

IDEALARC® DC-600

IM306-B

January, 1996

For use with machine Code Numbers above: **8280**

Safety Depends on You

Lincoln arc welding and cutting 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 MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT. And, most importantly, think before you act and be careful.



OPERATOR'S MANUAL

World's Leader in Welding and Cutting Products



Premier Manufacturer of Industrial Motors

Sales and Service through Subsidiaries and Distributors Worldwide
22801 St. Clair Ave. Cleveland, Ohio 44117-1199 U.S.A. Tel. (216) 481-8100

! WARNING

! CALIFORNIA PROPOSITION 65 WARNINGS !

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

The Above For Diesel Engines

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

The Above For Gasoline Engines

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety 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. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.



FOR ENGINE powered equipment.

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



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



1.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.



1.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.

1.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.

1.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.

1.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.



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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

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ELECTRIC SHOCK can kill.

- 3.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.
- 3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:**
- Semiautomatic DC Constant Voltage (Wire) Welder.
 - DC Manual (Stick) Welder.
 - AC Welder with Reduced Voltage Control.
- 3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".
- 3.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.
- 3.e. Ground the work or metal to be welded to a good electrical (earth) ground.
- 3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- 3.g. Never dip the electrode in water for cooling.
- 3.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.
- 3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.
- 3.j. Also see Items 6.c. and 8.



ARC RAYS can burn.

- 4.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.
- 4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 4.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.

- 5.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 with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**
- 5.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.
- 5.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.
- 5.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. MSDS forms are available from your welding distributor or from the manufacturer.
- 5.e. Also see item 1.b.

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WELDING SPARKS can cause fire or explosion.

- 6.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. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.
- 6.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.
- 6.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.
- 6.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 from the American Welding Society (see address above).
- 6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 6.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.
- 6.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.
- 6.h. Also see item 1.c.



CYLINDER may explode if damaged.

- 7.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.
- 7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 7.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.
- 7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
- 7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 7.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.

- 8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.
- 8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
- 8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

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PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protégez-vous contre la secousse électrique:
 - a. Les circuits à l'électrode et à la pièce sont sous tension quand la machine à souder est en marche. Éviter toujours tout contact entre les parties sous tension et la peau nue ou les vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
 - b. Faire très attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, 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'appliquent 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 où 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 protéger 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 latéraux 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 un endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus près 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 chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'échauffement des chaînes 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 fumées 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 phosgène (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 conformément au code de l'électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce 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 faire des travaux à l'intérieur de poste, la débrancher à l'interrupteur à la boîte de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

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IDEALARC DC-600

LINCOLN
ELECTRIC

Thank You —

for selecting a **QUALITY** product by Lincoln Electric. We want you to take pride in operating this Lincoln Electric Company product ••• as much pride as we have in bringing this product to you!

Please Examine Carton and Equipment For Damage Immediately

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.

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Model Name & Number _____

Code & Serial Number _____

Date of Purchase _____

Whenever you request replacement parts for or information on this equipment always supply the information you have recorded above.

Read this Operators Manual completely before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. The level of seriousness to be applied to each is explained below:

⚠ WARNING

This statement appears where the information **must** be followed **exactly** to avoid **serious personal injury or loss of life**.

⚠ CAUTION

This statement appears where the information **must** be followed to avoid **minor personal injury or damage to this equipment**.

IMPORTANT SAFETY NOTE: EMF CONSIDERATIONS

Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines. EMF fields may interfere with some pacemakers, and **welders having a pacemaker should consult their physician before welding**. Exposure to EMF fields in welding may have other health effects which are now not known.

All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Route the electrode and work cables together — Secure them with tape when possible.
2. Never coil the electrode lead around your body.
3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.
4. Connect the work cable to the workpiece as close as possible to the area being welded.
5. Do not work next to welding power source.

INSTALLATION

LOCATION

Install the welder in a dry location where there is free circulation of air through the louvers in the front and out through the louvers in the back of the case. A location which minimizes the amount of smoke and dirt drawn into the machine reduces the chance of dirt accumulation that can block air passages and cause overheating.

STACKING

Three DC-600's may be stacked by observing the following safety precautions:

1. The bottom unit must be placed on a firm, level surface suitable for the total weight [up to 1570 pounds (712 kg)] of the stacked machines.
2. The units must be stacked with their fronts flush, making sure the two holes in the base rails of the top unit are over the two pins located on top of the bottom unit.

WARNING: Do not stack more than three high. Do not stack the DC-600 on top of any other machine.

INPUT WIRING

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

Dual voltage (e.g. 230/460) models are shipped connected for the higher voltage. To change the connection, see the connection diagram pasted to the inside of the access panel in the case back.

Have a qualified electrician remove the rear case panel and connect 3 phase AC power to terminals L₁, L₂ and L₃ of the input contactor in accordance with the United States National Electrical Code, all local codes and the wiring diagram located inside the machine.

The welder frame must be grounded. A stud marked with the symbol \equiv located inside the machine near the input contactor is provided for this purpose. See the U.S. National Electrical Code for details on proper grounding methods.

**Recommended Input Wire, Ground Wire and Fuse Sizes
Based on U.S. National Electrical Code
For 60 Hertz, 3 Phase Welders at 100% Duty Cycle
Ambient Temperature 30°C or Less**

Input Volts	Amps Input	Copper Wire Size Type 75°C in Conduit		Super Lag Fuse Size in Amps
		3 Input Wires	1 Grounding Wire	
230	113	2	6	175
460	56.5	6	8	90

OUTPUT CONNECTIONS

A. Output Studs

Turn welder off. Connect the output leads to the output terminals marked (+) and (-). They are located at the lower right and lower left corners of the front panel. A strain relief loop for the electrode and work cables is provided directly below the output terminals and is retractable. Pull the loop out and pass the cables up through the loop before the connections to the output terminals are made. Tighten the output stud nuts with a wrench.

Cable Sizes for Combined Lengths of Electrode and Work Cable (Copper) at 100% Duty Cycle

Machine Size	Lengths up to 150 ft (46 m)	150 to 200 ft (46 to 61 m)	200 to 250 ft (61 to 76 m)
600	(2) 1/0 (53 mm ²)	(2) 2/0 (67 mm ²)	(2) 3/0 (85 mm ²)

B. Control Cable Connections

With the DC-600 turned off, the control cable from the automatic wire feeding equipment is connected to the

terminal strips behind the hinged door on the front of the power source. Strain relief box connectors are provided for access into the terminal strip section. A chassis ground screw is also provided below the terminal strip marked with the symbol \llcorner for connecting the automatic equipment grounding wire.

To connect the DC-600 to wire feeders not covered in available connection diagrams, write to the factory for instructions giving complete nameplate information for the DC-600 and wire feeder.

C. Auxiliary Power

This machine supplies the 115 volt, AC power needed for wire feeding equipment. The power is available from terminals #31 and #32 on the terminal strip. An 8 amp slow blow fuse on the machine control panel protects the auxiliary power from excessive overloads. The circuit has a 1000 volt-ampere rating.

D. Stick, Air/Carbon Arc and Other Miscellaneous Applications

1. Turn off the DC-600.
2. Disconnect all wire feed unit control, electrode and work leads.
3. Connect a jumper wire from #2 to #4 on the terminal strip.
4. Place mode switch in the VV (Constant Current) position for stick.
5. Place mode switch in the VV (Constant Current) position for air carbon arc.

WARNING: With the DC-600 connected for stick welding, the output terminals will be energized at all times.

If stick welding or air carbon arc cutting is to be done on the DC-600 along with semiautomatic/automatic welding, the optional K804 Multi-Process Switch is required. If the Multi-Process Switch is *not* used, *all* control, electrode, and work leads to wire feed equipment *must* be disconnected from the DC-600 *before* connecting the DC-600 for stick or air carbon arc cutting.

E. Optional K775 Remote Field Control

The K775 remote control is mounted at the wire feeder for output control. Complete instructions are included with the K775 remote control kit.

F. Optional Multi-Process Switch (The switch is not functional when used with paralleled DC-600's.)

The Multi-Process Switch permits easy changing of the polarity of the wire feed unit connected and provides separate terminals for connection of stick or air carbon arc. Electrode and work cables from a semiautomatic or automatic wire feeder are connected to the terminals on the left side of the box. Stick or air carbon arc electrode and work leads are connected to the terminals on the right side of the box. (See instruction sheet M13909.)

The unit consists of a 3 position switch for switching the electrode and work leads and a small micro switch that closes #2 to #4 to energize the output terminals. This switch is closed only in the stick position.

The switch assembly mounts to the front of the DC-600 by means of a bracket that fastens to the case. Two 4/0 (107 mm) leads connect the switch assembly to each output stud.

CAUTION: The wire feeder control cable has a grounding (GND) lead attached to the power source case. When using the Multi-Process Switch in the stick or air carbon arc position extra care must be taken to make sure the wire feeder grounding lead is protected from welding current.

Steps to be taken are:




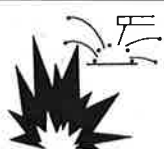
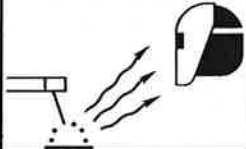
1. Make certain the work lead is in *good* electrical contact with the work piece.
2. Ground the work piece per ANSI Z49.1.

Should there be a question that the above can be properly done, make certain the wire feeder does not come into electrical contact with the work piece.

PARALLELING KIT FOR DC-600

Kit S20428 — field installation only, permits paralleling of two DC-600's for welding currents of up to 1200 amps, 100% duty cycle. (See instructions shipped with the kit for installation and operation.)

OPERATING INSTRUCTIONS

 WARNING	
	<ul style="list-style-type: none">• Do not touch electrically live parts or electrode with skin or wet clothing.• Insulate yourself from work and ground.
ELECTRIC SHOCK can kill.	
	<ul style="list-style-type: none">• Keep your head out of fumes.• Use ventilation or exhaust to remove fumes from breathing zone.
FUMES AND GASES can be dangerous.	
	<ul style="list-style-type: none">• Keep flammable material away.
WELDING SPARKS can cause fire or explosion.	
	<ul style="list-style-type: none">• Wear eye, ear and body protection.
ARC RAYS can burn.	

DUTY CYCLE

The DC-600 is rated for 100% duty cycle at 600 amps and 44 volts for either 60 or 50 Hertz.

ELECTRODE NEGATIVE — ELECTRODE POSITIVE

The toggle switch on the control panel labeled “Electrode Negative” — “Electrode Positive” is set at the same polarity as the electrode is connected to the power sources. This provides the correct polarity at the terminal strip on the front of the machine for correct operation of the automatic wire feeding equipment attached to the power source.

TO START THE WELDER

The pushbutton power “on” switch at the extreme right side of the control panel energizes and closes the three phase input contactor from a 115 volt auxiliary

transformer. This in turn energizes the main power transformer.

The red neon light below the stop-start button indicates when the input contactor is energized.

OUTPUT CONTROL

The output control in the center of the control panel is a tapered continuous control of the machine output. The control may be rotated from minimum to maximum while under load to adjust the machine output.

The machine is equipped with line voltage compensation as a standard feature. This will hold the output essentially constant except at maximum output of the machine, through a fluctuation of $\pm 10\%$ input line voltage.

IMPORTANT SAFETY NOTE: This power source provides “COLD” electrode in the CV modes when the gun trigger is released. This feature and DC Constant Voltage output provide an added margin of safety when welding must be performed under electrically hazardous conditions such as:

- damp locations
- while wearing wet clothing
- on metal structures, or,
- in cramped positions (sitting, kneeling or lying) if there is a high risk of unavoidable or accidental contact with the workpiece or ground.

OUTPUT CONTROL AT DC-600 OR OUTPUT CONTROL REMOTE

The toggle switch on the control panel labeled “Output Control at DC-600” — “Output Control Remote” gives the operator the option of controlling the output at the machine control panel or at a remote station. For remote control, the toggle switch is set in the “Output Control Remote” position and controlled at the wire feed unit control or by connecting a K775 control to terminals 75, 76 and 77 on the terminal strip at the front of the machine. For control on the machine control panel, the toggle switch is set in the “Output Control at DC-600”.

MODE SWITCH — FOR CONSTANT OR VARIABLE VOLTAGE (CONSTANT CURRENT) OUTPUT

The toggle switch labeled CV Innershield, CV Submerged Arc, VV (CC) is used to select the proper welder characteristics for the process being used.

The CV Innershield mode permits the DC-600 to produce essentially a flat output characteristic that can be varied from approximately 12 to 47 volts. In this position the dynamic characteristic of the machine under welding conditions provides optimum welding characteristics for Innershield welding and other open arc processes.

The CV Submerged Arc mode also produces an essentially flat output characteristic that can be varied from approximately 12 to 47 volts. In addition, the dynamic characteristics of the CV Submerged Arc mode are such that excellent submerged arc welding can be obtained for most procedures that previously required a variable voltage (CC) type power source.

The VV (CC) mode permits the DC-600 to produce a variable voltage output characteristic through the range of 120A-12V to 600A-47V with an open circuit voltage of 72 volts. Even though almost all submerged arc welding can now be done in the CV mode, the VV (CC) mode is available for those procedures where VV (CC) may still be desirable. Air carbon arc and stick welding are also done with the switch in this position.

MULTI-PROCESS SWITCH

There are three positions on the switch. With the switch in the left position, the wire feed terminals are electrode negative. In the center position, the wire feed terminals are electrode positive. In both the left and center switch positions, the right side stick terminals are disconnected. In the right switch position, the wire feed terminals are disconnected from the DC-600 and the stick terminals connected. The polarity of the stick terminals is as marked on the end of the box. To change stick polarity the electrode and work leads must be interchanged. In the stick position, the stick terminals are energized at all times.

WARNING: In the stick position, the stick terminals are energized at all times.

SET-UP FOR VARIOUS PROCESSES

Selection of Mode Switch Position — There are several general rules to follow in the selection of the mode switch position.

1. Use the CV Innershield mode for all Innershield welding and other open arc processes. Air carbon arc cutting, using up to 3/8" (9.5 mm) diameter carbon rods at currents as high as 750 amps, can also be done on CV (I) although the recommended mode for air carbon arc is VV (CC). On larger carbons, and currents over 750 amps, air carbon arc cutting can produce extremely high short circuiting pulses, resulting in more frequent tripping of the welder protection circuit. Use of the VV mode, as recommended, will lessen the likelihood of trip outs.
2. Use the CV Submerged Arc mode for most submerged arc welding. However, some high speed welding procedures may perform better on the CV Innershield mode. Merely change the switch between the CV Innershield and CV Submerged Arc position and select the best welding.
3. The VV (CC) mode is available for high current, large puddle, submerged arc procedures that cannot be done as well with the constant voltage mode. This mode is also for stick welding and air carbon arc cutting. For air

carbon arc cutting, the output control should initially be set at 9 and turned lower as required by the use of smaller carbons or procedure. The VV (CC) mode will offer better arc control and less frequent machine trip-outs when air carbon arc cutting with large electrodes at high currents than when cutting in the CV (I) mode.

Operation with an NA-3 — The NA-3 should be set for the mode being used on the power source. If using either of the CV modes, the NA-3 variable voltage board switch should be set for CV. If the power source is used in the VV (CC) mode, then the NA-3 variable voltage board mode switch should be placed in the VV (CC) position.

All NA-3's when used with the DC-600 are capable of cold starting with the variable voltage board mode switch in VV (CC). Cold starting permits the wire to be inched down to the work, automatically stop, and automatically energize the flux hopper valve. All NA-3's made after September, 1976, are capable of cold starting on either CV or VV (CC) settings of the variable voltage board.

Arc striking with DC-600 mode switch on CV Sub-Arc or CV Innershield — There are a number of basic techniques for good arc striking that apply to all processes and power sources. It may not be necessary in every application to follow these guidelines, but when striking problems do occur, following the suggestions below should provide trouble-free starting. These procedures apply to single solid wires and Innershield wires.

1. Cut electrode to a sharp point.
2. For cold starts, make certain work piece is clean and electrode makes positive contact with plate.
3. For hot starts, travel should be started before wire contacts the work ("on the fly" starting).
4. On the NA-3, set the open circuit voltage control to the same dial setting as the arc voltage control. If the procedure has not yet been established a good starting point is to set the OCV to #6.
5. Run a test weld, setting the proper current, voltage and travel speed.
6. Once the proper welding procedure is established and if the start is poor — wire blast-off, stub, etc. — adjust the NA-3 OCV and inch speed controls for optimum starting. In general, a low inch speed and an OCV dial setting identical to the voltage dial setting will provide the best starting.

Adjust the OCV by making repeated starts and observing the NA-3 voltmeter action.

With proper adjustment of the OCV control, the voltmeter needle will swing smoothly up to the desired arc voltage and thus provide repeatable starts.

If the voltmeter swings *above* then back to the desired welding voltage, the OCV is *too high*. This usually results in a bad start where the wire tends to "blast off".

If the voltmeter needle hesitates *before* coming up to the desired voltage, the OCV is set *too low*. This will cause the electrode to stub.

Single FCAW or flux-cored Wire — Procedures and techniques are the same as above. For electrical stickouts above 1-3/4" (44.4 mm), an NA-3 start board may be required.

Use of the NA-3 start board — For those procedures where an NA-3 start board is used to improve arc striking, the following method should be used to set up the procedure.

1. Set start time at 0 and start current and voltage at midrange. Set the proper current and voltage for the welding procedure.
2. Turn the start board timer to maximum.
3. Set start board current one to one-and-a-half dial numbers below NA-3 front control settings.
4. Place start board's voltage control approximately equal to NA-3 voltage control setting.

When set per steps 3 and 4, the starting only procedure will provide a current setting lower than the NA-3 current setting and a voltage setting nearly equal to the desired welding procedure.

5. With the start board time delay set at maximum, establish the correct arc striking procedure as described previously by changing OCV and inch speed.
6. Increase the start board current and voltage to bring the start current and voltage closer to the welding procedure. The start board current and voltage should be as close to the welding procedure as possible while still getting satisfactory starts.

7. Decrease the start time as low as possible for optimum starts.

Arc striking with the DC-600 mode switch in VV (CC)



1. NA-3 — The NA-3 variable voltage board mode switch should be set to the VV (CC) position.
2. The OCV control should be set for the same dial setting as the output control.
3. Other techniques recommended in the previous sections for good arc striking apply here also.

Operation with the NA-5 — Set the DC-600 mode switch to the process being used, either CV Innershield or CV Sub-Arc. Set the DC-600 machine/remote switch in the remote position. Refer to the NA-5 instruction manual (IM-305) for data regarding the set up of controls and modes on the NA-5.

Operation with an LN-8 — Set the LN-8 mode switch (located on the variable voltage (CC) board) to the CV position. Set the DC-600 mode switch on CV Innershield or CV Sub-Arc according to the process being used.

Operation with LN-7, LN-9 and other constant wire feed units — Set the DC-600 mode switch on CV Innershield or CV Sub-Arc according to the process being used. If using an LN-9, refer to the LN-9 instruction manual for further instructions on using the LN-9 with the DC-600. If using an LN-7, it will be necessary to use either a K775 remote control or operate the DC-600 with the machine/remote switch in the machine position.

MAINTENANCE AND TROUBLESHOOTING

 WARNING	
	• 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.
ELECTRIC SHOCK can kill.	

GENERAL MAINTENANCE

1. The fan motor has sealed bearings which require no service.
2. In extremely dusty locations, dirt may clog the air channels causing the welder to run hot. Blow out the welder with low pressure air at regular intervals to eliminate excessive dirt and dust build-up on internal parts.

OVERLOAD PROTECTION

The DC-600 has built-in protective thermostats. If the choke, power transformer or silicon controlled rectifiers (SCR's) reach the maximum safe operating temperature because of frequent overload, or high room temperature plus overload, the contactor drops out stopping the welder. This protects the SCR's as well as the choke and the power transformer. The thermostats automatically reset when the temperature reaches a safe operating level. Press the "Start" button to start the welder.

The SCR's are also protected by a special solid state circuit. With the occurrence of a short circuit or excessively high overloads, the input contactor opens. When the overload is removed, press the "Start" button to start the welder.

An 8 amp fuse located on the front of the machine protects the 115 volt auxiliary AC circuit (#31 and #32) from overload. If replacing, use an 8 amp slow blow fuse.

The control circuit is protected against grounds on leads 75, 76 or 77. If 75, 76 or 77 is grounded to either the positive or negative output leads, the DC-600 will either shut down completely or will operate at minimum output thus preventing any damage to the DC-600 control circuit.

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 lists for the replacement item number.

TROUBLESHOOTING GUIDE

TROUBLE	CAUSE	WHAT TO DO
Input contactor (CR1) chatters.	<ol style="list-style-type: none"> 1. Faulty input contactor (CR1). 2. Low line voltage. 3. Faulty relay (CR2). 	<ol style="list-style-type: none"> 1. Repair or replace. 2. Check input power. 3. Replace relay.
Machine input contactor does not operate.	<ol style="list-style-type: none"> 1. Supply line fuse blown. 2. Contactor power circuit dead. 3. Broken power lead. 4. Wrong input voltage. 5. Primary or secondary thermostats open. 6. Open input contactor coil. 7. Faulty start/stop pushbutton switch. 8. Faulty CR2 relay. 9. Defective control board. 	<ol style="list-style-type: none"> 1. Replace if blown — look for reason first. 2. Check pilot transformer T2 and associated leads. 3. Check input voltage at contactor. 4. Check voltage against nameplate and input connection. 5. Check for overheating; make sure fan is operating and there is no obstruction to free air flow. Replace faulty thermostats. 6. Replace coil. 7. Replace switch. 8. Replace relay. 9. Replace control board.
Input contactor pulls in when start button is pressed, but immediately drops out.	<ol style="list-style-type: none"> 1. Defective start/stop pushbutton. 2. Defective CR1 interlock. 3. With 2 — 4 jumpered, terminals 75, 76 or 77 grounded to <i>negative</i> output. 4. Short on output terminals with 2 — 4 jumpered. 5. Defective control board. 	<ol style="list-style-type: none"> 1. Check and replace if necessary. 2. Repair or replace. 3. Check 75, 76 or 77 for ground to negative output circuit. 4. Remove short. 5. Replace.
Machine input contactor operates but no output when trying to weld.	<ol style="list-style-type: none"> 1. Electrode or work lead loose or broken. 2. Open main transformer T1 primary or secondary circuit. 3. Output pilot relay (CR4) not operating or faulty. 4. Firing circuit P.C. board not connected or is faulty. 	<ol style="list-style-type: none"> 1. Repair connection. 2. Repair. 3. Check relay by connecting a jumper across terminals 2 and 4 on DC-600 terminal strip. Replace if faulty. 4. All nine light emitting diodes (LED1 thru LED9) must be lit. See P.C. board Troubleshooting Guide.
Machine has maximum output but no control.	<ol style="list-style-type: none"> 1. Output control switch (SW4) in wrong position. 2. Output control switch faulty. 3. Open in feedback circuitry. 4. Faulty control or firing circuit P.C. boards. 5. Output control potentiometer circuit open (Lead 75). 	<ol style="list-style-type: none"> 1. Check position of switch. 2. Check switch and replace if faulty. 3. Check wiring and control and firing circuit P.C. board wiring harness plugs. 4. All light emitting diodes must be lit, except LED4 on the control/fault board. See P.C. board Troubleshooting Guide. 5. Check and replace potentiometer if faulty. Check wiring of Lead #75.
Machine has minimum output and no control	<ol style="list-style-type: none"> 1. Terminals 75, 76 or 77 grounded to <i>positive</i> output. 	<ol style="list-style-type: none"> 1. Check 75, 76 or 77 for ground to positive output circuit.
Machine does not have maximum output.	<ol style="list-style-type: none"> 1. One input fuse blown. 2. One phase of main transformer open. 3. Faulty control or firing circuit P.C. board. 4. Output control potentiometer defective. 5. Output control potentiometer leads open (226, 237, 236, 238, 76, 77). 	<ol style="list-style-type: none"> 1. Check and replace if blown after checking for reason for blown fuse. 2. Check for open and repair. 3. All light emitting diodes must be lit on both P.C. boards, except LED4 on control/fault board. See P.C. board Troubleshooting Guide. 4. Check and replace if faulty. 5. Check and repair broken lead

TROUBLESHOOTING GUIDE (Cont'd)

TROUBLE	CAUSE	WHAT TO DO
Machine has output but trips off immediately when wire feed unit start button is pressed.	<ol style="list-style-type: none"> 1. Machine has either an internal or external short circuit on the output. 2. Faulty control P.C. board. 3. Terminals 75, 76 or 77 grounded to negative output terminal. 	<ol style="list-style-type: none"> 1. Check internally and externally for any shorts and remove or repair. 2. Replace control board. See P.C. board Troubleshooting Guide. 3. Check for grounded 75, 76 or 77.
Variable or sluggish welding arc.	<ol style="list-style-type: none"> 1. Poor electrode or work lead connection. 2. Welding leads too small. 3. Welding current or voltage too low. 4. Defective main SCR bridge. 	<ol style="list-style-type: none"> 1. Check and clean all connections. 2. Check table in instruction manual. 3. Check procedures for recommended settings. 4. Check and replace if defective.
Machine will not shut off.	<ol style="list-style-type: none"> 1. Input contactor contacts frozen. 2. Faulty relay (2CR). 	<ol style="list-style-type: none"> 1. Check and replace if necessary. 2. Check and replace if necessary.
Output control not functioning on the machine.	<ol style="list-style-type: none"> 1. Output control switch in wrong position. 2. Faulty output control switch. 3. Faulty output control potentiometer. 4. Leads or connections open in control circuit. 5. Faulty firing circuit or control circuit P.C. board. 	<ol style="list-style-type: none"> 1. Place switch in "Output Control at DC-600". 2. Check and replace if found faulty. 3. Check and replace if found faulty. 4. Check lead continuity and connections for an open and repair if necessary. 5. All light emitting diodes must be lit on both P.C. boards, except LED4 on control/fault board. See P.C. board Troubleshooting Guide.
Output control not functioning on remote control.	<ol style="list-style-type: none"> 1. Output control switch in wrong position. 2. Faulty output control switch. 3. Faulty remote control potentiometer. 4. Leads or connections open in control circuit. 5. Faulty firing or control circuit P.C. board. 	<ol style="list-style-type: none"> 1. Place switch in "Output Control Remote". 2. Check and replace if found faulty. 3. Check and replace if found faulty. 4. Check all leads and connections, internal or remote, for continuity; repair if necessary. 5. All light emitting diodes must be lit on both P.C. boards, except LED4 on control/fault board. See P.C. board Troubleshooting Guide.
Poor starting on CV Sub-Arc.	<ol style="list-style-type: none"> 1. Improper procedures or setting of controls. 2. Poor electrode or work lead connections. 3. 3CR reed switch inoperative. 4. Faulty control board. 	<ol style="list-style-type: none"> 1. See instruction manual and procedures. 2. Repair connections. 3. Check reed switch voltage leads 215 to 220. Idle voltage is about 8V; when welding, voltage must go to zero. 4. Replace.
Poor bead shape or erratic arc on CV Sub-Arc.	<ol style="list-style-type: none"> 1. Improper procedures. 2. Defective SW4 switch. 3. Defective 3CR reed switch. 4. Faulty control board. 5. Defective 5CR relay (codes below 8213). 6. Defective main SCR bridge. 	<ol style="list-style-type: none"> 1. See instruction manual and procedures. 2. Check by connecting jumper from 80-81. If welding is now OK, replace SW4 switch. 3. Check reed switch per 3 above. 4. Replace. 5. Replace. 6. Check and Replace if defective.
Poor starting on CV Innershield and CV Sub-Arc.	<ol style="list-style-type: none"> 1. Defective 3CR reed switch. 2. Faulty control board. 	<ol style="list-style-type: none"> 1. Replace. 2. Replace.
Poor arc characteristics on CV Innershield or other open arc processes.	<ol style="list-style-type: none"> 1. Mode switch in CV Sub-Arc mode. 2. Defective main SCR bridge. 	<ol style="list-style-type: none"> 1. Place mode switch in CV Innershield mode. 2. Check and replace if defective.
Poor arc characteristics on all processes.	<ol style="list-style-type: none"> 1. Defective control board. 2. Defective firing board. 3. Defective main SCR bridge. 	<ol style="list-style-type: none"> 1. Check and replace if defective. 2. Check and replace if defective. 3. Check and replace if defective.

P.C. BOARD TROUBLESHOOTING GUIDE

WARNING: Have qualified personnel do the troubleshooting work. When the sides are off and the power on, take special care to avoid contact with electrically "hot" terminals while using the following guide.

Machine settings for P.C. board troubleshooting.

Disconnect all leads to the wire feeder and jumper terminals #2 and #4 on DC-600.
Output Control at DC-600.
Mode switch in the CV position.

CONTROL FAULT PROTECTION P.C. BOARD

1. LED1 indicates AC input voltage is present at pins 255 — 256. If not lit, check the voltage across the secondary winding of the control transformer T2. The voltage should be approximately 115 volts. If not, the problem is in the power supply and not the P.C. board.
2. LED2 indicates welder output voltage is being supplied to the control circuit. If not lit, check to make certain lead 222 from the control circuit P.C. board connector is connected to the power source negative output lead, and is not broken.
3. LED3 indicates power is being applied to fault protection pilot relay 2CR when wire feeder arc start button is pressed or jumper is connected across 2-4.
4. LED4 indicates when fault protection circuit is being activated.
5. LED5 indicates a control signal is being supplied to the firing circuit. As the output control is varied, LED5 should change brilliancy from bright at low output to dim at high output. On VV (CC) the output is maximum at no load; thus, LED5 will be dim or out.

FIRING CIRCUIT P.C. BOARD

All nine light emitting diodes must be lit when the power source is turned on and the wire feed arc start button is pressed or a jumper is connected between 2 and 4.

For G1486-4 and lower firing P.C. boards:

1. *Light 7* indicates AC power being supplied to P.C. board from T1 auxiliary winding. If not lit, check voltage across terminals 203 and 204 on the terminal strip TS1 located on the right side on the control box. Voltage should be approximately 75 volts. If no voltage, indicates a supply problem, check wiring. If voltage is present, turn the machine off, remove the 12-pin Molex harness plug from the P.C. board, turn the machine back on and check the voltage across pins 2 and 3 on the connector. This should be approximately 75 volts. If no voltage and there is voltage at terminals 203 and 204 on terminal strip TS1, this indicates a broken lead or loose terminal on either lead 203 or 204. If voltage is present and light 7 is not lit, replace P.C. board.
2. *Light 8* indicates AC power being supplied to P.C. board from T1 auxiliary winding 205 — 206. If not, follow the same procedure as above in (1) for terminals 205 and 206 on terminal strip TS1 and pins 5 and 6 on the P.C. board connector.
3. *Light 9* indicates AC power being supplied to P.C. board from T1 auxiliary winding 207 — 208. If not, follow the same procedure as above in (1) for terminals 207 and 208 on terminal strip TS1 and pins 9 and 12 on the P.C. board connector.
4. *Lights 1 through 6* indicate gate signals are being supplied to the main power SCR's 1 through 6 respectively. If light 5 on the control circuit and lights 7 through 9 on the firing circuit are lit and lights 1 through 6 are not lit, check lead 231 between the firing

circuit and the control circuit to be sure that it is not broken and is connected to each Molex connector. If the lead shows continuity and lights 1 through 6 are not lit, replace the firing circuit P.C. board. If any one of the lights 1 through 6 is not lit and lights 7 through 9 are lit, replace the firing circuit P.C. board.

For G1486-5 and higher firing P.C. boards:

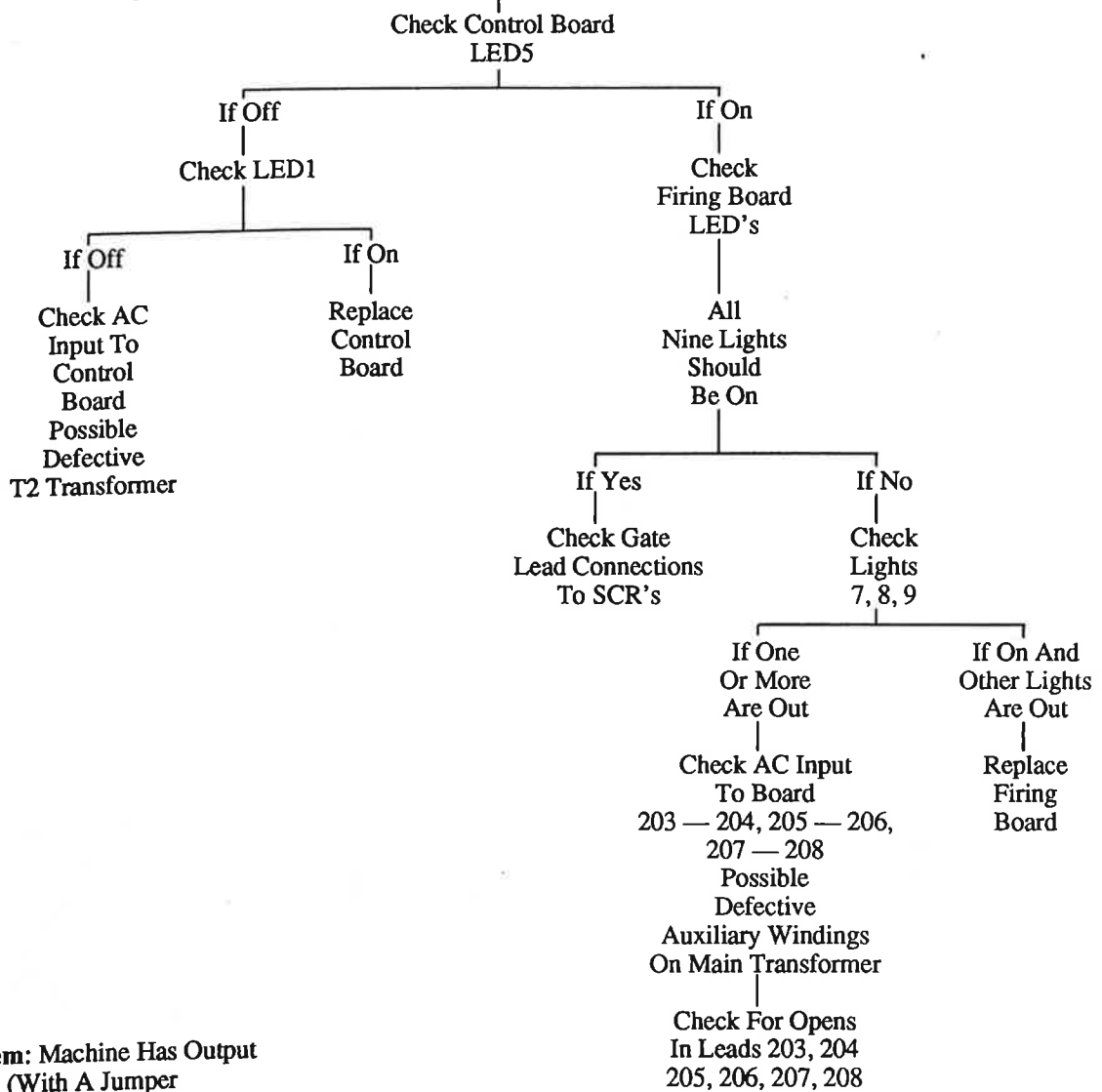
- a. *Lights 7, 8 and 9* indicate AC power being supplied to the P.C. boards from T1 auxiliary winding. If a light is not lit, turn the machine off and unplug P5 and J5 on the firing P.C. board. Turn the machine on and check the following voltages:

Light that was off	Check AC voltage between pins of Plug P5	Voltage should be Approx.
7	P5 Pins 2&4 (Wires 203, 204)	75 VAC
8	P5 Pins 7&3 (Wires 205, 206)	75 VAC
9	P5 Pins 9&8 (Wires 207, 208)	75 VAC

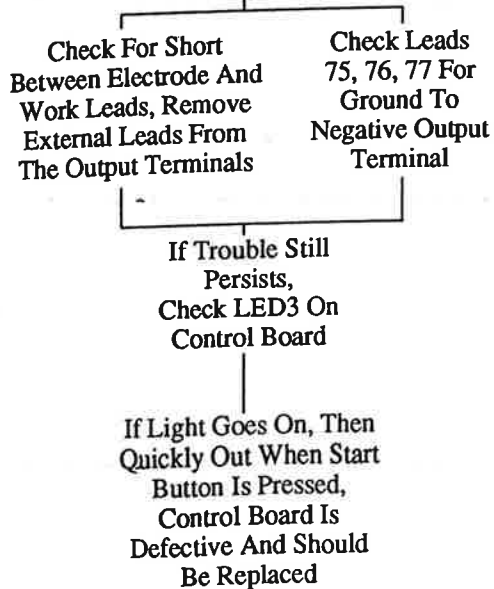
- If approximately 75 VAC is present, turn the machine off, plug P5 back into firing board. Turn the machine back on and check to see if the light or lights are on. If the light or lights are not on replace the firing P.C. board.
 - If 75 VAC was not present, then check the wiring.
- b. *Lights 1 through 6* indicate gate signals are being supplied to the main power SCR's 1 through 6 respectively. If light 5 on the control circuit and lights 7 through 9 on the firing circuit are lit and lights 1 through 6 are not lit, check lead 231 between the firing circuit and the control circuit that it is not broken and is connected to each Molex connector. If the lead shows continuity and lights 1 through 6 are not lit, replace the firing circuit P.C. board. If any one of the lights 1 through 6 is not lit and lights 7 through 9 are lit, replace the firing circuit P.C. board.

If troubleshooting guide indicates a possible P.C. board problem, the following guide can be used to locate the problem.

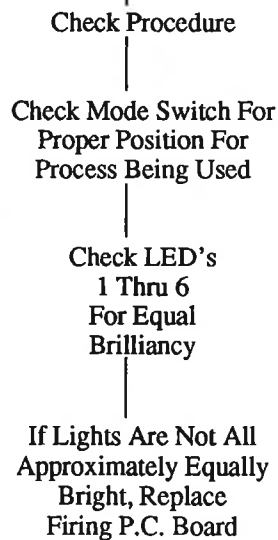
Problem: No Welder Output (Input Contactor "On", 2 and 4 Closed)



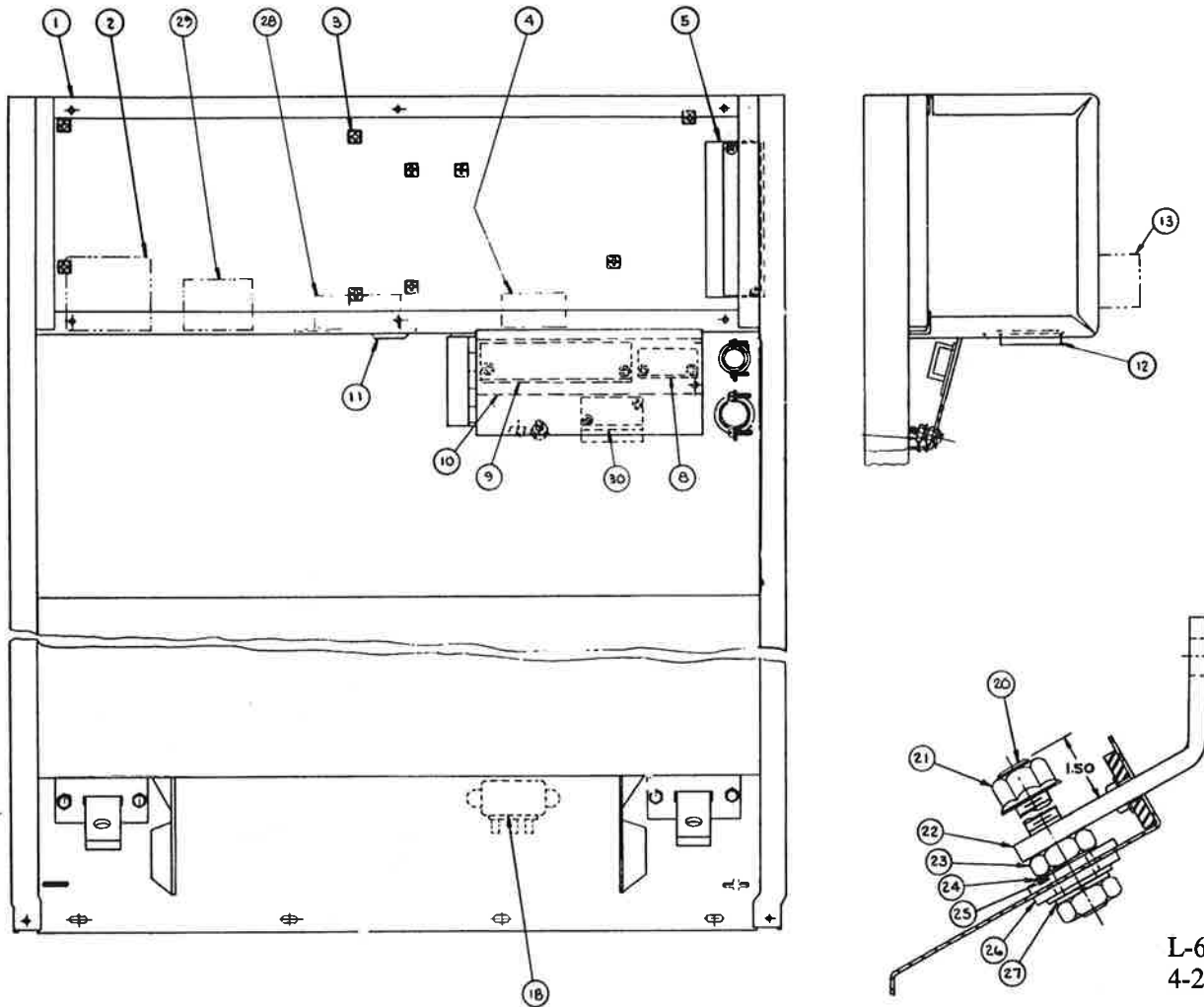
Problem: Machine Has Output (With A Jumper Between 2 and 4) But Trips Off Immediately



Problem: Erratic Welding



FRONT PANEL ASSEMBLY



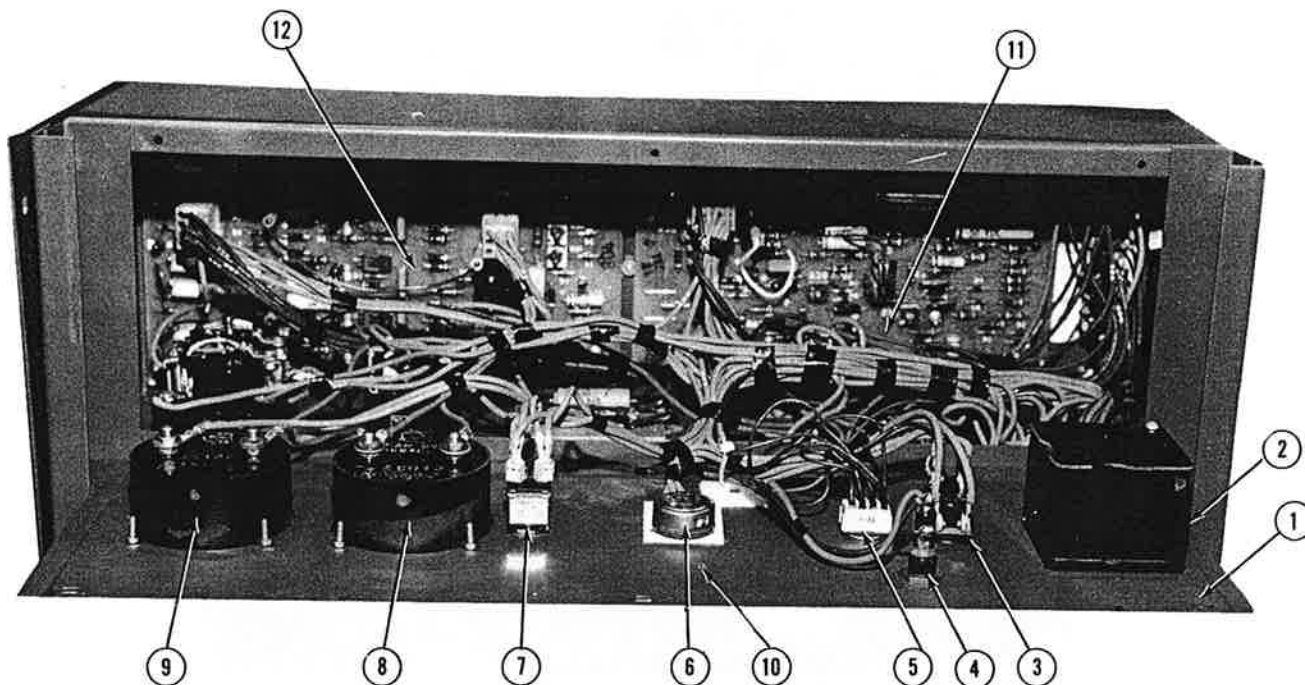
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4-26-85D

Parts List P-126-C

ITEM	PART NAME & DESCRIPTION	NO. REQ'D	ITEM	PART NAME & DESCRIPTION	NO. REQ'D
1	Front Panel	1	18	Capacitor	1
2	Relay	1	20	Stud	2
3	Identification Sticker (6 CR)	1	21	Flanged Nut	2
	Identification Sticker (4 CR)	1	22	Connection Strap	2
	Plastic Expansion Nut	11 or 13	23	Hex Jam Nut	4
4	Self Tapping Screw	11 or 13	24	Plain Washer	4
	Pilot Relay	1	25	Insulating Tube	2-
	Identification Sticker (2 CR)	1	26	Insulating Washer	4
5	Terminal Strip	1	27	Lock Washer	2
8	Number Plate	1	28	Time Delay Assembly	1
	Terminal Strip	1	29	Relay	1
9	Terminal Strip	1	30	Identification Sticker (5 CR)	1
10	Number Plate	1		Terminal Strip (Above Code 7975)	1
11	Bushing	1		Number Plate (Above Code 7975)	1
12	Bushing	1	31	Door and Hinge Assembly	1
13	Diode Assembly, Includes: Diode	1			

11-17-88

CONTROL BOX



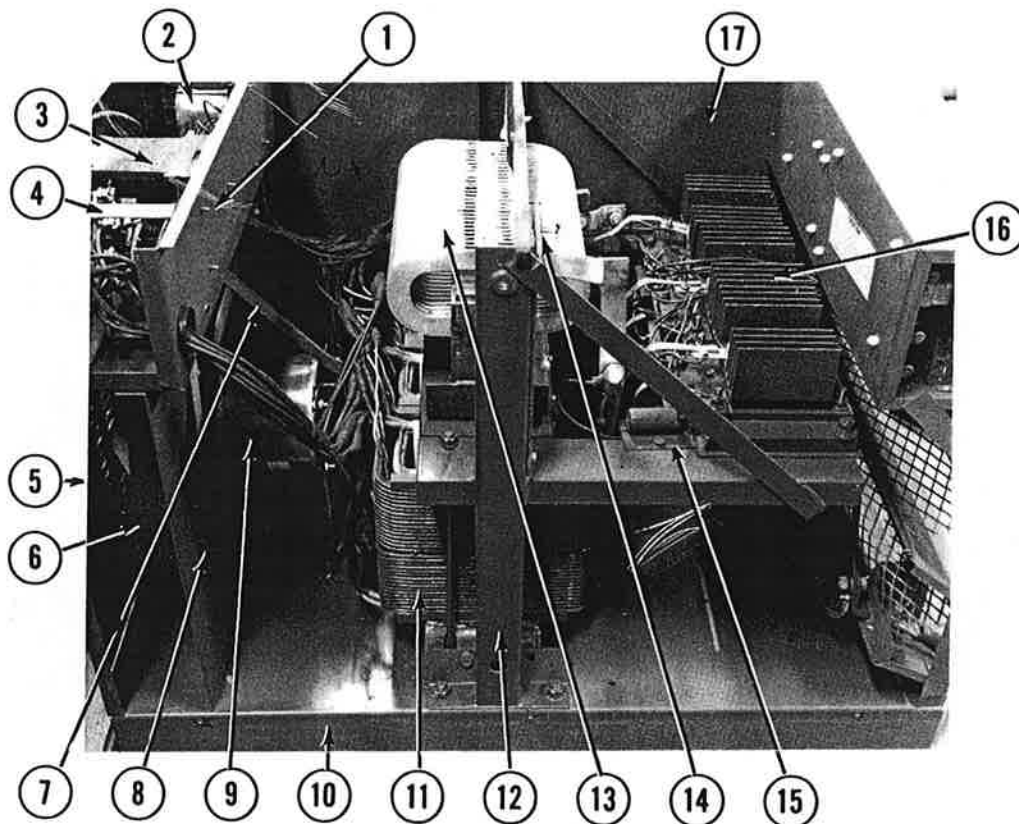
June 1978

Parts List P-126-D

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
1	Control Box Cover	1
2	Pushbutton	1
3	Output Control Switch (SW3) (Below Code 9300)	1
4	Output Control Switch (SW3) (Above Code 9300)	1
5	Fuse Holder	1
5	Fuse	1
5	Welding Mode Switch (Stick Welding Option Only) (SW5)	1
5	Welding Mode Switch (SW4)	1
6	Output Control Potentiometer	1
6	Potentiometer Insulation	1
7	Knob	1
7	Control Circuit Polarity Switch (SW2)	1
8	DC Ammeter (Optional)	1
9	DC Voltmeter (Optional)	1
10	Instruction Decal (Above Code 8040)	1
11	Control Circuit P.C. Board	1
12	Firing Circuit Printed Circuit Board	1
	Note 1: This P.C. Board can be replaced with the same basic numbered P.C. Board with the same or higher dash number.	
	Items Not Illustrated:	
	Nameplate	1
	Pilot Light	1
	Transient Suppressor P.C. Board	1

3-4-92

CASE AND INTERNAL COMPONENTS



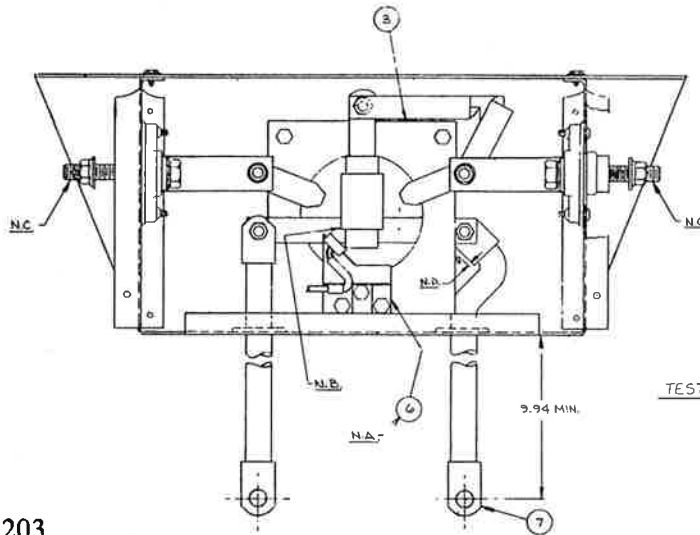
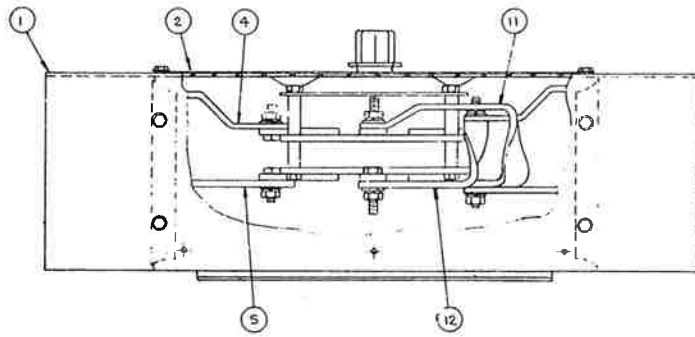
Parts List P-126-E

July 1979

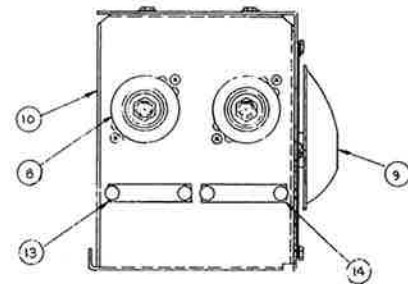
ITEM	PART NAME & DESCRIPTION	NO. REQ'D	ITEM	PART NAME & DESCRIPTION	NO. REQ'D
1	Input Box Bushing (Input Box Rear)	1 1	14	Choke Coil Choke And Lamination Assembly, Includes:	1 1
2	Bushing (Input Box Bottom)	1	15	Choke Top Baffle	1
3	Control Transformer	1	16	Snubber P.C. Board Assembly	1
4	Reconnect Panel (Dual Voltage Only)	1		Three Phase Bridge Rectifier Assembly, Includes:	1
	Terminal Board	1	17	SCR Heat Sink Assembly	6
	Self Tapping Screw	2		Side Panel	
5	Carriage Bolt	3		Parts Not Illustrated:	
	Rear Panel	1		Roof	1
	Input Access Door	1		Reed Switch (4 CR)	1
6	Fan Baffle Assembly	1		Reed Switch (3 CR)	1
7	Fan Motor Bracket Stiffener (Code Below 9750)	1		Meter Shunt Assembly	1
8	Fan	1		Relay Assembly Includes:	1
9	Fan Motor	1		Relay (7 CR)	1
10	Base	1		Relay Enclosure	1
11	Transformer Assembly Includes:	1		Resistor	1
	Primary Coils	3 or 6		Resistor Mounting Stud	1
	Secondary Coils	6		Resistor Plain Washer	1
	Studs	4		Resistor Lock Washer	1
	Lower Lamination Assembly	1		Resistor Insulating Washer	2
	Upper Lamination Assembly	1		Resistor Hex Nut	2
	Lamination Assembly	2		Ground Decal	1
	Insulation (Between Top & Bottom Primary Coils)	6		Caution Decal (Case Front)	1
	Insulation (Between Primary Coils & Lamination)	12			
12	Lift Ball Assembly	1			
	Cover Seal	1			
13	Choke And Lamination Assembly, Includes:	1			

5-16-89

K804 MULTI-PROCESS SWITCH



NOTE: Micro-switch should not be actuated when multi-process switch is in either the semi-automatic electrode positive or electrode negative position or any point in between.



TEST PER E2465

- N.A. ITEM 6 TO BE ADJUSTED FOR ACTUATION WHEN SWITCH IS APPROXIMATELY 80-90% OF ITS FULL STICK POSITION.
- N.B. PERMISSIBLE TO FILE CORNER IF REQUIRED FOR PROPER OPERATION.
- N.C. AT FINAL ASSEMBLY COAT OUTPUT STUDS AND NUTS WITH A LIGHT FILM OF E-1899 RUST PREVENTATIVE SOLVENT.
- N.D. POSITION ITEM 7 TO OBTAIN .125 MIN. CLEARANCE TO LEAF SPRING OF ITEM 3. PUSH LEAF SPRING TO EXTREME POSITION TO PRODUCE THE MIN. POSSIBLE CLEARANCE WHEN MAKING MEASUREMENT.

L6203
11-30-89F

Parts List P-126-F

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
1	Front & Top Cover	1
2	Nameplate	1
3	Process Switch	1
4	Negative Lead Strap	2
5	Positive Lead Strap	2
6	Micro Switch Assembly, Includes: Micro Switch Actuator	1 1 1
7	Lead	2
8	Output Terminal	4
	Output Stud Nut	4
9	Switch Handle	1
10	Box	1
11	Jumper	1
12	Jumper	1
13	Marker "To Work" Fastener Button	1 2
14	Marker "Electrode" Fastener Button	1 2

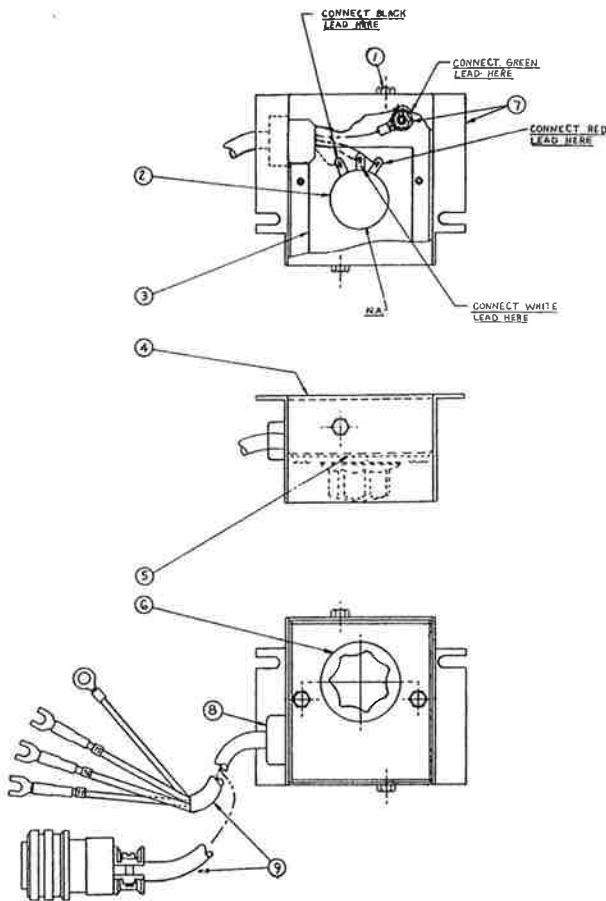
1-14-91

REMOTE CONTROL

Parts List P-84-J

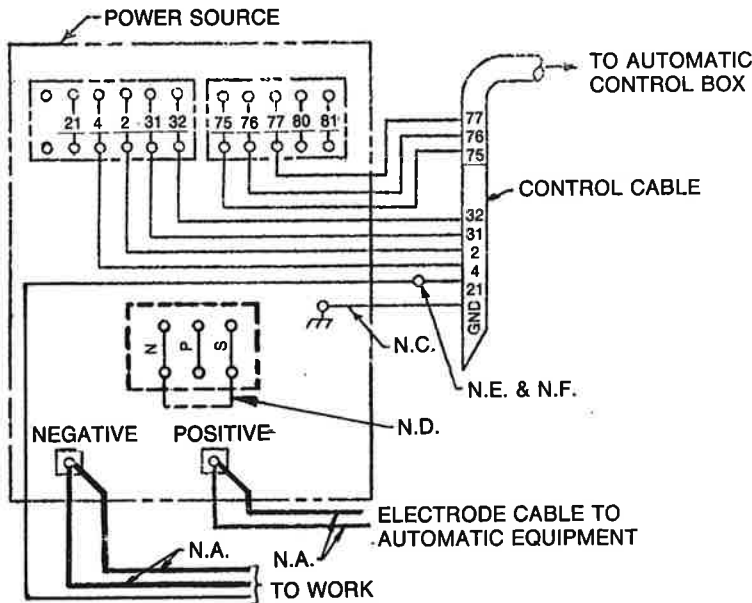
ITEM	PART NAME & DESCRIPTION	NO. REQ'D
	Remote Control Box Assembly, Includes:	1
	Remote Control Box Assembly, Includes:	1
1	Self Tapping Screw	4
2	Potentiometer	1
3	Insulation	1
4	Wraparound	1
5	Nameplate	1
6	Knob	1
7	Case	1
8	Lead Grommet	1
9	Lead	1

2-1-91



L-4829
2-15-80J

Connection of NA-3, LT-5 or LT-7 to DC-600



ABOVE DIAGRAM SHOWS ELECTRODE CONNECTED POSITIVE. TO CHANGE POLARITY, TURN POWER OFF, REVERSE THE ELECTRODE AND WORK LEADS AT THE POWER SOURCE AND POSITION THE SWITCH ON POWER SOURCE TO PROPER POLARITY. ALSO REVERSE THE LEADS ON THE BACK OF THE AMMETER AND VOLT-METER IN THE AUTOMATIC CONTROL BOX.

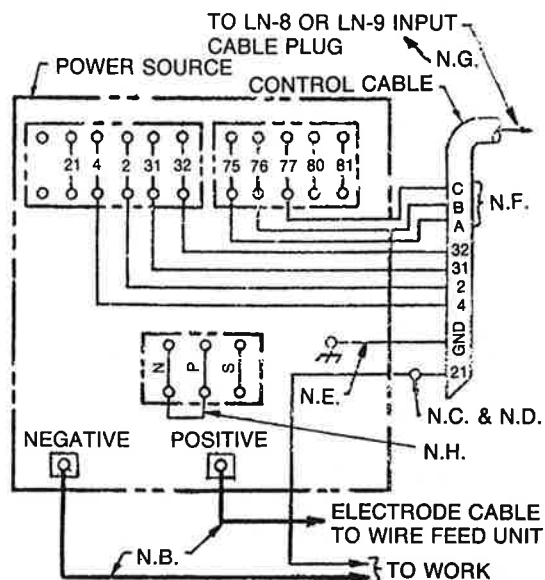
WARNING: TURN INPUT POWER TO THE DC-600 OFF BEFORE CONNECTING WIRE FEEDER.

NOTES

- N.A. WELDING CABLE MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS.
- N.C. CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME. TERMINAL MARKED \overline{m} NEAR THE POWER SOURCE TERMINAL STRIP. THE POWER SOURCE MUST BE PROPERLY GROUNDED.
- N.D. FOR DC-600 CODES BELOW 8200, CONNECT A JUMPER FROM "N" TO "S". THERE IS NO N P S TERMINAL STRIP ON CODES ABOVE 8200.
- N.E. EXTEND LEAD 21 USING #14 OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[] REMOTE VOLTAGE SENSING WORK LEAD IS AVAILABLE FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE KEEPING IT ELECTRICALLY SEPARATE FROM THE WELDING WORK LEAD CIRCUIT AND CONNECTION. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD.
- N.F. TAPE UP BOLTED CONNECTION.

S-16366
7-24-81X

Connection of LN-8 or LN-9 to DC-600



ABOVE DIAGRAM SHOWS ELECTRODE CONNECTED POSITIVE. TO CHANGE POLARITY, TURN POWER OFF, REVERSE THE ELECTRODE AND WORK LEADS AT THE POWER SOURCE AND POSITION THE SWITCH ON POWER SOURCE TO PROPER POLARITY.

FOR OPTIMUM PERFORMANCE WITH THE LN-9, DC-600'S WITH CODES 8288 AND ABOVE ARE PREFERRED.

WARNING: TURN INPUT POWER TO THE DC-600 OFF BEFORE CONNECTING WIRE FEEDER.

N.B. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS.

N.C. EXTEND LEAD 21 USING #14 OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[] REMOTE VOLTAGE SENSING WORK LEAD IS AVAILABLE FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE KEEPING IT ELECTRICALLY SEPARATE FROM THE WELDING WORK LEAD CIRCUIT AND CONNECTION. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD. (THIS EXTENDED #21 LEAD CONNECTION REPLACES THE NEED TO EMPLOY THE REMOTE WORK LEAD ACCESSORY ON LN-9'S WHICH HAVE A DIRECT WORK LEAD JACK.)

N.D. TAPE UP BOLTED CONNECTION.

N.E. CONNECT THE LN-8 OR LN-9 CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED ⏏ NEAR THE POWER SOURCE TERMINAL STRIP. THE POWER SOURCE MUST BE PROPERLY GROUNDED.

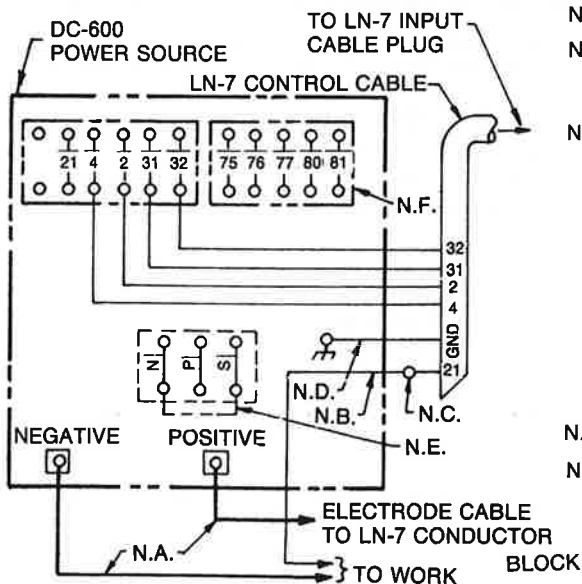
N.F. IF USING AN OLDER LN-8 CONTROL CABLE: CONNECT LEAD #75 TO #75 ON TERMINAL STRIP, CONNECT LEAD #76 TO #76 ON TERMINAL STRIP, CONNECT #77 TO #77 ON TERMINAL STRIP.

N.G. THE LN-9 VOLTAGE CONTROL JUMPERS MUST BE CONNECTED AS FOLLOWS (REFER TO LN-9 OPERATING MANUAL):
WHITE JUMPER ON VOLTAGE BOARD TO PIN "S".
BLUE JUMPER ON VOLTAGE BOARD (LATER UNITS ONLY) OR ON START BOARD (EARLIER UNITS) TO PIN "B".

N.H. FOR DC-600 CODES BELOW 8200 CONNECT A JUMPER FROM "N" TO "P" ON LN-9 ONLY. CONNECT A JUMPER FROM "N" TO "S" ON LN-8 ONLY. THERE IS NO NPS TERMINAL STRIP ON CODES ABOVE 8200.

S-16367
6-28-85N

Connection of LN-7 to DC-600



ABOVE DIAGRAM SHOWS ELECTRODE CONNECTED POSITIVE. TO CHANGE POLARITY, TURN POWER OFF, REVERSE THE ELECTRODE AND WORK LEADS AT THE POWER SOURCE AND POSITION THE SWITCH ON POWER SOURCE TO PROPER POLARITY.

WARNING: TURN INPUT POWER TO POWER SOURCE OFF BEFORE CONNECTING THE LN-7 WIRE FEEDER.

N.A. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS. SEE LN-7 OPERATING MANUAL FOR PROPER SIZES.

N.B. IF LN-7 IS EQUIPPED WITH A METER KIT, EXTEND LN-7 CONTROL CABLE LEAD #21 USING 14 AWG OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[LENGTH] REMOTE VOLTAGE SENSING WORK LEAD MAY BE ORDERED FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE INDEPENDENT OF THE WELDING WORK CABLE CONNECTION. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD. (IF THE LENGTH OF WELDING WORK CABLE IS SHORT, LESS THAN 25 FEET, AND CONNECTIONS CAN BE EXPECTED TO BE RELIABLE, THEN CONTROL CABLE LEAD #21 DOES NOT NEED TO BE EXTENDED AND CAN BE DIRECTLY CONNECTED TO TERMINAL #21 ON THE TERMINAL STRIP.)

N.C. TAPE UP BOLTED CONNECTION IF LEAD #21 IS EXTENDED.

N.D. CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED ⏏ NEAR THE POWER SOURCE TERMINAL STRIP. THE POWER SOURCE GROUNDING TERMINAL (MARKED ⏏ AND LOCATED NEAR THE POWER SOURCE INPUT POWER CONNECTIONS) MUST BE PROPERLY CONNECTED TO ELECTRICAL GROUND PER THE POWER SOURCE OPERATING MANUAL.

N.E. FOR DC-600 CODES BELOW 8200. CONNECT A JUMPER FROM "N" TO "S". THERE IS NO N.P.S. TERMINAL STRIP ON CODES ABOVE 8200.

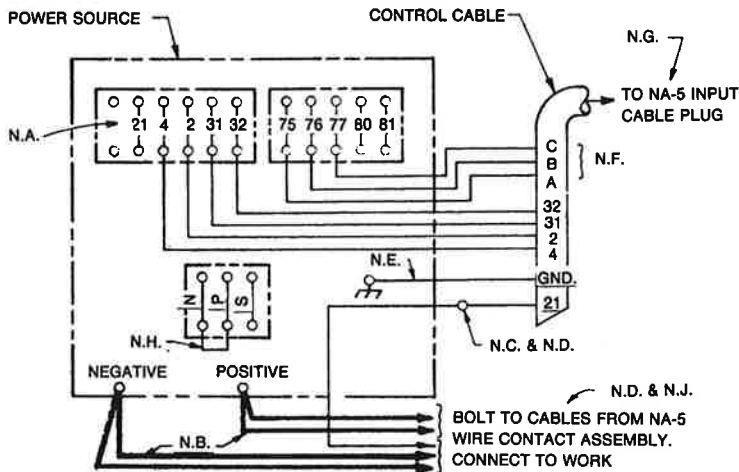
N.F. IF AN OPTIONAL REMOTE VOLTAGE CONTROL IS USED, CONNECT IT TO THIS TERMINAL STRIP.

S-16368
5-11-84M

Connection of NA-5 to DC-600

DC-600 WIRING DIAGRAM

CONNECTIONS MUST BE MADE EXACTLY AS SHOWN BELOW
FOR ANY OTHER USE OF POWER SOURCE, DISCONNECT ALL NA-5 LEADS AND CABLES.



NOTE: Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work cables at the power source and position the switch on power source to proper polarity. Refer to NA-5 operating manual for required NA-5 Control Box polarity connections.

- N.A. On earlier DC-600's, #67 terminal was also on the terminal strip.
- N.B. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.
- N.C. Extend lead #21 using #14 or larger insulated wire physically suitable for the installation. An S16586 remote voltage sensing work lead is available for this purpose. Connect it directly to the work piece keeping it separate from the welding work cable connection to the work piece. For convenience, this extended #21 lead should be taped along the welding work cable.
- N.D. Tape up bolted connection.
- N.E. Connect the NA-5 control cable grounding lead to the frame terminal marked r near the power source terminal strip. The power source must be properly grounded.
- N.F. If using an older K215 control cable: Connect lead #75 to #75 on terminal strip, connect lead #76 to #76 on terminal strip, connect lead #77 to #77 on terminal strip.
- N.G. The jumpers on the NA-5 Voltage Board must be connected as follows:
Connect red jumper to pin "S"
Connect white jumper to pin "B"
- N.H. Connect a jumper from "N" to "P". There is no NPS terminal strip on DC-600 codes above 8200.
- N.J. For proper NA-5 operation, the electrode cables must be snugged under the clamp bar on the left side of the NA-5 Control Box.

NOTE: This diagram is for reference only. It is not accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the welder code number.

DC-600 POWER SOURCE SETTINGS

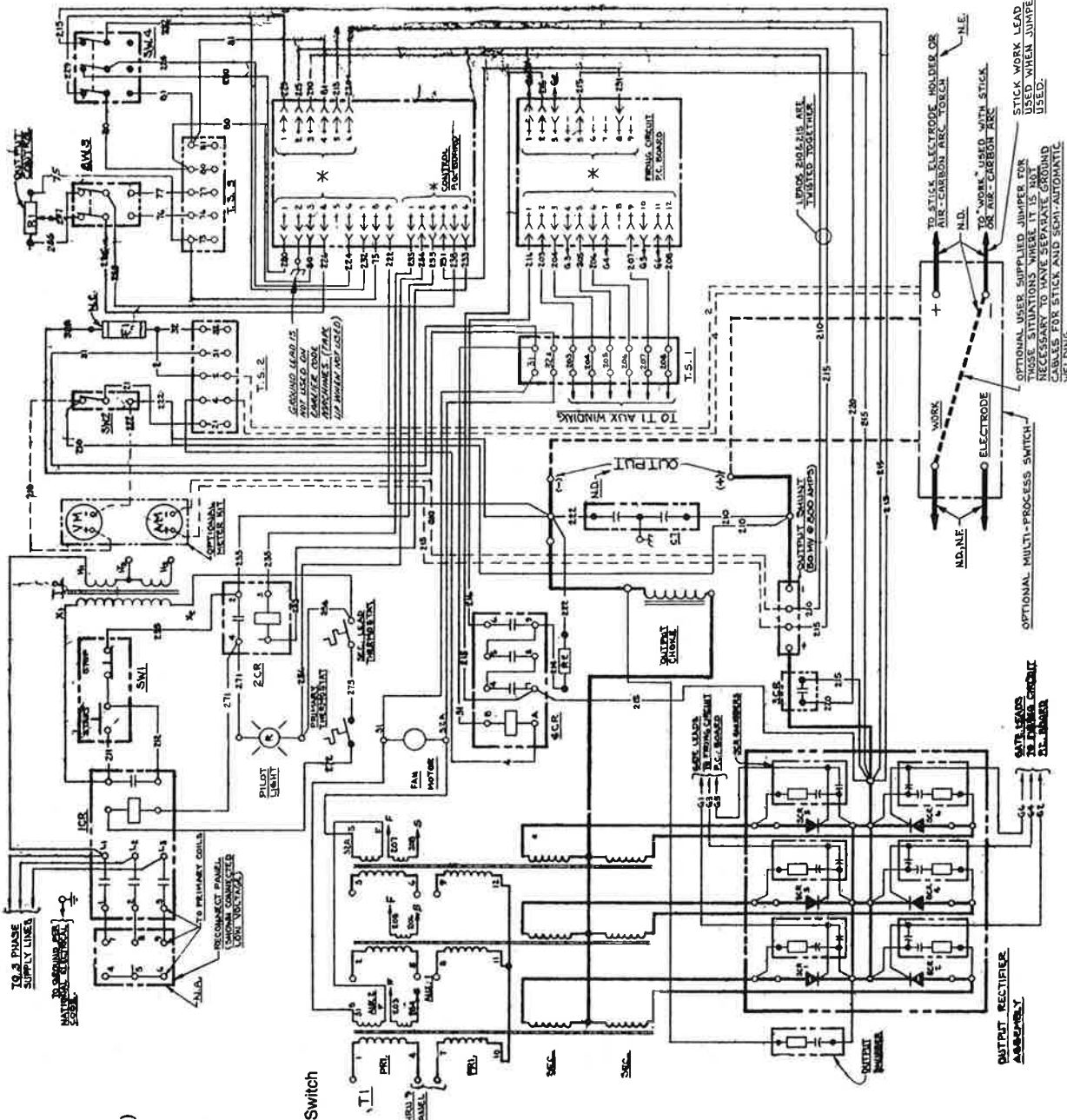
<p>All Codes: Turn Off Input Power</p> <p>Adjust the Power Source: DC-600</p> <ol style="list-style-type: none"> 1. Connect electrode cables to terminal of desired polarity. 2. Set toggle switch to same polarity as the electrode cable connection. 3. Set toggle switch to "Remote". 4. Set mode switch to the desired position for the process to be used.
<p>DC-600 Codes 8000 — 8045: For Sub-Arc:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Sub-Arc. 2. White lead on Control P.C. Board is connected to Pin "M" and blue lead is connected to "W". <p>For all Open Arc Processes Except NR-302 and NR-203 Electrodes:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Innershield. 2. White lead on Control P.C. Board is connected to Pin "M" and blue lead is connected to "W". <p>For NR-203 and NR-302 Electrodes:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Innershield. 2. White lead on Control P.C. Board is connected to Pin "I" and blue lead is connected to "S"
<p>DC-600 Codes 8046 — 8200: For Sub-Arc:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Sub Arc. 2. White lead on Control P.C. Board is connected to Pin "M". <p>For all Open Arc Processes Except NR-203 Electrodes:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Innershield. 2. White lead on Control P.C. Board is connected to Pin "M". <p>For NR-203 Electrodes:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Innershield. 2. White lead on Control P.C. Board is connected to Pin "I".
<p>DC-600 Codes Above 8200: For Sub-Arc:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Sub Arc. <p>For all Open Arc Processes:</p> <ol style="list-style-type: none"> 1. Set mode switch to CV Innershield.

For optimum performance with the NA-5, DC-600's with Codes 8288 and above are preferred.

For additional installation instructions, see NA-5 Operating Manual.

M13968
9-17-82B

DC-600 WIRING DIAGRAM

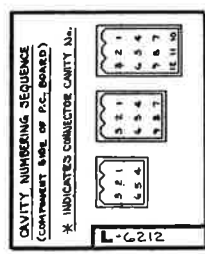


LEGEND

- SW1 - Input Power
- SW2 - Electrode Polarity
- SW3 - Output Control
- SW4 - Welding Mode (shown in stick position)
- C7 - .05 + .05 MFD.
- F1 - 8 Amp Slow Blow Fuse
- R1 - 10K Ω Pot.
- R2 - 30 Ω 100 W.
- T1 - Main Power Trans.
- T2 - Control Trans.
- 1CR - Input Contactor
- 2CR - Fault Protection Relay
- 3CR - Current Activated Reed Switch
- 4CR - Output Pilot Relay

L-6212
Wiring Diagram
1-29-82F

- N.A. Reconnect panel not present on single voltage input machines.
- N.B. For stick welding or air-carbon arc without a multi-process switch installed, disconnect all electrode, work and control leads to any wire feeders. Jumper 2 to 4. Output terminals will now be energized. Place mode switch in VV for stick and CV(I) for air carbon arc. See operating manual for further instructions.
- N.C. Center terminal of fuse holder.
- N.D. Welding cable must be of the proper capacity for the current and duty cycle of immediate and future applications.
- N.E. This diagram shows the "stick" polarity "positive". To change the polarity, turn the DC-600 off and reverse the leads at the multi-process switch.
- N.F. Using a wire feeder, K317 or K318 connection diagram, connect electrode and work leads to these terminals instead of the power source output terminals.
- ▲ These notes apply only to DC-600 with a multi-process switch installed.



A.N.S.I. ELECTRICAL SYMBOLS PER E-1537

NOTE: This diagram is for reference only. It is not accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

If the diagram is illegible, write to the Service Department for a replacement. Give the welder code number.

OPTIONAL USER SUPPLIED JUMPER FOR CONNECTIONS WHERE IT IS NOT NECESSARY TO USE THE PROVIDED CABLES FOR STICK AND SEMI-AUTOMATIC WELDING.

TO STICK ELECTRODE HOLDER OR AIR-CARBON ARC TOECH
TO WORK USED WITH STICK OR AIR-CARBON ARC
TO STICK ELECTRODE HOLDER OR AIR-CARBON ARC TOECH
TO WORK USED WITH STICK OR AIR-CARBON ARC

OPTIONAL MULTI-PROCESS SWITCH
ELECTRODE
WORK
N.D.N.F.

OUTPUT RECTIFIER ASSEMBLY
CATHODE LEADS TO BOARD

UPPER ELECTRIC ARC TWISTED TOGETHER

TO T1 AUX WINDING

GROUND LEAD IS NOT USED ON KAWAII CODE APPROXIMATE 1/2 INCH (SEE LIST)

MULTI-PROCESS SWITCH INSTALLATION

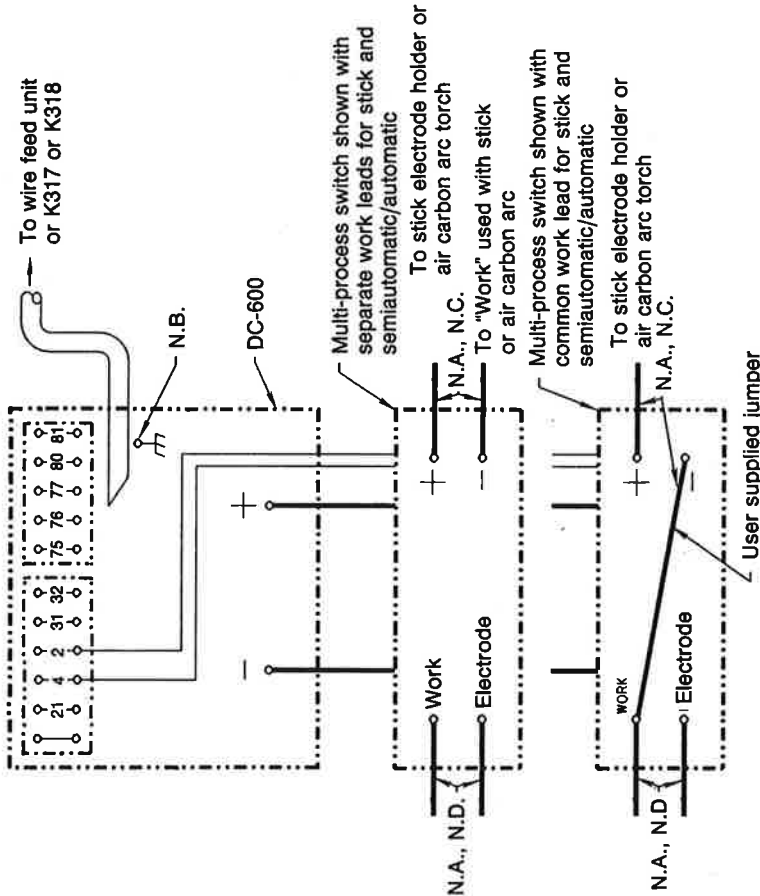
- Remove the two front-middle screws which secure the side panels of the DC-600. Attach the Multi-Process Switch Bracket across the front of the machine, flange down, with the longer self-tapping screws and lock washers provided. The bracket is to be on the outside of the side panel.
- Bring the Multi-Process Switch to the front of the DC-600. Route the control leads through the box connector into the terminal strip area. Connect these leads to #2 and #4 on the larger terminal strip.
NOTE: The wire feeder control cable is routed through this same box connector.
- Bring the Multi-Process Switch up flush to the DC-600 about 2" lower than the bracket and then slide it straight up to the bracket. Before securing to the bracket with the self-tapping screws supplied, make certain the bottom of the box is hooked behind the top of the bottom louver. Secure the switch to the front of the DC-600 using the 2 remaining self-tapping screws. If the DC-600 has no holes in front, drill two .153 dia. holes using the switch as a template.
- Connect the right cable from the switch to the DC-600 positive output stud and the left cable to the negative output stud.
- Connect wire feed unit electrode & work cables through the strain relief on the left side of the DC-600 to the output studs on the left side of the box.
- Connect wire feeder control cable and make other terminal strip connections as specified on the connection diagram for the Lincoln wire feeder being used. "Electrode" and "work" are connected to the left side of the Multi-Process Switch.
- Connect stick or air-carbon arc electrode & work cables through the strain relief on the right side of the DC-600 to the output studs on the right side of the box. (Refer to the lower sketch for those situations where it is not necessary to have separate ground cables for stick and semiautomatic welding.)

Operation

For operating instructions, refer to the information on the Multi-Process Switch Nameplate.

NOTES:

- N.A. Welding cable must be of the proper capacity for the current and duty cycle of immediate and future applications.
- N.B. Connect the control cable ground lead to the frame terminal marked 77, near the power source terminal strip.
- N.C. These diagrams show the "Stick" polarity "positive". To change the polarity, turn the DC-600 off and reverse the leads on the right side of the Multi-Process Switch.
- N.D. Using a wire feeder, K317 or K318 connection diagram, connect electrode and work leads to these terminals instead of the power source output terminals.



Instructions for Use With a DC-600 (See M14588 For DC-400 Instructions)

The DC-400/DC-600 Multi-Process Switch is designed to provide a selection between "Stick or Air Carbon Arc" and "Automatic or Semiautomatic", and a change of the "Automatic or Semiautomatic" polarity without changing any electrical connections. Wire feed unit cables are connected to the output studs on the left side of the box, while the stick or air carbon arc cables are connected to the output studs on the right side of the box. Selecting the "Stick or Air Carbon Arc" mode only energizes those output studs. The wire feeder nozzle or gun and electrode will NOT be electrically "hot".

Installation

BEFORE PROCEEDING WITH ANY INSTALLATION, BE CERTAIN THAT ALL POWER IS ELECTRICALLY DISCONNECTED FROM THE DC-600.

- Open the terminal strip access door located on the front panel.
- On code numbers below 8213, remove DC-600 nameplate screws and open the control box cover. Remove the smaller dia. of the two red wires connected to #4 on the main terminal strip. Insulate this unused lead terminal with adequate tape to provide at least 300 V. insulation. Close the control box cover.

M13909
Installation
11-4-88N



Now Available ...The following Service Manuals

These are comprehensive single sources of information relative to Installation, Operation, Maintenance, Accessories, Theory of Operation, Replacement Parts, Electrical Diagrams and Extensive Troubleshooting.

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	SP100	(Codes 9284-10050)	SVM102-A	\$45.00	
	Power Arc 4000	(Codes 10083)	SVM103-A	\$45.00	
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	SP255	(Codes 10164-10165)	SVM115-A	\$45.00	
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LIMITED WARRANTY

STATEMENT OF WARRANTY:

The Lincoln Electric Company (Lincoln) warrants to the original purchaser (end-user) of new equipment that it will be free of defects in workmanship and material.

This warranty is void if Lincoln finds that the equipment has been subjected to improper care or abnormal operation.

WARRANTY PERIOD:

All warranty periods date from the date of shipment to the original purchaser and are as follows:

Three Years:

Transformer Welders
Motor-generator Welders
Inverter Welders
Automatic Wire Feeders
Semiautomatic Wire Feeders
Plasma-cutting Power Source
Engine Driven Welders (except engine and engine accessories) with operating speed under 2,000 RPM

Two Years:

Engine Driven Welders (except engine, engine accessories and Power-Arc generator/welders) with operating speed over 2,000 RPM

All engine and engine accessories are warranted by the engine or engine accessory manufacturer and are not covered by this warranty.

One Year:

Equipment not listed above such as gun and cable assemblies, water coolers, FAS TRAK or MIG-TRAK equipment, Power-Arc generator/welders, Wire Feed Module (Factory Installed) and field-installed optional equipment.

TO OBTAIN WARRANTY COVERAGE:

You are required to notify Lincoln Electric, your Lincoln Distributor, Lincoln Service Center or Field Service Shop of any defect within the warranty period. Written notification is recommended.

WARRANTY REPAIR:

If Lincoln's inspection of the equipment confirms the existence of a defect covered by this warranty, the defect will be corrected by repair or replacement at Lincoln's option.

WARRANTY COSTS:

You must bear the cost of shipping the equipment to a Lincoln Service Center or Field Service Shop as well as return shipment to you from that location.

IMPORTANT WARRANTY LIMITATIONS:

- Lincoln will not accept responsibility for repairs made without its authorization.
- Lincoln shall not be liable for consequential damages (such as loss of business, etc.) caused by the defect or reasonable delay in correcting the defect.
- Lincoln's liability under this warranty shall not exceed the cost of correcting the defect.
- This written warranty is the only express warranty provided by Lincoln with respect to its products. Warranties implied by law such as the Warranty of Merchantability are limited to the duration of this limited warranty for the equipment involved.

August, '94

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