TECHNICAL MANUAL

# OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS LIST)

FOR

## WELDING MACHINE, ARC
## MODEL SAE-400
## (LINCOLN ELECTRIC COMPANY)
## (NSN 3431-00-498-6258)

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1981

## SAFETY PRECAUTIONS

In order to protect yourself and others from possible serious injury read and observe all Instructions and specific safety precautions included in this manual as well as the following general safety precautions.

1. Protect yourself from possible dangerous electrical shock.
   a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Never permit contact between "hot" parts of the circuits and bare skin or wet clothing. Wear dry. hole-free gloves to insulate hands.
   b. Always insulate yourself from ground using dry insulation when welding in damp locations, on metal floors, gratings or scaffolds, and particularly when in positions (such as sitting or lying) where large areas of your body can be in contact with possible grounds.
   c. Maintain the electrode holder, ground clamp, welding cable and welding machine in good, safe operating condition.
   d. Never dip the electrode holder in water for cooling.
   e. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.
   f. If using the welder as a power source for mechanized welding, these precautions for the electrode holder also apply for the automatic electrode, electrode reel, welding head, nozzle or semiautomatic welding gun.
2. When working above floor level. protect yourself from a fall should you get a shock. Never wrap the electrode cable around any part of your body.
3. Arcburn may be more severe than sunburn Therefore:
   a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Filter lens should conform to ANSI Z87 1 standards.
   b. Use suitable clothing to protect your skin and that of your helpers from the arc rays.
   c. Protect other nearby personnel with suitable non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.
4. Droplets of molten slag and metal are thrown or fall from the welding arc. Protect yourself with oil free protective garments such as leather gloves, heavy shirt, cuffless trousers. high shoes and cans over your hair Wear ear plugs when welding out of position or in confined places.
5. Always wear safety glasses when in a welding area. Use glasses with side shields when near slag chipping operations.
6. Remove fire hazards well away from the area. If this is not possible cover them to prevent the welding sparks from starting a fire Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
7. When not welding, place the holder where it is Insulated from the ground system. Accidental grounding can cause overheating and create a fire hazard.
8. Be sure the work cable is connected to the work as close to the welding area as practical. Work cables connected to the building framework or other locations some distance from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
9. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. This Is particularly important when welding on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes.
10. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas and other irritating products.
11. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase “Safe Practices for Welding and Cutting Containers That Have Held Combustibles." A6.0-65, from the American Welding Society.
12. Vent hollow castings or containers before heating, cutting or welding. They may explode.
13. For more detailed safety Information, it Is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1” for $5 00 from the American Welding Society, Miami, Florida 33125.

**Motor-Generator Welder Safety Precautions**

1. Ground the frame of the welder in accordance with the National Electrical Code and the manufacturer’s recommendations. The fixture or metal being welded must also be connected to a goad electrical ground.
2. Have a qualified electrician do the needed installation, troubleshooting and maintenance work.
3. Turn the welder off using the disconnect switch at the fuse box before doing maintenance work inside the machine.
4. Keep all covers and safety devices in position and good repair.
5. Keep hands, hair, clothing and tools away from all moving parts when operating or repairing equipment.

Technical Manual
No. 9-3431-260-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *10 July 1981*

# OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS LIST) FOR WELDING MACHINE, ARC MODEL SAE-400 (NSN 3431-00-498-6258)

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

**You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS, Rock Island, IL 61299. A reply will be furnished direct to you.**

**NOTE**

**This manual is published for the purpose of identifying an authorized commercial manual for the use of the personnel to whom this welder is issued.**

Manufactured by: Lincoln Electric Co.
22801 St. Clair Ave.
Cleveland, OH 44117

Procured under Contract No. DAAA09-79-C-2073

**This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.**

## INSTRUCTIONS FOR REQUISITIONING PARTS

## NOT IDENTIFIED BY NSN

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

1 - Manufacturer's Federal Supply Code Number - 36232

2 - Manufacturer's Part Number exactly as listed herein.

3 - Nomenclature exactly as listed herein, including dimensions, if necessary.

4 - Manufacturer's Model Number - Model SAE-400

5 - Manufacturer's Serial Number (End Item)

6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.

7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50.

Complete Form as Follows:

(a) In blocks 4, 5, 6, list manufacturer's Federal Supply Code Number - 36232 followed by a colon and manufacturer's Part Number for the repair part.

(b) Complete Remarks field as follows:
Noun: (nomenclature of repair part)
For: NSN: 3431-00-498-6258
Manufacturer: Lincoln Electric Co.

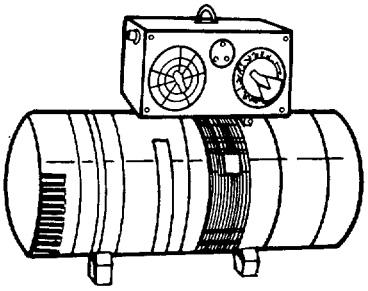
Model: SAE-400
Serial: (of end item)

Any other pertinent information such as Frame Number, Type, Dimensions, etc.

**OPERATING MANUAL**

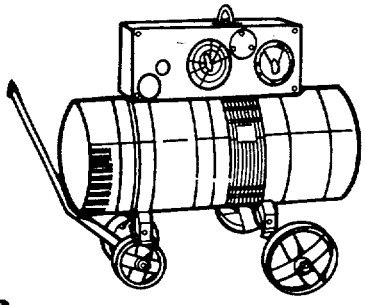
# SAE DC Welders

## Motor and Belt Driven



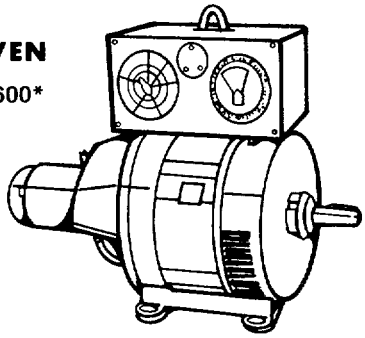
**AC MOTOR DRIVEN**

SAE 200*, 300, 400, 600*



**DC MOTOR DRIVEN**

SAE 200*, 300*, 400



**BELT DRIVEN**

SAE 200*, 300, 400, 600*, 900*-B

*Discontinued Models

**DAMAGE CLAIMS**

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

**SAFETY DEPENDS ON YOU**

These welders are designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. Read and observe all instructions and specific safety precautions included in this manual as well as the common machine operating and welding safety precautions outlined on the back of this manual. And, most importantly, think before you act and be careful.

**INPUT CONNECTION: Motor-Generator**

Install the welder in a dry location where there is free circulation of air. Place the air intake end of the machine to minimize the amount of smoke and fumes from welding which are drawn into the welder.

Be sure the voltage, phase and frequency of the input power is as specified on the welder nameplate. On single voltage machines, connections between the control box and motor are made at the factory. Dual voltage machines are shipped with the NVR coil and stator leads not connected. Connect these leads for the available voltage as indicated on the wiring diagram in the control box.

Have a qualified electrician connect power to the input panel or starter, as appropriate, in accordance with the National Electrical Code, all local codes and the wiring diagram glued to the inside of the door on the start button side of the control box.

The welder frame must be grounded. A stud marked with the symbol - located inside the control box is provided for this purpose. See the National Electrical Code for details on proper grounding -methods. (If an old machine does not have a grounding stud, connect the grounding wire to an unpainted frame screw or bolt.)

**Recommended Input Wire, Ground Wire and Fuse Sizes Based on National Electrical Code**
**For 60 Hertz, 3 Phase Welders at 60% Duty Cycle**

| Welder Size | Input Voltage | Input Ampere Rating | Copper Wire Size Type 75° C in Conduit | | Fuse Size (Super Lag) |
|---|---|---|---|---|---|
| | | | 3 Input Wires | 1 Ground Wire | |
| AC Motor SAE 200 | 230 | 44 | 8 | 8 | 80 |
| | 460 | 22 | 12 | 10 | 40 |
| | 575 | 18 | 14 | 10 | 30 |
| AC Motor SAE 300 | 230 | 62 | 6 | 8 | 100 |
| | 460 | 31 | 10 | 10 | 50 |
| | 575 | 25 | 10 | 10 | 40 |
| AC Motor SAE 400 | 230 | 78 | 6 | 6 | 125 |
| | 460 | 39 | 8 | 8 | 70 |
| | 575 | 31 | 10 | 10 | 50 |
| AC Motor SAE 500 | 220 | 106 | 3 | 6 | 200 |
| | 440 | 53 | 8 | 8 | 100 |
| | 550 | 42.5 | 8 | 8 | 80 |
| DC -DC SAE 600 | 230 | 120 | 3 | 6 | 175 |
| | 460 | 60 | 6 | 8 | 90 |
| | 575 | 48 | 8 | 8 | 70 |

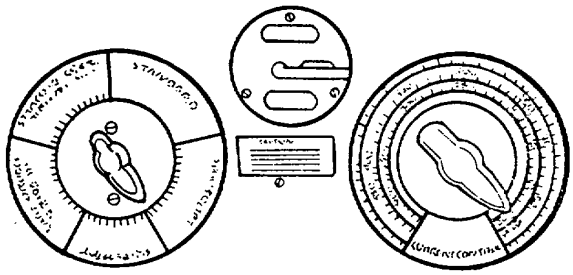
Start the welder and check the direction of rotation. Proper direction is shown by an arrow attached to the welder frame. On 3 phase AC motor driven models, the direction of rotation can be changed by interchanging any two input leads. DC motor driven models rotate in the proper direction but the input leads must be connected as marked on the instruction plate on the starter box so the output studs have the correct polarity.

After the machine has been in operation for some time, check all lead connections and tighten if necessary.

RECOMMENDED OUTPUT CABLE SIZES

| Machine Size in Amps | Cable Sizes for Combined Length of Electrode Plus Ground Cable (Copper) - 60% Duty Cycle | | |
|---|---|---|---|
| | Up to 150 ft. | 150 to 200 ft. | 200 to 250 ft. |
| 260 | 2 | 1 | 1/0 |
| 300 | 1/0 | 2/0 | 3/0 |
| 400 | 2/0 | 3/0 | 4/0 |
| 600 | 3/0 | 4/0 | 2-3/0 |

**CONTROL OF WELDING CURRENT**



**CONTINUOUS CURRENT CONTROL**

The Continuous Current Control provides the major adjustment of welding current to suit each particular application. On most machines the Continuous Current Control has a single dial calibrated in amperes and three colored pointers. On the SAE-300, above Code 5006 and the SAE-400, this control has three separate colored scales. The

**"BELTED" MODELS**

These machines consist of the same generator and controls as the motor-generator models but are driven by a PTO, electric motor or an engine.

The appropriate operating and maintenance instructions in this manual apply to the belted welders.

**INSTALLATION**

The welder frame must be grounded. A stud marked with the symbol ≡ located on the welding generator support frame is provided for this purpose. See the National Electrical Code for details on proper-grounding methods. The ground connector must be No. 8 or larger wire. (If an older welder does not have a grounding stud, connect the ground wire to an unpainted frame screw or bolt.)

Design the driving system to operate the generator at a steady full load speed (1800 or 1500 RPM as indicated on the nameplate). Build a rigid mounting which mountains accurate alignment through the driving system and minimizes vibrations transmitted to the welder. Use a flexible type coupling when connecting the generator shaft directly to the power source shaft. For belt driven installations, prevent excessive bearing wear by using only enough belt tension to avoid slipping.

colored pointers (or scales) correspond to the yellow, black and red sections of the Job Selector dial. When the Job Selector is set on the yellow section of its dial, the approximate welding current is indicated by the yellow pointer (or scale) on the Continuous Current Control dial.

DO NOT change the Continuous Current Control setting while welding.

**DUTY CYCLE**

60 Hertz machines are NEMA rated at a 60% duty cycle. This means they can be operated at rated output for 6 minutes out of every 10 minute period. 50 hertz machines are rated 50% duty cycle.

**JOB SELECTOR**

The Job Selector is both the fine current adjustment and the voltage control of your welder. With this control you can obtain the exact current you desire. Also, by means of this control, you can vary the open circuit voltage to adjust the arc characteristics to different welding situations.

The Job Selector dial is divided into four sections. The yellow section marked "Large Electrode" provides a high open circuit voltage. The black section marked "Normal Welding Range" gives a medium-high open circuit voltage.

The red section marked "Overhead and Vertical" is a medium-low open circuit voltage. The section marked "Special Applications" provides a low open circuit voltage which is used in conjunction with a minimum setting on the Continuous Current Control.

**HOW TO SET THE CONTROLS**

Example: Assume you want to weld with a 5/32" electrode at about 135 amps using the soft arc (medium-high open circuit voltage) recommended for most applications:

1. Set the Job Selector to the black section of the dial marked "Normal Welding Range."
2. Set the Continuous Current Control to read 135 amperes under the black pointer (or the black dial).
3. Strike the arc.
4. If the arc is too weak, set the Job Selector up (counter clockwise) to increase the current. If a still higher current is desired, turn the Continuous Current Control up 10 or 20 amps. In the final adjustment, be certain the Job Selector is still set in the black range to get the smooth arc recommended.

**POLARITY SWITCH**

Turn the Arc Polarity Switch to Electrode Negative or Electrode Positive as required for the particular application.

To change polarity on DC motor driven models, interchange the welding cables.

**AUXILIARY POWER OUTLET (Optional)**

AC motor and belt driven models (except SAE-200) can be furnished with a 1 KW exciter. This exciter provides 120 volt DC power for operating lights or power tools. When using a belted welder as a power source for tools, run the engine at the normal welding speed.

**MAINTENANCE AND TROUBLESHOOTING**

**Have a qualified electrician do the maintenance and troubleshooting work. Turn the power off using the disconnect switch at the fuse box before working inside the machine.**

**GENERAL INSTRUCTIONS**

1. Blow out the welder and controls with an air hose at least once every two months. In particularly dirty locations this cleaning may be necessary once every week. Use low pressure air to avoid driving dirt into the insulation.
2. Reactor brushes are silver graphite and should not be greased. Keep the contacts clean.
3. Rotate the Current Control through its entire range each morning. This cleans the contacts to lessen the possibility of the contact "freezing". Do not do this while welding.
4. The starter on motor driven models should be inspected every six months. Any accumulated dust should be blown out of the starter.
5. Keep electrode and ground connections tight.

**MOTOR PROTECTION (AC Motor Driven Only)**

The AC motor is protected by a special device operated by both temperature and current. This device stops the machine if the windings reach the maximum safe operating temperature because of frequent overloads, high room temperature plus overload, or abnormally high or low input voltage. Protection is also assured against excessive currents resulting from single phase or unbalanced line conditions.

The thermostat automatically resets when the temperature reaches a safe operating level. Restart the motor by pushing the start button.

Cooling of the motor can be speeded by holding in the start button and operating the machine idle. Models prior to code 3500 equipped with the optional two voltage switch cannot be cooled in this manner without burning out the NVR coil. If the reason for the disconnection was single phase or unbalanced line conditions, correct the situation before attempting to restart the motor. Serious damage will result if the start button is held in with these conditions present.

**BEARINGS**

Your welder is equipped with double-shield ball bearings having sufficient grease to last indefinitely under normal conditions. Where the welder is used constantly or in excessively dirty locations, it may be necessary to add one ounce of grease per year.

When greasing the bearings, keep all dirt out of the area. Wipe the fittings completely clean and use clean grease and equipment. More failures are caused by dirt introduced while greasing than from insufficient grease.

**COMMUTATOR AND BRUSHES**

The generator brushes are properly adjusted when the welder is shipped. They require no particular attention. DO NOT SHIFT THE BRUSHES or adjust the rocker setting.

Periodically inspect the commutators and brushes by removing the commutator covers. DO NOT remove or replace these covers while the machine is running.

Commutators require little attention. However, if they are black or appear uneven, have an experienced maintenance man clean them with fine sandpaper or a commutator stone. Never use emery cloth or paper for this purpose.

Have an experienced maintenance man replace brushes when they wear within 1/4" of the pigtail. A complete set of replacement brushes should be kept on hand. These brushes have a curved face to fit the commutator. Seat these brushes by lightly stoning the commutator as the armature rotates at full speed until

contact is made across the full face of the brushes. After stoning, blow out the dust with low pressure air.

**WARNING: Uncovered rotating equipment can be dangerous. Use care so your hands, hair, clothing or tools do not catch in the rotating parts. Protect your self from particles that may be thrown out by the rotating armature when stoning the commutator.**

**THE LINCOLN EXCHANGE PLAN** gives you fast repairs at modest cost. Here's how:

Factory remanufactured replacements for the major parts indicated in this manual are available for most models. These exchange parts are available only through the local authorized Field Service Shops. To get your welder back into operation quickly, replace the faulty part with a rebuilt part - often from the service shop's stock. The cost is less than a normal rewinding job.

The service shop will ship the removed part to the factory for inspection. If it can be rebuilt, a credit will be issued to the shop. They, in turn, will pass this credit to you, thus further reducing the net cost of the repair. And all exchange parts carry the same one year guarantee as new welders.

## TROUBLESHOOTING

Have a qualified electrician do the troubleshooting work. Turn the input power off using the disconnect switch at the fuse box before working inside the machine.

| TROUBLE | CAUSES | WHAT TO DO |
|---|---|---|
| Machine fails to hold the “heat" constantly. | Rough or dirty commutator. | Commutator should be trued or cleaned. |
| | Brushes may be worn down to limit of adjustment or life (1/4 inch from the pigtail). | Replace brushes. |
| | Brush springs may have lost adjustment or may be broken. | Replace brush springs. |
| | Field circuit may have variable resistance connection or intermittent open-circuit, due to loose connection or broken wire. | Check field current with ammeter to discover varying current. This applies to both the main generator and exciter. |
| | Electrode lead or work lead connections may be poor. | Tighten all connections. |
| | Wrong grade of brushes may have been installed on generator. | Use new brushes. |
| | Field rheostat may be making poor contact and overheating. | Inspect rheostat and clean the contact. |
| | Current control brushholder 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. |
| | Current control brushholder support stud and mating contact surfaces may be dirty or pitted and burned. | If brushholder internal contact surface is pitted and burned, replace the brushholder and support stud. If the contact surface is dirty clean off the brushholder stud and internal contact surface. Apply mixture of three parts silicone grease and one part zinc powder (by weight) to stud. |
| Welding arc is loud and spatters excessively. | 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. |
| Welder starts but fails to generate current. | May be running the wrong way. | Check direction of rotation with direction arrow. On three-phase motors direction of rotation may be changed by interchanging any two input leads. |
| | Generator or exciter brushes may be loose or missing. | Be sure that all brushes bear on the commutator and have proper spring tension. |
| | Exciter may not be operating. | Check exciter output voltage with voltmeter or lamp. |
| | Field circuit of generator or exciter may be open. | Check for open circuits in rheostat, field leads, field coils and resistors. Some machines give less output when fields are open. |
| | Polarity reversing switch may be in the neutral position. | Put handle in positive or negative position. |

## TROUBLESHOOTING

| TROUBLE | CAUSES | WHAT TO DO |
|---|---|---|
| Welder starts but fails to generate current (Continued) | Exciter may have lost excitation. | Flash the exciter fields.* |
| | Series field or armature circuit may be open-circuited. | Check circuit with ringer or voltmeter. |
| Welding current too great or too small compared to indication on the dial. | Current Control, shaft and handle may have turned slightly in the insulated bushing of the current control brushholder, caused by turning handle too hard against one of the stops. | See that Current Control Indicator yellow arrow is in the horizontal position when handle is turned against stop in the minimum direction. For the newer SAE-300's, set the control against the minimum stop and be sure the pointer is at the minimum mark on the dial plate. |
| | Exciter output low causing low output compared to dial indication. | Field discharge resistor that is wired to the reversing switch may be 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 connected reversed to make a cumulative series generator. Check rotation. |
| Motor trips off the line. | Power circuit may be single phase. | Check for one blown fuse or dead line. |
| | Thermostat may have tripped. | Check for overload condition. |
| | Welding electrode or work leads may be too long or too small in cross-section. operating at rated current. | Check terminal voltage while machine is loaded, it should not exceed 40 volts when |
| | 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 no interference with normal ventilation of the machine |
| | Motor input voltage too low (or high) under load. Unbalanced input voltage. | Motor supply voltages should not fall below 90% of normal voltage. Have power company check transformer and line capacity. The supply leads may be too long or too small. |
| | Ventilation may be impaired. | Blow out and clean. |
| Machine fails to start. | Power circuit may be completely dead. | Look for open disconnect switch, fuses removed from clips, or blown fuses. |
| | Power circuit may be single phased. | Look for one blown fuse or one 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 simultaneously when closed. |
| | Overload protecting device may be tripped or contacts 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 thermostats to find the open-circuited part. See wiring diagram for normally closed and open contacts on the pushbutton. |

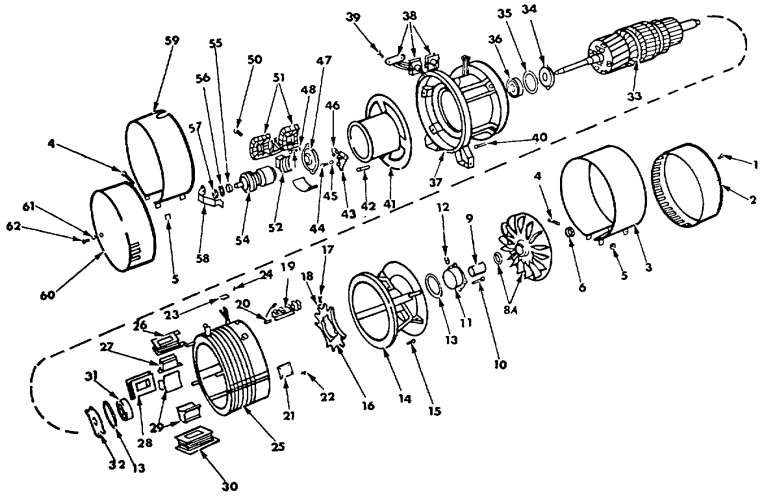
* Flashing the exciter fields consists of passing current through the fields using an external source of 6 to 125 volts of DC power from a storage battery or DC generator. If using a DC generator, keep the generator turned off except when actually applying the flashing current. To flash the fields:

1. Turn the welder off, close the Electrode Polarity switch and raise one exciter brush off the commutator.
2. Attach the positive lead from the DC source to the right hand brushholder.
3. Carefully holding an insulated section of the negative lead from the DC source, touch its lug or clamp to the left hand brushholder for 5 seconds. Pull it away quickly to minimize arcing.

Remove the leads from the brushholder, replace the brush on the commutator, start the welder and the generator voltage should build up.

## MOTOR GENERATOR - AC MOTOR DRIVEN

**WHEN ORDERING GIVE**: Item No., Part Name, Parts List No., and Welder Code.



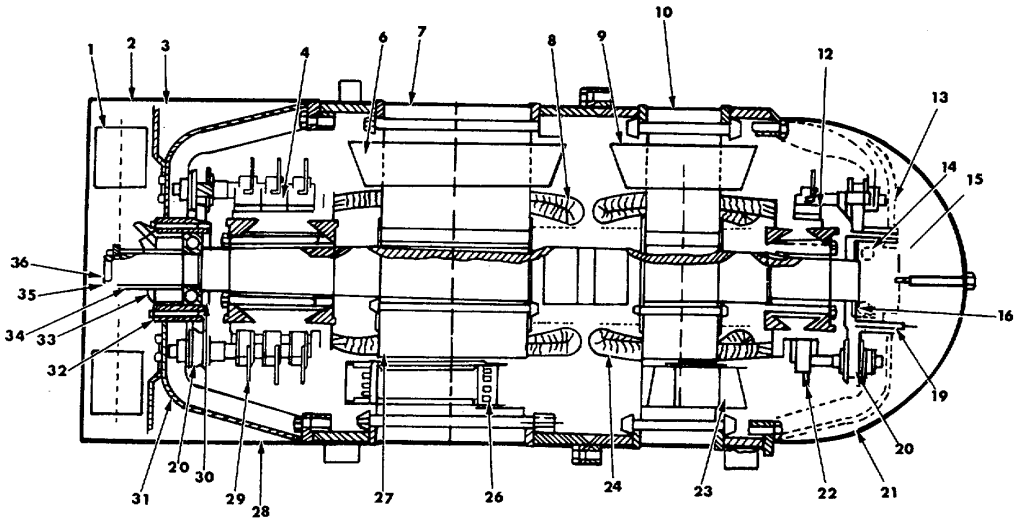
SAE-200 Parts List P-31-C
SAE-300 Parts List P-32-C

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| 1 | Screw, Fan Guard | 3 |
| 2 | Fan Guard | 1 |
| 3 | Cover, End Bracket | 1 |
| 4 | Screw, Round Head | 4 |
| 5 | Nut, Square Head | 4 |
| 6 | Nut, Blower | 1 |
| 7 | Washer, Blower | 1 |
| 8A | Blower | 1 |
| | Retaining Ring | 1 |
| 9 | Tube, Bearing Clamp (Used on Code 2433 and Below) | 1 |
| 10 | Screw, Dust Cap | 4 |
| 11 | Dust Cap, Outer | 1 |
| 12 | Pipe Plug | 1 |
| 13 | Gasket, Dust Cap | 2 |
| 14 | Bracket, Generator End | 1 |
| 15 | Screw. Bracket | 4 |
| 16 | Rocker | 1 |
| 17 | Screw, Round Head | 1 |
| 18 | Lockwasher | 1 |
| 19 | Brush Holder Assembly - Old Style (Prior to Code 275) | 4 |
| | Old Style Brush holder Parts See P-32-F | |
| 19 | Brush Holder Assembly - New Style | 4 |
| | New Style Brush holder parts See P-25-L | |
| 20 | Brush Generator | 8 |
| 21 | Nameplate | 1 |
| 22 | Drive Screw - Nameplate | 2 |
| 23 | Lead Block | 1 |
| 24 | Drive Screw, Lead Block | 4 |
| 25 | Generator Frame Assembly | 1 |
| | Interpole and Coil Assembly. Includes: | 4 |
| 26 | Interpole Coil | 4 |
| 27 | Pole Piece | 4 |
| 28 | Shunt Coil | 2 |
| 29 | Main Pole Piece | 4 |
| 30 | Series Coil | 2 |
| 31 | Bearing | 1 |
| 32 | Dust Cap, Inner | 1 |

SAE-400 Parts List P-33-C
SAE-600 Parts List P-34-C

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| 33 | Armature Assembly, Includes: | 1 |
| | Armature Coil | 1 |
| 34 | Dust Cap, Inner | 1 |
| 35 | Gasket, Dust Cap | 2 |
| 36 | Bearing | 1 |
| 37 | Wound Stator, Includes: | 1 |
| | Stator Coil | 1 |
| 38 | Thermostat Assembly | 1 |
| 39 | Screw, Thermo Mounting | 2 |
| 40 | Screw, Frame | 4 |
| 41 | Bracket, Exciter | 1 |
| 41 | Bracket, Exciter (Oversize Exciter Only) | 1 |
| 42 | Screw, Exciter Bracket | 4 |
| 43 | Brush Holder. Exciter | 2 |
| | Exciter Brush Holder Parts See P-25-M | |
| 44 | Screw, Exciter Brush Holder Mounting | 4 |
| 45 | Washer, Brush Holder Mounting | 4 |
| 46 | Brush, Exciter | 2 |
| 47 | Dust Cap, Outer | 1 |
| 48 | Pipe Plug | 1 |
| 49 | Screw | 2 |
| 50 | Screw, Exciter Pole Piece | 4 |
| 51 | Exciter Field Coil | 7 |
| 52 | Pole Piece | 2 |
| 52 | Pole Piece, Exciter (Oversize Exciter Only) | 2 |
| 53 | Shield, Exciter lead | 1 |
| 53 | Shield, Exciter Lead (Oversize Exciter Only) | 1 |
| 54 | Armature, Exciter | |
| 55 | Collar, Spacer | 1 |
| 56 | Washer, Exciter Nut | 1 |
| 57 | Nut, Exciter | 1 |
| 58 | Bracket, Exciter Cover | 1 |
| 58 | Bracket, Exciter Cover (Oversize Exciter Only) | 1 |
| 59 | Cover, Motor Frame | 1 |
| 60 | Cover. Exciter End | 1 |
| 61 | Washer | 1 |
| 62 | Screw | 1 |

## MOTOR GENERATOR - DC MOTOR DRIVEN



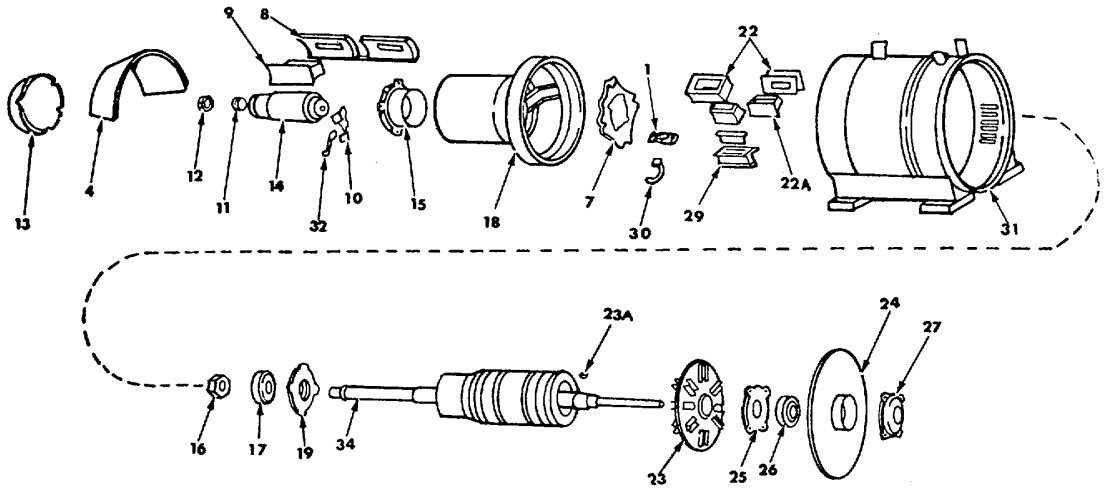

**WHEN ORDERING GIVE:** Item No., Part Name, Parts List No., and Welder Code.

Parts List P-35-C

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| 1 | Blower | 1 |
| 2 | Fan Guard Shield | 1 |
| 3 | Self-Tapping Screws | 4 |
| 4G | Brushes (200 and 300 Amp Models) | 3 |
| 4G | Brushes (400 Amp Models) | 12 |
| 6G | Series Field Coil | 2 |
| 6G | Shunt Field Coil | 2 |
| 7G | Frame | 1 |
| 8G | Armature Coil | 1 |
| 9M | Shunt and Series Field Coils | 4 |
| 10M | Frame | 1 |
| 12M | Brush | 4 |
| 13M | Bracket | 1 |
| 14 | Ball Bearing | 1 |
| 15M | Outer Dust Cap | 1 |
| 16M | Inner Dust Cap | 1 |
| 19 | Dust Cap Gasket | 4 |
| 20 | Rockers | 2 |
| 21 | End Shell | 1 |
| | | |
| | | |
| | | |

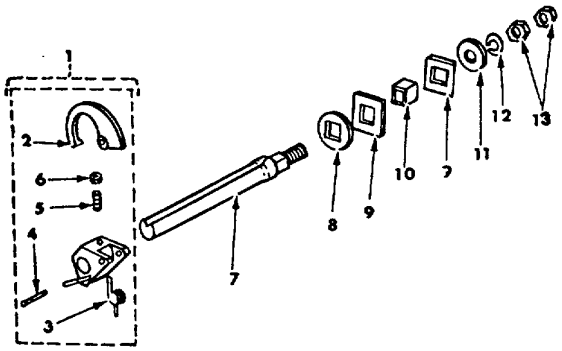
| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| 22M | Brushholder Assembly - Old Style, Prior to Code 322 | 2 |
| | old Style Brushholder Parts | See P-32-E |
| 22M | Brushholder Assembly - New Style | 2 |
| | New Style Brushholder Parts | See P-25-L |
| 23M | Interpole Coil | 4 |
| 24 | Armature Coil | 1 |
| 26G | Interpole Coil | 4 |
| 27 | Armature - Complete | 1 |
| 28G | Bracket Cover | 1 |
| 29G | Brushholder Assembly - Old Style, Prior to Code 322 | 4 |
| | Old Style Brushholder Parts | See P-32-E |
| 29G | Brushholder Assembly - New Style | 4 |
| | New Style Brushholder Parts | See P-25-L |
| 30G | Inner Dust Cap | 1 |
| 31G | Bracket | 1 |
| 32G | Ball Bearing | 1 |
| 33G | Outer Dust Cap | 1 |
| 34 | Bearings Clamp Tube | 1 |
| 35 | Lockwasher | 1 |
| 36 | Bearing Nut | 1 |
| | M- Indicates Motor End | |
| | G- Indicates Welder End | |

## WELDING GENERATOR - BELT DRIVEN



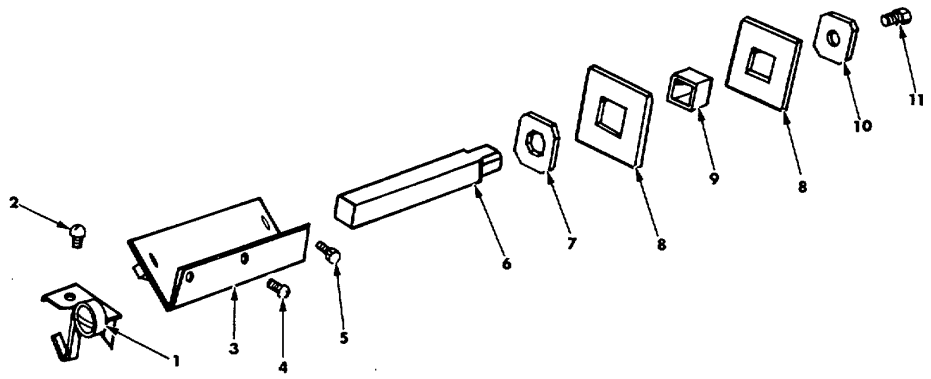

| SAE-200-B Parts List P-36C | | | SAE-300-B to 900-B Parts List P-36-D | | |
|---|---|---|---|---|---|
| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. | ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
| 1 | Brushholder Assembly - Old Style, Prior to Code 340 | 4 | 17 | Bearing | 1 |
| | | | 18 | End Bracket - Exciter End | 1 |
| | Old Style Brushholder Parts | See P-32-E | 19 | Inner Dust Cap | 1 |
| 1 | Brushholder Assembly - New Style | 4 | 20 | Commutator | 1 |
| | New Style Brushholder Parts | See P-25-L | 21 | Armature Coils | 1 |
| 4 | Cover | 1 | 22 | Series Coils | 2 |
| 7 | Rocker Includes: | 1 | 22 | Shunt Coils | 2 |
| | Clamp Screw | 1 | 22A | Pole Piece | 4 |
| 8 | Exciter Field Coils | 2 | 23 | Blower Assembly | 1 |
| 9 | Exciter Field Poles | 2 | 24 | End Bracket - Pulley End | 1 |
| 10 | Exciter Brushholder | 2 | 25 | Inner Dust Cap | 1 |
| | Exciter Brushholder Parts | See P-25-M | 26 | Bearing | 1 |
| 11 | Exciter Sleeve Collar | 1 | 27 | Outer Dust Cap | 1 |
| 12 | Exciter Sleeve Lock Nut | 1 | 29 | Interpole Field Coil | 2 |
| 13 | Exciter End Shield | 1 | 30 | Brushes | |
| 14 | Exciter Armature | 1 | 31 | Frame | 1 |
| 15 | Outer Dust Cap - Commutator End | 1 | 32 | Exciter Brushes | 2 |
| 16 | Bearing Lock Nut | 1 | 34 | Armature Assembly | 1 |

## GENERATOR BRUSH HOLDER - OLD STYLE



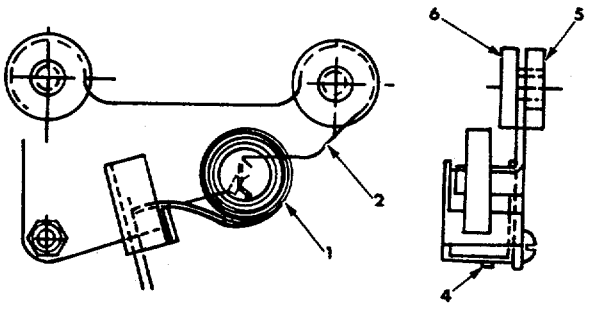

| All Models prior to Code 275 Parts List P-32-E | | |
|---|---|---|
| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
| | Brush Holder Assembly Includes: | |
| 1 | Brush holder - Includes: | 1 per brush |
| 2 | Finger | 1 |
| 3 | Finger Spring | 1 |
| 4 | Finger Stud | 1 |
| 5 | Socket Head Screw, Cup Point | 1 |
| 6 | Nut | 1 |
| 7 | Stud | 1 |
| 8 | Washer | 1 |
| 9 | Insulating Washer | 2 |
| 10 | Insulating Tube | 1 |
| 11 | Washer | 1 |
| 12 | Lockwasher | 1 |
| 1 | Hex Head Nut | 2 |

## GENERATOR BRUSH HOLDER - NEW STYLE



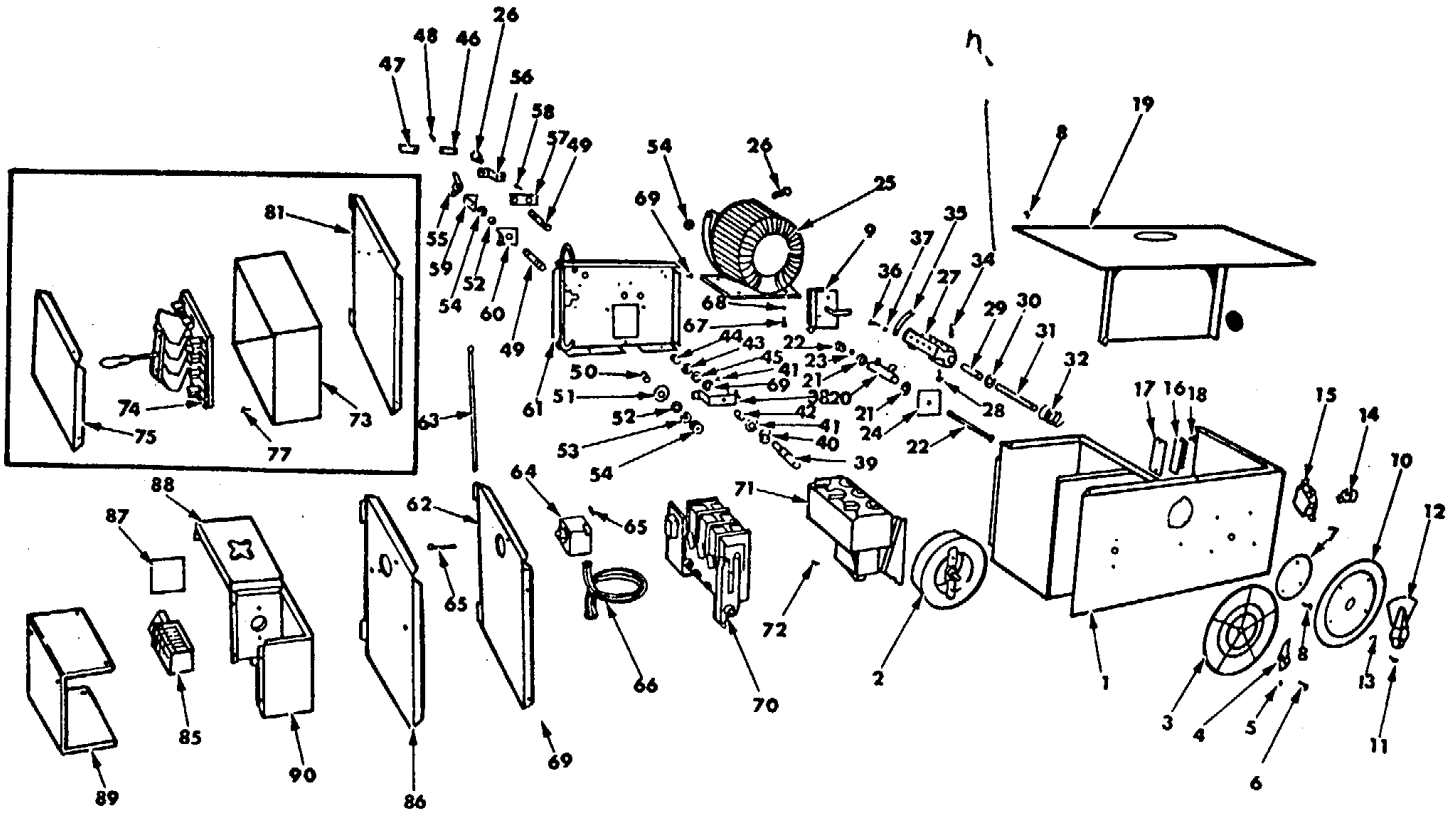

| | All Models Parts List P-32-E | |
|---|---|---|
| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
| | Brush Holder Assembly Includes: | |
| 1 | Spring and Clip Assembly | 4 |
| 2 | Round Head Cap Screw | 4 |
| 3 | Plate and Retainer Assembly | 1 |
| 4 | Round Head Cap Screw | 4 |
| 5 | Hex Head Cap Screw | 1 |
| 6 | Stud | 1 |
| 7 | Clamping Washer | 1 |
| 8 | Insulating Washer | 1 |
| 9 | Insulating Tube | 1 |
| 10 | Clamping Washer | 1 |
| 11 | Hex Head Cap Screw | 1 |
| | | |

## EXCITER BRUSH HOLDER




| All Models Parts List P-25-M | | |
|---|---|---|
| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
| | Exciter Brush Holder Assembly Includes: | 1 |
| 1 | Spring | 1 |
| 2 | Brush holder | 1 |
| 4 | Hex Nut | 1 |
| 5 | Insulating Washer | 2 |
| 6 | Bushing | 2 |

## BASIC CONTROL BOX



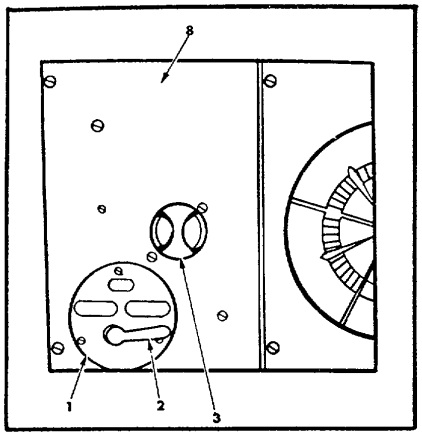

**WHEN ORDERING GIVE:** Item No., Part Name, Parts List No., and Welder Code.

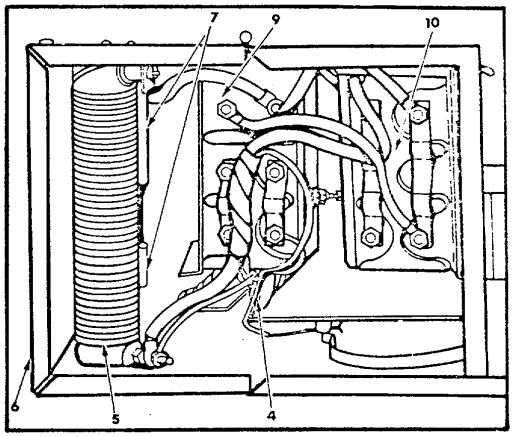
SAE-200 AC-Motor Parts List P-31-D
SAE-300 AC-Motor Parts List P-32-D
SAE-400 AC-Motor Parts List P-33-D
SAE-600 AC-Motor Parts List P-34-D
SAE DC-Motor Parts List P-35-D
SAE Belted Parts List P-36-E

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| 1 | Case Assembly | |
| 2 | Rheostat | 1 |
| 3 | Voltage Dial Plate | 1 |
| 4 | Rheostat Handle | 1 |
| 5 | Headless Set Screw, Cup Point | 1 |
| 6 | Screw, Rheostat Mounting | 2 |
| | Volt - Ammeter (Optional) | 1 |
| 7# | Reversing Switch Plate | 1 |
| 8 | Screw | 9 |
| 9# | Reversing Switch | 1 |
| 10 | Current Dial Plate | 1 |
| 11 | Rivets, Dial Plate Mounting | 4 |
| 12 | Reactor Handle | 1 |
| 13 | Set Screw, Hollow, Half Dog Point | 1 |
| 14 | Plug, Oversize Exciter Only | 1 |
| 15 | Receptacle, Oversize Exciters Only | 1 |
| 16 | Terminal Strip, SAE-600 Only | 1 |
| 17 | Terminal Strip Number Plate, SAE-600 Only | 1 |
| 18 | Self Tapping Screw, SAE-600 Only | 2 |
| 19 | Cover Assembly | 1 |
| 20# | Resistance Tube-500 OHMS Standard | 1 |
| 20# | Resistance Tube-200 OHMS Automatic Duty | 1 |
| 22# | Stove Bolt | 1 |
| 23# | Lockwasher | 1 |
| 24# | Insulation, Resistance Tube | 1 |
| 25 | Reactor | |
| 26 | Hex Head Cap Screw | 1 |
| | Reactor Brush Holder Assembly Includes: | 1 |
| 27 | Brush Holder | 1 |
| 28 | Hex Head Cap Screw | 2 |
| 29 | Insulation Tube | 1 |
| 31 | Shaft | 1 |
| 34 | Finger Spring | 4 |
| 35 | Contact Finger | 4 |
| 36 | Round Head Screw | 4 |
| 37 | Lockwasher | 4 |
| 30 | Washer | 2 |
| 32 | Spring | 1 |
| 33 | Reactor Spring Clip | 1 |
| | Stud and Bracket Assembly Includes: | 1 |
| 38 | Bracket | 1 |
| 39 | Stud | 1 |
| 40 | Copper Washer | 1 |
| 41 | Insulating Washer | 2 |
| 42 | Insulating Bushing | 1 |
| 43 | Lockwasher | 1 |
| 44 | Knead Brass Nut | 1 |
| 45 | Plain Washer | 1 |
| | Sub Panel Assembly Includes: (Without Meter) | 1 |
| | Sub Panel Assembly Includes: (With Meter) | 1 |
| 46 | "Electrode" Marker | 1 |
| 46 | "Positive" Marker (DC Motor Over 200V Input) | |
| 47 | "To Work" Marker | 1 |
| 47 | "Negative" Marker (DC Motor Over 300V Input) | |
| 48 | Hollow Rivet | 4 |

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| | Output Stud Assembly Includes: | 2 |
| 49 | Stud | 2 |
| 50 | Insulating Bushing | 2 |
| 51 | Insulating Washer | 4 |
| 52 | Plain Washer | 4 |
| 53 | Lock Washer | 2 |
| 54 | Hex Jam Nut | 4 |
| 55 | Hex Flanged Weld Nut | 2 |
| 56 | Connection Strap | 1 |
| 57 | Connection Strap Insulation | 1 |
| 58 | Self Tapping Screw | 1 |
| 59 | Connection Strap (Without Meter) | 1 |
| 59 | Shunt (With Meter Only) | 1 |
| 60 | Insulation | 1 |
| 61 | Sub Panel | 1 |
| 62 | End Cover (Without Two Voltage Switch) | 1 |
| 63*# | Hinge Pin | 1 |
| 64*# | Push Button Assembly | 1 |
| 65*# | Screw and Nut | 2 |
| 66*# | Harness, Push Button | 1 |
| 67 | Screw Reactor Mounting | 6 |
| 68 | Lock Washer, Reactor Mounting | 6 |
| 69 | Screw | R |
| 70*# | GXL Starter Assembly (Less NVR Coil) | 1 |
| | GXL Starter Parts | See P28-F |
| 71*# | S-45 Starter (600 Amp AC Motor) (Less NVR Coil) | 1 |
| | S-45 Starter Parts | See P-28-E |
| *# | GAC Starter Box | See P-28-G |
| *# | Dual Voltage Switch Assembly, Includes: | 1 |
| 85*# | Dual Voltage Switch | 1 |
| 86*# | End Cover | 1 |
| 87*# | Nameplate | 1 |
| 88*# | Locking Cover | 1 |
| 89*# | Case Cover | 1 |
| 90*# | Case | 1 |
| *# | Condensers, Optional (Not Illustrated) | 3 |

## GDC STARTER BOX



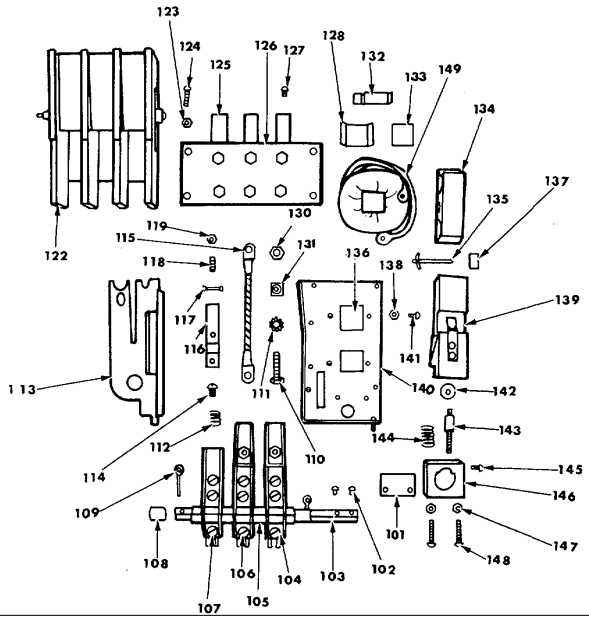

**WHEN ORDERING GIVE:** Item No., Part Name, Parts List No., and Welder Code.

SAE DC-Motor Parts List P-35-E

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| 1 | Polarity Switch (Less than 300 Volt Input Only) | 1 |
| | Round Head Screw, Switch Mounting | 2 |
| | Hex Nut | 2 |
| | Polarity Switch Flat Spring | 1 |
| 1 | Switch Hole Cover Plate (Over 300 Volt input) | 1 |
| 1 | Polarity Switch Plate | 1 |
| 2 | Polarity Switch Handle | 1 |
| | Switch Lever and Shaft Assembly | 1 |
| | Groove Pin - Handle to Shaft | 1 |
| 3 | Push Button | 1 |
| | Push Button Harness | 1 |
| 4 | Resistance Tube - Polarity Switch Discharge Tube | 1 |
| | Tube Insulation (Glastic) | 2 |
| | Tube Insulation (Duro) | 1 |
| | Insulating Washer | 1 |
| | Stove Bolt, Tube Mounting | 1 |
| | Hex Nut, Tube Mounting | 1 |
| 5 | Resistor, Specify Welder Input Voltage | 1 |
| 6 | End Cover | 1 |
| 7 | Resistance Tubes, Specify Welder Input Voltage | 2 |
| | Fiber Washers | 2 |
| | Tube Insulation (Duro) | 2 |
| | Tube Insulation (Glastic) | 4 |
| | Stove Bolt; Tube Mounting | 2 |
| | Hex Nut, Tube Mounting | 2 |
| 8 | Case | 1 |
| | Nameplate, Input Leads | 1 |
| | Self Tapping Screw, Nameplate Mounting | 2 |

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| | Input Lead Clamp | 1 |
| | Round Head Screw, Clamp Mounting | 1 |
| | Hex Nut, Clamp Mounting | 1 |
| 9 | #1 S-45 Starter (Used on Codes Below 6400) | 1 |
| | S-45 Starter Parts | See P-28-E |
| 9 | #1 S-67 Starter (Used on Codes Above 6400) | 1 |
| | S-67 Starter Parts | See P-28-H |
| 9 | #1 GDC* Starter, Prior to Code 2148 | |
| | GDC Starter Parts | See P-28-F |
| 10 | #2 S-45 Starter (Used on Codes Below 6400) | 1 |
| | S-45 Starter Parts | See P-28-E |
| 10 | #2 S-67 Starter (Used on Codes Above 6400) | 1 |
| | S-67 Starter Parts | See P-28-H |
| 10 | #2 GDC* Starter, Prior to Code 2148 | |
| | GDC* Starter Parts | See P-28-F |
| | #1 GDC* Starter Interlock Parts - Not Illustrated | |
| | Interlock Assembly | 1 |
| | Interlock Block | 1 |
| | Plunger | 1 |
| | Insulation | 1 |
| | Coil Spring | 1 |
| | Insulation | 1 |
| | Support Plate | 1 |
| | Time Delay Relay, Mount on #1 S-45 | 1 |
| | Bracket and Rocker Arm. Relay Mounting | 1 |
| | #1 GDC* Starter Mercury Switch Parts - Not Illustrated | |
| | Mercury Switch | 1 |
| | Trunnion | 1 |
| | Delay Arm | 1 |
| | *This GDC Starter, used on machines prior to Code 2148, is basically a GXL Starter. Spare parts are listed on the GXL Starter carts list. | |

## GXL STARTER

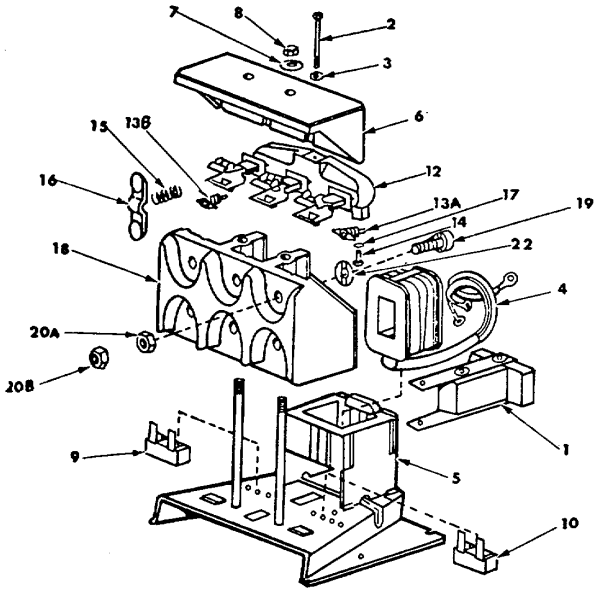



SAE-200, 300 and 400 AC-Motor Parts List P-28-F

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| | GDC* Starter, Includes: (Includes NVR Coil) DC Motor Driven Welders Only | 2 |
| | GXL Starter, Includes: (Less NVR Coil) | 1 |
| 101 | Interlock Insulation | 1 |
| | Interlock Support Plate | 1 |
| 102 | Sems Round Head Screw | 2 |
| 103 | Square Shaft | 1 |
| 104 | Sems Round Head Screw | 6 |
| 105 | Shaft Insulation | 1 |
| 106 | Contact Arm Clamp | 3 |
| 107 | Contact Arm | 1 |
| 108 | Bearing, Nylon | 2 |
| 109 | Cotter Pin | 2 |
| 110 | Hex Head Cap Screw - Contact Mounting (Lower) | 3 |
| 110 | Hex Head Cap Screw - Contact Mounting (Upper) | 3 |
| 112 | Shakeproof Washer | 6 |
| 112 | Contact Spring | 3 |
| 113 | Side Panel. Left Side | 1 |
| 114 | Sems Round Head Screw | 3 |
| 115 | Lead With Lugs | 3 |
| 116 | Moving Contact | 3 |
| 117 | Rivet, Contact Assembly | 3 |
| 118 | Headless Slotted Set Screw | 3 |
| 119 | Hex Nut | t |
| 122 | Barrier | 1 |
| 123 | Hex Nut, Side Panel Mounting | 4 |
| 124 | Sems Round Head Cap Screw - Contact Block Mounting (Lower) | 2 |
| 124 | Sems Round Head Cap Screw - Contact Block Mounting (upper) | 2 |
| | Shakeproof Washer | 4 |
| | Contact Block Assembly, Includes: | 1 |
| 125 | Stationary Contact | 3 |

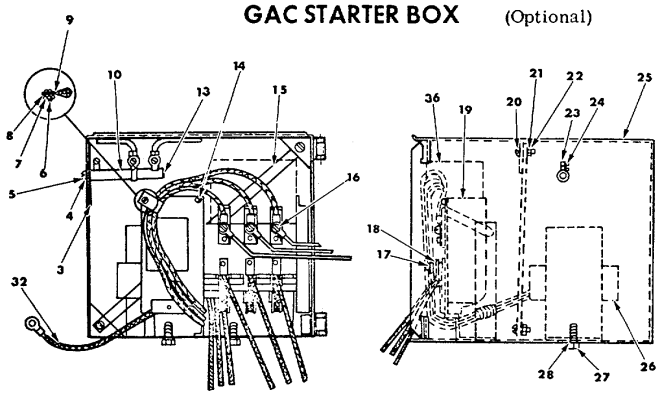
| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|
| 126 | Contact Block | 1 |
| | Stationary Contact (Not Illustrated) GDC Only | 1 |
| | Moving Contact (Not Illustrated) GDC Only | 1 |
| 129 | Jumper | 2 |
| 130 | Hex Nut | 4 |
| 131 | Square Nut | 3 |
| 132 | Clamp. NVR Coil | 1 |
| 133 | Fiber Retainer, NVR Coil | 1 |
| 134 | Moving Lamination, Note I | 1 |
| 135 | NVR Arm Pin | 1 |
| 136 | Stationary Lamination | 1 |
| 137 | Tinnerman Nut | 2 |
| 138 | Hex Nut | 4 |
| | Shakeproof Washer | 4 |
| 139 | Movable NVR Crossing Arm | 1 |
| 140 | Side Panel - Right Hand | 1 |
| 141 | Sems Round Head Screw, Lamination Mounting | 4 |
| | *Interlock Assembly, Includes: Not On All Starters | 1 or 2 |
| 142 | Plain Washer | 1 |
| 143 | Plunger | 1 |
| 144 | Coil Spring | 1 |
| 145 | Sems Phillips Head Screw | 2 |
| 146 | Interlock Block | 1 |
| 146 | NVR Arm Stop - Without Interlock | 1 |
| 147 | Hex Nut | 2 |
| 148 | Sems Round Head Screw - Interlock Mounting | 2 |
| 148 | Sems Round Head Screw - Arm Stop Mounting | 2 |
| | Lug | 3 |
| | Round Head Screw - Lug Mounting | 3 |
| 149 | NVR Coil (Specify Input Voltage) | 1 |
| | **Note 1: To obtain proper moving lamination (Item 134) specify input line cycles.** | |
| | *GDC Starter Interlock or Mercury Switch, | See P-15-E. |

## S-45 AND S-67 STARTER




| SAE-600 AC-Motor and SAE DC-Motor<br>S45 Parts List P-28-E<br>S-67 Parts List P-28-H | | |
|---|---|---|
| ITEM | PART NAME AND DESCRIPTION | NO |
| | S-45 & S-67 Starter Assembly, Includes:<br>(Less NVR Coil ) | 1 |
| 1 | Moving Lamination Assembly | 1 |
| 2 | Screw - Lamination mounting | 1 |
| 3 | Lockwasher | 1 |
| 4 | * | 1 |
| 5 | Lamination and Panel Assembly (Specify Input Hertz) | 1 |
| | Plastic Insert | 1 |
| 6 | Contact Block Cover | 1 |
| 7 | Plain Washer | 2 |
| 8 | Hug Nut | 2 |
| 9 | Stationary Interlock Contact Assembly | 1 |
| 10 | Stationary Interlock -Contact Assembly | 1 |
| | Screw - Lead Connections | 4 |
| | Contactor Assembly | 1 |
| 12 | Moving Contactor Block | 1 |
| 13A | Moving Interlock Contact Assembly | 1 |
| 13B | Moving Interlock Contact Assembly | 1 |
| 14 | Round Head Screw | 1 |
| 15 | Spring - Main Contact | 3 |
| 16 | Moving Contact | 3 |
| 17 | Lockwasher | 1 |
| | Main Contact Block Assembly | 1 |
| 18 | Main Contact Block | 1 |
| 19 | Main Stationary Contact: | 6 |
| 20A | Hex Jam Nut - Brass As | Needed |
| 20B | Hex Jam Nut - Brass As | Needed |
| 21 | Terminals | 3 |
| 22 | Spacer Washer | 4 |
| * | NVR Coil (Specify Input Voltage) | 1 |

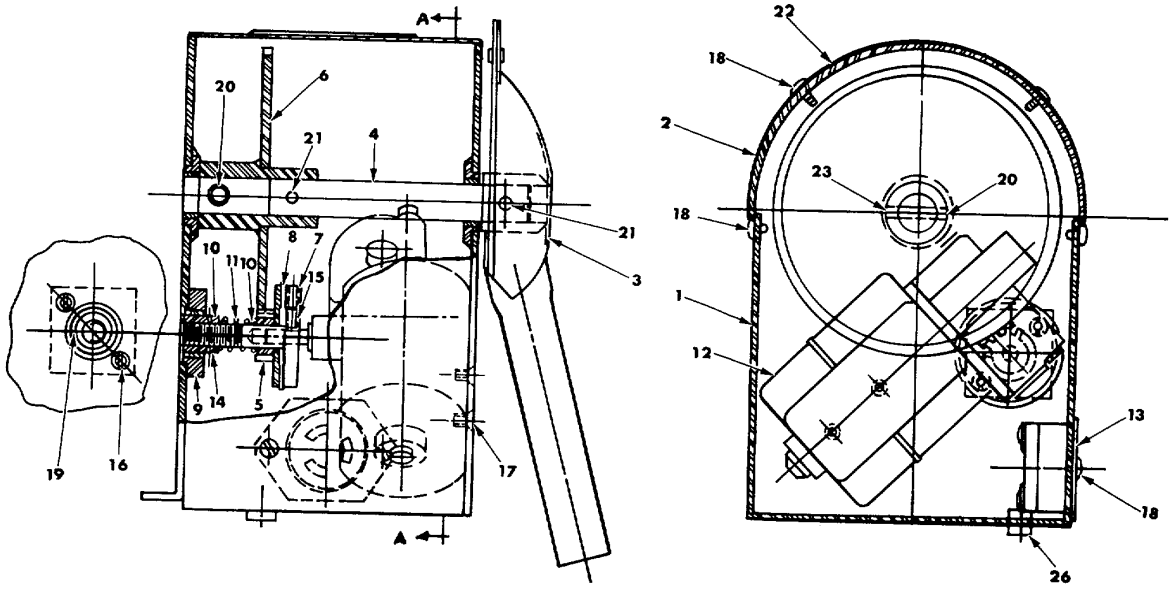
### GAC STARTER BOX (Optional)




SAE AC-Motor Parts List P-35-C

| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. | ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
|---|---|---|---|---|---|
| | GAC Starter, Includes: | 1 | 17 | Hex Nut | 3 |
| 3 | Insulation | 1 | 18 | Lockwasher | 3 |
| 4 | Lockwasher | 1 | 19 | GXL Starter | 1 |
| 5 | Round Head Screw | 1 | | GXL Starter Parts | See P-28-F |
| 6 | Round Head Screw | 1 | 20 | Round Head Screw | 2 |
| 7 | Hex Nut | 1 | 21 | Lockwasher | 2 |
| 8 | Lockwasher | 1 | 22 | Hex Nut | 2 |
| 9 | Lead Clip | 1 | 23 | Round Head Screw | 2 |
| 10 | Resistor | 1 | 24 | Hex Nut | 4 |
| 13 | Square Nut | 1 | 25 | Case | 1 |
| 14 | Self-Tapping Screw | 1 | 26 | Reactance Coil With Lamination | 1 |
| 15 | Cross Brace | 1 | 27 | Hex Head Screw | 2 |
| 16 | Round Head Screw | 3 | 28 | Lockwasher | 2 |
| | | | 36 | Barrier | |

## Optional Remote Current Control




| Parts List P-32-F | | |
|---|---|---|
| ITEM | PART NAME AND DESCRIPTION | NO. REQ'D. |
| 1 | Case Assembly | 1 |
| 2 | Case Cover Plate | 1 |
| 3 | Handle Assembly | 1 |
| 4 | Handle Shaft | 1 |
| 5 | Pinion Gear Assembly | 1 |
| 6 | Spun Gear Assembly | 1 |
| 7 | Clutch and Pinion Shaft | 1 |
| 8 | Clutch Disc. | 1 |
| 9 | Pinion support Bushing Assembly | 1 |
| 10 | Thrust Washer | 2 |
| 11 | Spring | 1 |
| 12 | Motor | 1 |
| 13 | Receptacle | 1 |
| 14 | Support Rushing | 1 |
| 15 | Set Screw | 2 |
| 16 | Flat Head Screw | 2 |
| 17 | Flat Head Screw | 2 |
| 18 | Self Tapping Screw | 10 |
| 19 | Gotter Pin | 1 |
| 20 | Set Screw | 1 |
| 21 | Groove Pin | 2 |
| 22 | Nameplate | 1 |
| 23 | Set Screw | 1 |
| 26 | Grommet | 1 |
| | | |
| | | |

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E. C. MEYER
*General, United States Army*
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|---|---|---|---|
| | | | |

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

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.