D E P A R T M E N T O F T H E A R M Y T E C H N I C A L M A N U A L

OPERATOR'S MANUAL

WELDING MACHINE , ARC

GENERATOR, DIESEL DRIVEN, SINGLE

OPERATOR, REMOTE CONTROL, 300 AMP

DC ARC, SKID MTD, 60 AMP 20 V MIN

375 AMP AT 40 V MAX, CURRENT 115 V

3 KW AUXILIARY POWER (LIBBY MODEL

ODW-300) FSN 3431-894-1573

This copy is a reprint which includes current pages from Change 3.

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y

A U G U S T 1 9 6 2

SAFETY PRECAUTIONS

BEFORE OPERATION

Do not operate the welding machine within an enclosed area unless the exhaust fumes are piped to the outside. Continued breathing of exhaust fumes is dangerous and can be fatal

.

Do not allow smoking or the use of an open flame while servicing batteries. Batteries generate hydrogen, a highly explosive gas.

When filling the heater fuel tank, always provide a metal-to-metal contact between the container and the fuel tank. This will prevent a static spark from being generated as fuel flows over the metallic surfaces.

DURING OPERATION

Do not fill the fuel tank while the engine is running. Fuel spilled on a hot engine may explode and cause injury to personnel.

Do not attempt any maintenance on the welder while the unit is operating. The voltage generated can cause injury or death.

Never discharge ether into a hot engine. Ether is highly flammable and can cause injury to personnel or equipment.

Do not perform a welding operation without a welder's helmet. The flash of the welding arc can cause injury to the eyes.

AFTER OPERATION

Use only approved cleaning solvents to prevent the possibility of fires or poisoning.

GPO 806-877-1

Changes In force: C 3

Change
No. 3 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., *29 December 1972*

OPERATOR'S MANUAL

**WELDING MACHINE, ARC; GENERATOR; DIESEL DRIVEN;
SINGLE OPERATOR; REMOTE CONTROL; 300-AMP,
DC ARC; SKID MOUNTED; 60-AMP, 20V - MIN;
375 AMP AT 40V MAX CURRENT \115V; 3 KW;
AUXILIARY POWER (LIBBY MODEL ODW-300)
FSN 3431-894-1573**

TM 5-3431-201-0, 15 August 1962, is changed as follows:

Page 3. Paragraphs 1*d* and 1*e* are superseded as follows:

d. The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, US Army Mobility Equipment Command, ATTN: AMSME-MPP, St. Louis, MO 63120.

e. Report all Equipment Improvement Recommendation as prescribed in TM 38-750.

Paragraph 2b. In line 2, "TM 5-505, Maintenance of Engineer Equipment" is changed to read "TM 38-750, The Army Maintenance Management System".

Page 6. Paragraph 4*b*(9) is rescinded.

Page 7. Table 1 is rescinded.

Page 20. Paragraph 23 is rescinded.

Page 23, paragraph 27*b*. The second sentence, "For current lubrication order, refer to DA Pamphlet 310-4" is rescinded.

Page 24, figure 11. On the line below the title "Reference: SM 10-1-C4-1" is changed to read "Reference: C91001L".

Page 28, paragraph 29. In the last sentence "(AR750-5)" is rescinded.

Page 29, paragraph 30*b*. In line 3, below *Publications* "DA Form 285" is changed to read "DA Form 2404".

Page 43, paragraph 62. The second sentence, "Refer to FM 5-25" is rescinded.

Page 45. Appendix I is superseded as follows:

**APPENDIX I
REFERENCES**

1. Fire Protection	
TB 5-4200-200-10	Hand Portable Fire Extinguishers Approved for Army Users
2. Lubrication	
C9100IL	Fuels, Lubricants, Oils and Waxes Lubrication Order
LO 5-3431-201-20	
3. Maintenance	
TB ENG 347	Winterization Technique for Engineer Equipment

*This change supersedes C 1, 15 March 1963, and C 2, 18 October 1968.

TB 750-651	Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems
TM 38-750	The Army Maintenance Management System
TM 9-207	Operation and Maintenance of Ordnance Material in Extreme Cold Weather(0 to -65 F.).
TM 9-6140-200-14	OPERATOR 1/4 Organizational, DS and GS Maintenance Manual; Storage Batteries Lead-Acid Type

4. Painting

AR 746-5	Color and Marking of Army Material
AR 740-1	Color, Marking, and Preparation of Equipment for Shipment

5. Shipment and Storage

TB 740-97-2	Preservation of USAMEC Mechanical Equipment for Shipment and Storage
TB 740-93-3	Administrative Storage USAMEC Mechanical Equipment

Page 47. Appendix II is superseded a follows

APPENDIX II
BASIC ISSUE ITEMS UST AND ITEMS TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

1. Scope

This appendix list* items required by the operator for operation of the welding machine.

2. General

This list is divided into the following sections:

a. Basic Issue Items List--Section II. Not applicable.

b. Items Troop Installed or Authorized List--Section III. A list of items in alphabetical sequence, which at the discretion of the unit commander may accompany the welding machine. These items are NOT SUBJECT TO TURN-IN with the welding machine when evacuated.

3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, section II, and Items Troop Installed or Authorized, section III.

a. Source, Maintenance and Recoverability Code (SMR). Not applicable.

b. Federal Stock Number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required.

d. Unit of Measure (U/M). A two character alphabetical abbreviation indicating the amount or quantity of the item which the allowances are based; e.g., ft, ea, pr, etc.

e. Quantity Furnished with Equipment (BIIL). Not applicable.

f. Quantity Authorized (Items Troop Installed or Authorized). This column indicates the quantity of the item authorized to be used with the equipment.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR CODE	(2) FEDERAL STOCK NO.	(3) DESCRIPTION REF. NO. & MFR CODE / USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY AUTH
	7520-559-9611	CASE. Maintenance and Operation manual	EA	1
	5975-243-5861	CLAMP. Electrical	EA	1
	4210-555-8837	EXTINGUISHER, Fire	EA	1
	5975-642-8937	ROD, Ground	EA	1
	6145-189-6695	WIRE, Electrical, 10 ft. Req.	EA	1

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General United States Army
Chief of Staff

Official:

VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25A (qty rqr block No. 181) operator maintenance requirements for Welding.

TECHNICAL MANUAL
No. 5-3431-201-10

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *15 August 1962*

OPERATOR'S MANUAL

WELDING MACHINE, ARC: GENERATOR; DIESEL DRIVEN SINGLE OPERATOR; REMOTE CONTROL; 300 AMP DC ARC; SKID MTD; 60 AMP 20 V MIN, 375 AMP AT 40 V MAX, CURRENT 115 V, 3 KW AUXILIARY POWER (LIBBY MODEL ODW-300) FSN 3431-894-1573

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the use of the personnel to whom the Libby Model ODW-300 Welding Machine is issued. They provide information on the operation, lubrication, and preventive maintenance services of the equipment, accessories, components, and attachments.

b. Appendix I contains a list of publications applicable to this manual. Appendix II lists the basic issue items authorized for use by the operator. The maintenance allocation chart is in TM 5-3431-201-20.

c. Numbers in parentheses on illustrations indicate quantity. Numbers preceding nomenclature callouts on illustrations indicate the preferred maintenance sequence.

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

e. Report unsatisfactory equipment performance and suggestions for equipment improvement to the organizational unit for initiating necessary corrective action.

2. Record and Report Forms

a. DA Form 2258 (Depreservation Guide of Engineer Equipment).

b. For other record and report forms applicable to the operator, refer to TM 5-505, Maintenance of Engineer Equipment.

Note

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

Section II. DESCRIPTION AND DATA

3. Description

a. General. The Libby Welding Company Inc., Welding Machine (figs. 1 and 2), Model ODW-300, is a self-contained, skid-mounted, enclosed unit, and is completely winterized. The welding machine is equipped with the necessary controls, instruments, and accessories for operation. All accessories of the welding machine are readily accessible through the hinged panels.. The unit is equipped with a towing eye in the front for towing and a lifting eye on top for lifting the unit. The unit can also be used as a 3-kilowatt auxiliary generator.

b. Engine. The diesel engine (fig. 1) is a 2-cylinder, in line, 2-cycle, 56-horsepower, liquid-cooled, full-diesel engine. The engine has full-pressure lubrication and is designed to operate at 1,400 revolutions per minute under load. The direction of engine rotation is counterclockwise when viewed from the flywheel end of the engine.

4. Identification and Tabulated Data

a. Identification. The welding machine has five identification plates. The Corps of Engineers plate is located on the left side of

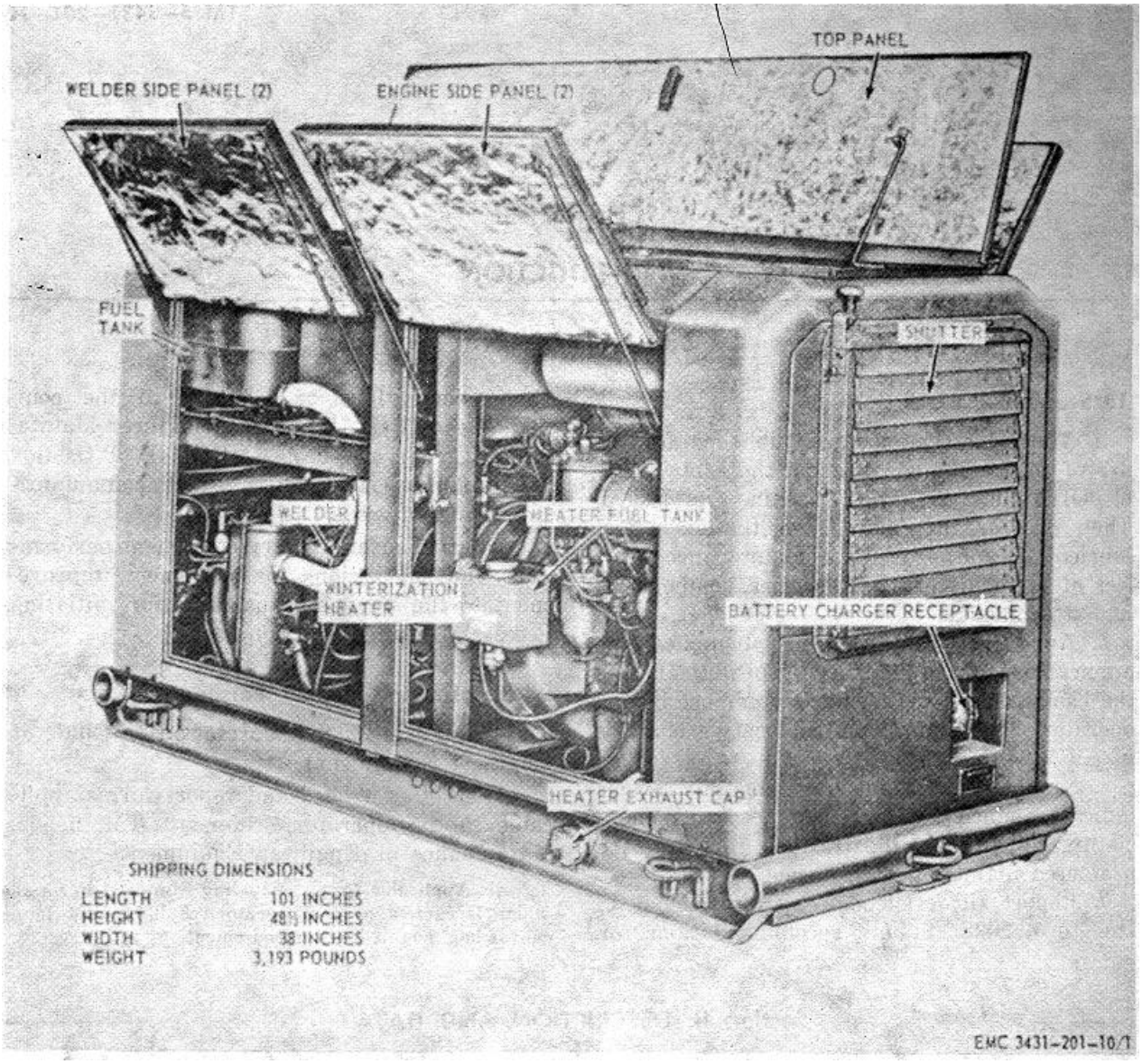


Figure 1. Welding machine, right front, three-quarter view, with shipping dimensions.

frame near front. The welding machine manufacturer's data plate is located on the control panel. The engine manufacturer's plate is located on the valve cover. The welder manufacturer's data plate is located on the right side of the welder. The heater manufacturer's data plate is located on the back of the heater housing.

(1) Corps of Engineers plate A.

Nom. .....Welding Machine Arc:
DED Skid Mtd. 300 AMP
D.C. TM 5-3431-201
Stock No. 3431-894-1573
Make .....Libby
Mod.....OD3-300
Date Mfg.
Ser.
Contract No.

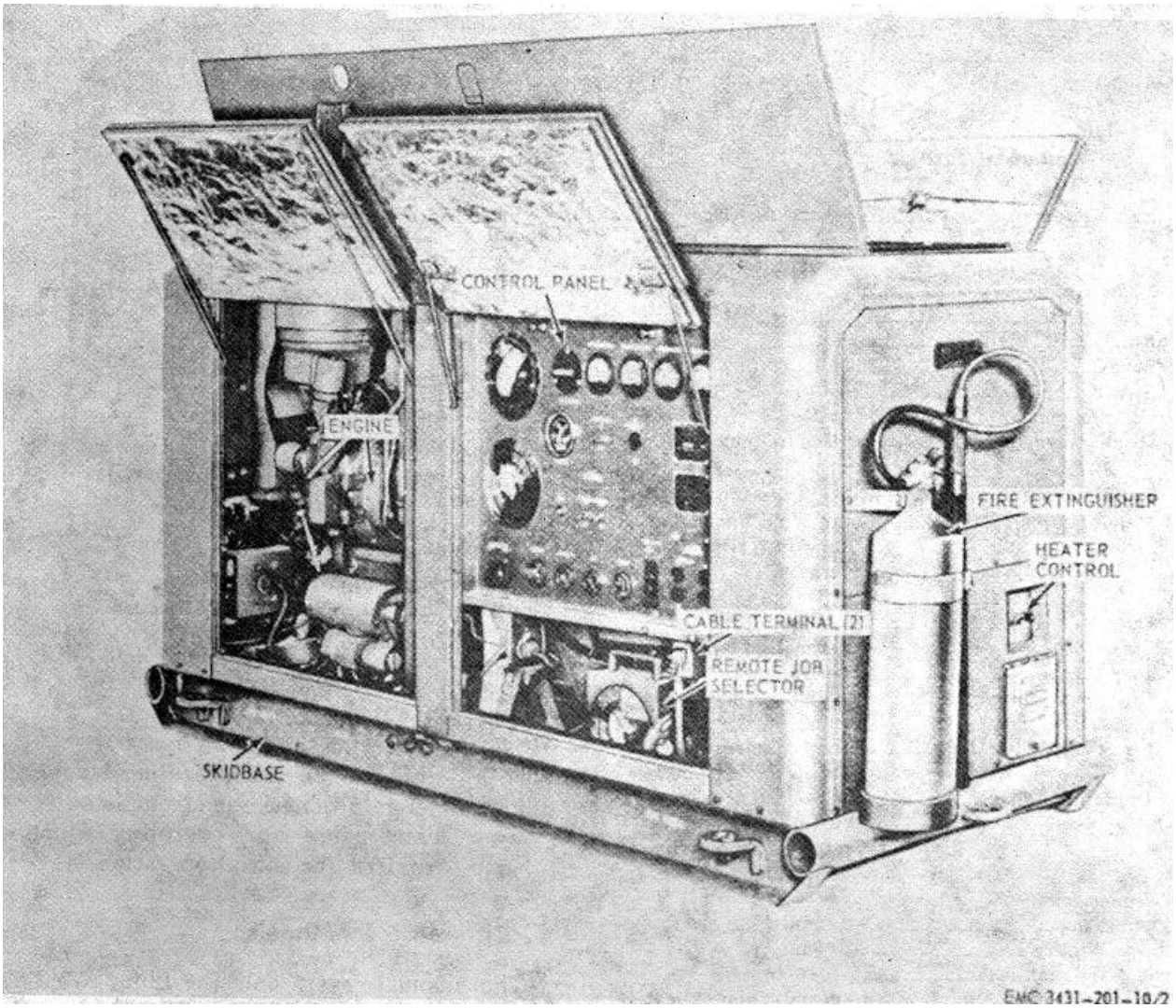


Figure 2. Welding machine, left rear, three-quarter view.

Engine make .....General Motors
Mod. 2056
Ser.

(2) Manufacturer's identification plate.

Nomenclature .....Welding machine, arc, diesel driven, 300 amperes, 40 volt, 60% duty cycle, 1,400 rpm, 3 KW, 115 volt dc
Stock No. 343-542-0598
Serial No. 21
Manufacturer .....Libby Welding Co., Inc.
Model ODW.-300
Contract No. DA-11-199-ORD-432

(3) Engine plate.

Model 2056
Unit No. 2A-49351
Max. Rpm, No load 1,620
Rated Hp
Cont. Hp

(4) Welder plate.

Type .....SAI 300
Rpm 1,400
Serial No. A414975
Code No. SPL-480

(5) Heater plate.

Model 939-C24
Serial No. 1434

Voltage:
Max 28
Min 18
Amperage:
Start 11
Run 1

b. Tabulated Data.

(1) Engine.

Manufacturer .....Detroit Diesel Engine Division, General Motors Corporation
Model 2056
Type .....Diesel (2-cycle)
Number of cylinders 2
Bore .....4.250 in. (inches)
Stroke .....5 in.
Compression ratio .....17 to 1
Displacement .....141.9 cu in. (cubic inches)

(2) Winterization heater.

Manufacturer .....South Wind Division of Stewart Warner Corporation
Model 939-C24
Output .....23,000 Btu (British thermal units)
Fuel .....Gasoline
Fuel consumption .....0.26 gph (gallons per hour)
Current consumption .....11 amp (amperes) starting; 1 amp running
Operating voltage .....28 v (volts), dc (direct current) max (maximum); 18 v dc min (minimum)
Dimensions:
Length .....9-1/2 in.
Width .....6-3/4 in.
Height .....15-5/16 in.
Weight .....15 pounds (approximately)

(3) Welder.

Manufacturer .....Lincoln Electric Co.
Type 300
Rpm (revolutions per minute).....1,400
Code No. SPL480

(4) Welding machine.

Manufacturer .....Libby Welding Co., Inc.
Model ODW-300
Rpm .....1,400 under load
Kw (kilowatt) rating 3
Voltage .....115 v dc
Mounting .....Skid mounted

(5) Storage batteries.

Manufacturer .....Willard Storage Battery Co.
Type 6TN
Rating .....12 v
Quantity 2

(6) Capacities.

Fuel tank, engine .....15 gal (gallons)
Fuel tank, heater .....2-1/2 qt (quarts)
Crankcase oil .....9 qt
Air cleaner .....1 qt
Cooling system .....13 qt

(7) Adjustment data.

v-belts .....5/8 in. deflection

(8) Dimensions and weight (fig. 1).

Overall length .....101 in.
Overall width .....28 in.
Overall height .....48-1/2 in.
Weight .....3,193 lb (pounds)

(9) Maintenance and operating supplies. Refer to table I for a complete list of maintenance and operating supplies required for initial operation.

5. Difference in Models

This manual covers only the Libby Welding Model ODW-300 welding Machine. No known unit difference exists for the model covered by this manual.

Table I. Maintenance and Operating Supplies.

Item	Component Application	Source of Supply	Federal Stock No.	Description	Quantity required for initial operation	Quantity required for 8 hours operation	Notes
1.	0101-CRANKCASE (1)			OIL, LUBRICATING: 5 gal. pail as follows:			(1) Includes quantity of oil to fill engine oil system as follows:
		10	9150-231-6653	Grade 9250 or	10 qt	(5)	7 qt-crankcase
		10	9150-265-9435	OE-30			2 qt-oil filter
		10	9150-231-9037	Grade 9110 or	10 qt	(5)	1 qt-air cleaner
		10	9150-265-9428	OE-10			(2) Use oil as prescribed in
		10	9150-242-7603	OES	10 qt	(5)	(1) above.
2.	0304-AIR CLEANER (2)			OIL, LUBRICATING (2)	1 qt	(5)	(3) Tank Capacity
3.	0306-TANK			FUEL OIL, DIESEL: bulk as follows:			(4) Average fuel consumption is 2.35 gph of continuous operation.
		10	9140-286-5294	Regular Grade (DF-2)	15 gal (3)	18.8 gal (4)	(5) See current LO for grade application and replenishment intervals.
		10	9140-286-5286	Winter Grade (DF-1) or	15 gal (3)	18.8 gal (4)	
		10	9140-286-5283	Arctic Grade (DF-A)	15 gal (3)	18.8 gal (4)	
4.	0311-PRIMING SYSTEM	5	2910-355-6377	PRESSURE PRIMER: diesel engine			(6) Average fuel consumption is 0.26 gal per hr of continuous operation.
5.	0501-RADIATOR			WATER:	13 qt		(7) Tank capacity.
			6850-224-8730	ANTIFREEZE: inhibited glycol 5 gal can		(8)	(8) For quantities, ambient-temperatures, specific gravities, and replenishment data, refer to organizational maintenance.
			6850-174-1806	ANTIFREEZE: compound arctic, 55 gal drum		(8)	
6.	4701.2-TACHOMETER DRIVE	10	9150-190-0904	GREASE, AUTOMOTIVE AND ARTILLERY: GAA 1-lb can		(5)	
7.	6000.3-WINTERIZATION HEATER TANK	10	9130-160-1817	GASOLINE: automotive 5-gal can 91A	2-1/2 qt (7)	2.08 gal (6)	

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

6. Inspecting and Servicing Equipment

Note

Make sure equipment is completely deprocessed before servicing. Make sure preservatives have been removed from the crankcase, fuel tanks, instrument panel, and accessory components.

a. Inspection.

(1) Make a general inspection of the entire welding machine. Inspect the packing list to be sure that all items have been received. Examine the identification plates for positive identification of the equipment.

(2) Inspect the welding machine for damaged or defective parts; fuel, water, or oil leaks; and defective electrical connections or insulation. Exercise extreme care when inspecting used equipment.

(3) Report all damage and deficiencies to organizational maintenance.

b. Servicing.

(1) Perform the before-operation services listed in paragraph 30.

(2) Lubricate the welding machine in accordance with the current lubrication order.

(3) Refer to table I and fill the engine fuel tank and the heater fuel tank with the proper fuels.

Warning

Do not fill the fuel tank while the engine is running. Fuel spilled on a hot engine may explode and cause injury to personnel.

Warning

When filling the fuel tank, always provide a metal-to-metal contact between the container and the fuel tank. This will prevent a static spark from being generated as fuel flows over metallic surfaces.

(4) Fill the cooling system with clean water and an approved corrosion inhibitor. When freezing temperatures are expected, be sure the cooling system contains the proper antifreeze mixture.

(5) Be sure the electrolyte level in the batteries is three-eighths inch above the plates. If the level is low, add water. If the batteries are received dry, report the condition to organizational maintenance.

Warning

Do not allow smoking or the use of an open flame in the immediate vicinity while servicing the batteries. Batteries generate hydrogen, a highly explosive gas.

(6) Clean all grease and dirt from the welding machine with an approved cleaning solvent.

Warning

Use only approved cleaning solvents to prevent the possibility of fire or poisoning.

7. Installation or Setting-Up Instructions

a. Location. When possible, locate the welding machine in an area free of dust and moisture. Avoid soft or muddy ground if possible. If it becomes necessary to locate the unit on soft ground, arrange a foundation of planks or logs to prevent the unit from settling or sinking. The unit should be as level as possible at all times.

b. Indoor Installation. When the welding machine is to be installed in an enclosure, make sure the floor of the structure is of sufficient strength to support the weight of the unit. Make sure the enclosure is well ventilated, with

a maximum supply of fresh air available to the unit. Install a suitable exhaust pipe extension to carry the exhaust fumes to the outside. Install metal or asbestos shields for the extension where it passes through flammable walls.

Warning

When the welding machine is operated in an includes area, be sure the exhaust fumes are piped to the outside. Exhaust gases contain carbon monoxide. Continued breathing of exhaust fumes is dangerous and can be fatal.

c. Batteries. Service the batteries (par. 49).

d. Cable Connections. Place the electrode switch in the OFF position and connect the work and electrode cables to the welding machine, as shown by figure 3.

8. Equipment Conversion

The unit is capable of providing 115 volts of direct current for operation of lights or small power tools. Refer to paragraph 15 for instructions to convert to direct current.

9. Movement to New Worksite

a. Preparation for Movement.

(1) Disconnect the welding cables (fig. 3).

(2) Remove the exhaust pipe extension if used.

(3) Drain the engine fuel tank.

(4) Close or install all doors and panels.

(5) Refer to the basic issue items list and make sure that all items listed are on or with the equipment.

b. Short Distance Movement. The welding machine may be towed or skidded for short distances where the terrain permits. Secure a suitable towing device to the skid base and tow the unit to the new worksite.

c. Long Distance Movement. The unit will be moved by carrier over long distances.

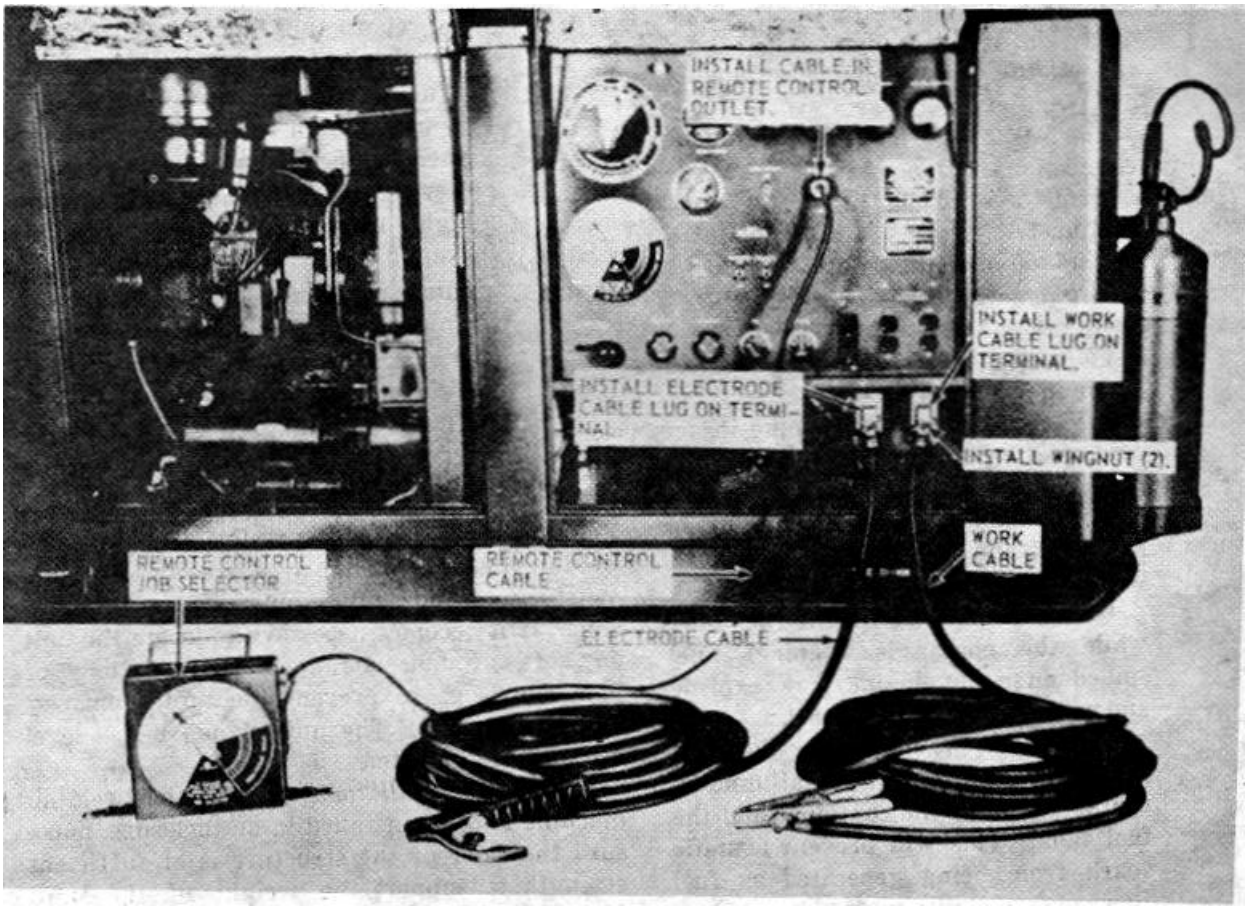


Figure 3. Welding cables and remote job selector, removal and installation.

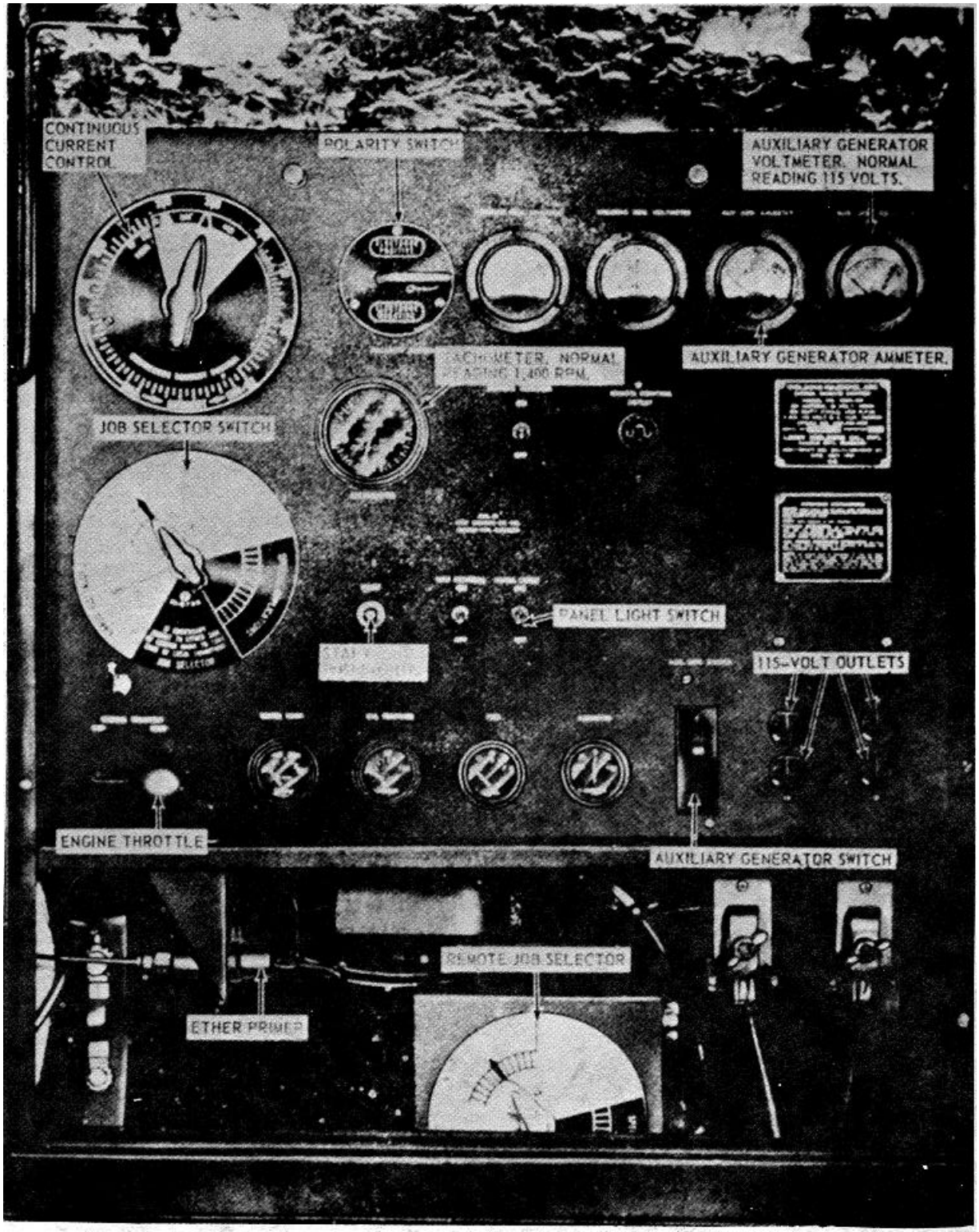
Section II. CONTROLS AND INSTRUMENTS

10. General

This section describes, locates, illustrates, and furnishes the operator sufficient information about the various controls and instruments for proper operation of the welding machine.

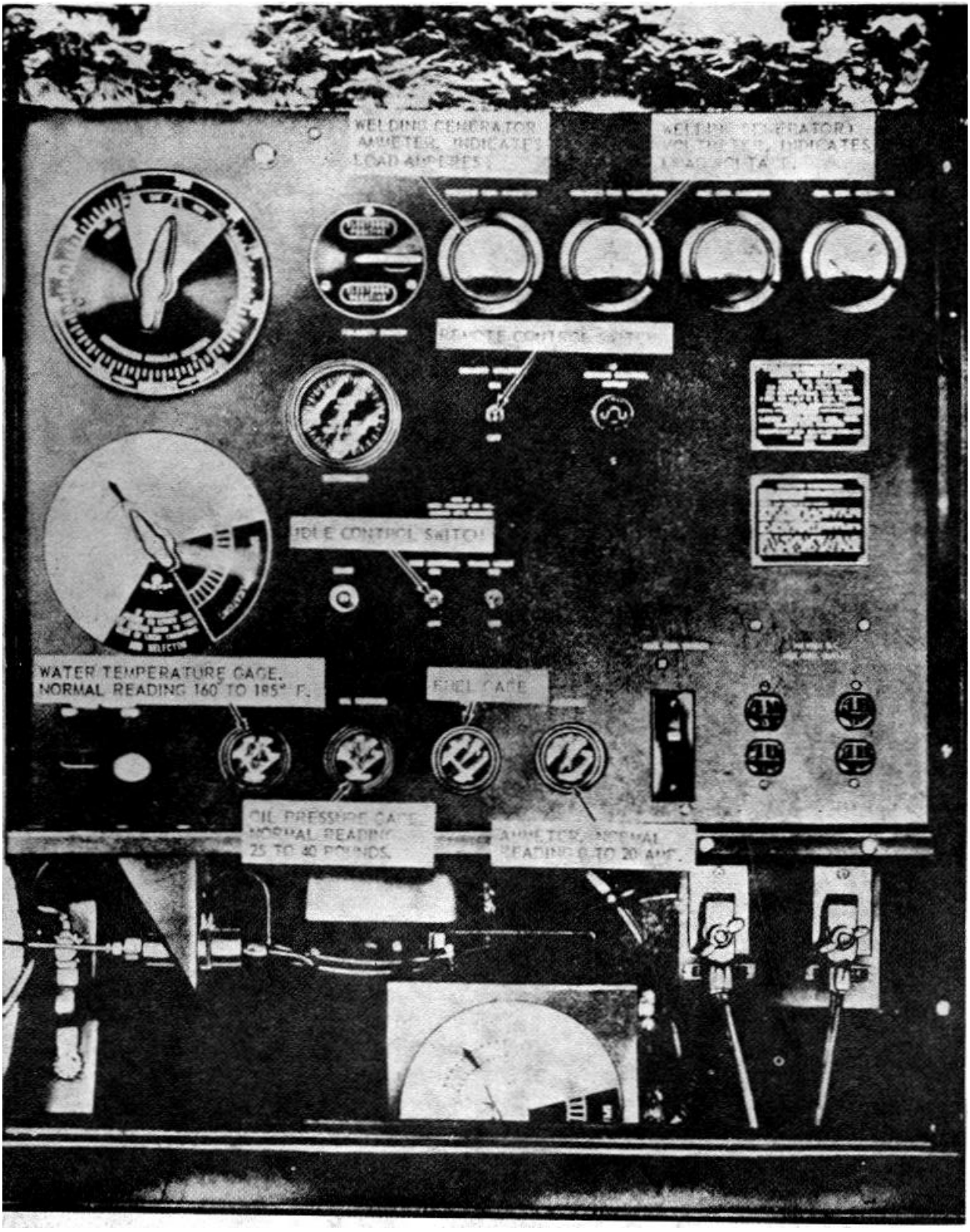
11. Controls and Instruments

The purpose of the controls and instruments and the normal and maximum readings of the instruments are illustrated in figure 4.



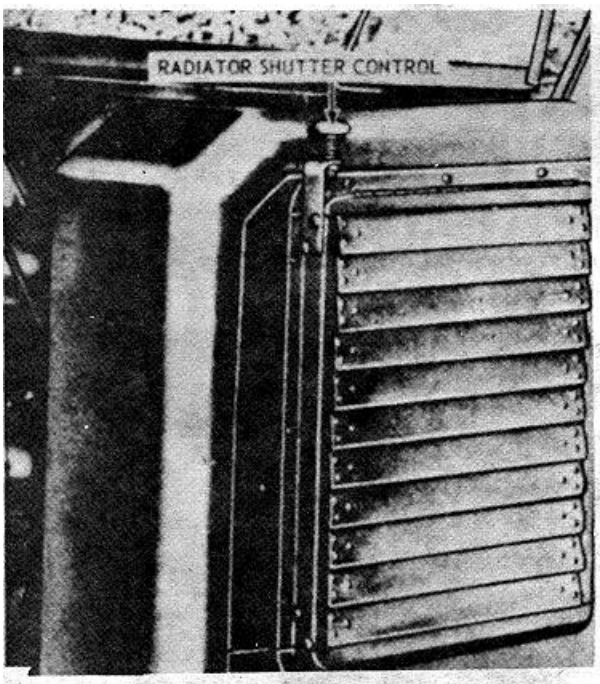
A. CONTROL PANEL. **EMC 3431-201-10/4 (1)**

Figure 4. Controls and instruments.

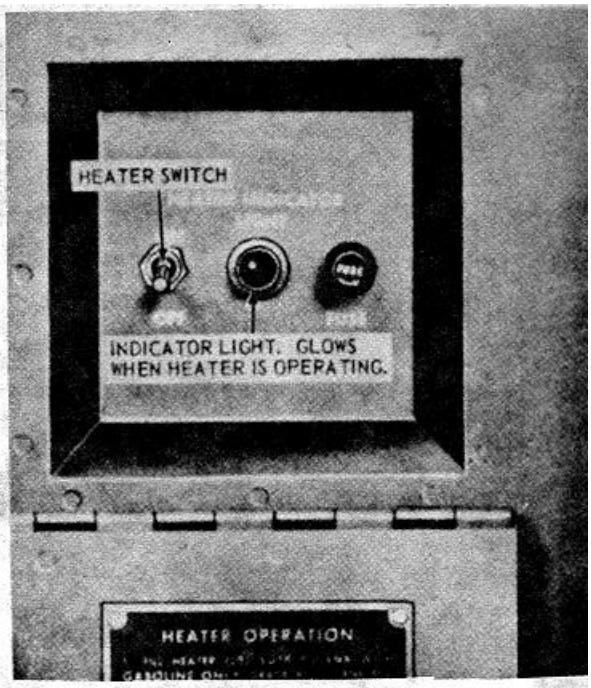


EMC 3431-201-10/4 (2)

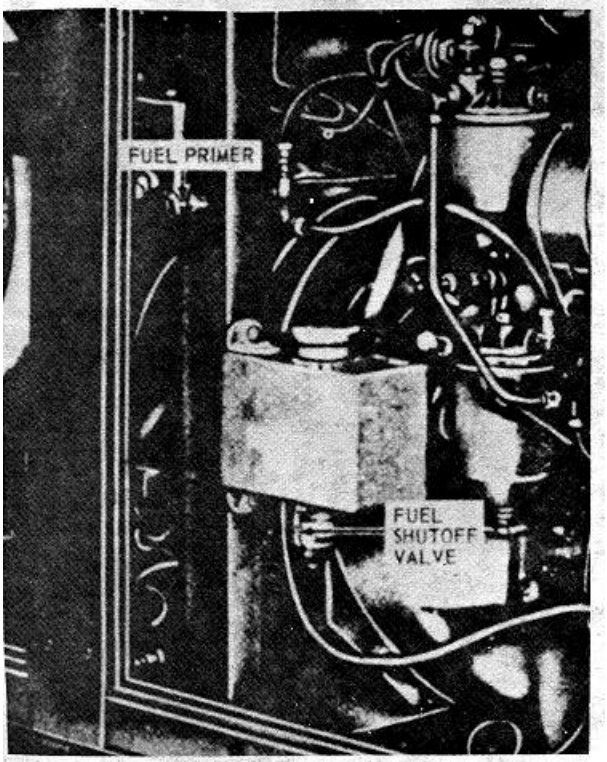
Figure 4-Continued.



RADIATOR SHUTTER CONTROL.



D. HEATER SWITCH AND INDICATOR LIGHT.



E. FUEL PRIMER AND FUEL SHUTOFF VALVE.

EMC 3431-201-10/4 (3)

Figure 4-Continued.

Section III. OPERATION OF EQUIPMENT

12. General

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

b. The operator must know how to perform every operation of which the welding machine is capable. This section gives instructions on starting and stopping the welding machine. Since nearly every job presents a different problem, the operator may have to vary given procedures to fit the individual job.

13. Starting

a. Preparation for Starting.

(1) Perform the before-operation services (par. 30).

(2) The fuel system must be primed: When starting the engine for the first time, after shipment, or if it has run out of fuel or has stood idle for an extended period of time. To prime the fuel system, operate the hand primer (fig. 5). Remove the bleeder plug from the top of the fuel filter and fuel strainer. Operate the hand primer until all air is bled from the lines. Install the bleeder plugs.

b. Starting the Engine.

(1) Perform the preparation for starting procedures as instructed in a above.

(2) Refer to figure 6 and start the engine.

c. Cold Weather Starting.

(1) Perform the preparation for starting procedures as instructed in a above.

(2) To start the engine in temperatures 32° F. or below, refer to figure 7 and inject an ether capsule into the primer, neck first. Operate the ether primer as described in figure 7.

(3) In extremely cold temperatures, it will be necessary to use the winterization heater for winter starting (par. 24).

14. Stopping

a. Normal Stopping.

(1) Refer to figure 8 and stop the engine.

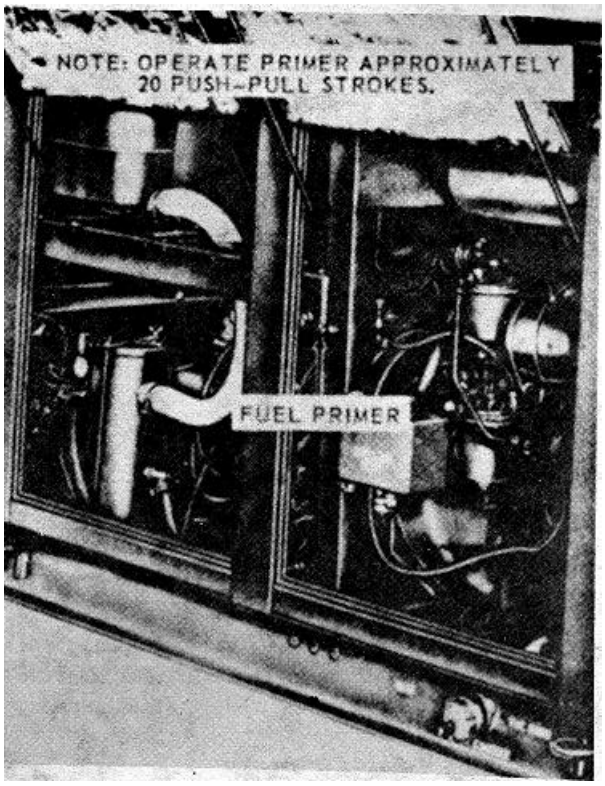


Figure 5. Fuel system, primer instructions.

(2) Perform the after-operation services (par. 30).

b. Stopping by Safety Devices. The engine is equipped with safety devices which will stop the engine in the event of a loss of oil pressure, high coolant temperature, low fuel pressure, or engine overspeed. These devices, when actuated, will cause the engine to stop. If the engine stops due to an overspeed condition, the governor will reset itself. In the event the engine stops due to defects other than lack of fuel, oil, or coolant, report the condition to organizational maintenance.

15. Welder Operation

a. Welding Machine.

(1) Attach the welding cables (fig. 9).

(2) Operate the welding machine as shown by figure 9.

Figure 6. Engine, starting instructions.

Warning

Do not operate the welding machine in an includes building unless the exhaust fumes are piped to the outside. Continued breathing of exhaust fumes is dangerous and can be fatal.

(3) Use the portable job selector (fig. 3) for remote work as shown by figure 3.

b. Auxiliary Power. Operate the auxiliary power generator as shown by figure 9.

c. Welding Methods.

(1) When welding in the vertical and overhead position, an operator should have a strong digging arc for penetration and a cool arc to let the molten metal solidify. With the job selector set for a low open circuit voltage (overhead and vertical setting), the operator can control the current merely by changing the length of his arc. If the electrode is forced into the fillet, current penetration and metal deposit rate will increase. If the

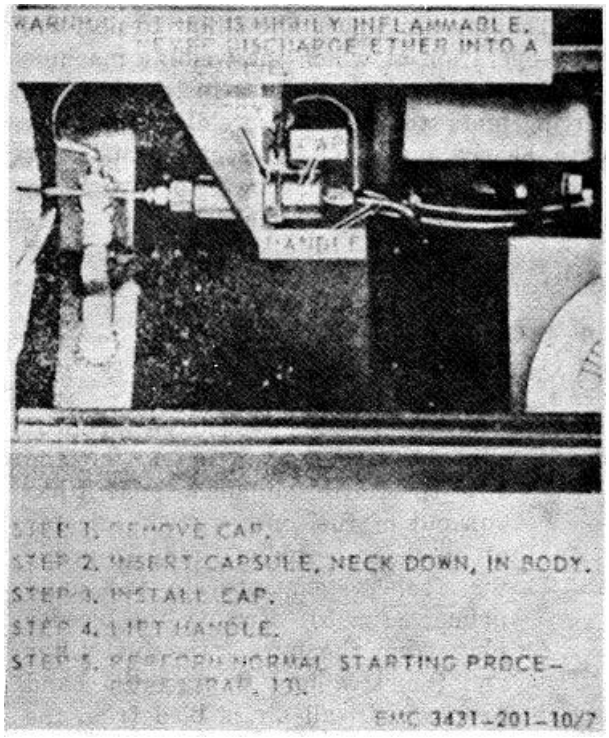
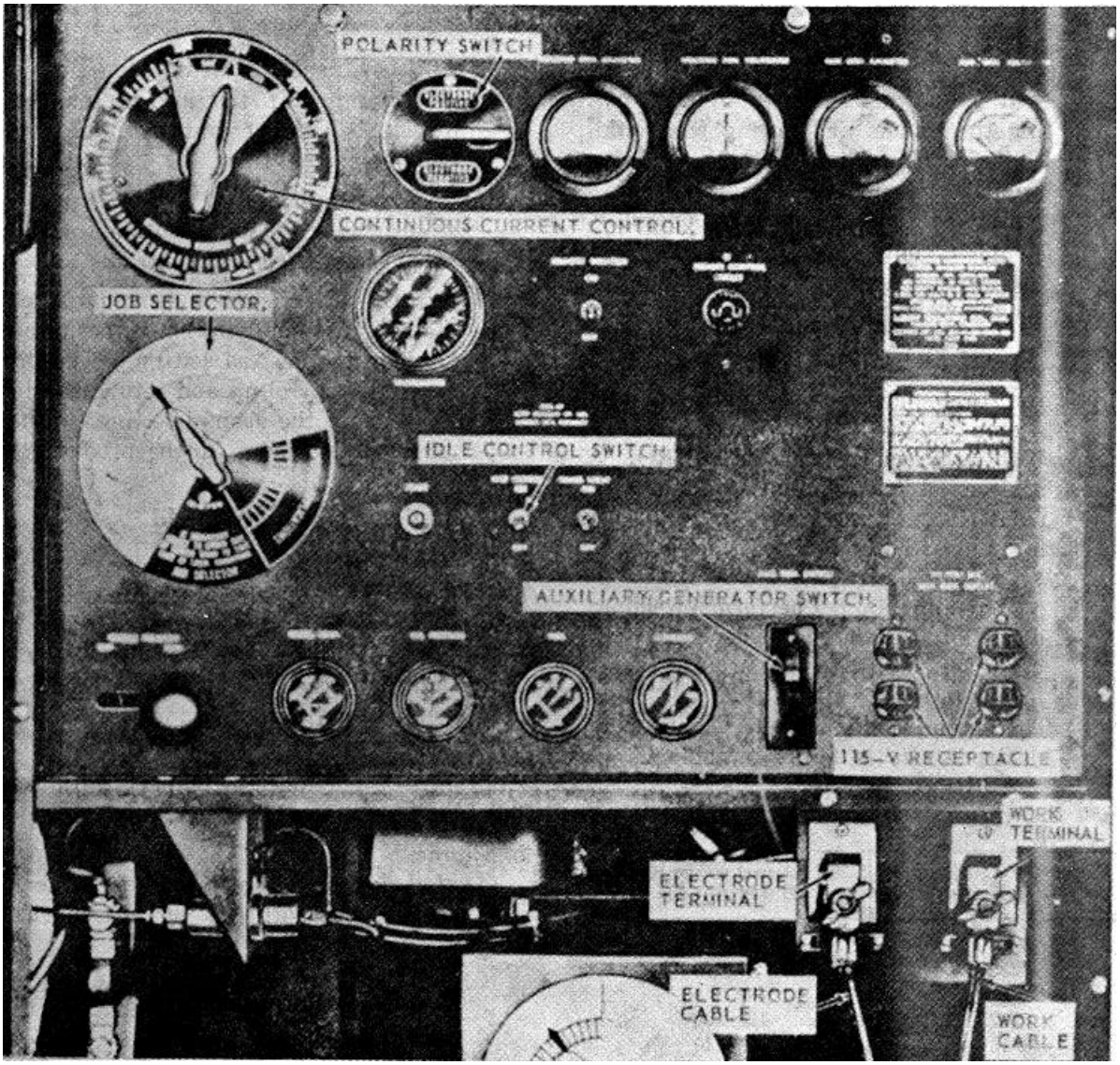


Figure 7. Ether primer, operating instructions.

Figure 8. Engine, stopping instructions.



OPERATION AS AN ARC WELDER.

STEP 1. REFER TO PAR. 13 AND START ENGINE.

STEP 2. ATTACH LUG END OF WORK CABLE TO WORK TERMINAL AND CLAMP END TO WORK METAL.

STEP 3. ATTACH LUG END OF ELECTRODE CABLE TO ELECTRODE TERMINAL.

STEP 4. PLACE POLARITY SWITCH IN NEGATIVE OR POSITIVE POSITION, DEPENDING ON ELECTRODE TO BE USED.

STEP 5. PLACE JOB SELECTOR IN PROPER POSITION FOR WELD TO BE MADE.

STEP 6. SET CURRENT CONTROL SO THAT COLORED ARROW OH HANDLE CORRESPONDS WITH THE COLOR AT WHICH JOB SELECTOR IS SET.

OPERATION AS A DC GENERATOR.

STEP 1 REFER-TO PAR. 13 AND START ENGINE.

STEP 2. PLACE IDLE CONTROL SWITCH IN OFF POSITION.

STEP 3. PLACE AUXILIARY GENERATOR SWITCH IN ON POSITION. EMC 3431-201-10/9

Figure 9. Operating instructions.

electrode is pulled away, the current will cut down to a lower figure, cooling the puddle and letting the metal solidify. The "in" and "out" motion, combined with the normal whipping technique, gives the operator complete control over the puddle during vertical and overhead welding.

(2) When welding down hand, or for sheet-metal application, no change of current is desired. During welding for this purpose, the job selector should be set in the NORMAL WELDING or LARGE ELECTRODE position. Little current change will result from lengthening or shortening the arc when the job selector is set in this position.

Warning:

Do not perform a welding operation without a welder's helmet. The flash of the welding arc can cause injury to the eyes.

(3) The recommended current setting per electrode size is found in table II.

Table II. Recommended Current Per Electrode Size.

Electrode Size (inches)	Current Range (amperes)
5/64	40-75
3/32	65-100
1/8	90-140
5/32	120-190
3/16	150-240

d. Dual Control. Dual control of amperage and voltage can be accomplished by the use of the job selector and the continuous current control. The dual control is utilized by the following steps:

(1) Place the polarity switch (fig. 4) in the OFF position.

(2) Start the engine (par. 13) and allow it to warm up.

(3) Place the polarity switch in the ON position.

(4) Set the job selector (fig. 4) to the desired marked position of the dial.

(5) Set the continuous current control to the desired amperes.

(6) Strike an arc.

(7) If the arc is too weak, turn the job, selector up. If the arc is too cold, turn the current control up 10 or 20 amperes and turn the job selector down.

Caution:

Do not maintain arc while changing the current control.

(8) If, when the correct current is obtained, the job selector is positioned beyond the desired setting, adjust the current control up and return the job selector to the desired setting, so that the necessary arc can be produced.

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

a. General. This welding machine is designed to operate in temperatures as low as -65° F. To operate successfully in cold weather, utilize the engine winterization heater. Refer to paragraph 13 for cold weather starting.

Caution:

Do not touch metal parts with bare hands in extremely cold weather.

b.Engine.

(1) *Lubrication*. Lubricate the engine in accordance with the current lubrication order.

(2) *Cooling system*. Inspect the engine coolant to be sure that it contains the correct amount of antifreeze. Before adding the initial antifreeze, clean and flush. the entire cooling system (par. 47). Inspect the cooling system components for signs of leaks or other damage. Inspect the shutter control for proper operation.

Caution:

Do not bend or kink coolant hoses during cold weather. Rubber hoses will become brittle in extreme cold and break with excessive handling.

(3) *Fuel system*. Keep the fuel tank as full as possible at all. times to prevent condensation. Any water that forms in the fuel tank will be carried to the fuel filter. It may be necessary to drain the fuel filter more frequently than under normal conditions.

(4) *Electrical system.* Before starting the engine, wipe the electrical component free of ice and moisture. Do not disturb the wiring as it becomes brittle with extreme cold. See that the batteries are fully charged at all times.

Caution:

Operate the engine for one hour after adding water to the batteries to allow the water to mix with the electrolyte and prevent freezing.

17. Operation in Extreme Heat

a. Engine.

(1) *Cooling system*. Keep the cooling system free of rust and scale. If necessary, add an approved rust inhibitor. Clean and flush the cooling system at frequent intervals (par. 47) Do not use salt water in the cooling system except in extreme emergency. Make sure the engine thermostat is working properly. Inspect the V-belts for proper adjustment (par. 48).

(2) *Lubrication*. Lubricate the engine in accordance with the current lubrication order.

(3) *Fuel system.* Do not fill the fuel tank to the top; allow sufficient room for the expansion of the fuel.

(4) *Batteries.* Inspect the electrolyte level of the batteries daily. The electrolyte should be three-eighths inch above the plates. Add water as necessary.

b. Welding Machine. Make sure the welding machine is free of airflow restrictions. When operating indoors, make provisions for adequate ventilation and the venting of exhaust fumes to the outside.

18. Operation in Dusty and Sandy Areas

a. Protection. When the installation of the unit is permanent, erect a protective cover for it. When a temporary installation is made, take advantage of natural barriers as much as possible. All doors and panels should be closed when unit is shut down. Keep the unit as clean as possible, paying special attention to the grill.

b. Lubrication. In dusty or sandy areas, filters and strainers must be cleaned more frequently than under normal conditions. Clean all lubrication points before and after lubrication. Be sure that all lubricant containers are tightly sealed and stored in an area as free as possible from dust and sand.

c. Fuel System. Take all necessary precautions to keep dirt and grit out of the fuel tank.

19. Operation Under Rainy or Humid Conditions

When the welding machine is operated outside, erect a shelter to protect the unit, when possible. If the erection of a shelter is not practical, keep the machine covered with canvas. Remove the cover during dry periods, open all doors, and .allow the unit to dry. Keep the fuel tank full to prevent the forming of condensation.

20. Operation in Salt Water Areas

a. General. Salt water causes corrosive action on metal. Care must be taken to avoid contact of equipment with salt water. If contact is made, or if the unit is exposed to salt spray, wash the unit with clean, fresh water.

Caution:

The cooling system is not designed to use salt water. However, salt water may be used in an emergency.

b. Protection. Coat all exposed polished surfaces with an approved rustproofing material or cover parts with a thin coat of grease. All exposed nonpolished surfaces may be coated with a thin layer of grease.

21. Operation at High Altitude

The welding machine is designed to operate at elevations up to 8,000 feet. To calculate specific generator output capability above 8,000 feet, use the following formula:

FORMULA

$$7\% \times \frac{\text{actual altitude } -5{,}000}{1{,}000} \times 5{,}000 \text{ ft rating} = \text{derating}$$

EXAMPLE SOLUTION FOR 13,000 FT:

$$0.07 \times \frac{13{,}000 - 5{,}000}{1{,}000} \times 3 \text{ kw} = \text{derating}$$

$0.07 \times 8 \times 3$ kw = 1.68 kw derating

3 kw - 1.68 kw = 1.32 kw (derated power at 13,000 ft)

Section IV. OPERATION OF AUXILIARY MATERIEL USED IN CONJUNCTION WITH WELDING MACHINE

22. Fire Extinguisher (Monobromotrifluoro-methane Type)

a. Description. The monobromotrifluoromethane type fire extinguisher is generally suitable for use on all types of fire, with the exception of fires involving LOX (liquid oxygen) generating equipment. The fire extinguisher is furnished with a disposable-type cylinder.

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

(1) Remove the fire extinguisher from its location.
(2) Break the seal by pulling the safety pin from the handle.
(3) Point the horn at the base of the flame.
(4) Depress the trigger for discharge and direct the stream of content at the base of the fire.
(5) Replace with a new cylinder immediately after using.

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

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

d. Maintenance. Weigh fire extinguisher every'3 months and replace cylinder if gross weight has decreased 4 ounces or more. Lubricate cylinder neck threads with 1 drop of OE 30 oil before reassembly.

23. Fire Extinguisher (Carbon Dioxide Type)

a. Description. The carbon dioxide type of fire extinguisher is suitable for electrical and flammable liquid fires. The carbon dioxide types are of the 4-pound, 7-1/2 pound, 10pound, and 15-pound sizes. The 4-pound extinguisher is portable; the other three are the fixed type.

b. Operation. Remove fire extinguisher from its location, break the seal, operate the control valve, and direct the stream at the base of the flame.

c. Maintenance. For maintenance of the fire extinguishers, refer to TM 5-687 and TM 9-1799.

24. Winterization Heater

a. General. The heater is a gasoline-burning unit designed to preheat the coolant of the engine in preparation for starting at extremely low temperatures. This heater may also, be used as a standby coolant heater to prevent freezing during periods when the engine is not in use, and it is not desired to add antifreeze or to drain the cooling system.

b. Operation. Refer to figure 10 for instructions for operating the heater.

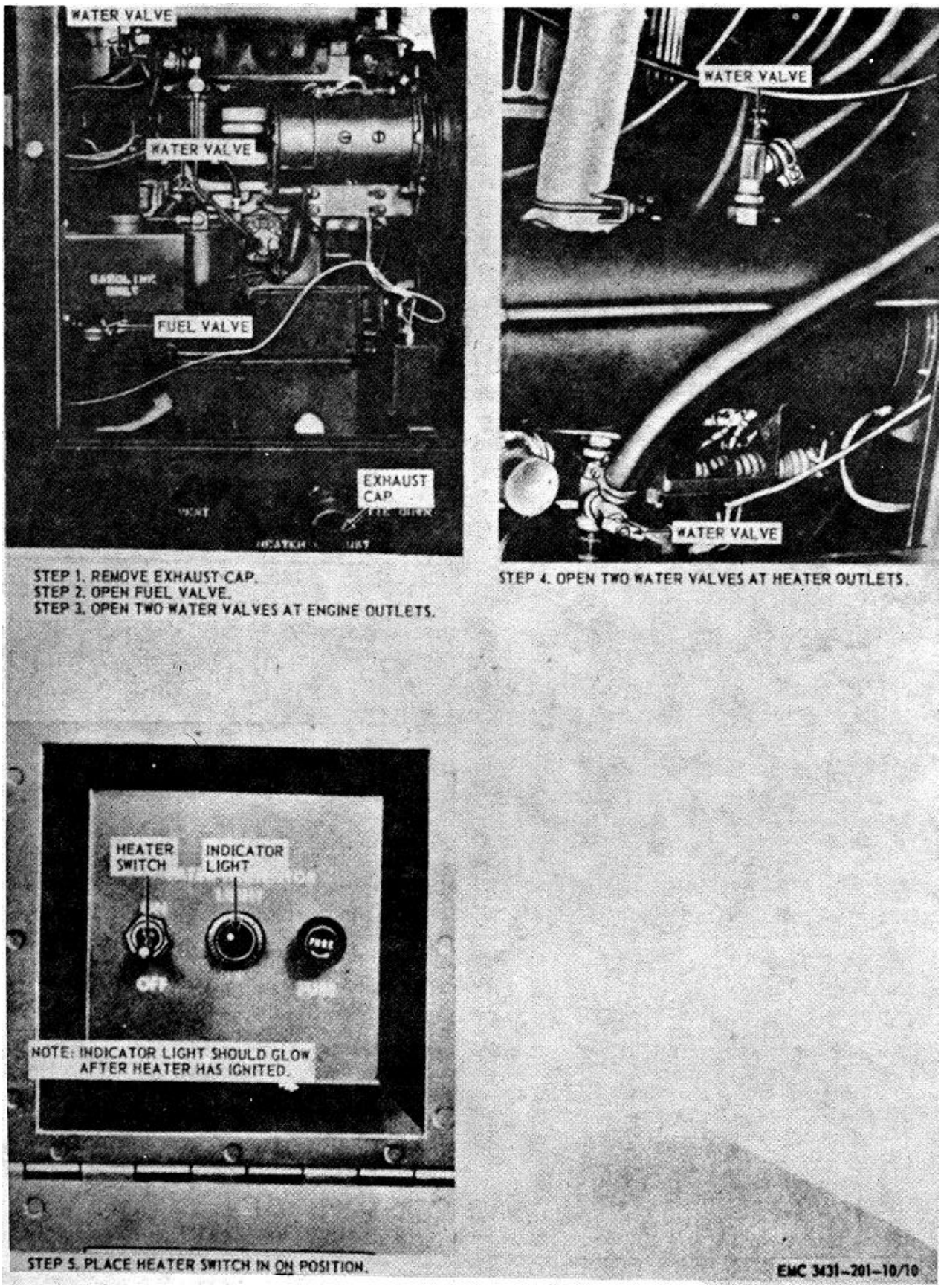


Figure 10. Winterization heater, operating instructions.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S TOOLS AND EQUIPMENT

25. Special Tools and Equipment

No special tools or equipment are required by the operator for the maintenance of the welding machine.

26. Basic Issue Tools and Equipment

Tools and repair parts issued with or authorized for the welding machine are listed in appendix II.

Section II. LUBRICATION

27. General Lubrication Information

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

b. The lubrication order shown in figure 11 is an exact reproduction of the approved lubrication order for the welding machine. For the current lubrication order, refer to DA Pam 3104.

28. Detailed Lubrication Information

a. Care of Lubricants. Keep all lubricants in sealed containers and stored in a clean, dry place away from external heat. Keep lubricants free of dust, dirt, water, or foreign matter.

b. Points of Lubrication. Refer to figure 11 for illustration of the lubrication points.

c. Cleaning. Wipe all lubrication points free of dirt and grease before lubricating.

Clean all lubrication points after lubricating to prevent the accumulation of foreign matter.

d. Operation Immediately After Lubrication. Operate the engine immediately after lubrication. Inspect the oil filter and oil lines for evidence of leakage. If the crankcase oil has been changed, it will be necessary to operate the engine for 5 minutes before checking the oil level.

e. Air Cleaner.

(1) Refer to figure 12 and service the air cleaner.

(2) Perform field expedient repairs on a clogged unserviceable air cleaner by removing the defective element and, if available, by securely fastening a section of clean, fine-meshed screen over the open air intake. Operate the engine without the air cleaner.

Caution:

Performance of any field expediency repair creates a condition possibly dangerous to the equipment or personnel. The unit so repaired should be taken out of service as soon as possible for replacement of the defective parts.

f. Oil Filter. Refer to figure 13 and service the oil filter.

LUBRICATION ORDER

LO 5-3431-201-20

7 MAY 1962

WELDING MACHINE, ARC: GENERATOR; DIESEL DRIVEN SINGLE OPERATOR; REMOTE CONTROL; 300 AMP DC ARC; SKID MTD; 60 AMP 20V MIN, 375 AMP AT 40V MAX, CURRENT 115V, 3KW AUXILIARY POWER (LIBBY MODEL ODW-300) W/GMC ENGINE MODEL 2056 SERIES 2-71

Reference: SM 10-1-C4-1

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

Relubricate after washing.

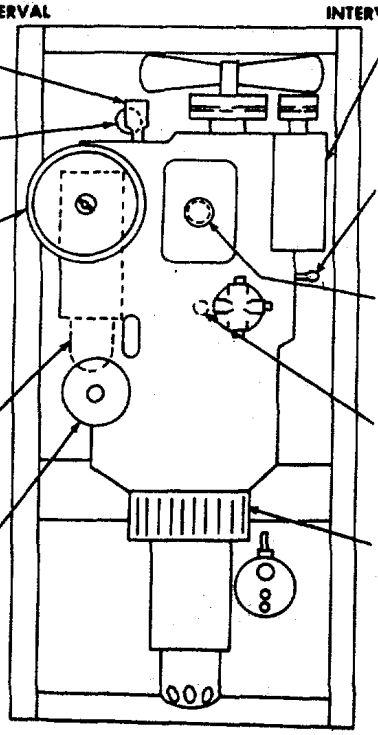
Clean fittings before lubricating.

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

A dotted circle indicates a drain below.

Drain crankcase when hot. Fill and check level.

	LUBRICANT	INTERVAL
1	Overspeed Governor (Sparingly)	OE 50
2	Tachometer Drive Adapter	GAA 50
3	Air Cleaner (Refill oil reservoir to level mark; every 50 hours disassemble entire unit, clean, re-oil, and reassemble) (See Key)	OE 10
4	Starter Motor (Sparingly) (Remove starter to service)	OE 500
5	Oil Filter (Disassemble, clean housing, renew element and reassemble) (See note 2)	100



	INTERVAL	LUBRICANT
		Battery Charging Generator (Sealed bearings no lubrication required)
6	10	Crankcase Oil Level Gage (Check level)
7	OE	Crankcase Oil Fill Cap (See Key)
8	100	Crankcase Oil Drain Plug (Drain and refill)
		Main Generator (Sealed bearings no lubrication required)

CONTINUED ON FOLLOWING PAGE

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Figure 11. Lubrication order.

CONTINUED FROM
PRECEDING PAGE

— KEY —

LUBRICANT	CAPACITY	EXPECTED TEMPERATURES			INTERVALS
		Above +32°F	+40°F to −10°F	0°F to −65°F	
OE —OIL, Engine, Heavy Duty		OE 30 or 9250	OE 10 or 9110	OES	Intervals given are in hours of normal operation.
Crankcase	9 qt				
Air Cleaner	1 qt				
Oil Can Points					
OES —Oil, Engine, Sub-zero					
GAA —GREASE, Automotive and Artillery		All Temperatures			

NOTES:

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

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

3. OIL CAN POINTS. Every 100 hours lubricate the door hinges, latches, shutter control linkage and all exposed adjusting threads with OE.

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

BY ORDER OF THE
SECRETARY OF THE ARMY:

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

OFFICIAL:

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

EMC 3431-201-10/11 (2)

Figure 11-Continued.

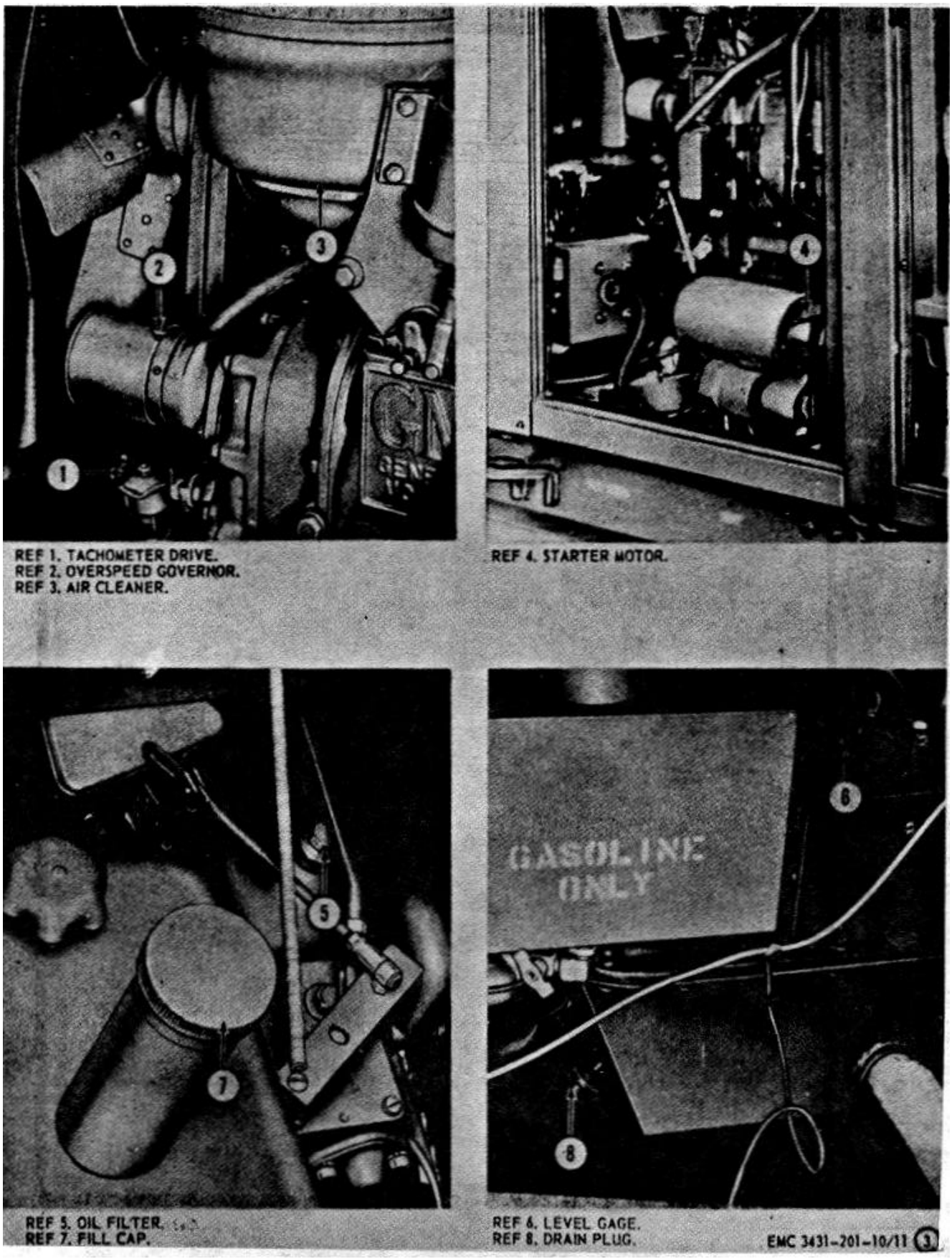


Figure 11-Continued.

NOTE: CLEAN ALL PARTS WITH AN APPROVED CLEANING SOL VENT AND BLOW DRY WITH COMPRESSED AIR IF AVAILABLE.

NOTE: FILL OIL CUP IN ACCORDANCE WITH CURRENT LUBRICATION ORDER.

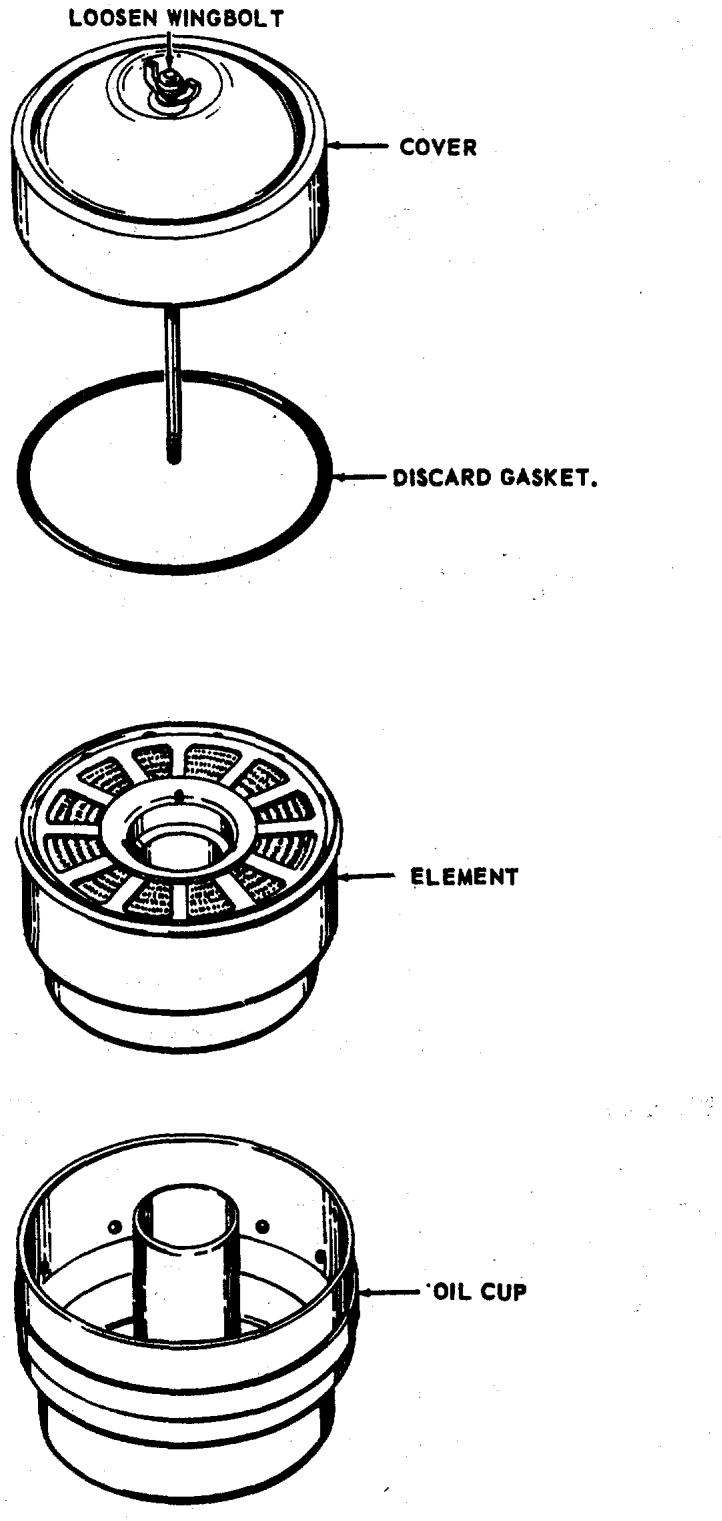


Figure 12. Air cleaner, service.

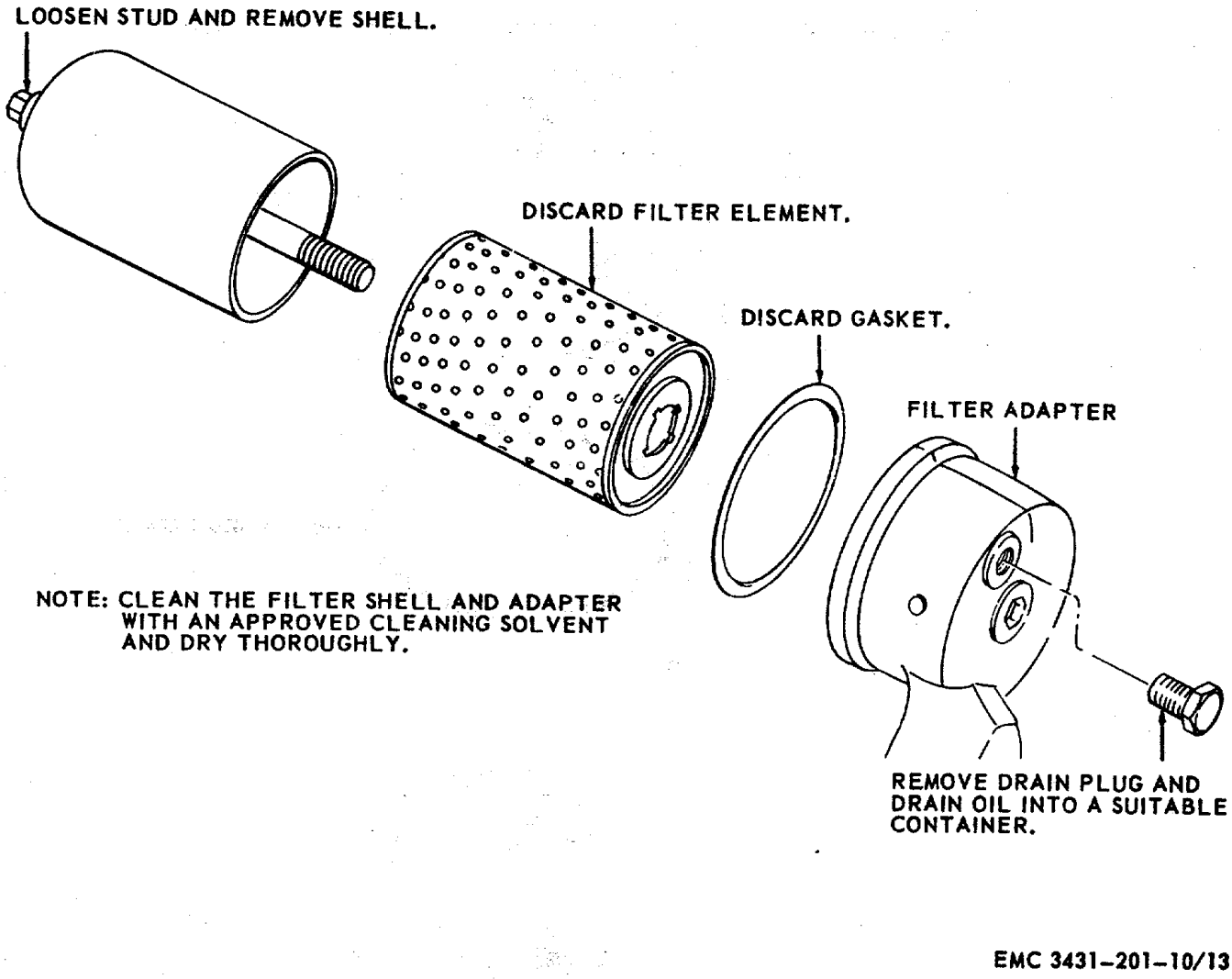


Figure 13. Oil filter, service.

Section III. PREVENTIVE MAINTENANCE SERVICES

29. General

To insure that the equipment is ready for operation at all times, it must be inspected systematically before operation, during operation, and after operation, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services shall be performed before operation. Defects discovered during operation of the unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noticed during operation which could damage the equipment if operation were continued. After-operation services shall be performed by the operator after every operating period. After-operation services shall be performed at intervals based on the normal operations of the equipment. Reduce interval to compensate for abnormal conditions. Defects or unsatisfactory operating characteristics beyond the scope of the operator to correct must be reported at the earliest opportunity to organizational maintenance. Responsibility for performance of preventive maintenance services rests not only with the operator but also with the entire chain of command from section chief to commanding officer (AR 750-5).

30. Operator's Daily Services

a. General. The intervals at which specific daily services are to be performed by the operator or crew are indicated by an X in the appropriate block in figure 14 as follows:

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

b. Additional Daily Services. An X in the appropriate column (s) indicates the interval at which the service is to be performed.

Intervals			Procedure
B	D	A	
X	X	X	*Visual inspection*. Make a complete visual inspection of the entire unit for missing parts, insecure mountings, or other damage. Correct all defects or report them to organizational maintenance.
X	X	X	*Leaks, general.* Inspect the entire unit for evidence of fuel, oil, or coolant leaks. Correct all defects or report them to organizational maintenance.
X	--	--	Lubrication. Lubricate the unit in accordance with the current lubrication order.
X	--	--	Publications. Make sure that a copy of this manual, the current lubrication order, and DA Form 285 are on or with the welding machine and are in serviceable condition.
X	--	X	*Tools and equipment.* Make sure that all tools and equipment issued with the unit are in serviceable condition, clean, and properly stowed.
X	X	--	*Unusual operation and noise.* Make a visual inspection of the entire welding machine for loose mountings. Observe the unit while in operation for excessive vibration, unusual noises, overheating, or other defects. If defects are present, shut down the engine and correct any operational trouble or report the condition to organizational maintenance.
X	--	--	*Tampering.* Inspect to see whether the welding machine has been tampered with or damaged. Do not operate until all deficiencies have been corrected.
		X	*Cleaning.* Clean all dirt, grease, or other foreign matter for the welding machine. Pay particular attention to the radiator core.
		X	*Protection.* See that all doors and panels are properly installed and latched. If the welding machine is outside, cover with a suitable waterproof cover. If low temperatures are expected and antifreeze is not available, drain the cooling system (par. 47). Place a tag on the radiator to indicate that the cooling system has been drained.

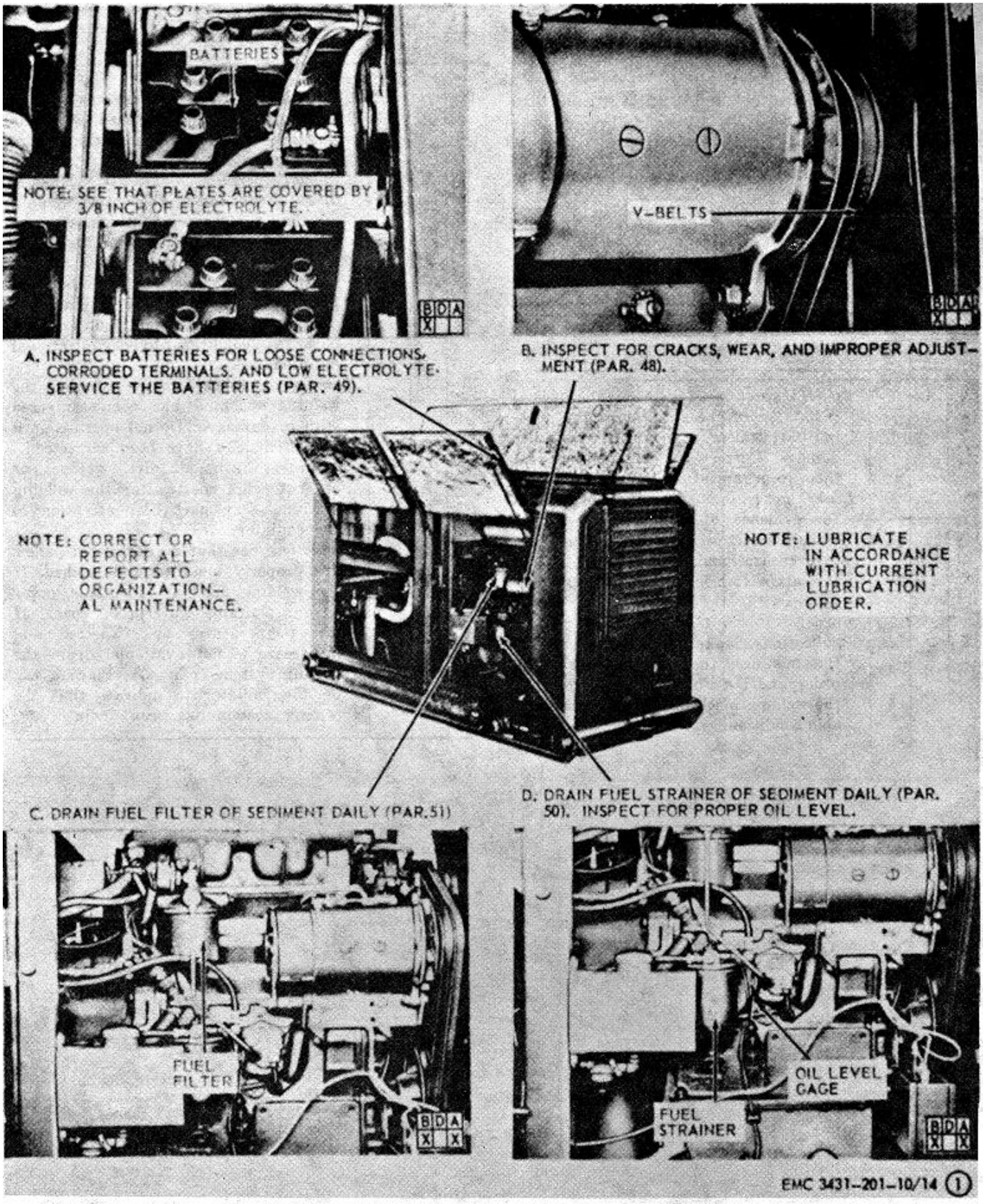


Figure 14. Operator's daily services.

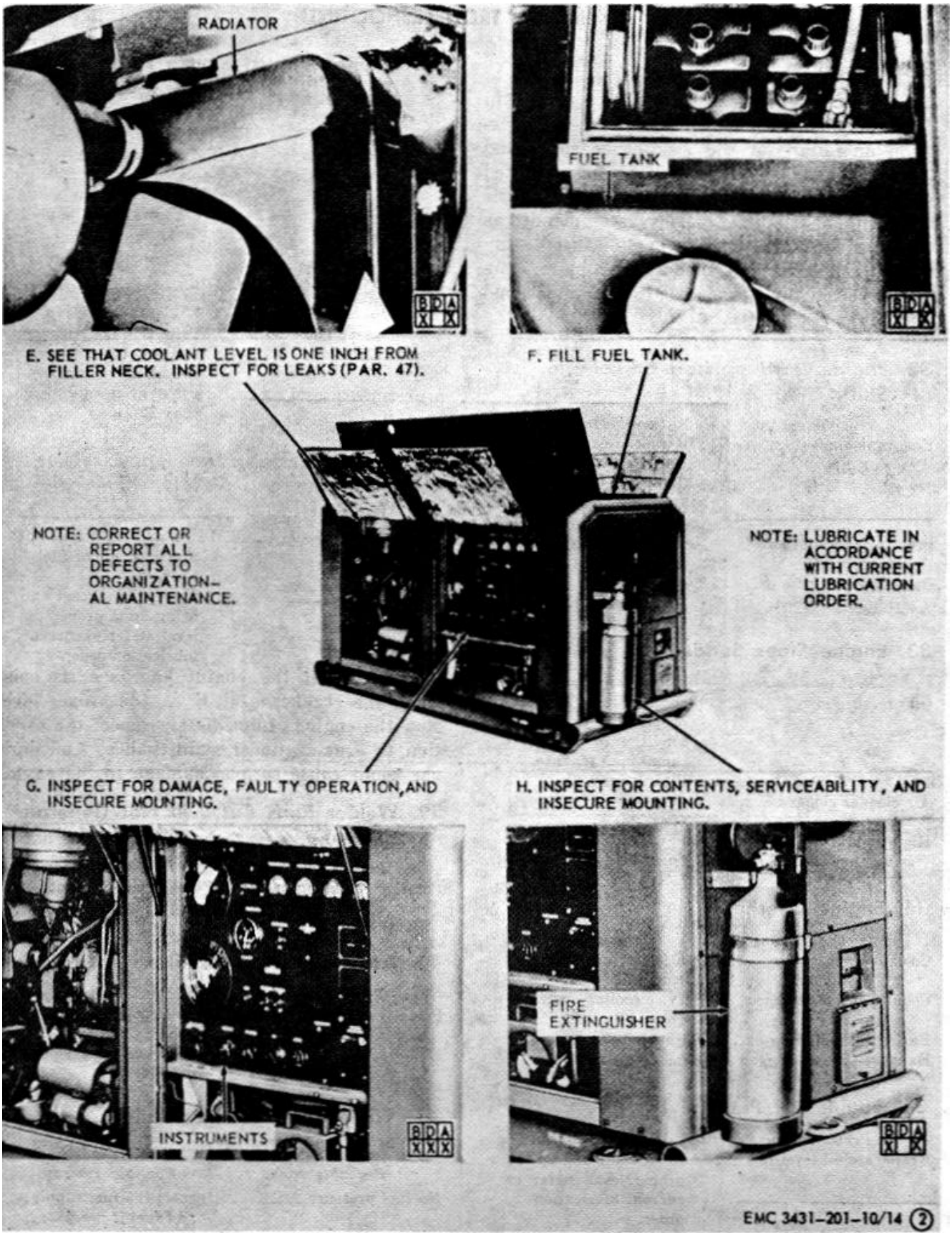


Figure 14-Continued.

Section IV. TROUBLESHOOTING

31. General

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

32. Engine Hard to Start or Fails to Start

Probable cause	*Possible remedy*
Fuel tank empty	Fill tank (par. 6).
Water or dirt in fuel	Service fuel strainer and
.....	fuel filter (pars. 50 and
.....	51). Drain and flush fuel
.....	tank. Refill tank.
Starting procedure.....	Refer to starting instruc-
improper.	tions (par. 13).
Battery leads loose or.....	Tighten leads or clean
terminal corroded.....	. terminals (par. 49),.

33. Engine Stops Suddenly

Probable cause	*Possible remedy*
Oil pressure low	Inspect oil level. Add oil to proper level or report condition to organizational maintenance.
Fuel tank empty	Fill tank (par. 6).
Air cleaner clogged	.Service air cleaner (par. 28).
High-coolant temperature switch operates.	Add water to radiator (par. 47).

34. Engine Overheats

Probable cause	*Possible remedy*
Coolant level low	Add water to radiator (par. 47).
Cooling system clogged	Service cooling system (par. 47).
Fan V-belts slipping	Adjust V-belts. par. 48).
Exhaust system clogged	.Remove restriction.

35. Engine Oil Pressure Low

Probable cause	Possible remedy
Crankcase oil level low	Add oil and bring up to proper level. Refer to current lubrication order.

36. Engine Exhaust Smoke Excessive

Probable cause	*Possible remedy*
Air cleaner clogged	.Service air cleaner (par. 28).
Engine operating temperature too low.	Close radiator shutter with manual control and report condition to organizational maintenance.

37. Engine Lacks Power

Probable cause	*Possible remedy*
Fuel strainer and fuel filter clogged.	Service the fuel strainer and fuel filter (pars. 50 and 51).
Air cleaner clogged	Service air cleaner (par. 28).

38. Engine Knocks-or Develops Excessive Noise

Probable cause	*Possible remedy*
Fuel grade improper	Drain and refill tank with proper grade of fuel (par. 6).
Oil level low	Add oil to crankcase and bring up to proper level. Refer to current lubrication order.

Caution:

If the engine knocks or is noisy when the crankcase oil is at the proper level, stop the engine. Immediately report the condition to organizational maintenance. Continued use could cause serious damage to the engine.

39. Welder Runs But Will Not Generate Current

Probable cause	*Possible remedy*
Polarity reversing switch may be in the neutral position.	Place handle in positive or negative position.

40. Arc is Loud and Spatters Excessively

Probable cause	*Possible remedy*
Polarity may be wrong	Inspect polarity. Reverse polarity or try an electrode of the opposite polarity.

41. Winterization Heater Fails to Ignite or Keep Burning

Probable cause	*Possible remedy*
No fuel pressure	Inspect the fuel supply; add fuel if necessary.

Section V. FIELD EXPEDIENT REPAIRS

42. General

Operational troubles may occur while the welding machine is operating in the field where supplies and repair parts are not available and normal corrective action cannot be performed. When this condition exists, the following expedient remedies may be used during emergencies, upon the decision of the unit commander. Equipment so repaired must be removed from operation as soon as possible, and properly repaired before being placed in operation.

43. Engine Not Getting Fuel

Trouble	*Expedient remedy*
Fuel strainer clogged	Remove fuel strainer element (par. 50).
Fuel filter clogged	Remove fuel filter element (par. 51).

44. Engine Lacks Power

Trouble	*Expedient remedy*
Air cleaner clogged or defective.	Remove air cleaner element (par. 28).

45. Winterization Heater Not Getting Fuel

Trouble	*Expedient remedy*
Fuel filter clogged	Remove filter elements (par. 57),

46. V-Belts Make Excessive Noise

Trouble	*Expedient remedy*
Fan v-belt frayed or broken.	Remove broken V-belt and operate with one V-belt until replacement can be obtained (par. 48).

Section VI. ENGINE ACCESSORIES

47. Radiator

a. General. The radiator should be cleaned externally at weekly intervals by directing compressed air at it to remove dirt and foreign matter from the radiator core. The cooling system should be drained and flushed at least twice a year, or before adding and after draining antifreeze solution.

b. Draining, Cleaning, and Flushing.

(1) Operate the engine until it reaches operating temperature.

(2) Refer to figure 15 and drain and fill the cooling system.

(3) Fill the radiator with clean, fresh water and the proper amount of an approved cleaning compound.

(4) Operate the engine until the rust and scale is removed from the cooling system. Refer to figure 15 and drain the cooling system.

(5) Repeat (3) and (4) above, substituting an approved neutralizer for the cleaning compound.

(6) Repeat (1) and (2) above with clean water until the water that is drained from the radiator runs clear.

(7) Fill the cooling system with clean water and add an approved rust inhibitor.

Note.

If an ambient temperature of 32° F is anticipated, see that the cooling system is serviced with the proper grade and quantity of antifreeze by organizational maintenance.

48. V-BELTS

a. Refer to figure 16 and adjust the V-belts.

b. Perform field expedient repairs on a broken V-belt by removing the broken V-belt.

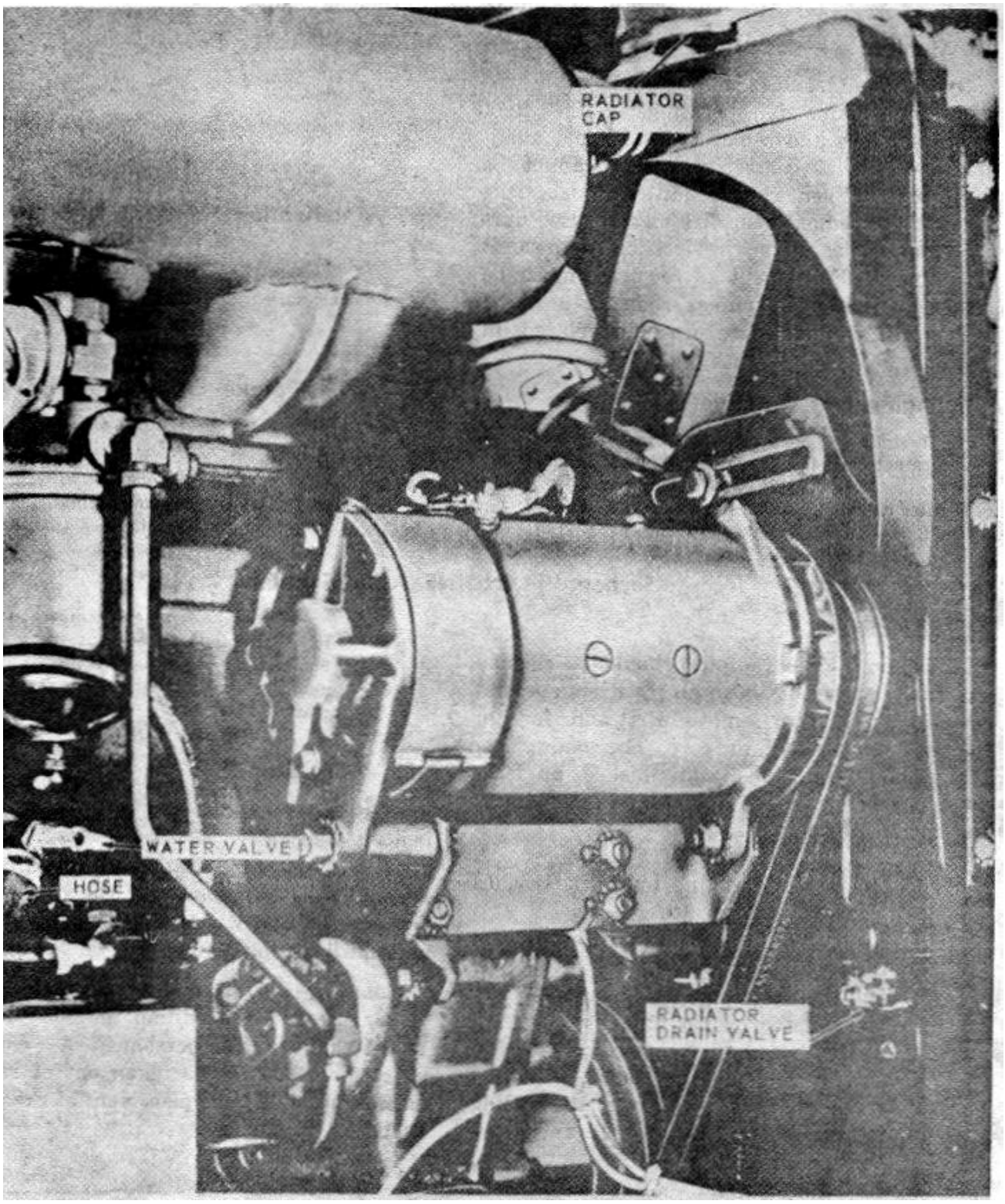
Operate the unit with the remaining belt of the pair until a replacement can be obtained.

Caution:

Performance of any field expedient repair creates a condition possibly dangerous to the equipment or personnel. A welding unit so repaired should be taken out of service as soon as possible for replacement of the defective parts.

49. Batteries

a. General. The welding machine has two 12-volt batteries connected in series by a jumper electrical lead. The batteries are grounded to the frame by the positive lead and are connected to the starter solenoid by a negative electrical lead. The batteries are also connected to the battery-charging receptacle for charging from an outside source.



STEP 1. OPEN DRAIN VALVE AND DRAIN RADIATOR.
STEP 2. REMOVE HOSE AND OPEN WATER VALVE AND DRAIN COOLING SYSTEM.
STEP 3. AFTER WATER IS DRAINED FROM RADIATOR AND ENGINE, CLOSE RADIATOR DRAIN VALVE AND WATER VALVE AND INSTALL HOSE.
STEP 4. REMOVE RADIATOR CAP AND FILL RADIATOR WITH CLEAN WATER TO WITHIN ONE-INCH OF TOP AND REPLACE CAP.

Figure 15. Cooling system, service.

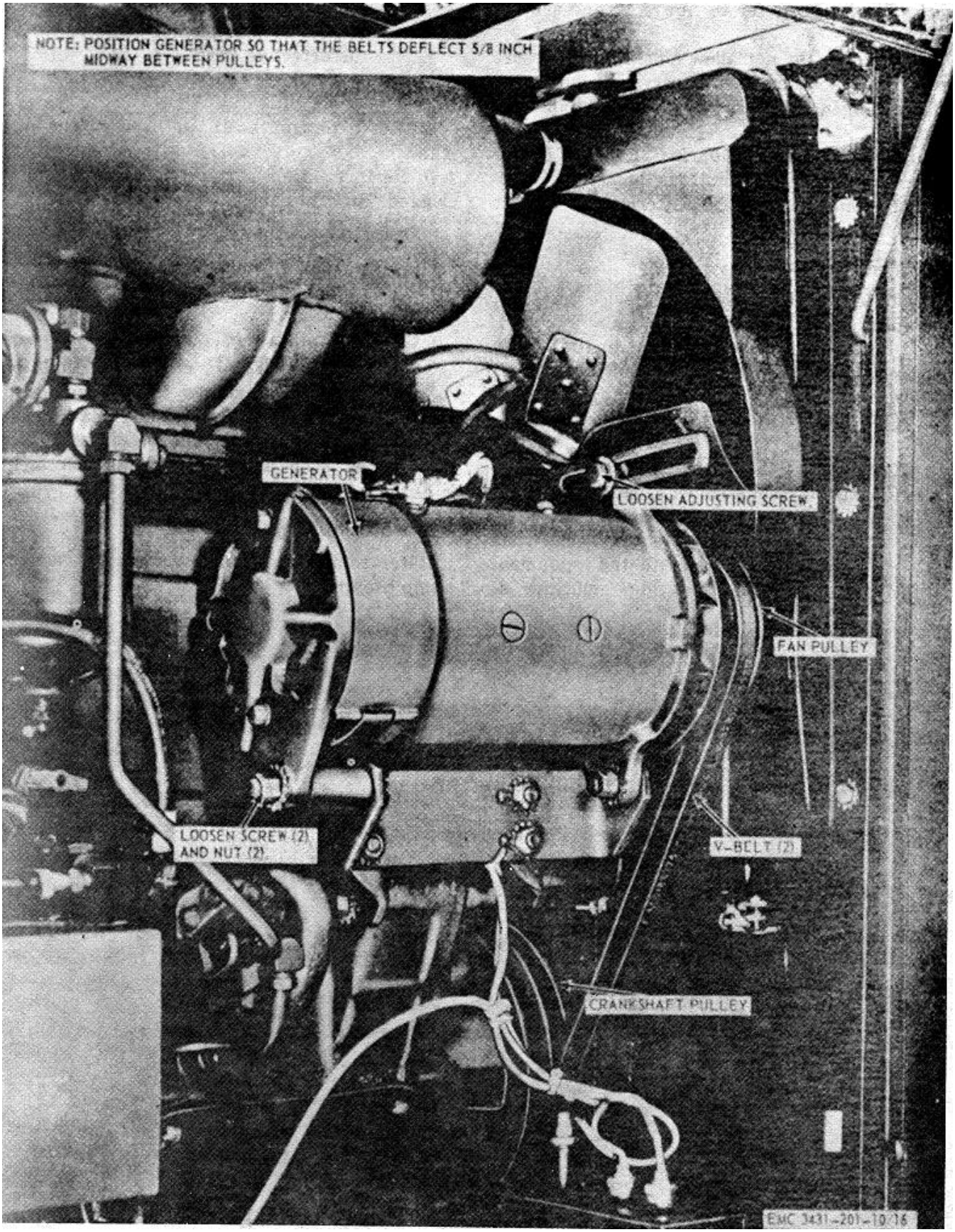


Figure 16. V-belt, adjustment.

b. Servicing. Refer to figure 17 and service the batteries.

Warning:

Do not allow smoking or the use of an open flame while servicing batteries. Batteries generate hydrogen, a highly explosive gas.

c. Removal and Installation. Refer to figure 17 and remove and install the batteries.

d. Cleaning. Clean the batteries and inspect for corrosion.

50. Fuel Strainer

a. Refer to figure 18 and service the fuel strainer.

b. Perform field expedient repairs on a clogged, unserviceable fuel strainer element as follows:

(1) Remove fuel strainer cover and gasket (fig. 18).

(2) Remove the element.

(3) Install fuel strainer cover and gasket.

Caution:

Performance of any field expedient repair creates a condition possibly dangerous to the equipment or personnel. A welding machine so repaired should be taken out of service as soon as possible for replacement of the defective parts.

51. Fuel Filter

a. Refer to figure 19 and service the fuel filter.

b. Perform field expedient repairs on a clogged, unserviceable fuel filter as follows:

(1) Remove the filter cover and gasket (fig. 19).

(2) Remove the element.

(3) Install the filter gasket and filter cover.

Caution:

Performance of any field expedient repair creates a condition possibly dangerous to the equipment or personnel. A welding machine so repaired should be taken out of service as soon as possible for replacement of the defective parts.

52. Vacuum Pump Breather

Refer to figure 20 and service the vacuum pump breather.

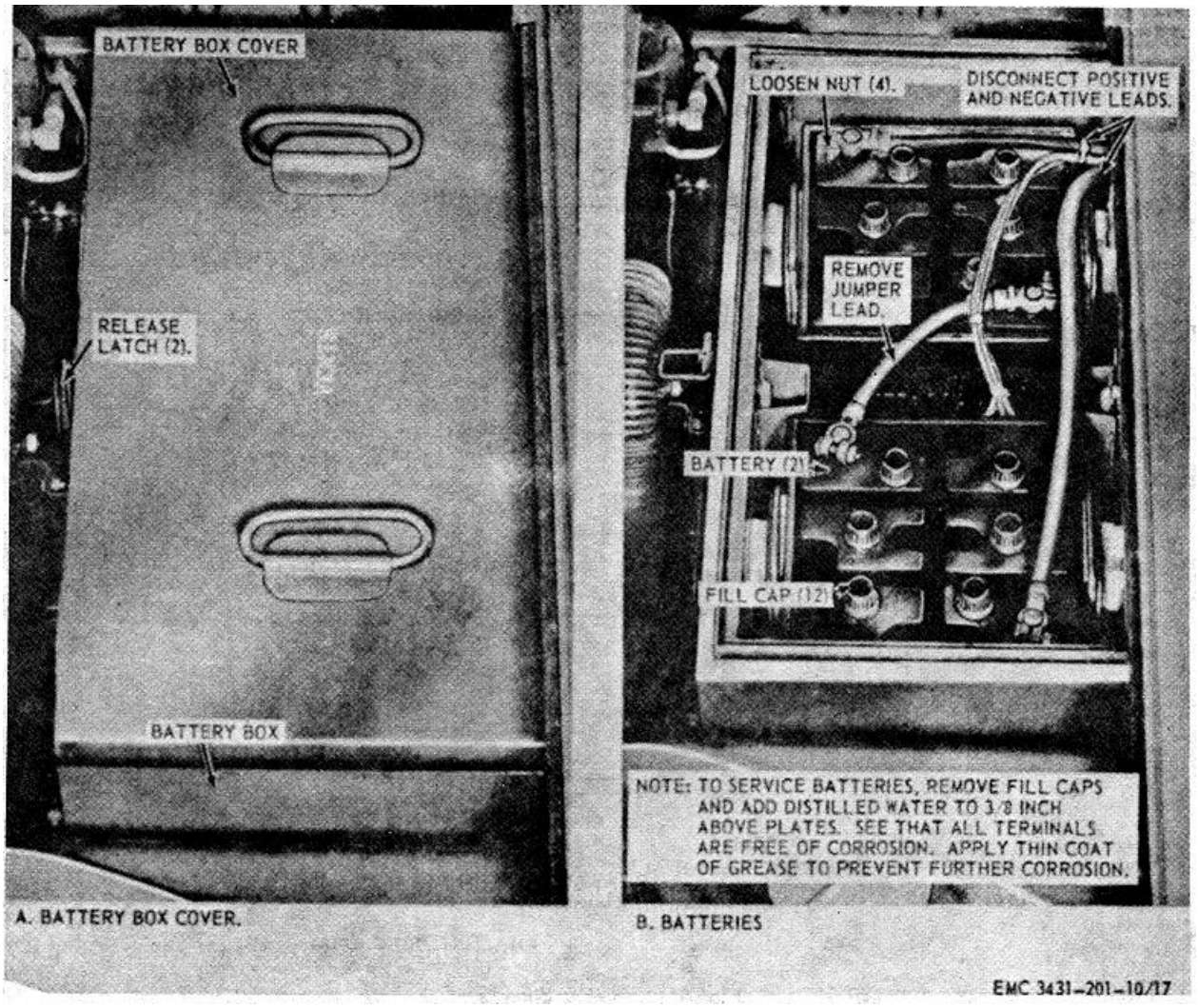


Figure 17. Batteries, service, removal, and installation.

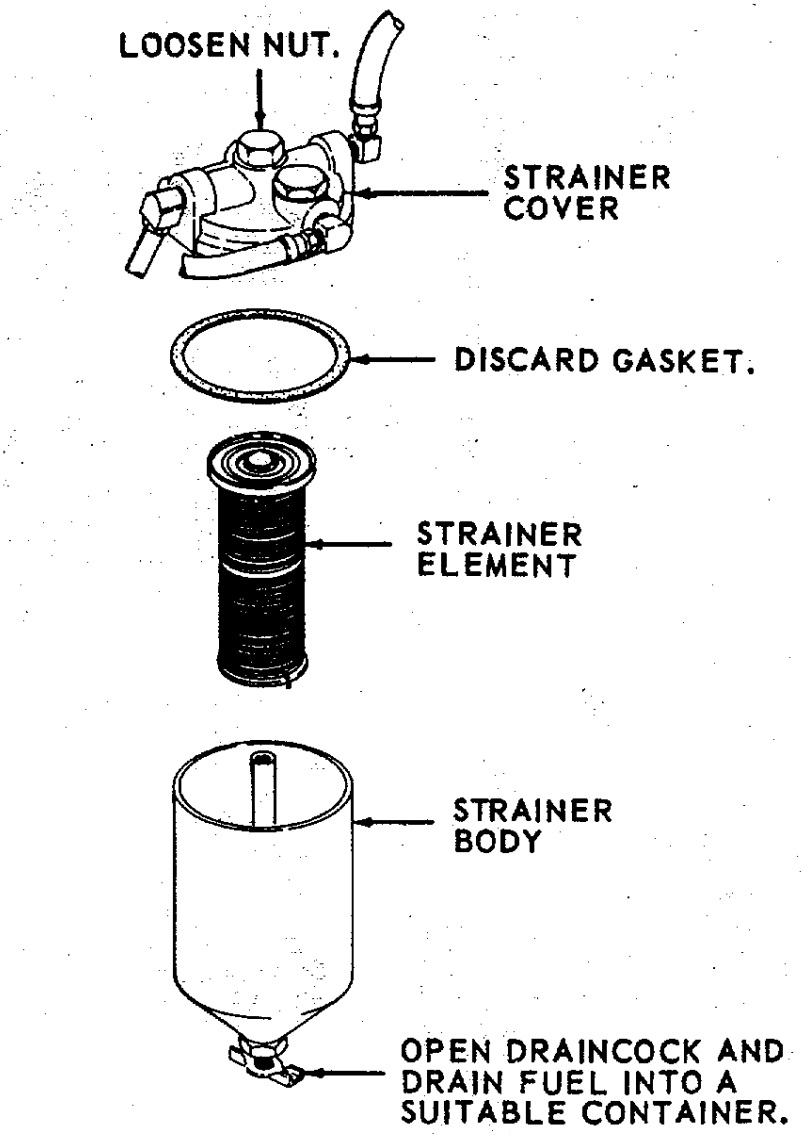


Figure 18. Fuel strainer, service.

NOTE: CLEAN FILTER COVER AND SHELL WITH AN APPROVED CLEANING SOLVENT AND DRY THOROUGHLY.

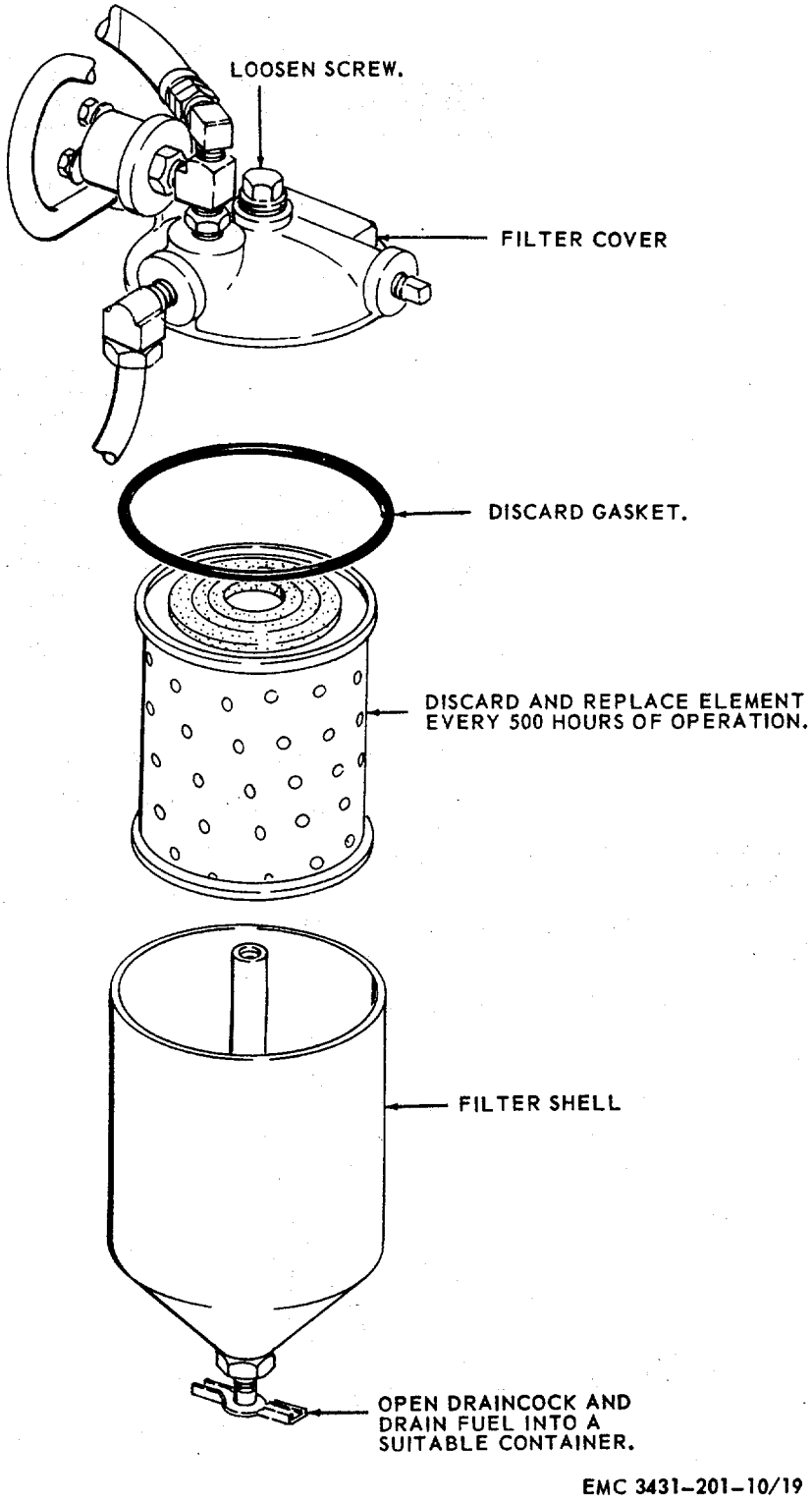


Figure 19. Fuel filter, service

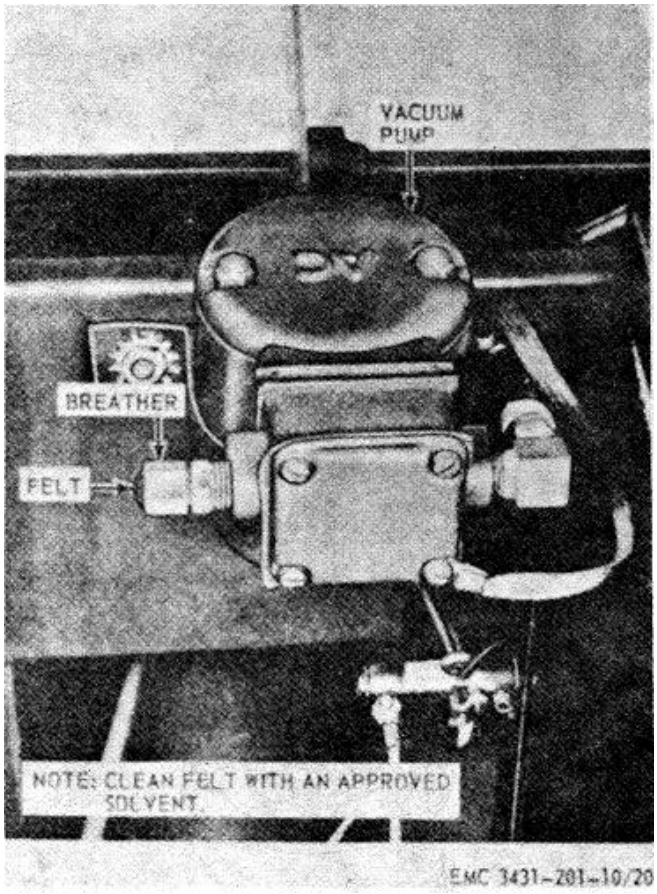


Figure 20. Vacuum pump breather, service.

Section VII. LAMPS AND FUSE

53. Control Panel Lamps and Healer Indicator Lamp

Remove and install lamps as shown by figure 21.

54. Fuse

Refer to figure 21 and remove and install the fuse.

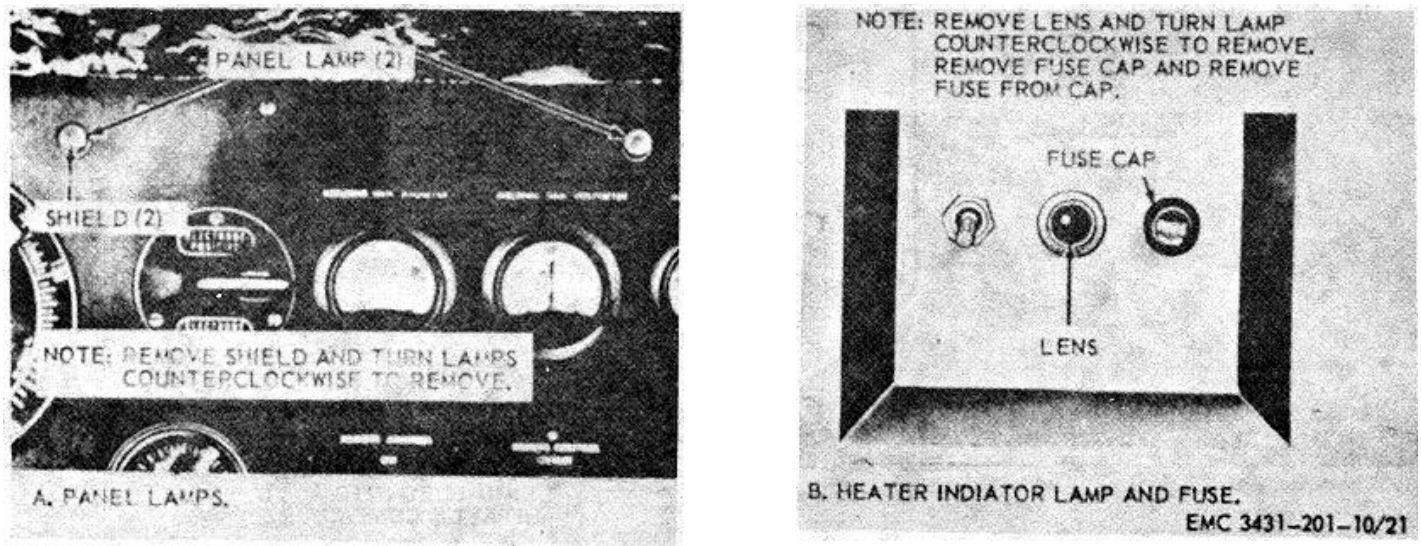


Figure 21. Panel lamps, heater indicator lamp, and fuse, removal and installation.

Section VIII. WINTERIZATION HEATER

55. General

The welding machine is equipped with a winterization heater to provide means of engine preheating, which is necessary for starting in extreme cold. The heater will also provide 24-hour standby heating so that the engine can be started at any time during extremely cold conditions. The heater is mounted on the skid frame at the rear of the set. The heater fuel system is equipped with an electric fuel pump that pumps filtered gasoline to the heater.

Caution:

The use of the engine heater causes a high current drain on the batteries. When the heater is being used frequently, start and run the welder daily to keep the batteries in a charged condition.

56. Fuel Pump

a. Refer to figure 22 and service the fuel pump filter.

b. Perform field expedient repairs on a clogged, unserviceable fuel pump as follows:

(1) Remove heater fuel pump cover and gasket (fig. 22).

(2) Remove screen.

(3) Install gasket and pump cover.

Caution:

Performance of any field expedient repair creates a condition possibly dangerous to the equipment or personnel. A unit so repaired should be taken out of service as soon as possible for replacement of the defective parts.

57. Fuel Tank Filter

a. Refer to figure 23 and service the fuel tank filter.

b. Perform field expedient repairs on a clogged, unserviceable fuel filter as follows:

(1) Remove the cover and gasket (fig. 23).

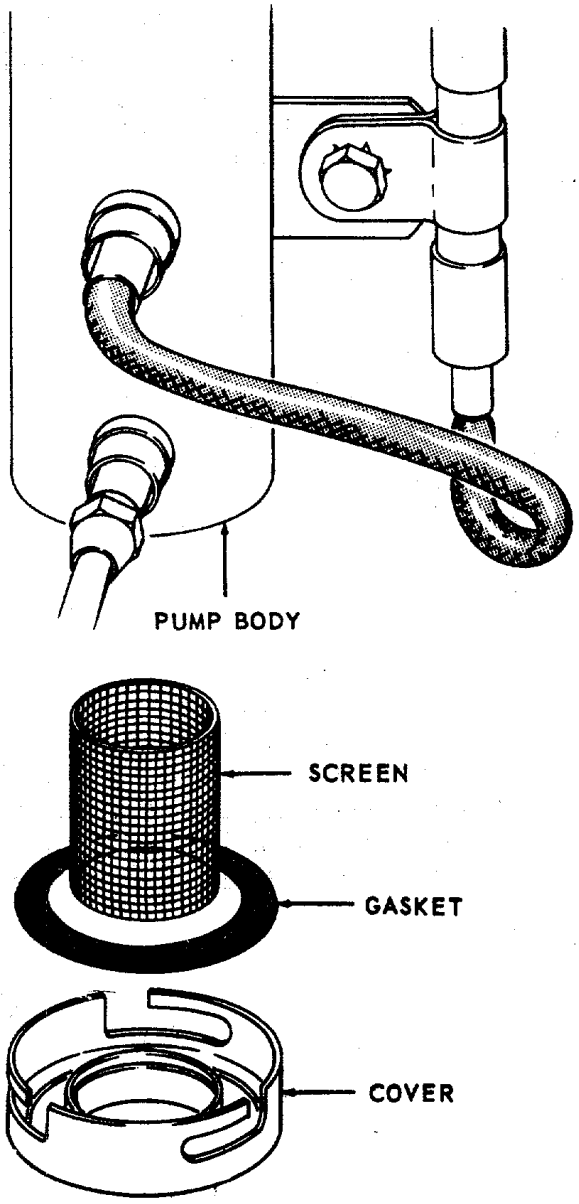
(2) Remove the knurled screw and filters (fig. 23).

(3) Install the knurled screw, gasket, and cover (fig. 23).

Caution:

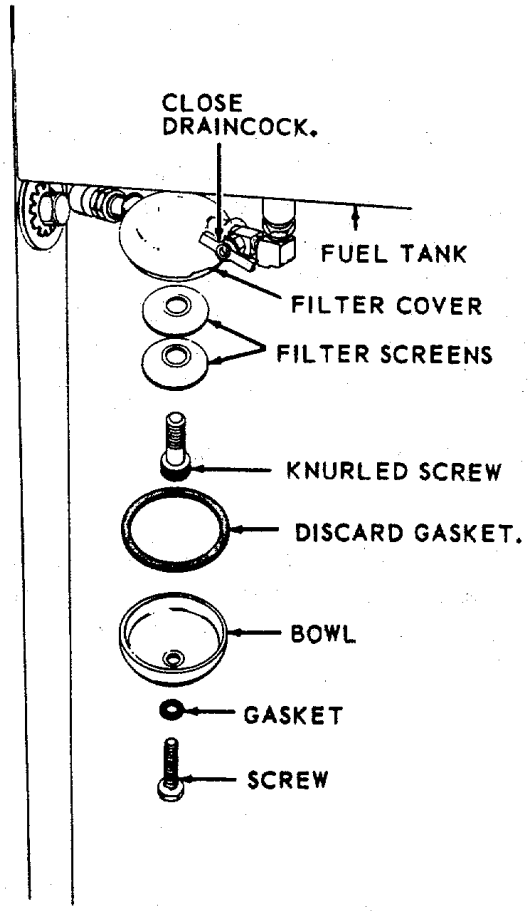
Performance of any field expedient repair creates a condition possibly dangerous to the equipment or personnel. A unit so repaired should be taken out of service as soon as possible for replacement of the defective parts.

NOTE: CLEAN SCREEN AND INSPECT GASKET EVERY 500 HOURS OF OPERATION. REPLACE GASKET AS NECESSARY.



EMC 3431-201-10/22

Figure 22. Heater fuel pump filter service.



NOTE: CLEAN FILTER COVER, SCREENS, AND BOWL WITH AN APPROVED CLEANING SOLVENT AND DRY THOROUGHLY.

EMC 3431-201-10/23

Figure 23. Heater fuel tank filter service.

CHAPTER 4

DEMOLITION OF WELDING MACHINE TO PREVENT ENEMY USE

58. General

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

59. Demolition to Render the Welding Machine Inoperative

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

(1) Fuel injector pump and engine crankcase.

(2) All fuel and oil lines.

(3) Starter and solenoid.

(4) Battery-charging generator.

Note.

The above steps are minimum requirements for this method.

(5) All controls and instruments.

b. Demolition by -Misuse. Perform the following steps to render the welding machine inoperative:

(1) Drain the radiator and engine crankcase. Pour sand, gravel, nuts, bolts, and screws into the radiator, oil filler pipe, fuel tank, and other openings.

(2) Remove the belts and block the emergency operations switches in the run position. Operate the engine until failure occurs.

60. Demolition by Explosives or Weapons Fire

a. Explosives. Place as many of the following charges (fig. 24) as the situation permits and detonate them simultaneously with a detonating cord and a suitable detonator.

b. Weapons Fire. Fire on the welding machine with the heaviest practical weapons available.

61. Other Demolition Methods

a. Scattering and Concealment. Remove all easily accessible parts such as the fuel injector pump, fuel and oil lines, starter and solenoid, and battery-charging generator. Scatter them through dense foliage, bury them in dirt or sand, or throw them in a lake, stream, or other body of water.

b. Burning. Pack' rags, clothing, or canvas under and around the unit. Saturate the packing with gasoline, oil, or diesel fuel and ignite.

c. Submersion. Totally submerge the welding machine in a body of water to provide water damage and concealment. Salt water will do greater damage to metal part. than fresh water.

62. Training

All operators should receive thorough training in the destruction of the welding machine. Refer to FM 5-25. Simulated destruction, using all of the methods listed above, should be included in the operator training program. It must be emphasized in training that demolition operations are usually necessitated by critical situations when time available for carrying out destruction is limited. For this

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

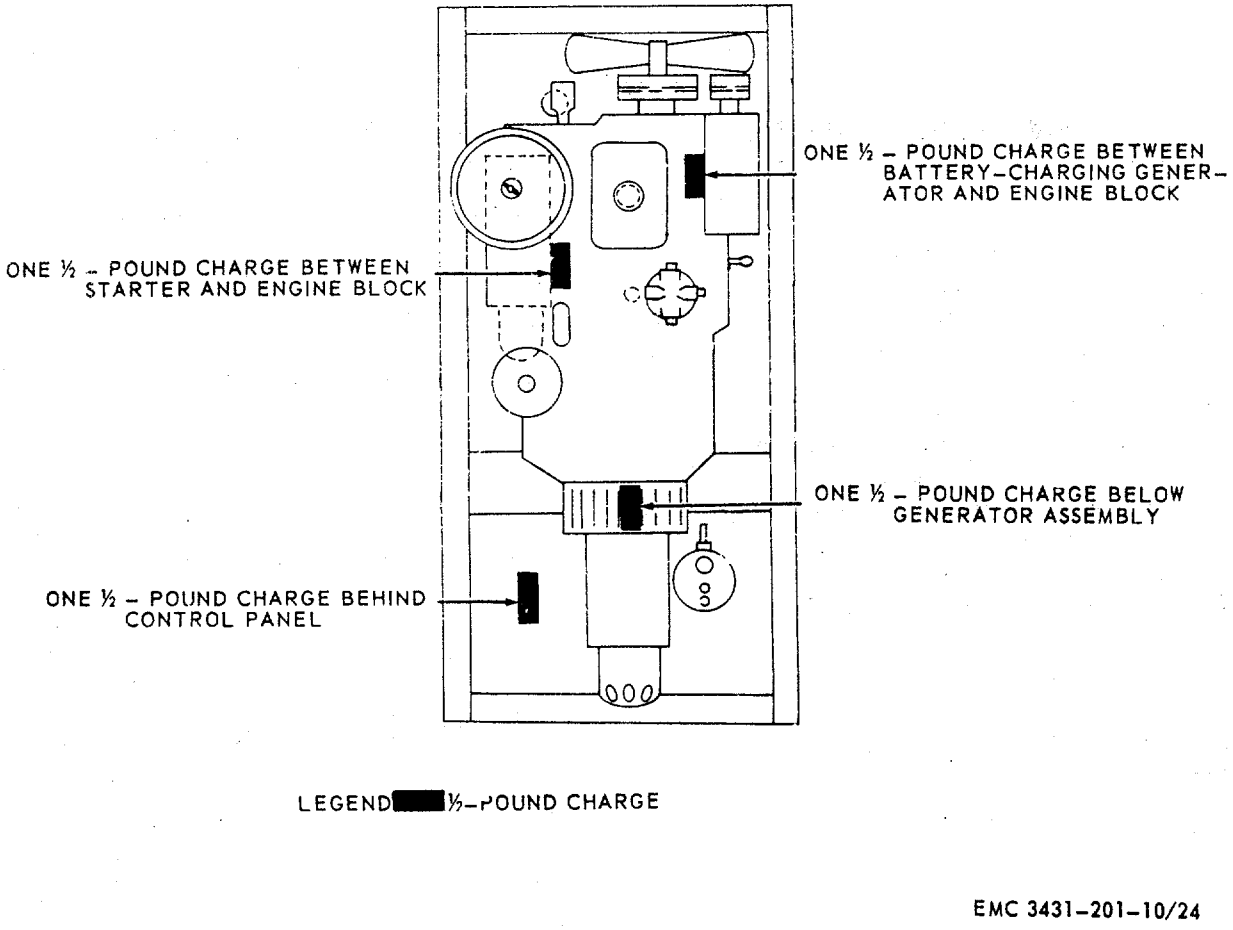


Figure 24. Placement of charges.

APPENDIX I
REFERENCES

1. Dictionaries of Terms and Abbreviations

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

2. Fire Protection

SB 5-111	Extinguisher, Fire, Monobromotrifluoromethane (CF_3Br) Charged, FSN 4210-555-8837
TM 5-687	Repairs and Utilities: Fire Protection Equipment and Appliances; Inspections, Operations, and Preventive Maintenance
TM 9-1799	Ordnance Maintenance: Fire Extinguisher

3. Lubrication

LO 5-3431-201-20	Welding Machine, Arc: Generator; Diesel Driven Single Operator; Remote Control; 300 Amp Dc Arc; Skid Mtd: 60 Amp 20 V Min, 375 Amp at 40 V Max, Current 115 V, 3 Kw Auxiliary Power (Libby Model ODW-300) W/GMC Engine Model 2056 Series 2-71

4. Preventive Maintenance

AR 750-5	Organization, Policies, and Responsibilities for Maintenance Operation
TB ENG 347	Winterization Technique for Engineer Equipment
TM 5-505	Maintenance of Engineer Equipment
TM 9-207	Operation and Maintenance of Ordnance Materiel in Extreme Cold Weather (0° to -65°F)
TM 9-6140-200-15	Storage Batteries: Lead-Acid Type

5. Publications Indexes

DA Pam 310-2	Index of Blank Forms
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders

6. Supply Publications

SM 10-1-C4-1 Petroleum, Petroleum-Base Products, and Related Material

7. Training Aids

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

APPENDIX II

BASIC ISSUE ITEMS

1. General

This appendix lists the accessories, tools, and publications required in 1st echelon maintenance and operation, initially issued with, or authorized for the welding machine.

2. Explanation of Columns

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

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

9-Ordnance Corps

10-Quartermaster Corps

12-Adjutant General's Corps

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

(a) P-applied to high-mortality repair parts which are stocked in or supplied from the technical service depot system, and authorized for use at indicated maintenance echelons.

(b) P1-applied to repair parts which are low-mortality parts, stocked in or supplied from technical services depots, and authorized for installation at indicated maintenance echelons.

(c)-X2-applied to repair parts which are not stocked. The indicated maintenance echelon requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization, such repair parts will be requisitioned with supporting justification through normal supply channels.

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

O-Organizational Maintenance
(1st and 2d Echelon)

b. Federal Stock Numbers. When a Federal stock number is available for a part, it shall be shown in this column, and used for requisitioning purposes.

c. Description.

(1) The item name and a brief description of. the part are shown.

(2) A five-digit Federal supply code for manufacturers and/or other technical services is shown in parentheses followed by the manufacturer's part number. This number shall be used for requisitioning purposes when no Federal stock number is indicated in the Federal stock number column.

Example: (08645) 86453

(3) The letters GE, shown in parentheses immediately following the description, indicate General Engineer supply responsibility for the part.

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

e. Expendability. Those items classified as nonexpendable are indicated by letters NX.

Items not indicated by NX are expendable.

f. Quantity Authorized, This column lists the quantities of repair parts, accessories, tools, or publications authorized for issue to the equipment operator or crew as required.

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

3. Index To Federal Supply Code for Manufacturers

36232--Lincoln Electric Co.
36024-Libby Welding Co.
83145-Wells, Martin, Inc.

4. Comments and Suggestions

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

Basic Issue Items List-Continued

Source Code												
Technical Service	Source	Maintenance	Recoverability	Federal Stock No.	Description	Unit of issue	Expendability	Quantity authorized	Quantity issued with equipment	Illustration	
										Fig.	Item
					GROUP 06-ELECTRICAL SYSTEM						
					0608-MISCELLANEOUS						
	P1	O	--	5935-258-9156	CONNECTOR, PLUG, ELECTRICAL	--	--	1	1		
					0612-BATTERIES						
9	P	O	--	6140-057-2554	BATTERY, STORAGE, 12 VOLT.	--	--	2	2		
3	P	O	--	6810-264-9063	SULPHURIC ACID, ELECTROLYTE.	GAL	-	4	4		
					GROUP 26-ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT AND TOOLS						
					2602.1-ACCESSORIES						
10	P	O	--	7520-559-9618	CASE, OPERATIONS AND MAINTENANCE PUBLICATIONS: cotton duck, water repellent, mildew resistant.	--	--	1	1		
					2602.2-COMMON TOOLS						
10	P	O	--	5120-240-5328	WRENCH, OPEN END, ADJUSTABLE; 8 in. lg.	--	--	1	1		
10	P	O	--	5120-278-1283	SCREWDRIVER, FLAT TIP, plastic handle, flared tip, 5/16 in. w, 6 in. lg blade.	--	--	1	1		
	P	O	--	5120-223-7396	PLIERS, COMBINATION: slip joint, w/cutter 6 in. lg.	--	--	1	1		
					2602.4-PUBLICATIONS						
12	--	--	--	----------	DEPARTMENT OF THE ARMY OPERATORS MANUAL TM 5-3431-201-10.	--	--	2	2		

Basic Issue Items List-Continued

Source Code											
Technical Service	Source	Maintenance	Recoverability	Federal Stock No.	Description	Unit of issue	Expendability	Quantity authorized	Quantity issued with equipment	Illustration Fig.	Illustration Item
					2602.4-PUBLICATIONS-Continued	--	--	1	1		
12	--	--	--	----------	DEPARTMENT OF THE ARMY LUBRICATION ORDER LO 5-3431-201-20.						
12	--	--	--	----------	DEPARTMENT OF THE ARMY ORGANIZATIONAL MAINTENANCE MANUAL TM 5-3431-201-20.	--	--	2	2		
12	--	--	--	----------	DEPARTMENT OF THE ARMY ORGANIZATION MAINTENANCE REPAIR PARTS AND SPECIAL TOOL LISTS TM 5-3431-201-20P.	--	--	2	2		
					GROUP 44-WELDING METALIZING, METAL HEATING AND PLATING EQUIPMENT						
					4406.4-CONNECTING DEVICES						
	P	O	--	6150-242-3717	CABLE, ELECTRICAL, 2/0, w/2 lugs, 20 ft.	--	--	1	1		
	P	O	--	6150-242-3716	CABLE, ELECTRICAL, 2/0, w/1 lug, 50 ft lg.	--	--	1	1		
	X2	O	--	5975-258-0126	CLAMP, GROUND, WELDING (36232) GC-500.	--	--	1	1		
	X2	O	--	3439-238-1638	HOLDER, ELECTRODE (83145) 3 TW	--	--	1	1		
	X2	O	--	----------	BOX ASSEMBLY, REMOTE CONTROL: (36024) 432A-1236	--	--	1	1		
					GROUP 76-FIRE FIGHTING EQUIPMENT						
					7603-FIRE EXTINGUISHERS						
	P1	O	--	4210-223-9915	EXTINGUISHER, FIRE, carbon dioxide, 15 lb.			(SEE NOTE)			
	P1	O	--	4210-555-8837	EXTINGUISHER, FIRE monobromotrifluoromethane CF_3.Br.			1	1		

Note. Requisition CTC/CO_2 extinguisher until Depot Stocks are exhausted.

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    Rock Island Engr Dist (1)
    St Louis Engr Dist (1)
    St Paul Engr Dist (1)
Div Engr Dist (2) except
    Lower Miss Valley Div Engr (none)
    North Central Div Engr (none)
Engr Fld Maint Shops (2)
Engr Dep Maint Shops (2)
USAERDL (3)
Engr Cen (5)
AMS (3)
USA Engr Proc Ofc (10)
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ESCO (10)
Fld Comd, DASA (8)
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USAREUR Engr Sup Con Agcy (10)
USAREUR Engr Proc Cen (2)
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MAAG (1)
JBUSMC (1)
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    5-279 (2)

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DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 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 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 025489-000