondary filter (1)	a. 3 fuel lines (5, 6, and 7)	Remove from elbows.	
	b. 2 nuts (8), 4 washers (9), and 2 bolts (10)	Remove.	2 technicians reqd.

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
6. 1st secondary filter (1) (cont)	c. 3 elbows (11) and plug (12)	Remove.	
7. 2nd secondary filter (3)	a. 2 fuel lines (13 and 14)	Remove from elbow and fitting.	Use adjustable wrench to hold adapter (18).
	b. 2 nuts (15), 4 washers (16), and 2 bolts (17)	Remove.	2 technicians reqd.
	c. Elbows, valve, and adapter (18)	Remove as a unit.	
	d. Elbow (19), and 2 plugs (20)	Remove.	

INSTALLATIONCAUTION

Do not over tighten fittings or lines. Over tightening may damage the equipment.

NOTE

Replace any damaged fitting, but make sure they are replaced to the same position as noted in the removal.

8. 2nd secondary filter (3)	a. 2 plugs (20) and elbow (19)	Install and tighten with elbow in position as shown.	
	b. Elbows, valve, and adapter (18)	Install as a unit and tighten in position as shown.	
	c. 2 bolts (17), 4 washers (16) and 2 nuts (15)	Install and tighten.	2 technicians reqd.

---

4-34. FIRST SECONDARY AND SECOND SECONDARY FUEL FILTERS (cont)

---

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
8. 2nd secondary filter (3) (cont)	d. 2 fuel lines (14 and 13)	Install and tighten.	
	e. Element (4)	Repeat steps 4 and 5.	
9. 1st secondary filter (1)	a. Plug (12) and 3 elbows (11)	Install and tighten elbows in positions as shown.	
	b. 2 bolts (10), 4 washers (9), and 2 nuts (8)	Install and tighten.	2 technicians reqd.
	c. 3 fuel lines (5, 6, and 7)	Install and tighten.	
	d. Element (2)	Repeat steps 3 and 5.	

Page 4-129 is a blank page.



4-35. 3-WAY SOLENOID, 2-WAY SOLENOID, AND FLOW DIVIDER VALVES

This task covers:

- a. Inspection                      b. Test                      c. Removal                      d. Installation

INITIAL SETUP

Test Equipment

Multimeter (appx D)

Tools

- 5/8 combination wrench
- 3/8 combination wrench
- 9/16 combination wrench
- 1/2 combination wrench
- 7/16 combination wrench
- 1/2 open end wrench
- 7/16 open end wrench

References

Para 1-14.c.(4 and 5)  
Para 2-2, 2-3, and 2-7

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
31	5,6,7,9	4-2
44	3	4-2
45	4	4-2
46	3	4-2
79	1	4-2

Materials/Parts

- Bucket (item 3, appx E)
- Rags (item 14, appx E)
- Tags (item 16, appx E)
- Tape (item 17, appx E)
- Fuel inlet fitting packing
- Fuel outlet fitting packing

Equipment Condition

Para                      Condition Description

4-13                      Front roof removed.

General Safety Instructions

No smoking or open flame.

Personnel Required

Utilities Equipment Repairer  
MOS 52C

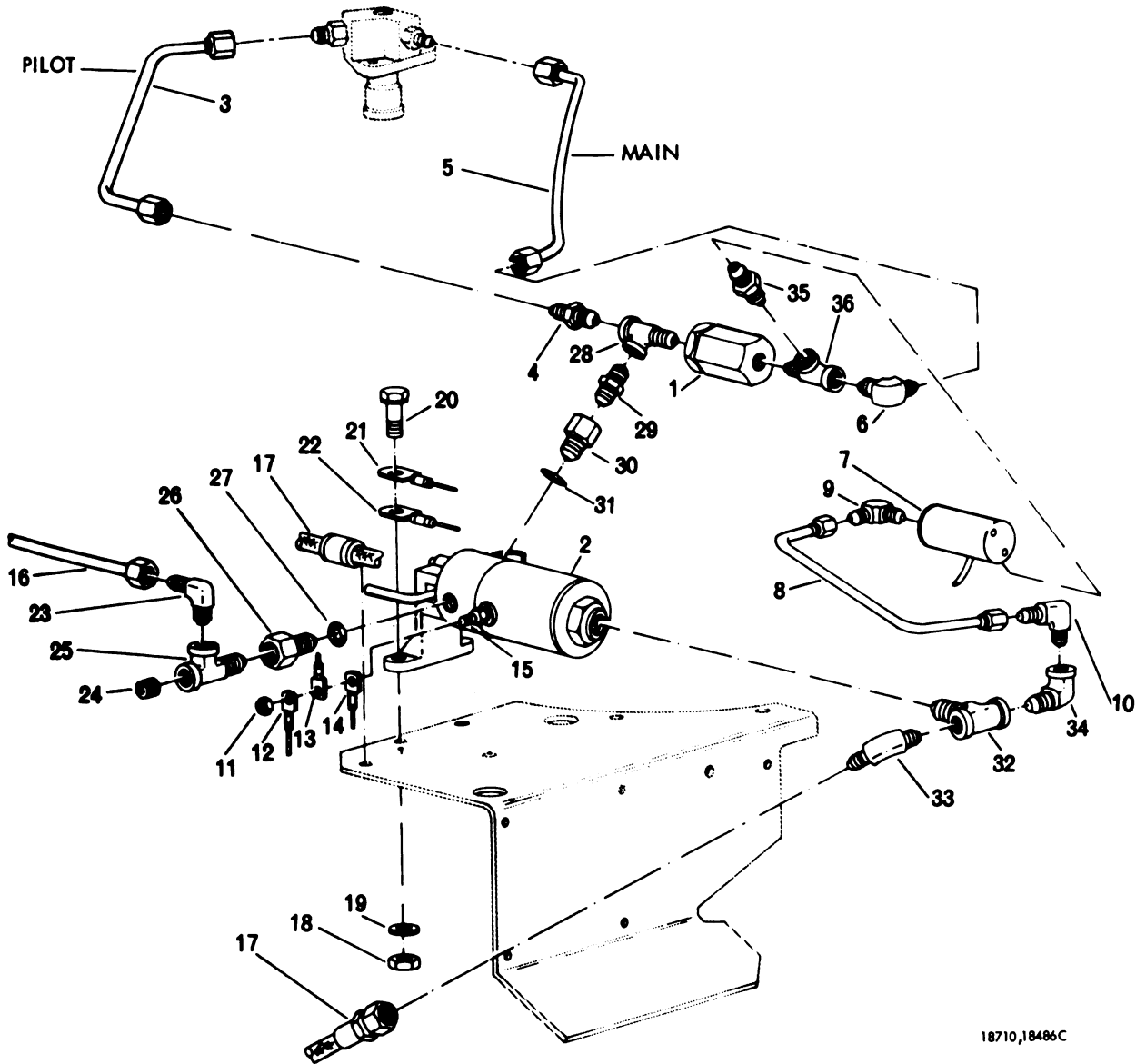
LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Flow divider valve (1) 3-way valve (2), and 2-way valve (7)

Inspect for:

1. Fuel leaks at split-line or fittings. Tighten if possible or replace.



18710,18486C



4-35. 3-WAY SOLENOID, 2-WAY SOLENOID, AND FLOW DIVIDER VALVES (cont)

LOCATION	ITEM	ACTION	REMARKS
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TEST

1. Flow divider valve (1) (cont)		2. Damaged or missing components.	Replace.
----------------------------------	--	-----------------------------------	----------

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

2. 3-way valve (2)	a. Pilot fuel tube (3)	Loosen at both ends and disconnect from union (4).	
--------------------	------------------------	--	--

NOTE

Check that manual fuel shutoff valve is in open position (in) before cranking engine.

b. Union (4)	a. Connect drain hose and route to suitable container.		
	b. Crank engine until no lightoff shutdown.		
	c. Check fuel flow.		Flow should be approx 1/2 cup (0.12 liter). Replace valve if low or no flow.
	d. Remove drain hose.		
c. Pilot fuel tube (3)		Connect to union (4) and tighten.	Do not over tighten.

LOCATION	ITEM	ACTION	REMARKS
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TEST (cont)

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

- |                           |                        |  |  |
|---------------------------|------------------------|--|--|
| 3. Flow divider valve (1) | a. Pilot fuel tube (3) | Loosen at both ends and disconnect from union (4). |  |
|                           | b. Union (4)           | Cap.   |  |
|                           | c. Main fuel tube (5)  | Loosen at both ends and disconnect from elbow (6). |  |

NOTE

Check that manual fuel shutoff valve is in the open position (in) before cranking engine.

- |                        |  |   |
|------------------------|--|---|
| d. Elbow (6)           | a. Connect drain hose and route to suitable container.   |   |
|                        | b. Crank engine until a no light off shutdown occurs and determine if there is any immediate flow from the main fuel tube elbow (6). | Replace valve if fuel flows to container. |
|                        | c. Remove drain hose and cap.  |   |
| e. Main fuel tube (5)  | Connect to elbow (6) and tighten both ends.  | Do not over tighten.                      |
| f. Pilot fuel tube (3) | Connect to union (4) and tighten both ends.  | Do not over tighten.                      |

4-35. 3-WAY SOLENOID, 2-WAY SOLENOID, AND FLOW DIVIDER VALVES (cont)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

TEST (cont)

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

4. 3-way (2) and 2-way (7) valves	a. Fuel tube (8)	Disconnect from elbows (9 and 10).	
---	------------------	---------------------------------------	--

NOTE

Check that manual fuel shutoff valve is in the open position (in) before cranking engine.

b. 2 elbows (9 and 10)	a. Connect drain hose to each elbow and route to suitable container.		
	b. Start engine per step 14 and check for fuel drainage.		
	c. Fuel flows from 3-way valve, elbow (10) during start up.	Replace 3-way valve.	
	d. Fuel flows from 2-way valve, elbow (9) during start up.	Replace 2-way valve.	

e. Remove drain hoses.

c. Fuel tube (8)	Connect to elbows (9 and 10) and tighten.		
------------------	---	--	--

5. 3-way valve (2)	a. Nut (11)	Remove.	
	b. 3 leads (12, 13, and 14)	Remove from connector (15), tag, and identify.	

c. Solenoid electrical connector (15)	Measure resistance to ground.	Set multimeter RX1 scale. Resistance should be 6 to 10 ohms.	
---------------------------------------	-------------------------------	--	--

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4-35. 3-WAY SOLENOID, 2-WAY SOLENOID, AND FLOW DIVIDER VALVES (cont)

---

LOCATION	ITEM	ACTION	REMARKS
<u>TEST (cont)</u>			
6. 2-way valve (7)	a. Nut (11)	Remove.	
	b. Lead (14)	a. Remove from connector (15)  b. Measure resistance to ground.	Set multimeter R x 1 scale. Resistance should be 20 to 26 ohms.



LOCATION	ITEM	ACTION	REMARKS
<u>TEST (CONT)</u>			
6. 2-way valve (cont)	c. Nut (18), washer (19), bolt (20), and lead (21).	a. Remove from 3- way valve (2).	This isolates the 2-way valve.
		b. Measure for short from lead (14) to solenoid housing (7).	Set multimeter RX10K scale. Resistance should be 10,000 ohms minimum.

NOTE

Without removing lead (21), 20-26 ohms will be obtained during testing for short.

REMOVAL

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

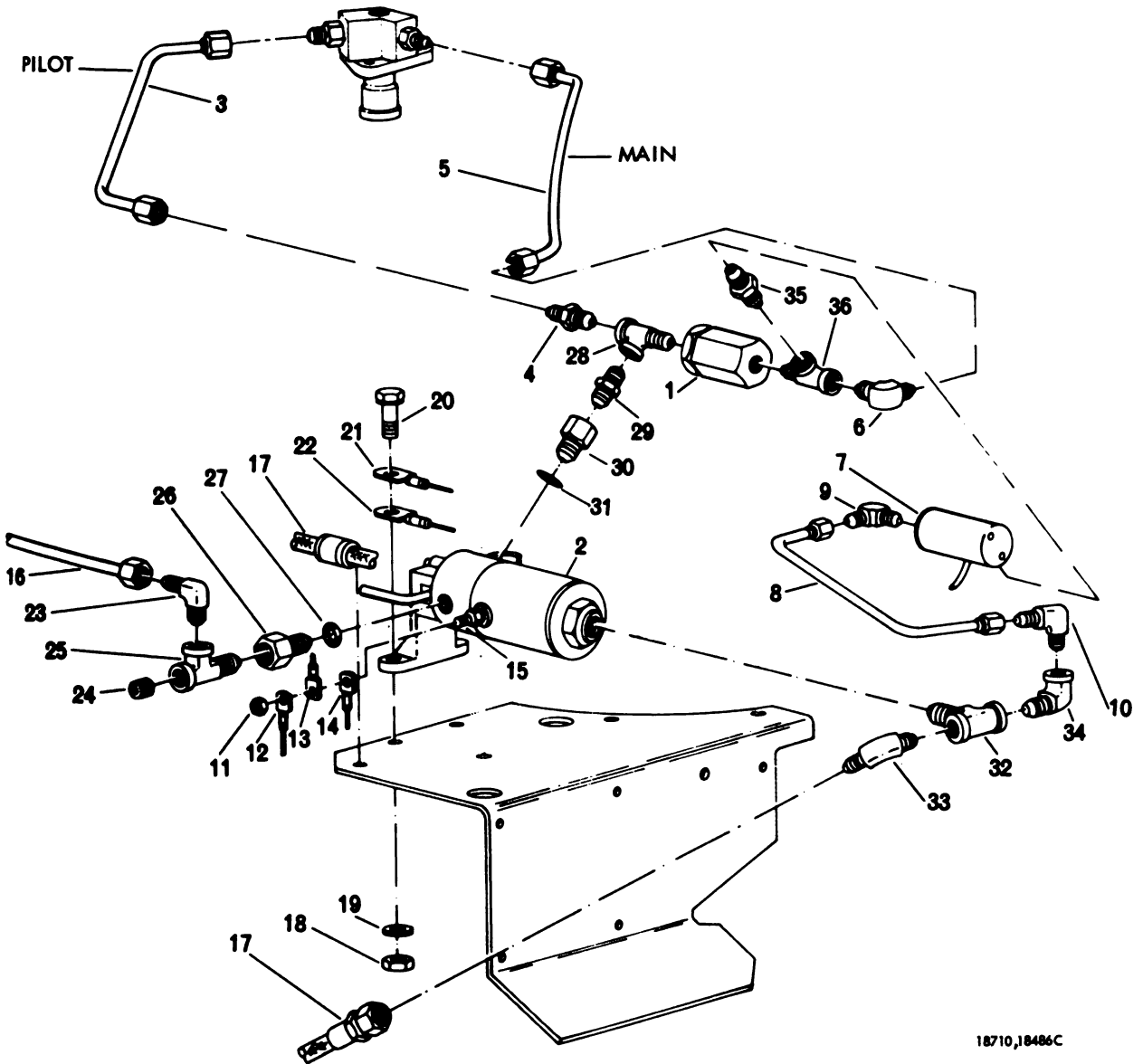
NOTE

Record position of fittings in solenoid to assist in locating correct position during installation.

7. 3-way (2), 2- way (7), and flow divider (1) valves (as a unit)	a. 4 fuel lines (3, 5, 16, and 17)	Disconnect.
	b. Nut (11) and 3 leads (12, 13, and 14)	Remove from connector (15) tag and identify leads.
	c. 2 nuts (18), wash- ers (19), bolts (20), and leads (21 and 22)	Remove, tag, and identify leads.
	d. Complete unit	Remove.

4-35. 3-WAY SOLENOID, 2-WAY SOLENOID, AND FLOW DIVIDER VALVES (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
NOTE			
The three valves should be removed in the following order. Follow the procedures given until you remove the desired valve. Any fitting may be replaced, as required, while its grouping is being removed or installed.			
8. 3-way valve (2)	a. Elbow (23), plug (24), tee (25), coupling (26) and packing (27)	Remove as a unit and discard packing. Disassemble fittings only if reqd for replacement of any fitting.	See note.
	b. Fuel line (8)	Remove.	
	c. Tee (28), 2 unions (4 and 29), coupling (30), and packing (31)	Remove as a unit and discard packing. Disassemble fittings only if reqd for replacement of any fitting.	See note.
	d. Tee (32), 3 elbows (10, 33, and 34)	Remove as a unit. Disassemble fittings only if reqd for replacement of any fitting.	See note.
	e. 3-way valve (2)	Remove.	
9. 2-way valve (8)	a. Elbow (9)	Remove.	See note.
	b. 2-way valve (8)	Remove from union (35).	
10. Flow divider valve (1)	a. Tee (28), 2 unions (4 and 29), and coupling (30)	Remove as a unit.	See step 8.c. for fitting replacement.
	b. Tee (36), elbow (6), and union (35)	Remove as a unit. Disassemble fittings only as reqd for replacement of any fitting.	See note.
	c. Flow divider valve (1)	Remove.	



18710,18486C



4-35. 3-WAY SOLENOID, 2-WAY SOLENOID, AND FLOW DIVIDER VALVES (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION</u>			
<u>CAUTION</u>			
Do not over tighten fittings or lines. Over tightening may damage the equipment.			
<u>NOTE</u>			
Replace any damaged fitting, but make sure they are replaced to the same position as noted in the removal, they must be in the same relative position as at removal.			
11. Flow divider valve (1)	a. Tee (36), elbow (6), and union (35)	Install in flow valve.	Position as noted.
	b. Tee (28), 2 unions (4 and 29), and coupling (30)	Install in flow valve.	Position as noted.
12. 2-way valve (7)	a. Elbow (9)	Install on fittings (35) and tighten.	Position as noted.
	b. Valve (7)	Install and tighten.	Position as noted.
13. 3-way valve (2)	a. New packing (31)	Install on coupling (30).	
	b. Coupling (30), packing (31), 2-way (7), and flow divider valves (1)	Install on 3-way solenoid (2) and tighten.	Position as noted.
	c. Tee (32) and 3 elbows (10, 34, and 33)	Install and tighten.	Position as noted.
	d. New packing (27)	Install on coupling (26).	

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont.)</u>			
13. 3-way valve (2) (cont)	e. Coupling (26), packing (27), tee (25), elbow (23), and plug (24)	Install and tighten.	Position as noted.
	f. Fuel line (8)	Install and tighten.	
	g. 3-way solenoid (2)	Position on bracket.	
	n. 2 bolts (20), with leads (21 and 22), washers (19), and nuts (18)	Remove tags, install bolts thru leads, 3-way solenoid, and bracket. Install washers and nuts on bolts and tighten nuts.	
	i. 3 electrical leads (14, 13, and 12) and nut (11)	Remove tags, install on terminal (15), and tighten nut.	
	j. 4 fuel lines (3, 5, 16, and 17)	Install and tighten.	

## NOTE

Fuel shutoff valve is IN (inward position) for on.

14. Engine	a. Start and run 10 minutes.	Para 2-2 and 2-3.
	b. Shut down.	Para 2-7.
	c. Check for leaks.	Tighten fittings as reqd.

4-36. FUEL NOZZLE ASSEMBLY

This task covers:

- a. Removal                      b. Inspection                      c. Installation

INITIAL SETUP

Tools

- 5/16 combination wrench
- 7/16 combination wrench
- 7/16 open end wrench

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
31	7	4-2
33	2	4-2
44	2	4-2
45	3	4-2
46	2	4-2

Materials/Parts

- Fuel nozzle gasket

Personnel Required

- Utilities Equipment Repairer  
MOS 52C

Equipment Condition

<u>Para</u>	<u>Condition Description</u>
4-13	Front roof removed.

References

- Para 1-14.c.(6)
- Para 2-2, 2-3, and 2-7
- Item 3, table 4-1

General Safety Instructions

No smoking or open flame.

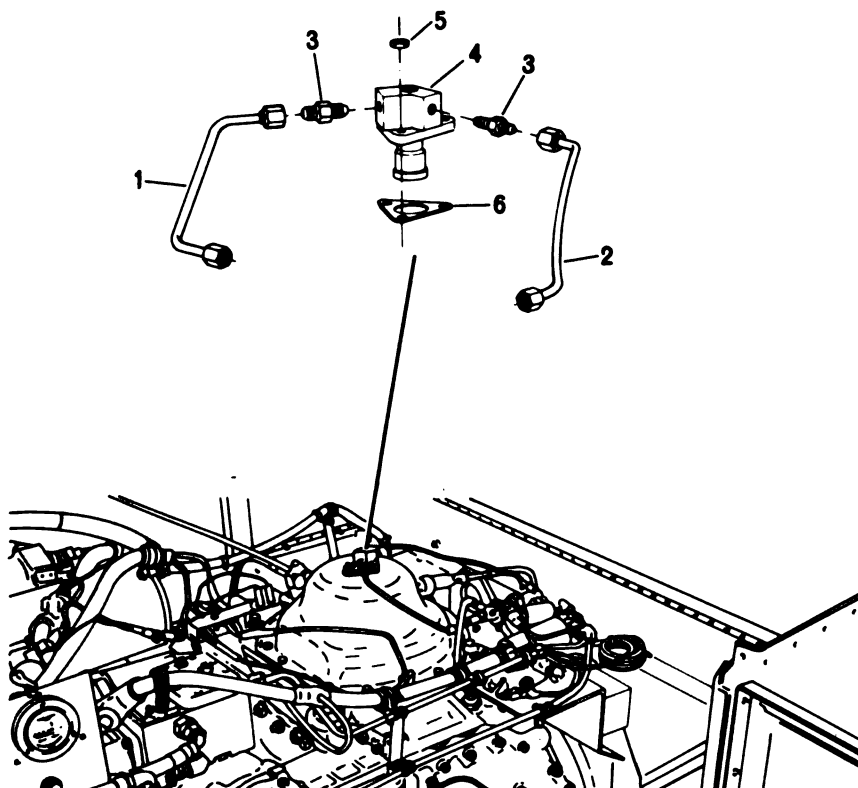
<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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REMOVAL

WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

- |               |                         |                                      |
|---------------|-------------------------|--------------------------------------|
| 1. Fuel lines | a. Fuel lines (1 and 2) | Disconnect from nozzle fittings (3). |
|               | b. 2 fittings (3)       | Remove.                              |



18486A, 18516

4-36. FUEL NOZZLE ASSEMBLY (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
2. Fuel nozzle (4)	a. 3 nuts (5)	Remove.	
	b. Gasket (6)	Remove and discard.	Do not reuse gasket.

INSPECTION

CAUTION

Do not attempt to clean or service fuel nozzle. Damage to engine will result. If fuel nozzle has carbon deposits, or is clogged or plugged, replace fuel nozzle with a serviceable nozzle and return fuel nozzle to depot.

3. Fuel nozzle (4)		Inspect for:	
		1. Damaged tip.	Replace.
		2. Burned tip or orifices.	Replace.
		3. Distorted orifices.	Replace.
		4. Plugged orifices.	Replace.
		5. Carbon deposits.	Replace.

INSTALLATION

4. Fuel nozzle (4)	a. New gasket (6)	Install.	
	b. Nozzle (4)	Install.	
	c. 3 nuts (5)	Install and tighten.	
	d. 2 fittings (3)	Install and tighten.	
	e. 2 fuel lines (1 and 2)	Install and tighten.	

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
5. Engine		a. Start and run 10 minutes.	Para 2-2 and 2-3.
		b. Shut down.	Para 2-7.
		c. Check for leaks.	Tighten fittings as reqd.

4-37. FUEL DRAIN VALVE ASSEMBLY

This task covers:

- a. Removal                      b. Installation

INITIAL SETUP

Tools

- 11/16 socket
- Ratchet handle
- 2-in. extension

Materials/Parts

- Rags (item 14, appx E)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

References

Para 3-5

General Safety Instructions

No smoking or open flame.

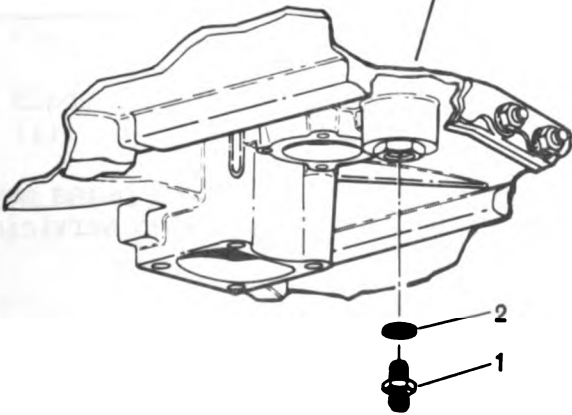
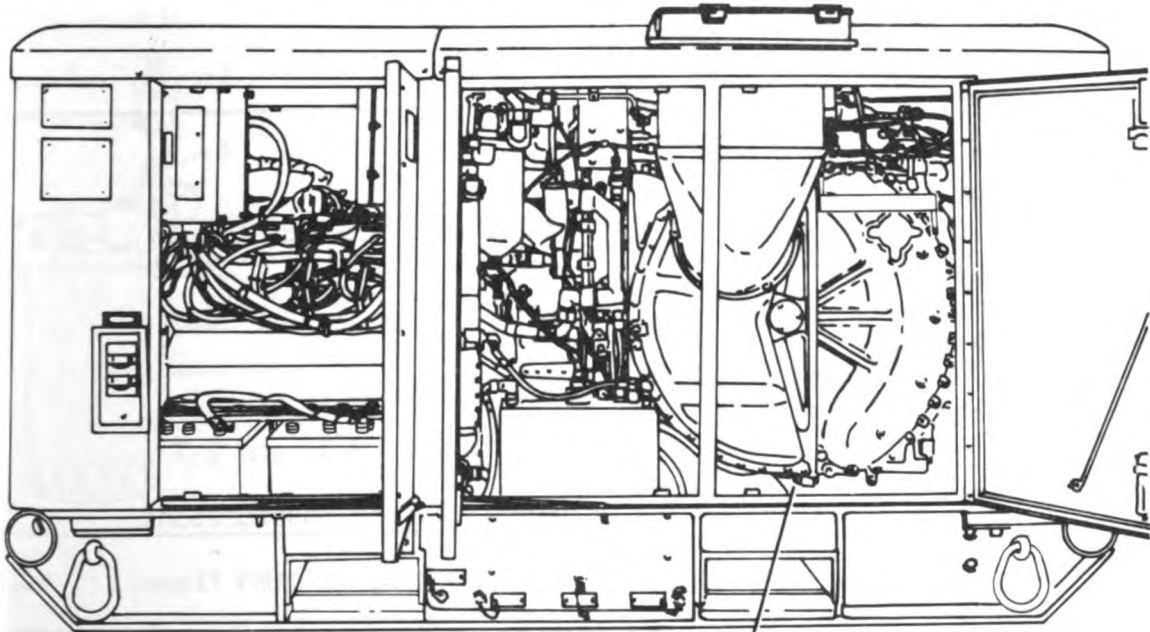
LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

- |                                      |         |  |
|--------------------------------------|---------|--|
| 1. Drain valve (1)<br>and washer (2) | Remove. |  |
|--------------------------------------|---------|--|

INSTALLATION

- |                                      |                      |                         |
|--------------------------------------|----------------------|-------------------------|
| 2. Washer (2) and<br>drain valve (1) | Install and tighten. | Do not over<br>tighten. |
|--------------------------------------|----------------------|-------------------------|



18526, 18700



4-38. SWING-TYPE CHECK VALVE (2)

This task covers:

- a. Removal                      b. Test                              c. Installation

INITIAL SETUP

Tools

- 7/8 combination wrench
- 10-in. adjustable
- 5/16 open end wrench
- 5/16 combination wrench (appx D)
- 1-1/8 open end wrench (appx D)

Materials/Parts

- Rags (item 14, appx E)

Personnel Required

- Utilities Equipment Repairer  
MOS 52C

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
31	8	4-2

References

Para 2-2, 2-3, and 2-7

General Safety Instructions

No smoking or open flame.

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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REMOVAL

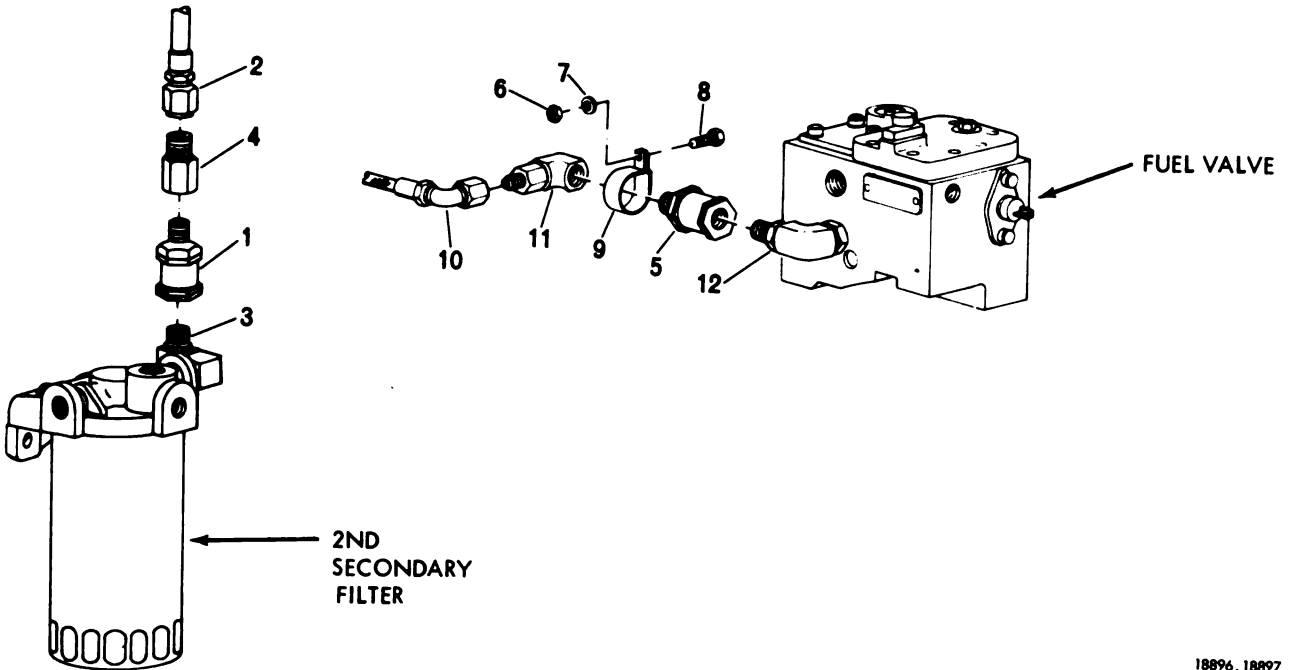
WARNING

Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.

NOTE

Record position of fittings to assist in locating correct position during installation.

- |                    |                  |                        |
|--------------------|------------------|------------------------|
| 1. Check valve (1) | a. Fuel line (2) | Disconnect.            |
|                    | b. Valve (1)     | Remove from elbow (3). |
|                    | c. Adapter (4)   | Remove from valve.     |



18896, 18897

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REMOVAL (cont)

- |                    |   |                           |  |
|--------------------|---|---------------------------|--|
| 2. Check valve (5) | a. Nut (6), washer (7), bolt (8), and clamp (9) | Remove.                   |  |
|                    | b. Fuel line (10)                               | Disconnect.               |  |
|                    | c. Elbow and adapter (11)                       | Remove.                   |  |
|                    | d. Valve (5)                                    | Remove from fitting (12). |  |

TEST

- |                         |   |                                |
|-------------------------|---|--------------------------------|
| 3. Check valve (1 or 5) | a. Apply air pressure in check direction. | Valve should prevent air flow. |
|                         | b. Apply air pressure in flow direction.  | Should not prevent air flow.   |

4-38. SWING-TYPE CHECK VALVE (2) (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION</u>			
<u>CAUTION</u>			
Do not over tighten fittings and lines. Over tightening may damage the equipment.			
NOTE			
o These valves are not interchangeable due to different thread sizes.			
o Replace any damaged fitting, but make sure they are replaced to the same position as noted in the removal, they must be in the same relative position as at removal.			
4. Check valve (5)	a. Valve (5)	Install on fitting (12) and tighten.	
	b. Elbow and adapter (11)	Install and tighten.	
	c. Fuel line (10)	Connect and tighten.	
	d. Clamp (9), bolt (8), washer (7), and nut (6)	Install and tighten nut.	
5. Check valve (1)	a. Adapter (4)	Install on valve and tighten.	
	b. Valve (1)	Install and tighten.	
	c. Fuel line (2)	Connect and tighten.	
6. Engine	a. Start and run 10 minutes.		Para 2-2 and 2-3.
	b. Shut down.		Para 2-7.
	c. Check for leaks.		Tighten fittings as reqd.

4-39. FUEL LINES AND FITTINGS

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools

- 7/16 open end wrench
- 7/16 combination wrench
- 9/16 combination wrench
- 5/8 combination wrench
- 11/16 combination wrench
- 7/8 combination wrench
- 1-in. combination wrench
- 7/16 socket
- Ratchet handle
- 5-in. extension
- 1-1/8 open end wrench (appx D)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

References

Para 2-2, 2-3, and 2-7  
Item 3 and 25, table 2-1  
Para 4-2.a.(6)  
Para 4-38

General Safety Instructions

No smoking or open flame.

Materials/Parts

- Bucket (item 3, appx E)
- Rags (item 14, appx E)
- Fuel valve OUT to solenoid preformed packing
- Fuel valve IN preformed packing
- Fuel valve OUT to tank preformed packing

LOCATION	ITEM	ACTION	REMARKS
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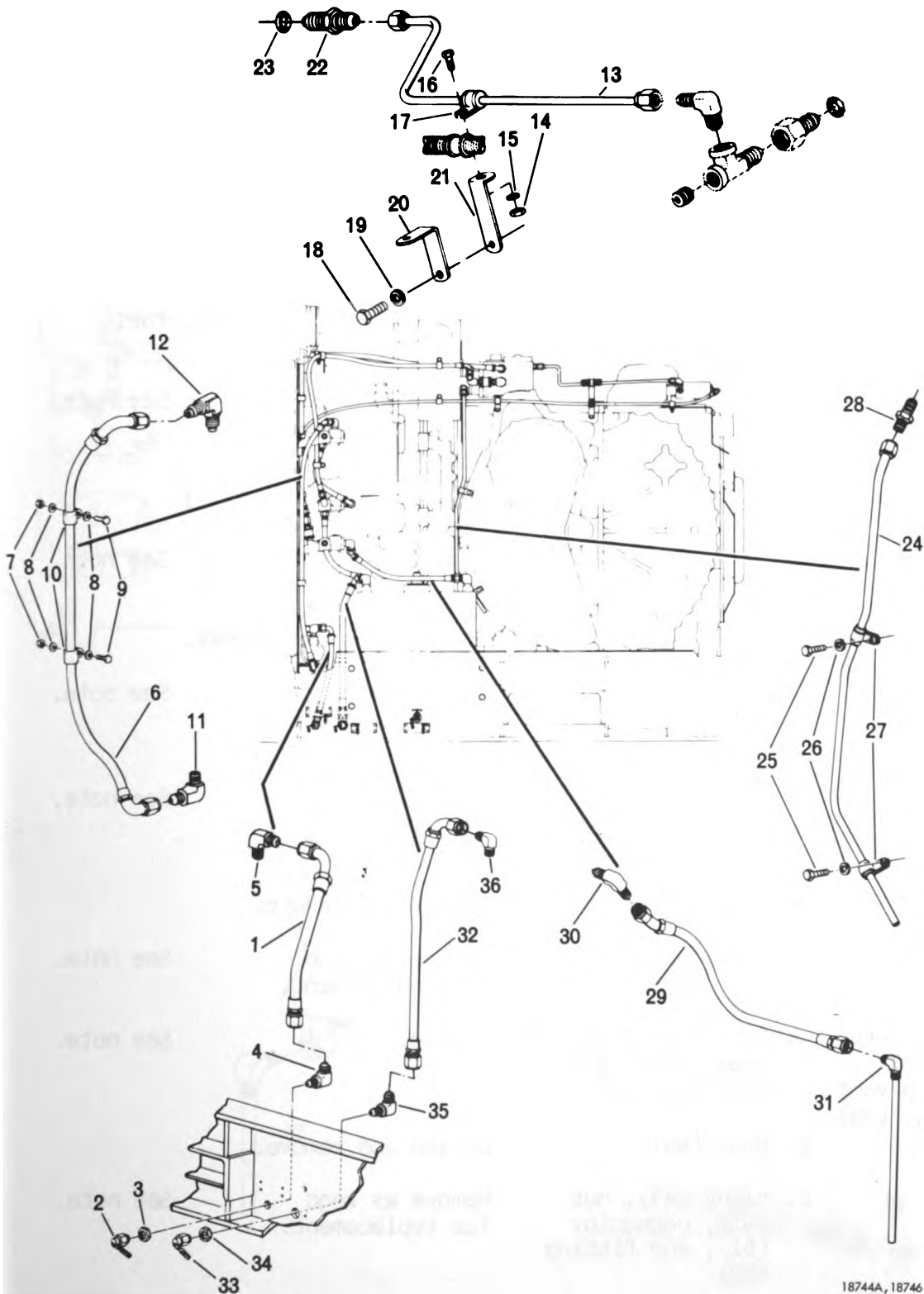
REMOVAL

NOTE

Mark location of attaching brackets, clamps, and fittings to assist in installation of new hoses and tubes. Hold fittings when loosening nuts on hoses and tubes or other fittings. Remove fittings only if they are required to be replaced.

4-39. FUEL LINES AND FITTINGS (cont)

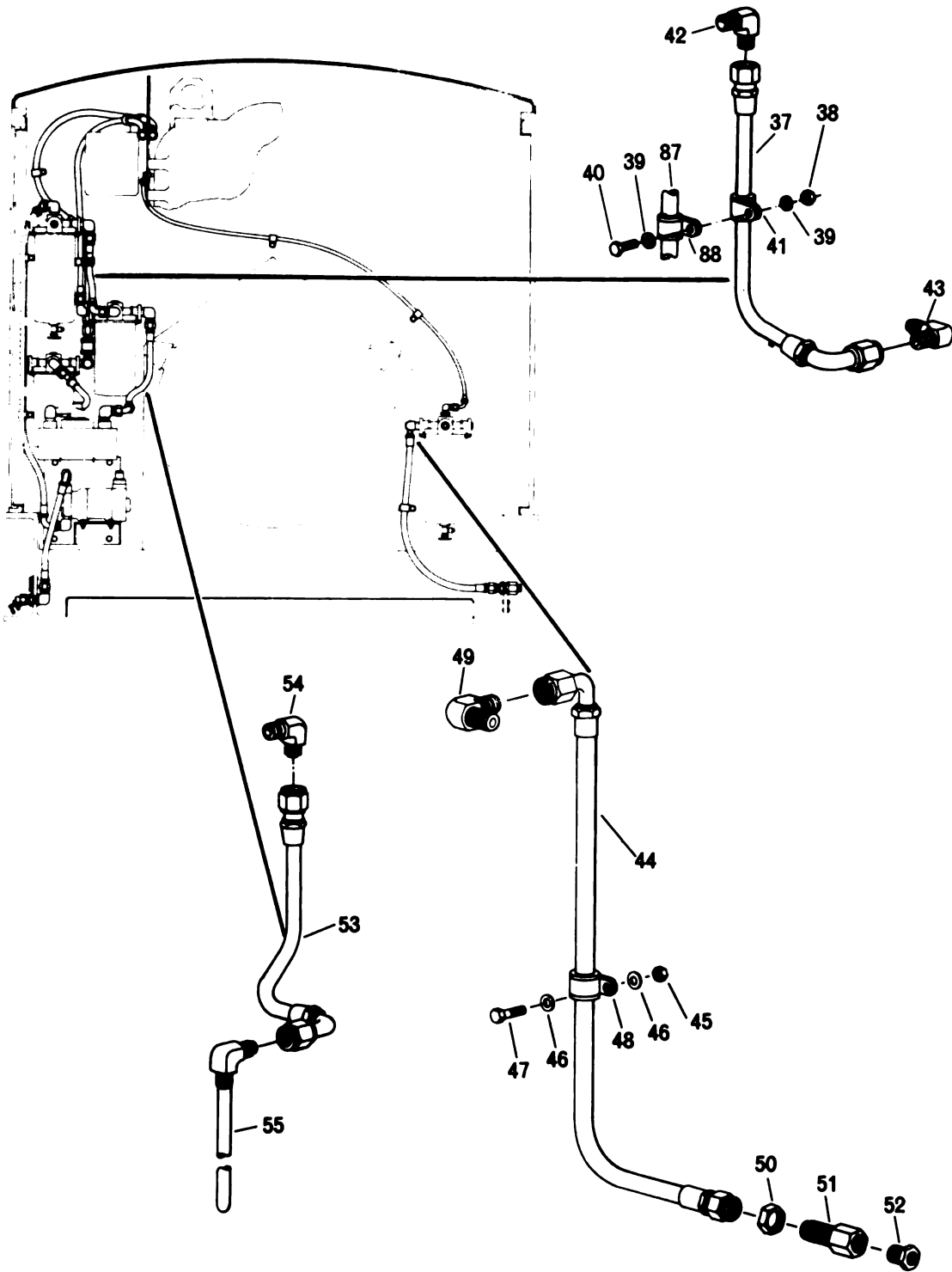
LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
<u>WARNING</u>			
Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.			
1. Fuel inlet-to-transfer pump hose (1)	a. Hose (1).	Loosen and remove.	
	b. Cap (2), nut (3), and 2 elbows (4 and 5)	Remove as reqd for replacement.	See note.
2. Transfer pump-to-primary filter hose assy (6)	a. 2 nuts (7), 4 washers (8), 2 bolts (9), and clamps (10)	Remove.	
	b. Hose (6)	Loosen and remove.	
	c. 2 elbows (11 and 12)	Remove as reqd for replacement.	See note.
3. Fuel valve-to-3-way valve tube assy (13)	a. Nut (14), washer (15), bolt (16), clamp (17), bolt (18), washer (19), and 2 brackets (20 and 21)	Remove.	Remove brackets only as reqd for replacement.
	b. Tube (13)	Loosen and remove.	
	c. Union (22) and packing (23)	Remove as reqd for replacement; discard packing.	See note.
4. Fuel pump drain tube assy (24)	a. 2 bolts (25), washers (26) and clamps (27)	Remove.	
	b. Tube (24)	Loosen and remove.	



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## 4-39. FUEL LINES AND FITTINGS (cont)

LOCATION	ITEM	ACTION	REMARKS	
<u>REMOVAL (cont)</u>				
<u>WARNING</u>				
Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.				
4.	Fuel pump drain c. Union (28) tube assy (24) (cont)	Remove as reqd for replacement.	See note.	
5.	1st secondary filter-to- tank (inlet) hose assy (29)	a. Hose (29) b. Elbow (30) and tank fitting (31)	Remove. Remove as reqd for replacement.	See note.
6.	Tank-to-vent hose assy (32)	a. Hose (32) b. Cap (33), nut (34), and 2 elbows (35 and 36)	Loosen nuts and remove. Remove as reqd for replacement.	See note.
7.	Primary-to- 1st secondary filter hose assy (37)	a. Nut (38), 2 washers (39), bolt (40), and clamp (41) b. Hose (37) c. 2 elbows (42 and 43)	Remove. Loosen and remove. Remove as reqd for replacement.	See note.
8.	Primary (catch and drain) filter-to-vent hose assy (44)	a. Nut (45), 2 washers (46), bolt (47), and clamp (48) b. Hose (44) c. Elbow (49), nut (50), connector (51), and fitting (52)	Remove. Loosen and remove. Remove as reqd for replacement.	See note.

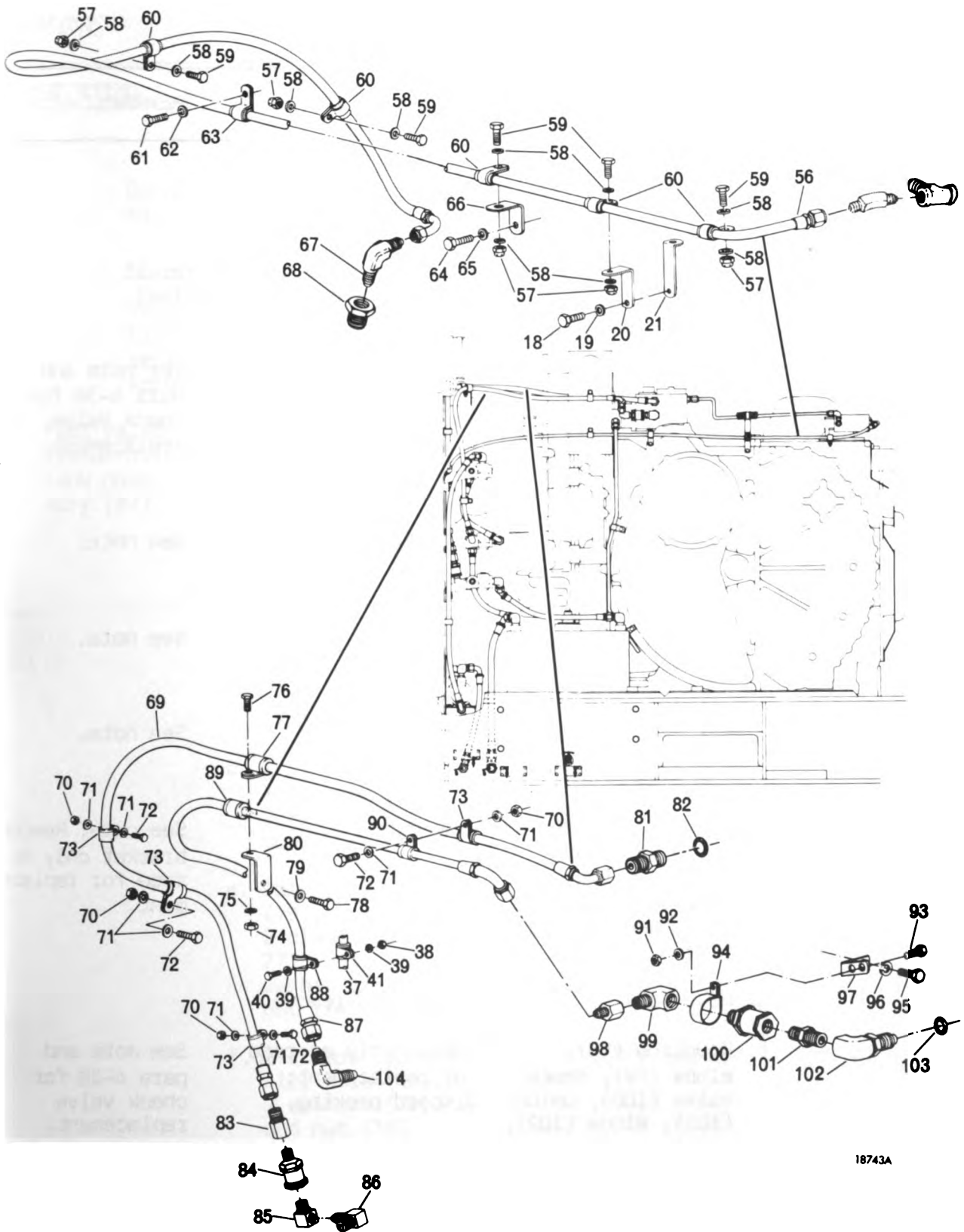


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4-39. FUEL LINES AND FITTINGS (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
<u>WARNING</u>			
Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.			
9. 1st secondary filter-to-tank hose assy (53)	a. Hose (53)	Loosen and remove.	
	b. Elbow (54) and tank fitting (55)	Remove as reqd for replacement.	See note.
10. Solenoid drain valves-to-primary (catch and drain) filter hose assy (56)	a. 5 nuts (57), 10 washers (58), 5 bolts (59), and clamps (60)	Remove.	See note.
	b. 3 bolts (18, 61, and 64), washers (19, 62, and 65), clamp (63), and 3 brackets (20, 21, and 66)	Remove.	See note. Remove brackets only as reqd for replacement.
	c. Hose (56)	Loosen nuts and remove.	
	d. Elbow (67) and reducer (68)	Remove only as reqd. for replacement.	See note.
11. 2nd secondary filter-to-fuel metering valve inlet hose assy (69)	a. 4 nuts (70), 8 washers (71), 4 bolts (72), and clamps (73)	Remove.	See note.
	b. Nut (74), washer (75), bolt (76), clamp (77), bolt (78), washer (79), and bracket (80)	Remove.	See note. Remove bracket only as reqd for replacement.
	c. Hose (69)	Loosen nuts and remove.	



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## 4-39. FUEL LINES AND FITTINGS (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
<u>WARNING</u>			
Fire may be caused by spilled fuel. Serious burns may result from accidental ignition of fuel spilled when servicing fuel system components.			
11. 2nd secondary filter-to-fuel metering valve inlet hose assy (cont)	d. Union (81) and packing (82), connector (83), check valve (84), connector (85), and elbow (86)	Remove as reqd for replacement; discard packing.	See note and para 4-38 for check valve replacement.
12. Fuel valve (return)-to-tank hose assy (87)	a. Nut (38), 2 washers (39), bolt (40), and clamp (88)	Remove.	See note.
	b. Nut (74), washer (75), bolt (76), and clamp (89)	Remove.	See note.
	c. Nut (70), 2 washers (71), bolt (72), and clamp (90)	Remove.	See note.
	d. Nut (91), washer (92), bolt (93), and clamp (94), bolt (95), washer (96), and bracket (97)	Remove.	See note. Remove bracket only as reqd for replacement.
	e. Hose (87)	Loosen and remove.	
	f. Coupling (98), elbow (99), check valve (100), union (101), elbow (102), packing (103), and elbow (104)	Remove only as reqd for replacement; discard packing.	See note and para 4-38 for check valve replacement.

LOCATION	ITEM	ACTION	REMARKS
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INSTALLATIONCAUTION

Do not over tighten fittings and lines. Over tightening may damage the equipment.

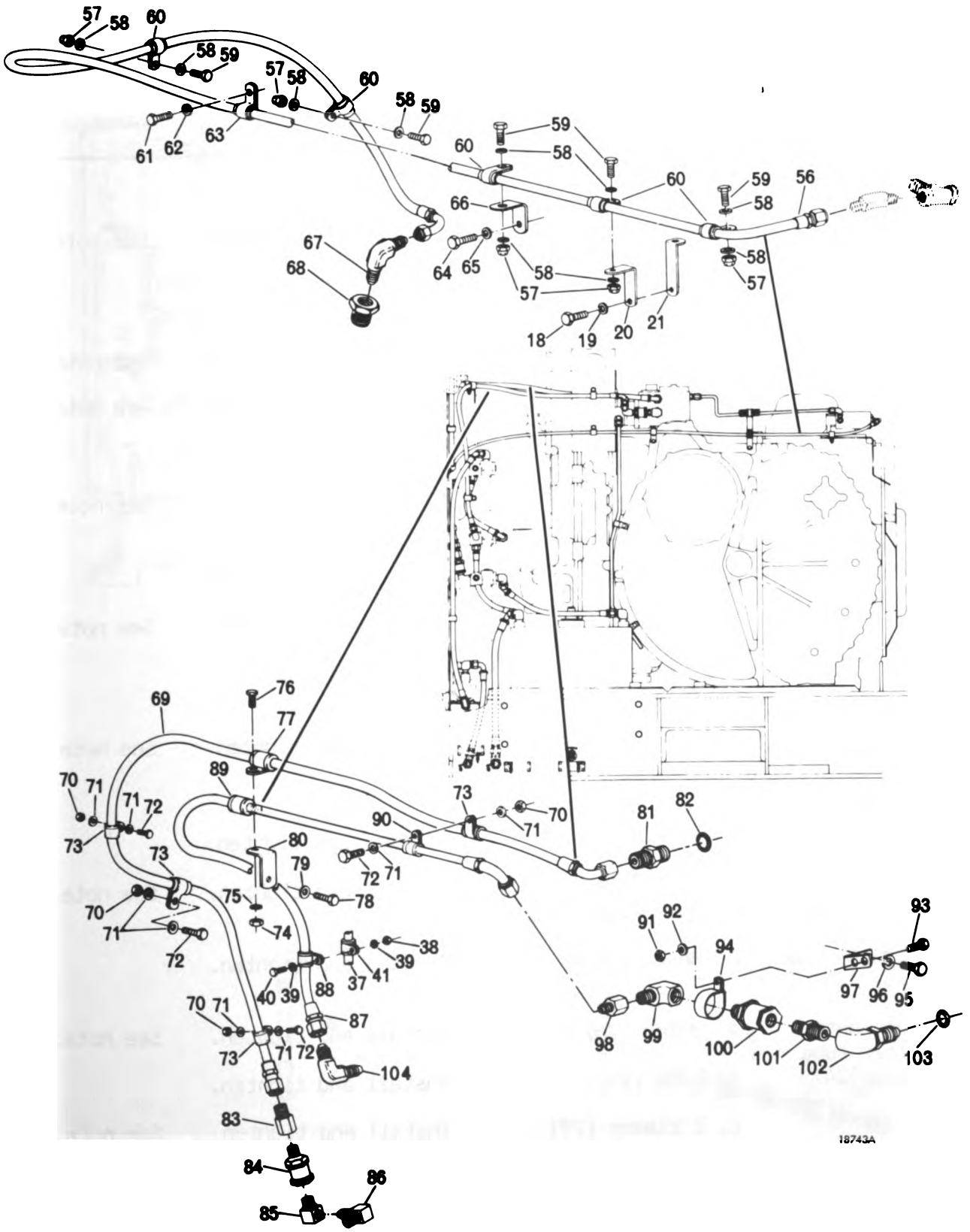
NOTE

Fittings may not have been removed. Use fitting installation instructions only if fittings have been removed for replacement. Install all clamps and fittings as noted at removal.

13. Fuel valve (return)-to-tank hose assy (87)	a. Elbow (104), new packing (103), elbow (102), union (101), check valve (100), elbow (99), and coupling (98)	Install packing on elbow and install and tighten each fitting as reqd.	See note and para 4-38 for check valve installation.
	b. Hose (87)	Install and tighten.	
	c. Bolt (95), washer (96), bracket (97), clamp (94), washer (92), and nut (91)	Install and tighten as reqd.	See note.
	d. 2 clamps (90 and 73), bolt (72), 2 washers (71), and nut (70)	Install and tighten nut.	See note.
	e. Bolt (78), washer (79), bracket (80), 2 clamps (89 and 77), bolt (76), washer (75), and nut (74)	Install and tighten as reqd.	See note.
	f. 2 clamps (88 and 41), bolt (40), 2 washers (39), and nut (38)	Install and tighten nut.	See note.

4-39. FUEL LINES AND FITTINGS (cont)

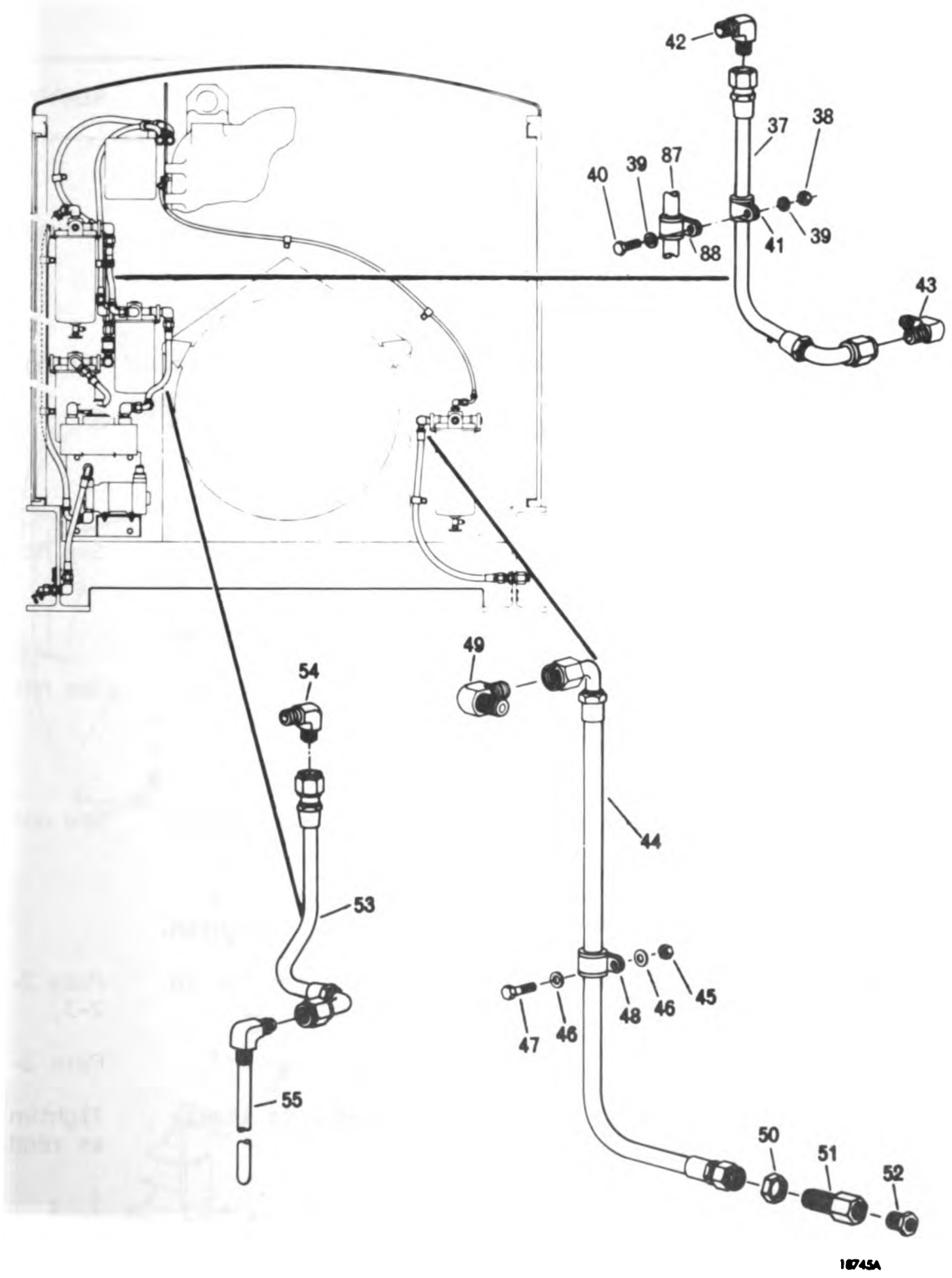
LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
14. 2nd secondary filter-to-fuel metering valve inlet hose assy (69)	a. Elbow (86), connector (85), check valve (84), connector (83), new packing (82), and union (81)	Install and tighten each fitting as reqd.	See note and para 4-38 for check valve installation.
	b. Hose (69)	Install and tighten.	
	c. Bolt (78), washer (79), bracket (80), 2 clamps (77 and 89), bolt (76), washer (75), and nut (74)	Install and tighten as reqd.	See note.
	d. 4 clamps (73), bolts (72), 8 washers (71), and 4 nuts (70)	Install and tighten nuts.	See note.
15. Solenoid drain valves-to-primary (catch and drain) filter hose assy (56)	a. Reducer (68) and elbow (67)	Install and tighten each fitting as reqd.	See note.
	b. Hose (56)	Install and tighten.	
	c. 3 bolts (64, 61, and 18), washers (65, 62, and 19), and clamp (63)	Install and tighten bolts as reqd.	See note.
	d. 5 clamps (60), bolts (59), 10 washers (58), and 5 nuts (57)	Install and tighten nuts.	See note.
16. 1st secondary filter-to-tank hose assy (53)	a. Tank fitting (55) and elbow (54)	Install and tighten.	See note.
	b. Hose (53)	Install and tighten.	



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4-39. FUEL LINES AND FITTINGS (cont)

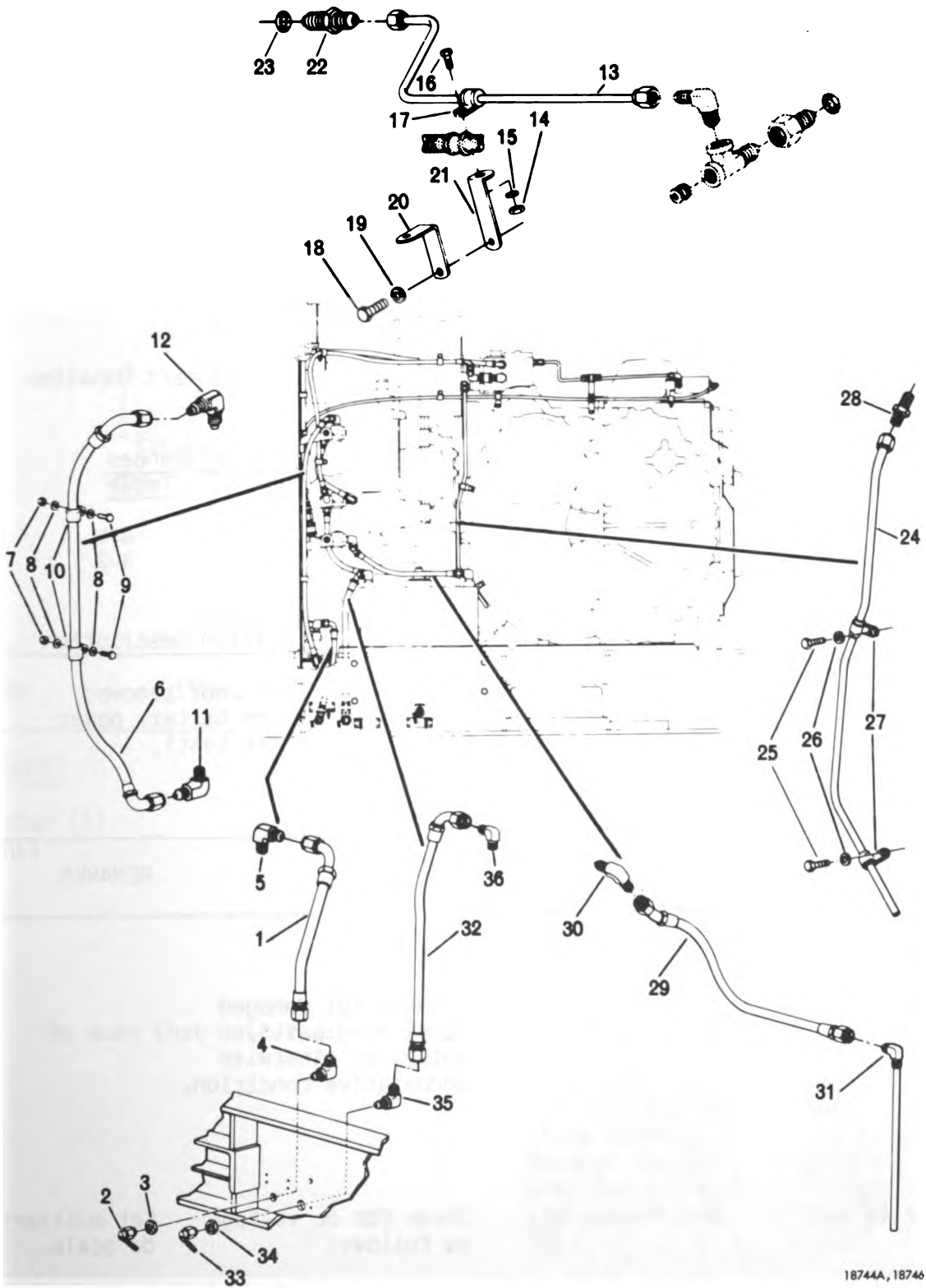
LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
17. Primary (catch and drain) filter-to-vent hose assy (44)	a. Fitting (52), connector (51), nut (50), and elbow (49)	Install and tighten.	See note.
	b. Hose (44)	Install and tighten.	See note.
	c. Clamp (48), bolt (47), 2 washers (46), and nut (45)	Install and tighten nut.	See note.
18. Primary-to-1st secondary filter hose assy (37)	a. 2 elbows (43 and 42)	Install and tighten.	See note.
	b. Hose (37)	Install and tighten.	
	c. 2 clamps (41 and 88), bolt (40), 2 washers (39), and nut (38)	Install and tighten nut.	See note.
19. Tank-to-vent hose assy (32)	a. 2 elbows (36 and 35), nut (34), and cap (33)	Install and tighten.	See note.
	b. Hose (32)	Install and tighten.	
20. 1st secondary filter-to-tank (inlet) hose assy (29)	a. Tank fitting (31) and elbow (30)	Install and tighten.	See note.
	b. Hose (29)	Install and tighten.	
21. Fuel pump drain tube assy (24)	a. Union (28)	Install and tighten.	See note.
	b. Tube (24)	Install and tighten.	
	c. 2 clamps (27), washers (26), and bolts (25)	Install and tighten bolts.	See note.





4-39. FUEL LINES AND FITTINGS (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
22. Fuel valve-to-3-way valve tube assy (13)	a. New packing (23) and union (22)	Install and tighten.	See note.
	b. Tube (13)	Install and tighten.	
	c. 2 brackets (21 and 20), washer (19), bolt (18), clamp (17), bolt (16), washer (15), and nut (14)	Install with electrical lead clamp on bracket, as shown, and tighten nut.	See note.
23. Transfer pump-to-filter hose assy (6)	a. 2 elbows (12 and 11)	Install and tighten.	See note.
	b. Hose (6)	Install and tighten.	
	c. 2 clamps (10), bolts (9), 4 washer (8), and 2 nuts (7)	Install and tighten nuts.	See note.
24. Fuel inlet-to-transfer pump hose assy (1)	a. 2 elbows (5 and 4), nut (3), and cap (2)	Install and tighten nut and cap.	See note.
	b. Hose (1)	Install and tighten.	
25. Engine	a. Start and run 10 minutes.		Para 2-2 and 2-3.
	b. Shut down.		Para 2-7.
	c. Check for leaks		Tighten fittings as reqd.



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## Section XII. MAINTENANCE OF IGNITION SYSTEM

### 4-40. STARTER

This task covers:

- a. Inspection
b. Test
c. Removal
d. Installation

#### INITIAL SETUP

##### Test Equipment

Multimeter (appx D)

##### Personnel Required

Utilities Equipment Repairer  
MOS 52C

##### Tools

7/16 socket  
10-in. extension  
3/4 combination wrench  
6-in. flat tip screwdriver  
Pry bar  
Ratchet handle  
19 mm socket (appx D)  
Putty knife

##### Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
28	4,5,6	4-2
30	2	4-2

##### Equipment Condition

<u>Para</u>	<u>Condition Description</u>
4-13	Front roof removed.
4-21	Disarm battery power (after test).

##### Materials/Parts

Starter motor gasket  
Tags (item 16, appx E)

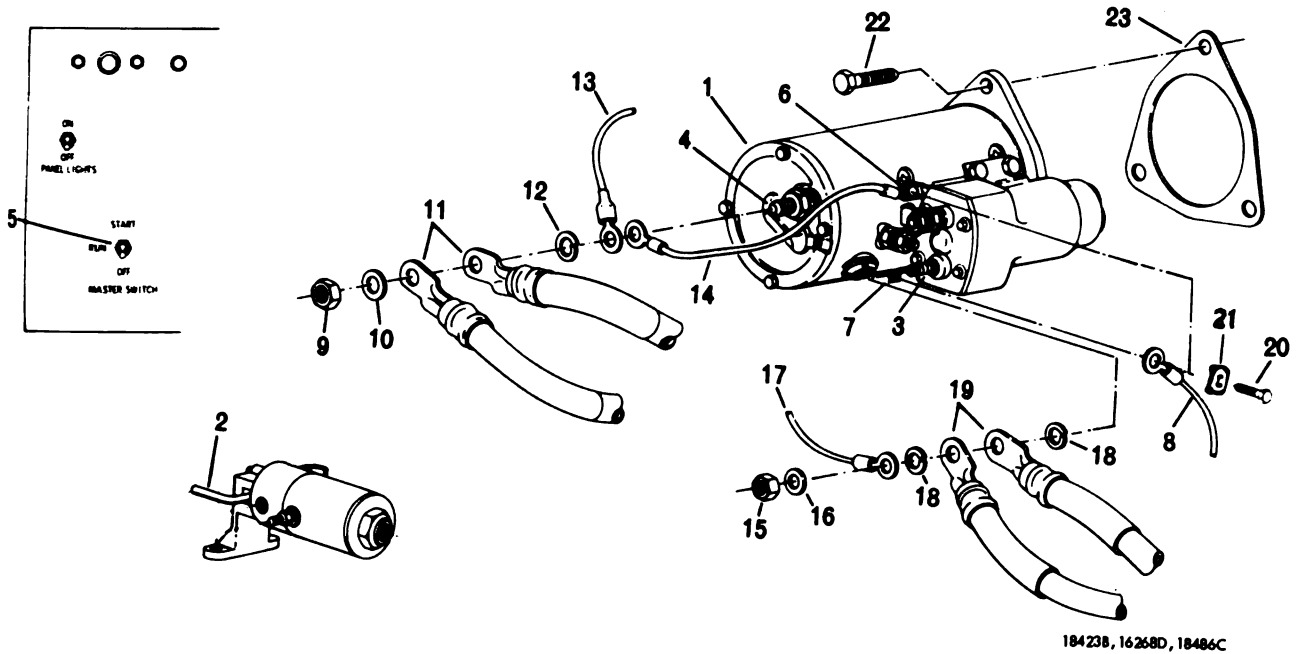
LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

#### INSPECTION

- |                |  |
|----------------|--|
| 1. Starter (1) | Inspect for damaged or missing parts, noisy, or otherwise inoperative condition. |
|----------------|--|

#### TEST

- |   |   |   |                          |
|---|---|---|--------------------------|
| 2. Starter (1)  | Check for dc voltage as follows: <table style="margin-left: 20px;"> <tr> <td style="width: 70%;">1. Move fuel shutoff valve (2) to OFF (out) position.</td> <td style="width: 30%; vertical-align: top;">Set multimeter dc scale.</td> </tr> </table> | 1. Move fuel shutoff valve (2) to OFF (out) position. | Set multimeter dc scale. |
| 1. Move fuel shutoff valve (2) to OFF (out) position. | Set multimeter dc scale.  |   |                          |



LOCATION	ITEM	ACTION	REMARKS
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TEST (cont)

2. Starter (1) (cont)		2. Check static voltage between solenoid positive (3) and starter negative (4) posts.	Voltage should be 24 Vdc minimum.
--------------------------	--	---	-----------------------------------

NOTE

Be sure that batteries are good before proceeding with this test.

3. Move MASTER switch (5) to START and check voltage between solenoid positive (3) and ground post (6).	Two technicians reqd. Voltage should be 10 Vdc minimum. If voltage is low replace starter (1).
---	--

4-40. STARTER (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>TEST (cont)</u>			
2. Starter (1) (cont)		4. Move MASTER switch (5) to START and check voltage between solenoid switch post (7) and ground post (4).	Two technicians reqd. Voltage should be 10 Vdc minimum. If voltage is low replace starter (1).
		5. Move MASTER switch (5) to OFF.	
		6. Move fuel shutoff valve (2) to ON (in) position.	
<u>REMOVAL</u>			
3. Starter (1)	a. Nut (9) and flat washer (10)	Remove.	
	b. 2 leads (11), lock washer (12)	Remove, tag, and identify leads.	
	c. Lead (13)	Remove, tag, and identify.	Retain lead (14) on starter post.
	d. Nut (15), flat washer (16)	Remove.	
	e. Lead (17), 2 lock washers (18), and leads (19)	Remove, tag, and identify.	
	f. Screws (20), washer (21), and lead (8)	Remove, tag, and identify lead.	Retain lead (14) starter post.
	g. Washer (21) and screw (20)	Replace in starter solenoid.	
	h. 3 bolts (22)	Remove.	
	i. Starter (1)	Remove.	

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION</u>			
3. Starter (1) (cont)	j. Gasket (23)	Remove and discard gasket. Clean mounting surfaces of any gasket material.	Do not reuse gasket.
4. Starter (1)	a. New gasket (23)	Install.	
	b. Starter (1)	Install.	
	c. 3 bolts (22)	Install and tighten.	
	d. Screw (20)	Remove from solenoid.	Lead (14) remains on solenoid.
	e. Lead (8)	Remove tag and install.	
	f. Washer (21) and screw (20)	Install and tighten.	
	g. 2 leads (19), lock washers (18), and lead (17)	Remove tag from leads and install.	
	h. Flat washer (16) and nut (15)	Install and tighten.	
	i. Lead (13), lock washer (12), and 2 leads (11)	Remove tags from leads and install.	Lead (14) remains on starter.
	j. Flat washer (10) and nut (9)	Install and tighten.	

4-41. IGNITION OR, SPARK IGNITER, AND IGNITION EXCITER

This task covers:

- a. Inspection                      b. Test                              c. Removal                        d. Installation

INITIAL SETUP

Test Equipment

Multimeter (appx D)

Tools

- 4-in. flat tip screwdriver
- 1/2 socket
- 13/16 deep socket
- 5-in. extension
- 3/8 combination wrench
- Hinge handle
- Ratchet handle
- 7/8 combination wrench
- Torque wrench, 0-300 in. lb (appx D)
- Torque wrench, 0-150 ft lb (appx D)

Material/Parts

- Anti-seize compound (item 3, appx E)
- Lock washer (4)
- Spark igniter gasket

Personnel Required

Utilities Equipment Repairer  
MOS 52C

References

Para 1-14.d.(6 and 7)  
Item 6, table 4-1

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
31	1,2	4-2

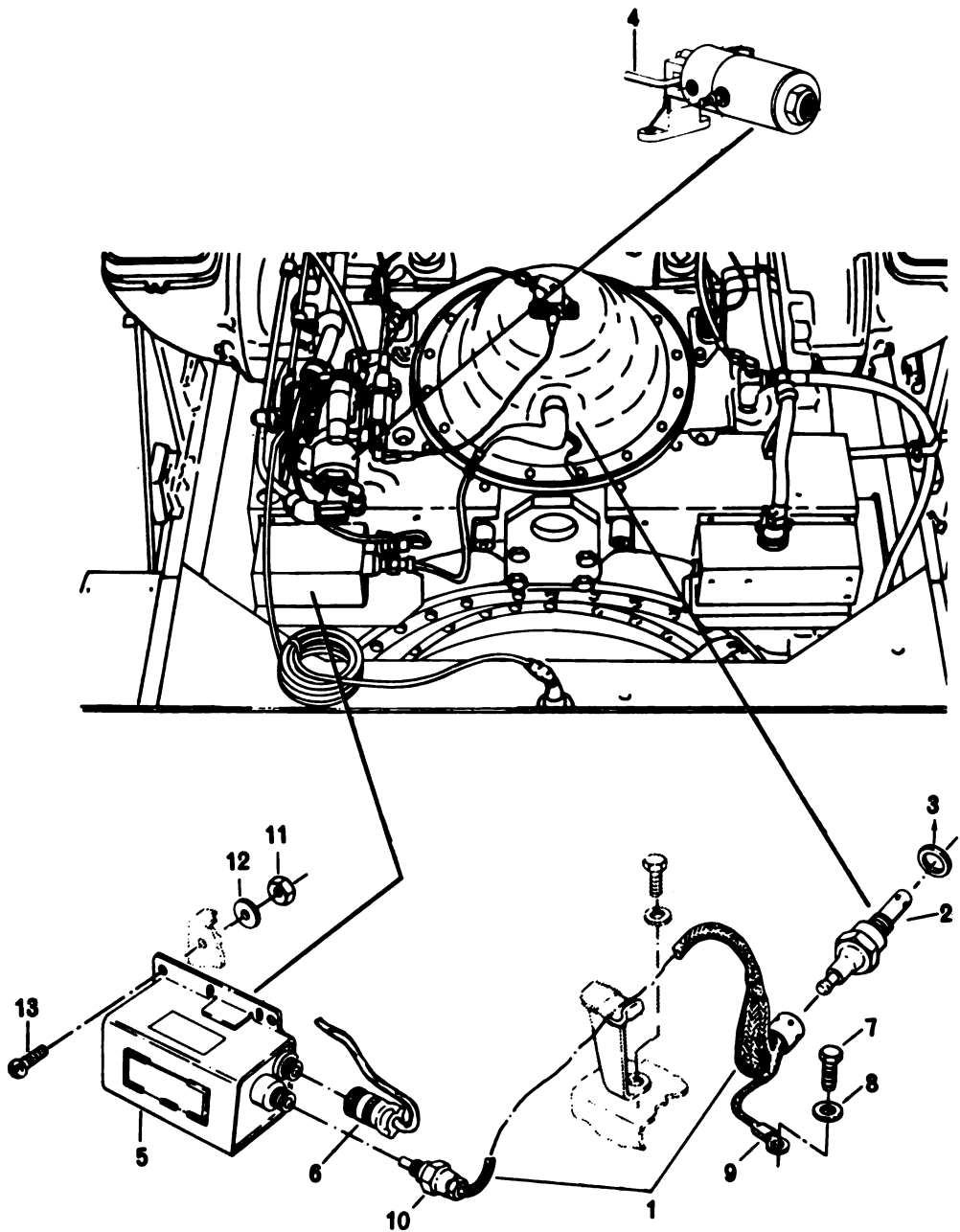
Equipment Condition

<u>Para</u>	<u>Condition Description</u>
4-13	Front roof removed.
4-21	Disarm battery power (after test).

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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INSPECTION

1. Ignition lead (1)	Inspect for:	Replace per step 9 and 12.
	1. Cracks in lead.	
	2. Loose or damaged terminal end.	
	3. Frayed or chafed insulation.	



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4-41. IGNITION LEAD, SPARK IGNITER, AND IGNITION EXCITER (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>INSPECTION (cont)</u>			
	2. Spark igniter (2) and gasket (3)	Remove (per step 10) and inspect for:  1. Cracks.  2. Damaged threads.  3. Carbon deposits.  4. Excessive burning or erosion.	Replace per step 13.
<u>TEST</u>			
	3. Spark igniter (2) and gasket (3)	a. Remove from burner (step 10).  b. Install igniter in lead (1).  c. Position so igniter is grounded to the engine.	
	4. Manual shutoff valve (4) on 3-way solenoid valve	Position (pull) to OFF.	
	5. Ignition exciter (5)	Harness connector (6) (low voltage)  a. Disconnect.  b. Put MASTER switch to RUN position.  c. Check voltage across pins A and B of connector (6), while holding MASTER switch to START position.	Set multimeter to 50V DC scale.      Voltage should be 10-30 V, if not correct noti- fy next higher level of main- tenance.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

TEST (cont)

- |                                |  |  |  |
|--------------------------------|--|--|--|
| 5. Ignition exciter (5) (cont) | <ul style="list-style-type: none"> <li>d. Place MASTER switch to OFF position.</li> <li>e. Reconnect to ignition exciter.</li> </ul> |  |  |
|--------------------------------|--|--|--|

WARNING

Do not touch spark igniter or ignition lead while motoring the engine. High voltage could cause serious injury or death.

- |                             |   |  |
|-----------------------------|---|--|
| 6. Engine                   | <ul style="list-style-type: none"> <li>a. Motor and observe the arc on tip of igniter.</li> </ul>             | <p>If arcing is observed on either the lead or on exciter unit, that component should be replaced. If voltage is correct (step 5.c.), and there is no arc, replace individually, igniter, (step 13), lead (step 12), and or exciter (step 14) until arc is seen.</p> |
| 7. Manual shutoff valve (3) | <ul style="list-style-type: none"> <li>b. Turn MASTER switch to OFF.</li> </ul> <p>Position (push) to ON.</p> |  |
| 8. Spark igniter (2)        | <ul style="list-style-type: none"> <li>a. Remove from lead (1).</li> <li>b. Install per step 13.</li> </ul>   |  |

4-41. IGNITION LEAD, SPARK IGNITER, AND IGNITION EXCITER (cont)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REMOVAL

9. Ignition lead (1)	a. Bolt (7) and washer (8)	Remove.	
----------------------	----------------------------	---------	--

NOTE

Replace bolt and washer in burner after removing ground.

b. Ground lead terminal (9)	Remove.
-----------------------------	---------

c. Connector (10)	Disconnect from exciter.
-------------------	--------------------------

WARNING

Disconnect input (low voltage) cable connector before removing the ignition (high voltage) lead nut. High voltage retained in ignition exciter could cause serious injury or death.

d. Input (low voltage) cable connector (6)	Disconnect.
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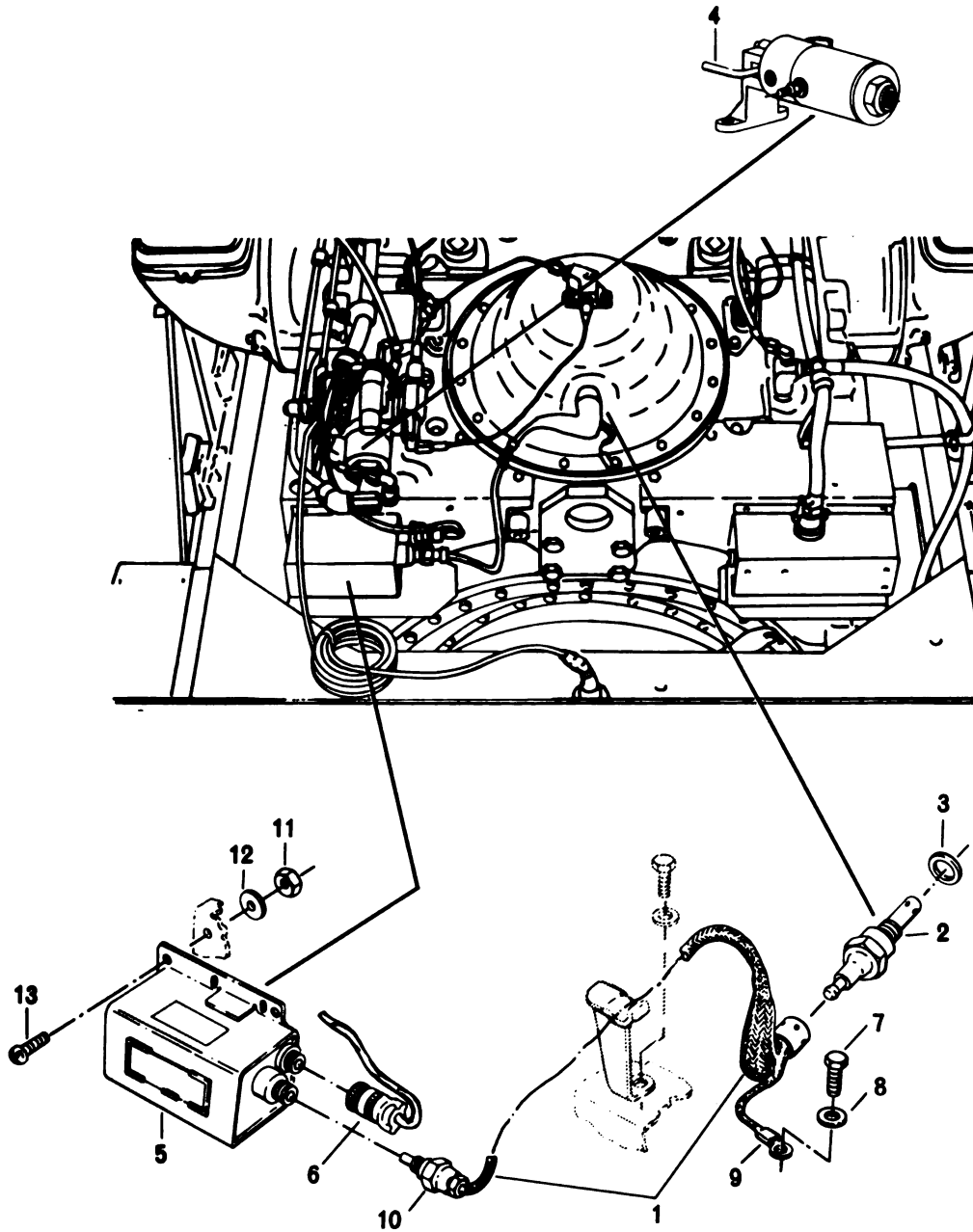
e. Ignition lead (1)	Disconnect from igniter and remove.
----------------------	-------------------------------------

10. Spark igniter (2)

WARNING

Disconnect input (low voltage) cable connector before removing the exciter (high voltage) lead nut or spark igniter. High voltage retained in ignition exciter could cause serious injury or death.

a. Input (low voltage) lead connector (6)	Disconnect from exciter.
---	--------------------------



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4-41. IGNITION LEAD, SPARK IGNITER, AND IGNITION EXCITER (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
10. Spark igniter (2) (cont)	b. Igniter lead	Disconnect.	
	c. Igniter (2)	Remove.	
	d. Gasket (3)	Remove and discard.	
11. Ignition exciter (5)			

WARNING

Disconnect input (low voltage) cable before removing the exciter (high voltage) cable.

- |   |                                   |  |
|---|-----------------------------------|--|
| a. Input (low voltage) lead connector (6)         | Disconnect.                       |  |
| b. Ignition lead connector (10)                   | Disconnect.                       |  |
| c. 4 nuts (11), lock washers (12), and bolts (13) | Remove, and discard lock washers. |  |
| d. Exciter (5)                                    | Remove.                           |  |

INSTALLATION

- |                          |   |                                 |   |
|--------------------------|---|---------------------------------|---|
| 12. Ignition lead<br>(1) | a. Ignition lead (1)                                  | Connect to igniter (2).         |   |
|                          | b. Connector nut (10)                                 | Connect to exciter and tighten. |   |
|                          | c. Ground lead terminal (8), washer (9), and bolt (7) | Install on burner.              | Torque bolt to 80-90 in. lb (9-10 N·m). |
|                          | d. Input (low voltage) cable connector (6)            | Connect to exciter and tighten. |   |

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
13. Spark igniter (2)	a. New gasket (3)	Install on igniter.	
	b. Igniter (2)	a. Apply anti-seize compound to threads.	
		b. Install.	
	c. Ignition lead (1)	Connect to igniter.	
14. Ignition exciter (5)	a. Exciter (5)	Install.	
	b. 4 bolts (13), new lock washers (12), and nuts (11)	Install and tighten.	
	c. Ignition lead (1)	Connect and tighten.	
	d. Input lead connector (6)	Connect and tighten.	

## Section XIII. MAINTENANCE OF LUBRICATION SYSTEM

### 4-42. OIL FILTER ASSEMBLY

This task covers:

Service

#### INITIAL SETUP

##### Tools

5/8 combination wrench

##### Personnel Required

Utilities Equipment Repairer  
MOS 52C

##### Materials/Parts

Oil filter element  
Filter shell gasket  
Oil filter stud gasket  
Bucket (item 3, appx E)  
Engine oil (item 11 or 12,  
appx E)  
Rags (item 14, appx E)

##### References

Para 1-14.b.(23)  
Para 2-2, 2-3, and 2-7  
Item 9, table 2-1  
LO 5-6115-598-12  
Item 9, table 4-1

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

#### SERVICING

##### WARNING

Lube oils MIL-L-23699 and MIL-L-7808 are highly toxic. Wash at once with soap and water if oil comes in contact with skin. If irritation occurs, get medical attention.

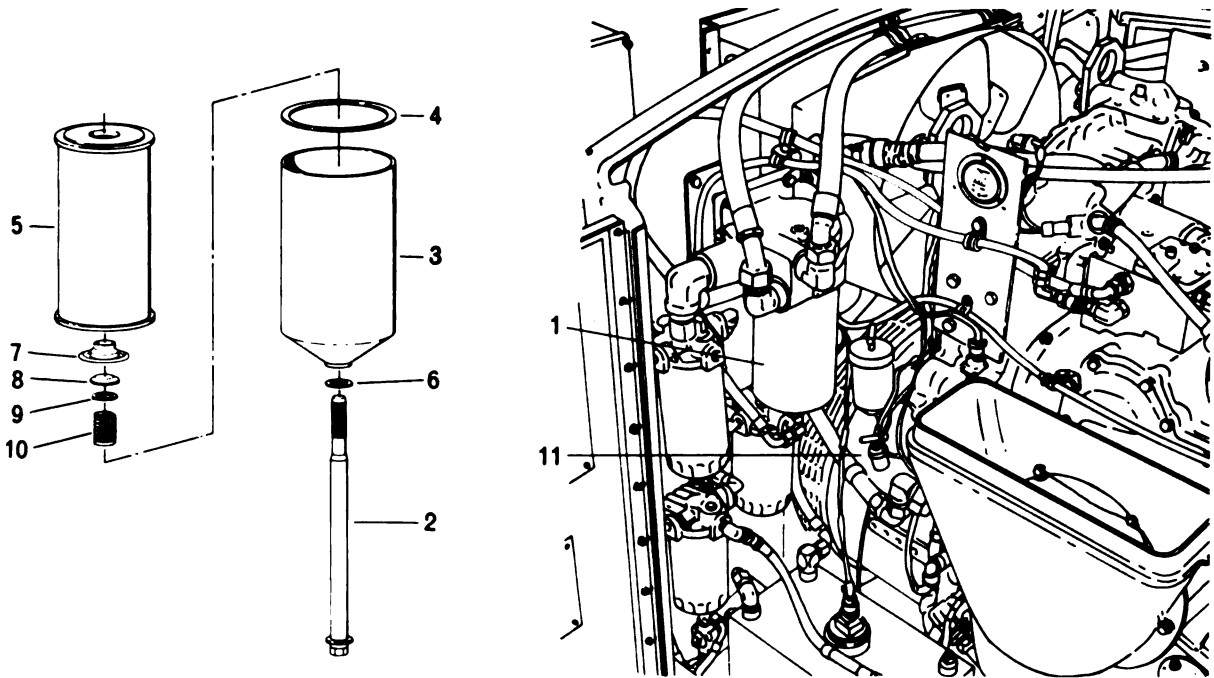
- |                      |                      |         |
|----------------------|----------------------|---------|
| 1. Oil filter<br>(1) | a. Retainer stud (2) | Loosen. |
|----------------------|----------------------|---------|

##### NOTE

Use suitable container to catch oil runoff.

- |  |                       |                                |
|--|-----------------------|--------------------------------|
|  | b. Shell (3)          | Remove.                        |
|  | c. Shell gasket (4)   | Remove from shell and discard. |
|  | d. Filter element (5) | Remove from shell and discard. |

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LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

SERVICING (cont)

l. Oil filter (1) (cont)	e. Stud (2) and gasket (6)	Remove from shell. Discard gasket.	
	f. Retainer (7), seal (8), washer (9), and spring (10)	Remove from shell.	Clean inside of shell with clean rag.
	g. Stud (2) and gasket (6)	Install new gasket on stud and install stud in shell.	
	h. Spring (10), washer (9), seal (8), and retainer (7)	Install in shell.	
	i. New element (5)	Install in shell.	
	j. New shell gasket (4)	Lubricate with engine oil and install on shell.	



---

4-42. OIL FILTER ASSEMBLY (cont)

---

LOCATION	ITEM	ACTION	REMARKS
<u>SERVICING (cont)</u>			
1. Oil filter (1) (cont)	k. Shell (3), gasket (4), and retainer stud (2)	Install and tighten stud.	
2. Engine		a. Start and run 10 minutes.	Para 2-2 and 2-3.
		b. Shut down.	Para 2-7.

CAUTION

Mixing lube oils MIL-L-23699 and MIL-L-7808 may damage the engine. Check the log book before adding oil to ensure that you add the same type of oil that is in the engine.

Oil level gage (11)	a. Check oil level and add (proper type) or remove oil as reqd.	LO 5-6115-598-12. Level marked on on gage.
	b. Check for oil leaks.	Tighten fittings as reqd.

4-43. ENGINE OIL COOLER AND FRAME ASSEMBLY

This task covers:

- a. Inspection
- b. Service

INITIAL SETUP

Tools

Air blow gun (appx D)

References

Item 7, table 4-1

Personnel Required

Utilities Equipment Repairer  
MOS 52C

Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
40	2	4-2

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
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INSPECTION

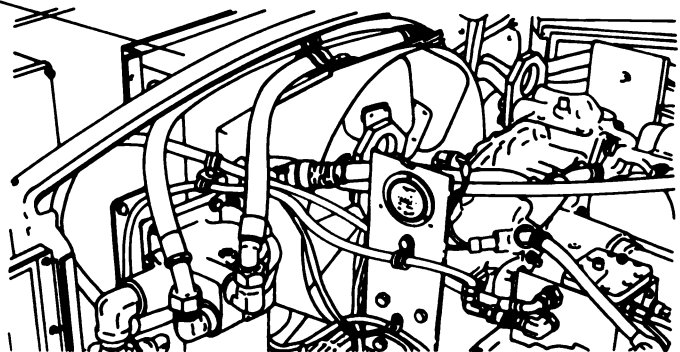
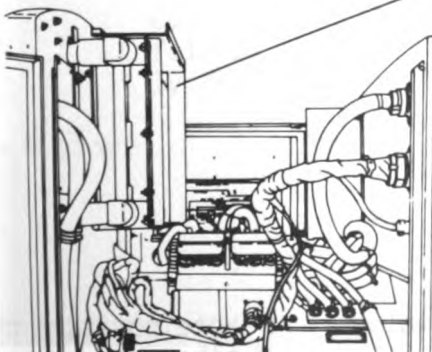
- |                   |  |
|-------------------|--|
| 1. Oil cooler (1) | Inspect for oil leaks and damaged or missing components. |
|-------------------|--|

SERVICE

WARNING

Lube oils MIL-L-23699 and MIL-L-7808 are highly toxic. Wash at once with soap and water if oil comes in contact with skin. If irritation occurs, get medical attention.

- |                   |   |
|-------------------|---|
| 2. Oil cooler (1) | Blow out dirt and debris with compressed air. |
|-------------------|---|



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4-44. MANUAL SHUTOFF OIL DRAIN VALVE

This task covers:

- a. Removal                      b. Installation

INITIAL SETUP

Tools

- 1 1/8 open end wrench (appx D)
- 1 1/4 open end wrench (appx D)
- 1 3/8 open end wrench (appx D)

References

- Para 1-14.b.(24)
- Para 2-2, 2-3, and 2-7
- Para 3-5
- LO 5-6115-598-12

Materials/Parts

- Engine oil (item 11 or 12, appx E)
- Rags (item 14, appx E)

<u>Equipment</u>	<u>Condition</u>	<u>Description</u>
Para	Condition	Description
4-45	Oil system (drained).	

Personnel Required

Utilities Equipment Repairer  
MOS 52C

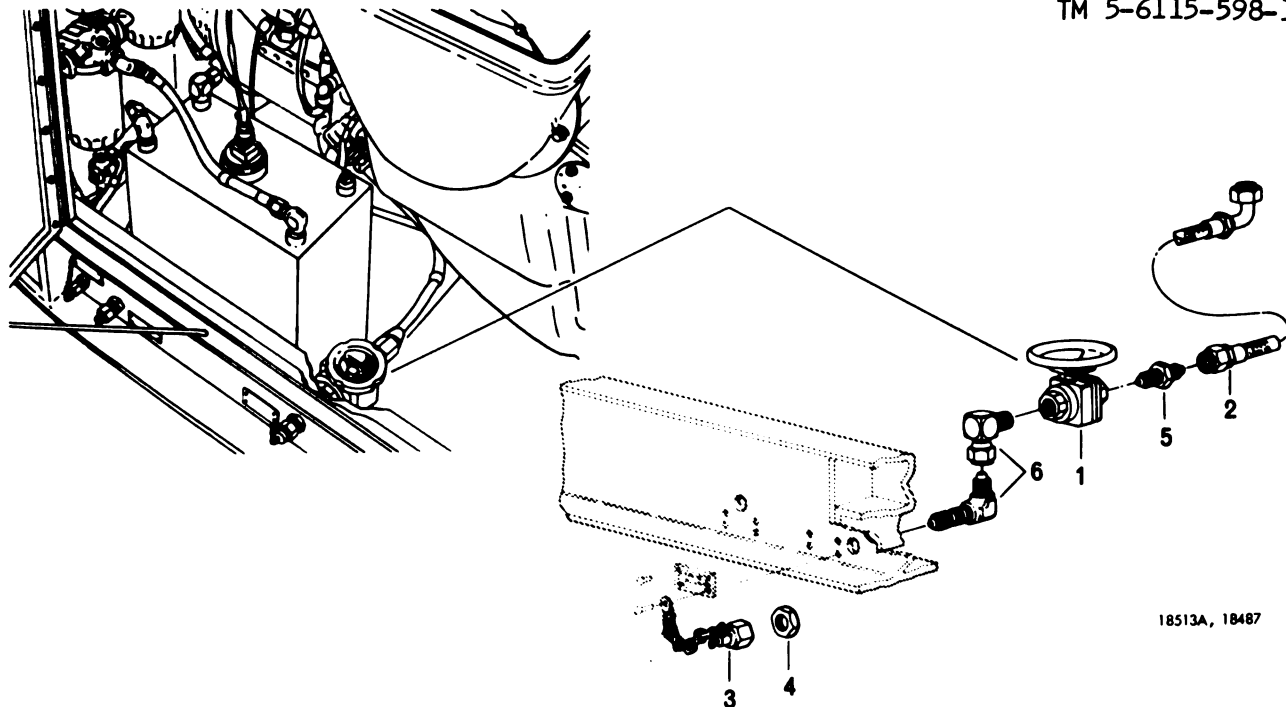
LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

WARNING

Lube oils MIL-L-23699 and MIL-L-7808 are highly toxic. Wash at once with soap and water if oil comes in contact with skin. If irritation occurs, get medical attention.

1. Drain valve (1)	a. Hose (2)	Disconnect and remove.	
	b. Cap (3)	Remove.	
	c. Nut (4)	Remove.	
	d. Valve (1) with fittings (5 and 6)	Remove.	
	e. Fittings (5 and 6)	Remove from valve.	Note position of elbows on valve for installation.



LOCATION	ITEM	ACTION	REMARKS
<b>INSTALLATION</b>			
2. Drain valve (1)	a. 2 fittings (5 and 6)	Install on valve and tighten.	Position fittings as noted during removal.
	b. Valve (1) with fittings (5 and 6)	Install.	
	c. Nut (4)	Install and tighten.	
	d. Cap (3)	Install and tighten.	
	e. Hose (2)	Connect and tighten.	

**CAUTION**

Lube oils MIL-L-23699 and MIL-L-7808 will not mix. Engine failure may occur if the lubrication system is not properly flushed when changing from one type oil to the other.

3. Engine	a. Fill with oil.	Para 4-45.
	b. Start and run 10 minutes.	Para 2-2 and 2-3.
	c. Shut down.	Para 2-7.

---

4-44. MANUAL SHUTOFF OIL DRAIN VALVE (cont)

---

LOCATION	ITEM	ACTION	REMARKS
<u>INSTALLATION (cont)</u>			
3. Engine (cont)	Oil level gage	a. Check for proper oil.	LO 5-6115-598-12.
		b. Check oil level and add or remove oil as reqd.	Level marked on gage.
		c. Check for oil leaks.	Tighten fittings as reqd.

Page 4-183 is a blank page.



4-45. OIL SYSTEM LINES AND FITTINGS

This task covers:

Service

INITIAL SETUP

Tools

1 1/4 open end wrench (appx D)

Personnel Required

Utilities Equipment Repairer  
MOS 52C

Materials/Parts

Bucket (item 2, appx E)  
Engine oil (item 11 or 12,  
appx E)  
Rags (item 14, appx E)

References

Items 3 and 4, table 2-1  
Para 2-2, 2-3, and 2-7  
LO 5-6115-598-12  
Para 4-1.a.(7)  
Item 9, table 4-1  
Para 4-42

LOCATION	ITEM	ACTION	REMARKS
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SERVICING

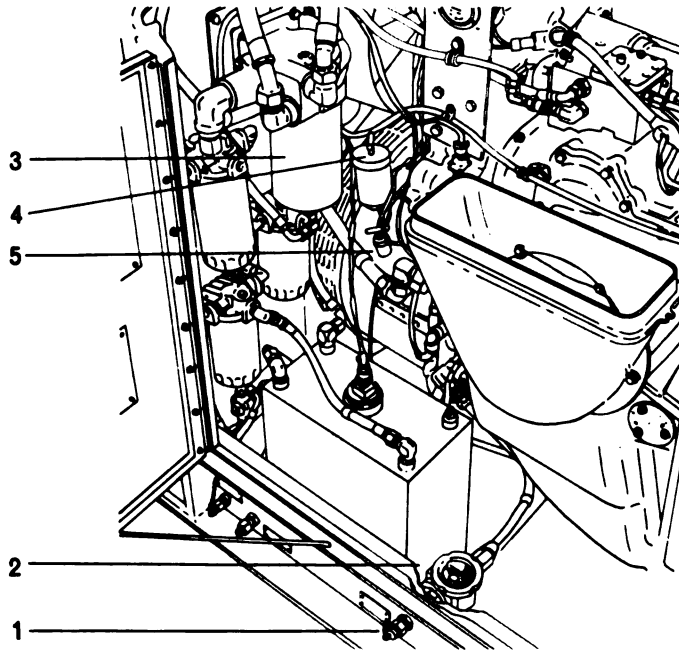
WARNING

Lube oils MIL-L-23699 and MIL-L-7808 are highly toxic. Wash at once with soap and water if oil comes in contact with skin. If irritation occurs, get medical attention.

NOTE

Drain oil immediately after a unit has been run for some time. Most of the sediment will be in suspension and, therefore, will drain readily.

1. Oil	a. Cap (1)	Remove.	Place container under opening.
	b. Oil drain valve (2)	a. Open by turning to left.	Approx 15 qt (14 liters).
		b. Drain oil from engine/gearbox assembly.	



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LOCATION	ITEM	ACTION	REMARKS
<b><u>SERVICING (cont)</u></b>			
1. Oil (cont)	c. Oil filter (3)	Change.	Para 4-42.
	d. Drain valve (2)	Close (turn to right).	
	e. Cap (1)	Install and tighten.	
	f. Oil filler cap (4)	Remove.	
NOTE			
When engine oil is changed, record in log book the type of oil used.			
	g. Oil	Fill and record oil type.	Approx 15 qt (14 liters).
	h. Oil filler cap (4)	Install and tighten.	
2. Oil lines and fittings		Tighten any loose fittings as reqd.	



4-45. OIL SYSTEM LINES AND FITTINGS (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>SERVICING (cont)</u>			
<u>CAUTION</u>			
Mixing lube oils MIL-L-23699 and MIL-L-7808 will dilute oil quality and may damage the engine. If you switched from one type of oil to the other when changing the engine oil, flush the lubrication system per step 3. If you used the same type of oil, proceed to step 4.			
3.	Engine	a. Start and run engine for 30 minutes.	
		b. Change oil and filters per steps 1 and 2.	
4.	Engine	a. Start and run 10 minutes.	Para 2-2 and 2-3.
		b. Shut down.	Para 2-7.
	Oil level gage (5)	a. Check for proper oil.	LO 5-6115-598-12.
		b. Check oil level and add or remove oil as reqd.	Level marked on on gage.
		c. Check for oil leaks.	Tighten fittings as reqd.

## Section XIV. MAINTENANCE OF ENGINE SYSTEM

### 4-46. LH OR RH REGENERATOR HOUSING ASSEMBLY

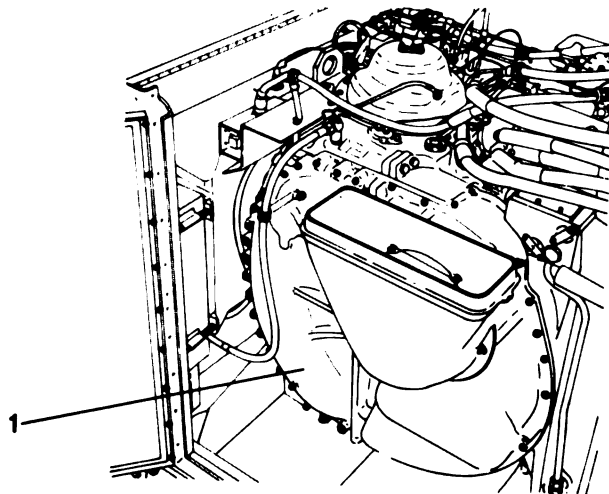
This task covers:

Inspection

#### INITIAL SETUP

##### Personnel Required

Utilities Equipment Repairer MOS 52C



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LOCATION	ITEM	ACTION	REMARKS
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#### INSPECTION

1. Regenerator  
drive housings  
(1)

Inspect for:

1. Cracks.
2. Leaks.
3. Visual signs of any defects in housing or missing components.

## Section XV. MAINTENANCE OF ENGINE EXHAUST SYSTEM

### 4-47. LH OR RH EXHAUST DUCT ASSEMBLY (WITH CYLINDER)

This task covers:

- a. Removal                      b. Installation

#### INITIAL SETUP

##### Tools

- 7/16 combination wrench
- 9/16 combination wrench
- 6-in. flat tip screwdriver
- 7/16 socket
- 5-in. extension
- Ratchet handle

##### References

- Para 1-14.b.(5)
- Para 3-5
- Para 4-1.a.(1)

##### General Safety Instructions

Do not attempt removal while ducts are hot.

##### Personnel Required

Utilities Equipment Repairer  
MOS 52C

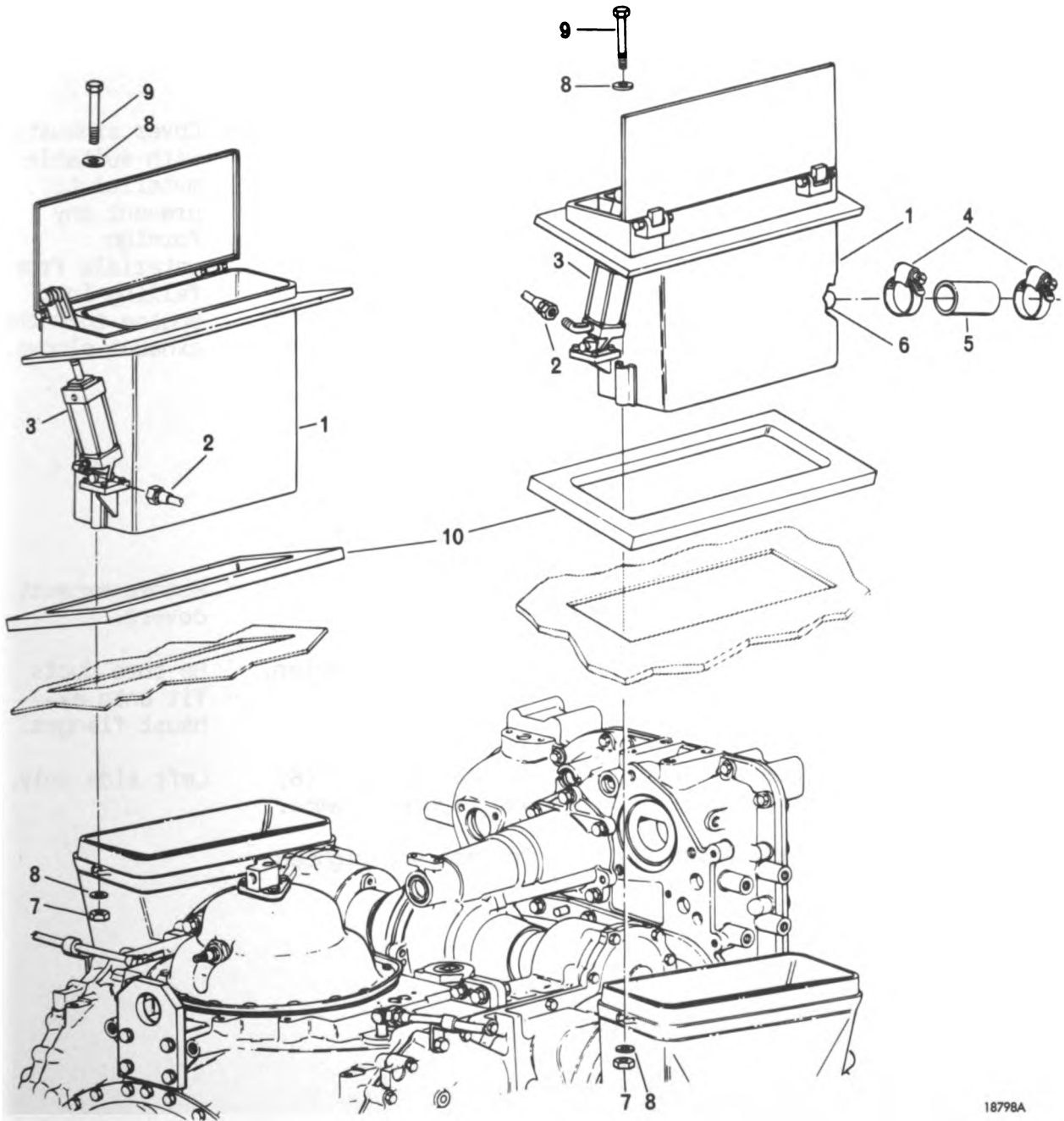
LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

#### REMOVAL

##### WARNING

Exhaust heat is created by operation of the generator set. Severe burns may result from attempting to service any exhaust system component before allowing time for cooling after operation.

- |                                |   |  |                 |
|--------------------------------|---|--|-----------------|
| 1. LH and RH exhaust ducts (1) | a. 2 air hoses (2)                            | Disconnect from cylinders (3).                   |                 |
|                                | b. 2 clamps (4) and hose (5)                  | Loosen clamps and disconnect hose from vent (6). | Left side only. |
|                                | c. 4 nuts (7), 8 washers (8), and 4 bolts (9) | Remove.  |                 |



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## 4-47. LH OR RH EXHAUST DUCT ASSEMBLY (WITH CYLINDER) (cont)

LOCATION	ITEM	ACTION	REMARKS	
<u>REMOVAL (cont)</u>				
1. LH and RH exhaust ducts	d. 2 ducts (1)	Remove.	Cover exhausts with suitable material to prevent any foreign materials from falling into engine thru the exhaust elbows.	
	e. 2 gaskets (10)	Remove.		
<u>INSTALLATION</u>				
2. LH and RH exhaust ducts (1)	a. 2 gaskets (10)	Install on duct.	Remove exhaust covers.	
	b. 2 ducts (1)	Install.		
	c. 4 bolts (9), 8 washers (8), and 4 nuts (7)	Install and tighten.		Be sure ducts fit onto exhaust flanges.
	d. Hose (5) and 2 clamps (4)	Connect on vent (6) and tighten clamps.		Left side only.
	e. 2 air hoses (2)	Connect and tighten.		

Page 4-191 is a blank page.



## Section XVI. MAINTENANCE OF CONTROLS AND INSTRUMENTS

### 4-48. BATTLE SHORT SWITCH

This task covers:

- a. Test                      b. Removal                      c. Installation

#### INITIAL SETUP

##### Test Equipment

Multimeter (appx D)

##### Tools

4-in. flat tip screwdriver  
9/16 combination wrench

##### Materials/Parts

Tags (item 16, appx E)

##### References

Para 1-19.6  
Para 2-9.

##### Personnel Required

Utilities Equipment Repairer  
MOS 52C

##### Troubleshooting References

<u>Item</u>	<u>Step</u>	<u>Table</u>
12	2	4-2
67	2	4-2

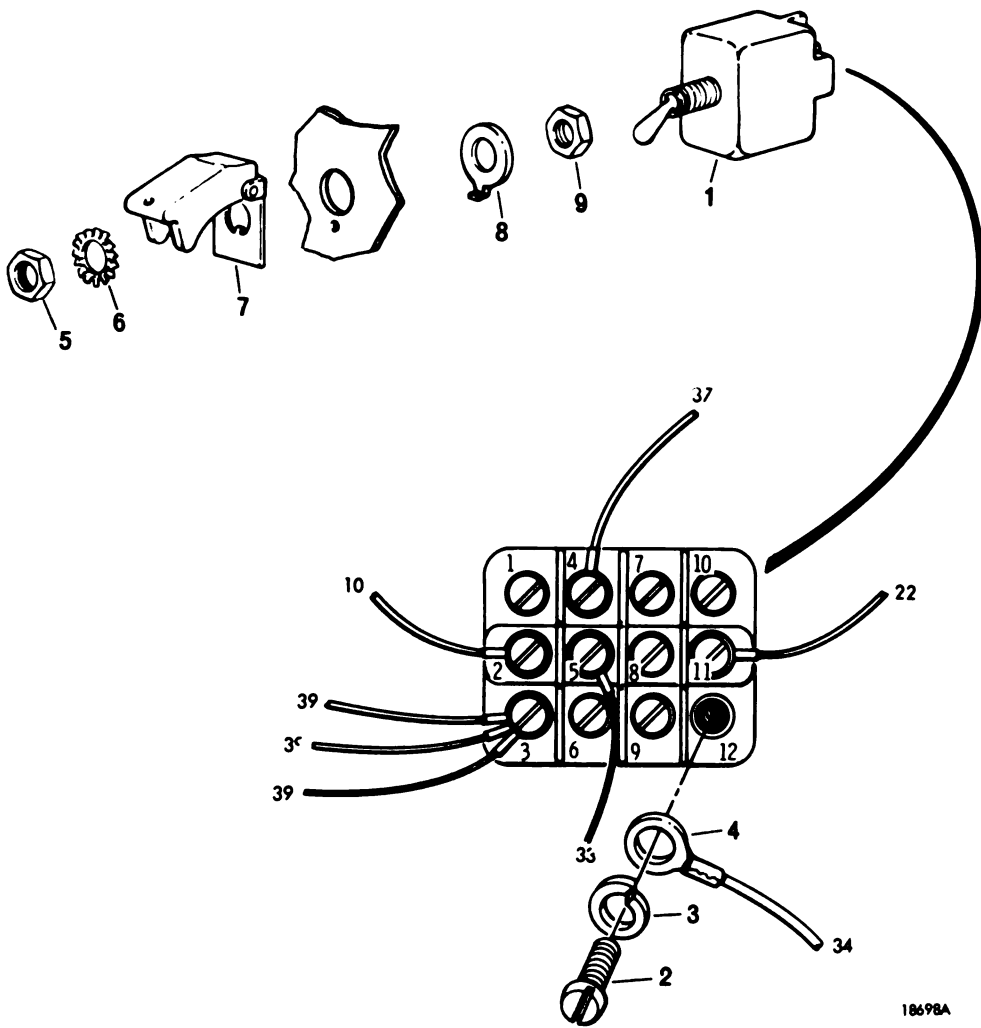
##### Equipment Condition

<u>Para</u>	<u>Condition</u>	<u>Description</u>
4-21	Disarm battery power.	

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

#### TEST

- |                            |                    |   |
|----------------------------|--------------------|---|
| 1. Control cabinet         | a. Outer door      | Unlatch and open.   |
|                            | b. Inner door      | Turn knobs to right to unlock and open.                                   |
| 2. Battle short switch (1) | Posts 2, 5, and 11 | a. Remove screws (2), washers (3), and leads (4). Tag and identify leads. |



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LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

TEST (cont)

2. Battle short switch (1) (cont)

b. Make resistance check with switch ON (guard up).

1. Between posts 11 and 12, 5 and 6, and 2 and 3.

Set multimeter RX1 scale. Reading should be 0-1 ohm.



4-48. BATTLE SHORT SWITCH (cont)

LOCATION	ITEM	ACTION	REMARKS
<u>TEST (cont)</u>			
2. Battle short switch (1) (cont)		2. Between posts 11 and 10, 5 and 4, and 2 and 1.	Set multimeter RX10,000 scale. Reading should be infinity.
		c. Make resistance check with switch OFF (guard down).	
		1. Between posts 11 and 10, 5 and 4, and 2 and 1.	Set multimeter RX1 scale. Reading should be 0-1 ohm.
		2. Between posts 11 and 12, 5 and 6, and 2 and 3.	Set multimeter RX10,000 scale. Reading should be infinity.
3. Control cabinet	a. Inner door	Close and turn knobs to left to latch.	
	b. Outer door	Close and lock.	

REMOVAL

4. Control cabinet	a. Outer door	Unlatch and open.	
	b. Inner door	Turn knobs to right to unlock and open.	
5. Battle short switch (1)	a. Screws (2), washers (3), and leads (4)	Remove, tag, and identify leads.	
	b. Nut (5), washer (6), and guard (7)	Remove from front of panel.	

LOCATION	ITEM	ACTION	REMARKS
<u>REMOVAL (cont)</u>			
5. Battle short switch (1) (cont)	c. Battle short switch (1)	Remove from rear of panel.	
	e. Washer (8) and nut (9)	Remove from switch.	
<u>INSTALLATION</u>			
6. Battle short switch	a. Nut (9) and washer (8)	Install on switch.	Washer (8) is keyed to panel slot.
	b. Battle short switch (1)	Install from rear of panel.	
	c. Guard (7), washer (6), and nut (5)	Install from front of panel.	
	d. Leads (4), washers (3), and screws (2)	Remove tag and install and tighten screws.	
7. Control cabinet	a. Inner door	Close and turn knobs to left to lock.	
	b. Outer door	Close and latch.	

4-48.1. CLUTCH VALVE ASSEMBLY

This task covers:

- a. Inspection

INITIAL SETUP

Tools

Kit, Master Mechanics  
5180-00-699-5273  
1-in. combination wrench tool

Materials/Parts

Rags (item 14, appx E)  
Magnetic plug seal

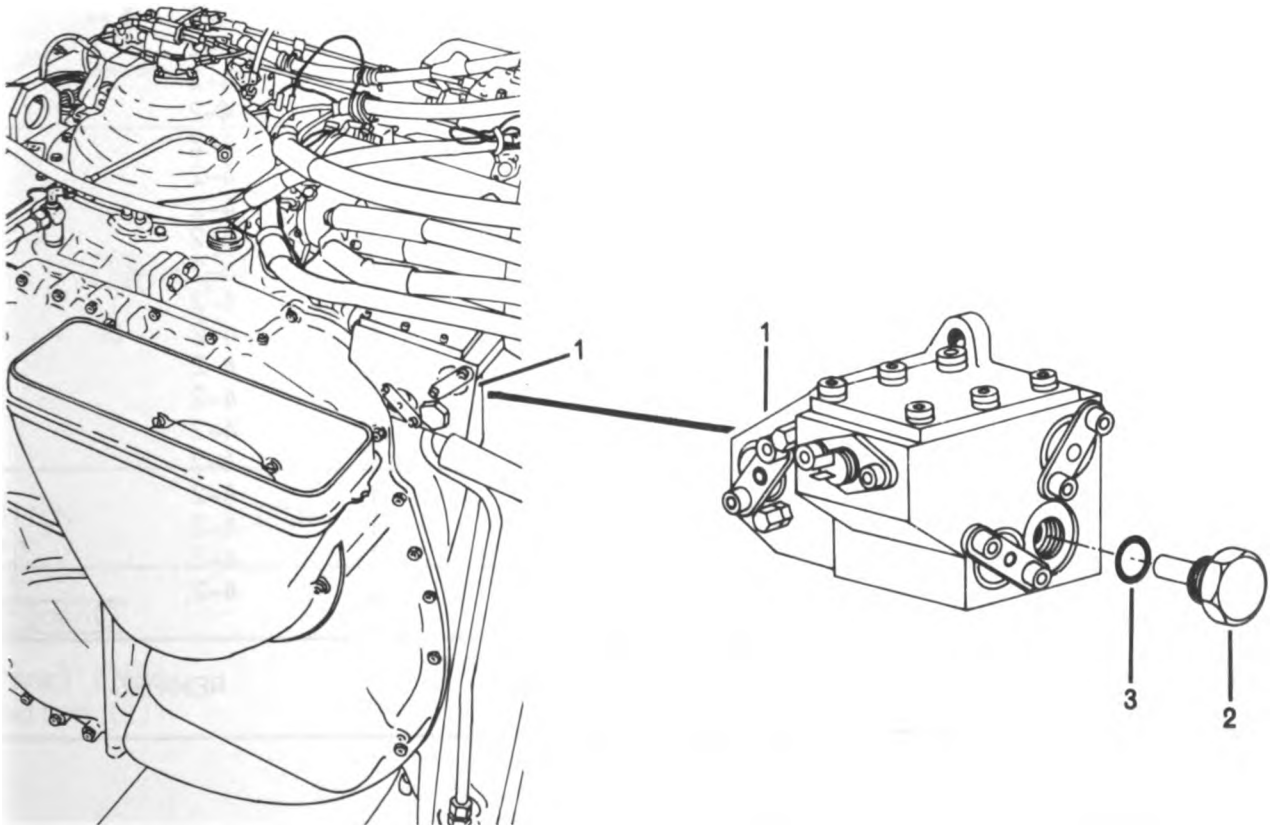
Personnel Required

Utilities Equipment Repairer  
MOS 52C

References

<u>Item</u>	<u>Step</u>	<u>Table</u>
10		4-1

LOCATION	ITEM	ACTION	REMARKS
	1. Clutch valve (1)	a. Remove and discard seal.  b. Check for metal particles.	Small amounts of metallic particles are normal and not cause for replacement.
	b. New seal (3) and plug (2)	Install and tighten plug.	



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4-49. LIGHT ASSEMBLIES (ENGINE AND GENERATOR CONTROLS)

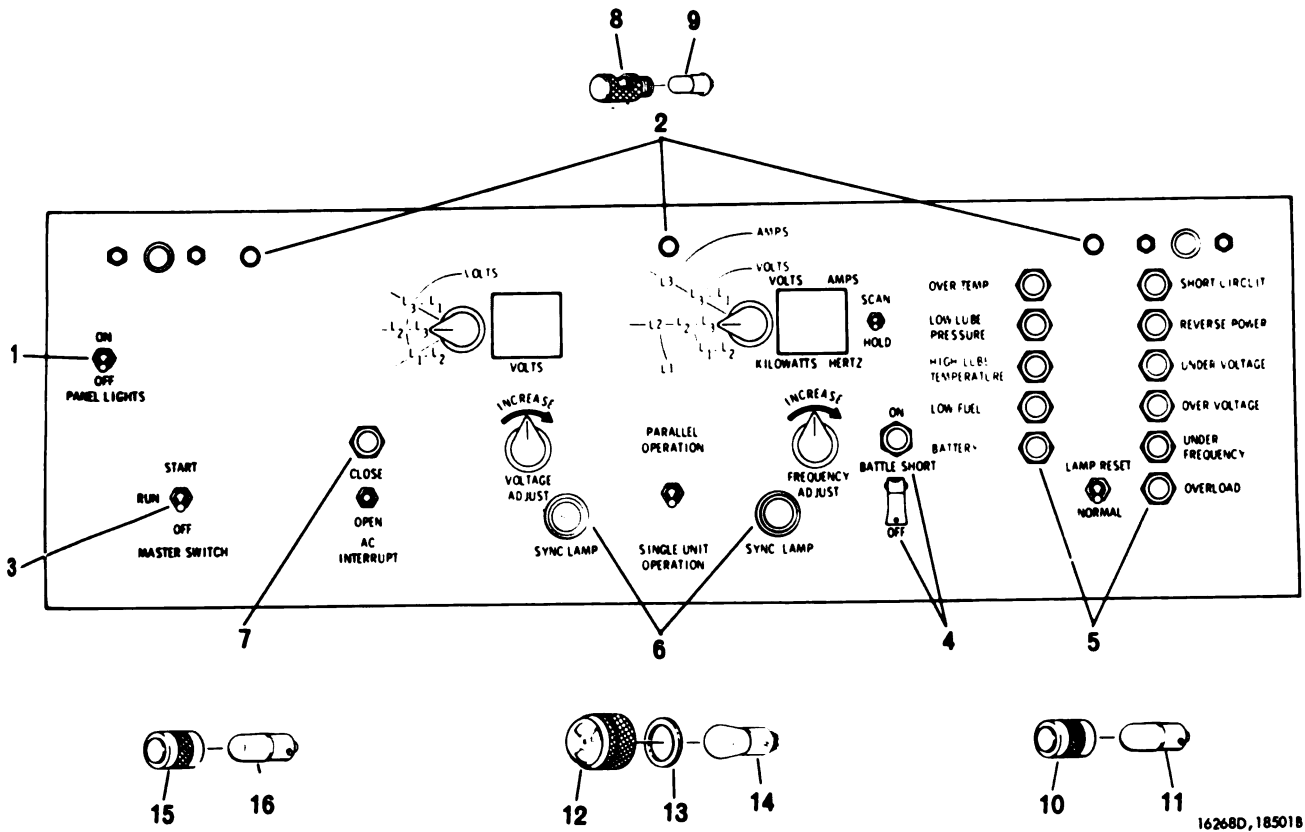
This task covers:

- a. Test
- b. Repair

INITIAL SETUP

<u>Materials/Parts</u>	<u>Troubleshooting References</u>		
	<u>Item</u>	<u>Step</u>	<u>Table</u>
Sync lamp			
Battle short or fault indicator lamp	1	1	4-2
Panel and AC interrupt lamp	13	1	4-2
	14	1	4-2
	15	1	4-2
<u>Personnel Required</u>	16	1	4-2
	17	1	4-2
Utilities Equipment Repairer	18	1	4-2
MOS 52C	19	1	4-2
	20	1	4-2
	21	1	4-2
	22	1	4-2
	23	1	4-2
	24	1	4-2
	25	1	4-2
	26	1	4-2
	27	1	4-2
	50	1	4-2
	55	1	4-2
	68	1	4-2
	70	1	4-2

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
<u>TEST</u>			
1. Control cabinet	Outer door	Unlatch and open.	



LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

TEST (cont)

2. Panel light switch (1)		Place in ON position and observe panel lights (2).	Replace bulbs as reqd.
---------------------------	--	--	------------------------

NOTE

If bulb replacement does not correct problem, notify the next higher level of maintenance.

3. Master switch (3)		Place in RUN position.	
----------------------	--	------------------------	--

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4-49. LIGHT ASSEMBLIES (ENGINE AND GENERATOR CONTROLS) (cont)

---

LOCATION	ITEM	ACTION	REMARKS
<u>TEST (cont)</u>			
4. Battle short switch (4)		Place in ON position and wait 10 seconds.	
NOTE			
The following lamps will be on without pressing; BATTLE SHORT, BATTERY, UNDER VOLTAGE, and UNDER FREQUENCY.			
5. Lights	Fault indicators (5) and ac interrupt (7)	Press to test each lamp (except as noted).	Replace bulbs as reqd.
6. Battle short switch (4)		Place in OFF position.	
7. Master switch (3)		Place in OFF position.	
8. Panel lamp switch (1)		Place in OFF position.	

REPAIR

9. Panel lamps (2)	Lens (8) and bulb (9)	a. Unscrew lens and remove bulb. b. Install new bulb and install and tighten lens. c. Repeat step 2.	
--------------------	-----------------------	--	--

LOCATION	ITEM	ACTION	REMARKS	
<u>REPAIR (cont)</u>				
10. Lights	a. Fault indicators (5)	a. Unscrew lens (10) and bulb (11).		
		b. Install new bulb and install and tighten lens.		
		c. Repeat step 5.		
	b. Sync lamps (6)	a. Unscrew lens (12) and gasket (13) and remove bulb (14).	Ensure rubber gasket on socket is serviceable.	
		b. Install new bulb and install gasket and lens and tighten lens.		
		c. Repeat step 5.		
	c. AC interrupt lamp (7)	a. Unscrew lens (15) and remove bulb (16).		
		b. Install new bulb and install and tighten lens.		
	d. Battle short lamp (4)	a. Unscrew lens (10) and bulb (11).		
		b. Install new bulb and install and tighten lens.		
	11. Control cabinet	Outer door	Close and latch.	



## Section XVII. PREPARATION FOR SHIPMENT AND STORAGE

---

### 4-50. GENERATOR SET SHIPPING CONTAINER INSTALLATION AND REMOVAL

---

#### a. Generator set installation.

(1) Remove the six screws (1) and washers (2) from the shipping container cap.

(2) Attach a sling and hoist to the lifting brackets on the cap. Lift the cap (3) from the pallet base (4) and set aside.

#### NOTE

The pallet base and cap are symmetrical. There is no front and rear or right and left to either the pallet base or the cap.

(3) Remove four nuts (5) and flat washers (6) from the pallet base at attachment bolts (7). Retain this hardware for attaching the generator set.

(4) Inspect the container cap and the pallet base to determine if they are complete and serviceable.

#### NOTE

Pay particular attention to the wooden members to assure that they are damage free.

#### CAUTION

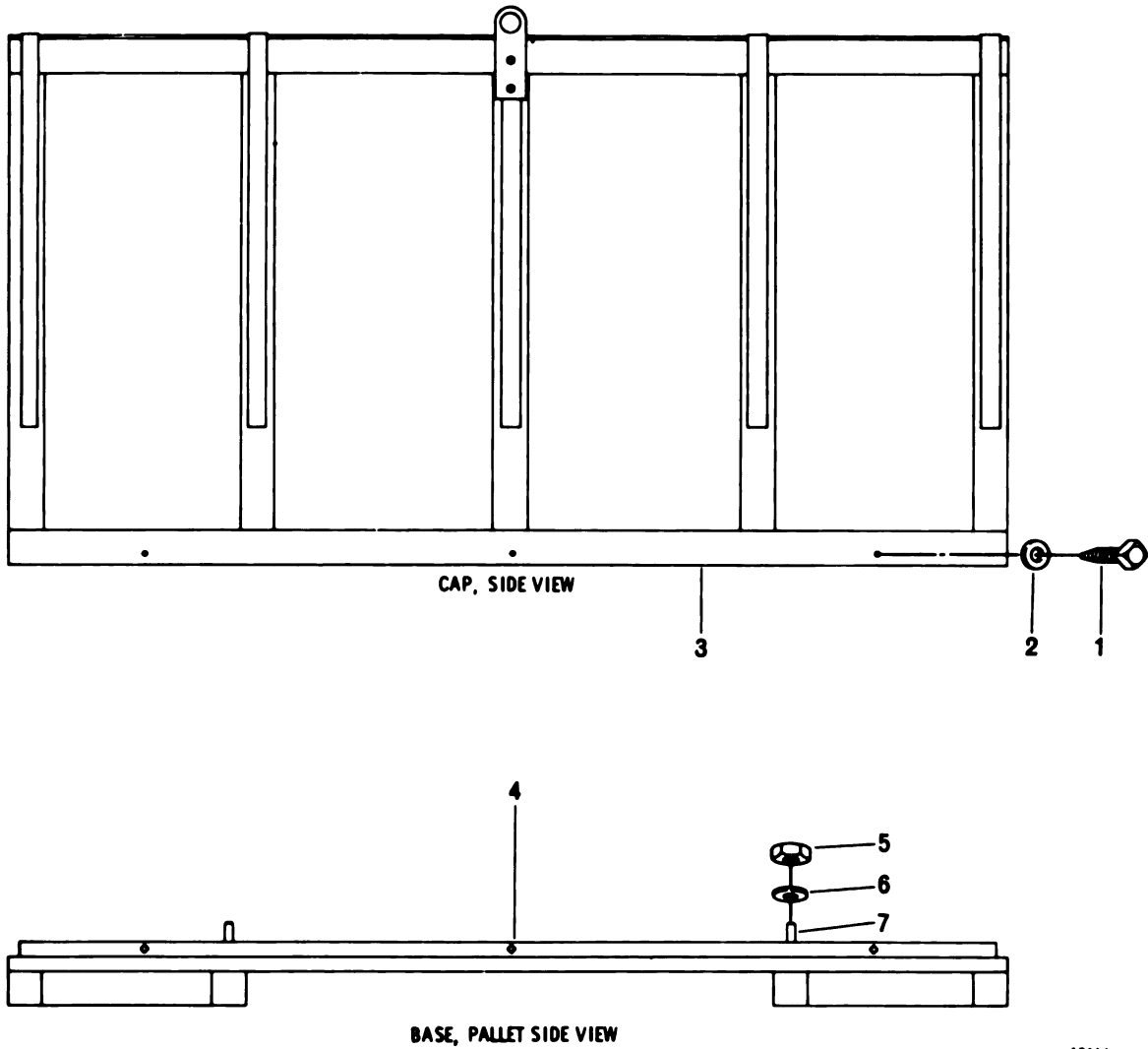
Fork lift from side only. Fork lift tines will cause damage if unit is lifted from the end of the container.

(5) Attach sling or handling fixture to the generator set assembly.

(6) Carefully lift the assembly and lower onto the four attachment bolts (7) in the pallet base.

(7) Install the flat washers (6) and nuts (5) on the attachment bolts (7). Torque the nuts (5) to 20-25 in. lb (2-3 N·m).

(8) Attach a lifting device to the container cap (3).



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### Generator Set Shipping Container

(9) Raise the cap and lower onto the pallet base (4).

(10) Attach the cap to the pallet base using the six flat washers (2) and screws (1). Tighten the screws (1) until the bearing washers (2) are flush to the cover; over tightening will damage the base.

(11) Remove the lifting device from the cap assembly.

---

4-50. GENERATOR SET SHIPPING CONTAINER INSTALLATION AND REMOVAL (cont)

---

NOTE

Special Instructions: Coordinate air shipment of generator set in container with the air carrier. The container will require an air line pallet. The size of the container limits its applicable aircraft. (See table 4-3.)

Table 4-3. Generator Set Container Reference Data

---

Overall Dimensions	
Length	102.5 in. (2.6 m)
Width	56.0 in. (1.4 m)
Height	62.5 in. (1.6 m)
External Cubage	207.6 cu ft (5.9 m <sup>3</sup> )
Empty Container Weight	576 lb (261.7 Kg)

---

b. Generator Set Removal.

- (1) Remove the six screws (1) and washers (2) from the shipping container cap (3).
- (2) Attach a sling and hoist to the lifting brackets on the cap. Lift the cap (3) from the pallet base (4) and set aside.
- (3) Remove four nuts (5) and flat washers (6) from the pallet base (4).
- (4) Attach a sling or handling fixture to the generator set assembly.
- (5) Carefully lift the assembly from the pallet base (4). Place on a clean, dry surface.
- (6) Install the four flat washers (6) and nuts (5) on the pallet base bolts (7) and tighten.
- (7) Attach the sling and hoist to the cap lifting brackets. Lift the cap (3) onto the pallet base (4).
- (8) Install the six washers (2) and screws (1). Tighten the cap to the pallet base.

(9) Remove the lifting device from the cap. ■

NOTE

Store the shipping container assembly in a weatherproof building or cover with polyvinyl sheeting. The container is reuseable.

c. Refer to TM 740-90-1 Administrative Storage of Equipment and TB 740-97-2 Preservation of USAMECOM Mechanical Equipment for Shipment and Storage. Type of Storage is as follows:

- (1) Short term -- 1 - 45 days
- (2) Intermediate -- 45 - 180 days
- (3) Long term -- no time limit

Paragraph 4-51 deleted. ■

Pages 4-205 thru 4-210 deleted. ■

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## APPENDIX A

### REFERENCES

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#### A-1. SCOPE

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This appendix lists all forms, field manuals, and technical manuals referenced in this manual.

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#### A-2. FORMS

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Equipment Improvement Recommendations (EIR's) . . . . . SF 368  
 Equipment Inspection and Maintenance Work Sheet. . . . . DA Form 2404  
 Recommended Changes to Equipment Technical Manuals . . . . . DA Form 2028-2  
 Recommended Changes to Publications and Blank Forms. . . . . DA Form 2028  
 Operator Maintenance Requirements for Generator Sets, Engine  
 Driven, 150 kW 400 Hz Alternating Current. . . . . DA Form 12-25D

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#### A-3. FIELD MANUALS

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Artificial Respiration Manual. . . . . FM 21-11

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#### A-4. TECHNICAL MANUALS

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Administrative Storage of Equipment. . . . . TM 740-90-1  
 Lubrication Order. . . . . LO 5-6115-598-12  
 Operation and Maintenance of Ordnance Materiel in Cold Weather  
 (0° to -65°F, -18° to -54°C). . . . . TM 9-207  
 Operator's Organizational, DS, and GS Maintenance Manual:  
 Storage Batteries, Lead-Acid Type . . . . . TM 9-6140-200-14  
 Procedures for Destruction of Equipment to Prevent Enemy Use . . . TM 750-244-3  
 The Army Maintenance Management System (TAMMS) . . . . . TM 38-750  
 Organizational, Direct Support and General Support Maintenance  
 Repair Parts and Special Tools List (Including Depot Maintenance  
 Repair Parts and Special Tools . . . . . TM 5-6115-598-24P

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A-5. TECHNICAL BULLETINS

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Preservation of USAMECOM Mechanical Equipment for Shipment and  
Storage . . . . . TB 740-97-2  
Lifting Devices Safety Inspection and Testing Safety Precautions  
for Maintenance of Electronic Equipment TB 385-4. . . . . TB 43-0142

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A-6. SPECIFICATIONS

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Index of Technical Publications. . . . . DA PAM 310-4

## APPENDIX B

### MAINTENANCE ALLOCATION CHART

#### Section I. INTRODUCTION

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##### B-1. GENERAL

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This appendix contains the maintenance allocation charts (MAC's) for equipment covered in this report. The MAC's assign maintenance functions and repair operations to be performed by the lowest appropriate maintenance categories.

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##### B-2. REMARKS, EXPLANATIONS, AND DEFINITIONS

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a. Maintenance Functions. Maintenance functions will be limited to and defined as follows:

(1) Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

(2) Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

(3) Service. Operations required periodically to keep an item in proper operating condition; i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

(4) Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

(5) Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

(6) Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.



(7) Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

(8) Replace. The act of substituting a serviceable like part, subassembly, or module (component or assembly) for an unserviceable counterpart.

(9) Repair. The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

(10) Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to the like new condition.

(11) Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

b. Column Entries. Columns used in the maintenance allocation chart are identified below.

(1) Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

(2) Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

(3) Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2.

(4) Column 4, Maintenance Category. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of man-hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. The time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart.

(5) Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

(6) Column 6, Remarks. Column 6 specifies, by code, those actions to be taken during the inspect, test, service, and adjust functions designated in column 3.

c. Category Symbols. The symbols shown in the maintenance category subcolumns for responsible categories are defined as follows:

C (Operator/Crew)	1st Category
O (Organizational)	2nd Category
F (Direct Support)	3rd Category
H (General Support)	4th Category
D (Depot)	5th Category

## Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
01	FRAME AND HOUSING								
0101	Roof Panels, Generator Compartment	Repair Replace		0.8	2.5			1,2,63,67 3,36,37	A
0102	Panel Assy, Front Cabinet	Inspect Repair Replace	0.1		2.5			1,2,67 3	A
0103	Panel Assy, Rear Cabinet	Repair Replace			2.5 0.5			1,2,4,50,67 1	A
0104	Door Assys	Inspect Repair Replace	0.1	0.2 0.2	0.3			1,2,3,7,67 3,46,75	A,D
0105	Screen Assy, Rear Cabinet Enclosure, Cooling Air Inlet	Inspect Service Replace	0.1 0.1	0.2				3	
0106	Bulkhead Assy, Center	Repair Replace			2.5 4.0			1,2,50,67 1	A
0107	Air Inlet Assy, Cleaner, Air Screen and Louver LH and RH	Inspect Service Replace	0.2	0.2 0.2				3	
0108	Air Cleaners, LH and RH	Inspect Service Replace		0.1 1.0 1.0				3	
0109	Plenum Assy, Engine Air Inlet	Inspect Repair Replace			0.2 0.2 0.5			2,50 1	M

(1) Group Number	(2) Component/ Assembly	(3) Mainte- nance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
0110	Base Assy, Generator Set	Repair			2.5			1,2,20,64, 67 1	A
		Replace			8.0				
0111	Tray Assy, Battery, LH and RH	Inspect		0.1				3 3,17,38	
		Service		1.0					
		Replace		0.2					
0112	Ring, Cargo	Inspect		0.1				3	
		Replace		0.1					
0113	Data Plates	Inspect	0.2					2,50	
		Replace			0.3				

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
02	DC ELECTRICAL AND CONTROL SYSTEM								
0201	Battery Cables	Inspect Repair Replace	0.2		0.5			1, 50, 55 3, 42	
0202	Batteries	Inspect Test Service Replace	0.1 0.2		0.2			4, 61, 62 22, 61, 62 3, 61, 62	B
0203	Pickup, Magnetic Sensor, N1 & N2	Test Replace			0.2 0.2			4, 6 2, 7, 39	
0204	Thermocouple Assy, Single Element, T4	Inspect Test Replace			0.4 0.2 0.4			4, 6 1	
0205	Temperature Sensor, Compressor Inlet	Test Replace			0.2 0.3			4, 6 1, 2, 39, 54	
0206	Hourmeter, 24-Volt DC	Inspect Test Replace	0.1					3, 5 3	
0207	Alternator, 24-Volt	Inspect Test Adjust Replace Repair		0.2 0.2 0.2	1.5			4, 5, 6 3, 5 1, 4 1, 4, 6, 13, 27	
020701	Rectifier Assy	Inspect Test Replace			0.1 0.2 0.3			5	
020702	Brush	Inspect Replace			0.1 0.1				

(1) Group Number	(2) Component/ Assembly	(3) Mainte- nance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
020703	Rotor Assy	Inspect Test Replace			0.1 0.1 0.2			5	
020704	Regulator	Inspect Adjust Replace			0.1 0.2 0.2			5	
020705	Stator Assy	Inspect Test Replace			0.1 0.2 0.1			4	
020706	Diode trio Load Dump	Inspect Test Replace			0.1 0.2 0.3			5	
0208	Switch, Low Oil Pressure	Test Replace		0.1 0.1				5 3	
0209	Thermo Switch Assy (oil temp)	Test Replace		0.2 0.1				5 3	
0210	Circuit Breaker, 150-Amp, Automatic Reset	Test Replace		0.1 0.2				5 3	
0211	Rectifier, 275-Amp Avg., 5,000-Amp Surge	Test Replace			0.1 0.2			4,6 1,4	
0212	Panel Assy, Relay	Test Repair  Replace			1.0 1.5  1.0			4,6 1,4,6,20,55, 69,72 1	
0213	Terminal, Load (Ground Stud)	Inspect Service Replace		0.1 0.1 0.1				3,17 3	
0214	Wiring	Inspect Test Repair Replace		0.1	0.1 0.3 0.5			1,4,5,6 1,4,6	

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
03	ELECTRICAL POWER GENERATOR AND CONTROL SYSTEM								
0301	Receptacle, Duplex, and 15-A Circuit Breaker	Test Replace		0.2 0.4				5 3	
0302	Contactor, Main	Test Replace			0.5 0.5			4,6 1	
0303	Transformer Assy, Current	Test Replace			0.2 0.5			4,6 1,4,55	
0304	Droop Transformer	Test Replace			0.2 0.5			4,6 1,4,55	
0305	Support Assy, Main Contactor Current Trans- former	Repair Replace			1.0 2.5			1,2,67 1,2	A
0306	Alternator, 150kW AC, Brushless, Air Cooled	Inspect Test Replace  Overhaul		0.2	0.7 2.0			3 4,6,68 1,2,4,16,27, 29,30,34,48, 53,70,71	
0307	Fan and Driving Disc	Inspect Replace						*	
0308	Stator and Coil Assy	Inspect Test Replace						*	
0309	Exciter Armature Assy	Inspect Test Replace						*	

(1) Group Number	(2) Component/ Assembly	(3) Mainte- nance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
0310	Exciter, Field	Inspect Test Replace					*		
0311	Rotating Field and Shaft	Inspect Test Replace					*		
0312	Rectifier Bridge Assy	Test Replace					*		
0313	Bearing Assy	Inspect Replace					*		



(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
04	FUEL SYSTEM								
0401	Pump, Fuel Transfer	Inspect Service Test Repair Replace	0.2	0.2	0.2 1.5 0.3			3 1,4,6,20 1,4,49 1,4	
0402	Fuel Filters, Primary & Catch & Drain	Inspect Service Replace	0.1	0.1 0.3				12 3	
0403	Fuel Filters, 1st Secondary & 2nd Secondary	Inspect Service Replace	0.1	0.1 0.3				12 3	
0404	Switch, Fuel Level	Test Adjust Replace			0.4 0.2 0.3			4,6 4,6,57 1,4	
0405	Tank Assy, Fuel	Inspect Repair Replace	0.2		1.5 0.3			76 1,67 1	K A
0406	Valve Assemblies, Solenoid, 3-Way and 2-Way	Test Replace		0.4 0.3				5 3	I
0407	Flow Divider Valve	Inspect Test Replace		0.1 0.5 0.3				3	I
0408	Nozzle Assy, Fuel	Inspect Replace Test Overhaul		0.1 0.1				3,41	
0409	Valve Assy, Fuel Drain	Inspect Replace	0.1	0.1				3,41	

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks	
			C	O	F	H	D			
0410	Metering Valve, Fuel	Inspect Test Replace Calibration Overhaul	0.1		0.6 0.2			* * *	4,6 1,8,11	F C
0411	Fuel Pump, Mechanical	Inspect Test Replace	0.1		0.5 0.3				1,8,11	
0412	Valve, Swing-Type Check	Test Replace		0.3 0.3					3 3,41	
0413	Lines and Fittings	Inspect Replace	0.1	0.3					3,45	

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
06	IGNITION SYSTEM								
0601	Starter	Inspect Test Replace Repair		0.1 0.3 1.0	0.8  1.0			5 3,14 1,4	
060101	Brushes	Inspect Replace			0.2 0.6				
060102	Solenoid Switch	Test Replace			0.3 0.2		5		
060103	Armature Motor	Test Repair Replace			0.5 0.8 0.5		4 4		
060104	Field Coil Assy	Inspect Test Replace			0.1 0.2 0.8		4		
0602	Lead, Ignition, Spark Igniter	Inspect Test Replace		0.2 0.2 0.1			3 3,39	L L	
0603	Igniter, Spark	Inspect Test Replace		0.1 0.2 0.2			3 3,40		
0604	Exciter, Ignition	Test Replace		0.2 0.3			3 3	L L	

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
08	LUBRICATION SYSTEM								
0801	Oil Filter Assy, Cooler Bypass	Inspect Service Replace	0.1	0.2	0.3			3 1,4,51	
0802	Oil Cooler and Frame Assy, Engine	Inspect Service Replace Overhaul		0.2 0.1	0.5 0.6		*	9 1,4,10,16	
0803	Valve, Oil Drain Manual Shutoff	Inspect Replace	0.1	0.2				3,42,43,45	
0805	Oil System Lines and Fittings	Inspect Service Replace	0.3	0.1	0.5			42 1,4,15,16, 51	

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
10	ENGINE SYSTEM								
1001	Engine Assembly, 404-4	Inspect Test Replace  Overhaul			0.5 1.0 6.0			19 1,2,4,16, 27,29,30, 34,53,70, 71	
1002	Housing Assembly, Regenerator, LH and RH	Inspect Repair Replace		0.1	1.0 2.5			1,67 1,21,24,26, 31,39	A
1003	Regenerator Disc & Ring Gear Assembly, LH and RH	Inspect Replace  Overhaul			0.5 2.5			4,23,28,31, 35,59,73	
1004	Burner Assembly, Prechamber	Inspect Replace			1.0 1.0			1,39,40	
1005	Bell Assy, Air Inlet	Inspect Replace			0.1 0.2			1,39	
1006	Rotor Assembly, Gasifier	Inspect Replace Overhaul							
1007	Gearbox Assy, Regenerator Drive	Inspect Replace Overhaul			1.0 1.0			1 1,25	N
1008	Gearbox Assy, Accessory Drive	Inspect Replace  Overhaul				1.0		1,2,4,14, 16,60	O
1009	Power Turbine System Assembly	Inspect Test Replace Overhaul							

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
1010	Clutch Assy	Inspect Replace Overhaul					*		
1011	Block Assy, Engine	Inspect Overhaul					*		

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
11	ENGINE EXHAUST SYSTEM								
1101	Cylinder Assy, LH and RH	Inspect Test Replace	0.1		0.5 0.4			1 1	J
1102	Duct Assy, Exhaust, RH and LH	Inspect Repair Replace	0.1	0.5	1.0			1,4,67 3	A
1103	Elbow, Exhaust, RH and LH	Inspect Repair Replace	0.1		1.0 0.2			1 1,49	

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
12	ENGINE CONTROLS AND INSTRUMENTS								
1201	Electrical Harness Assy, Engine	Inspect Test Repair Replace	0.1		0.5 1.0 1.0			4,6,55 2,4 1,4,10,55	
1202	Control Assy, Electronic	Adjust Test Repair Replace Overhaul			0.3  0.3	1.5 1.5		1, 1,2 1	G
1203	Printed Circuit Board A-1	Replace Overhaul					*		G
1204	Printed Circuit Board A-2	Replace Overhaul					*		G
1205	Printed Circuit Board A-3	Replace Overhaul					*		G
1206	Printed Circuit Board A-4	Replace Overhaul					*		G
1207	Printed Circuit Board A-5	Replace Overhaul					*		G
1208	Printed Circuit Board A-6	Replace Overhaul					*		G
1209	Printed Circuit Board A-7	Replace Overhaul					*		G
1210	Printed Circuit Board A-8	Replace Overhaul					*		G
1211	Printed Circuit Board A-9	Replace Overhaul					*		G



(1) Group Number	(2) Component/ Assembly	(3) Mainte- nance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
1212	Printed Circuit Board A-10	Replace Overhaul					*		G
1213	Printed Circuit Board A-11	Replace Overhaul					*		G
1214	Rheostat	Test Replace			0.1 0.3			4,6 1,2,4,50	
1215	Battle Short Switch	Test Replace		0.2 0.3				5 3	
1216	Light Assemblies	Test Repair Replace		0.2 0.2	0.2 0.3			4,5,6 1,4	E
1217	Relays	Test Replace			0.1 0.3			4,5,20 1	
1218	Valve Assy, Clutch	Inspect Test Service Replace Calibration Overhaul		0.1	0.1 3.0 0.5 0.3			3 4,5,19,44 1,4,5 1,10,40	Q
							*		
							*		

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
13	GENERATOR CONTROLS AND INDICATORS								
1301	Cabinet Assembly, Control	Test Repair Replace			0.5 1.5 0.5			4,6 1,2,4,6 1,2,4,50,67	A
1302	Control Assembly, Digital Voltmeter	Test Replace Overhaul			0.2 0.1		*	4,6 1	
1303	Rheostats	Test Replace			0.2 0.2			4,5 1,4,55	
1304	Toggle Switch	Test Replace			0.3 0.2			4,6 1,55	
1305	Circuit Breakers	Test Replace			0.2 0.5			4,5 1,4,55	
1306	Relays	Test Replace			0.3 0.2			4,5 1,4,20	
1307	Light Assemblies	Test Repair Replace		0.2 0.2	0.2 0.3			4,5,6 2	E
1308	Voltage Regulator and Monitor Assy	Test Replace Overhaul			0.5 0.3		*	4,6 1	
1309	Wiring Harness	Inspect Test Repair Replace	0.3		1.0 1.5 2.0			4,5 1,4,55 1,4,55	
1310	Chassis	Test Repair Replace			0.2 0.2 0.2			4,5 4,55 1,4,55	
1311	Switch, Phase Paralleling	Inspect Replace			0.2 0.5			1	

## SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS

REF. CODE	MAINT. CAT.	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	F,H	Tool Kit, Master Mechanic's	5180-00-699-5273	SC-5180-90-CL-N05
2	F	Shop Equipment, Contact Maintenance, Truck Mounted	4940-00-294-9518	SC-4940-95-CL-804
3	O	Tool Kit, General Mechanic	5180-00-177-7033	SC-5180-90-CL-N26
4	F,H	Shop Equipment, Electrical Repair, Semi Trailer Mounted	4940-00-294-9517	SC-4940-95-CL-805
5	O	Multimeter	6625-00-581-2036	AN RURM 105
6	F	Multimeter, Digital	6625-00-495-3513	
7	F	Socket, 10 mm	5120-00-287-4150	
8	F	Combination Wrench, 10 mm	NSN	
9	O	Gun, Air Blow	4940-00-333-5541	
10	F	Socket, 13 mm	5120-00-263-4137	
11	F	Combination Wrench, 13 mm	NSN	
12	O	Wrench, Pipe, Strap Steel	5120-00-262-8491	
13	F	Puller, Drive Coupling, 65 amp Alternator		23005033
14	O,F,H	Socket, 19 mm	5120-00-240-1428	
15	F	Crows-foot Wrench, 1 1/2"	NSN	
16	F	Socket, 17 mm	5120-00-263-4143	
17	O	Brush, Scratch Wire	7920-00-291-5815	

REF. CODE	MAINT. CAT.	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
19	F	Test Set, Engine Monitor (23005047)	6115-01-118-5542	CTA80EF0000939
20	F	Power Supply (0-40V DC)		
21	F	Stand, Regenerator Cover (2 each)		23003038
22	C	Filler, Battery, Gravity	6140-00-635-3824	
23	F	Lift, Regenerator Cover and Disc		6899906
24	F	Plates, Regenerator Cover Mounting (2 each)		23003187 U/W 23003038
25	F	Puller, Regenerator Pinion Drive Shaft Gear and Worm Gear		23003684
26	F	Pin, Alignment, Regenerator Cover		23005034
27	F	Holder, Drive Coupling, 65 amp Alternator		23005032
28	F	Lift, Regenerator Disc		23004192
29	F	Lift, Engine		23004174
30	F	Combination, Wrench, 17 mm	NSN	
31	F	Installation Tool, Regenerator Retaining Ring		23005035
32	F	Shipping Plates	NSN	
33	F	Wrench, Locknut		6899999
34	F	Indicator, Dial, Generator Shaft Runout		23005042
35	F	Strap, Regenerator Disc Holder (2 each)		9592N13
36	O	Holder, Plastic Hammer Face	5120-00-903-8553	
37	O	Face, Hammer Insert, Plastic (2 each)	5120-00-293-2997	

REF. CODE	MAINT. CAT.	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
38	O	Stud Remover and Setter	5120-00-288-6578	
39	O,F	Wrench, Torque, 0-300 in. lb	5120-00-247-2536	
40	O	Wrench, Torque, 0-150 ft lb	5120-00-640-6364	
41	O	Wrench, Combination, 5/16	5120-00-298-9503	
42	O	Wrench, Open End, 1 1/4	5120-00-277-2694	
43	O	Wrench, Open End, 1 3/8	5120-00-884-2621	11020397
44	F	Gage, Pressure, 0-300 psi		
45	O	Wrench, Open End, 1 1/8	5120-00-157-7133	
46	F	Stripper, Wire	5110-00-268-4224	
47	F	Pusher, Regenerator Pinion Drive Shaft Inner Seal		23003686
48	F	Support, Generator Set, Engine-to-Base		23006349
49	F	Pliers, Safety Wire		
50	F	Tool, Pop Rivet		
51	F	Wrench, Open End, 1 5/8		
52	F	Pusher, Regenerator Pinion Drive Shaft Outer Seal		23003685
53	F	Mirror, Adjustable		
54	F	Adapter, 3/4 male to 1/2 female		
55	F	Gun, Thermal	4940-00-561-1002	
56	F	Tool, Rotor-crimp (Battery Terminal)		Model 600850 04618

REF. CODE	MAINT. CAT.	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
57	F	Wrench Set, Bristol		
58	F	Wrench, Combination, 1/4		
59	F	Caliper, Slide		
60	F	Socket, 29 mm		
61	O,F	Apron, Rubber		
62	O,F	Gloves, Rubber	8415-00-171-5641	
63	F	Installation Tool, Insert		TD428L
64	F	Installation Tool, Insert		THD1210L
65		Deleted		
66		Deleted		
67	F	Welding Shop, Trailer Mounted	3431-00-935-7821	SC3431-95-CL-A01
68	F	Meter Set, Frequency	6625-00-892-0021	PFM604B
69	F	Generator Set, Gasoline Engine	6115-00-889-1447	
70	F	Guide Pin Alternator to Engine		Manufacture
71	F	Pry Bars (Aluminum or Brass) (2 each)		Manufacture
72	F	16 Gage Jumper Wire (12 inch long) (4 each)		Manufacture
73	F	Gaging Bar, 24 inch		
74		Deleted		
75	O	Screwdriver, Flat Tip, Offset	5120-00-256-9014	
76	O	Wrench, Allen Head 3/8 inch	5120-00-198-5390	GGGK275

## Section IV. REMARKS

### MAINTENANCE ALLOCATION CHART

---

Reference Code	Remarks
A	Repair by welding.
B	Crewman services limited to inspection and adding water.
C	Remove the fuel valve by removal of the mechanical fuel pump.
D	Organizational repair is replacement of door latches/hinges, clips, and rods.
E	Repair is replacement of lamps (bulbs).
■ F	Direct support test limited to test given in para 6-5, TM 5-6115-598-34.
G	Repair to include calibration.
H	Organizational test to isolate defective starter; DS test before and after repair.
I	3-way and 2-way solenoid and Flow Divider Valves are removed as a unit.
J	LH and RH Cylinder Assemblies are removed with the LH and RH Duct Assemblies.
K	Organizational technician is authorized to remove and replace the plug in the top of the day tank to check fuel level.
L	Handled in same maintenance function as spark igniter.
M	Repair limited to mounted bracket plate nuts.
N	Direct Support replacement limited to pinion drive gear removal.
O	General Support replacement limited to removal of accessory drive retainer assembly.
P	Direct Support replacement limited to flushing the oil cooler.
■ Q	Crew inspect shall consist of inspection of the magnetic plug.
*	The depot work times figure will be provided by the contractor concurrent with the Depot Maintenance Work Requirements (DMWR).

---

## APPENDIX C

### COMPONENTS OF END ITEM LIST (COEIL)

#### Section I. INTRODUCTION

---

##### C-1. SCOPE

---

This appendix lists integral components of and basic issue items for the electric generator set to help you inventory items required for safe and efficient operation.

---

##### C-2. GENERAL

---

This Components of End Item List is divided into the following sections:

a. Section II. Integral Components of the End Item. These items, when assembled, comprise the electric generator set and must accompany it whenever it is transferred or turned in. The illustrations will help you identify these items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the electric generator set in operation, to operate it, and to perform emergency repairs. Although shipped separately packed they must accompany the electric generator set during operation and whenever it is transferred between accountable officers. The illustrations will assist you with hard-to-identify items. This manual is your authority to requisition replacement BII, based on TOE/MTOE authorization of the end item.

---

##### C-3. EXPLANATION OF COLUMNS

---

a. Illustration. This column is divided as follows:

(1) Paragraph Number. Indicates the paragraph number which the illustration is shown.

(2) Item Number. The number used to identify item called out in the illustration.

b. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.



c. Part Number. Indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

d. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

e. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

g. Quantity. This column is left blank for use during an inventory. Under the Rcvd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item at a later date; such as for shipment to another site.

**Section II. INTEGRAL COMPONENTS OF END ITEM**

Para No.	Item No.	National Stock No.	Part No. & FSCM	Description	Location	Qty Reqd	Qty Rcvd Date
4-2	1	NSN	6253S 81790	Ground Rod Assy	In base of set	1	

## **APPENDIX D**

### **ADDITIONAL AUTHORIZATION LIST (AAL)**

#### **Section I. INTRODUCTION**

---

##### **D-1. SCOPE**

---

This appendix lists additional items you are authorized for the support of the electric generator set.

---

##### **D-2. GENERAL**

---

This list identifies items that do not have to accompany the electric generator set and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

---

##### **D-3. EXPLANATION OF LISTING**

---

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment.

## Section II. ADDITIONAL AUTHORIZATION LIST (AAL)

NATIONAL STOCK NUMBER	PART NUMBER & FSCM	DESCRIPTION	U/M	QTY AUTH
5120-00-228-9503	9H44691 53800	Wrench, Combination, 5/16 in.	ea	1
5120-00-187-7133	1735 65814	Wrench, Open End, 1-1/8 in.	ea	1
5120-00-277-2694	41W1176-70 95683	Wrench, Open End, 1-1/4 in.	ea	1
5120-00-198-5390	11020397 19204	Wrench, Open End, 1-3/8 in.	ea	1
5120-00-240-1428	SWM191	Socket, 19 mm, 1/2 in. Drive	ea	1
5120-00-247-2536		Torque Wrench, 0-300 in. lb	ea	1
5120-00-640-6364	GGG-W-00686TY2 CL1STA 95683	Torque Wrench, 0-150 ft lb	ea	1
5120-00-262-8491	41W1853 95683	Strap Wrench, Pipe Steel	ea	1
5120-00-293-2977	GGG-H-33 TY1CL3 STD 80244	Hammer, Face, Plastic, Insert	ea	1
5120-00-903-8553	GGG-H-33 TY1CL3 STDDEA 80244	Holder, Inserted Hammer Face	ea	2
5120-00-288-6578	865 45225	Stud Remover and Setter	ea	1
7920-00-291-5815	HB178 81348	Brush, Wire Scratch	ea	1

NATIONAL STOCK NUMBER	PART NUMBER & FSCM	DESCRIPTION	U/M	QTY AUTH
4940-00-333-5541	DGA520 17431	Gun, Air Blow	ea	1
6625-00-581-2036	ANRURM105 80058	Multimeter	ea	1
6140-00-635-3824		Filler, Battery	ea	1
5120-00-287-2130		Screwdriver, Flat Tip, Offset	ea	1
8415-00-171-5641		Gloves, Rubber	ea	1
8418-00-634-5023		Apron, Laboratory Rubber	ea	1
5120-00-198-5390	GGGK275 81348	Wrench, Allen Head 3/8 inch	ea	1

Change 3 D-3/(D-4 blank)



## APPENDIX E

### EXPENDABLE SUPPLIES AND MATERIALS LIST

#### Section I. INTRODUCTION

---

##### E-1. SCOPE

---

This appendix lists expendable supplies and materials you will need to operate and maintain the electric generator set. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

---

##### E-2. EXPLANATION OF COLUMNS

---

- a. Column 1 -- Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use sealing compound, item 6, Appendix E").
- b. Column 2 -- Category. This column identifies the lowest category of maintenance that requires the listed item.
  - C - Operator/Crew
  - O - Organizational Maintenance
- c. Column 3 -- National Stock Number. This is the national stock number assigned to the item; use it to request or requisition the item.
- d. Column 4 -- Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.
- e. Column 5 -- Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

**Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST**

ITEM NUMBER	CATEGORY	NATIONAL STOCK NUMBER	DESCRIPTION	U/M
1	C,0	6810-00-264-6618	Baking Soda	gl
2	C,0		Brush, Paint	
3	0		Bucket (approximately 5-gallon (19-liter) capacity)	ea
4	0	8030-00-597-5367	Compound, Anti-seize	lb
5	0	8030-00-105-0270	Compound, Anti-seize (Never-seez, nickel special)	lb
6	0	8030-00-252-3391	Compound, Sealing (paste form gasket)	ea
7	C,0		Face Shield, Industrial	ea
8	C,0		Grease (GAA)	lb
9	0	8030-01-136-5601	Loctite Pipe Sealant with Teflon (Loctite 59231) P/N PS/T (05972)	pt
10	0		Lubricant, Turbine	oz
11	0		Oil, Engine, MIL-L-23699	gl
12	0	9150-00-782-2627	Oil, Engine, MIL-L-7808	gl
13	C,0		Paint, Green, CARC (38).	gl
14	C,0	7920-00-205-1711	Rags, Wiping, Cotton and Cotton Synthetic	lb
15	C,0		Solvent, Cleaning (approved)	gl
16	0		Tags	ea
17	0	5970-00-222-6383	Tape, Insulation, Electrical, 1-in. (25.4 mm)	ro
18	C,0		Water, Distilled	gl
19	0	9505-01-049-0144	Wire, 0.050 In Dia	bulk

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**By Order of the Secretary of the Army:**

**Official:**

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*Chief of Staff*

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*The Adjutant General*

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PUBLICATION DATE  
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Model D424A, NSN 6115-01-113-1093

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D BLOCK  
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PATOR  
OR

ATION RCPT  
RCPT  
CPT

VALVE(2WAY)  
VALVE(3WAY)  
VALVE

NOID

N  
I  
I

CB CONN  
SSY CONN  
UMP CONN  
FIELD EXCITATION CONN  
CONNECT CONN  
CONN  
SS SW CONN  
ASSY CONN  
E CONN  
CONN  
PEED PICKUP CONN  
PEED PICKUP CONN  
IENT TEMP SENSOR CONN  
CONTROL CONN  
CONTROL CONN  
CONTROL CONN  
CONN  
PEED PICKUP  
SPEED PICKUP  
P SW  
SSURE SW  
SW  
LOW SW

NENT RESISTANCE VALUES SHOWN  
MINAL VALUES ONLY AND MAY VARY  
EN UNITS AND TEMPERATURE DIFFERENCES

FO-1-1. Generator Set Wiring Diagram  
(Control Console Connector Wiring)

Change 3 FO-1-1

W1 STARTER(-) TO BTRY CABLE ASSY  
 W2 BATTERY CABLE ASSY  
 W3 STARTER(+) TO BTRY CABLE ASSY  
 W4 SERIES BTRY JUMPER CABLE ASSY  
 W5 ENG TO BCR CABLE ASSY  
 W6 ECU TO BCR CABLE ASSY  
 W7 CONVENIENCE RPT CABLE ASSY  
 W8 ENG ELECTRICAL WIRING ASSY  
 W9 HOURMETER PWR LEAD ASSY  
 W10 LOAD TERMINAL CABLE ASSY  
 W11 IGN EXCITER LEAD ASSY  
 W12 STARTER(-) TO ENG GND LEAD ASSY  
 W13 BTRY CHG ALT(-) TO RCT CABLE ASSY  
 W14 BTRY CHG ALT(+)-TO CB CABLE ASSY  
 W15 RCT TO SLAVE RPT(-) CABLE ASSY  
 W16 CB TO SLAVE RPT(+)-CABLE ASSY  
 W17 CB TO CONVENIENCE RPT LEAD ASSY  
 W18 ECU TO CONT MOD CABLE ASSY  
 W19 STARTER(+)-POST TO SLAVE RPT CABLE ASSY  
 W20 STARTER(-)-POST TO SLAVE RPT CABLE ASSY  
 W21 HOURMETER GND LEAD ASSY

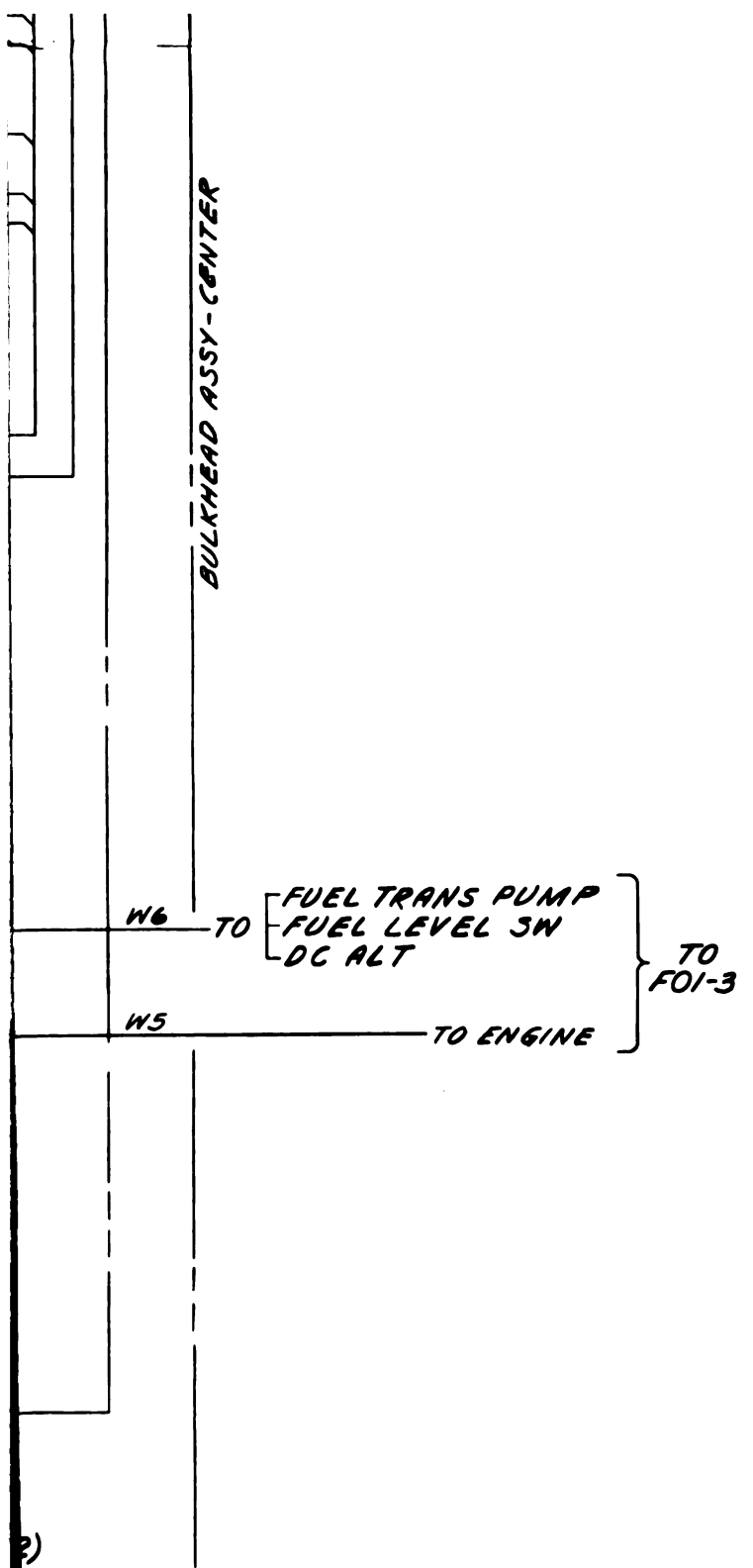
T1 THERMOCOUPLE-ENGINE  
 T2 THERMOCOUPLE-ENGINE  
 T3 THERMOCOUPLE-ENGINE  
 T4 THERMOCOUPLE-ENGINE

MIC CONTROL  
 ILE  
 SENSOR ASSY  
 ER ASSY  
 PANEL

PUMP MOTOR  
 R  
 RPT CB  
 R CB  
 AND CONTROL  
 MR

RENT XFMR  
 P CURRENT XFMR

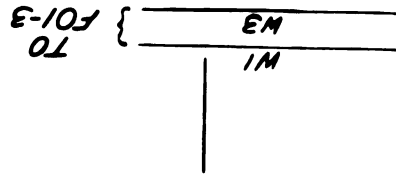
TM 5-6115-598-12



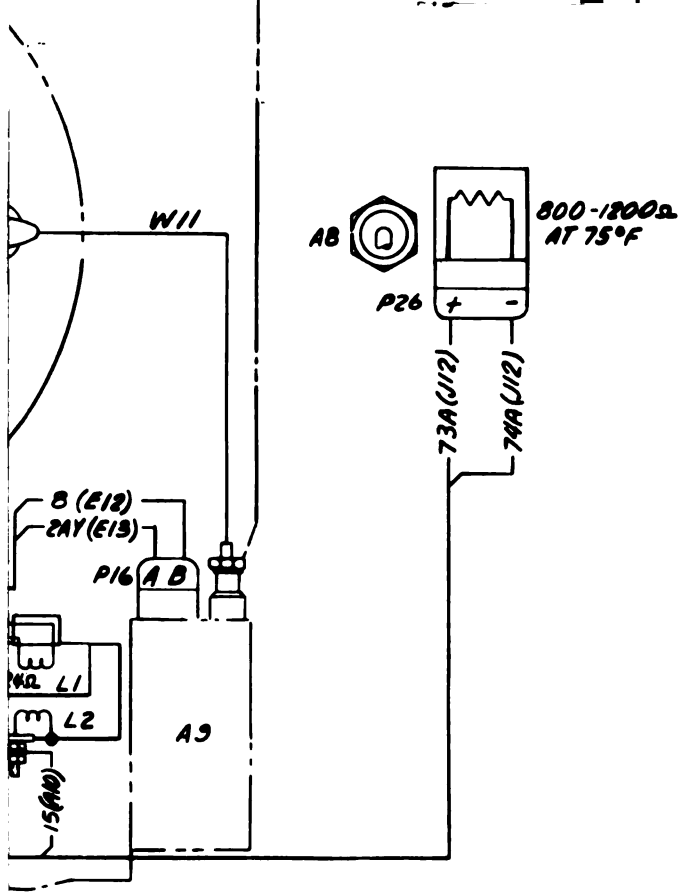
FO-1-2. Generator Set Wiring Diagram  
 (Generator Compartment Wiring)

Change 3 FO-1-2



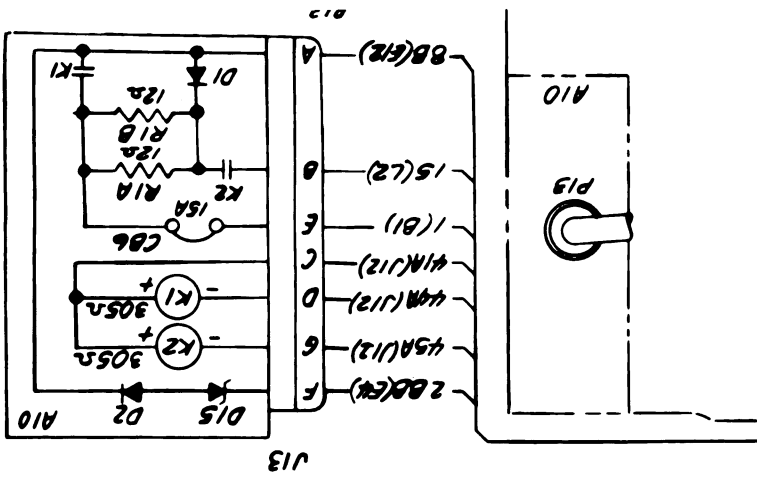


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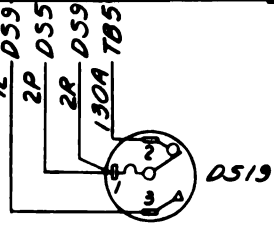
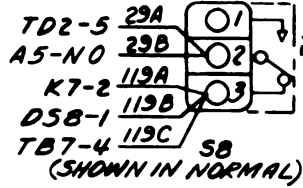
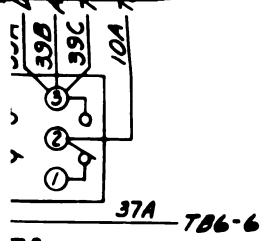


FO-1-3. Generator Set Wiring Diagram  
(Engine Compartment Wiring)

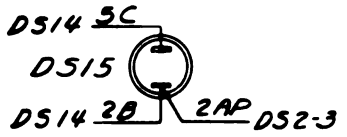
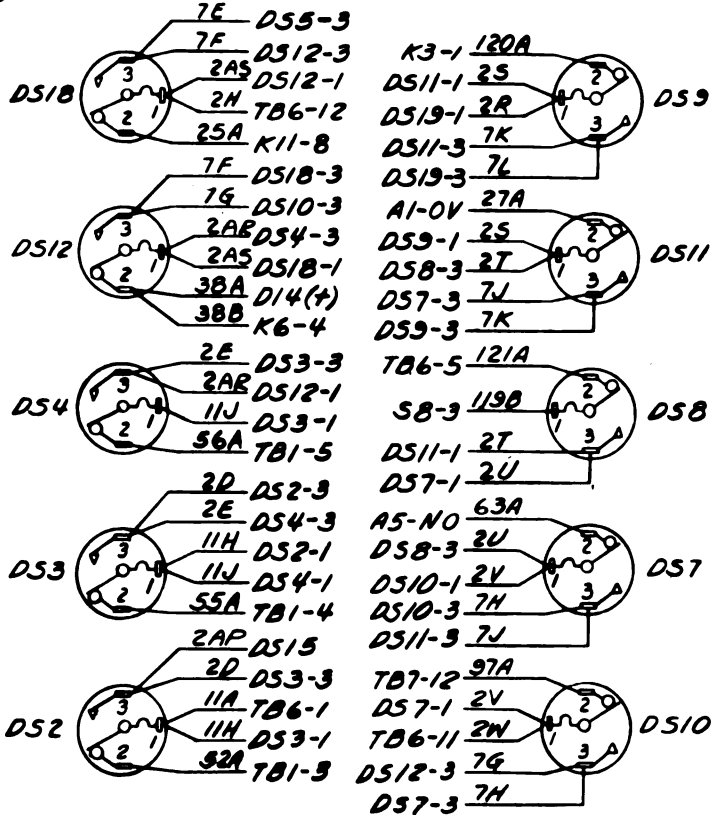
Change 3 FO-1-3



TM 5-6115-598-12



- 7D DS6-3
- 7E DS18-3
- 2N DS6-1
- 2P DS19-1
- 2A S3-3



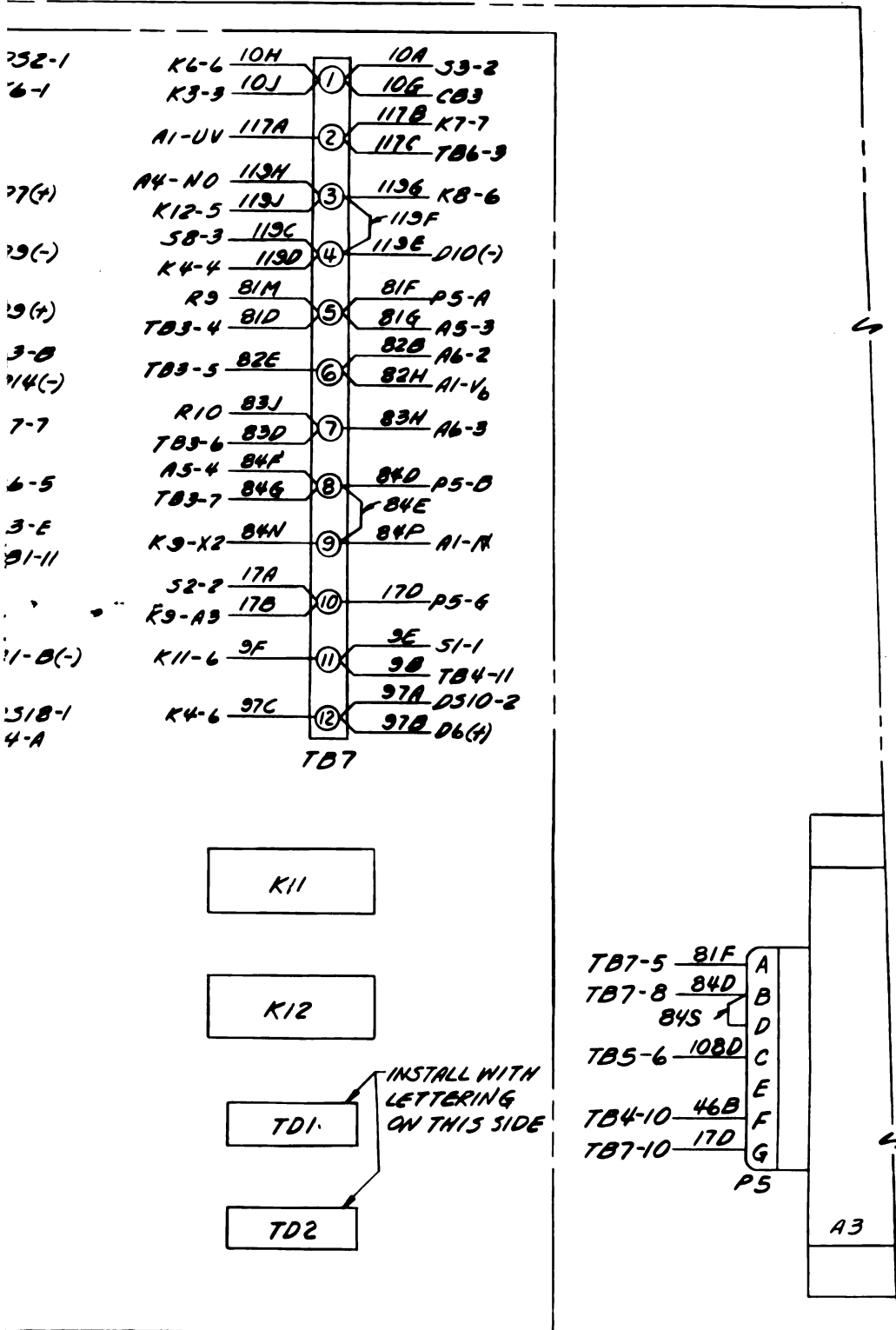
FO-2-1. Generator Set Control Console Wiring Diagram  
(Control Console Inner Door - Rear View)

Change 3 FO-2-1

355-2  
1-85  
86-9  
87-1

- T81
  - T82
  - T83
  - T84
  - T85
  - T86
  - T87
  - T01
  - T02
- CONTROL CABINET CHASSIS  
TERMINAL BOARD
- FUEL PUMP TIME DELAY RELAY  
WARNING LAMP TIME DELAY RELAY

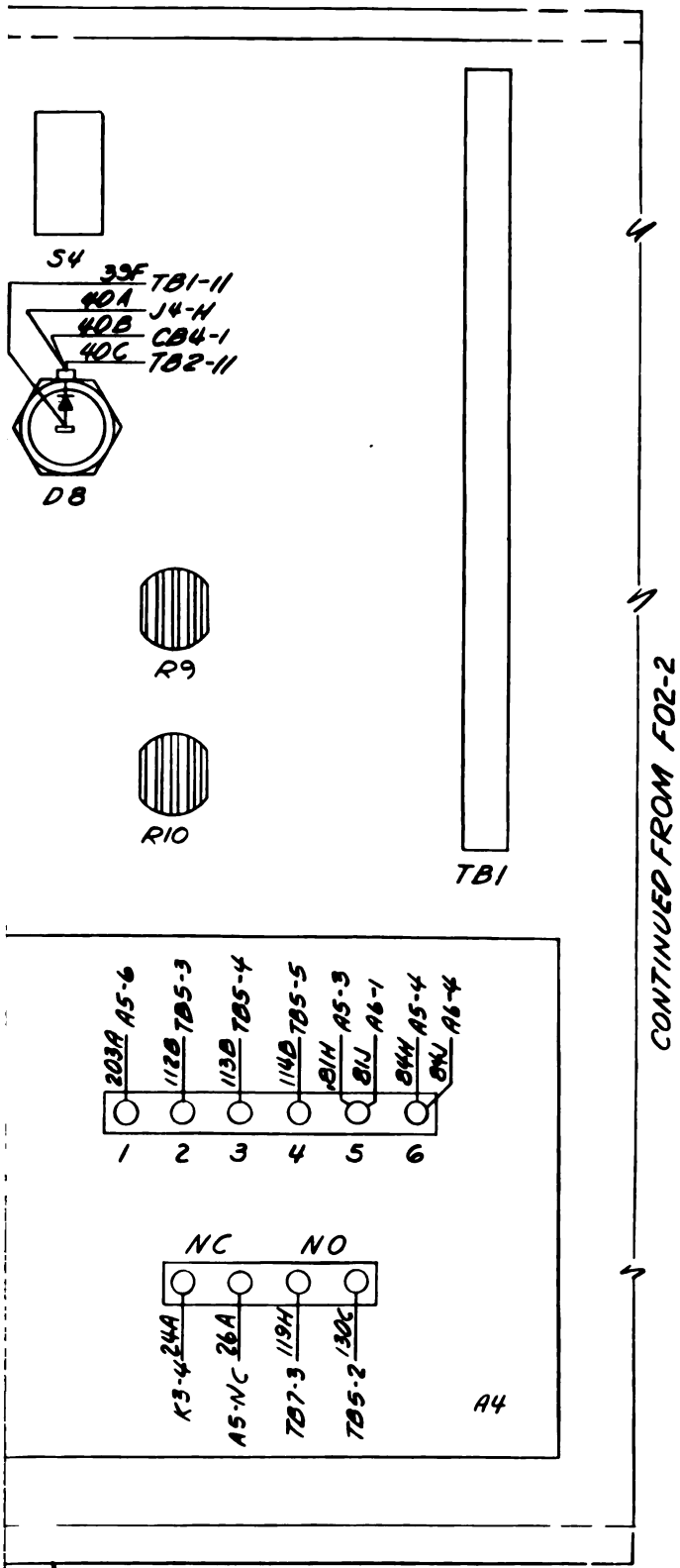
TM 5-6115-598-12



FO-2-2. Generator Set Control Console Wiring Diagram (Control Console Cabinet Chassis - Right Side View)

Change 3 FO-2-2



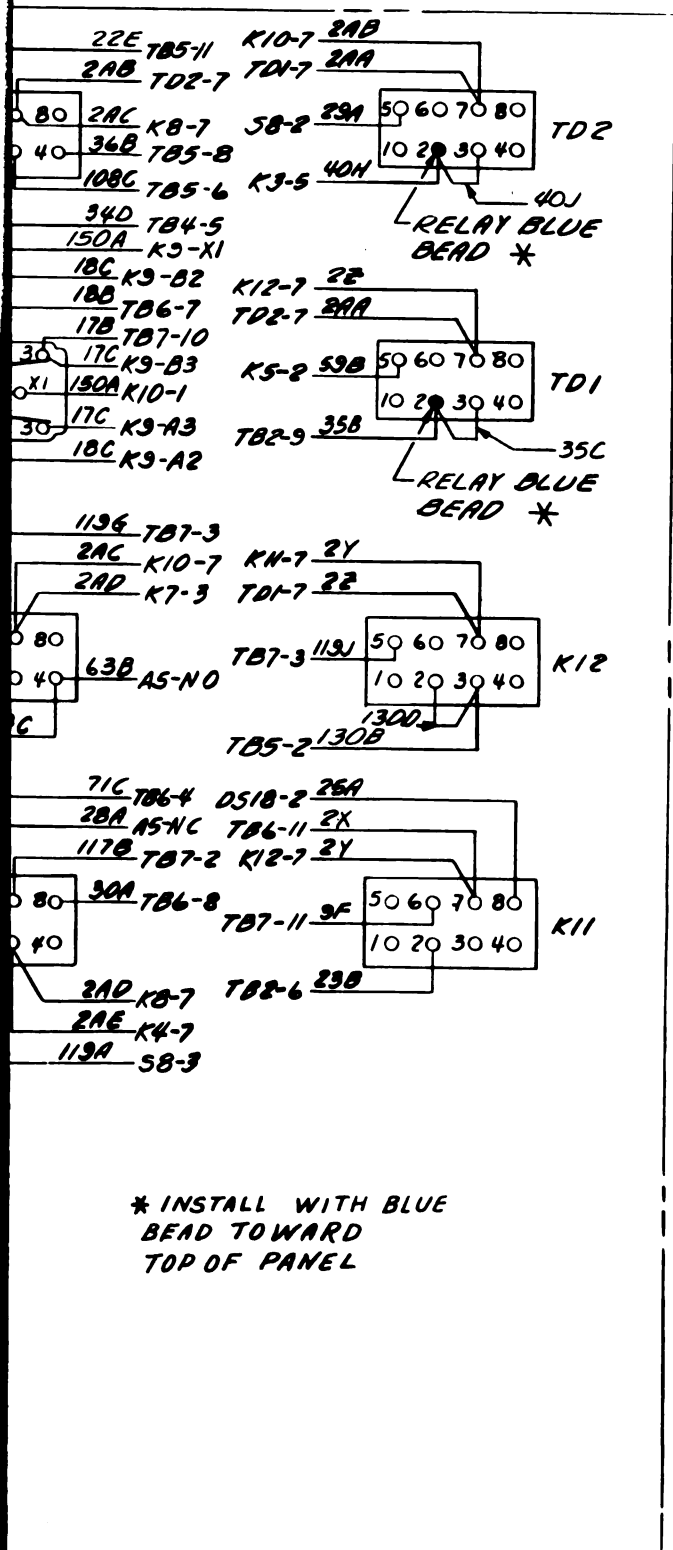


REAR OF CONTROL CABINET

Generator Set Control Console Wiring Diagram  
Control Console Cabinet Chassis - Left Side View)



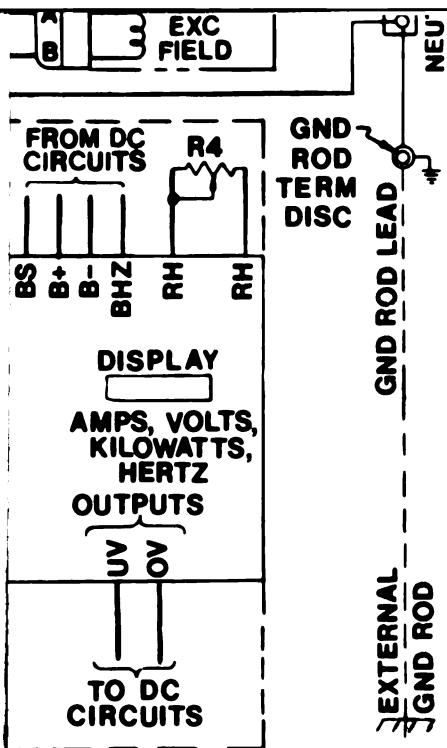




Generator Set Control Console Wiring Diagram  
(Control Console Chassis - Rear View)

Change 3 FO-2-4





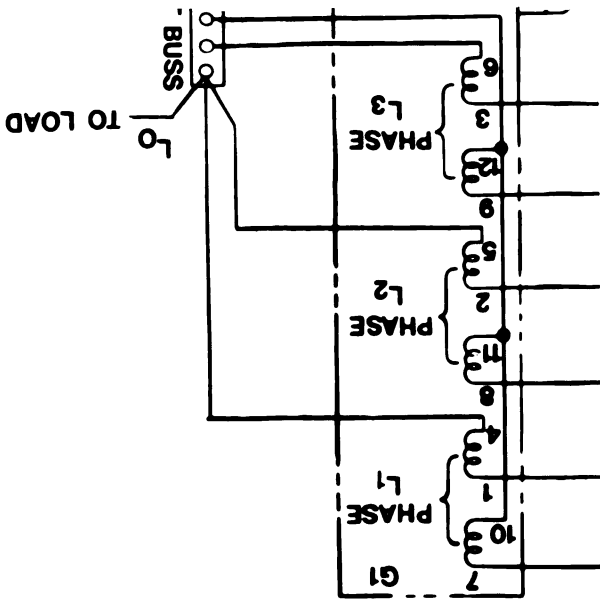
- COMPONENT
- MONITOR REGULATOR ASSY
  - ENGINE ELECTRONIC CONTROL
  - PARALLELING PHASE SW ASSY
  - OVERLOAD RELAY ASSY
  - REVERSE POWER RELAY ASSY
  - SHORT CIRCUIT RELAY ASSY
  - CONTROL CONSOLE ASSY
  - CONTROL CIRCUIT INTERRUPTER ASSY
  - CONVENIENCE RCPT CB
  - CT3 INSTRUMENT & CONTROL CURRENT XFMR
  - CT6 AC SAFETY CURRENT XFMR
  - VOLTAGE DROOP CURRENT XFMR
  - 17 SYNC LAMP ASSY
  - MAIN AC GENERATOR
  - REMOTE OPERATION RCPT
  - 10 VAC CONVENIENCE RCPT
  - 12 DEAD BUS RELAY
  - 13 INTERRUPTER RELAY
  - 14 VOLT METER, DIGITAL
  - 15 VOLTAGE RHEOSTAT
  - 16 CURRENT XFMR BALLAST RESISTORS
  - 17 VOLTAGE DROOP RHEOSTAT
  - 18 SYNC LAMP BALLAST RESISTORS
  - 19 UNIT PARALLEL SW

73342-23000384

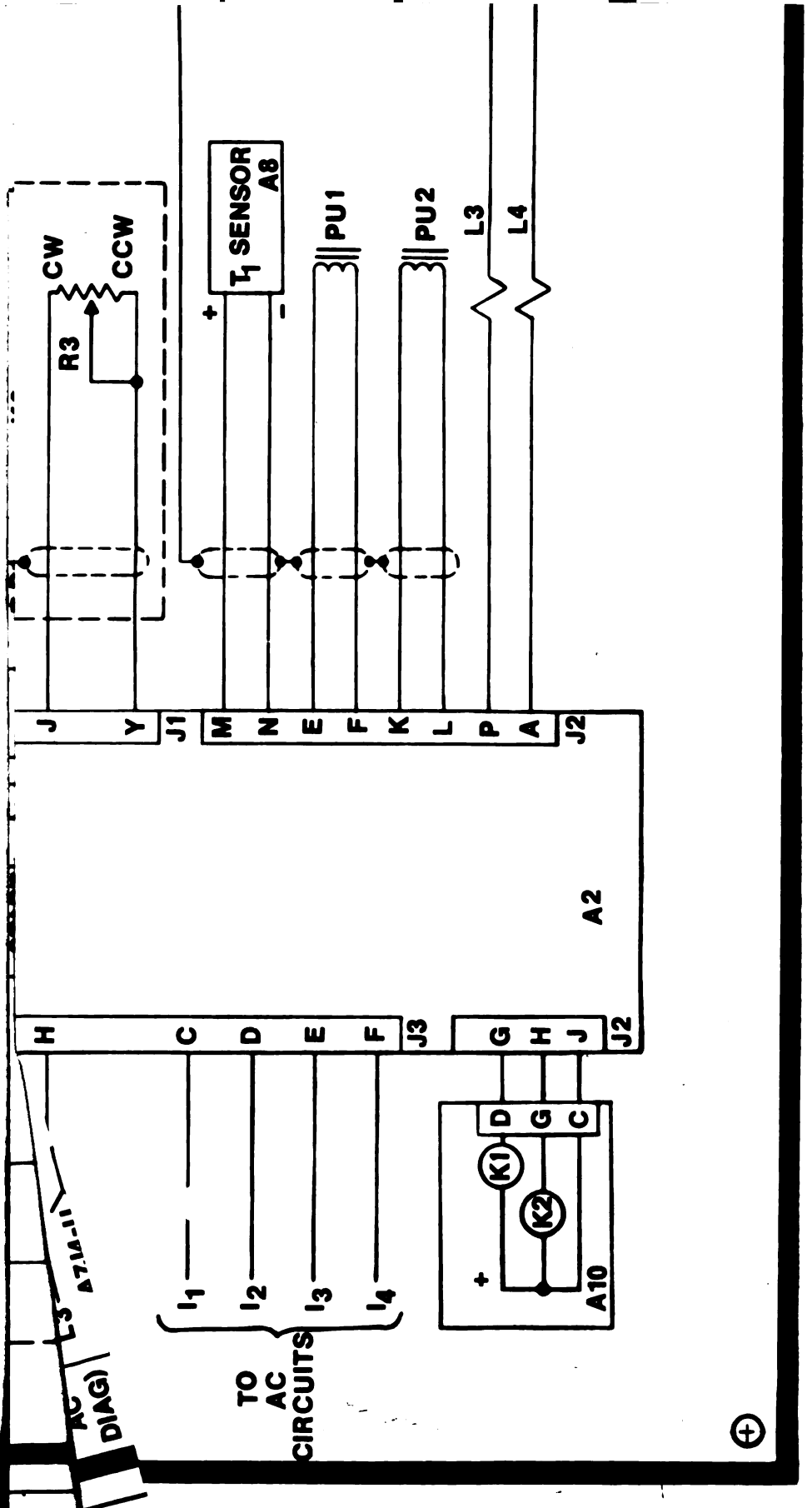


FO-3. AC Schematic

Change 3 FC



TM 5-6115-598-12



FO-4. DC Schematic

Change 3 FO-4

... ..

- S1 MASTER SWITCH
- S2 AC INTERRUPT SWITCH
- S3 BATTLE SHORT SWITCH
- S4 RUN/IDLE SWITCH
- S5 PANEL LIGHT SWITCH
- S6 ISOCH/DROOP SWITCH
- S7 UNIT PARALLEL SWITCH
- S8 LAMP RESET SWITCH
- S9 HIGH LUBE TEMPERATURE SWITCH
- S10 LOW LUBE PRESSURE SWITCH
- S11 FUEL LEVEL SWITCH

- TC1 } ENGINE TURBINE INLET
- TC2 } THERMOCOUPLES
- TC3 }
- TC4 }

- TD1 FUEL PUMP TIME DELAY RELAY
- TD2 WARNING LAMP TIME DELAY RELAY

**73342-23006363**



TM 5-6115-598-12

12-15-90

MX 001 851 475

# The Metric System and Equivalents

## Linear Measure

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

## Weights

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigram = .035 ounce  
 1 dekagram = 10 grams = .35 ounce  
 1 hectogram = 10 dekagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

## Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

## Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inches  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

## Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

## Temperature (Exact)

°F	Fahrenheit	5/9 (after	Celsius	°C
	temperature	subtracting 32)	temperature	





