LINCOLN® WELDERS

IM-132-F

October, 1990

OPERATING MANUAL

Lincwelder®

DC-250-MK AND DC-250-MK (Aircraft)

AC Motor Driven DC Arc Welding Power Source

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

MODELS:

MC-180-MK*
DC-250-MK
DC-250-MK (Aircraft)
SAE-150J*
SAE-150J (Aircraft)
SAE-200J*
SAE-200J (Aircraft)

* 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

Lincoln arc welding equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS OPERATING MANUAL AND THE ARC WELDING SAFETY PRECAUTIONS ON PAGES 2, 3 and 4. And, most importantly, think before you act and be careful.

IM132
October, 1990
Lincwelder DC-250-MK (aircraft)

1; 13; 14; 15; 45; 46; 52; 53; 54; 55; 56; 57; 58; 66; 67; 70; 74; 77; 90; 93; 97; 102; 132; 133; 134; 135; 138; 139; 150; 153; 156; 157; 158; 160; 164; 165; 166; 172; 178; 180; 181; 184; 187; 194; 210; 219; 222; 224; 226; 254; 260; 269; 271; 272; 273; 274; [illegible] 595; 602; 603; 604 [illegible] 656; 667; [illegible] 870; 1371; 1432; [illegible] 1470; 1471; 1472; 1473; 1474; 1475; 1476; 1477; 1478; 1479; 1480; 1481; 1484; 1488; 1490; 1508; 1511; 1513; 1514; 1515; 1523; 1623; 1634; 1647; 1664; 1665; 1666; 1673; 1685; [illegible] 1770; 1864; [illegible] 2302; 2308; 2419; 2420; 2431; 2432; 2449; 2450; 2451; 2452; 2453; 2454; 2493; 2494; 2495; 2496; [illegible] 2501; 2502; 2503; 2513; [illegible] 2665; 2725; 2773; 2819; 2836; 2941; 2942; 3032; 3045; 3050; 3051; 3100; 3103; 3104; 3105; 3108; 3120; 3121; 3122; 3123; 3139; 3151; 3155; 3171; 3175; 3180; 3188; 3218; 3219; 3222; 3224; 3225; 3228; 3232; 3233; 3245; 3249; 3302; 3306; 3307; 3350; 3351; 3352; 3359; 3360; 3361; 3370; 3371; 3386; 3387; 3392; 3395; 3402; [illegible] 3675; 3676; 3677; 3678; 3681; 3708; 3726; 3794; 3800; 3905; 3940; 4001; 4004; 4086; 4111; 4118; 4119; 4120; 4139; 4186; 4211; 4250; 4287; 4288; 4618; 4655; 4661; 4669; 4757; 4758; 4768; 4769; 4770; 4771; 4775; 4788; 4793; 4806; 4808; 4821; 4825; 4826; 4827; 4836; 4837; 4838; 4840; 4845; 4847; 4849; 4850; 4853; 4855; 4856; 4857; 4858; 4861; 4862; 4863; 4865; 4881; 4882; 4883; 4884; 4888; 4889; 4890; 4905; 4912; 4914; 4951; 4952; 4954; 4967; 4976; 5000; 5005; 5009; 5012; 5021; 5100; 5101; 5102; 5134; 5135; 5205; 5332; 5396; 5446; 5464; 5487; 5499; 5518; 5640; 5667; 5694; 5944; 5968; 6002; 6014; 6026; 6027; 6063; 6114; 6116; 6160; 6161; 6162; 6163; 6164; 6182; 6195; 6196; 6205; 6206; 6233; 6251; 6252; 6253; 6254; 6255; 6256; 6257; 6258; 6259; 6263; 6370; 6435; 6527; 6538; 6541; 6564; 6565; 6566; 6708; 6735; 6768; 6855; 7028; 7118; 7196; 7233; 7426; 7427; 7434; 7490; 7493; 7494; 7495; 7496; 7497; 7498; 7505; 7506; 7516; 7567; 7568; 7691; 7822; 7878; 7993; 8035; 8085; 8257; 8260; 8456; 8457; 8779; 8938; 9115; 9116; 9152; 9161; 9169; 9178; 9194; 9543

ARC WELDING SAFETY PRECAUTIONS

WARNING: PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.

ELECTRIC SHOCK can kill.

1. a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

   b. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".

   c. Insulate yourself from work and ground using dry insulation. When welding in damp locations, on metal framework such as floors, gratings or scaffolds, and when in positions such as sitting or lying, make certain the insulation is large enough to cover your full area of physical contact with work and ground.

   d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

   e. Ground the work or metal to be welded to a good electrical (earth) ground.

   f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

   g. Never dip the electrode in water for cooling.

   h. 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.

   i. When working above floor level, protect yourself from a fall should you get a shock.

   j. Also see Items 4c and 6.

ARC RAYS can burn.

2. 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. Headshield and filter lens should conform to ANSI Z87.1 standards.

   b. Use suitable clothing made from durable flame-resistant material 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.

FUMES AND GASES can be dangerous.

3. a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. When welding on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes, even greater care must be taken.

   b. 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.

   c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

   d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices.

   e. Also see item 7b.

WELDING SPARKS can cause fire or explosion.

4. a. Remove fire hazards from the welding 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. Have a fire extinguisher readily available.

   b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

   c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

   d. 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 "Recommended Safe Practices for the Preparation for

Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1-80 from the American Welding Society (see address below).

e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away 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.

h. Also see item 7c.

CYLINDER may explode if damaged.

5. a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

c. Cylinders should be located:
- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

d. Never allow the electrode, electrode holder, or any other electrically "hot" parts to touch a cylinder.

e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

f. Valve protection caps should always be in place and handtight except when the cylinder is in use or connected for use.

g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

6. a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

FOR ENGINE powered equipment.

7. a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

c. Do not add the fuel near an open flame, welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR WORK performed by qualified people.

For more detailed information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting — ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974.

PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté specifiques qui parraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:
   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vètements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique, ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état de fonctionnement.
   d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.
3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:
   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.
4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protèger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.
5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.
6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.
7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un èchauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particulièrement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.
10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.
11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

PRÉCAUTIONS DE SÛRETÉ POUR LES MACHINES À SOUDER À TRANSFORMATEUR ET À REDRESSEUR

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.
2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.
3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

INSTALLATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Have an electrician install and service this equipment.**
- **Turn the input power off at the fuse box before working on equipment.**
- **Do not touch electrically hot parts.**

Locate the welder in a clean, dry place where there is free circulation of air.

CONNECTION

Be sure the voltage, phase and frequency of the input power is as specified on the welder nameplate.

Dual and triple input voltage machines (230/460 and 220/380/440-50 hertz) are shipped with the motor leads disconnected but with the higher voltage heater links in place and the lower voltage heater links tied to the starter. Connect the motor leads and the appropriate heater links as indicated on the instructions inside the starter cover.

Have a qualified electrician connect 3 phase AC power to the starter in accordance with the U.S. National Electrical Code, all local codes and the wiring diagram glued to the inside of the starter cover.

Recommended Input Wire, Ground Wire and Fuse Sizes Based on U.S. National Electrical Code. For 60 Hertz, 3 Phase Welders at 50% Duty Cycle Rating

Welder Size	Input Voltage	Input Ampere Rating (at 200 A, 30V Output)	Copper Wire Size Type 75°C in Conduit		Fuse Size Amperes (Super Lag)
			3 Input Wires	1 Ground Wire	
250	230	32	#10	#10	60
	460	16	#14	#14	30
	575	12.8	#14	#14	25

⚠ WARNING

FALLING EQUIPMENT can cause injury.

- **Do not lift this machine using lift bale if it is equipped with a heavy accessory such as trailer or gas cylinder.**
- **Lift only with equipment of adequate lifting capacity.**
- **Be sure machine is stable when lifting.**

GROUNDING

The frame of the welder must be grounded. A stud marked with the symbol ⏚ located on the starter mounting panel is provided for this purpose. See the U.S. 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.)

Start the welder and check the direction of rotation. Proper direction is shown by an arrow on the nameplate. On 3 phase machines the direction of rotation can be changed by interchanging any two input leads. For two phase, 3 wire input power, interchange the two outside leads. Be sure the neutral wire is connected to the motor neutral, which is the center terminal on the starter. For two phase, 4 wire input power, interchange two phase, 4 wire input power, interchange two leads in the same phase.

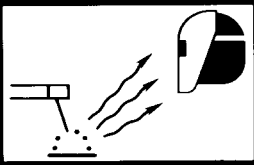
NOTE: When changing the voltage connection for any machine above code 4835 and below code 3050, the heater links must be changed. See page 7 to determine which heater links must be installed. On machines with a code number between 3050 and 4835, the heater links do not have to be changed when changing the voltage connection as long as the connection on the wiring diagram inside the starter cover of these machines is used.

OPERATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**

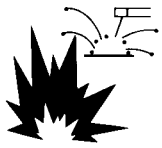


ARC RAYS can burn.

- **Wear eye, ear and body protection.**

FUMES AND GASES can be dangerous.

- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**



WELDING SPARKS can cause fire or explosion.

- **Keep flammable material away.**

RECOMMENDED OUTPUT CABLES

Machine Size in Amperes	Recommended Copper Cable Sizes at 30% Duty Cycle			
	Cable Sizes of Combined Lengths of Electrode and Work Cable			
	0 to 100' (0 to 300 m)	100 to 150' (300 to 450 m)	150 to 200' (450 to 600 m)	200 to 250' (600 to 750 m)
180	4	3	2	1
250	3	2	1	1/0

ELECTRODE POLARITY

With the welder off connect the electrode cable to the DC negative or DC positive stud as required for your particular application. Connect the work cable to the other stud.

DUTY CYCLE

These welders are NEMA rated for a 30% duty cycle. Duty cycle is based on a 10 minute period. Therefore, they can be operated at full output (either 250 or 180 amps) for 3 minutes out of each 10 minute period without overheating. At 50% duty cycle the output rating is 200 amps for the DC-250 and SAE-200J models or 145 amps for the DC-180 and SAE-150J models.

CONTROL OF WELDING CURRENT

Continuous Current Control

The Continuous Current Control provides the major adjustment of welding current to suit your particular applications. The continuous current control has a single dial calibrated in amperes. The control handle has five pointers corresponding to the five major divisions on the Continuous Voltage Control dial. When the Continuous Voltage Control dial is set on 55, for example, the approximate welding current is indicated by the pointer marked 55 on the Current Control handle.

Continuous Voltage Control

The Continuous Voltage Control is both the fine current control and voltage control of your welder. With this control, it is possible to obtain the exact current you require. Also, by means of this control, you can vary the open circuit voltage to adjust the arc characteristics to suit different welding applications.

The Continuous Voltage Control dial is divided into equal divisions marked 40 to 60 open circuit volts. Generally the high open circuit voltage from 50 to 60 volts provides a steady, smooth and stable arc desirable for speedy downhand welding. The low open circuit voltage from 50 to 40 volts provides a digging type arc required for overhead and vertical welding.

How to Set the Controls

Example: Assume you want to make a vertical up weld using 5/32" (4.0 mm) electrode at about 135 amps. A snappy digging arc (medium low open circuit voltage) is required to give the best control of the arc in the whipping technique that must be used.

1. Set the Continuous Voltage Control to about 45.
2. Set the Continuous Current Control to read 135 amperes under the pointer marked 45.
3. Strike the arc.

4. If the arc is too weak, turn the Voltage control up for higher voltage and higher current. If a still higher current is required, turn the Current Control up 10 or 20 amperes. In the final adjustments be certain the Voltage control is still set for the lower part of the scale to provide the snappy arc recommended for vertical welding.

LINCONTROL® (Accessory)

The Lincontrol is a foot operated current control for welding light gauge material. All "Aircraft" models are equipped with the required wiring to operate with the Lincontrol. All other models can easily be adapted for operation with the Lincontrol by installing a receptacle (S7588-1) and a special rheostat (M5090K). Write for IM-113-A for further information.

MAINTENANCE

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Have an electrician install and service this equipment.**
- **Turn the input power off at the fuse box before working on equipment.**
- **Do not touch electrically hot parts.**

BEARINGS

Your welder is equipped with double-shielded ball bearings which have 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 to the bottom bearing and one half ounce to the top bearing.

CAUTION: When greasing the bearings, use a good grade of bearing grease. Keep all dirt out of the area. Wipe the fittings clean and use clean grease and equipment. More failures are caused by dirt introduced during greasing than from insufficient grease.

When replacing the bearings check the bearing cage for excessive wear.

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.

Replace brushes when they wear within ¼" (6.4 mm) of the pigtail. A complete set of replacement brushes should be kept on hand. Lincoln 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 yourself from particles that may be thrown out by the rotating armature when stoning the commutator.

PREVENTATIVE MAINTENANCE

1. Turn the welder off at the fuse box before doing work inside the machine. See pages 2 and 3 for additional safety precautions.
2. Blow out the welder and controls with an air hose once every two months. In particularly dirty locations this cleaning may be necessary every week. Use low pressure air to avoid driving dirt into the insulation.
3. Inspect the starter every six months. Brush any accumulation of dust out of the starter.
4. Rotate the Current Control through its entire range twice each morning. This cleans the contacts to lessen the possibility of the contact "freezing."

CAUTION: Do not rotate the current control while welding because the current may arc between the contacts and damage the switch.

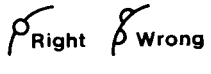
5. Keep electrode and work connections tight.

TROUBLESHOOTING

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Have an electrician install and service this equipment.**
- **Turn the input power off at the fuse box before working on equipment.**
- **Do not touch electrically hot parts.**

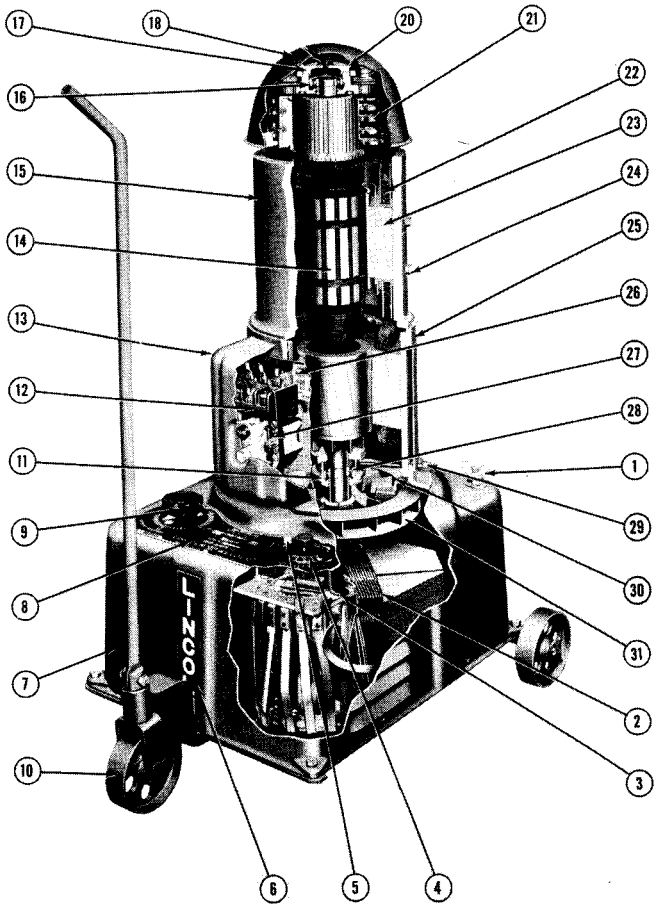
TROUBLE	CAUSES	WHAT TO DO
1. Machine fails to start.	A. Power circuit may be dead. B. Power circuit may be single phased. C. Machine may be jammed. D. Overload heater links may be tripped. E. Power line voltage not suitable for the motor, or input voltage too low.	● Look for open switch, fuses removed from clips or blown fuses. ● Look for one blown fuse or one dead line. ● See that armature turns over easily by hand, and look for foreign material in air gap. ● When machine has had time to cool press start button to reset links and to start the welder. ● Check line voltage and make sure it agrees with nameplate voltage. If voltage is too low have power company check for line losses.
2. Motor trips off the line.	A. Power circuit may be single phase. B. Welder may be oeprating above current capacity. C. Welding leads may be too long or too small in cross-section. D. Ventilation may be impaired. E. Motor input voltage too low. F. Welder may be connected for 460V and running on 230V.	● Check for one blown fuse or dead line. ● Check load against nameplate. ● See Table on page 4. ● Make sure the space under dome is open and that the louvers in base are clear of any obstructions that would interfere with normal ventilation of the machine. ● Motor supply voltages should not fall below 90% of normal voltage. Have power company check transformer and line capacity. If supply lines are too long or too small they should be corrected. (See Table on page 4.) ● Check the connections for proper voltage.
3. Welding arc is loud and spatters excessively.	A. Current setting may be too high. B. Polarity may be wrong.	● Check setting and current output with ammeter. ● Check polarity against recommended polarity for electrode being used.
4. Welder starts but fails to generate current.	A. Wrong rotation. B. Generator brushes may be loose or missing. C. Series field and armature circuit may be open. D. Poor welding lead connections. E. Broken circuit in current control. F. Open rheostat.	● Check rotation with the arrow on nameplate. If wrong rotation, change the direction as follows: a. for three-phase — change any two leads. b. for two-phase, 3 wire — change two outside leads but be sure neutral power line is connected to the neutral (center terminal on the starter). c. for two-phase, 4 wire — change two leads in the same phase. ● Be sure that all brushes bear on the commutator and have proper spring tension. ● Check circuit with ringer or voltmeter. ● Make sure all connections at work and machine are tight and that there are no breaks in the welding leads. ● Replace current control. ● To check for open rheostat, turn voltage to maximum. If welder generates at maximum rheostat setting but not below, replace rheostat.
5. Machine fails to hold heat constantly.	A. Rough or dirty commutator. B. Brushes may be worn down to limit of adjustment or life. C. Brush springs may have lost adjustment or may be broken. D. Field circuit may have variable resistance connection or intermittent open-circuit due to loose connection or broken wire. E. Electrode lead or work lead connections may be poor. F. Wrong grade of brushes may have been installed on generator. G. Field rheostat may be making poor contact and overheating. H. Brush rocker may be loose or out of adjustment.	● Commutator should be trued or cleaned. ● Replace or readjust brushes. ● Replace springs. ● Check field circuit with ammeter to discover varying current. ● Tighten all connections.. ● DC-180-MK and 150J use Brush T6968 (Lincoln part number) DC-250-MK and 200J use Brush T7554. ● Inspect rheostat and clean. If the rheostat finger is loose replace rheostat. ● Be sure the mark, half on the rocker and half on the bearing cage, is aligned. 

6. NAMEPLATES

Whenever routine maintenance is performed on this machine — or at least yearly — inspect all nameplates and labels for legibility. Replace those which are no longer clear. Refer to the parts list for the replacement item number.

WELDER ASSEMBLY

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



OUTPUT STUDS

Parts List P-37-F

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
	Output Stud Assembly	2

January 1975

BRUSHHOLDER — NEW STYLE

Parts List P-25-N

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
	Brushholder Assembly	2

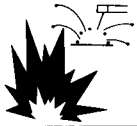
NOTE: New and old style brushholders are interchangeable. However, both brushholders on one machine must be the same type. For old style brushholder parts (Parts List P-37-G), contact a Lincoln authorized Field Service Shop.

December 1981

Parts List P-37-C for DC-180-MK and SAE 150J
Parts List P-37-D for DC-250-MK and SAE-200J

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
	Complete Control Box, Includes Items 1 Through 9	
1	Output Stud Assembly	2
	Output Stud Assembly Parts See P-37-F	
2	Stabilizer	1
	Spacer, Stabilizer Mounting	2
3	Selector Switch	1
4	Selector Switch Handle	1
	Pin, Handle to Switch Shaft	1
5	Selector Switch Stop Screw	1
7	Control Box	1
	Control Box Base	1
8	Nameplate	1
9	Rheostat	1
	Rheostat Handle	1
	Set Screw, Handle to Rheostat Shaft	1
	Receptacle, (Aircraft Models Only)	1
10	Dolly Assembly	1
11	Inner Dust Cap	1
12	Starter See Parts Page P-37-D	
	Heater Elements	1
13	Starter Cover	1
14	Armature Complete	1
15	DC Frame	1
	DC Frame Shield	1
16	Top Bearing, Slotted, Note 1	1
	Top Bearing, Note 1	1
17	Bearing Cage and Rocker Assembly, Note 2	1
	Clamping Ring, Note 2	1
18	Top Shield	1
	Top Shield Fiber	1
20	Thrust Washer (Not Used With Slotted Bearing Cage)	
21	Brushholder, New Style, Note 3	2
	Brushholder Parts See P-25-N	
21	Brushholder, Old Style, Note 3	2
	Brushholder Parts See P-37-G	
	Brush	8
22	Main Pole Coil	2
23	Main Pole Piece	2
	Interpole Coil and Pole Piece (Pair)	1
	Lead Shield ($4\frac{5}{8}$" × $3\frac{3}{4}$" × $\frac{1}{16}$")	1
24	Hex Head Screw, Main Pole to Frame	4
	Hex Head Screw, Interpole to Frame	4
25+	Stator With Coils	1
	Stator Bolt	2
26	Starter Mounting Plate	1
27	Starter Heater Elements See Parts Page P-37-E	
28	Bottom Bearing	1
	Bearing Spacer	1
29	Grease Pipe	1
	Pipe Cap	1
30	Bottom Bracket	1
31	Blower	1
	Blower Unit	1
	NOTE 1: Slotted bearing fits all models. Plain bearing fits models not equipped with slotted bearing cage. (1956)	
	NOTE 2: Replace with new assembly plus clamping ring. Use slotted bearing with new assembly.	
	NOTE 3: New and old style brushholders are interchangeable. However, both brushholders on one machine must be the same style (1953)	

5-2-86

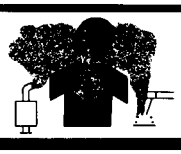
			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絶緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCT ION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			⚠
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración. para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweißrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os painéis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
● 頭部遠離煙霧。 ● 在呼吸區使用通風或排風器除煙。	● 維修前切斷電源。	● 機表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀焊材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

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