

IDEALARC[®] DC-1500

Constant Voltage and Constant Current DC Arc Welding Power Source, 3 Phase Rectifier Type

For use with machines having Code Numbers 8294 and above.
For codes below 8294 see IM280.

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



LINCOLN[®]
ELECTRIC

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- World's Leader in Welding and Cutting Products •
- Sales and Service through Subsidiaries and Distributors Worldwide •

Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

⚠ 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.

Mar '95



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.

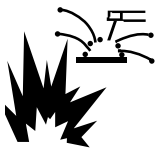
- 4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.
- 4.b. Use suitable clothing made from durable flame-resistant material to 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. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.
- 5.c. 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.d. 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.e. 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.f. Also see item 1.b.

AUG 06

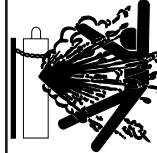


WELDING and CUTTING SPARKS can cause fire or explosion.

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.
- 6.i. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.
- 6.j. Do not use a welding power source for pipe thawing.



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.

Jan, 07

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. Eviter 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 reçoit 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 soleil, 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 châssis 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.

Mar. '93

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!

CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

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.

Product _____

Model Number _____

Code Number or Date Code _____

Serial Number _____

Date Purchased _____

Where Purchased _____

Whenever you request replacement parts or information on this equipment, always supply the information you have recorded above. The code number is especially important when identifying the correct replacement parts.

On-Line Product Registration

- Register your machine with Lincoln Electric either via fax or over the Internet.
 - For faxing: Complete the form on the back of the warranty statement included in the literature packet accompanying this machine and fax the form per the instructions printed on it.
 - For On-Line Registration: Go to our **WEB SITE** at www.lincolnelectric.com. Choose "Quick Links" and then "Product Registration". Please complete the form and submit your registration.

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**.

INSTALLATION

WARNING

FALLING
EQUIPMENT can
cause injury.

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

LOCATION

Install the welder in a dry location where there is free circulation of air in 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.

INPUT WIRING

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.

Failure to fuse the input lines per the specifications in this manual will constitute customer abuse and void the warranty.

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

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

The frame of the welder must be grounded. A stud marked with the symbol located on the fan shroud is provided for this purpose. See the U.S. National Electrical Code for details on proper grounding methods.

**Recommended Input Wire, Grounding Wire and Fuse Sizes
Based on National Electrical Code For 60 Hertz,
3 Phase Welders at 100% Duty Cycle**

Input Volts	Amps Input	Copper Wire Size Type 75° In Conduit		Super Lag Fuse Size in Amps
		3 Input Wires	Grounding Conductor	
460	184	000	3	300

NOTE: The standard machines are designed to operate on 460 volt-60 Hertz, 440 volt-50 Hertz and 380 volt-50 Hertz input power systems. However, to use the machines on 380 volt-50 Hertz power, reconnect the transformer input leads in accordance with the connection diagram pasted to the inside of the lower right side case panel.

OUTPUT CONNECTION (Turn Power Source Off)

a. Output Studs

The “Positive” and “Negative” output studs are located on the front panel. Two of each are provided to simplify connecting multiple electrode or work cables as suggested in the table below.

Connect the electrode cables to the “Positive” studs for electrode positive (DC+) polarity or to the “Negative” stud for electrode negative (DC-) polarity as required by the welding procedures. Connect the work cables to the other set of studs. Tighten the nuts with a wrench.

Suggested Copper Cable Sizes — 80% Duty Cycle		
Below 1000 amps	Two 4/0	Up to
1000 to 1200 amps	Three 4/0	200'
1200 to 1500 amps	Four 4/0	

b. Auxiliary Power

This machine supplies the 1000 volt-amperes of 115 volt, AC power needed for the automatic wire feeders. The power is available from terminals #31 and #32 on the terminal strip.

c. “NL Option” (K783)

Installation of an NL option is *required* when connecting a DC-1500 to LAF-3, NA-2, LT-3 or LT-34 wire feeding systems. See the section on page 9 entitled “NL Option Kit” for full information.

d. Wire Feeder Connection — Without NL Option

Turn the welder off. Remove the screw and lift the hinged door on the front of the control panel to expose the terminal strips. Connect the leads of the wire feeder input control cable to the terminal strip *exactly* as specified in the appropriate connection diagram included in the wire feeder Operating Manual. Attach the control cable to the panel at the right of the terminal strip using the clamp attached to the control cable. Close the door and replace the screw.


To connect the DC-1500 to wire feeders not covered in available connection diagrams, write to the factory for instructions giving complete nameplate information for the DC-1500 and wire feeder.

INSTALLATION

e. Optional Remote Control (K775)

This control is included as part of the “NL Option”. Connect it to the “NL Option” box per instructions shipped with the option. (Not required with the NA-3, NA-5, LT-7 or LT-56.)

It can be purchased separately when the DC-1500 is used for other applications.

To install, turn the power off. Remove the screw and lift the hinged door on the front of the control panel to expose the terminal strips. Connect the numbered leads to the appropriate terminals — 75 to 75, etc — on the terminal strip and the green lead to the stud marked with the symbol . Attach the control cord to the panel at the right of the terminal strip using a suitable clamp. Close the door and replace the screw. The Remote Control cord can be lengthened to any length by properly splicing an appropriate four conductor rubber-covered cable to the standard 25’ cord before connecting to the DC-1500 terminal strip.

f. Connecting for Air Carbon Arc

To use the DC-1500 for air carbon arc or other applications, disconnect all wire feeder welding cables and

control leads and connect a jumper between #2 and #4 on the terminal strip on the front of the DC-1500. With the #2 to #4 jumper connected, the output studs are energized whenever the machine is on.

WARNING: If the electrode leads to the wire are not disconnected per instructions, the wire feeder nozzle or gun and electrode will be electrically “hot”.

g. DC-1500 Paralleling Kit

A kit for field installation only, (order K1900-1) is available for paralleling two DC-1500’s for currents up to 3000 amperes, 100% duty cycle. Complete installation instructions are shipped with the kit.



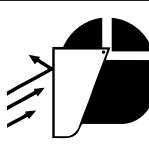

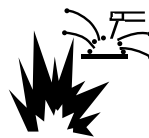
h. Connecting for High Frequency Starting

As shipped, these welders can be used with a high frequency unit for improved automatic welding starting characteristics.

RATINGS

IP21 enclosure
Main Transformer insulation class 155 (F)

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. 		<ul style="list-style-type: none"> • Wear eye, ear and body protection.
ELECTRIC SHOCK can kill.		ARC RAYS can burn.	
	<ul style="list-style-type: none"> • Keep your head out of fumes. • Use ventilation or exhaust to remove fumes from breathing zone. 		<ul style="list-style-type: none"> • Keep flammable material away.
FUMES AND GASES can be dangerous.		WELDING SPARKS can cause fire or explosion.	

DUTY CYCLE

The DC-1500 is rated for 100% duty cycle at 1500 amps and 60 volts.

To Set Polarity

Connect the electrode cable to the “Positive” or “Negative” studs depending upon the electrode polarity desired. Connect the work cable to the other studs.

Set the “Electrode Negative — Electrode Positive” switch to correspond to the polarity of the electrode cable connection. This switch setting is necessary for proper operation of the Lincoln wire feeder attached to the power source.

To Start the Welder

Press the “On-Off” pushbuttons to start and stop the welder. The red pilot light near the center of the control panel indicates when the welder is on.

OPERATING INSTRUCTIONS

To Set for Machine or Remote Control

The output can be controlled either at the wire feeder or the DC-1500. When the NL Option Kit is installed, however, output is controlled only from the K775 Remote Control usually mounted at the wire feeder.

To adjust the output from the wire feeder, set the toggle switch on the front of the DC-1500 to "Output Control Remote". To adjust the output using the DC-1500 "Output Control" rheostat, set this switch to "Output Control at DC-1500".

To Set the Welder Output

With the toggle switch set to "Output Control at DC-1500", rotating the "Output Control" rheostat on the DC-1500 from 1 to 10 increases the machine output from minimum to maximum. The same full range control is set from the wire feeder or K775 when the toggle switch is set to "Output Control Remote".

Set the output as required by the welding procedures.

Mode Switch

The toggle switch labeled CV Innershield, CV submerged arc, VV submerged arc, is used to select the proper welder characteristics for the process being used.

NOTE: Some machines say "VV" for variable voltage while other machines use the terminology "CC" for constant current.

The CV Innershield Mode permits the DC-1500 to produce essentially a flat output characteristic that can be varied from approximately 20 to 60 volts. In this position the dynamic characteristics 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 characteristics that can be varied from approximately 20 to 60 volts. 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 constant current type power source.

The VV Submerged Arc Mode permits the DC-1500 to produce a constant current output characteristic through the range of 200A-28V to 1500A-60V with an open circuit voltage of 45 to 98 volts. Although almost all submerged arc welding can now be done in the CV mode, the VV mode is available for those procedures where VV (CC) may still be desirable.

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.
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.

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.
4. *Air Carbon Arc Gouging or Cutting* — For air carbon arc gouging, the constant voltage Innershield mode is used with the output control set between 4 and max. depending on the application, carbon size, etc. Up to 1/2" carbons, start with the machine control set at 4 and increase as required for long cable lengths. With 1/2" and 5/8" carbons, short (100') cable lengths can lead to occasional tripout of the protection circuit when the carbon is shorted to the work. Cutting back the output setting will reduce the short circuit current and minimize tripping. Longer cable lengths do an even better job since this also reduces the short circuit current but even more significantly permits raising the open circuit voltage (by increasing control setting) for smoother operation. See the table below for optimum cable size and length.

Carbon Size	Typical Current Range	Combined Total Electrode and Work Lead Length		Electrode and Work Lead Size
		(Min)	(Max)	
1/2"	600-1000 Amps	250'	825'	2 — 4/0
5/8"	800-1200 Amps	375'	925'	3 — 4/0

If ever longer leads are used and the output control is already set on max., the unit has reached its maximum air carbon arc capability.

3/4" carbons are not recommended for use with the DC-1500 because the high surge currents that occur with this diameter can cause the DC-1500 fault protection circuitry to trip the machine off the line, if the operator does not gouge in such a way to limit the currents.

General Set-Up Procedures When Using DC-1500 and Lincoln Automatic Head NA-3

(Read the following and refer also to the chart on page 9.)

1. 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 VV board switch should be set for CV. If the power source is used in the VV mode, then the NA-3 VV board mode switch should be placed in the VV position.

All NA-3's when used with the DC-1500 are capable of cold starting with the variable voltage board mode switch in VV. Cold starting permits the wire to be inches 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 settings of the variable voltage board switch.

OPERATING INSTRUCTIONS

2. *Arc striking with DC-1500 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 all single solid wire, Innershield wire, and Twinarc $1/8$ and $3/32$ solid wire.

- a. Except for long stickout Innershield procedures and Tiny Twinarc $1/16$ procedures, an NA-3 start board is *not* needed. If a start board is *not* needed, it *should* be removed from the machine, or at least disconnected and the logic board jumper plug replaced. Leaving it connected makes the setup for arc striking more difficult. Also, if a crater board is *not* needed, it should be removed from the NA-3 or at least electrically disconnected and the jumper plug replaced.
- b. Cut electrode to a sharp point.
- c. For cold starts, make certain work piece is clean and electrode makes positive contact with plate.
- d. For hot starts, travel should be started before wire contacts the work (“on the fly” starting).
- e. Set NA-3 open circuit voltage control to approximately the same setting as the weld setting. For initial test welds, choose the voltage setting based on the table below. Set the inch control to 2.

These are approximate settings only until the welding procedure has been set.

It should be noted that with the DC-1500 the OCV required for optimum starting is lower than that required with other type power sources.

Approximate Voltage	Voltage Control Setting
22-24	2
34-36	4
46-48	6
56-60	8

- f. Run a test weld, setting the proper current, voltage and travel speed.
- g. Once the proper welding procedure is established and if the start is poor — wire blast-off, stub, etc., adjust the OCV and inch speed for optimum starting. In general, a low inch speed will provide the best starting.

Adjust the OCV by making repeated starts and observing the 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 setting 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.

- h. For Twinarc welding, clipping both wires to equal lengths will be beneficial to make consistently good starts.
3. *Single Innershield Wire* — Procedures and techniques are the same as above, except starting is generally better “hot” than “cold”. For electrical stickouts above $1\frac{3}{4}$ an NA-3 start board is required.
 4. *Twinarc Innershield* — Procedures and techniques are the same as above, except starting is generally better “hot than “cold”. Use of an NA-3 start board improves starting.
 5. *Twinarc Submerged Arc $1/16$* — Procedures and techniques are the same as above, except starting is best when using CV Innershield and the NA-3 start board.
 6. *Use of the NA-3 Start Board* — For those processes above that recommend use of the NA-3 start board, the following method should be used to set up the procedure.
 - a. Set start time at 0 and start current and voltage at mid-range. Start the weld and set the proper current and voltage for the welding procedure.
 - b. Turn the start board timer to maximum.
 - c. Set start board current 1 to $1\frac{1}{2}$ dial numbers below NA-3 front control settings.
 - d. Place start board’s voltage control approximately equal to NA-3 voltage control setting.

When set per c and d, above, 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.

 - e. With the start board time delay set at maximum, establish the correct arc striking procedure as described previously by changing OCV and inch speed.
 - f. Now 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.
 - g. Now decrease the start time as low as possible for optimum starts.
 7. *Arc striking with the DC-1500 mode switch in VV.*
 - a. NA-3 — The NA-3 variable voltage board mode switch should be set to the VV position.
 - b. Set OCV control at 6.5 to 7.0.
 - c. Other techniques recommended in the previous sections for good arc striking apply here also.

OPERATING INSTRUCTIONS

General Set-Up Procedures When Using DC-1500 and Lincoln Automatic Head NA-5

(See chart below.)

1. Install the NA-5 per the information in the NA-5 operating manual (IM-305). Connect the NA-5 to the DC-1500 as described on the connection diagram.
2. Place the DC-1500 mode switch in the proper position according to the process and procedure to be used.
3. Place the machine/remote switch in remote.
4. Connect the work lead to the work or a suitable piece of scrap. Clip the end of the electrode to a sharp point.
5. Preset the Start (if used), Weld and Crater (if used) Controls to the wire speed and voltage specified in the procedure.
6. Make several test welds, readjusting the starting and stopping controls in the following order:
 - a. Set the Arc Striking Wire Speed and Volts Controls for optimum arc striking. For initial test welds, set the NA-5 arc striking wire speed control to 1/2 the weld wire feed speed and the arc striking voltage control 4 volts above the weld voltage.
 - b. If striking is still not satisfactory, see the NA-5 operating manual for information on the feed motor acceleration.
 - c. If installed, adjust the “Start Controls” to set the welding procedures for the time set on the timer to provide the bead size, penetration, or other factor as needed for the application. If not used, this board should be disconnected and the jumper plug replaced.
 - d. If installed, adjust the “Crater Controls” to set the welding procedures for the set time after the stop button is pressed to provide the bead size or fill the crater as needed for the application. If not used, this board should be disconnected and the jumper plug replaced.
 - e. Set the “Burnback Time” to provide the stopping characteristics needed.

RECOMMENDED SET-UP PROCEDURES FOR NA-3/DC-1500, NA-5/DC-1500

Equipment and Control Settings	INNERSHIELD						SUBMERGED ARC							
	Single Innershield Stickout under 1 ^{3/4} "		Single Innershield Stickout over 1 ^{3/4} "		Twinarc Innershield		Single Solid Wire		Tiny Twin ^{1/16} (1)		Tiny Twin Over ^{1/16}		High Current Very Large Puddle	
Wire Feed Type Control	NA-3S or NA-3N	NA-5	NA-3S or NA-3N	NA-5	NA-3S or NA-3N	NA-5	NA-3S	NA-5	NA-3S	NA-5	NA-3S	NA-5	NA-3S	NA-5
NA-3S VV Board Mode Switch	CV	—	CV	—	CV	—	CV	—	CV	—	CV	—	VV	—
NA-3 Inch Speed Dial Setting ⁽⁵⁾	2	—	2	—	2	—	2	—	2	—	2	—	2	—
NA-5 Arc Striking Wire Speed ⁽⁵⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾
NA-3 OCV Control ⁽⁶⁾	⁽⁶⁾	—	⁽⁶⁾	—	⁽⁶⁾	—	⁽⁶⁾	—	⁽⁶⁾	—	⁽⁶⁾	—	6.5 - 7.0	—
NA-5 Arc Striking Volts Control	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾	—	⁽⁴⁾
NA-3 Start Board	⁽²⁾	—	Req'd ⁽²⁾	—	Req'd ⁽²⁾	—	⁽²⁾	—	⁽²⁾	—	⁽²⁾	—	⁽²⁾	—
DC-1500 Output Control Switch — Machine or Remote	Remote		Remote		Remote		Remote		Remote		Remote		Remote	
DC-1500 Mode Switch	CV Innershield		CV Innershield		CV Innershield		CV Submerged Arc ⁽³⁾		CV Innershield		CV Submerged Arc ⁽³⁾		NA-3S	NA-5
	Inoperative		Inoperative		Inoperative		Inoperative		Inoperative		Inoperative		CC	CVS
DC-1500 Output Control	Inoperative		Inoperative		Inoperative		Inoperative		Inoperative		Inoperative		Inoperative	

⁽¹⁾ Starting is best with “hot” starting. Start button is pressed with wire above the work.
⁽²⁾ If an NA-3 start board is called for, refer to page 7 for details on how to set the controls. If an NA-3 start board is not required, it should be electrically disconnected and the jumper plug replaced.
⁽³⁾ Some high speed welding procedures may perform better on the CV Innershield mode. Merely change the switch between CV Innershield and CV Submerged arc position and select the best welding.
⁽⁴⁾ The NA-5 arc striking wire speed should initially be set at 1/2 the welding wire feed speed, and the NA-5 arc striking volts control 4 volts above the welding voltage. These controls can be adjusted as required for optimum arc striking.
⁽⁵⁾ Exact dial setting depends on cable size and length, carbon size, etc.
⁽⁶⁾ Set the OCV control to the same dial setting as the NA-3 voltage control. For initial test welds, choose the setting based on the table on page 7.

OPERATING INSTRUCTIONS

NL Option Kit

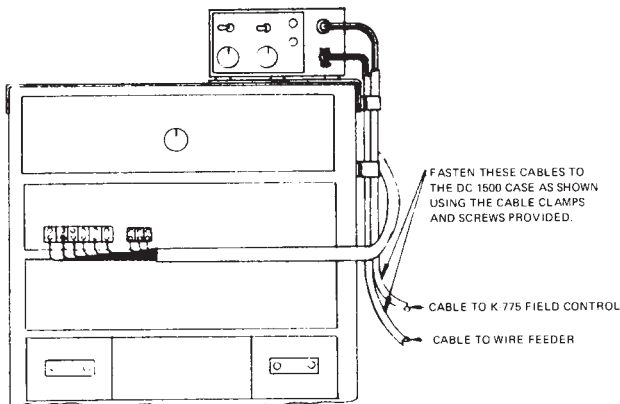
(Not Required With NA-3, NA-5, LT-7 or LT-56)

The K783 NL option kit (for field installation) is designed to permit use of the NA-2, LAF-3, LT-3 and the LT-3 section of the LT-34 tractor with DC-1500's assigned code 7687 and above. It provides the necessary DC control power for the operation of the equipment and the necessary circuitry for proper inching, cold starting and arc striking. **In using the NL option kit a K775 remote field control is required and is included as part of the option kit.** (See pg 6, paragraph e.)

The NL option kit consists of a sheet metal box, 12.5" long, 11.5" deep and 5.7" high. This box mounts on top of the DC-1500 and the following controls are located on the front of the box:

1. Inch speed control — used for LT tractor only.
2. Hot start control — used to obtain optimum arc striking.
3. Polarity switch — changes polarity of control circuit to correspond with electrode polarity.
4. Contactor dropout delay switch — switches in or out a slight contactor dropout delay to prevent sticking of the wire in the crater at the end of welding.

The terminal strip for connection to the automatic equipment is located under the front cover. All necessary control leads for connection to the DC-1500 are wired into the NL kit for easy connection to the DC-1500 terminal strip.



Before proceeding with any installation, be certain the DC-1500 is turned off.

1. Mount the NL option box to the top of the DC-1500 with the screws used to fasten the roof and sides.
2. Remove the cover of the NL option for access to the terminal strip.
3. Feed the control cable from the automatic wire feed control unit through the grommet on the front of the NL box. Connect the control leads per the appropriate connection diagram included at the back of this man-

ual. Secure the cables to the case with the clamps and screws provided.

4. Using the same diagram, connect the leads from the option kit to the DC-1500 terminal strip.
5. Feed the K775 control cable through the clamp on the front of the NL option box and connect the leads to terminals 75,76, and 77 per connection diagram.
6. Replace the cover. This completes the installation.

NOTE: An NL Option was **factory installed** inside DC-1500's built to codes 7562-NL, 7636-NL and 7676-NL. The instructions for the K783 apply except as follows:

1. The factory-installed NL Option does not have a separate "POS — NEG" switch.
2. The factory-installed NL Option does not have an "Inch Speed" control.
3. It cannot be used with LT-3 or LT-34 wire feeders.
4. The fuse protecting the 115 volt DC circuit is a 2 amp fuse located on the NL Option panel inside the welder.

Operation When Connected to the NA-2

1. Set the "POS — NEG" switch (on both NL Option & DC-1500) to correspond to the polarity of the electrode cable connection.
2. Set the mode switch on the front of the DC-1500 to "Constant Voltage — Innershield" or "Constant Voltage — Sumerged Arc".
3. Set the toggle switch on the front of the DC-1500 to "Output Control Remote".
4. Set the output as required for the procedures using the K775 Remote Output Control shipped with the NL Option.
5. Set the NA-2 inch speed to a speed lower than welding feed speed for good starting using the control on the NA-2. The NL Option "Inch Speed" control is not in the circuit.
6. Set the "Hot Start Control" on the NL Option to 4.
7. Set the "Contactor Drop-Out Delay" switch to "Off". Refer to the NA-2 Operating Manual for instructions for setting the contactor drop-out delay and crater filling features built into the NA-2 circuit.

Operation When Connected to the LAF-3 and the K783 NL Option Kit

For proper arc striking and welding when using the LAF-3 with the DC-1500 and K783 NL Option Kit, follow the instructions below (Turn the input power off at the fuse box before working inside the machine.):

1. Connect the DC-1500 NL option, and LAF-3 per the connection diagram M13321.
2. Remove the cover from the LAF-3 control box.

OPERATING INSTRUCTIONS

3. Remove the blue jumper lead connected between #1 on the coil of the main relay and #7 on the coil of the transfer relay. (The main relay is the upper right relay when facing the left end of the control box. The transfer relay is just to the left of the main relay.)
4. Replace the LAF-3 control cover.
5. Set the “POS — NEG” switch (on both the NL Option and the DC-1500) to correspond to the polarity of the electrode cable connection.
6. Set the mode switch on the front of the DC-1500 to “Variable Voltage”.
7. Set the toggle switch on the front of the DC-1500 to “Output Control Remote”.
8. Set the DC-1500 welding current as required by the procedures using the K775 Remote Output Control shipped with the NL Option.
9. Set the LAF-3 “Inch Speed” control near minimum so the electrode touches the work lightly before starting the arc. The NL Option “Inch Speed” control is not in the circuit.
10. Set the “Hot Start Control” on the NL Option at #2. This setting does not change the open circuit voltage, but it will improve starting, particularly at low currents. Adjust the control for optimum starting.

NOTE: The “Hot Start Control” does not affect the starting method of the LAF-3, i.e., “cold” start, “hot” start, etc. See IM-198-B, Sec. 2.4.9.

11. Set the NL Option “Contactor Drop-Out Delay” switch to “On”. This circuit delays opening of the output contactor for a fixed length of time after wire feeding stops to prevent sticking.



Operation When Connected to the LT-3 or LT-34

Follow the same instructions as above except in Step 1, connect per M13322. Omit Steps 2, 3 and 4. Set the “Inch Speed” control on the NL Option as low as possible so the electrode touches the work piece lightly before starting the arc.

Overload Protection

The NL Option kit includes two fuses on the front panel. The upper fuse (2 amp slow blow) protects the inching circuit when the option is used with LT-3 and LT-34 wire feeders. The lower fuse (2.8 amp slow blow) protects the 115 volt DC circuit (#1 and #2). If replacing either fuse use the same size and type.

MAINTENANCE

 WARNING	
	<ul style="list-style-type: none">• Have an electrician install and service this equipment.
	<ul style="list-style-type: none">• 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 motors have 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. Also blow dirt out of the NL Option box.

OVERLOAD PROTECTION

The DC-1500 has built-in protective thermostats. If the rectifier or transformer reaches the maximum safe operating temperature because of frequent overload or high room temperature plus overload, the contactor drops out stopping the welder. The thermostat automatically reset when the temperature reaches a safe operating level. Press the “On” button to start the welder.

The power rectifiers 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 “On” button to start the welder.

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

TROUBLESHOOTING GUIDE

⚠ WARNING



ELECTRIC SHOCK can kill.

- Have a qualified individual install and service this equipment.
- Turn the input supply power OFF at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.

Note: To locate the “Firing Circuit” and “Control/Fault Protection Circuit” P.C. boards, remove the upper case panel on the left side of the machine. The names are printed on the boards.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	REMEDY
Input contactor (CR1) chatters.	a. Faulty input contactor (1CR). b. Low line voltage. c. Faulty pilot relay (2CR).	a. Repair or replace. b. Check with power company. c. Replace relay.
Machine input contactor does not operate.	a. Supply line fuse blown. b. Contactor power circuit dead. c. Broken power lead. d. Wrong input voltage. e. Primary or power SCR thermostats open. f. Open input contactor coil. g. Faulty on-off switch. h. Faulty pilot relay (2CR).	a. Replace if blown. Look for reason first. b. Check pilot transformer T1 and associated leads and 5 amp fuse. c. Check input voltage at contactor. d. Check voltage against nameplate. e. Check for overheating. Make sure both fans are operating and there is no obstruction to free air flow. Faulty thermostats — replace. f. Replace coil. g. Replace switch. h. Replace relay.
Machine input contactor operates but no output when trying to weld.	a. Electrode or work lead loose or broken. b. Open main transformer (T5) primary or secondary circuit. c. “Firing Circuit” P.C. board not connected or is faulty. d. Output pilot relay (6CR) not operating or faulty.	a. Repair connection. b. Repair. c. All nine light emitting diodes (L1 thru L9) must be lit. (See “P.C. Board Troubleshooting Guide”.) d. Check relay by connecting a jumper across terminals 2 and 4 on DC-1500 terminal strip. Replace if faulty.
Machine has maximum output but no control.	a. “Output Control” switch (SW4) in wrong position. b. “Output Control” switch faulty. c. Open in feed back circuitry. d. Faulty “Control/Fault Protection” or “Firing Circuit” P.C. boards. e. Output control potentiometer open (lead no. 75).	a. Check position of switch. b. Check switch and replace if faulty. c. Check wiring and control and “Firing Circuit” P.C. board wiring harness plugs. d. All light emitting diodes must be lit, except L4 on “Control/Fault Protection” board. (See “P.C. Board Troubleshooting Guide.”) e. Check and replace if faulty.
Machine does not have maximum output.	a. One input fuse blown. b. One phase of main transformer open. c. Faulty “Control/Fault Protection” or “Firing Circuit” P.C. boards. d. Output control potentiometer defective. e. Output control potentiometer leads open 226, 237, 236, 73, 74, 76, 77.	a. Check and replace if blown after checking for reason for blown fuse. b. Check for open and repair. c. All light emitting diodes must be lit on both P.C. boards, except L4 on “Control/Fault Protection” board. (See “P.C. Board Troubleshooting Guide.”) d. Check and replace if faulty. e. Check and repair broken leads.
Machine has output but trips off immediately.	a. Machine has either an internal or external short circuit on the output. b. Faulty “Control/Fault Protection” P.C. board. c. Machine output voltage applied to control leads.	a. Check internally and externally for any shorts and remove or repair. b. If no short circuits, LED L4 must be lit (See “P.C. Board Troubleshooting Guide”). c. Check control cable or wire feeder for shorted or grounded control leads.


⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353.

TROUBLESHOOTING GUIDE


PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	REMEDY
Variable or sluggish welding arc.	<ul style="list-style-type: none"> a. Poor work or electrode connection. b. Welding leads too small. c. Welding current or voltage too low. 	<ul style="list-style-type: none"> a. Check and clean all connections. b. Check table on page 4. c. Check procedures for recommended settings.
Machine will not shut off.	<ul style="list-style-type: none"> a. Input contacts frozen. b. Pilot relay contacts stuck closed. 	<ul style="list-style-type: none"> a. Check for approximately .13 inch over travel of contacts. b. Check and replace if necessary.
Output control not functioning on the machine.	<ul style="list-style-type: none"> a. "Output Control" switch in the wrong position. b. Faulty output control switch. c. Faulty "Output Control" rheostat. d. Leads or connections open in "Control Circuit". e. Faulty "Firing Circuit" or "Control/Fault Protection" P.C. board. 	<ul style="list-style-type: none"> a. Place switch in "Output Control at DC-1500". b. Check and replace if found faulty. c. Check and replace if found faulty. d. Check lead continuity and connections for an open and repair if necessary. e. All light emitting diodes must be lit on both P.C. boards, except L4 on "Control/Fault Protection" board. (See "P.C. Board Troubleshooting Guide.")
Output control not functioning on remote control.	<ul style="list-style-type: none"> a. "Output Control" switch in the wrong position. b. Faulty output control switch. c. Faulty remote control rheostat. d. Leads or connections open in "Control Circuit". e. Faulty "Firing" or "Control/Fault Protection" P.C. board. 	<ul style="list-style-type: none"> a. Place switch in "Output Control Remote". b. Check and replace if found faulty. c. Check and replace if found faulty. d. Check all leads and connections, internal and remote, for continuity and repair if necessary. e. All light emitting diodes must be lit on both P.C. boards, except L4 on "Control/Fault Protection" board. (See "P.C. Board Troubleshooting Guide.")
Machine trips off with High Current Procedures on starting.	<ul style="list-style-type: none"> a. OCV setting too high. b. Defective control board. 	<ul style="list-style-type: none"> a. Reduce OCV setting. b. Replace control board.

P.C. BOARD TROUBLESHOOTING GUIDE



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.

CONTROL/FAULT PROTECTION P.C. BOARD

1. LED L1 indicates AC input voltage is present at pins 255-256. If not lit, check the voltage across the secondary winding of the control transformer T7. The voltage should be approximately 115 volts. If not, the problem is in the power supply and not the P.C. board.
2. LED L2 indicates welder output voltage is being supplied to the control circuit. If not lit, check to make certain 222 from pin 2 of the 12-pin control circuit P.C. board connector is connected to the power source negative output stud, and is not broken.

P.C. BOARD TROUBLESHOOTING GUIDE

- LED L3 indicates power is being applied to fault protection relay 2CR, when wire feeder button is pressed or jumper is connected across 2 and 4.
- LED L4 indicates when fault protection circuit is being activated.
- LED L5 indicates a control signal is being supplied to the firing circuit. As the output control is varied, LED L5 should change brilliancy.

FIRING CIRCUIT P.C. BOARD

Machine settings for P.C. board troubleshooting: Terminals #2 and #4 jumpered on DC-1500. Output Control at DC-1500. Variable Voltage operation.

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.

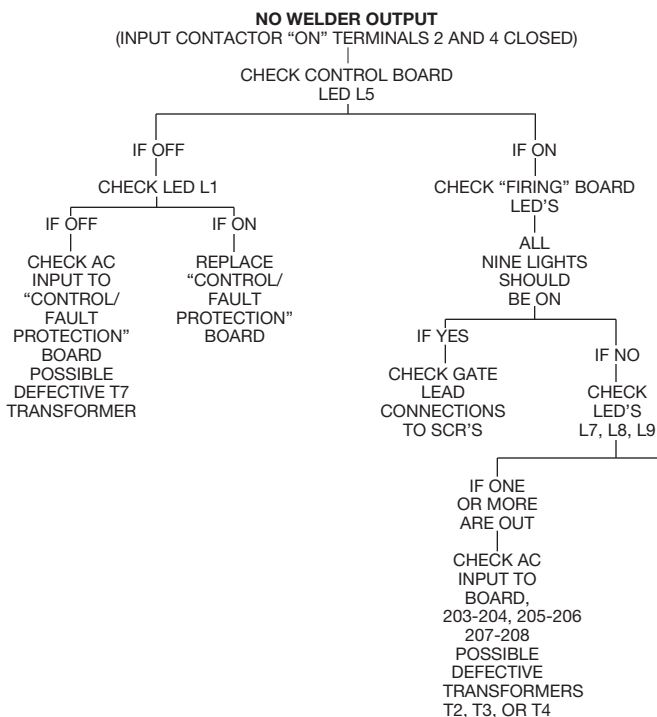
- LED L7 indicates AC power being supplied to P.C. board from control transformer T2. If not lit, check voltage across terminals 203 and 204 on the terminal strip located on the left side of the bottom fan baffle. Voltage should be approximately 115 volts. If no voltage indicates a supply problem, check wiring and transformer. If voltage is present, turn the machine off, remove the 12-pin harness plug from the P.C. board, turn the machine back on and check the voltage across pins 2 and 3 on the plug. This should be approximately 115 volts.

If no voltage and there is voltage at terminals 203 and 204 on terminal strip TS-1 this indicates a broken lead or loose terminal on either lead 203 or 204. If voltage is present and LED L7 is not lit, replace P.C. board.

- LED L8 indicates AC power being supplied to P.C. board from control transformer T3. If not, follow the same procedure as above in (1) for terminals 205 and 206 on terminal strip TS-1 and pins 5 and 6 on the connector.
- LED L9 indicates AC power being supplied to P.C. board from control transformer T4. If not, follow the same procedure as above in (1) for terminals 207 and 208 on terminal strip TS-1 and pins 9 and 12 on the connector.
- LED L1 through L6 indicate gate signals are being supplied to the main power SCR's L1 through L6 respectively. If light L5 on the "Control/Fault Protection" circuit P.C. board and lights L7 through L9 on the "Firing" circuit P.C. board are lit and LED's L1 through L6 are not lit, check lead 231 between the "Firing" P.C. board and the "Control/Fault Protection" P.C. board that is not broken and is connected to each connector. If the lead shows continuity and LED L1 through L6 are not lit, replace the "Firing Circuit" P.C. board. If any one of the LED's L1 through L6 is not lit and lights L7 through L9 are lit, replace the "Firing Circuit" P.C. board.

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

OUTLINE FOR DC-1500 TROUBLESHOOTING GUIDE



MACHINE HAS OUTPUT BUT TRIPS OFF IMMEDIATELY

CHECK FOR SHORT BETWEEN ELECTRODE AND WORK LEADS, REMOVE EXTERNAL LEADS FROM THE OUTPUT TERMINALS

IF TROUBLE STILL PERSISTS, CHECK LED L3 ON "CONTROL/FAULT PROTECTION" BOARD

IF LIGHT GOES ON, THEN QUICKLY OUT WHEN START BUTTON IS PRESSED, "CONTROL/FAULT PROTECTION" BOARD IS DEFECTIVE AND SHOULD BE REPLACED

ERRATIC WELDING

CHECK PROCEDURE

CHECK MODE SWITCH FOR PROPER POSITION FOR PROCESS BEING USED

CHECK LED'S L4, L5, L6 FOR EQUAL BRILLIANCY

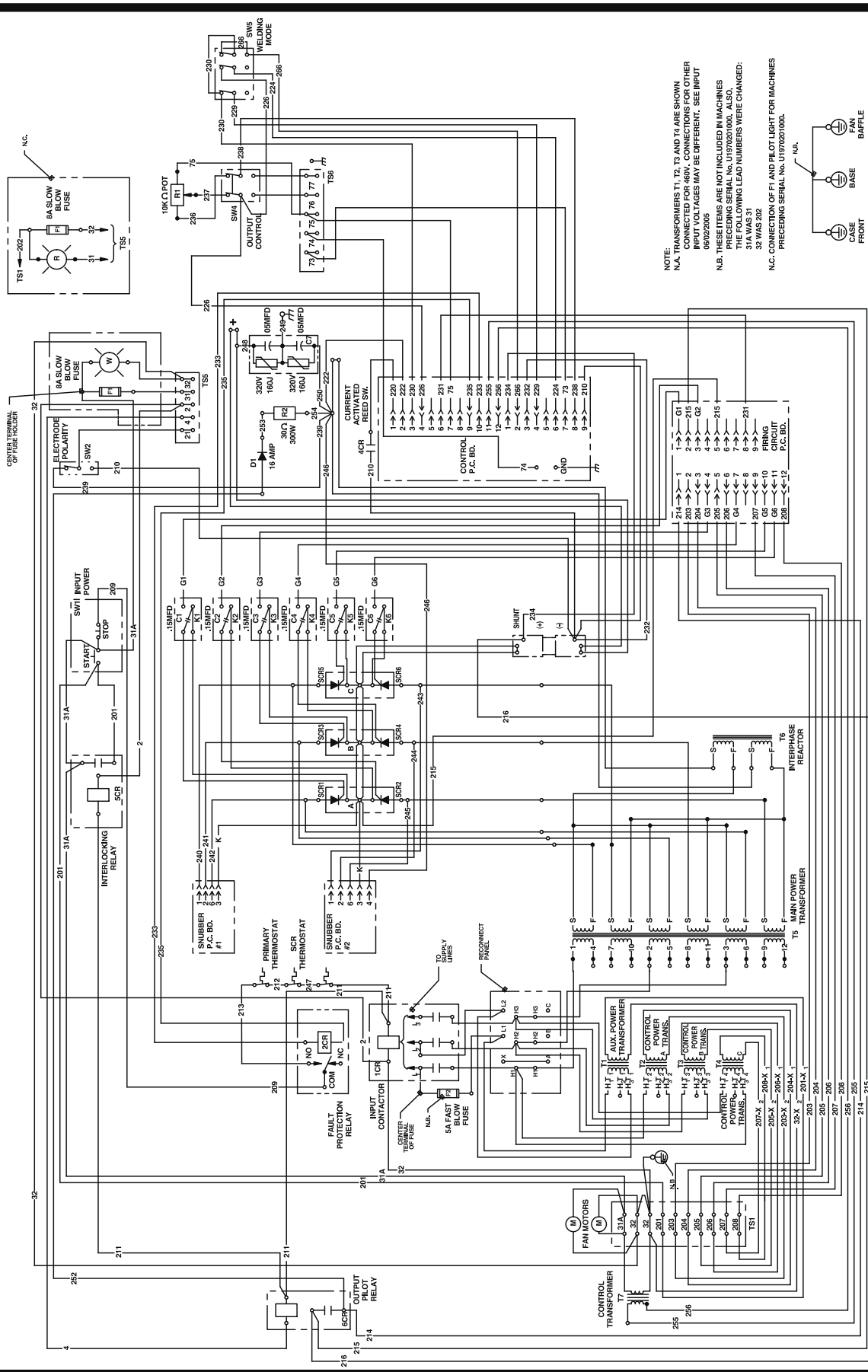
IF LIGHTS ARE NOT ALL APPROXIMATELY EQUAL BRIGHT, REPLACE FIRING P.C. BOARD

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.

DC1500 AMP IDEALARC - WIRING DIAGRAM



A.A.S.I. ELECTRICAL SYMBOLS PER E1537.

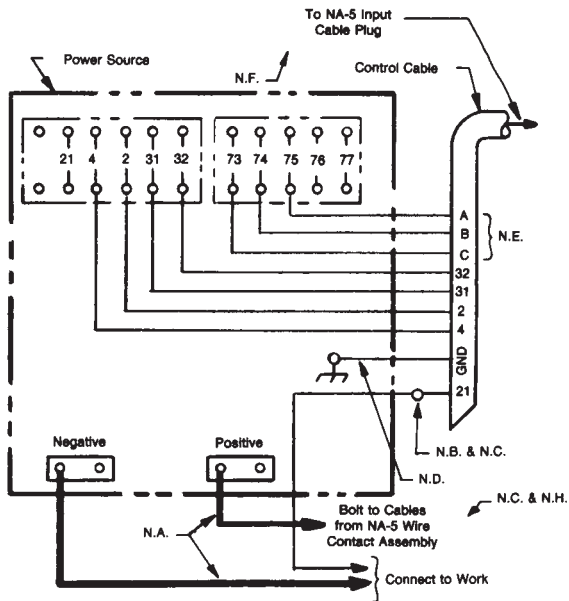
L6427

B


NOTE: This diagram is for reference only. It may not be 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 equipment code number.

DIAGRAMS

Connection of DC-1500 to NA-5

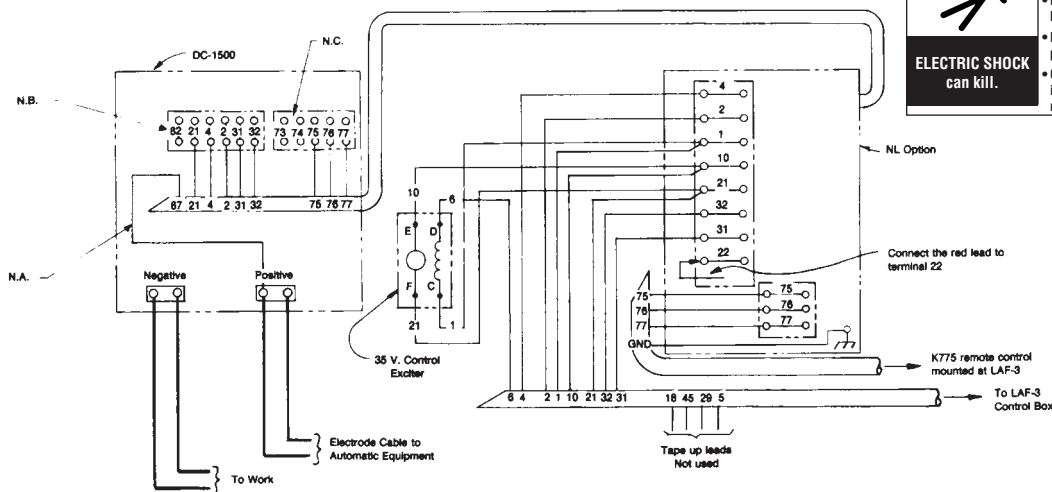


Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source, and position the switch on power source to proper polarity.

- N.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.
- N.B. 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 work piece. For convenience, this extended #21 lead should be taped along the welding work cable. (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.C. Tape up bolted connection.
- N.D. Connect the NA-5 control cable ground lead to the frame terminal marked  near the power source terminal strip. The power source must be properly grounded.
- N.E. If using an older automatic control cable with leads 75, 76, 77; connect lead 75 to #75 on terminal strip, connect lead #76 to #74 on terminal strip, connect lead #77 to #73 on terminal strip.
- N.F. Connect the jumpers on the NA-5 voltage board as follows: connect RED jumper to pin "S", connect WHITE jumper to pin "B".
- N.G. Set the DC-1500 controls as follows: Set the control switch to "Output Control Remote". For C.V. Submerged Arc Processes, set the mode switch to "C.V. Submerged Arc". For Open Arc Processes, set the mode switch to "C.V. Innershield".
- N.H. For proper operation, the electrode cable **must** be snugged under the clamp bar on the left side of the NA-5 control box.

S16889
7-6-84G

Connection of DC-1500 With NL Option Kit (K783) to LAF-3 (Obsolete)



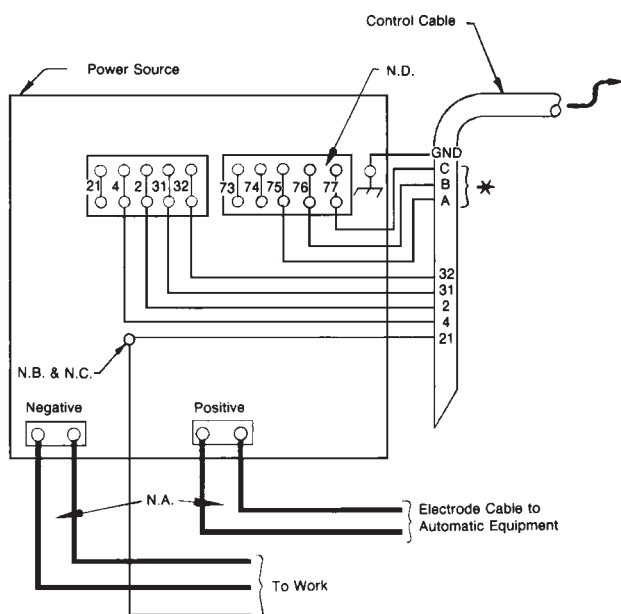
- N.A. On codes above 8234 extend lead 67 and connect it to the electrode cable going to the automatic equipment.
 - N.B. On codes below 8234 this is #67 and the LAF-3 #67 lead can be connected either to the #67 terminal or the electrode cable terminal as shown. Terminal 82 not present on later D.C. 1500's.
 - N.C. Terminals 73 & 74 not present on earlier D.C. 1500's.
- This diagram shows the electrode connected positive. To change polarity, turn power source off, reverse the electrode and work leads at the power source and position the leads on the back of the ammeter and voltmeter in the LAF-3 control box.
- Contactor drop out delay switch on the NL option kit must be in the "on" position.
- The 4/0 cables shown will handle up to 1000 amps at 80% duty cycle. For higher currents or duty cycle add additional cables to the power source output studs.


For best arc striking when connected to an LAF-3 make the following inside the LAF-3 control unit. Remove the jumper lead connected between #1 on the coil on the main relay and #7 on the coil of the transfer relay. (The main relay is the upper right relay when facing the left end of the control box. The transfer relay is just to the left of the main relay.)

M13321
2-26-82C

DIAGRAMS

Connection of DC-1500 to NA-3 (All), LT-5 or LT-7



Connect the control cable ground lead to the frame terminal marked  near the power source terminal strip. The power source must be properly grounded.

To automatic control box.

* If using an older 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.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.

N.B. 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 lead circuit and connection for convenience, this extended #21 lead should be taped to the welding work lead.

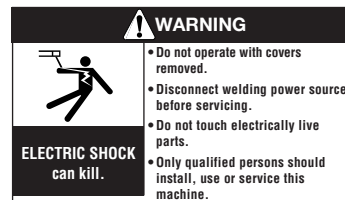
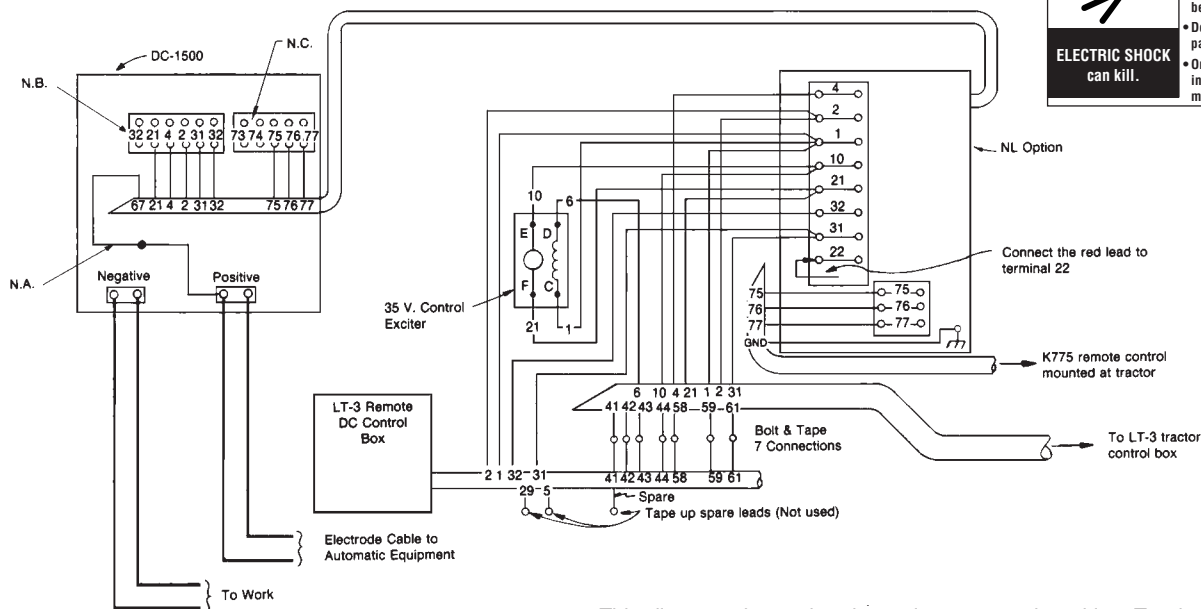
N.C. Tape up bolted connection.

N.D. Terminals 73 and 74 not present on earlier DC-1500.

Above diagram shows electrode connected positive. To change polarity, turn power source 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 voltmeter in the automatic control box.

S15534
2-26-82B

Connection of DC-1500 With NL Option Kit (K783) to LT-3 or LT-34 (Obsolete)



N.A. On codes above 8234 extend lead 67 and connect it to the electrode cable going to the automatic equipment.

N.B. On codes below 8234 this is #67 and the LT-3 or LT-34 #67 lead can be connected either to #67 or to the electrode cable terminal as shown. Terminal 82 not present on later DC-1500's.

N.C. Terminals 73 and 74 not present on earlier DC-1500's.

This diagram shows the electrode connected positive. To change polarity, turn power source off, reverse the electrode and work leads at the power source and position the switch on the power source and the NL option kit to the proper polarity. Also reverse the leads on the back of the ammeter and voltmeter in the LT-3 control box.

Contact drop out delay switch on the NL option kit must be in the "On" position.

The 4/0 cables shown will handle up to 1000 amps at 80% duty cycle. For higher currents or duty cycle add additional cables to the power source output studs.

M13322
2-26-82C

NOTES

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. 	<ul style="list-style-type: none"> ● Keep flammable materials away. 	<ul style="list-style-type: none"> ● Wear eye, ear and body protection.
Spanish AVISO DE PRECAUCION	<ul style="list-style-type: none"> ● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aíslese del trabajo y de la tierra. 	<ul style="list-style-type: none"> ● Mantenga el material combustible fuera del área de trabajo. 	<ul style="list-style-type: none"> ● Protéjase los ojos, los oídos y el cuerpo.
French ATTENTION	<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ● Gardez à l'écart de tout matériel inflammable. 	<ul style="list-style-type: none"> ● Protégez vos yeux, vos oreilles et votre corps.
German WARNUNG	<ul style="list-style-type: none"> ● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden! 	<ul style="list-style-type: none"> ● Entfernen Sie brennbares Material! 	<ul style="list-style-type: none"> ● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese ATENÇÃO	<ul style="list-style-type: none"> ● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra. 	<ul style="list-style-type: none"> ● Mantenha inflamáveis bem guardados. 	<ul style="list-style-type: none"> ● Use proteção para a vista, ouvido e corpo.
Japanese 注意事項	<ul style="list-style-type: none"> ● 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。 	<ul style="list-style-type: none"> ● 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。 	<ul style="list-style-type: none"> ● 目、耳及び身体に保護具をして下さい。
Chinese 警告	<ul style="list-style-type: none"> ● 皮膚或濕衣物切勿接觸帶電部件及鎢條。 ● 使你自已與地面和工件絕緣。 	<ul style="list-style-type: none"> ● 把一切易燃物品移離工作場所。 	<ul style="list-style-type: none"> ● 佩戴眼、耳及身體勞動保護用具。
Korean 위험	<ul style="list-style-type: none"> ● 전도체나 용접봉을 젖은 헝겍 또는 피부로 절대 접촉치 마십시오. ● 모재와 접지를 접촉치 마십시오. 	<ul style="list-style-type: none"> ● 인화성 물질을 접근시키지 마십시오. 	<ul style="list-style-type: none"> ● 눈, 귀와 몸에 보호장구를 착용하십시오.
Arabic تحذير	<ul style="list-style-type: none"> ● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الألكترود بجسد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل. 	<ul style="list-style-type: none"> ● ضع المواد القابلة للاشتعال في مكان بعيد. 	<ul style="list-style-type: none"> ● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION 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.

			
<ul style="list-style-type: none"> ● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone. 	<ul style="list-style-type: none"> ● Turn power off before servicing. 	<ul style="list-style-type: none"> ● Do not operate with panel open or guards off. 	WARNING
<ul style="list-style-type: none"> ● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases. 	<ul style="list-style-type: none"> ● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio. 	<ul style="list-style-type: none"> ● No operar con panel abierto o guardas quitadas. 	Spanish AVISO DE PRECAUCION
<ul style="list-style-type: none"> ● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail. 	<ul style="list-style-type: none"> ● Débranchez le courant avant l'entretien. 	<ul style="list-style-type: none"> ● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés. 	French ATTENTION
<ul style="list-style-type: none"> ● Vermeiden Sie das Einatmen von Schweißrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes! 	<ul style="list-style-type: none"> ● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!) 	<ul style="list-style-type: none"> ● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen! 	German WARNUNG
<ul style="list-style-type: none"> ● Mantenha seu rosto da fumaça. ● Use ventilação e exaustão para remover fumo da zona respiratória. 	<ul style="list-style-type: none"> ● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas. 	<ul style="list-style-type: none"> ● Mantenha-se afastado das partes moventes. ● Não opere com os painéis abertos ou guardas removidas. 	Portuguese ATENÇÃO
<ul style="list-style-type: none"> ● 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。 	<ul style="list-style-type: none"> ● 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ください。 	<ul style="list-style-type: none"> ● パネルやカバーを取り外したまま機械操作をしないで下さい。 	Japanese 注意事項
<ul style="list-style-type: none"> ● 頭部遠離煙霧。 ● 在呼吸區使用通風或排風器除煙。 	<ul style="list-style-type: none"> ● 維修前切斷電源。 	<ul style="list-style-type: none"> ● 儀表板打開或沒有安全罩時不準作業。 	Chinese 警告
<ul style="list-style-type: none"> ● 얼굴로부터 용접가스를 멀리하십시오. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시오. 	<ul style="list-style-type: none"> ● 보수전에 전원을 차단하십시오. 	<ul style="list-style-type: none"> ● 판넬이 열린 상태로 작동치 마십시오. 	Korean 위험
<ul style="list-style-type: none"> ● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها. 	<ul style="list-style-type: none"> ● أقطع التيار الكهربائي قبل القيام بأية صيانة. 	<ul style="list-style-type: none"> ● لا تشغيل 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說明以及應該使用的銀焊材料，並請遵守貴方的有閣勞動保護規定。

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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