DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, FIELD AND DEPOT MAINTENANCE MANUAL WELDING MACHINE, ARC GENERATOR; ELEC MOTOR DRIVEN; AC 220V, 3-PHASE, 60 CYCLE, SINGLE OPERATOR; REMOTE CONTROL; 300 AMP, DC ARC; WHEEL MOUNTED, 4 WHEEL, STEEL TIRES; 60 AMP AT 20V, MIN, 375 AMP AT 40V MAX CURRENT (LIBBY MODEL LA 300) FSN 3431-081-8059

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1963

SAFETY PRECAUTIONS

Before Operation

Be sure to wear proper clothing, eye and facing area is removed or protected to prevent fires and bodily injury.

Be sure to wear proper clothing. eye and face shield before attempting a welding operation. The flash of the welding arc can cause serious injury to the eyes and severe burns to the skin.

Enclose the welding area with curtains to prevent eye injury to personnel within the adjacent areas.

During Operation

Do not raise the face shield during welding operation. Serious injury to the eyes could result.

Do not attempt to handle welded items unless hands are protected. A serious burn could result.

After Operation

Never disconnect the electrical connection from the source of supply during rotation of the armature. Serious bodily burn could result.

Use proper material and extra caution while cleaning the commutator so that injury to personnel will be prevented.

CHANGE
No. 1

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

Operator, Organizational, Field and Depot Maintenance Manual

WELDING MACHINE, ARC; GENERATOR; ELECTRIC-MOTOR

DRIVEN; AC, 220V, 3-PHASE, 60 CYCLE, SINGLE OPERATOR;

REMOTE CONTROL; 300 AMP, DC ARC; WHEEL MOUNTED,

4 WHEELS, STEEL TIRES; 60 AMP AT 20V, MIN, 375 AMP AT

40V MAX CURRENT (LIBBY MODEL LA300)

PSN 3431-081-8059

TM 5-3431-207-15, 27 August 1963 is changed as follows:

Page 3. Paragraph Id is superseded as follows:

d. You can improve this manual by calling attention to errors and by recommending improvements, using DA Form 2028 (Recommended Changes to Publications) or by a letter, and mail directly to Commander, U. S. Army Mobility Equipment Command, ATTN: AMSME-MPP, St. Louis, Mo., 63120. A reply will be furnished directly to you.

Page 42. Appendix III is superseded as follows:

APPENDIX III

BASIC ISSUE ITEMS LIST AND ITEMS

TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

1. Scope

This appendix lists 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 alphabetic abbreviation indicating the amount or quantity

of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

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

f. Quantity Authorized (Items Troop I' stalled or Authorized). This column indicate 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	(6) Qty Auth
	7520-559-9618	CASE, Maintenance and Operation manual		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. 182) organizational maintenance requirements for Welding.

TECHNICAL MANUAL
No. 5-3431-207-15

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 27 August 1963

Operator, Organizational,

Field, and Depot Maintenance Manual

WELDING MACHINE, ARC: GENERATOR; ELEC MOTOR DRIVEN; AC, 220V, . PHASE, 60 CYCLE; SINGLE OPERATOR; REMOTE CONTROL; 300 AMP, DC ARC; WHEEL MTD, 4 WHEEL, STEEL TIRES; 60 AMP AT 20V MIN, 375 AMP AT 40V MAX CURRENT (LIBBY MODEL LA 300) FSN 3431-81-8059

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the use of personnel to whom the Model LA-300 Arc Welding Machine is issued. The instructions contained herein provide information on the operation, lubrication, maintenance, and overhaul procedures for the equipment.

b. Appendix I, contains a list of Publications applicable to this manual. Appendix II, contains the Maintenance Allocation Chart which lists the Maintenance and Repair Operations authorized for all echelons of responsibility and shall be strictly adhered to. Appendix III, contains the Basic Issue Items Lists.

c. Numbers in parentheses on the 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 Mobility Support Center, ATTN: SMOMS-MM, P. O. Box 119, Columbus, Ohio 43216. 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

DA Form 2258 Depreservation Guide of Engineering Equipment

For other record and report forms applicable to The Operator, Crew, and Organizational Maintenance refer to TM 38750.

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 welding machine (fig. 1 and 2) Model LA-300, is a self-contained, trailer mounted, semi-enclosed unit and is, excluding the controls, completely winterized. The welding machine is equipped with the necessary controls, instruments, and accessories for operation. All accessories and controls which are mounted on top of the welding machine are readily accessible. The unit is equipped with one towing arm attached to one end and a lifting eye located on top of the machine.

b. Motor-Generator. The motor-generator is an electric A.C. unit with a D.C. output made by Lincoln Electric Co. The unit is rated at a nominal 300 amperes at 40 volts while operating at a 60 percent duty cycle. The A.C. motor is protected by a special protective device operated by both temperature and current. This device, consisting of two current transformers and two thermostats mounted on the laminations of the motor frame, gives protection against burn-out of the motor from all usual causes. Protection is assured against burn-out if the windings reach a maximum safe operating temperature from any cause too frequent overloads, high room temperature plus overload, abnormally high or low voltage, or abnormally high current due to single phase or unbalanced phase conditions. The thermostats automatically reset when the motor returns to a safe temperature and no manual operations are required to restart the machine except pushing the start button.

c. Control Panel. The control panel (fig. 3) contains all the switches and indicators necessary for the operation of the unit. Included in this group are the job selector, current control, remote switch, current volt-amp meter, circuit breaker and polarity switch. Also included on the control panel is the push-button starter switch.

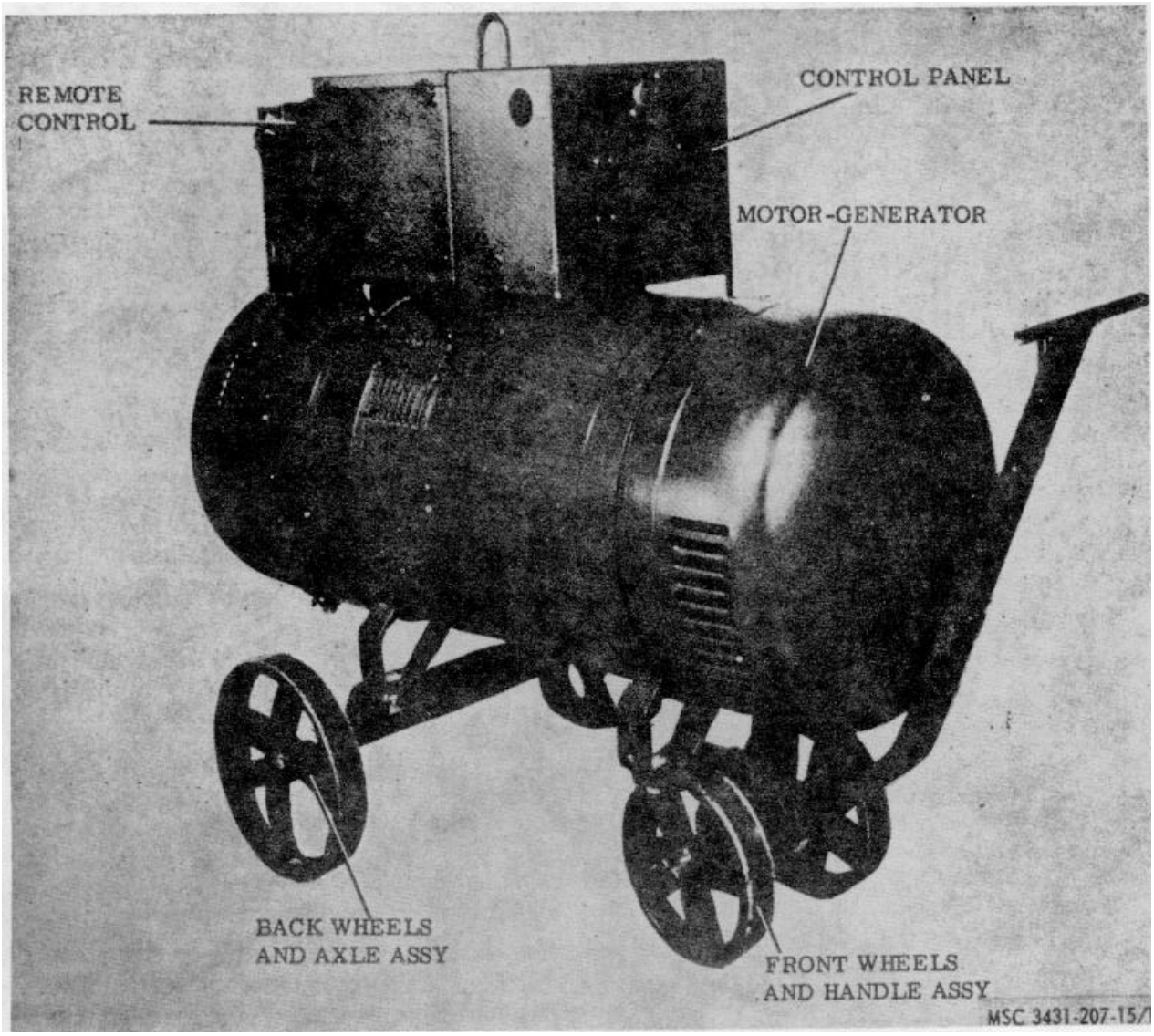

Figure 1. Welding machine, right front three-quarter view.

4. Identification and Tabulated Data

a. Identification. The Welding Machine has a Manufacturer's Identification Plate (fig. 4) and U.S. Army Corps of Engineers Identification Plate, located on the Motor Generator

b. Tabulated Data.

(1) *Welding machine*

Manufacturer.....	Libby Welding Co., Inc.
Model.....	LA-300

(2) *Motor-generator.*

Manufacturer.....	The Lincoln Electric Co.
Model.....	SAE 300
Type.....	A.C. with D.C. output
Speed	1800 RPM

(3) *Welder.*

Manufacturer.....	The Lincoln Electric Co.
Rating	300 Amperes at 40 Volts
Duty Cycle	60%
Voltage.....	220 or 440 Volts
Type.....	3 phase

(4) *Wiring diagram.*

The electrical connection wiring diagram can be seen in figure 5.

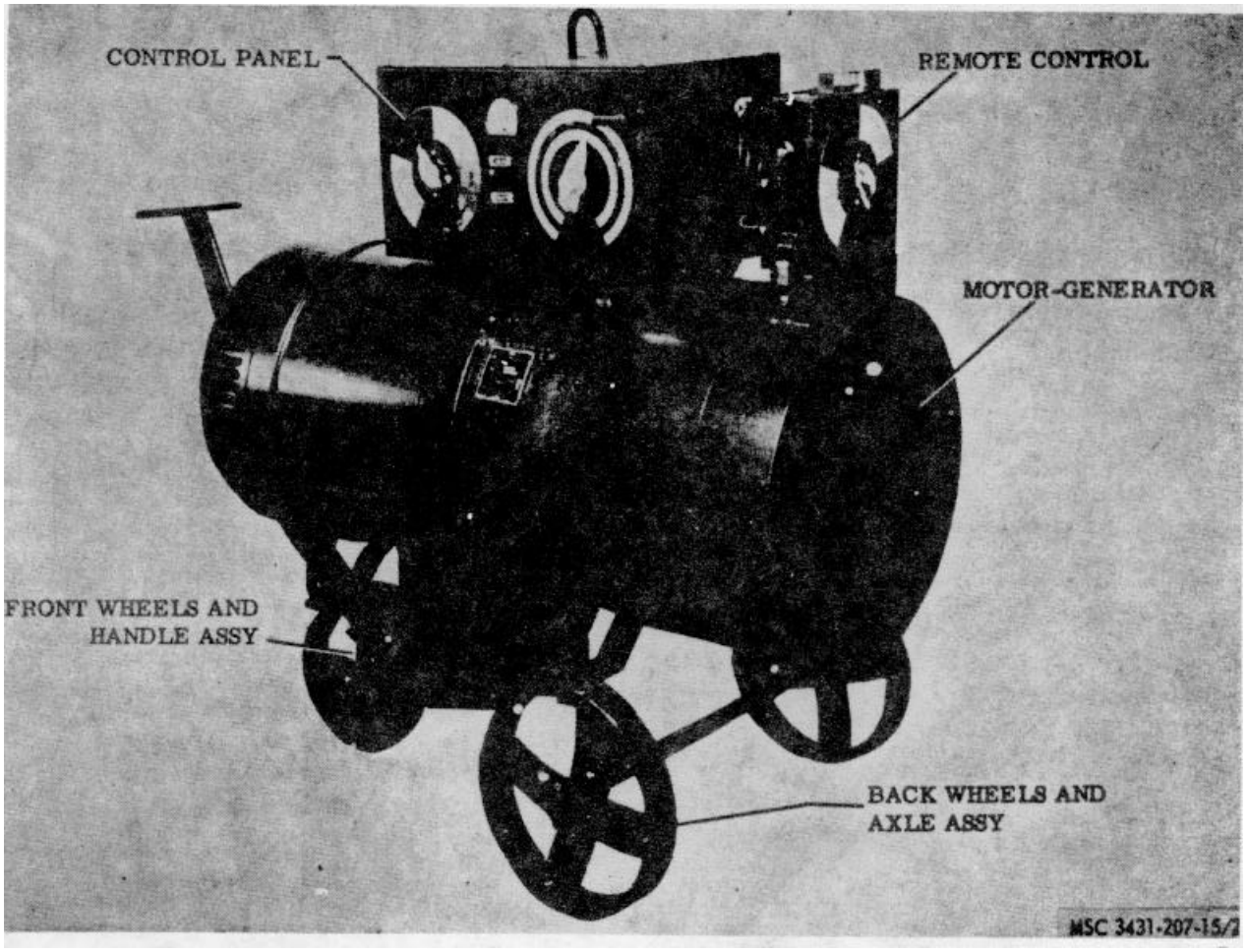

Figure 2. Welding machine, left rear, three-quarter view.

(5) *Maintenance and operating supplies.*

There are no lubricants necessary for the initial operation of this unit.

(6) *Shipping dimensions.*

The welding machine is 58 1/16 inches long, 20 1/8 inches wide, 47 3/8 inches high and weighs 1193 pounds.

5. Difference in Models

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

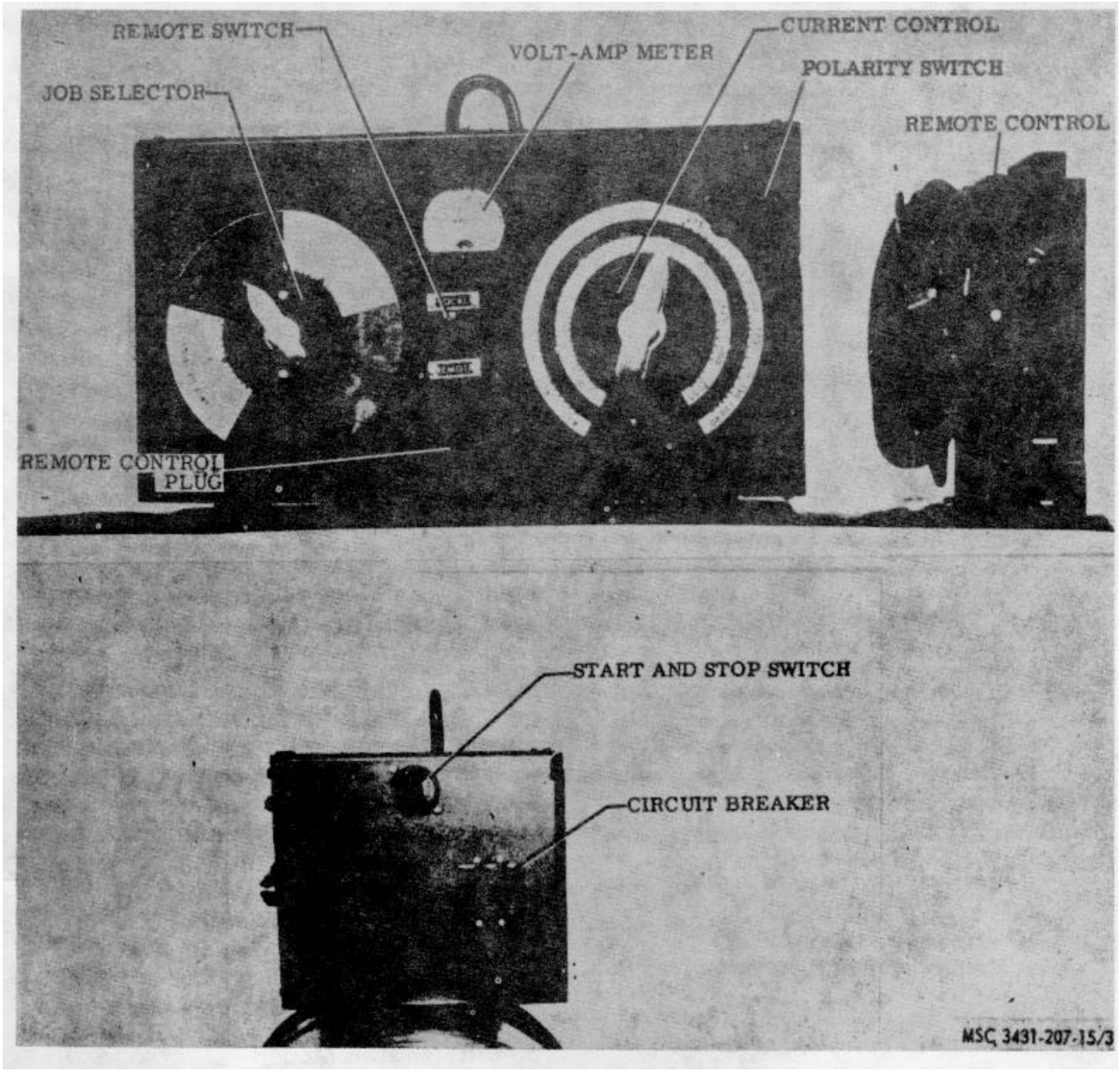

Figure 3. Control panel

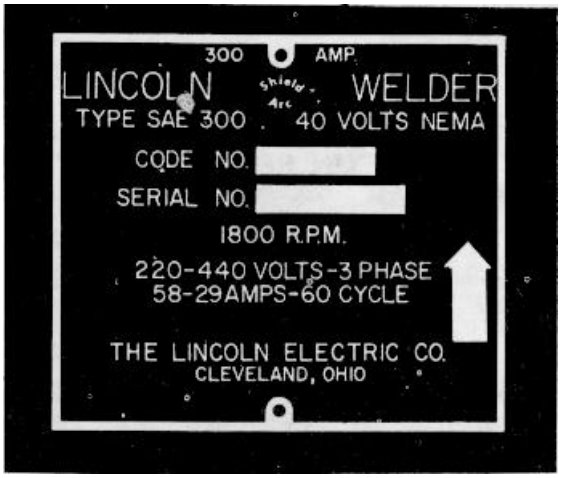

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Figure 4. Identification plate

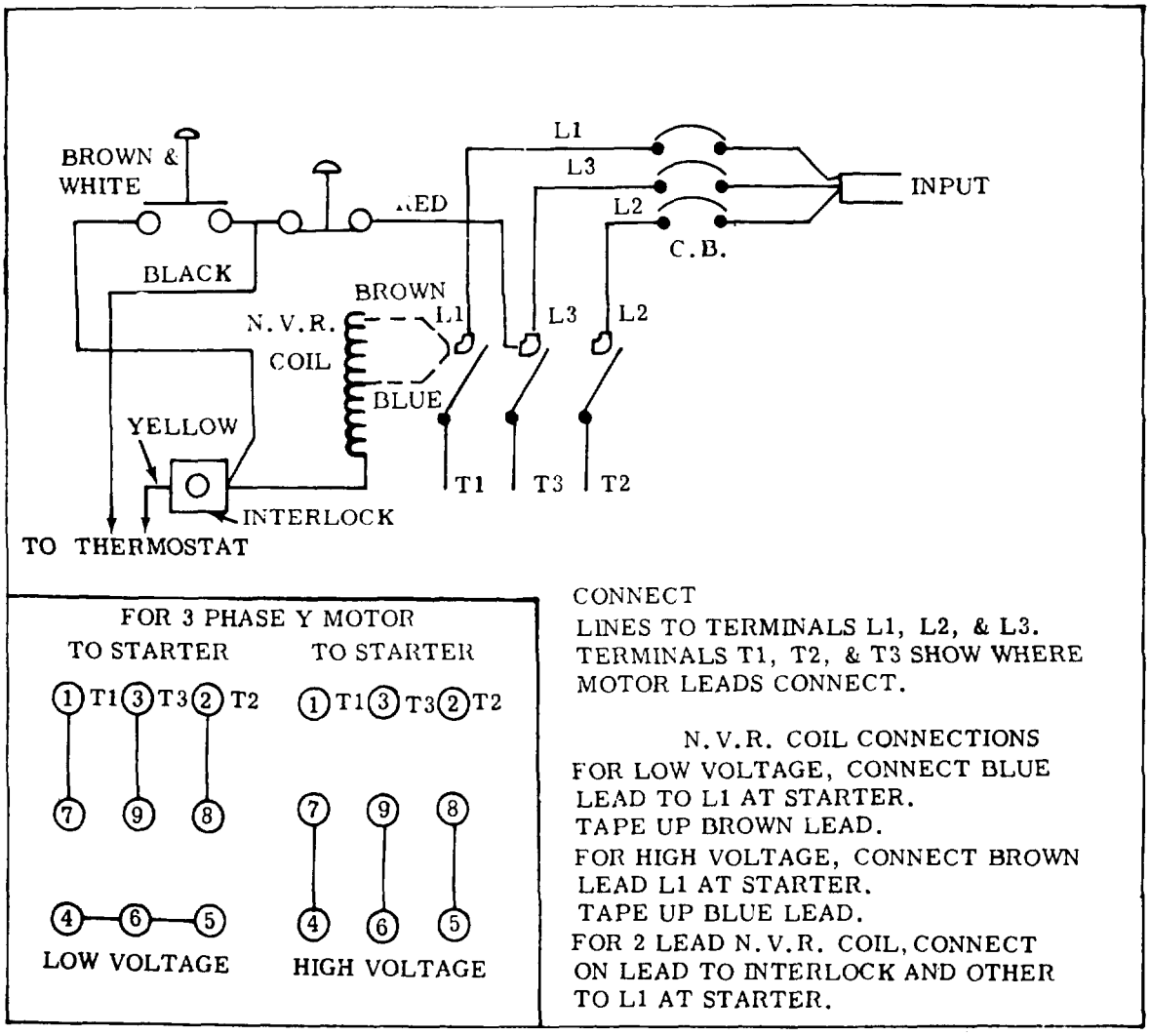

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Figure 5. Wiring diagram, electrical connection.

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

6. Unloading and Unpacking Equipment

a. blocking or strapping securing welding machine to floor of carrier.

b. If an overhead hoist or crane is available, place sling around crate and lift from carrier. If the welding machine is not crated, attach lifting cable to the lifting eye located on top of the machine. If hoist or crane is not available, unload crates with fork lift or slide crates down a ramp. Use a snubbing rope to avoid injury to personnel or equipment. If machine is uncrated let it roll down a ramp backwards, using snubbing rope to control speed and towing arm to guide it.

c. The equipment should be carefully uncrated and all parts laid out for checking. The use of pinch bars or anything which might injure the mechanism while uncrating MUST BE AVOIDED. Disassembly of the wooden crate may be accomplished by simply removing all sides very carefully. Remove the attachments which hold the wheels and towing tongue to the sides of the crate.

d. Prepare the machine for inspection and operation as outlined on DA Form 2258, attached on or near the operator's control panel.

7. Inspection and Servicing Equipment

a. Inspection.

(1) Make a general inspection of the entire welding machine. Inspect the packing list to insure 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 and defective electrical connections or insulation. Exercise extreme care when inspecting used equipment.

(3) Material which has been damaged in shipment should be laid to one side and the attention of the Shipment Department called to it, so that proper claims may be made against the transportation company.

b. Servicing.

(1) Blow out the welder and controls with an air hose at least once every two months--once every week in dirty locations --with low air pressure to avoid driving dirt into insulations.

(2) Starting switches on electrically driven machines should be inspected every six months. Any accumulated dirt or dust should be brushed or blown off the insulating parts.

(3) Keep electrode and ground connections tight.

(4) Grease should be cleaned from the welding machine with an approved cleaning solvent.

8. Installation of Separately Packed Components

a. Remote Control.

(1) Remove the remote control unit (fig. 6) from the shipping crate.

(2) Blow off the remote control unit with a low pressure air hose.

(3) Place the unit in its correct position on the motor-generator.

(4) Secure the suitcase type clips in order to stabilize the unit.

(5) When in use, the unit is removed from its mounting, plugged into the remote control plug and set at the desired setting.

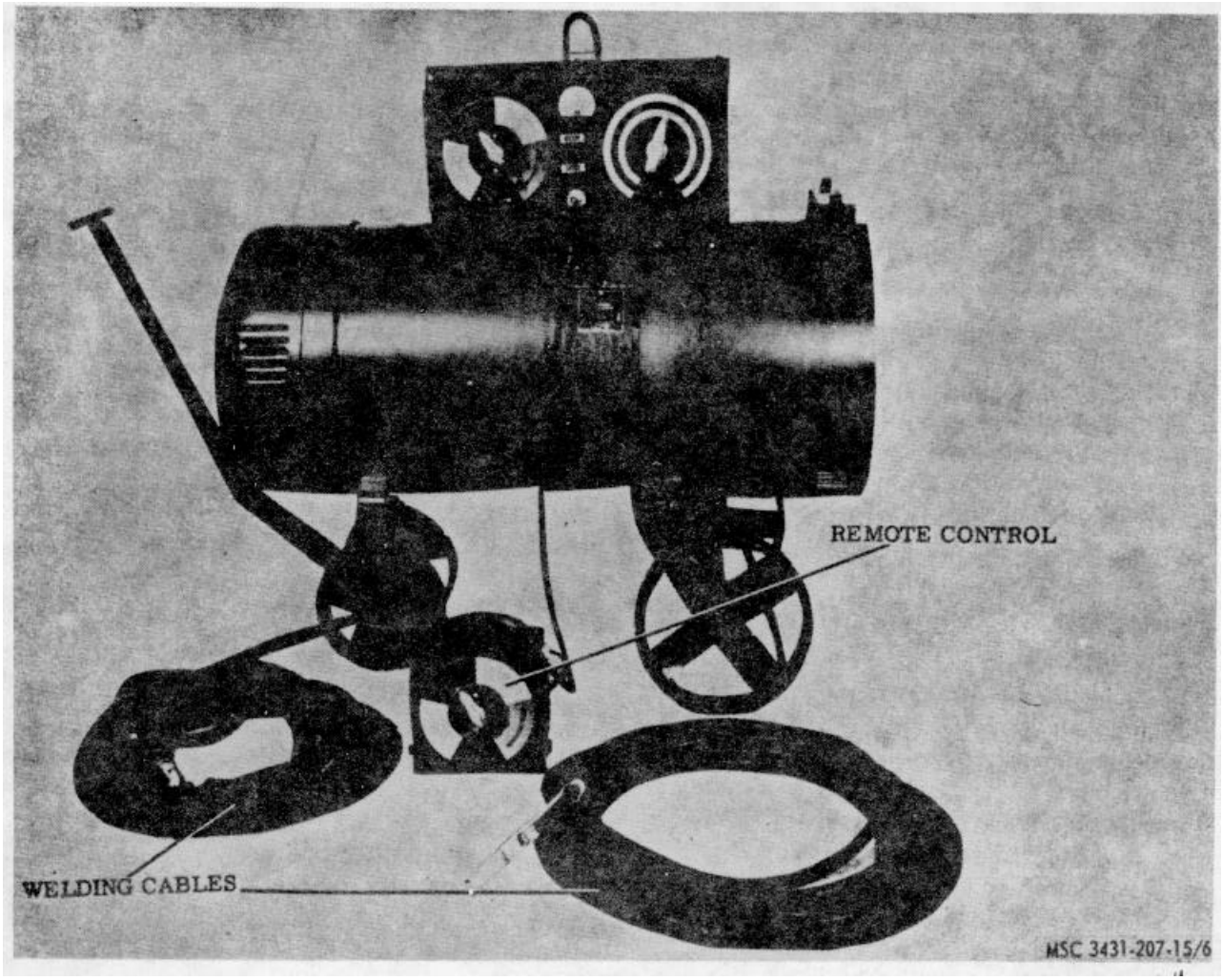


Figure 6. Welding cables and remote control.

b. Cables.

(1) Remove the cables (fig. 6) from the shipping crate.

(2) Wipe off the cables with a clean rag.

(3) Check the ground and electrode holder connections and tighten if necessary.

(4) Plug in the cables in their correct location.

9. Installation or Setting-Up Instructions

a: Location. The welding machine should, if possible, be located in a clean, dry and well ventilated place using the same discretion that you would in locating any piece of electrical apparatus. It should be set on a foundation as free from vibration as practical. If it becomes necessary to locate the unit on soft or muddy ground, arrange a foundation of planks or logs to prevent the unit from settling or sticking. The unit should be as level as possible at all times. Whenever possible, position the welding machine as close and as convenient to the work so that short cables can be used.

b. Indoor Installation. When the welding machine is to be installed in an enclosed area, 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 suitable shields for the extension where it passes through flammable walls.

Section II. MOVEMENT TOA NEW WORK SITE

10. Dismantling for Movement

a. Preparation for Movement.

(1) Disconnect all electrical power leading to the welding machine.

(2) Disconnect welding cables and remote control, if used. (fig. 6.)

(3) 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 for short distances. Secure a suitable towing device to the towing tongue and proceed to a new work site.

c. Long Distance Movement. The welding machine may be recrated and shipped by a transportation company to a new long distance work site.

11. Reinstallation After Movement

The welding machine should be installed or set up after movement in accordance with procedures outlined in paragraph 9.

Section III. CONTROLS AND INSTRUMENTS

12. 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.

13. Job Selector

a. Location. The job selector (fig. 3) is located in the center left hand side of the control panel.

b. Purpose. Varies the voltage of the welding motor-generator.

14. Remote Switch

a. Location. The remote switch (fig. 3) is located directly in the center of the control panel.

b. Purpose. Switches the control of the open circuit voltage of the welding motor-generator from the current control on the control panel to the remote current control.

15. Welding Motor-Generator Volt-Amp Meter

a. Location. The motor-generator volt-amp meter (fig. 3) is located in the upper center of the control panel.

b. Purpose. Indicates the output voltage, amperage, and polarity of the motor-generator.

16. Current Control

a. Location. The current control (fig. 3) is located on the center right hand side of the control panel.

b. Purpose. Varies the current output of the welding motor-generator.

17. Remote Control Unit

a. Location. The remote control unit (figure 3) is mounted on top of the motor-generator just to the right of the control panel.

b. Purpose. Varies the voltage of the welding motor-generator.

18. Motor Start and Stop Switch

a. Location. The motor start and stop switch (figure 3) is located around and to the left of the control panel facing the front of the welding machine.

b. Purpose. To start or stop the current flow directed to the motor-generator thus causing the machine to run or stop running.

19. Circuit Breaker

a. Location. The circuit breaker (fig. 3) is located around and to the left of the control panel just below the motor start switch.

b. Purpose. Serves as an overload protection for the motor-generator.

Section IV. OPERATION OF EQUIPMENT

20. General

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

b. The operator must know every operation of which the welding machine is capable. This section gives instructions on starting, stopping and various operations of the welding machine.

21. Starting

a. Preparation for Starting.

(1) Check and then connect all cable leads to the welding machine.

(2) Connect the machine to the correct source of power.

b. Starting the Motor-Generator.

The machine may be started by simply pushing the start button.

Caution: **Once the machine is started, the direction of rotation should be checked immediately with the manufacturer's instructions or directional arrow. On three-phase motors such as this Model LA-300, direction of rotation may be changed by interchanging any two input leads.**

22. Stopping

The machine may be stopped by simply pushing the stop button.

Caution: **If the welder is suddenly disconnected from the line, the thermostats have undoubtedly tripped and .the trouble should be located at once. The thermostats automatically reset when the motor returns to a safe temperature and no manual operations are required to restart the machine except pushing the start button.**

23. Operation Under Usual Conditions

a. D. C. Welding Machine.

(1) Attach welding cables to welding generator output studs.

(2) Attach lug end of work cable to work terminal and clamp end to work metal.

(3) Attach lug end of electrode cable to electrode terminal.

(4) Place polarity switch (fig. 3) in up or down position and check the polarity of the electrode.

(5) Place job selector (fig. 3) in proper position for weld to be made.

(6) Set current control (fig. 3) so that colored arrow on handle corresponds with the color at which the job selector is set.

(7) Use the portable job selector for remote work as shown in figure 6.

b. Welding Methods.

(1) When welding in the vertical and overhead position, the operator should have a strong digging are for penetration and a cool arc to let the molden metal solidify. With the job selector set in the red section for a medium-low open-circuit voltage (overhead and vertical setting), the 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 downhand or for sheet metal application. no change of current is desired. During welding for this purpose, the job selector should be set in the black section for a medium-high open-circuit voltage(normal welding range). Little current range will result from lengthening or shortening the arc when the job selector is in this position.

(3) When a "rubbery" arc or large electrodes and high currents is desired for the

welding operation. the job selector should be set in the yellow section for a high open-circuit voltage (large electrode range).

(4) For special jobs requiring the smallest size of electrodes and very low current values, the job selector should be set in the special applications section for a low open-circuit voltage.

Warning: **Do not perform any welding operation without a welders helmet. The flash of the welding arc can cause injury to the eyes.**

(5) The approximate current range for bare and lightly coated electrodes is shown in Table I. Table II gives similar information for gaseous and slag types of electrodes.

Table I. Current Setting Range for Bare or Lightly Coated Electrodes

Electrode diameter (in.)	Current minimum (amps)	Electrode maximum (amps)	Lengths (in.)
3/32	70	90	11 1/2
1/8	110	135	14 or 18
5/32	150	180	14 or 18
3/16	180	220	14 or 18
1/4	250	300	14 or 18
5/16	300		14 or 18

Table II. Comparison of Current Used with Gaseous and Slag Types of Electrodes

Electrode diameter (in.)	Gaseous types		Slag type
	Flat position (amps)	Vertical and Overhead position (amps)	fiat position (amps)
3/32	60	60	
1/8	120	110	130
5/32	150	140	160
3/16	175	160	200
1/4	200		300
5/16	325		400

c. 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. 3) in the OFF position.

(2) Start the motor-generator in accordance with paragraph 21.

(3) Place the polarity switch in the up or down position as required.

(4) Set the job selector (fig. 3) to the desired voltage.

(5) Set the current control (fig. 3) to the desired amperage.

(6) Strike an arc.

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

Warning: **Do not adjust welding controls while maintaining arc.**

(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.

24. Operation Under Unusual Conditions

a. Operation in Extreme Cold (Below 0º F.)

(1) Before starting the machine, disconnect its source of electrical power and wipe the electrical components free of ice and moisture. Do not disturb the wiring as it becomes brittle with extreme cold.

(2) Connect the welding machines source of the electrical supply.

(3) Start motor-generator in accordance with paragraph 21.

(4) Begin usual welding operations.

b. Operation in Dusty or Sandy Areas.

(1) When the installation is permanent, erect a protective cover for it. When a temporary installation is made, take advantage of natural barriers as much as possible. Keep the unit as clean as possible, paying special attention to the control panel.

(2) Connect the welding machines source of electrical supply.

(3) Start motor-generator in accordance with paragraph 21.

(4) Begin usual welding operations.

c. Operation Under Wet or Humid Conditions.

(1) 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 a canvas. Remove the covering during dry periods and allow the unit to dry thoroughly.

(2) Connect the welding machines source of electrical supply.

(3) Start motor-generator in accordance with paragraph 21.

(4) Begin usual welding operations.

d. Operation in Salt Water Areas.

(1) 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.

Warning: **Be sure welder and all components are thoroughly dry before attaching to power supply.**

(2) Coat all exposed polished surfaces with an approved rust proofing material or cover parts with a thin coat of grease. All exposed nonpolished surfaces may be coated with a thin layer of grease.

(3) Connect the welding machines source of electrical supply.

(4) Start motor-generator in accordance with paragraph 21.

(5) Begin usual welding operations.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND LUBRICATION

25. Special Tools and Equipment

No special tools or equipment are required by the operator or the organizational maintenance personnel for the performance of the maintenance instructions described in this section.

26. Lubrication

There are no lubricants or lubrications necessary for the initial operation of this unit.

Note **Appendix II, contains the Maintenance Allocation Chart, listing all Maintenance and Repair Operations authorized for all echelons of responsibility and shall be strictly adhered to.**

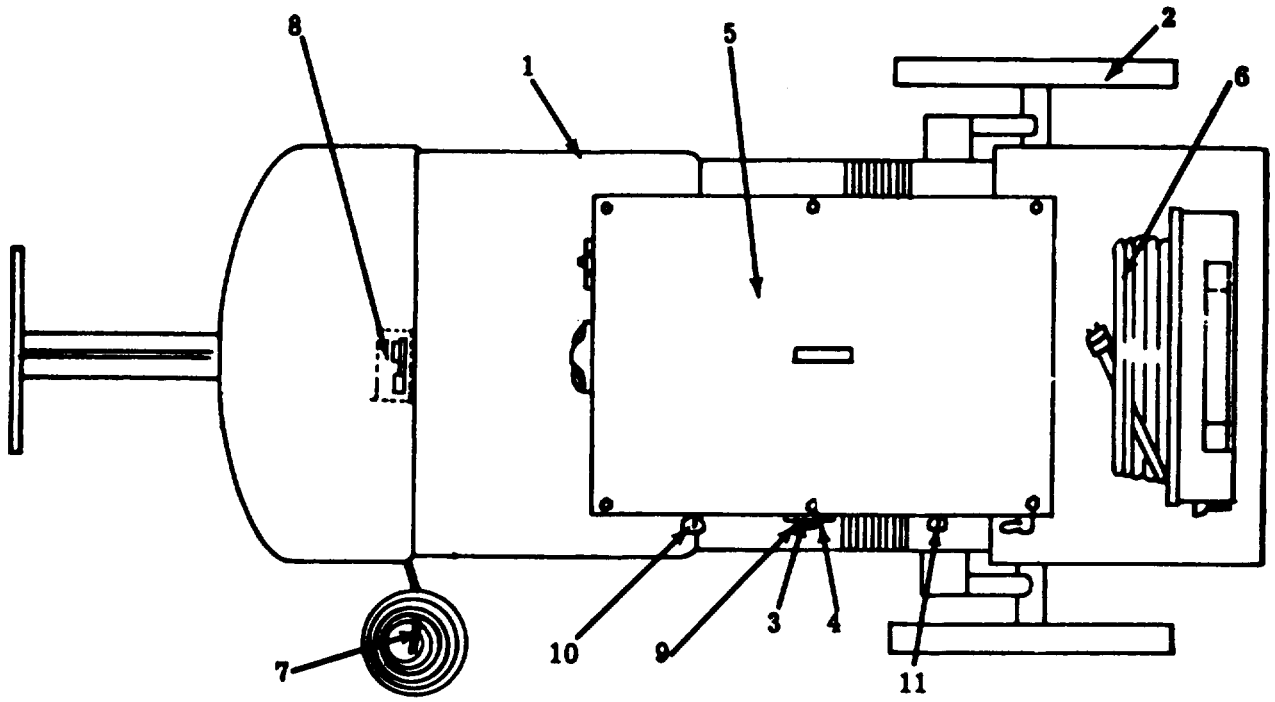
Section II. PREVENTIVE MAINTENANCE SERVICE

27. General

To insure that the Model LA-300 Welding Machine is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary Preventive Maintenance Services to be performed are listed and described in paragraphs 28 through 30. The item numbers indicate the sequence of minimum inspection requirements. Defect's discovered during operation of the unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and short comings will be recorded together with the corrective action taken on DA Form 2404 at the earliest possible opportunity.

28. Daily Preventive Maintenance Services

This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 7 for the Daily Preventive Maintenance Services.



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Item		Par. ref.
1	*ARC WELDER*. Inspect and service the arc welder daily or as required	40
2	*WHEELS*. The wheels should be inspected daily and repaired if need be. If a major damage is discovered, the wheel should be replaced.	51
3	*METERS.* Inspect meter before and during operation. If a malfunction is noticed, and if the meter is beyond repair, it should be replaced at once. Inspect and replace, at the same time, the instrument shunt if need be.	42
4	*RECEPTACLE.* Inspect receptacle before and during operation. If the receptacle is not operating properly, it should be replaced at once.	48
5	*TERMINAL BOARD.* Inspect terminal boards. If not functioning properly replace with a new one.	49
6	*CABLE ASSEMBLY*. Check cable assembly. If damage appears, replace with a new one immediately.	52
7	*ELECTRODE HOLDER ASSEMBLY.* The electrode holder assembly s	
53	inspected carefully before operating the machine. If the holder assembly is beyond repair, it should be replaced at once.	
8	*BRUSHES.* Inspect the brushes and replace them if necessary	37
9	*SWITCHES.* If a switch fails to operate properly, it should be replaced at once	43
10	*RESISTORS.* If, for any reason, a resistor is thought not to be operating properly, it should. be tested with a tester. If the resistor is not good, it should be replaced with a new one.	44
11	*RHEOSTAT.* If the rheostat is not operating properly, it should be replaced immediately.	45

Figure 7. Daily preventive maintenance service.

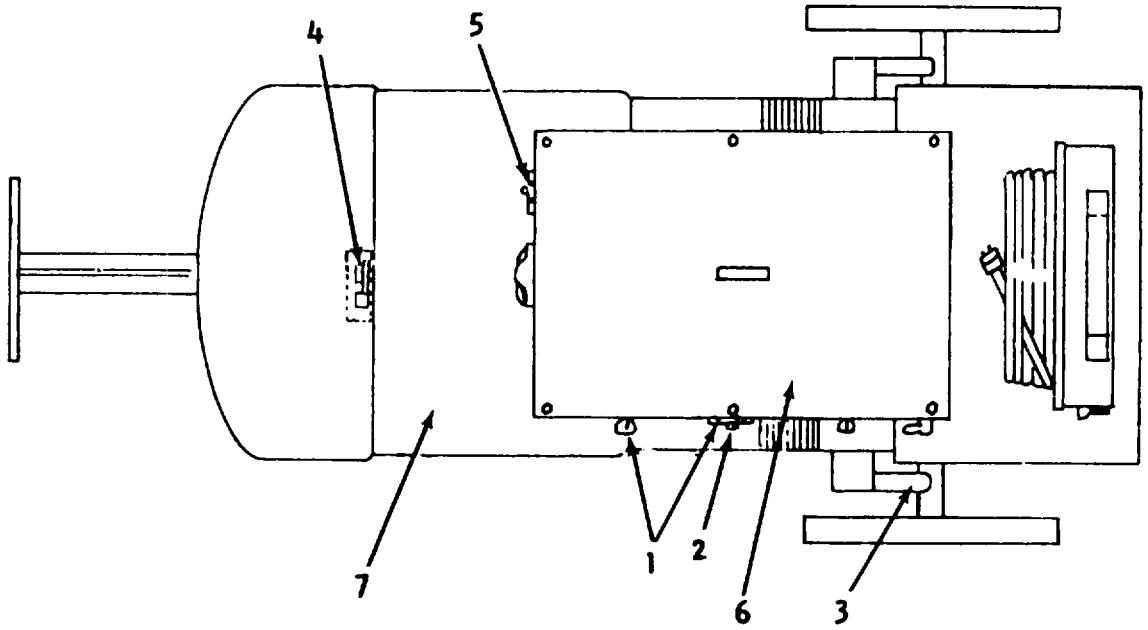
29. Operational Maintenance

Operational trouble that may occur that is beyond the scope of the operator shall be reported to organizational maintenance. Organizational maintenance is normally limited to minor repairs and the adjusting or replacing of various components of the welding machine.

30. Quarterly Preventive Maintenance Services

a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months, or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to Figure 8 for the Quarterly Preventive Maintenance Services.



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Item		Par. ref.
1	*WIRING, RESISTORS, SWITCHES*. Check switches to see that they are operating properly and if they are properly installed. Check wiring for frayed, oil-soaked, or deteriorated insulation, broken wires and loose or damaged connections. Clean corroded and tighten loose connections. Replace defective switches and resistors.	43 and 44
2	*VOLT-AMP METER*. Inspect the volt-amp meter for cracked or broken glass, loose mounting screws and replace missing mounting screws. Adjust the volt-amp meter. Replace any damaged or defective meter and calibrate as necessary.	42
3	*FRAME AND SUBBASE*. Check frame and subbase for broken welds, tears, loose or missing assembly bolts and nutsRepair all broken welds and tears. If a damaged wheel is discovered, it should be replaced, if it is beyond repair.	51
4	*BRUSHES AND COLLECTOR RINGS*. Inspect collector rings for dirty or rough surfaces. Inspect brushes for a worn condition. Inspect electrical leads for a worn or unserviceable conditionInspect brush springs for improper tension. Inspect brush holders for insecure mounting hardware. Tighten all loose electrical connections or brush holdersReplace worn or damaged brushes. Adjust brush spring tension as necessary.	37
5	*CIRCUIT BREAKER.* Inspect the mounting, wiring and operation of the circuit breaker. Inspect for excessive accumulation of corrosion on the terminals. Inspect for defective wiring and broken or loose connections. Clean all corrosion from the circuit breaker terminals. Tighten all loose connections. If a defective circuit breaker is present, replace immediately.	47
6	*CONTROL PANEL AND INSTRUMENTS*. Inspect all instruments for cracked or broken glass. Inspect for insecure mountings, loose connections, and improper operation. Inspect control panel for cracks, breaks and other damage. Tighten all loose mountings and electrical connections. Inspect electrical leads for a corroded condition. Replace any and all defective instruments such as current control, job selector, and remote control.	45 and 46
7	*MOTOR-GENERATOR.* Inspect the motor-generator very carefully. The motor-generator should be serviced quarterly or as necessary.	40

Figure 8. Quarterly preventive maintenance.

Section III. TROUBLESHOOTING

31. General

Paragraphs 32 through 35 provides information useful in diagnosing and correcting unsatisfactory operations or failure of equipment or any of its components. Each trouble symptom stated is followed by a list of probable causes of trouble shown in the left-hand column. The possible remedy recommended is given opposite the cause in the right hand column.

32. Motor Fails to Hold the "Heat" Constantly

Probable cause	*Possible remedy*
Electrode Lead or work lead connections may be poor.	Tighten all connections.
Field rheostat may be making poor contact and overheating.	Inspect rheostat and clean or replace (par. 45)
Brushes may be worn down to limit of adjustment or life.	Replace brushes (par. 37).
Brush springs may have lost adjustment or may be broken.	Replace or readjust brush springs (par. 39).
Current control brush holder support stud and mating contact surfaces may be dirty or pitted and burned.	Clean off brush holder stud and internal contact surface use light application of vasoline to stud and replace. If brush holder internal contact surface is burned, replace brush holder and support stud (par. 37).

33. Welder Starts but Fails to Generate Current

Probable cause	*Possible remedy*
Generator or exciter brushes may be loose or missing.	Be sure that all brushes bear on the commutator and have proper spring tension (par. 37).
Field circuit of generator or exciter may be open.	Check for open circuits in rheostat, field leads, and field coils. Also check resistors and rectifiers, if any. Some machines give less output when fields are open (pars. 44 and 46).

34. Motor Trips off the Line

Probable cause	*Possible remedy*
Unbalanced input voltage Ventilation may be impaired.	Blow out and clean (par. 40).

35. Machine Fails to Start

Probable cause	*Possible remedy*
Power circuit may be completely dead.	Look for open disconnect switch (par. 43).

Section IV. MOTOR-GENERATOR

36. General

In normal use the motor-generator brushes wear and the spring tension is lessened causing arcing of the brushes and may cause pitting of the commutator bars. The commutators require little attention, however, they do need cleaning from time to time.

37. Brushes

a. Removal. The worn brushes are removed by disconnecting the pigtails and removing them from the brush holders.

b. Replacement. Brushes should be replaced before the pigtails are within 1/8 inch of the commutator or before the limit of spring travel is reached. New brushes must be seated before they can be used on the machine. This is accomplished by placing the new brushes in position with a piece of medium sandpaper placed under the brush toe. Hold the brush in its normal position by a slight pressure of the fingers. The sandpaper then should be drawn back and forth under the brush with the back of the sandpaper held closely in contact with the commutator. This will wear the brush down to the curve of the commutator. When the end of the brush has the proper curve, the operation is complete. Care should be exercised to blow all of the carbon dust away from the commutator.

38. Commutators

The commutators require practically no attention. They should be cleaned from time to time with a clean rag, or while running with a piece of fine sandpaper. Never use emery cloth or paper for this purpose.

Warning: **Care should be exercised in cleaning commutator to prevent physical injury to personnel.**

39. Brush Springs

It is desirable to check the brush springs (fig. 14) occasionally to make sure they are holding the brushes on the commutator with a firm even pressure. The brush spring tensions for the brushes in the welding-generator and exciter are 32 ounces each. The tension readings are taken with a spring-scale gauge at the instant the brush spring releases contact on the brush. Correct the tension by bending the brush spring to provide the specified tension plus or minus two ounces.

40. Welding Machine

The complete welding machine should be blown out with a low pressure air hose. Grease should be cleaned from the machine with an approved cleaning solvent.

Section V. CONTROLS AND INSTRUMENTS

41. General

The Model LA-300 welding machine contains all the controls and instruments necessary for the operation of the unit. The controls and instruments should be checked often to make sure they are operating properly.

42. Volt-Amp Meter

a. *Inspection*. If the volt-amp meter (fig. 3) fails to operate properly an inspection should be made. The connecting terminals in back of the volt-amp meter should be checked first to make sure they are tight, and are connected properly. Make an overall inspection of the meter for damage. If the meter can be suitably repaired, it should be, otherwise it should be replaced.

b. *Removal*. Remove the mounting screws which hold the volt-amp meter to the control panel. Disconnect the terminal contacts at the rear of the meter, by unscrewing the terminal screws and removing the leads. Lift the meter from the control panel and replace with a new one.

43. Switches

If a switch (fig. 3) fails to operate properly, it should be replaced at once. The switch is removed by removing the mounting screws from the control panel, or by simply removing the knob. In order to completely free the switch from the unit, the terminal leads should be removed from the switch. Lift the switch from the unit and replace with a new one.

44. Resistors

a. Testing. Connect the resistor leads to the tester and read the amount of resistance left in the resistor.

b. Replacement. Remove the old resistor by disconnecting both leads. Replace with a new resistor by soldering both leads into their correct position.

45. Job Selector and Remote Control

Remove the backs from the job selector (fig. 3) and remote control (fig. 9). Remove the output wiring from the job selector by disconnecting it from the terminals. Remove the handle from the face of the job selector. The job selector may now be removed by simply lifting it from the case.

46. Current Control

Remove the current control (fig. 3) handle by removing the setscrew and pulling straight out. Remove the dial plate by removing its attaching parts. The resistance tube and brush holder may now be removed by removing all their attaching parts. The reactor may now be removed by removing the screws, nuts, and lockwashers which hold it into place.

47. Circuit Breaker

Disconnect all electrical leads in back of circuit breaker (fig. 3). Remove the screws and nuts which holds the breaker into position. The circuit breaker may now be removed from the control panel and replaced with a new one.

48. Receptacle

Disconnect terminals in back of receptacle (fig. 3). The receptacle can now be removed from the control panel by removing the screws and nuts which hold it into position.

49. Terminal Board

Disconnect all leads from the terminal board. Remove screws and nuts which holds the board. Remove the terminal board.

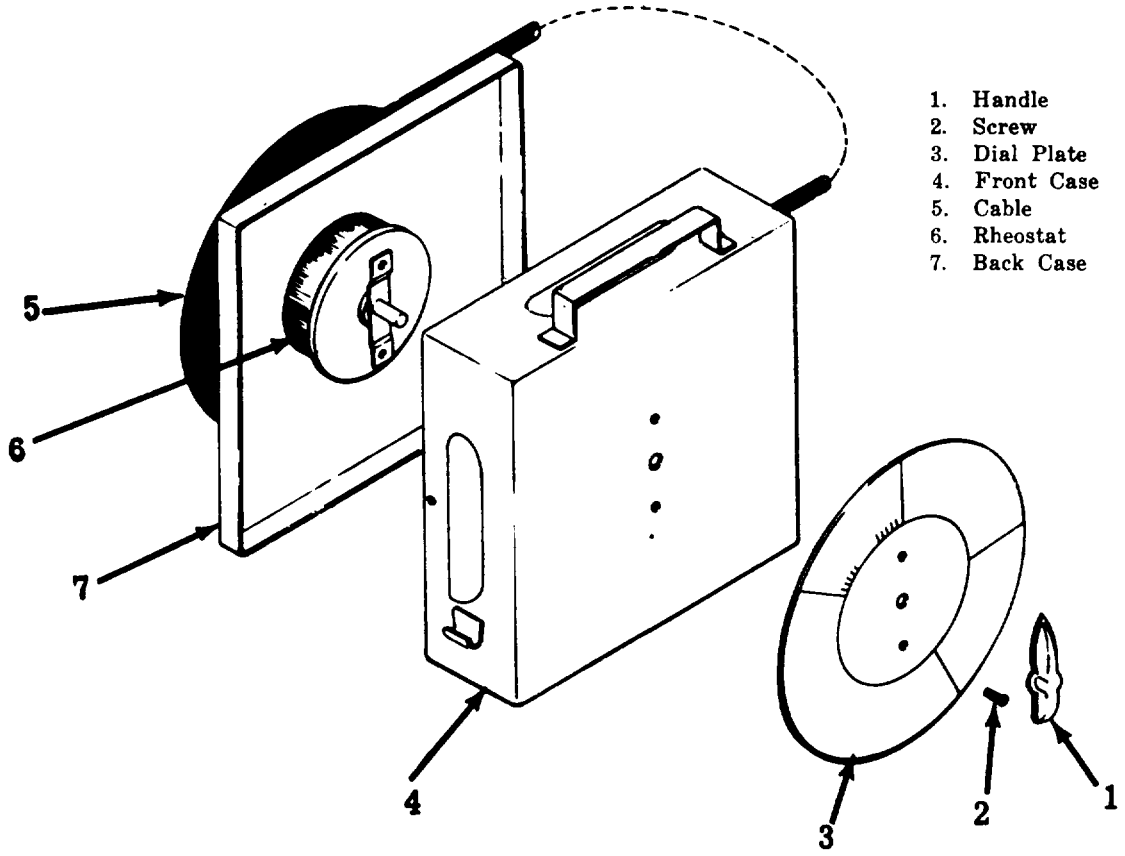

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Figure 9. Remote control.

Section VI. MISCELLANEOUS EQUIPMENT

50. General

The frame and subbase should be inspected often for cracks and tears. If a wheel is damaged, it should be replaced at once. Just as the frame and subbase. the cable assemblies and the electrode holder should be inspected often for damage.

51. Wheels

Remove the cotter key which holds the wheel into position. Slide the wheel off its axle and replace with a new one.

52. Cable Assembly

To completely free a cable assembly (fig. 3), disconnect it from its electrical terminals. Replace the damaged cable with a new one.

53. Electrode Holder Assembly

Disconnect the cable from the electrode holder. Slide the electrode holder assembly off the cable and replace with a new one.

CHAPTER 4

FIELD AND DEPOT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

54. Scope

This section provides complete disassembly, repair and testing of the welding machine. The sections are outlined in a logical sequence of disassembly. The instructions provided in the succeeding sections are beyond the scope and skill of organizational personnel.

***Note*. Appendix II, contains the Maintenance Allocation Chart, listing all Maintenance and Repair Operations authorized for all echelons of responsibility and shall be strictly adhered to.**

55. Field and Depot Maintenance Record and Report Forms

For record and report forms applicable to field and depot maintenance, refer to TM 38-750.

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

Section II. DESCRIPTION AND DATA

56. Description

For complete description of the welding machine, see paragraph 3.

57. Field and Depot Maintenance Tabulated Data

a. Generator Classification and Rating.

Rating	1800 RPM (revolutions per minute)
Voltage	220 to 440 volts
Current	300 amps (amperes)
Cooling	Fan
Lubrication type	Sealed bearings
Duty Classification	Continuous
Degree of Enclosure	Fully Enclosed
Drive	Direct

b. Main Generator Rebuild Data.

(1) Type of winding	Series
Size and type of wire	(.032 x 7/8) aluminum, 2.9 lbs.
Number of turns	21
Winding	15 turns 2 wide and 6 turns 2 high
(2) Type of winding	Armature
Number of poles	4
Slots per core	37
No.	63 7/8 in.
Lamination	5½
Diameter	9 ¾
Bars	73
Coils	372
Turns	1-1
Wire	.110 x .240
Wedge form	½ in. pins x 31 ¾ cut ¼ in. off center
Span	1-10
Groups	37
Coils	2
Pounds	20.38
(3) Type of winding	Shunt
Poles	2/4
Used with arm	37.4
Volts	125
Amps	300
Turns	1000
Wire	20 S.N.F.
Pounds	5.4

c. Exciter.

(1) Type of winding	Series
Turns	600
Wire	19 S.N.F.
Pounds	2.5
(2) Type of winding	Armature
Volts	120
Poles	2
Slots	24
No.	155
Lamination	1¾
Diameter	4
Bars	48
Coils	242
Turns	20-20
Wire	NO. 23 HNF
Reels	1

Wedge Form	.....	Machine wound
Span	.....	1-11
Pounds	.....	1.8

d. Motor Stator.

(1) Type of winding	.....	Stator
Volts	.....	220-440
Phase	.....	3
Cycles	.....	60
Poles	.....	4
RPM	.....	1800
Slots	.....	48
Turns	.....	7
Wire	.....	NO. 15 HNF
Reels	.....	3
Coils	.....	48
Pounds	.....	22.3

e. Wiring Diagram. The Welding Machine electrical schematic can be seen in Figure 10.

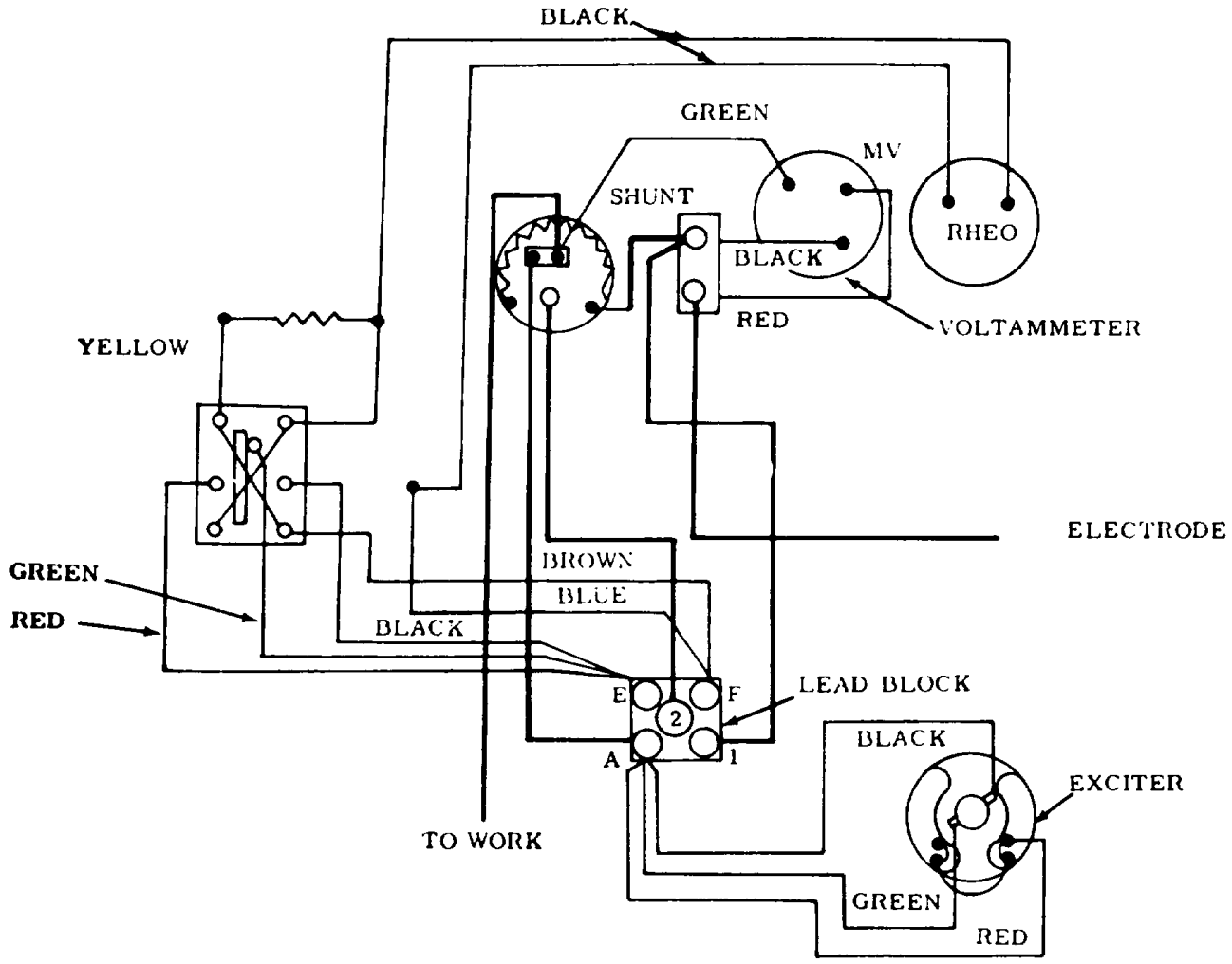

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Figure 10. Wiring diagram welding machine electrical schematic.

Section III. SPECIAL TOOLS AND EQUIPMENT

58. Special Tools and Equipment

There are no special tools and/or equipment required to perform field and depot maintenance on the welding machine other than the normal tools allotted to these echelons of maintenance.

59. Field and Depot Maintenance Repair Parts

A complete listing of repair parts is provided in TM 5-3431-207-25P.

Section IV. TROUBLESHOOTING

60. General

Paragraphs 61 through 66 provides information useful in diagnosing and correcting unsatisfactory operations or failure of equipment or any of its components. Each trouble symptom stated is followed by a list of probable causes of trouble shown in the left-hand column. The possible remedy recommended is given opposite the cause in the right-hand column.

61. Motor Fails to Hold the "Heat" Constantly

Probable cause	*Possible remedy*
Rough or dirty commutator.	Commutator should be trued or cleaned (par. 38).
Field circuit may have variable resistance connection, or intermittent open-circuit, due to loose connections or broken wire.	Check field current with ammeter to discover varying current. This applies to both the main generator and exciter, if used.
Brush-shifting or other mechanical current-adjusting mechanism may have loose or worn links.	Check current adjusting mechanism for backlash and play.
Current control brush holder contact springs may be worn out or bent. Contact surface may be dirty, rough or pitted.	Inspect, replace needed parts, clean internal contact surface of control device. 'Do not lubricate. Smooth up roughened surface.
Motor regulator rheostat shorting switch out of adjustment.	Adjust switch contacts or mercury switch tilt angle so circuit is open when motor is at full speed and when welding.

62. Welder Starts But Fails to Generate Current

Probable cause	*Possible remedy*
May be running the wrong way.	Check direction of rotation with manufacturer's instructions or direction arrow. On three-phase motors, directions may be changed by interchanging any two input leads.
Polarity reversing switch may be in the neutral position.	Place handle in up or down position.
Exciter may have lost excitation.	Flash the field with a storage battery or another generator, first with one polarity and then with another to see if it "builds up" (flash exciter field, if set has separate exciter).
Reversing switch wiper contact bent and not clearing the blade of switch when switch is closed.	This shorts the exciter series and causes failure to generate-bend or replace to secure correct operation.

63. Welding Arc is Loud and Splatters Excessively

Probable cause	*Possible remedy*
Current setting may be too high.	Check setting and current output with ammeter.
Polarity may be wrong.	Check polarity, Try reversing polarity or try an electrode of the opposite polarity.
Motor regulator shorting switch contacts close intermittently when running at full speed, causes increasing surge of current and splatter.	Adjust so contacts are well open or mercury level below contact on mercury tilt switch when motor is at full speed position of motor regulator (bellows fully (extended).

64. Welding Current too Great or too Small Compared to Indication of the Dial

Probable cause	*Possible Remedy*
Current control, shaft and handle may have turned slightly in the insulated bushing of the current control brush holder, caused by turning handle too hard against one of the stops.	See that current control indicator yellow arrow in the horizontal position when handle is turned against stop in the minimum direction.
Exciter output low causing low output compared to dial indication.	Field discharge resistor wired to reversing switch and open-circuited. Check for circuit through it.
Current control set to minimum and welder output so great that motor stalls when arc is struck.	Motor is probably running backward or series fields connector reversed to make a cumulative series generate. Check rotation.

65. Motor Trips off the Line

Probable cause	*Possible remedy*
Power circuit may be single phased.	Check for a dead line.
Welder may be operating above current capacity.	Check load against welder nameplate.
Welding electrode or work leads may be too long or too small in cross-section.	Check terminal voltage while machine is loading; it should not exceed 40 volts when operating at rated current.
Ambient temperature may be too high.	Make sure that temperature in motor-generator room or housing does not exceed 100 degrees F., and that there is not interference with normal ventilation of the machine.
Motor input voltage too low (or high) under load.	Motor supply voltage should not fall below 90% of normal voltage. Have power company to check transformer and line capacity. If supply loads too long or too small they should be corrected.

66. Machine Fails to Start

Probable cause	*Possible remedy*
Power circuit may be single phased.	Check for a dead line.
Power-line voltage may not be suitable for motor, or may be extremely low; may be accompanied by chattering of the motor starter.	Check voltage with voltmeter, particularly at the moment of attempted starting.
Machine may be jammed.	See that armature turns over easily by hand and look for foreign material in air gaps.
Motor starter may be single phased.	Check to see that all fingers on starter make contact when closed.
Overload protecting device may be tripped or controls open-circuited.	If machine has had time to cool after tripping due to overload or is cold and starter fails to close - check for circuit through push button, NVR COIL and thermostat to find the open-circuited part. See wiring diagram for normally closed and open contacts on the pushbutton.

Section V. REMOVAL AND INSTALLATION OF COMPONENTS

67. General

The Model LA-300 Welding Machine is so constructed that the removal of a major component is impractical without the complete disassembly of some of the components. The following sections will provide detail instructions for the removal, disassembly, cleaning, repair, and reinstallation of all of the welding machine components.

Section VI. CONTROL PANEL

68. Control Panel Assembly

(fig. 11).

a. Disassembly.

(1) Remove handles (1) and (2) by removing setscrews (3) and (4).

(2) Remove dial plates (5) and (6) by removing screws (7) and (8).

(3) Remove cover assembly (9) by removing screws (10).

(4) Remove volt-amp meter (11) in accordance with paragraph 42.

(5) Remove rheostat (13) in accordance with paragraph 45.

(6) Remove remote control switch (14) in accordance with paragraph 43.

(7) Remove contact fingers (16) by removing screws (17) and lockwashers (18).

(8) Remove brushholder (19) by removing screws (20) and springs (21). Pull straight out to remove from shaft.

(9) Remove insulation tube (22).

(10) Remove flat washer (23).

(11) Remove shaft (24).

(12) Remove spring (25) by removing spring clip (26).

(13) Remove polarity switch (27) by removing handle (28).

(14) Remove resistance tube (29) by removing stove bolt (30), mounting washers (31), lockwashers (32). And nut (33).

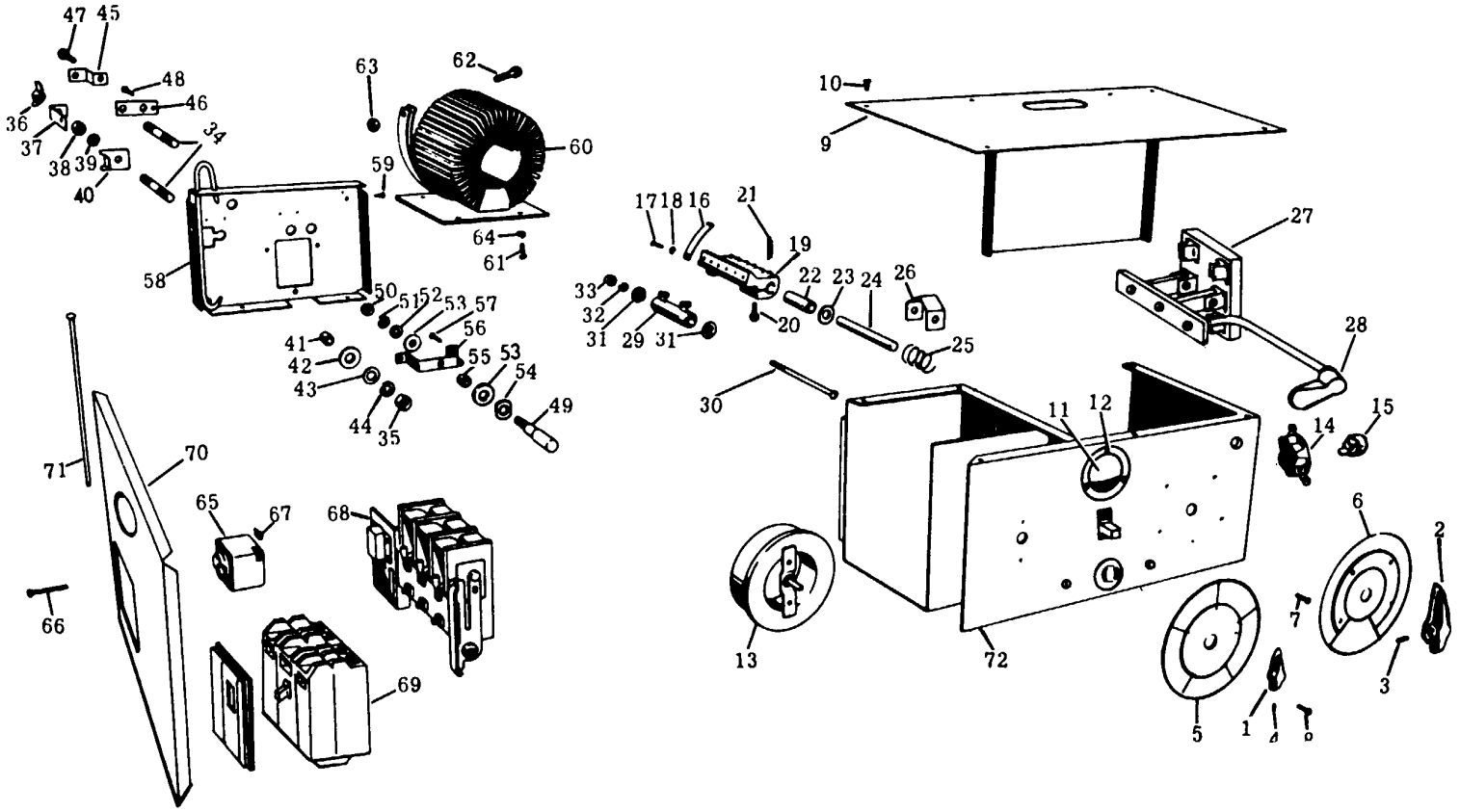
(15) Remove studs (34') by removing nuts (35) and (36), connection strap (37), nuts (38), washers (39), connection strap (40) bushings (41), washers (42) and (43) and lockwashers (44).

(16) Remove connection straps (45) and (46) by removing screws (47) and (48).

(17) Remove stud (49) by removing nut (50), lockwashers (51), washers (52), (53) and (54) and bushing (55).

(18) Remove bracket (56) by removing screws (57).

(19) Remove subpanel (58) by removing screws (59).



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1	Handle	13	Rheostat	24	Shaft	36	Nut	49	Stud	62	Screw
2	Handle	14	Remote Control	25	Spring	37	Connection Strap	50	Nut	63	Nut
3	Setscrew		Switch	26	Spring Clip	38	Nut	51	Lockwasher	64	Lockwasher
4	Setscrew	15	Receptacle	27	Polarity Switch	39	Washer	52	Washer	65	Pushbutton Assy
5	Dial Plate	16	Contact Finger	28	Handle	40	Connection Strap	53	Washer	66	Screw
6	Dial Plate	17	Screw	29	Resistance Tube	41	Bushing	54	Washer	67	Nut
7	Screw	18	Lockwasher	30	Stove Bolt	42	Washer	55	Bushing	68	Starter Assembly
8	Screw	19	Brushholder	31	Washer	43	Washer	56	Bracket	69	Circuit Breaker
9	Cover Assembly	20	Screw	32	Lockwasher	44	Lockwasher	57	Screw		Assembly
10	Screw	21	Spring	33	Nut	45	Connection Strap	58	Subpanel	70	Door
11	Volt-amp Meter	22	Insulation Tube	34	Stud	46	Connection Strap	59	Screw	71	Door
12	Screw	23	Flat Washer	35	Nut	47	Screw	60	Reactor	71	Hinge Pin
						48	Screw	61	Screw	72	Case Assembly

Figure 11. Control panel assembly.

(22) Remove starter assembly (68).
(21) Remove pushbutton assembly (65) by removing screw (66) and nut (67).
(23) Remove circuit breaker assembly (69) in accordance with paragraph 47.
(20) Remove reactor in accordance with paragraph 46.
(24) Remove door (70) by removing hinge pin (71).
(25) Remove case assembly (72).

b. Cleaning.

(1) Wipe panels, plates, dials, gauges and meters with solvent-dampened cloth and dry and clean, lint-free cloth. Clean switches with compressed air. Clean all threaded parts in solvent, using wire brush if necessary, and dry thoroughly. Wipe power outlets with clean, lint-free cloth.

c. Inspection.

(1) Inspect panel for dents and cracks.
(2) Inspect meter and gauges for cracked or broken glass and defaced dials.
(3) Inspect electrical terminals for corrosion and damaged threads.
(4) Inspect rheostat for burned or blackened areas and open turns.
(5) Inspect switches for pitted or corroded contacts.
(6) Check wiring for good condition and missing lugs or cable clamps.

d. Repair.

(1) Straighten panel if dented or-warped. Replace any defective leads in wiring harness with same size and length of wire and tie new leads to harness at six inch intervals. If contacts of switch are slightly pitted or blackened, clean with NO. 00 sandpaper. Replace all other parts which do not pass inspection.

69. GXL: Starter
(fig. 12).

a. Disassembly.
(1) Remove side panel assembly (left hand) (1) by removing screws (2) and nuts (3).
(2) Remove coil (4) by removing retainer (5) and coil clamps (6) and (7).

e. Reassembly. Reassemble in reverse of subparagraph a. above.

(3) Remove contacts (8) by removing screws (9).
(4) Remove contact block (10) by removing screws (11) and nuts (12).
(5) Remove barrier assembly (13).
(6) Remove contact arm (14) by removing screws (15).
(7) Remove moving contacts (16) by removing screws (17) and (18), nut (19) and spring (20).
(8) Remove interlock insulation (21) by removing screws (22) and nuts (23).
(9) Remove interlock block (24) by removing screws (25).
(10) Remove washer (26).
(11) Remove plunger (27).
(12) Remove coil spring (28).
(13) Remove movable NVR crossing arm (29).
(14) Remove NVR arm pin (30) by removing tinnerman nut (31).
(15) Remove moving lamination (32).
(16) Remove lead with lug (33) by removing screw (34), washer (35) and nuts (36) and (37).
(17) Remove stationary lamination (38).
(18) Remove side panel assembly (right hand), (39) by removing screw (40) and nut (41).
(19) Remove bearing (42) by removing cotter pin (43).

(20) Remove square shaft (44) by removing screws (45).
(21) Remove contact arms (46).
(22) Remove shaft insulation (47).

b. Cleaning.

(1) Clean studs, nuts, metal washers, spacers, and end frames in solvent and dry thoroughly. Wipe off plunger with solvent-dampened cloth and dry with clean, lint-free cloth. Clean corrosion on any part with NO. 00 sandpaper and blow off with compressed air.

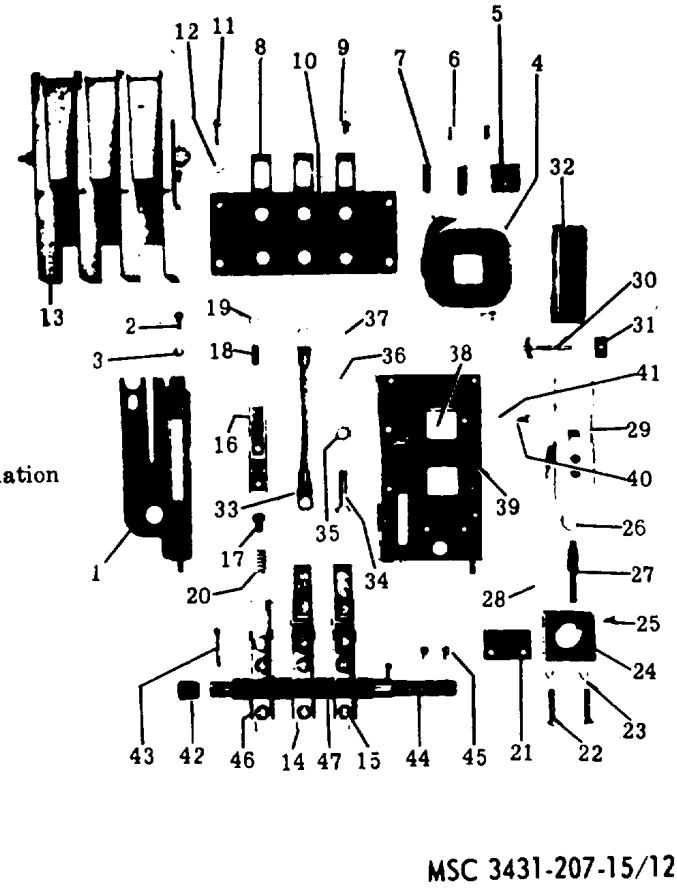
c. Inspection.

(1) Inspect bearing surfaces of bushings for wear and scoring. Inspect studs for burned or otherwise damaged threads. Inspect contact disc for pitted or burned spots.

d. Repair.

(1) Replace any part which does not pass inspection.

e. Reassembly. Reassemble in reverse of a. above.



1 Side Panel Assembly
2 Screw
3 Nut
4 NVR Coil
5 NVR Retainer
6 NVR Coil Clamp Insulation
8 Stationary Contact
9 Screw
10 Contact Block
11 Screw
12 Nut
13 Barrier Assembly
14 Arm Clamp
15 Screw
16 Moving Contact
17 Screw
18 Screw
19 Nut
20 Contact Spring
21 Interlock Insulation
22 Screw
23 Nut
24 Interlock Block
25 Screw
26 Screw
27 Plunger
28 Coil Spring
29 Movable NVR Crossing Arm
30 NVR Arm Pin
31 Nut
32 Moving Lamination
33 Lead with Lug
34 Screw
35 Washer
36 Nut
37 Nut
38 Stationary Lamination
39 Side Panel Assembly
40 Screw
41 Nut
42 Bearing
43 Cotter Pin
44 Square Shaft
45 Screw
46 Contact Arm
47 Shaft Insulation

Figure 12. GXL: starter.

Section VII. MOTOR-GENERATOR

70. Motor-Generator

(fig. 13).

a. Disassembly.

(1) Remove covers (1) (2) and (3) by removing screws (4) (5) and (6), washer (7) and nuts (8) and (9).
(2) Remove fan guard (10) by removing screws (11).

(3) Remove blower (12) by removing nut (18') and washer (14).

(4) Remove dust cap (15) by removing screws (16).

(6) Remove pipe plug (17).

(6) Remove gasket (18).

(7) Remove bracket (19) by removing screws (20).

(8) Remove socket (21) by removing screw (22) and lockwasher (23).

(9) Remove brushholder assembly (24).

(10) Remove brush (25) in accordance with paragraph 37.

(11) Remove nameplate (26') by removing screws (27).

(12) Remove leadblock (28) by removing screws (29).

(13) generator frame assembly (30).

(14) Remove pole pieces (34 and 35).

(15) Remove coils (31, 32 and 33).

(16) Remove bearing (36).

(17) Remove gasket (37).

(18) Remove dust cap (38).

(19) Remove wound stator (39) by removing screws (40) and (41).

(20) Remove thermostat assembly (42) by removing screws (43).

(21) Remove bracket (44).

(22) Remove armature assembly (45) by removing nut (46). washer (47) and collar (48).

(23) Remove armature (49).

(24) Remove coil set (50) by removing screws (51) and pole pieces (52).

(25) Remove shield (56).

(26) Remove dust cap (54) by removing screws (55).

(27) Remove pipe plug (56).

(28) Remove brush (67) in accordance with paragraph 37.

(29) Remove brushholder (58) and washer (60) and screw (59).

(30) Remove bracket (61).

(31) Remove bearing (62).

(32) Remove gasket (63).

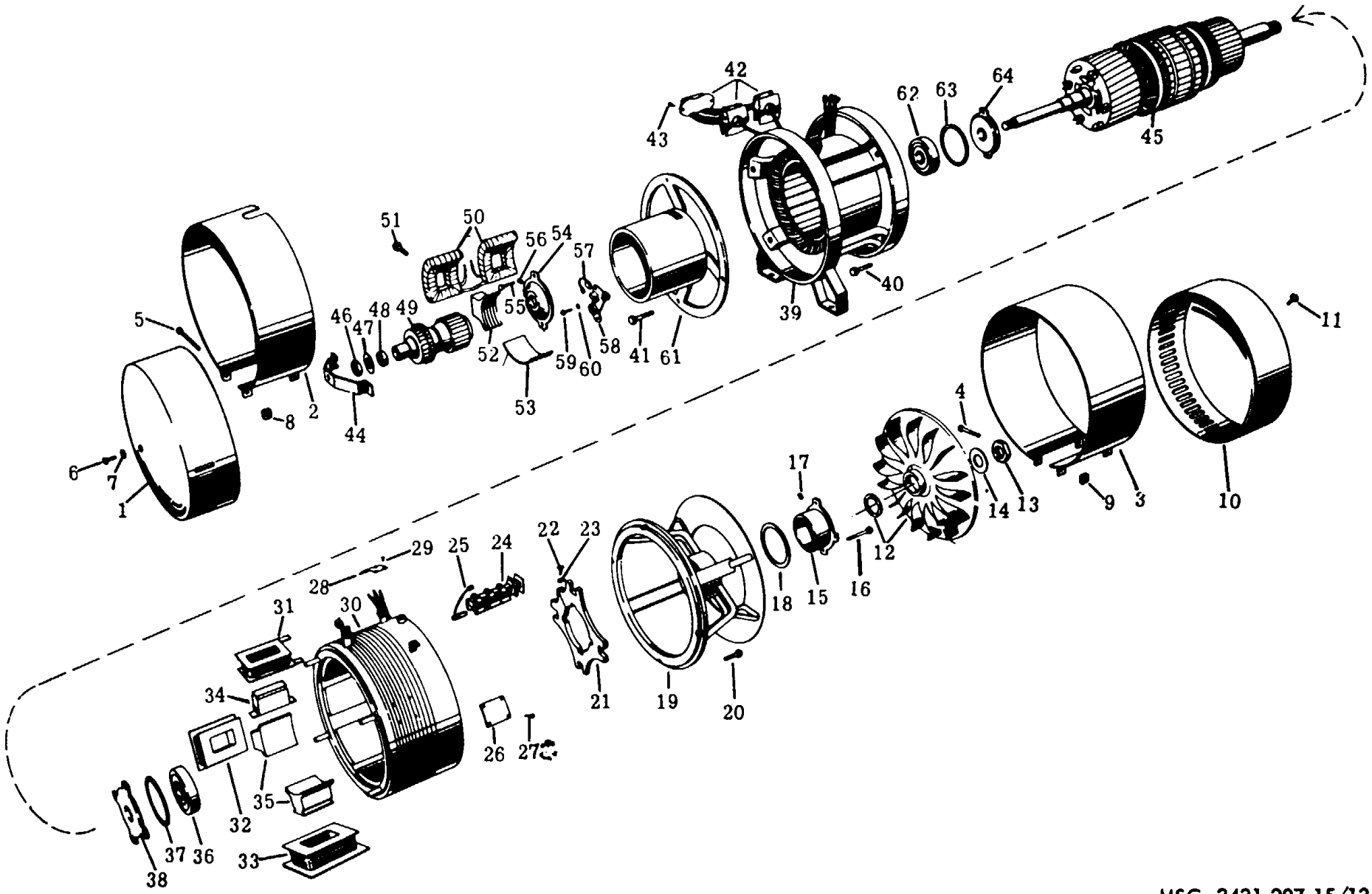
(33) Remove dust cap (64).

b. Cleaning. Clean studs, nuts, metal washers, spacers drive assembly and frame in solvent and dry thoroughly. Wipe off blower with solvent-dampened cloth and dry with clean lint-free cloth. Clean armature with very fine sandpaper and blow off thoroughly.

c. Inspection. Inspect brushes, brush holder, coil assemblies, and armature for damage or wear. Inspect bearing surfaces of bushings for wear and scoring. Inspect drive assembly for general condition. Inspect studs for burned or otherwise damaged threads.

d. Repair. Replace brushes before the pigtails are within 1/8 inch of the commutator. Replace armature and field coils which are defective and cannot be easily repaired. Turn down commutator in lathe if rough or out of round. Replace any other parts which do not pass inspection.

e. Reassembly. Reassemble in reverse of subparagraph a. above.



MSC 3431-207-15/13

1 Cover
2 Cover
3 Cover
4 Screw
5 Screw
6 Screw
7 Washer
8 Nut
9 Nut
10 Fan Guard
11 Screw
12 Blower
13 Nut
14 Washer
15 Dust Cap
16 Screw
17 Pipe Plug
18 Gasket
19 Bracket
20 Screw
21 Socket
22 Screw
23 Lockwasher
24 Brushholder Assembly
25 Brush
26 Nameplate
27 Screw
28 Lead Block
29 Screw
30 Generator Frame Assembly
31 Coil
32 Coil
33 Coil
34 Pole Piece
35 Pole Piece
36 Bearing
37 Gasket
38 Dust Cap
39 Wound Stator
40 Screw
41 Screw
42 Thermostat Assembly
43 Screw
44 Bracket
45 Armature Assembly
46 Nut
47 Washer
48 Collar
49 Armature
50 Coil Set
51 Screw
52 Pole Piece
53 Shield
54 Dust Cap
55 Screw
56 Pipe Plug
57 Brush
58 Brushholder
59 Screw
60 Washer
61 Bracket
62 Bearing
63 Gasket
64 Dust Cap

Figure 13. Motor-Generator

71. Brushholder
(fig. 14).

a. Disassembly.

(1) Remove spring and clip assembly (1) by removing screw (2) and lockwashers (3).

(2) Remove screws (4) and (5).

(3) Remove plate and retainer assembly (6).

(4) Remove stud (7) by removing screw (8) and lockwasher (9).

(5) Remove washers (10) and (11).

(6) Remove insulation tube (12).

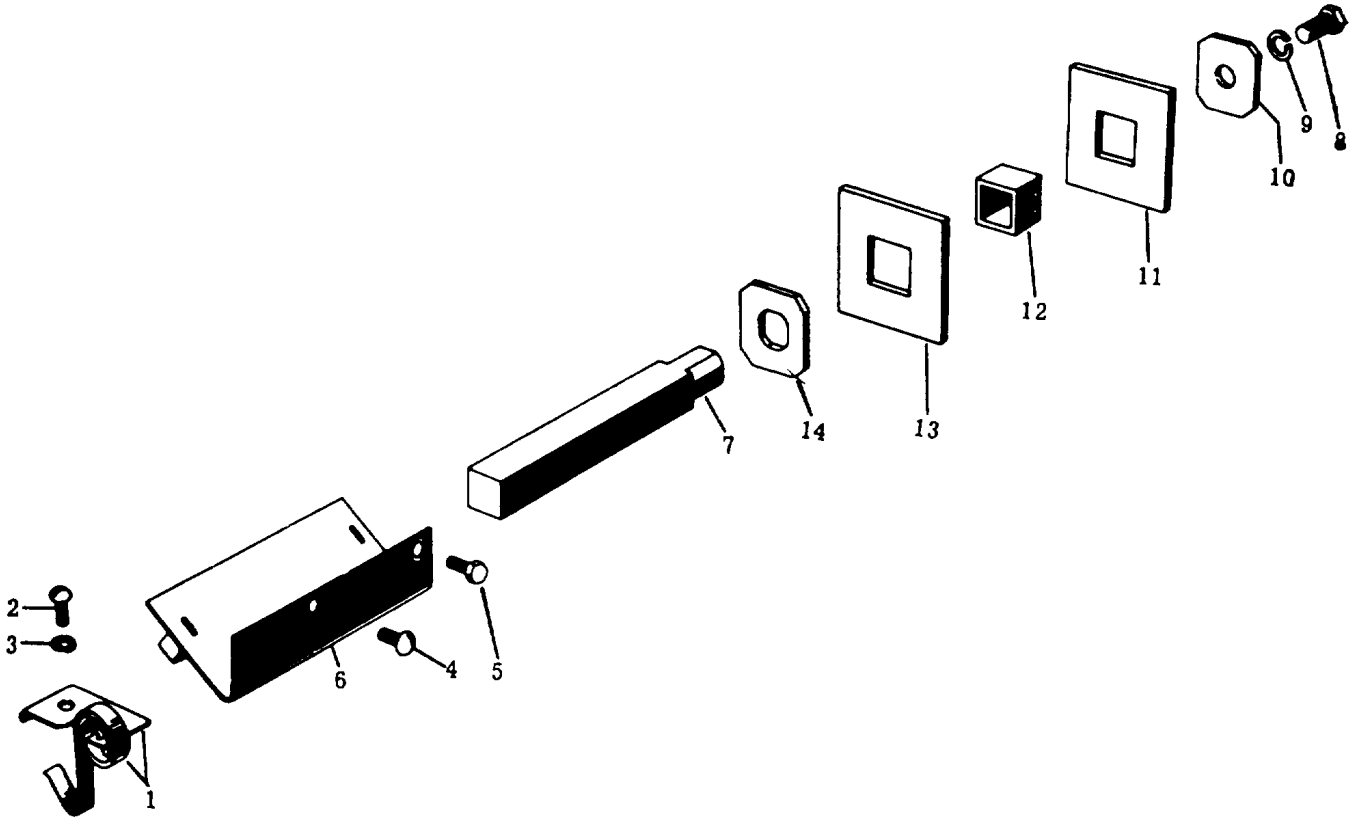
(7) Remove washers (13) and (14).

b. Cleaning. Clean all metal parts in solvent and dry thoroughly Clean any corrosion from spring and clip with NO. 00 sandpaper. Blow off with compressed air.

c. Inspection. Inspect washers and tube for good condition. Inspect spring and clip for wear.

d. Repair. Replace brushes before the pigtails are within 1/8 inch of the commutator. Replace any other parts which do not pass inspection.

e. Reassembly. Reassemble in reverse of *a* above.



MSC 3431-207-15/14

1	Spring and Clip Assembly	8	Screw
2	Screw	9	Lockwasher
3	Lockwasher	10	Washer
4	Screw	11	Washer
5	Screw	12	Insulation Tube
6	Plate and Retainer Assembly	13	Washer
7	Stud	14	Washer

Figure 14. Brushholder.

CHAPTER 5

DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

72. 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.

73. Demolition to Render the Welding Machine Inoperative

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

a. Motor-Generator.

b. Starter.

c. All controls and instruments.

74. Demolition by Explosives or Weapons Fire

a. Explosives. Place as many of the charges as the situation permits and detonate them simultaneously with a detonating cord and a suitable detonator (figure 15).

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

75. Other Demolition Methods

a. Scattering and Concealment. Remove all easily accessible parts and scatter them through dense foliage, bury them in dirt or sand, or throw them in a lake, stream or other bodies 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. Totally submerge the welding machine in a body of water to provide water damage and concealment. Salt water will do greater damage to metal parts than fresh water.

76. 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.

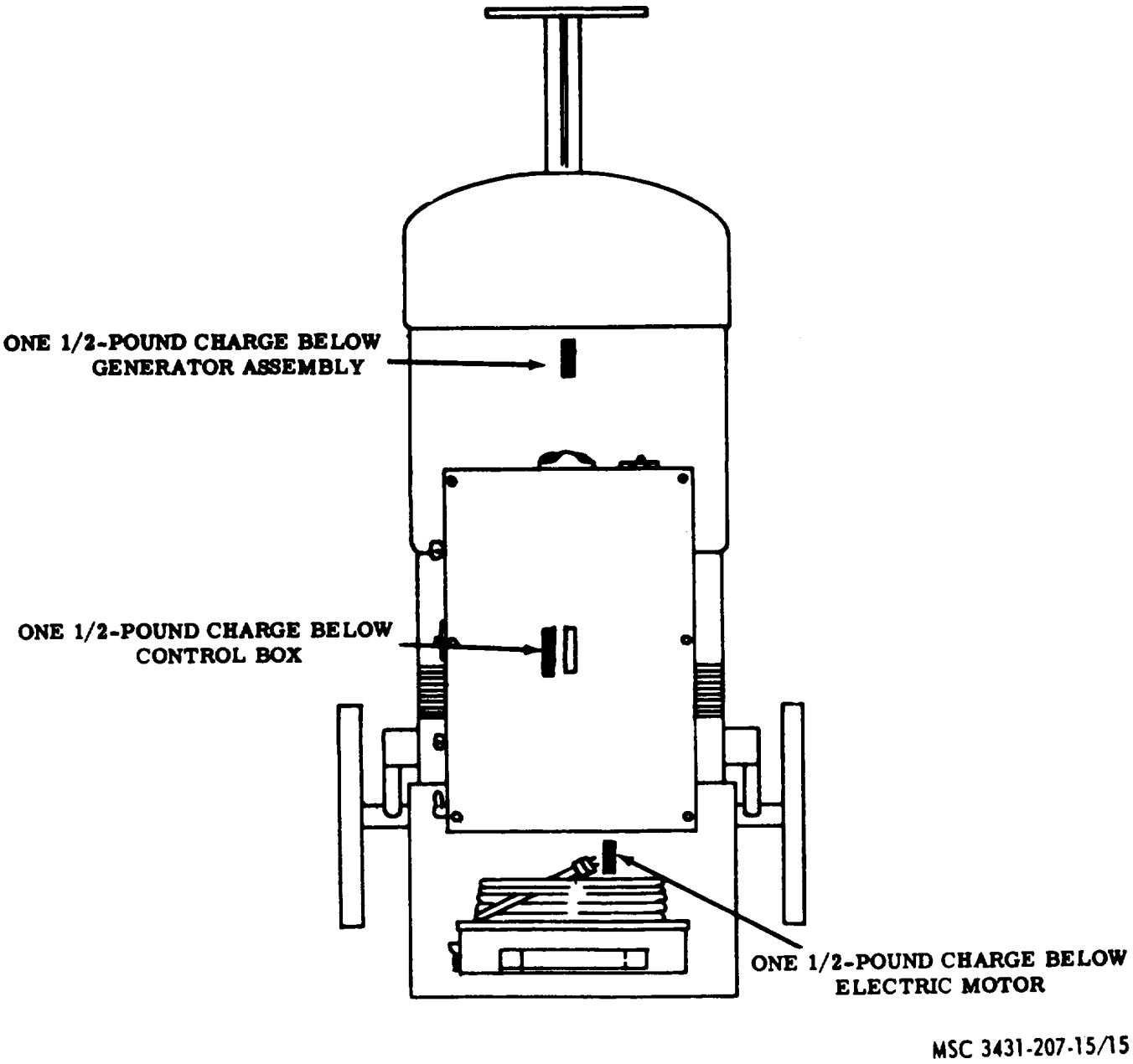


Figure 15. Placement of demolition charges.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE

Section I. SHIPMENT WITHIN ZONE OF INTERIOR

77. Preparation of Equipment for Shipment

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

b. Inspection. The welding machine shall be inspected for any unusual conditions such as damage, rusting, accumulation of water, and/or pilferage. Conduct a technical inspection as outlined in paragraph 30 "Quarterly Preventive Maintenance Services."

c. Cleaning and Drying. The machine shall be cleaned by an approved method. Methods and application of cleaning and drying procedures are outlined in TM 38-230.

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

e. Depreservation Guide. A properly annotated DA Form 2258 "Depreservation Guide of Engineer Equipment," for each item of mechanical equipment will be placed in a waterproof envelope, marked "Depreservation Guide", and fastened in a conspicuous location on or near the operator's controls.

f. Sealing Openings. Openings that will permit direct entry of water into the motor-generator shall be sealed with Type III, Class I, water-proof pressure-sensitive tape conforming to Specification PPP-T-60.

g. Basic Issue Items. Disconnected cables shall be coiled and packed with the basic issue items and the publication in a suitable container. The container shall be secured to the machine to prevent loss or pilferage. Refer to TM 38-230 for selection and guidance in container fabrication.

h. Marking. Marking shall be in accordance with MIL-STD-129.

78. Loading

Fasten lifting cable to lifting eye, located top center of machine, and with suitable material handling equipment lift the machine to the bed of the carrier. If material handling equipment is not available, tow the machine up a ramp. Secure the machine to the carrier with appropriate tie downs and blocking, to assure carrier acceptance and safe delivery at destination.

Section II. LIMITED STORAGE

79. Preparation of Equipment for Storage

a. General. Detailed instructions for preservation and maintaining the machine in limited storage are outlined in this paragraph. Limited storage is defined as storage not to exceed 6 months. Refer to AR 743-505.

b. Inspection. Refer to paragraph 77.

c. Cleaning and Drying. Refer to paragraph 77.

d. Painting. Refer to paragraph 77.

e. Depreservation Guide. Refer to paragraph 77.

f. Sealing Openings. Refer to paragraph 77.

g. Basic Issue Items. Refer to paragraph 77.

h. Weatherproofing. Warehouse storage is preferred for this machine. If this is not available, position the machine on planking or other solid surface. Cover the machine with a tarpaulin or other suitable waterproof covering. Tie the covering securely to assure it provides the machine adequate protection from the

elements.

i. Exercising. Every 90 days equipment will be inspected as outlined in quarterly maintenance instructions and operated for a short period of time. After each exercising period the equipment will be represerved as outlined above.

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. Preventive Maintenance

AR 750-5	Organization, Policies, and Responsibilities for Maintenance Operation
TM 38-750	Army Equipment Record Orders System and Procedures

3. Shipment and Limited Storage

TB ENG 60	Preservation and Painting of Serviceable Corp of Engineers Equipment
TM 38-230	Preservation, Packaging, and Packing of Military Supplies and Equipment
AR 743-505	Limited Storage of Engineers Mechanical Equipment

4. 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

5. 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

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

This Appendix contains a Maintenance Allocation Chart, listing all Maintenance and Repair Operations authorized for all echelons of responsibility and shall be strictly adhered to.

2. Maintenance

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

a. Service. To clean, to preserve and lubricate.

b. Adjust. To regulate periodically to prevent malfunction.

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

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

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

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

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

3. Explanation of Columns

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

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

c. Echelon Maintenance.

Column 1. First Echelon.

First echelon maintenance is that maintenance performed by the user or operator of the equipment, such as servicing, cleaning, lubricating, and limited adjustments. It also includes removal and replacement of items to accomplish servicing and lubrication.

Column 2. Second Echelon.

Second echelon maintenance is that maintenance performed by trained personnel provided for that purpose in the using organization, such as replacement of all items in column 2, limited parts fabrication from bulk material, adjustments, and repair of assemblies, components, and end items that can be accomplished without extensive disassembly.

Column 3. Third Echelon.

Third echelon maintenance is that maintenance performed by specially trained units in direct support of the using organization, such as replacement of all items in columns 2 and 3, repair assemblies, components and end items, and fabricate parts from bulk material.

Column 4. Fourth Echelon:
Fourth echelon maintenance is that maintenance performed by units organized as semi-fixed or permanent shops to serve lower echelon maintenance within a geographical area such as replacement of items, overhaul assemblies, components, and fabricate general use common hardware and parts.

Column 5. Fifth Echelon:
Fifth echelon maintenance is that maintenance authorized to overhaul assemblies, components, end items, and replacement of all parts in columns 2, 3, 4, and 5.

4. Symbol X
The symbol placed in the appropriate column indicates the lowest echelon responsible for performing that particular maintenance operation, but does not necessarily indicate repair parts will be stocked at that level.

5. Remarks
The remarks column is used to explain why maintenance that would normally be done at a lower echelon is moved to a higher echelon because of some peculiarity in the construction of the end item.

Section II. MAINTENANCE ALLOCATION CHART

Functional group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
10	FRONT AXLE						
1001	AXLE, TONGUE						
	Axle; Tongue; Springs						
	Replace		X				
11	REAR AXLE						
1100	REAR AXLE ASSEMBLY						
	Axle, Rear						
	Replace		X				
13	WHEELS						
1311	WHEEL ASSEMBLY						
	Wheels						
	Replace		X				
	Bearings, Roller						
	Service		X				
	Replace		X				
22	ACCESSORY ITEMS						
2202	ACCESSORY ITEMS						
	Cables						
	Replace		X				
	Repair		X				
	Holder, Publication						
	Replace		X				
2210	DATA PLATES						
	Plate, Data						
	Replace			X			
	Plate Identification						
	Replace		X				
	Diagram, Wiring; Instruction Sheet						
	Replace	X					Remote Control Assembly
26	ACCESSORIES, PUBLICATIONS						
2602	ACCESSORIES						
	Accessory						
2605	Repair		X				
	PUBLICATIONS						
	Publications						
44	Replace	X					
4400	WELDING EQUIPMENT						
	ARC WELDERS						
	Welder Assembly						

Functional group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
	Service	x					
	Test		X				
	Repair			X			
	Overhaul					X	
4401	ROTOR ASSEMBLY						
	Armature Assembly						
	Test				X		
	Replace				X		
	Overhaul					X	
	Armature, Exciter						
	Test			X			
	Replace			X			
4402	STATOR ASSEMBLY						
	Stator Assembly, Motor						
	Test				X		
	Replace				X		
	Overhaul					X	
	Coil Set, Exciter Field						
	Test	.		X			
	Coils, Generator Stator						
	Replace			X			
	Test				X		
	Replace				X		
	Poles, Generator Stator						
	Replace				X		
	Poles, Exciter Field						
	Replace			X			
	Cable and Wiring						
	Replace				X		
	Repair		X				
4403	BRUSH HOLDER ASSEMBLY						
	Brushes						
	Replace		X				
	Bracket, Main Brush Holder						
	Replace				X		
	Brush Holder Assemblies						
	Replace		X				
	Repair		X				
4405	FRAME SUPPORT, HOUSING, CARRIER						
	Bearings, Ball						
	Replace				X		
	Frame Assembly, Generator						
	Replace					X	
	Covers						
	Replace		X				
4406	VENTILATING, COOLING SYSTEM						
	Fan, Cooling						
	Replace		X				
4407	CONTROL PANELS, HOUSING						
	Control Box Assembly						
	Replace			X			
	Wiring						
	Replace		X				
	Repair		X				
	Meter; Shunt; Receptacle						
	Replace		X				
4409	PROTECTIVE DEVICES, ELECTRICAL						
	Thermostat						
	Replace				X		

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
4410	SWITCHING CONTROL						
	Circuit Breaker; Switches						
	Replace		X				
	Starter Assembly						
	Repair			X			
4411	RESISTOR COMPONENTS						
	Resistor						
	Test		X				
	Replace		X				
	Rheostat						
	Replace		X				
4412	TRANSFER COMPONENTS						
	Reactor Assembly						
	Replace			X			

APPENDIX III

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

Section II, it lists the accessories, tools, and publications required in 1st echelon maintenance and operation, initially issued with, or authorized for the arc 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 service depots, and authorized for installation at indicated maintenance echelons.

(c) M -applied to repair parts which are not procured or stocked but are to be manufactured at indicated maintenance echelons.

(d) 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 2nd Echelon)

(4) Recoverability. Repair parts and/or tool and equipment items that are recoverable are indicated by one of the following code symbols:

(a) R--applied to repair parts and assemblies which are economically reparable at field maintenance facilities (3d and 4th echelons) and normally are furnished by supply on an exchange basis.

(b) T--applied to high-dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts normally are repaired or overhauled at depot maintenance facilities.

(c) U--applied to repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, high-dollar value reusable casings, castings, and the like.

b. Federal Stock Numbers. This column lists the 11-digit Federal stock number which is used for requisition 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, indicates 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. 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.

f. 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.

g. Illustrations. This column is subdivided into two columns which provide the following information:

(1) Figure number. Provides the identifying number of the illustration.

(2) Item number. Provides referenced number for the parts shown in the illustration.

3. Federal Supply Code for Manufacturers

Code	Manufacturers Name and Address
36024	Libby Welding Company Kansas City, Missouri

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 Mobility Support Center, ATTN: SMOMS-MM, P. O. Box 119, Columbus, Ohio 43216. Direct communication is authorized.

APPENDIX III

Section II. BASIC ISSUE ITEMS LIST

Source Code				Federal stock No.	Description	Unit of issue	Expendability	Quantity authorized	Quantity issued with equipment	Illustration	
Technical service	Service	Maintenance	Recoverability							Fig.	Item
					GROUP 22- ACCESSORY ITEMS 2202-ACCESSORY ITEMS						
	P1	0			CABLE ASSEMBLY (36024) LA300-1832			1	1	6	
	P1	0			CABLE ASSEMBLY (36024) LA 300-1831			1	1	6	
9	P1	0		3432-238-1638	ELECTRODE HOLDER			1	1	6	
					GROUP 26 -- ACCESSORIES, PUBLICATIONS 2602 - ACCESSORIES						
10	P	0		7520-559-9618	CASE: Operations and maintenance publica- tions, cotton duck, water repellent, mildew resistant.			1	1		
	P1	0			REMOTE CONTROL: (36024) EOW 100			1	1	6	
					2605 -- PUBLICATIONS						
12					TM 5-3431-207-25P REPAIR PARTS MANUAL			1	1		
12					TM 6-3431-207-15 OPERATION, ORGANIZATION, FIELD, AND DEPOT MAINTENANCE MANUAL			2	2		

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Brushes:		
Removal	37*a*	18
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