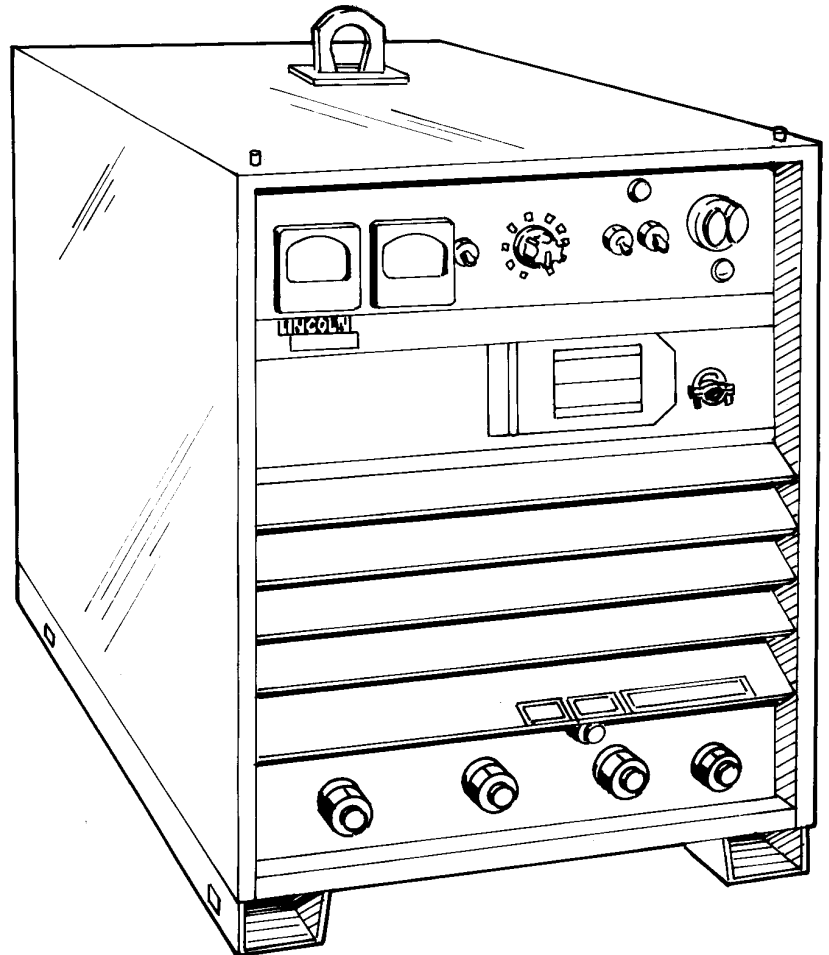


IDEALARC™ DC 1000For use with Machine Code Numbers: **9919**
9920**Safety Depends on You**

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.

**SERVICE 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.



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.**

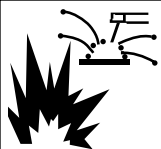
5.b. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

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.

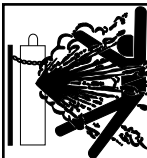
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe 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. 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 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-1000



TECHNICAL SPECIFICATIONS – IDEALARC DC - 1000

INPUT - THREE PHASE ONLY				
<u>Standard Voltage</u> 230/460/575		<u>Input Current at Rated Output</u> 193/96.5/77		
RATED OUTPUT				
<u>Duty Cycle</u> 100% 60% 55%		<u>Amps</u> 1000 1140 1250		<u>Volts at Rated Amperes</u> 44 44 44
OUTPUT				
<u>Mode</u> Constant Current Constant Voltage Constant Voltage (@500 Amp Stud)	<u>Current Range</u> 140 to 1250 Amps 140 to 1250 Amps 140 to 625 Amps	<u>Maximum Open Circuit Voltage</u> 75 VDC	<u>Auxiliary Power</u> 115 VAC, 8 Amps	
RECOMMENDED INPUT WIRE AND FUSE SIZES				
Input Voltage/Frequency	Fuse (Super Lag) or Breaker Size	Input Ampere Rating on Nameplate	Type 75C Copper Wire in Conduit AWG (IEC) Sizes	Type 75C Copper Ground Wire in Conduit AWG (IEC) Sizes
230/60	300	193	000 (85mm ²)	4 (25mm ²)
430/60	150	96.5	3 (26.7mm ²)	6 (16mm ²)
575/60	125	77	6 (16mm ²)	6 (16mm ²)
PHYSICAL DIMENSIONS				
<u>Height</u> 30.75 in (781 mm)	<u>Width</u> 22.25 in (567 mm)	<u>Depth</u> 38.0 in (965 mm)	<u>Weight</u> 821 lbs (372 kg)	

IDEALARC DC-1000



Read entire Installation Section before installing the IDEALARC DC-1000.

SAFETY PRECAUTIONS

WARNING

ELECTRIC SHOCK CAN KILL.



- Only qualified personnel should install this machine.
- Turn the input power OFF at the disconnect switch or fuse box before installing or working on the equipment.
- Do not touch electrically hot parts.
- Always connect the IDEALARC DC-1000 grounding terminal to a good electrical earth ground.

SELECT PROPER LOCATION

Place the IDEALARC DC-1000 where clean, dry air can freely circulate in through the front intake and out through the rear louvers. Dirt, dust, or any foreign material that can be drawn into the machine should be kept at a minimum. Not following these precautions can result in the nuisance shutdown of the machine because of excessive operating temperatures.

STACKING

WARNING

FALLING EQUIPMENT can cause injury.



- Do not lift this machine using lift bale if it is equipped with a heavy accessory such as trailer or gas cylinder.
- Lift only with equipment of adequate lifting capacity.
- Be sure machine is stable when lifting.
- Do not stack more than two high.
- Do not stack the DC-1000 on top of any other machine.

Two IDEALARC DC-1000 machines can be stacked.

Follow these guidelines when stacking:

1. Select a firm, level surface capable of supporting the total weight of two machines (1642 pounds/744 kilograms).
2. Set the bottom machine in place.
3. Stack the second machine on top of it by aligning the two holes in the base rails of the second machine with the two pins on top front of the bottom machine.

NOTE: The machines must be stacked with the Case Front of each machine flush with each other. See Figure A.1.

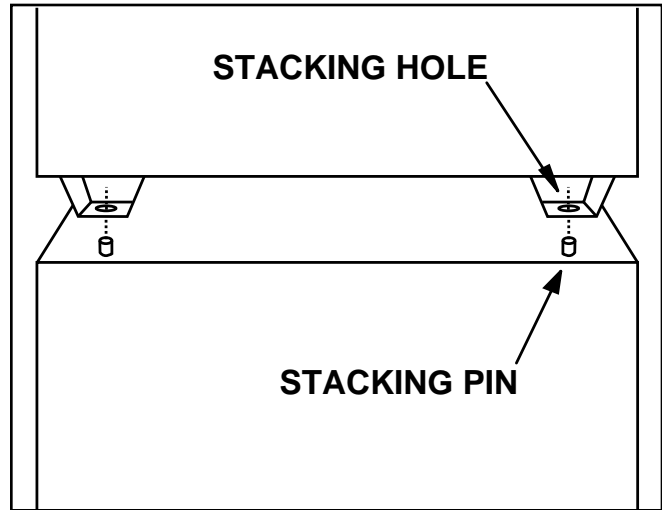


FIGURE A.1 - Stacking IDEALARC DC-1000 Machines

TILTING

The IDEALARC DC-1000 must be placed on a stable, level surface so it will not topple over.

ELECTRICAL INPUT CONNECTIONS

Before installing the machine, check that the input supply voltage, phase, and frequency are the same as the machine's voltage, phase, and frequency as specified on the machine's rating plate on the Case Front Assembly Control Panel. Connect input power supply by removing the rear access panel and connecting to the three line terminals on the input panel. See Figure A.2 for the location of the machine's input cable entry opening and reconnect panel assembly for dual voltage machines.

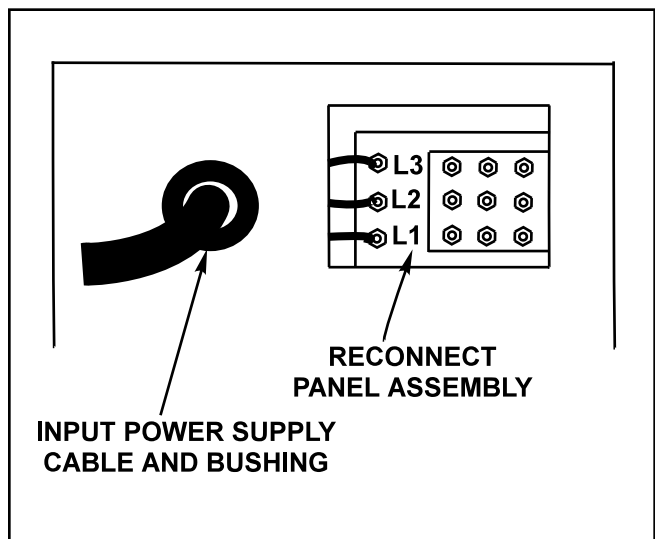


FIGURE A.2 - Input Power Supply Connection

IDEALARC DC-1000



FUSE AND WIRE SIZES

Protect the input circuit with the super lag fuses or delay type circuit breakers listed on the **Technical Specifications** page of this manual for the machine being used. They are also called inverse time or thermal/magnetic circuit breakers.

DO NOT use fuses or circuit breakers with a lower amp rating than recommended. This can result in nuisance tripping caused by inrush current even when machine is not being used for welding at high output currents.

Use input and grounding wire sizes that meet local electrical codes, or see the **Technical Specifications** page in this manual.

GROUND CONNECTION

Ground the frame of the machine. A ground terminal marked with the symbol \equiv is located inside the Case Back of the machine. Access to the rear input panel is at the upper rear of the machine. See your local and national electrical codes for proper grounding methods.

INPUT POWER SUPPLY CONNECTIONS

A qualified electrician should connect the input power supply leads.

1. Follow all national and local electrical codes.
2. Follow Input Supply Connection Diagram located on the inside of the machine.
3. Use a three-phase line.
4. Remove Input Access Door at upper rear of machine.
5. Connect the three-phase AC power supply leads L1, L2, and L3 to the input terminals on the reconnect panel. See Figure A.2

RECONNECT PROCEDURE

Multiple voltage machines are shipped connected to the highest input voltage listed on the machine's rating plate. Before installing the machine, check that the Reconnect Panel in the Input Box Assembly is connected for the proper voltage.



CAUTION

Failure to follow these instructions can cause immediate failure of components within the machine.

To reconnect a multiple voltage machine to a different voltage, remove input power and follow the Input Connection Diagram located on the inside of Case Back Input Access Door. These connection diagrams are listed below:

1. For 460 single voltage, 230/460 Dual Voltage, 220/440 Dual Voltage, 415 Single Voltage or 575 Single Voltage, refer to Figure A.3a.
2. For 380 Single Voltage Machines, refer to Figure A.3b.
3. For 380/500 Dual Voltage Machines, refer to Figure A.3c.
4. For 220/380/440 Triple Voltage Machines, refer to Figure A.3d

⚠ WARNING

All input power must be electrically disconnected before touching panel.

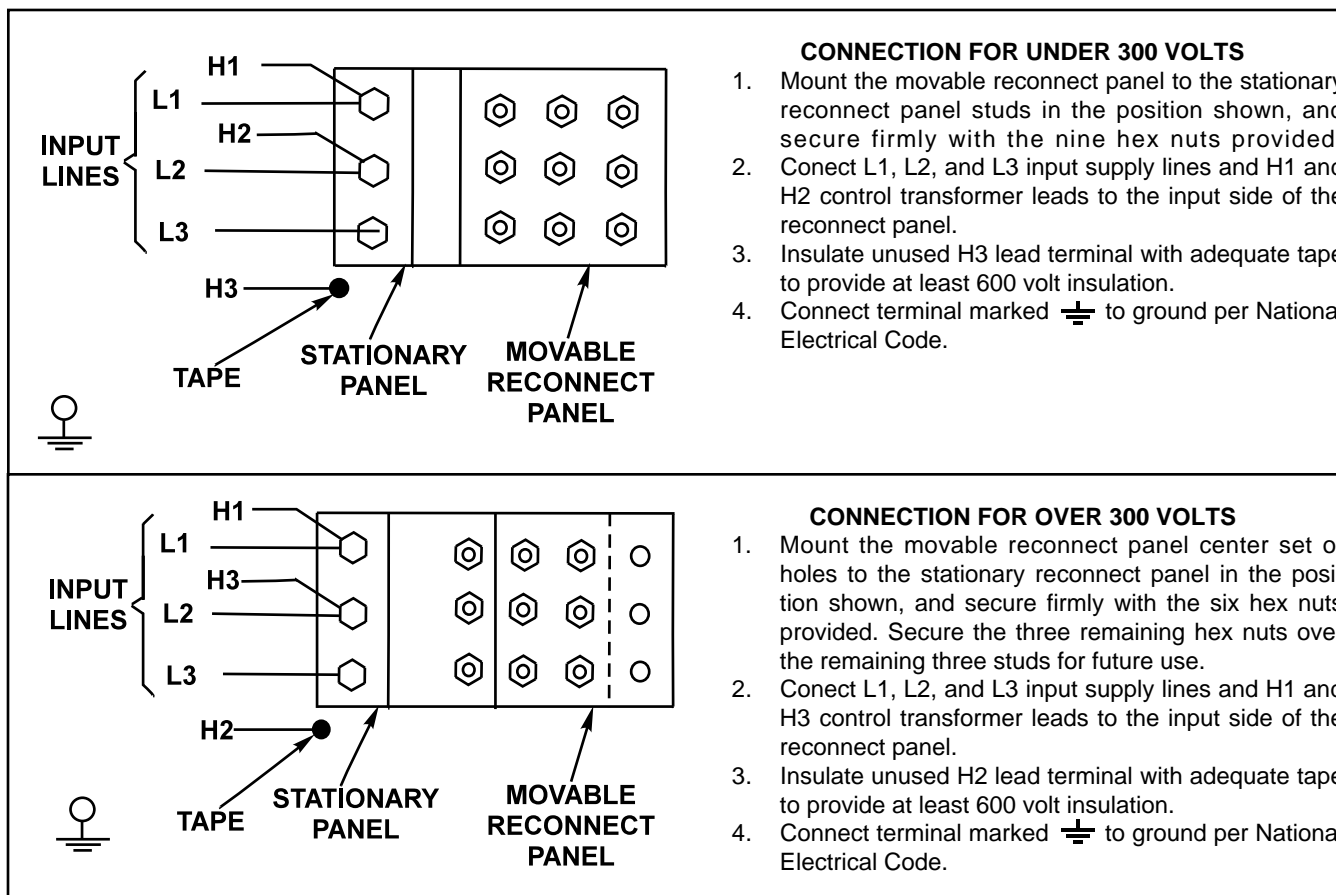


FIGURE A.3a - Input Connection Diagram

⚠ WARNING

All input power must be electrically disconnected before touching panel.

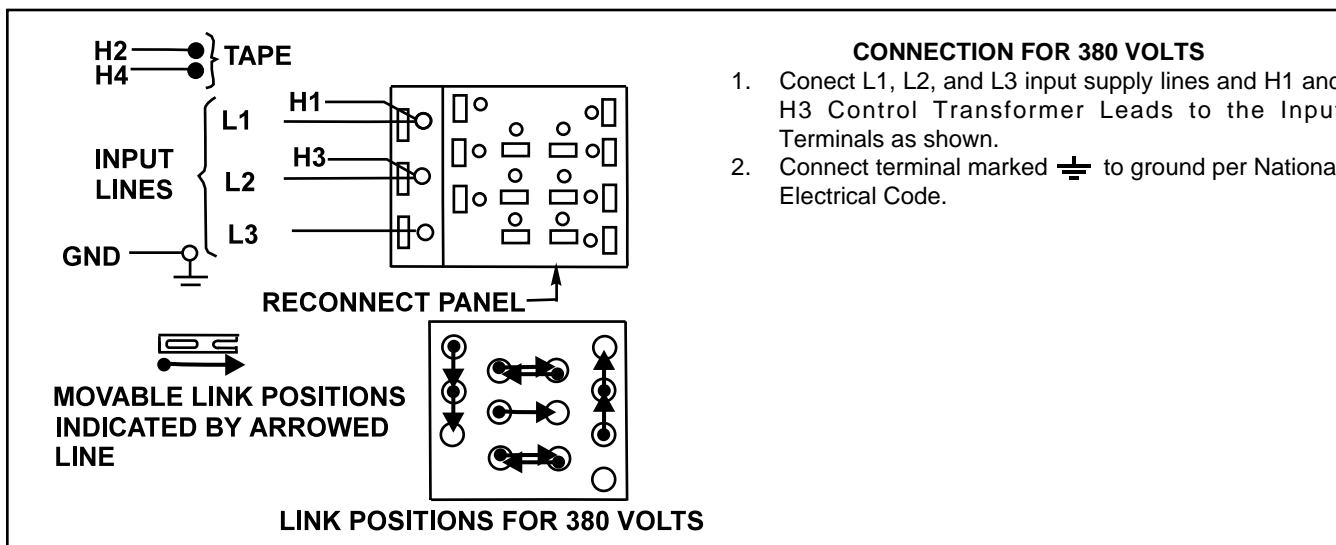


FIGURE A.3b - Input Connection Diagram

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**WARNING**

All input power must be electrically disconnected before touching panel.

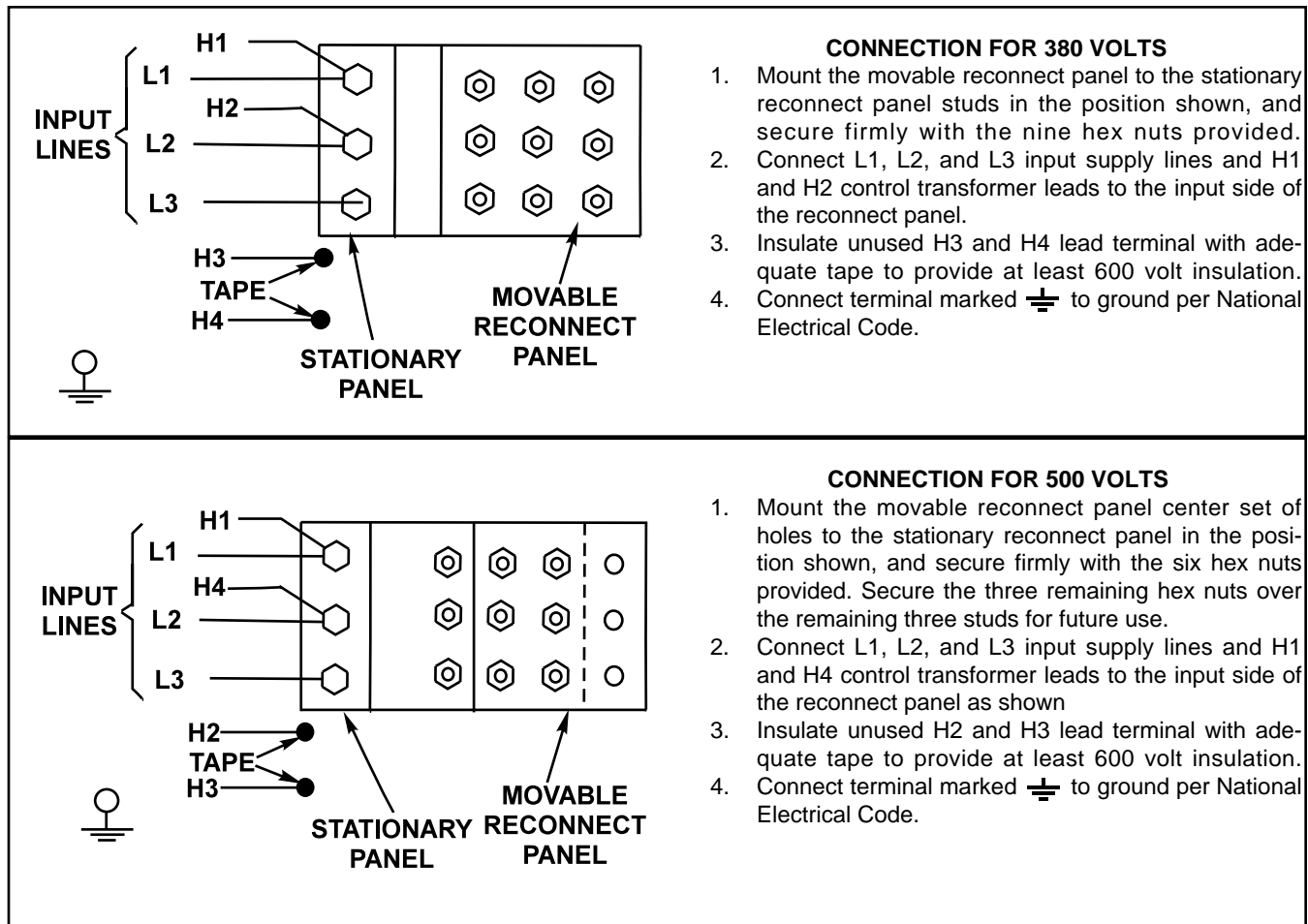


FIGURE A.3c -Input Connection Diagram

⚠ WARNING

All input power must be electrically disconnected before touching panel.

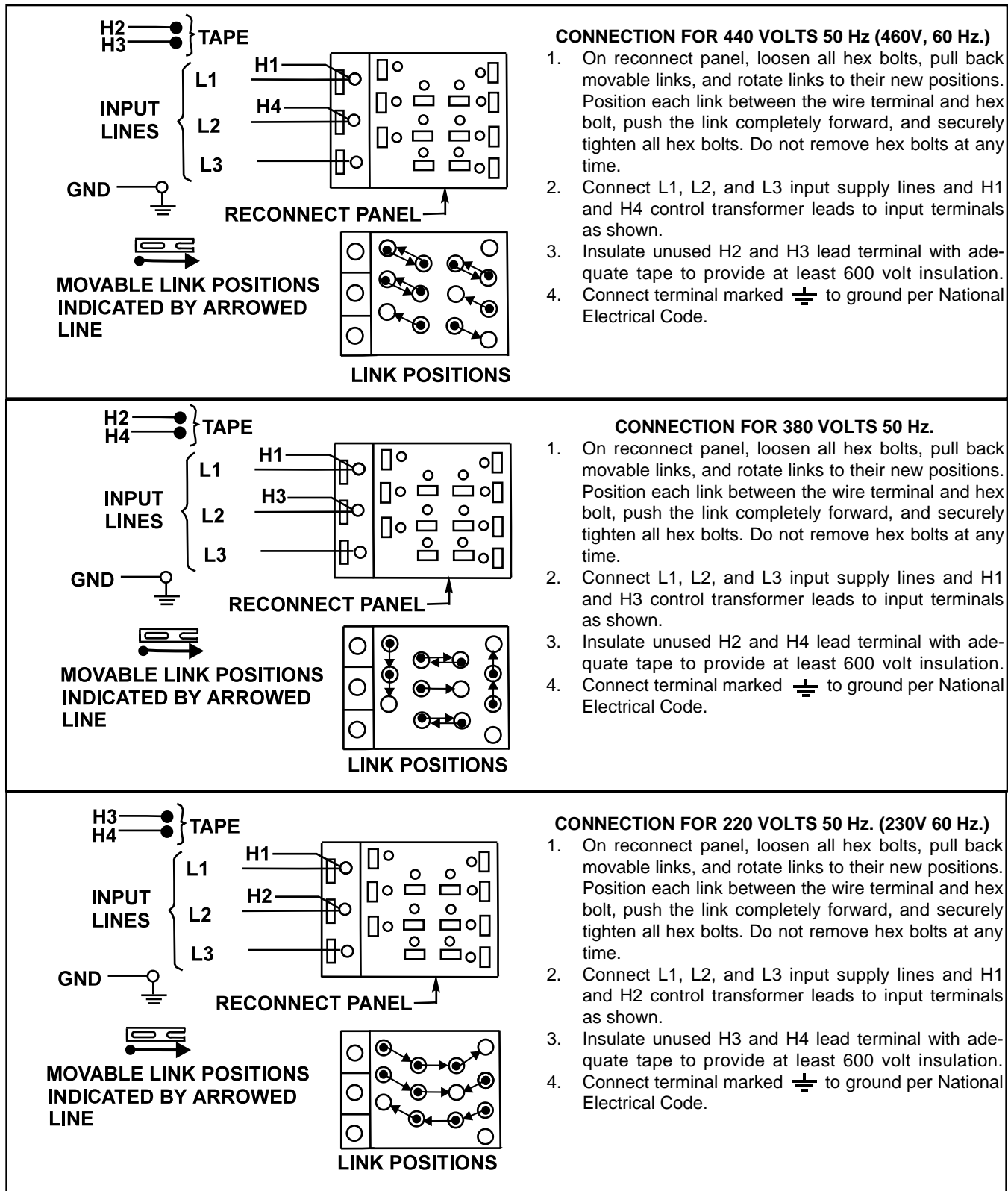


FIGURE A.3d - Input Supply Connection Diagram

IDEALARC DC-1000



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OUTPUT CONNECTIONS

See Table A.1 for recommended IDEALARC DC-1000 cable sizes for combined length of electrode and work cables.

TABLE A.1

Suggested Copper Cable Sizes - 100% Duty Cycle Combined Lengths of Electrodes and Work Cables		
Amperes	Length	Cable Size
1000	0 - 250 ft. (76.2m)	3-3/0 (3 x 85.0 mm ²)

CONNECT ELECTRODE AND WORK LEADS TO OUTPUT TERMINALS

The output terminals are located on the lower case front and labeled “+” and “-”. See Figure A.4. There are 1000 amp rated “+” terminals on the right side, one 500 amp rated “+” terminal near the center and “-” terminals on the left side. They are fully recessed to minimize the possibility of accidental contact by an object or a person.

The 1000 amp output connections provide the full rated output range of the machine.

The 500 amp output connections provide enhanced lower current arc characteristics, especially for submerged arc and GMAW procedures below 450 amps.

1. Set the ON/OFF PUSH BUTTON to OFF.
2. Insert the electrode lead through the oval opening in the lower shelf of the front case, closest to the desired polarity (positive or negative). Pull through enough cable to reach the output terminals.

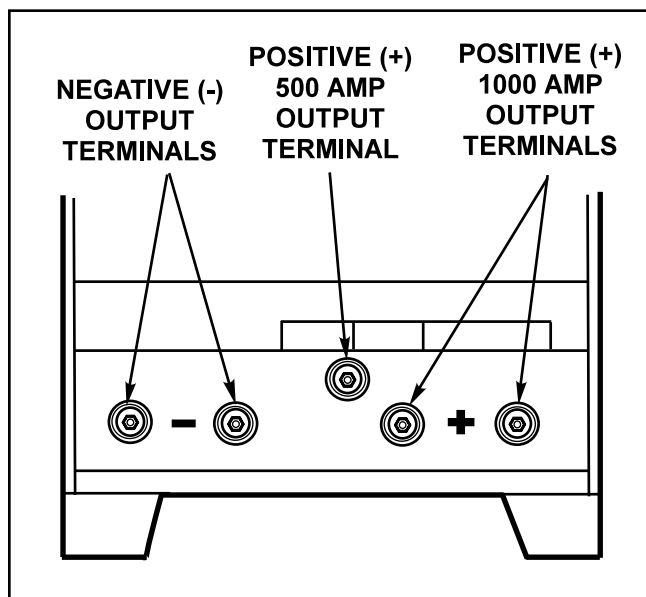


FIGURE A-4 - Output Terminals

3. Connect electrode lead to the desired terminal (positive or negative) and tighten the output terminal nut with a wrench.
4. Connect the second work lead to the other output terminal (positive if negative is attached and vice versa) following steps 2 and 3.

AUXILIARY POWER

This machine supplies the 115 volt, AC power needed for operating 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.

CONNECTION FOR SEMI-AUTOMATIC OR AUTOMATIC WIRE FEEDER CONTROL

With the DC-1000 turned off, the control cable from the semi-automatic or automatic wire feeding equipment is connected to the terminal strip. A strain relief box connector is provided for access into the terminal strip section. A chassis grounding screw is also provided below the terminal strip marked with the symbol \equiv for connecting the wire feeding equipment grounding wire. See the appropriate connection diagram for the exact instructions for the wire feeder being used. A spare plugged hole is provided in case an additional box connector is required.

NOTE: See the **ACCESSORIES** Section of this manual for specific instructions on connecting the following semi-automatic and automatic wire feeders:

- LN-7 } Semi-Automatic Wire Feeders
- LN-8 } Semi-Automatic Wire Feeders
- LN-9 } Semi-Automatic Wire Feeders

- NA-3 } Automatic Wire Feeders
- NA-5 } Automatic Wire Feeders

- LT-7 } Tractors
- LT-56 } Tractors

CONNECTION FOR AIR/CARBON ARC CUTTING OPERATION



WARNING

THE OUTPUT TERMINALS ARE ENERGIZED AT ALL TIMES WHEN THE IDEALARC DC-1000 IS CONNECTED FOR AIR/CARBON ARC CUTTING.

1. Set ON/OFF PUSH BUTTON to OFF.
2. Locate and open the access door on the Front Case Assembly.
3. If necessary, disconnect all wire feeder control cable connections from the DC-1000 terminal strip.
4. Remove the leads from the unit by pulling them through and out of the strain relief box connector (s).
5. Connect a jumper wire from terminal #2 to terminal #4 on the terminal strip.
6. Set the Welding Mode Switch to the CV(I) position for air/carbon arc cutting.

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Read and understand this entire section before operating your machine.

SAFETY INSTRUCTIONS



WARNING



ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals or internal wiring.
- Insulate yourself from the work and ground.
- Always wear dry insulating gloves.



FUMES AND GASES can be dangerous.

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



WELDING, CUTTING and GOUGING SPARKS can cause fire or explosion

- Keep flammable material away.
- Do not weld, cut or gouge on containers that have held combustibles.



ARC RAYS can burn.

- Wear eye, ear and body protection.

Only qualified personnel should operate this equipment. Observe all safety information throughout this manual.

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GENERAL DESCRIPTION

The IDEALARC DC-1000 is an SCR-controlled, three phase, welding and cutting power source. It uses a single range potentiometer to control:

- Submerged Arc Semi-Automatic or Automatic Welding
- Open Arc Semi-Automatic or Automatic Welding
- Air/Carbon Arc Cutting (Carbon Rod Sizes up to 5/8" [15.9 mm] Diameter)
- With the addition of the 500 ampere output terminal on models code 9500 and above, GMAW procedures can be performed.

The IDEALARC DC-1000 has a three-position Welding Mode Switch to enable the user to operate in one of three modes:

- Constant Voltage (CV) Innershield®
- Constant Voltage (CV) Submerged Arc
- Variable Voltage (VV) - Constant Current (CC) Submerged Arc

The IDEALARC DC-1000 can be easily connected to wire feeding equipment, including:

- Semi-automatic wire feeders LN-7, LN-8, and LN-9
- Automatic wire feeders NA-3 and NA-5
- Tractors LT-56 and LT-7

RECOMMENDED PROCESSES AND EQUIPMENT

The IDEALARC DC-1000 is recommended for the following welding or cutting processes within its output capacity of 140 amps to 1250 amps (625 amps at 500 amp output stud) in the Constant Voltage mode, and 140 amps to 1250 amps in the Variable Voltage (Constant Current) mode:

- Submerged Arc Semi-Automatic or Automatic Welding
- Open Arc Semi-Automatic or Automatic Welding
- Air/Carbon Arc Cutting (Carbon Rod Sizes up to 5/8" [15.9 mm] Diameter)

OPERATIONAL FEATURES AND CONTROLS

The IDEALARC DC-1000 comes with the following standard controls:

- DOUBLE ON/OFF PUSH BUTTON (Main Power and 115V Auxiliary)
- OUTPUT CONTROL POTENTIOMETER
- OUTPUT CONTROL SWITCH (Remote or Machine Control)
- WELDING MODE SWITCH
- CONTROL CIRCUIT POLARITY SWITCH
- POWER SOURCE PILOT LIGHT
- DC AMMETER (OPTIONAL)
- DC VOLTMETER (OPTIONAL)

DESIGN FEATURES AND ADVANTAGES

The following list of design features will help you understand the machine's total capabilities and how you can take advantage of them to get maximum use of your machine.

- Excellent arc characteristics for optimum constant voltage submerged arc and Innershield® welding performance.
- A control circuit designed to provide good starting for a large variety of processes and procedures.
- Output Control Potentiometer that provides easy single range continuous control.
- Output Control Switch that provides simple switching from local to remote control.
- Red neon pilot light to confirm that the Input Contactor is energized.
- Auxiliary power source to provide 115-volt AC power (1000 VA) to wire feeding equipment.
- Multi-functional terminal strip for easy connection of wire feeding control cables and switching between CV Innershield® and CV Submerged Arc welding when using the Dual Process or Dual Procedure Kits.
- Recessed output terminals to help prevent any person or object from accidentally coming into contact with the output current. These terminals are prominently labeled positive and negative for easy identification.
- Thermostatically protected power source.
- Electronic protection circuit to protect power source against overloads.
- Input line voltage compensation to provide an essentially constant output.
- SCR electronically controlled welder output provides extra long life, especially for highly repetitive welding applications.

IDEALARC DC-1000



- Three circuit solid state control system provides maximum performance and circuit protection.
- Low profile case provides maximum use of space.
- Convenient access to all controls.
- Large output lead strain relief openings to prevent terminal and cable damage.
- Easily removed case side, even when stacked.
- Enclosure designed with air intake louvers that keep dripping water from entering the unit, allowing outdoor operation. Transformer, SCR bridge, and choke have special corrosion resistant paint for added protection.

WELDING CAPABILITY

The IDEALARC DC-1000 has the following duty cycle ratings.

If the duty cycle is exceeded, the thermal protective thermostat will shut off the output of the machine by keeping the input contactor open until the machine cools to normal operating temperature. The machine can then be restarted by pushing the ON/OFF push button.

Duty Cycle	Amps	Volts	Hertz
55% (Based on 10 min.)	1250	44	50/60
60% (Based on 10 min.)	1140	44	50/60
100%	1000	44	50/60

CONTROLS AND SETTINGS

All operator controls and adjustments are located on the Case Front Assembly of the IDEALARC DC-1000. See Figure B.1 for the location of each control.

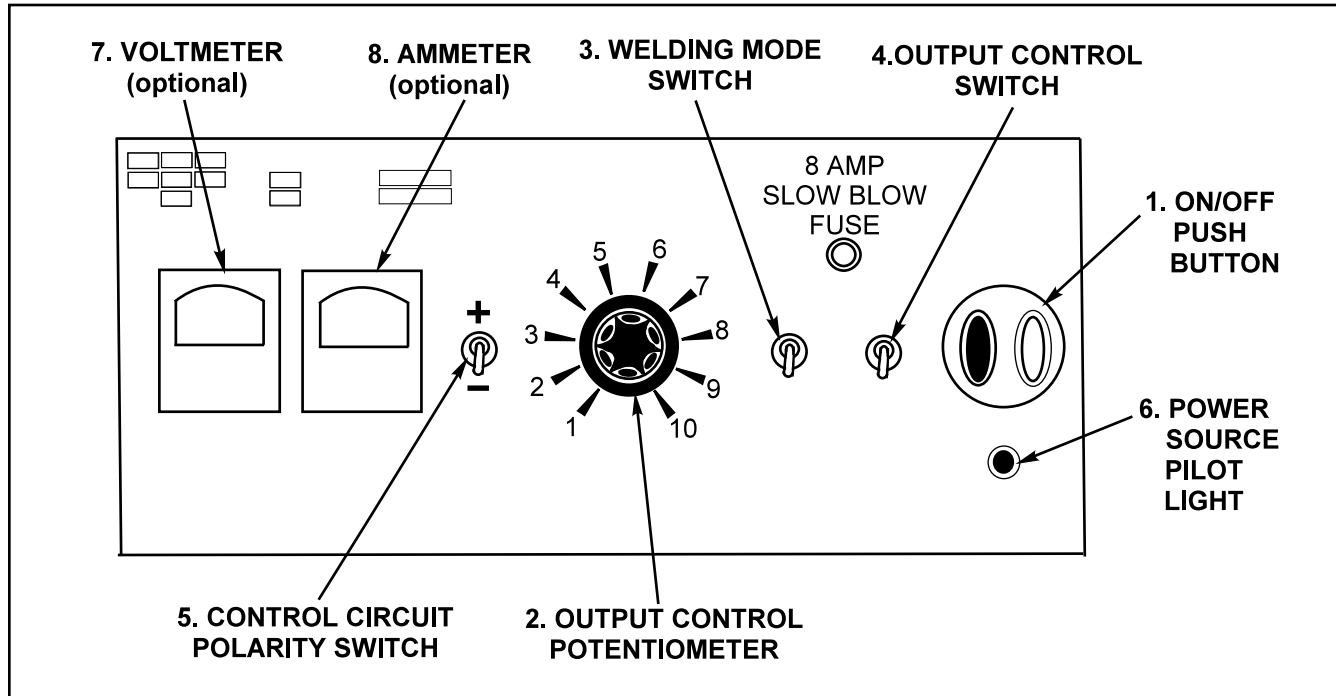


FIGURE B.1 - Control Panel Keys

1. **ON/OFF PUSH BUTTON:** This push button turns the machine ON or OFF
2. **OUTPUT CONTROL POTENTIOMETER:** This control provides tapered, continuous control of the machine output. The control can be rotated from minimum to maximum while machine is under load to adjust the machine output.
3. **WELDING MODE SWITCH:** This toggle switch is used to select the proper welder performance characteristics for the process being used. There are three modes: CV (Constant Voltage) Innershield®, CV (Constant Voltage) Submerged Arc, and VV (Variable Voltage) CC (Constant Current) Submerged Arc.
4. **OUTPUT CONTROL SWITCH:** This toggle switch is used to switch between "Output Control at DC-1000" for local control of machine output and "Output Control Remote" for remote control of machine output.
5. **CONTROL CIRCUIT POLARITY SWITCH:** This toggle switch is used to set power source voltage sensing polarity to match the polarity to which the electrode is connected to the machine. This provides the correct polarity at the terminal strip for correct operation of the automatic wire feeding equipment powered by the auxiliary power from the power source.
6. **POWER SOURCE PILOT LIGHT:** The red neon light glows when the power source input contactor is energized.
7. **VOLTMETER:** An optional voltmeter is available.
8. **AMMETER:** An optional ammeter is available.

OPERATING STEPS

The following procedures are for using the IDEALARC DC-1000 in the local control mode of operation. For remote control of the machine, see the Remote Control of Machine Operation section.

Before operating the machine, make sure you have all materials needed to complete the job. Be sure you are familiar with, and have taken all possible safety precautions before starting work. It is important that you follow these operating steps each time you use the machine.

1. Turn on the main AC power supply to the machine.
2. Set the CONTROL CIRCUIT POLARITY SWITCH to the appropriate position.
 - Set toggle to "Electrode Negative" position if the electrode is connected to the negative (-) output terminal.
 - Set toggle to "Electrode Positive" position if the electrode is connected to the positive (+) output terminal.
3. Set the WELDING MODE SWITCH to welding process being used.
 - CV Innershield®
 - CV Submerged Arc
 - VV (CC)
4. Push the ON/OFF PUSH BUTTON to the ON position.
 - The red neon light glows.
 - The fan starts.
5. Set Output Control Potentiometer to desired voltage or current.
6. Make the weld (NOTE: Terminal #2 and #4 must be connected together to energize the machine output).

REMOTE CONTROL OF MACHINE OPERATION

The toggle switch on the control panel labeled "Output Control at DC-1000" - "Output Control Remote" gives the operator the option of controlling the machine output from a remote location. If in the Remote position, a wire feeder with remote control capabilities or a remote control device such as a K775, must be connected to terminals #75, #76, and #77 to operate. Refer to **Accessories** Section for wire feeder remote information.

WELDING PROCEDURE

RECOMMENDATIONS

Select Welding Mode Switch position based on type of welding to be done.

1. Innershield® Welding/Other Open Arc Processes: Use the CV Innershield® mode.
2. Submerged Arc Welding: Use the CV Submerged Arc mode. If performing high speed welding, switch between the CV Submerged Arc and the CV Innershield® mode and use the mode that produces the best welding results. High Current, Large Puddle Submerged Arc Welding: Use the VV (CC) mode.
3. When the IDEALARC DC-1000 is used for Air/Carbon Arc cutting, use the CV (I) mode and initially set the OUTPUT CONTROL POTENTIOMETER to "9". Based on the size of the carbon being used, turn the potentiometer to a lower setting as required to obtain the best results. You can use carbon rods up to 5/8" (15.9 mm) in diameter. The welder protection circuit protects the machine from extremely high short circuiting pulses.

SEMI-AUTOMATIC AND AUTOMATIC WIRE FEEDING WITH IDEALARC DC-1000 AND WIRE FEEDERS

NA-3 AUTOMATIC WIRE FEEDER

1. Set the DC-1000 Output Control Switch to Remote.

NOTE: Later model NA-3 automatic wire feeders are capable of cold starts when the NA-3 Mode switch is in the CV or VV (CC) mode position. Some earlier models are capable of cold starting only in the VV (CC) mode position. Cold starting enables you to inch the wire down to the work, automatically stop, and automatically energize the flux hopper valve.

2. Set the DC-1000 welding mode switch for the desired process: CV Submerged Arc, CV Innershield® mode or VV (CC) mode.
3. Set the NA-3 mode Switch Position to either CV or VV (CC) to match the DC-1000 mode selected in step 2.
4. Refer to the NA-3 operators manual for instructions on how to use the NA-3 in conjunction with the DC-1000.
5. Follow the following guidelines for good arc striking detailed below for each welding mode.

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GOOD ARC STRIKING GUIDELINES FOR THE NA-3 WITH THE IDEALARC DC-1000 IN THE CV INNERSHIELD®, CV SUBMERGED ARC OR VV (CC) WELDING MODES.

Following are some basic arc striking techniques that apply to all wire feed processes. Using these procedures should provide trouble-free starting. These procedures apply to single, solid wires and Innershield® wires.

1. Cut the electrode to a sharp point.
2. Set the NA-3 Open Circuit Voltage Control to the same dial setting as the Arc Voltage Control. If this is a new welding procedure, a good starting point is to set the Open Circuit Voltage Control to #6.

NOTE: The open circuit voltage of the IDEALARC DC-1000 varies from approximately 25 volts to 75 volts in the CV Innershield or CV Submerged Arc modes. The open circuit voltage is constant in the VV (CC) mode.

3. Run a test weld. Set proper current, voltage, and travel speed.
 - a. For the best starting performance, the NA-3 Open Circuit Voltage Control and Voltage Control setting should be the same. Set the Inch Speed Control for the slowest inch speed possible.
 - b. To adjust the Open Circuit Voltage Control to get the best starting performance, make repeated starts observing the NA-3 voltmeter.

When the voltmeter pointer swings smoothly up to the desired arc voltage, without undershooting or overshooting the desired arc voltage, the Open Circuit Voltage Control is set properly.

If the voltmeter pointer overshoots the desired voltage and then returns back to the desired voltage, the Open Circuit Voltage Control is set too high. This can result in a bad start where the wire tends to "Blast off."

If the voltmeter pointer hesitates before coming up to the desired voltage, the Open Circuit Voltage Control is set too low. This can cause the electrode to stub.

4. Start and make the weld.
 - a. Cold starts. For cold starts, be sure the work piece is clean and the electrode makes positive contact with the work piece.
 - b. Hot "On the Fly" starts. For hot starts, travel should begin before the wire contacts the work piece.

ARC STRIKING WITH IDEALARC DC-1000 AND THE NA-3 START BOARD

When electrical strikeouts exceed 1 3/4" (44.4 mm) an NA-3 Start Board may be required to improve arc striking. When the NA-3 Start Board is used to improve arc striking, use the following procedures:

1. Set start time at 0.
2. Set NA-3 start current and start voltage at mid range.
3. Set the NA-3 output current and voltage to the proper settings for the welding procedure to be used.
4. Turn the Start Board Timer to maximum.
5. Set Start Board current and voltage control.
 - a. Set the Start Board current control to 1-1/2 dial numbers below that set on the NA-3 current control.
 - b. Set the Start Board voltage control equal with the NA-3 voltage control setting

NOTE: These Start Board current and voltage settings result in a start-up current that is lower than the NA-3 current setting and approximately equal with the NA-3 voltage setting for the desired welding procedure.

6. Establish the correct arc striking procedure with the NA-3 Start Board timer set at maximum.
 - a. For the best starting performance, the NA-3 Open Circuit Voltage Control and Voltage Control setting should be the same. Set the Inch Speed Control for the slowest inch speed possible.
 - b. To adjust the Open Circuit Voltage Control to get the best starting performance, make repeated starts observing the NA-3 voltmeter.

When the voltmeter pointer swings smoothly up to the desired arc voltage, without undershooting or overshooting the desired arc voltage, the Open Circuit Voltage Control is set properly.

If the voltmeter pointer overshoots the desired voltage and then returns back to the desired voltage, the Open Circuit Voltage Control is set too high. This can result in a bad start where the wire tends to "Blast off."

If the voltmeter pointer hesitates before coming up to the desired voltage, the Open Circuit Voltage Control is set too low. This can cause the electrode to stub.

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- c. Set NA-3 Start Board current and voltage as close to the welding procedure current and voltage as possible.

NOTE: The Start Board current and voltage should be as close as possible to the welding procedure current and voltage, while still getting satisfactory starts.

- d. Set the start time to as low a time as possible while still getting satisfactory starts.

7. Start and make the weld.

IDEALARC DC-1000 POWER SOURCE SETTING WHEN CONNECTED TO NA-5 AUTOMATIC WIRE FEEDER

When using the IDEALARC DC-1000 with the NA-5 automatic wire feeder, set the controls on the IDEALARC DC-1000 as follows for the best performance:

1. Turn OFF main AC input power supply to the IDEALARC DC-1000.
2. Connect the electrode cables to terminal polarity to be used.
3. Set the CONTROL CIRCUIT POLARITY SWITCH to the same polarity as the electrode cable connection.
4. Set the OUTPUT CONTROL SWITCH to REMOTE.
5. Set the IDEALARC DC-1000 WELDING MODE SWITCH to the position that matches the welding process being used.
 - a. For submerged arc welding, set WELDING MODE SWITCH TO CV SUBMERGED ARC position.
 - b. For all open arc welding processes set WELDING MODE SWITCH TO CV INNERSHIELD® position.
6. Set the Open Voltage Control four volts higher than the welding voltage, and the inch speed at 1/2 the welding wire feed speed for the initial test weld.
7. Refer to NA-5 Operator's Manual for instructions on how to use the NA-5.

LN-8 SEMI-AUTOMATIC WIRE FEEDER

To use the LN-8 Semi-Automatic Wire Feeder with IDEALARC DC-1000

1. Set the IDEALARC DC-1000 WELDING MODE SWITCH to either CV Innershield® mode or CV Submerged Arc mode depending on the welding process being used.
2. Set the IDEALARC DC-1000 OUTPUT CONTROL SWITCH to the REMOTE position.
3. Set the LN-8 Welding Mode Switch to the CV position. The LN-8 Welding Mode Switch is located on the variable voltage VV (CC) board.
4. Refer to the LN-8 Operator's Manual for instructions on how to use the LN-8.

LN-7 AND LN-9 SEMI-AUTOMATIC WIRE FEEDERS OR OTHER CONSTANT WIRE FEEDERS

To use the LN-7, LN-9, or other constant wire feed speed semi-automatic wire feeders with IDEALARC DC-1000

1. Set the IDEALARC DC-1000 WELDING MODE SWITCH to either CV Innershield® mode or CV Submerged Arc mode depending on the welding process being used.

NOTE: These semi-automatic wire feeders cannot be used in the VV (CC) mode.

2. Set the IDEALARC DC-1000 OUTPUT CONTROL SWITCH.
 - a. LN-7: Use either an optional K775 Remote Control Box Assembly or set the IDEALARC DC-1000 OUTPUT CONTROL SWITCH in the Local position.
 - b. LN-9: Refer to the LN-9 Operator's Manual for instructions on how to use the LN-9.

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OPTIONS/ACCESSORIES

- Remote Control Box Assembly (K775)
- LN-7
- LN-8 } Semi-Automatic Wire Feeders
- LN-9 }
- NA-3 } Automatic Wire Feeders
- NA-5 }
- LT-7 and LT-56 Tractors

METERS

Optional factory-installed voltmeter and ammeter are available.

REMOTE OUTPUT CONTROL - (OPTIONAL)

The K775 Remote Output Control consists of a control box with 28 ft. (8.4 m) four conductor cable. This connects to terminals #75, #76, #77 on the terminal strip, and the case grounding screw marked with the symbol \equiv on the machine. These terminals are made available by opening the terminal access cover on the case front. This control will give the same control as the output control on the machine.

CONNECTIONS FOR SEMI-AUTOMATIC OR AUTOMATIC WIRE FEEDER CONTROL

1. Set the ON/OFF PUSH BUTTON to OFF.
2. Locate and open the hinged access door on the Front Case Assembly.
3. Insert control cable through the strain relief box connector and pull enough cable through to reach the terminal strip.
4. Connect the automatic wire feeder control cable to the terminal strip. See corresponding connection diagram in this section of the manual, or the instructions included with the wire feeder.
5. Connect the wire feeder grounding wire to the chassis ground screw marked with the symbol \equiv .

NOTE: The IDEALARC DC-1000 Auxiliary Power Circuit (at #31 and #32 on the terminal strip) supplies 115-volt AC power to the wire feeding equipment. The circuit has a 1000 volt ampere rating. An 8-amp slow blow fuse on the machine's control panel protects the auxiliary power supply from excessive overloads or short circuits.

CONNECTING THE NA-3 OR LT-7 TO IDEALARC DC-1000

1. Disconnect main AC input power to the IDEALARC DC-1000.
2. Set IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
3. Connect the wire feeder control cable leads to the IDEALARC DC-1000 terminal strip as shown in Figure C.1.

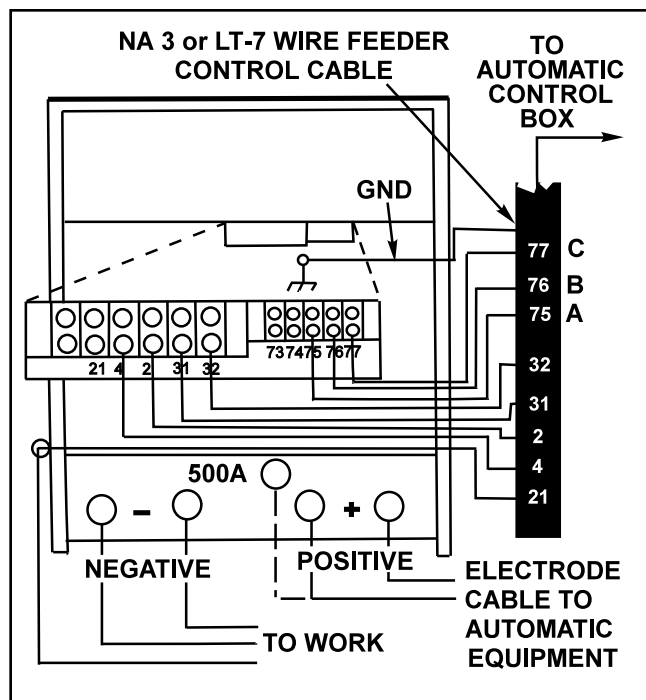


FIGURE C.1 - NA-3 or LT-7 Wire Feeder Connection to the IDEALARC DC-1000

4. Connect the wire feeder control cable ground lead to the frame terminal marked \equiv .



CAUTION

The IDEALARC DC-1000 must be properly grounded.

5. Extend wire feeder control cable lead #21 so it can be connected directly to the work piece.
 - a. Make a bolted connection using AWG #14 or larger insulated wire.
 - b. Tape the bolted connection with insulating tape.

NOTE: An S-16586-X remote voltage sensing work lead is available for this purpose.

- c. Keep the #21 lead electrically separate from the work cable circuit and connection.

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- d. Tape the #21 lead to work cable for ease of use.
6. Connect the welding cables as shown in Figure C.1.

NOTE: Welding cables must be of proper capacity for the current and duty cycle for immediate and future applications.

NOTE: The connection diagram shown in Figure C.1 shows the electrode connected for positive polarity. To change polarity:

- Set the IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
- Move the electrode cable to the Negative (-) output terminal.
- Move the work cable to the Positive (+) output terminal.
- Set the IDEALARC DC-1000 CONTROL CIRCUIT POLARITY SWITCH to NEGATIVE.
- Reverse the leads at the back of the ammeter and voltmeter on the wire feeder automatic control box.

CONNECTING THE NA-5 TO THE IDEALARC DC-1000

NOTE: For optimum performance, use the NA-5 with IDEALARC DC-1000 codes 8288 and above.

- Disconnect main AC input power to the IDEALARC DC-1000.
- Set the IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
- Connect the wire feeder control cable leads to the IDEALARC DC-1000 terminal strip as shown in Figure C.2.

NOTE: If using a K215 control cable, connect control cable leads #75 to #75 on the terminal strip, #76 to #74 on the terminal strip, and #77 to #73 on the terminal strip.

- Connect the wire feeder control cable ground lead to the frame terminal marked \perp .



CAUTION

The IDEALARC DC-1000 must be properly grounded.

- Extend wire feeder control cable lead #21 so it can be connected directly to the work piece.
 - Make a bolted connection using AWG #14 or larger insulated wire.
 - Tape the bolted connection with insulating tape.

NOTE: An S-16586-X remote voltage sensing work lead is available for this purpose.

- Keep the #21 lead electrically separate from the work cable circuit and connection.
 - Tape the #21 lead to work cable for ease of use.
7. Connect the welding cables as shown in Figure C.2.
- Connect red jumper on Voltage Control Board to pin "S."
 - Connect white jumper on Voltage Control Board to pin "B."

NOTE: Welding cables must be of proper capacity for the current and duty cycle for immediate and future applications.

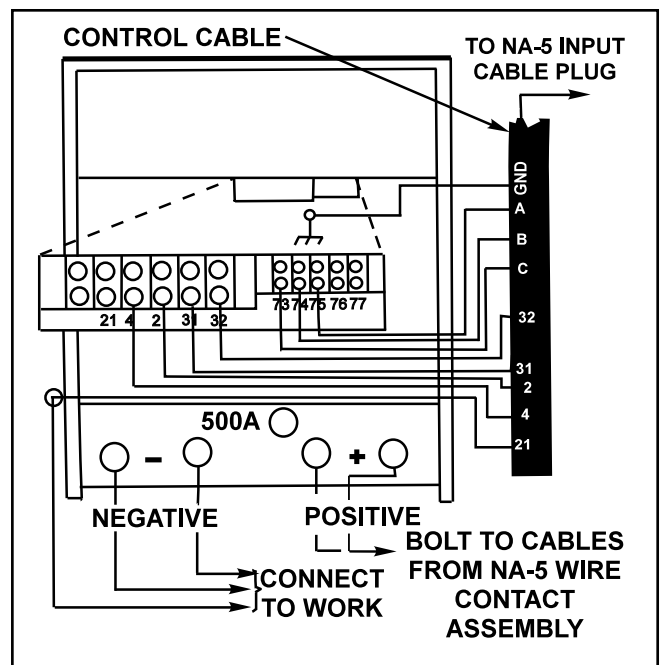


FIGURE C.2 - NA-5 Wire Feeder Connection to the IDEALARC DC-1000

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NOTE: The connection diagram shown in Figure C.2 shows the electrode connected for positive polarity. To change polarity:

- Set the IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
- Move the electrode cable to the Negative (-) output terminal.
- Move the work cable to the Positive (+) output terminal.
- Set the IDEALARC DC-1000 CONTROL CIRCUIT POLARITY SWITCH to NEGATIVE.
- Refer to NA-5 operator's manual for proper control box polarity connections.

NOTE: For proper NA-5 operation, the electrode cables must be secured under the clamp bar on the left side of the NA-5 Control Box.

CONNECTING THE LN-8 TO THE IDEALARC DC-1000

- Set the ON/OFF PUSH BUTTON to the OFF position.
- Disconnect AC input power to the IDEALARC DC-1000.
- Connect the wire feeder control cable leads to the DC-1000 terminal strip. See Figure C.3.
- Connect the wire feeder control cable ground lead to the frame terminal marked ⏏ .



CAUTION

The IDEALARC DC-1000 must be properly grounded.

- Extend the wire feeder control cable #21 lead so it can be connected directly to the work piece.
 - Make a bolted connection using AWG #14 or larger insulated wire.
 - Tape the bolted connection with insulating tape.

NOTE: An S-16586-X remote voltage sensing work lead is available for this purpose.

- Keep the #21 lead electrically separate from the work cable circuit and connection.
- Tape the #21 lead to the work cable for ease of use.

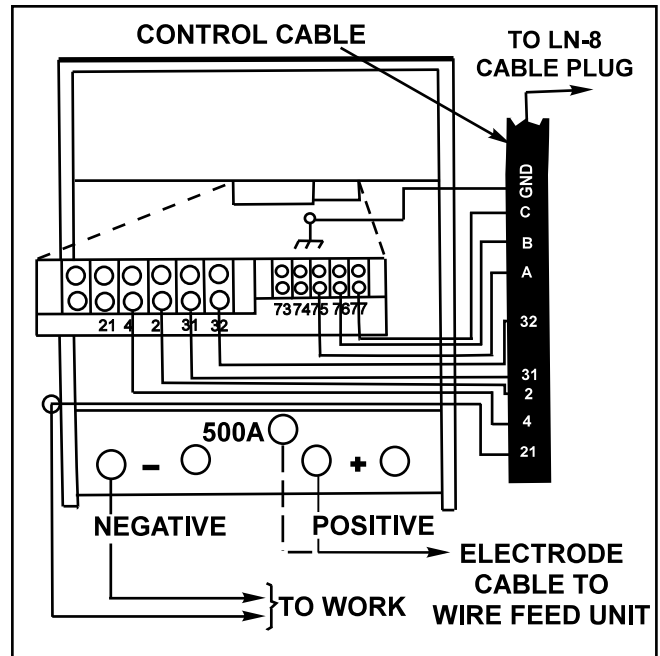


FIGURE C.3 - LN-8 Wire Feeder Connection to the IDEALARC DC-1000

- Connect lead #75(A) to #75 on the terminal strip.
- Connect lead #76(B) to #76 on the terminal strip.
- Connect lead #77(C) to #77 on the terminal strip.
- Connect the welding cables as shown in Figure C.3.

NOTE: Welding cables must be of proper capacity for the current and duty cycle for immediate and future applications.

- Set the DC-1000 output control switch to the "Output Control Remote" position.

NOTE: The connection diagram shown in figure C-3 shows electrode connected positive. To change polarity:

- Set the IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
- Move the electrode cable to the Negative (-) output terminal.
- Move the work cable to the Positive (+) output terminal.
- Set the IDEALARC DC-1000 CONTROL CIRCUIT POLARITY SWITCH to NEGATIVE.
- Refer to LN-8 operator's manual for proper control box polarity connections.

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CONNECTING THE LN-9 WIRE FEEDER TO THE IDEALARC DC-1000

1. Set the ON/OFF PUSH BUTTON to the OFF position.
2. Disconnect AC input power to the IDEALARC DC-1000.
3. Connect the wire feeder control cable leads to the DC-1000 terminal strip. See Figure C.4.
4. Connect the wire feeder control cable ground lead to the frame terminal marked ⏚ .



CAUTION

The IDEALARC DC-1000 must be properly grounded.

5. Extend the wire feeder control cable #21 lead so it can be connected directly to the work piece.
 - a. Make a bolted connection using AWG #14 or larger insulated wire.
 - b. Tape the bolted connection with insulating tape.

NOTE: An S-16586-X remote voltage sensing work lead is available for this purpose.

- c. Keep the #21 lead electrically separate from the work cable circuit and connection.
 - d. Tape the #21 lead to the work cable for ease of use.
6. Connect lead #75(A) to #75 on the terminal strip.
 7. Connect lead #76(B) to #74 on the terminal strip.
 8. Connect lead #77(C) to #73 on the terminal strip.
 9. Connect the welding cables as shown in Figure C.4.

Note: Welding cables must be of proper capacity for the current and duty cycle for immediate and future applications.

10. Connect LN-9 wire feeder jumpers on voltage board as follows: See LN-9 operator's manual.
 - a. White jumper on voltage board to pin "S"
 - b. Blue jumper on voltage board (later models) or on start board (earlier models) to pin "B".

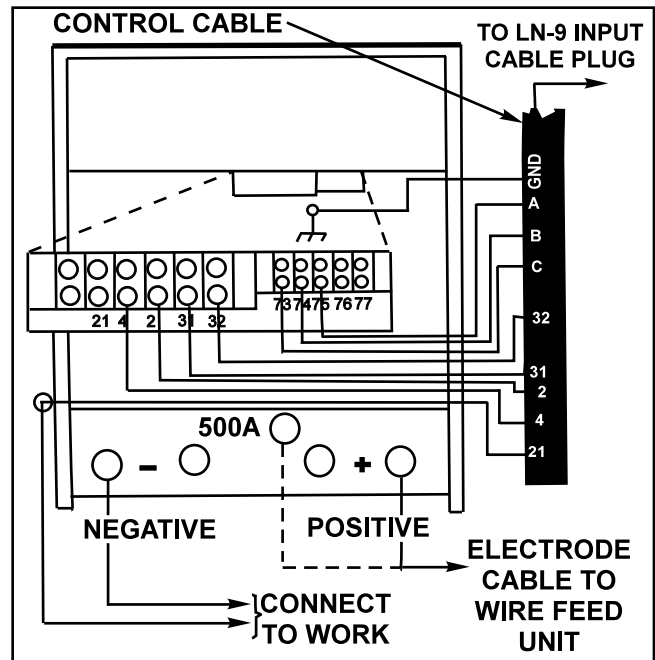


FIGURE C.4 - LN-9 Wire Feeder Connection to the IDEALARC DC-1000

11. Set the DC-1000 output control switch to the "Output Control Remote" position.

NOTE: The connection diagram shown in figure C-4 shows electrode connected for positive polarity. To change polarity:

- a. Set the IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
- b. Move the electrode cable to the Negative (-) output terminal.
- c. Move the work cable to the Positive (+) output terminal.
- d. Position the positive-negative switch on the power source to correspond to the polarity of the electrode cable connection.
- e. Refer to LN-9 operating manual for required polarity connections.

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CONNECTING THE LN-7 WIRE FEEDER TO THE IDEALARC DC-1000

1. Set the IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
2. Disconnect main AC input power to the IDEALARC DC-1000.
3. Connect the wire feeder control cable leads to the IDEALARC DC-1000 terminal strip as shown in Figure C.5.
4. Connect the wire feeder control cable ground lead to the frame terminal marked \perp .



CAUTION

The IDEALARC DC-1000 must be properly grounded.

5. PERFORM THIS STEP ONLY IF THE LN-7 IS EQUIPPED WITH A METER KIT.

Extend wire feeder control cable lead #21 so it can be connected directly to the work piece.

- a. Make a bolted connection using AWG #14 or larger insulated wire.
- b. Tape the bolted connection with insulating tape.

NOTE: If the work cable length is less than 25 feet and the connections to the work piece are secure, then wire feeder control cable lead #21 can be connected directly to the DC-1000 terminal strip.

NOTE: An S-16586-X remote voltage sensing work lead is available for this purpose.

- b. Keep the #21 lead electrically separate from the work cable circuit and connection.
- c. Tape the #21 lead to work cable for ease of use.

6. Connect the welding cables as shown in Figure C.5.

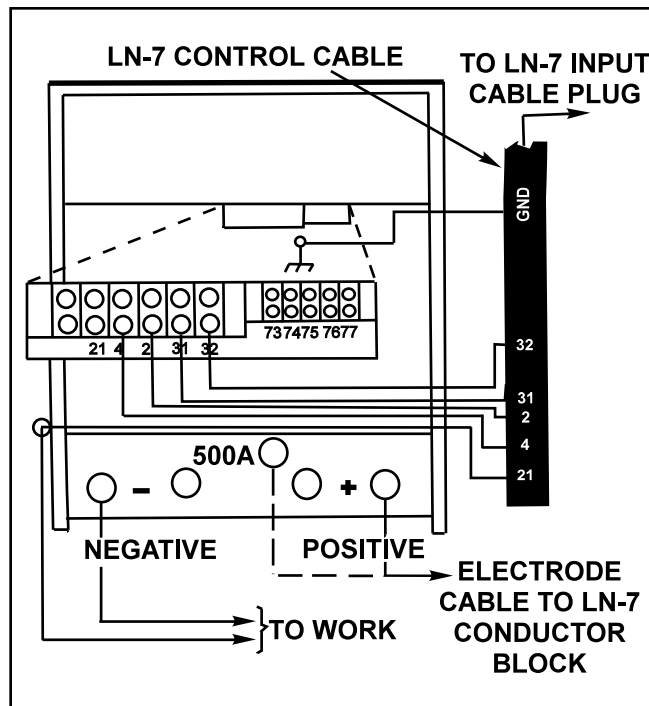


FIGURE C.5 - LN-7 Wire Feeder Connection to the IDEALARC DC-1000

NOTE: Welding cables must be of proper capacity for the current and duty cycle for immediate and future applications.

NOTE: The connection diagram shown in Figure C.5 shows the electrode connected for positive polarity. To change polarity:

- a. Set the IDEALARC DC-1000 ON/OFF PUSH BUTTON to OFF.
- b. Move the electrode cable to the Negative (-) output terminal.
- c. Move the work cable to the Positive (+) output terminal.
- d. Set the IDEALARC DC-1000 CONTROL POLARITY SWITCH to NEGATIVE.

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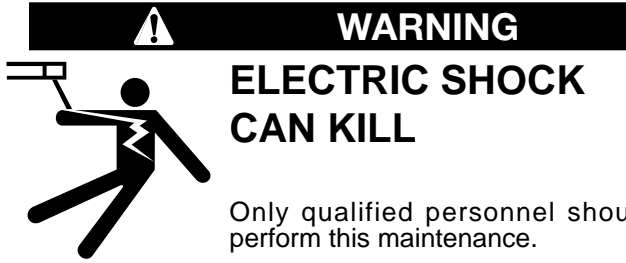
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SAFETY PRECAUTIONS



Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.

Do not touch electrically hot parts.

ROUTINE AND PERIODIC MAINTENANCE

1. Disconnect input AC power supply lines to the machine before performing periodic maintenance, tightening, cleaning, or replacing parts. See Figure D.1

Perform the following daily:

1. Check that no combustible materials are in the welding or cutting area or around the machine.
2. Remove any debris, dust, dirt, or materials that could block the air flow to the machine for cooling.

3. Inspect the electrode cables for any slits or punctures in the cable jacket, or any condition that would affect the proper operation of the machine.

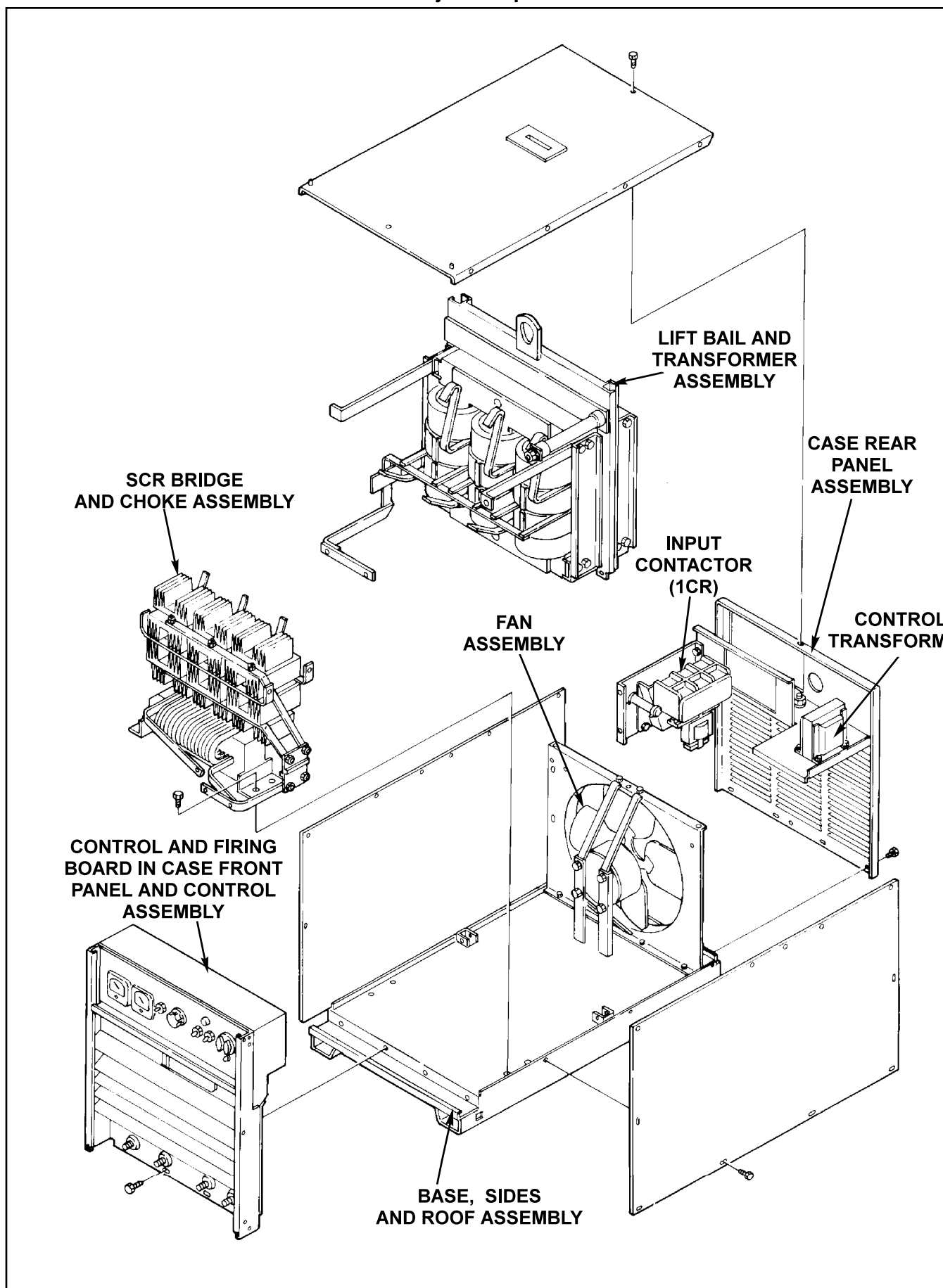
Perform Periodically:

Clean the inside of the machine with low pressure air stream. Clean the following parts. Refer to Figure D.1.

- Main transformer and choke
- Electrode and work cable connections.
- SCR rectifier bridge and heat sink fins.
- Control board.
- Firing board.
- Fan Assembly.

NOTE: The fan motor has sealed bearings which require no maintenance.

FIGURE D.1 - Major Component Locations



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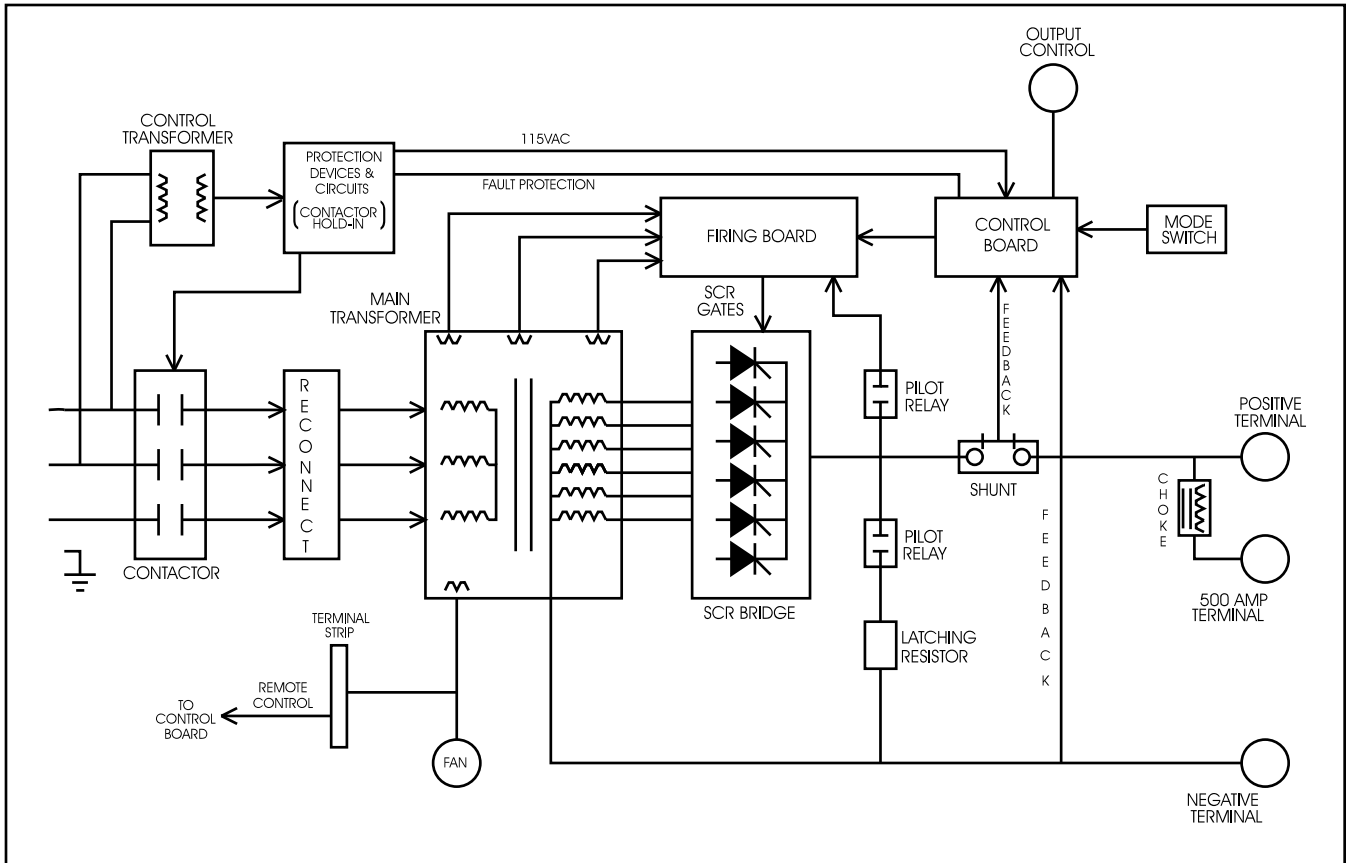


FIGURE E.1 Block Logic Diagram

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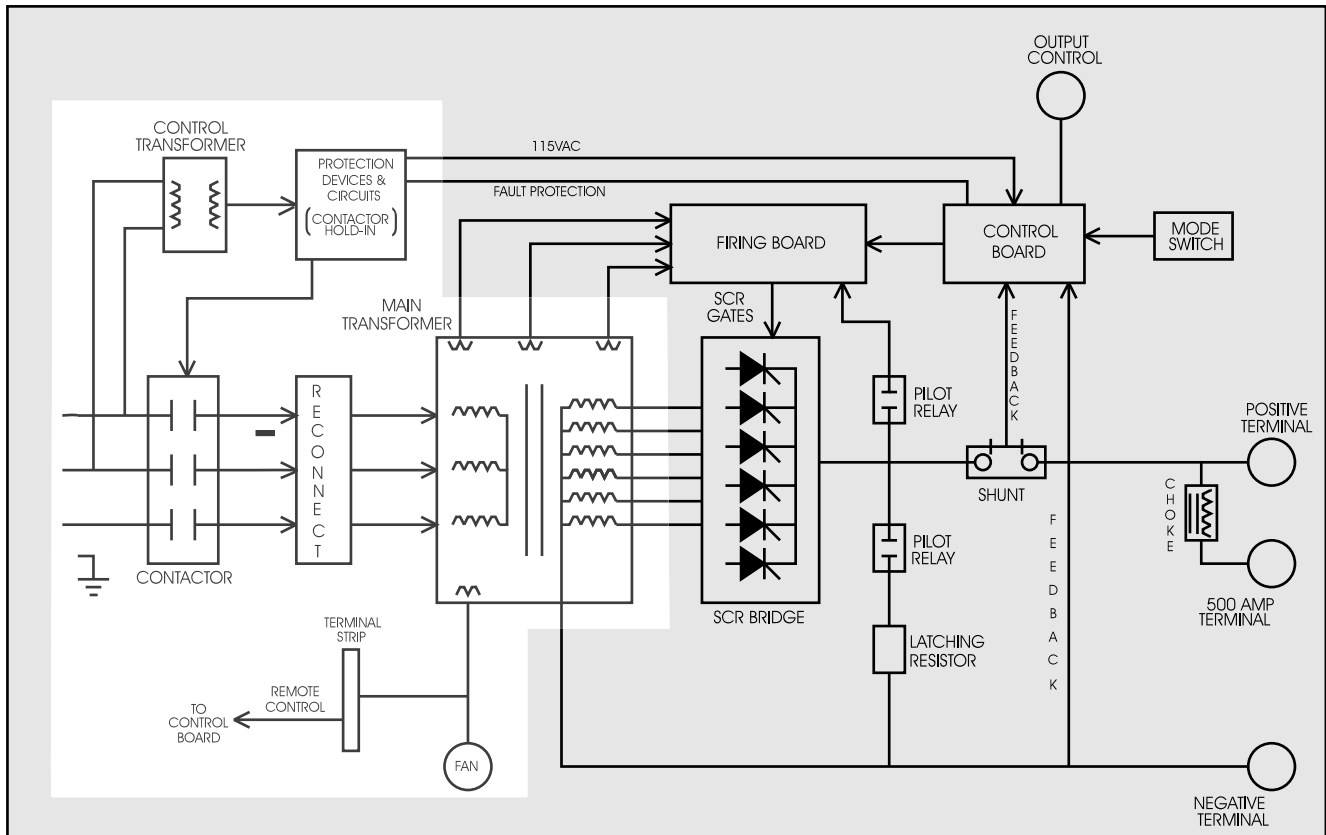
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GENERAL DESCRIPTION

The DC 1000 is an SCR - controlled DC power source. It is designed to be controlled with a single

range potentiometer output control. It can be used for submerged arc or open arc automatic and semi-automatic welding.

FIGURE E.2 - Input Line Voltage, Contactor and Main Transformer



INPUT LINE VOLTAGE, CONTACTOR, AND MAIN TRANSFORMER

The desired three phase power is connected to the DC-1000 through an Input Contactor located in the input box at the rear of the machine. Two phases of the input lines are also connected to the Control Transformer which supplies power to the Contactor Hold-In Circuit. The Contactor Hold-In Circuit will disable the Input Contactor if the DC-1000 is overloaded or overheated.

A Reconnect Panel allows the user to configure the machine for the desired input voltage. This AC input voltage is applied to the primary of the Main Transformer. The transformer changes the high volt-

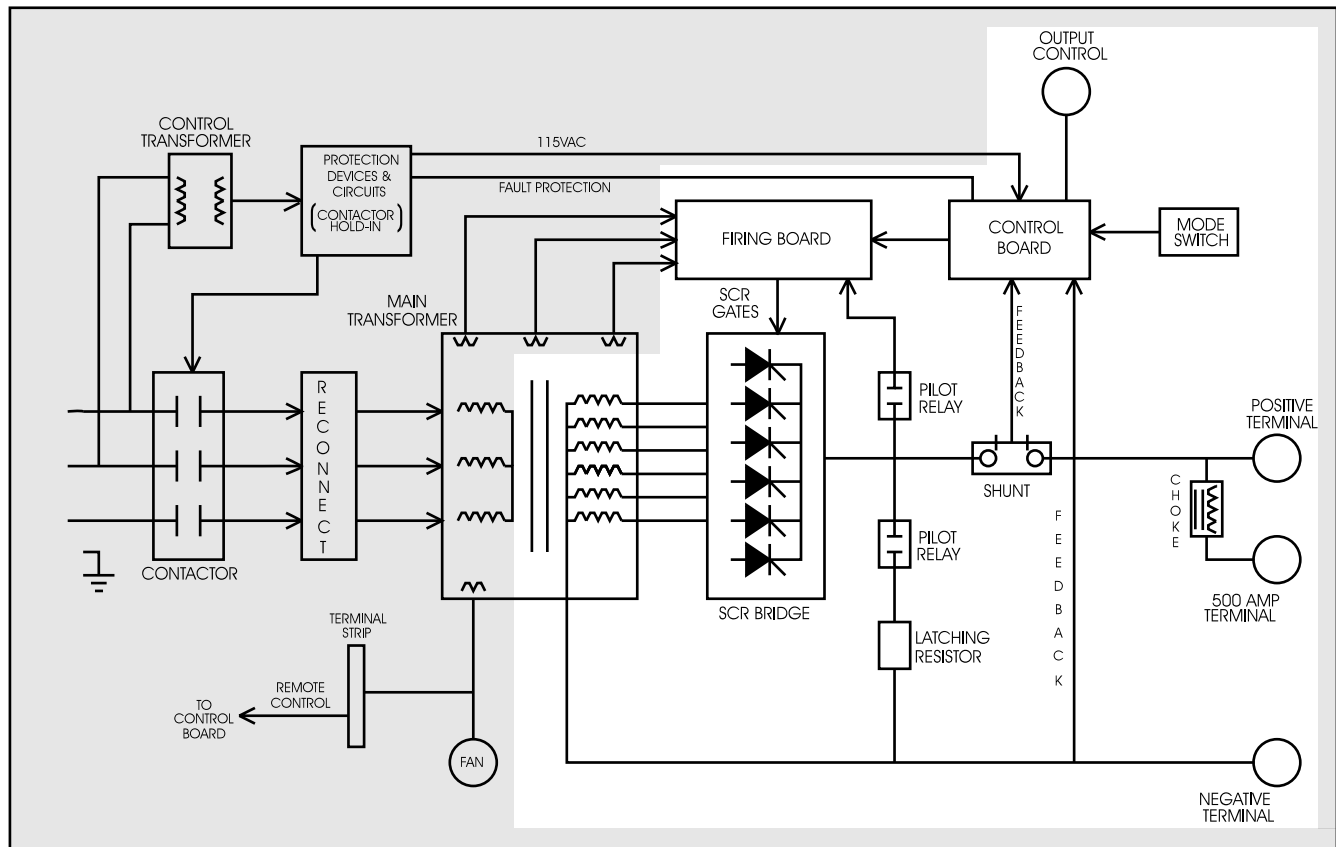
age, low current input power to a low voltage, high current output. The finishes or "neutrals" of the main secondary coils are connected together and the six starts of the secondary windings are connected to the rectifier assembly. In addition, the main transformer also has an isolated 115 VAC auxiliary winding that supplies 115 VAC to operate the cooling fan and offers 8 amps of auxiliary power to operate wire feeding equipment. The three 75 VAC phase angle windings are also housed in the Main Transformer assembly. These windings provide power and "timing" to the Firing Board.

NOTE: Unshaded areas of block logic diagrams are the subject of discussion.

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FIGURE E.3- Output, Rectification, Control and Feedback



OUTPUT RECTIFICATION, CONTROL, AND FEEDBACK

The neutrals of the Main Transformer secondary windings are connected together and the six starts are connected to the six SCR assemblies to form a six phase output. This six phase AC output from the Main Transformer secondary is rectified and controlled through the SCR bridge. Output current is sensed at the shunt, and output voltage is monitored at the welding output terminals. This feedback information is processed in the control board. The control board compares the commands of the Mode switch and the Output Control Potentiometer (or Remote Control) with the feedback information and sends the appropriate signal to the Firing Board.

The Firing Board is a three phase circuit. Each phase provides two firing pulses, one for each of the two Silicon Controlled Rectifiers (SCR) controlled by that phase. The firing circuit supplies the

proper amount of energy to the gates of the power SCRs. When this gate signal is applied, at the correct time, the SCR will turn "ON". The amount of "ON" time versus "OFF" time determines the output of the machine. See **SCR Operation**.

The Pilot Relay signals the Firing Board circuit to supply gate pulses to the SCR Bridge. Closing of the Pilot Relay (a "dry" closure of leads #2 and #4) also brings the Latching Resistor into the machine output circuit. The Latching Resistor provides a pre-load for the SCR Bridge.

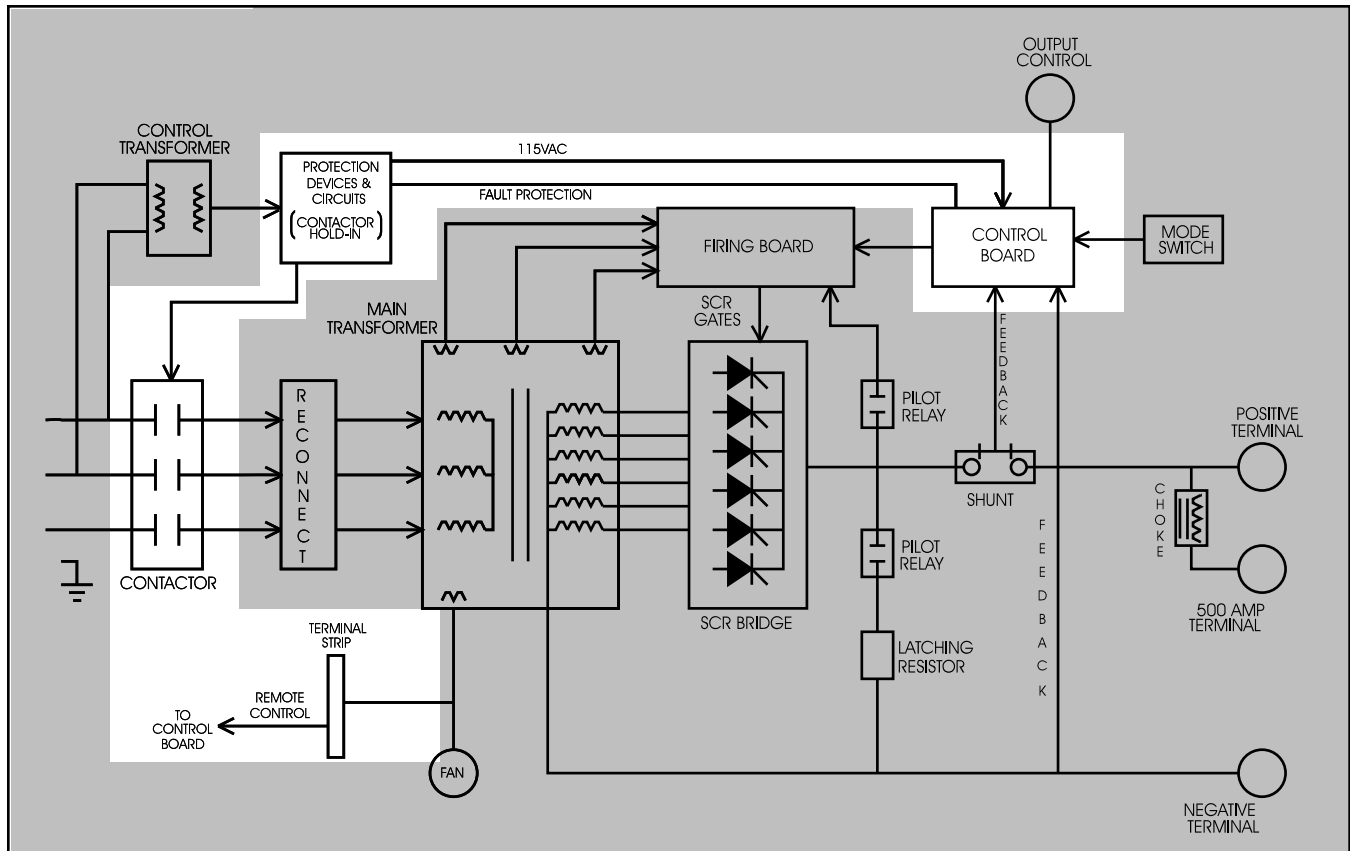
In later models (above code 9500) a Choke and separate 500 amp output terminal is provided to enhance lower current arc characteristics, especially for submerged arc and GMAW procedures below 450 amps.

NOTE: Unshaded areas of block logic diagrams are the subject of discussion.

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FIGURE E.4 - Protection Devices and Circuits (Contactor Hold-In)



PROTECTION DEVICES AND CIRCUITS (CONTACTOR HOLD-IN)

Two thermostats protect the DC-1000 from excessive operating temperatures. Excessive operating temperatures may be caused by a lack of cooling air or operating the machine beyond the duty cycle and output rating. If excessive operating temperature should occur, the thermostat(s) will deactivate the input contactor, turning the machine off. The input contactor will remain open until the machine cools. The machine can then be restarted by operating the start push button.

Upon restart, if the fan does not turn or the air intake louvers are obstructed, then the input power must be removed and the fan problem or air obstruction be corrected.

The DC-1000 is also protected against high current overloads. This electronic protection circuit senses an overload on the power source and opens the input contactor should the overload remain for a predetermined time. If the overload is great the machine will shut down immediately. The input contactor will remain open until the start push button is operated.

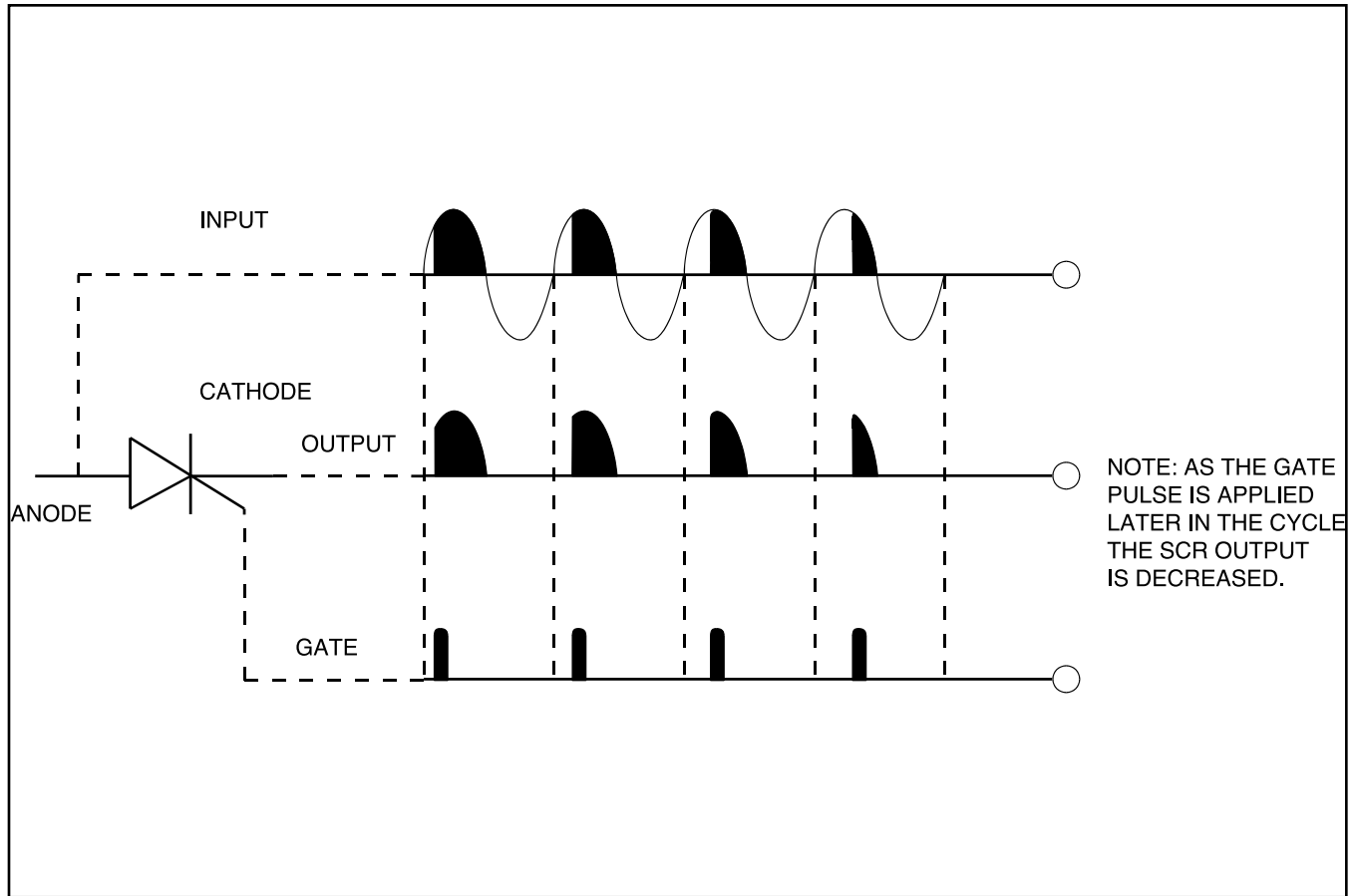
The Remote Control circuit is also protected from "grounds" or voltage intrusions. If the #73, #74, #75, #76 or #77 leads come in contact with either of the machine's output cables, the DC-1000 will only operate at a minimum output or the input contactor will open.

NOTE: Unshaded areas of block logic diagrams are the subject of discussion.

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FIGURE E.5 - SCR Operation



SCR OPERATION

A silicon controlled rectifier (SCR) is a three terminal device used to control rather large currents to a load. An SCR acts very much like a switch. When a gate signal is applied to the SCR it is turned ON and there is current flow from anode to cathode. In the ON state the SCR acts like a closed switch. When the SCR is turned OFF there is no current flow from anode to cathode thus the device acts like an open switch. As the name suggests, the SCR is a rectifier, so it passes current only during positive half cycles of the AC supply. The positive half cycle is the portion of the sine wave in which the anode of the SCR is more positive than the cathode.

When an AC supply voltage is applied to the SCR, the device spends a certain portion of the AC cycle time in the on state and the remainder of the time in the off state. The amount of time spent in the ON state is controlled by the Gate.

An SCR is fired by a short burst of current into the gate. This gate pulse must be more positive than the cathode voltage. Since there is a standard PN junction between gate and cathode, the voltage between these terminals must be slightly greater than 0.6 V. Once the SCR has fired it is not necessary to continue the flow of gate current. As long as current continues to flow from anode to cathode the SCR will remain on. When the anode to cathode current drops below a minimum value, called holding current, the SCR will shut off. This normally occurs as the AC supply voltage passes through zero into the negative portion of the sine wave. If the SCR is turned on early in the positive half cycle, the conduction time is longer resulting in greater SCR output. If the gate firing occurs later in the cycle the conduction time is less resulting in lower SCR output.

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HOW TO USE TROUBLESHOOTING GUIDE



WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

STEP 1 LOCATE PROBLEM (SYMPTOM).

Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into the following categories: output problems, function problems, and welding problems.

STEP 2 PERFORM EXTERNAL TESTS.

The second column labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)" lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

STEP 3. RECOMMENDED COURSE OF ACTION

The last column labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

All of the referenced test procedures referred to in the Troubleshooting Guide are described in detail at the end of this chapter. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the specified test points, components, terminal strips, etc. can be found on the referenced electrical wiring diagrams and schematics. Refer to the Electrical Diagrams Section Table of Contents to locate the appropriate diagram.

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.

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PC BOARD TROUBLESHOOTING PROCEDURES

**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.

CAUTION: Sometimes machine failures appear to be due to PC board failures. These problems can sometimes be traced to poor electrical connections. To avoid problems when troubleshooting and replacing PC boards, please use the following procedure:

1. Determine to the best of your technical ability that the PC board is the most likely component causing the failure symptom.
2. Check for loose connections at the PC board to assure that the PC board is properly connected.
3. If the problem persists, replace the suspect PC board using standard practices to avoid static electrical damage and electrical shock. Read the warning inside the static resistant bag and perform the following procedures:

P.C. Board can be damaged by static electricity.

**ATTENTION
Static-Sensitive
Devices
Handle only at
Static-Safe
Workstations**

**Reusable
Container
Do Not Destroy**

- Remove your body's static charge before opening the static-shielding bag. Wear an anti-static wrist strap. For safety, use a 1 Meg ohm resistive cord connected to a grounded part of the equipment frame.

- If you don't have a wrist strap, touch an unpainted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.

- Tools which come in contact with the P.C. Board must be either conductive, anti-static or static-dissipative.

- Remove the P.C. Board from the static-shielding bag and place it directly into the equipment. Don't set the P.C. Board on or near paper, plastic or cloth which could have a static charge. If the P.C. Board can't be installed immediately, put it back in the static-shielding bag.

- If the P.C. Board uses protective shorting jumpers, don't remove them until installation is complete.

- If you return a P.C. Board to The Lincoln Electric Company for credit, it must be in the static-shielding bag. This will prevent further damage and allow proper failure analysis.

4. Test the machine to determine if the failure symptom has been corrected by the replacement PC board.

NOTE: It is desirable to have a spare (known good) PC board available for PC board troubleshooting.

NOTE: Allow the machine to heat up so that all electrical components can reach their operating temperature.

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.

a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.

b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.

6. Always indicate that this procedure was followed when warranty reports are to be submitted.

NOTE: Following this procedure and writing on the warranty report, "INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM," will help avoid denial of legitimate PC board warranty claims.

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major Physical or Electrical Damage is Evident.	Contact the Lincoln Electric Service Dept. (216) 383-2531 or 1-800-833-9353 (WELD)	
The Machine is dead - The Input contactor does not operate.	<ol style="list-style-type: none"> 1. Check for blown or missing fuses in input lines. 2. Check the three-phase input line voltage at the machine. The input voltage must match the rating plate and reconnect panel. 	<ol style="list-style-type: none"> 1. The Start/Stop button (S1) may be faulty- Check for proper operation. See wiring diagram. 2. The Control Transformer (T2) may be faulty. Perform the Control Transformer Test. 3. The primary or secondary thermostats may be open. Check or replace. Also check the associated wiring. See wiring diagram. 4. The pilot relay (2CR) may be faulty. Check or replace. See wiring diagram. 5. The input contactor coil may be open. See wiring diagram. 6. The Control board may be faulty - Replace.
Input contactor (1CR) chatters.	<ol style="list-style-type: none"> 1. The input line voltage may be low. Check all three phases. 2. Make sure input line voltage matches machine rating and reconnect panel. 	<ol style="list-style-type: none"> 1. The pilot relay (2CR) may have bad contacts. Check or replace relay. 2. Check for loose or faulty wiring between pilot relay (2CR) and input contactor (1CR) coil connections. 3. The input contactor (1CR) may be faulty - Replace.



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.

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
<p>Input contactor pulls in when start button is pressed but immediately drops out when start button is released.</p>	<ol style="list-style-type: none"> 1. Make sure input voltages match machine rating and reconnect panel. 2. Remove all external wires attached to terminal strip (2, 4, 31, 32, 73, 74, 75, 76, 77). If contactor (1CR) functions correctly, there may be a ground or negative intrusion on the remote control leads (73, 74, 75, 76, or 77). There may also be a short at the welder output terminals. 3. If the problem persists after performing steps #1 and #2, the problem is in the DC-1000. 	<ol style="list-style-type: none"> 1. The 1CR interlock may be faulty. Replace if necessary. 2. The Start/Stop button may be faulty. Check or replace. 3. Check internal remote control circuit (leads 73, 74, 75, 76 and 77) and switch SW3 for grounds or shorts. 4. The control board may be faulty - Replace.



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.

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
<p>Machine input contactor operates but machine has no weld output. Fan runs and pilot light glows.</p>	<ol style="list-style-type: none"> 1. Install a jumper from #2 to #4 on machine terminal strip. If machine weld output is restored, the problem is in the wire feeder or control cable. 2. If remote control is not being used, make certain the output control switch (SW3) is in the "OUTPUT CONTROL AT DC 1000" position. 3. Check 8 AMP fuse in the front panel. Replace if blown. 4. Check for loose or faulty weld cable connections. 	<ol style="list-style-type: none"> 1. Check operation of output pilot relay (4CR). There should be 115 VAC present on leads #31 and #4 at (4CR) when #2 and #4 are jumpered together at the terminal strip. <ol style="list-style-type: none"> a. If the correct voltage is present and the relay does not activate, the relay may be faulty - Replace. b. If the 115 VAC is missing, check the associated wiring for loose or faulty connections. See wiring diagram. 2. Check the output control potentiometer (R1) and associated circuitry for loose or faulty connections. See wiring diagram. 3. Perform Main Transformer Test 4. Perform Firing Board Test. 5. Perform Control Board Test. 6. Perform SCR Output Bridge Test.



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.

IDEALARC DC-1000



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
<p>Machine has maximum weld output and no control.</p>	<ol style="list-style-type: none"> 1. If remote control is being used, put output control switch (SW3) in "OUTPUT CONTROL AT DC-1000" position and control weld output with the output control (R1) at DC-1000. If the problem is solved, check the remote control unit (or wire feeder) and associated control cable. 	<ol style="list-style-type: none"> 1. Check output control switch (SW3) and associated wiring. 2. Check feedback leads #222 (negative output terminal) and #215, #210(output shunt) for loose or faulty connections. See wiring diagram. 3. Check the #75 lead for continuity (zero ohms) from the output control potentiometer (R1) to the control board plug 10J1. See wiring diagram. 4. Perform Firing Board Test. 5. Perform Control Board Test. 6. Perform SCR Output Bridge Test.
<p>Machine has minimum output and no control.</p>	<ol style="list-style-type: none"> 1. If a remote control unit is NOT connected to the terminal strip #73, #74,#75, #76, and/or #77 terminals, the output control switch must be in the "OUTPUT CONTROL AT DC-1000" position. 2. If a remote control cable is connected to terminals #73, #74, #75, #76, and/or #77, the leads may be shorted to the positive weld output. 3. Make certain the three phase input voltage is correct and matches the machine rating and the reconnect panel. 	<ol style="list-style-type: none"> 1. Check the output control potentiometer (R1) and associated wiring. 2. Check the output control switch (SW3) the welding mode switch (SW4) and associated wiring. 3. Perform the Control Board Test. 4. Perform the Firing Board Test. 5. Perform the SCR Output Bridge Test. 6. Perform Main Transformer Test.



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.

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
<p>The machine does not have maximum weld output.</p>	<ol style="list-style-type: none"> 1. Check all three-phase input lines at the DC-1000. Make sure input voltages match machine rating and reconnect panel. 2. Put output control switch (SW3) in "OUTPUT CONTROL AT DC-1000" position. If problem is solved, then check remote control unit or wire feeder. 	<ol style="list-style-type: none"> 1. Check the output control potentiometer (R1) and associated circuitry for loose or faulty connections. See wiring diagram. 2. Perform Control Board Test. 3. Perform Firing Board test. 4. Perform Main Transformer Test. 5. Perform SCR Output Bridge Test.

 **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.

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
<p>Machine shuts off (input contactor drops out) when the welder output terminals are electrically energized. (#2 to #4 closure at terminal strip.)</p>	<ol style="list-style-type: none"> 1. Remove all welding cables and control cables from the DC-1000. Jumper #2 to #4 at the terminal strip. If the machine does NOT shut off and normal open circuit voltage is present at the welder output terminals, the problem is external to the DC-1000. Either the remote leads #73, #74, #75, #76 or #77 are grounded to the negative output cable, or there is a short on the welding output terminals. 2. If the machine still shuts off when all control and welding cables are removed, then the problem is internal to the DC-1000. 	<ol style="list-style-type: none"> 1. Check for grounds and or shorts in the #73, #74, #75, #76, #77 circuit. See wiring diagram. 2. Check for grounds and shorts in the welder output terminals and associated leads. See wiring diagram. 3. Check the output shunt and associated leads. See wiring diagram. 4. Perform the Control Board Test.
<p>The DC-1000 will NOT shut off when the Stop button is pushed.</p>	<ol style="list-style-type: none"> 1. Contact your local Lincoln Authorized Field Service Facility. 	<ol style="list-style-type: none"> 1. The input contactor (1CR) contacts may be stuck closed. Check and replace if necessary. 2. The Interlock contacts (part of 1CR) may be faulty. Replace if necessary. 3. The Start/Stop button may be faulty. Check or replace.



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.

IDEALARC DC-1000



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Return to Section TOC

Return to Master TOC

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
<p>The weld output terminals are always electrically "hot".</p>	<ol style="list-style-type: none"> 1. Remove any external leads hooked to #2 and #4 on the terminal strip. If the problem disappears, the fault is in the control cable or wire feeder. 2. If some open circuit voltage is present (over 3 VDC.) after performing Step #1, then the problem is within the DC-1000. 	<ol style="list-style-type: none"> 1. Check for an internal short between leads #2 and #4. See wiring diagram. 2. The Pilot Relay (4CR) may be stuck closed. Check or replace. 3. Perform Firing Board Test. 4. Perform Control Board Test. 5. Perform the SCR Output Bridge Test. 6. The SCR Snubber(s) may be "leaky". Check or replace. See wiring diagram.

⚠ 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.

IDEALARC DC-1000



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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
Poor arc starting when the DC-1000 is in the CV Sub-Arc or CV Innershield Modes.	<ol style="list-style-type: none"> 1. Make sure the proper welding procedures are being used (wire feed speed, arc voltage and wire size). 2. Check weld cables for loose or faulty connections. 	<ol style="list-style-type: none"> 1. Check the 3CR reed switch. The voltage from lead #215 to lead #220 should be 8 VDC when the DC-1000 is in an idle condition (on but not welding). When the machine is producing welding current, the reed switch (3CR) should close and the voltage from #215 to #220 should drop to zero. 2. Perform the Firing Board Test. 3 Perform the SCR Output Bridge Test. 4. The control board may be faulty - Replace.
Poor arc characteristics in all processes.	<ol style="list-style-type: none"> 1. Check for the correct input voltages on the three phase input lines at the DC-1000. 2. Make sure the proper welding procedures are being used (wire feed speed, arc voltage and wire size). 3. Check the welding cables for loose or faulty connections. 	<ol style="list-style-type: none"> 1. Check the Mode Switch (SW4) and the associated wiring for loose or faulty connections. See wiring diagram. 2. Check the 3CR reed switch. The voltage from lead #215 to lead #220 should be 8 VDC when the DC-1000 is in an idle condition. When the machine is producing welding current, the reed switch (3CR) should close and the voltage from #215 to #220 should drop to zero. 3. Perform the Firing Board Test. 4. Perform the SCR Output Bridge Test. 5. The control board may be faulty - Replace.



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.

IDEALARC DC-1000



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
<p>Poor performance (including arc outages) while welding at low current (less than 450 amps) when connected to 1000 amp (+) output terminals.</p>	<p>1. Change the welding cable(s) to the 500 amp terminal (later models only).</p>	
<p>The machine frequently shuts off while using the 500 amp (+) output terminal (later models only).</p>	<p>1. The output current demand may be over 500 amps, causing the choke to overheat. Change the welding cable(s) to the 1000 amp output terminals.</p>	<p>1. The choke thermostat may be faulty - Replace.</p>



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.

IDEALARC DC-1000



CONTROL TRANSFORMER (T2) VOLTAGE TEST



WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

TEST DESCRIPTION

This test will determine if the correct voltage is being:

- a. applied to the primary of the control transformer.
- b. induced on the secondary winding of the control transformer.

MATERIALS NEEDED

Volt/Ohm Meter (Multimeter)

IDEALARC DC-1000 wiring diagrams (See Electrical Diagram Section of Manual).

IDEALARC DC-1000



CONTROL TRANSFORMER (T2) VOLTAGE TEST

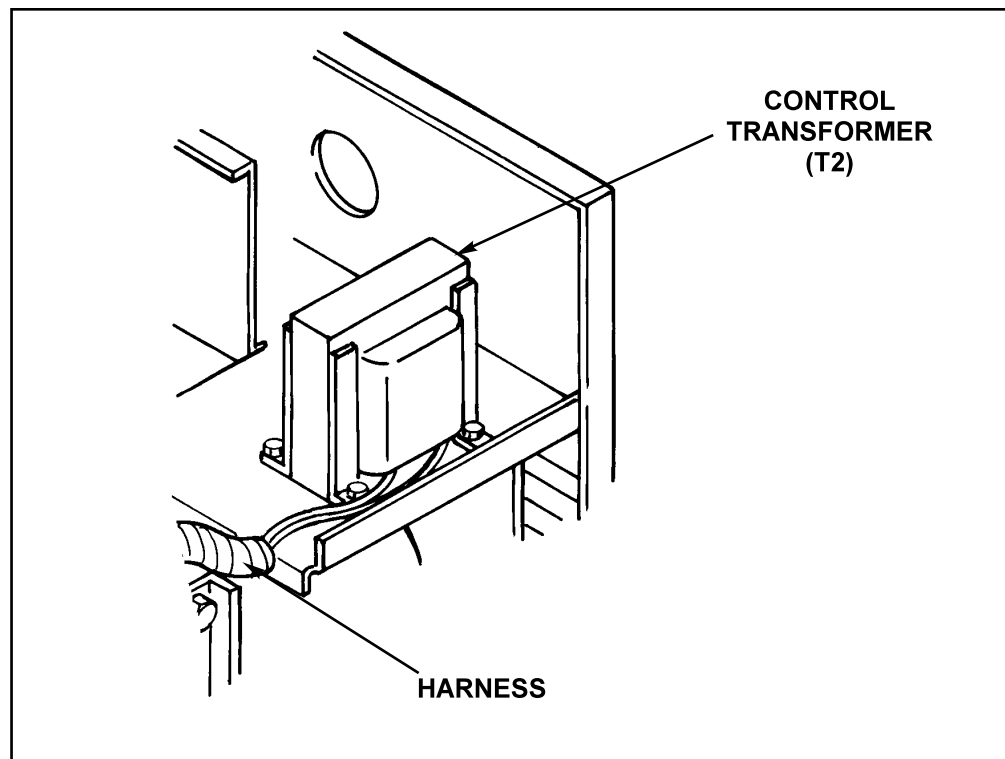


FIGURE F.1 - Control Transformer Lead Location

TEST PROCEDURE

1. Disconnect main AC input power to the machine.
2. Remove the Top and Case Sides.
3. Locate the Control Transformer (T2) on the left side of the Input Box (facing the back of the machine). See Figure F.1.
4. Locate the Control Transformer primary leads (H1, H2, H3, etc.). See wiring diagram.

NOTE: Unused leads should be taped. Check for loose or faulty connections.

CONTROL TRANSFORMER (T2) VOLTAGE TEST

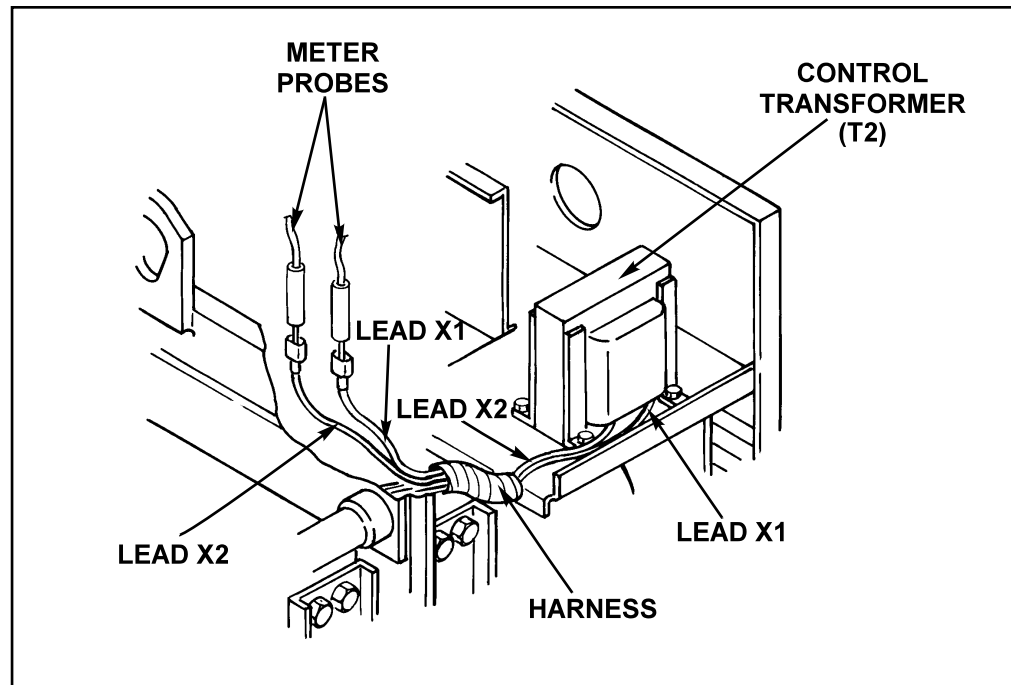


FIGURE F.2 - Control Transformer X1 and X2 Test Points

5. Locate Control Transformer leads X1 and X2 at in line connectors. See Figure F.2.
6. Apply power and test for 115 VAC between leads X1 to X2.
7. If 115 VAC is not present between leads X1 and X2, test for correct main AC input power to the Control Transformer primary windings (H1, H2, H3, etc.) See wiring diagram.

If the correct main AC input power to the Control Transformer is present, and the secondary voltage is not correct, the Control Transformer may be faulty. Replace.

MAIN TRANSFORMER (T1) VOLTAGE TEST



WARNING

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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 (800) 833-9353 (WELD).

TEST DESCRIPTION

This test will determine if the correct voltages are being:

- a. applied to the primary windings of the Main Transformer (T1).
- b. induced on the secondary winding, auxiliary windings, and phase angle windings.

MATERIALS NEEDED

Volt/Ohm Meter (Multimeter)

IDEALARC DC-1000 wiring diagrams (See Electrical Diagram Section of Manual).

IDEALARC DC-1000



MAIN TRANSFORMER (T1) VOLTAGE TEST

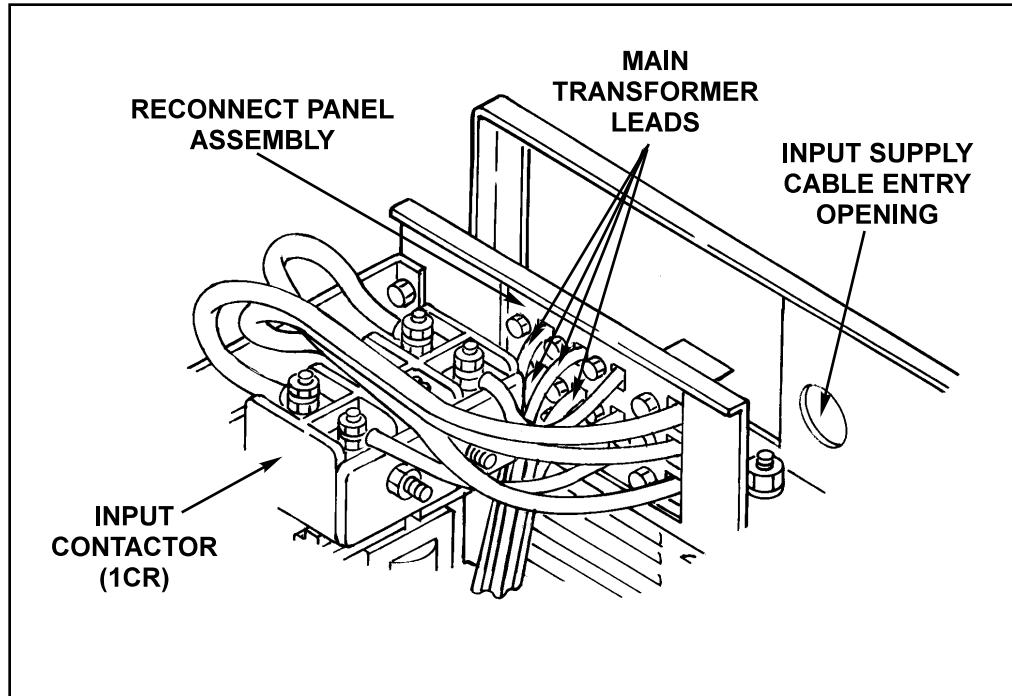


FIGURE F.3 - Input Contactor, Reconnect Panel, and Primary Leads to Main Transformer Locations

TEST DESCRIPTION

1. Disconnect main AC input power to the machine.
2. Inspect the Input Contactor, Reconnect Panel, and primary leads to the Main Transformer for loose or faulty connections. See Figure F.3.
3. Apply input power, push start button, and make sure the Input Contactor (1CR) energizes.
4. Test with an AC voltmeter for proper main AC input voltage to the line side of the Input Contactor (1CR). See wiring diagram.
 - L1 to L2.
 - L2 to L3.
 - L1 to L3.
 - a. If proper voltage is not present in any or all of the three phases, check input fuses and leads.
5. Test with an AC voltmeter for proper main AC input voltage from the output side of the Input Contactor. (1CR). See wiring diagram.
 - T1 to T2.
 - T2 to T3.
 - T1 to T3.
 - a. If correct voltage is present, the Contactor is working properly.
 - b. If the correct voltage is not present for any or all of the three phases, the contactor may be faulty.
6. Test with an AC voltmeter for approximately 60 VAC from each of the six main transformer secondary leads to the common buss connected to the negative output terminal. See Figure F.4.

IDEALARC DC-1000



MAIN TRANSFORMER (T1) VOLTAGE TEST

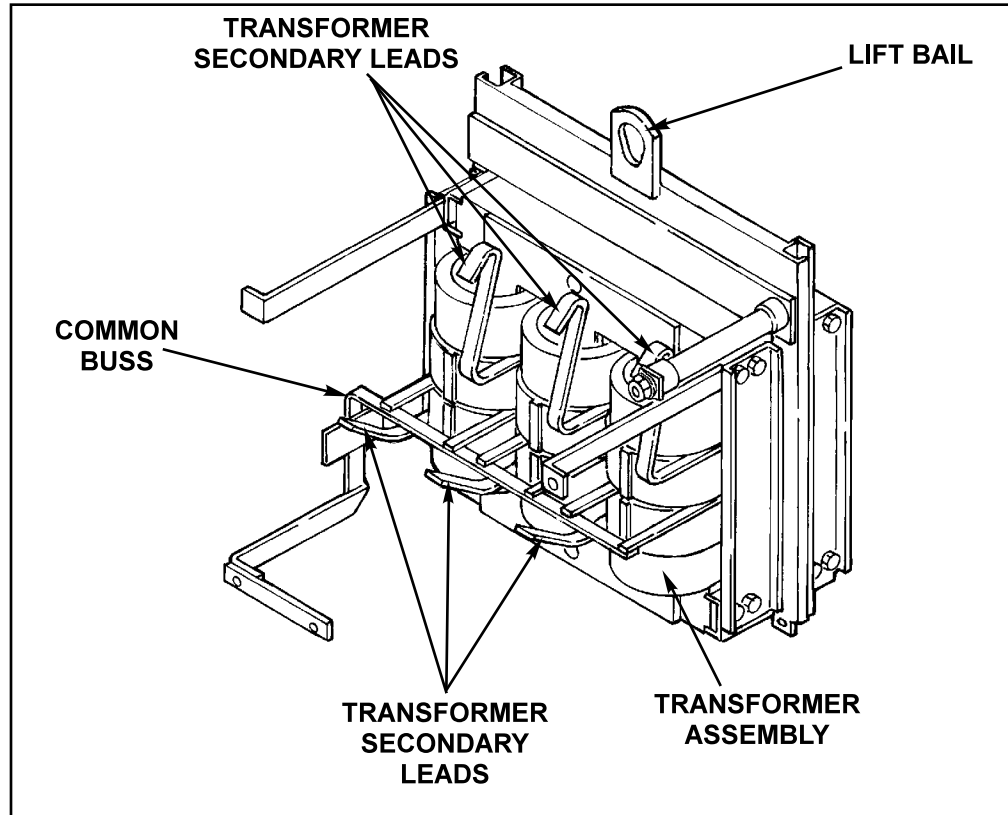


FIGURE F.4 - Main Secondary Lead Test Points

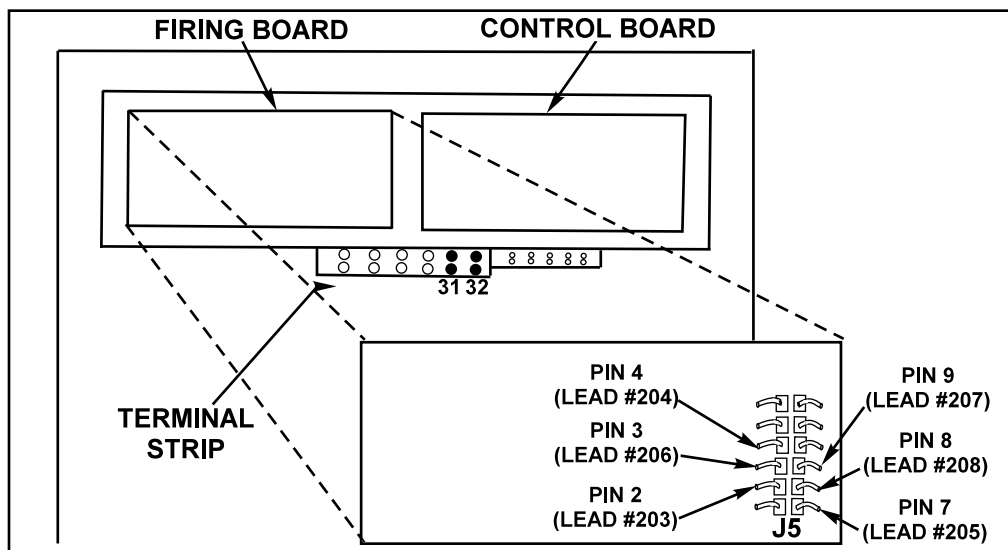
- a. If one or more of the above voltage tests are incorrect, check for loose or faulty wiring. If the wiring is good, then the Main Transformer may be faulty.
 - b. If the wiring is good, then the Main Transformer may be faulty.
7. Test for 115 VAC between leads #31 to #32 on the terminal strip. These can be accessed through the front panel assembly door.
 - a. If the 115 VAC is not present, check for loose or faulty wiring or blown fuse. If necessary, untape and track the continuity of leads #31 and #32 through the entire harness.
 8. Remove the screws from the control box cover. It does not have to be completely removed to perform this test.
 9. Test with an AC voltmeter for 75 VAC for each phase angle winding as shown. See Figure F.5.

NOTE: If the main supply voltage varies, the Main Transformer voltages will vary proportionately. See Figure F.5.

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MAIN TRANSFORMER (T1) VOLTAGE TEST



From			To			Expected VAC
Plug	Pin	Lead	Plug	Pin	Lead	
J5	2	#203	J5	4	#204	75 VAC
J5	7	#205	J5	3	#206	75 VAC
J5	9	#207	J5	8	#208	75 VAC

FIGURE F.5 - Phase Angle Windings Test Points and Firing Board Pin Location

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Return to Section TOC

Return to Master TOC

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Return to Master TOC

FIRING BOARD TEST



WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

TEST DESCRIPTION

This test determines whether or not the Firing Board is receiving the correct voltages and gate signals. The LED's (Light Emitting Diodes) will help you determine if the Firing Board is generating gate signals to the main SCR's.

MATERIALS NEEDED

Volt/Ohm Meter (Multimeter)

IDEALARC DC-1000 Wiring Diagram and Firing Board Schematic Diagram (See Electrical Diagram Section of Manual).

IDEALARC DC-1000



FIRING BOARD TEST

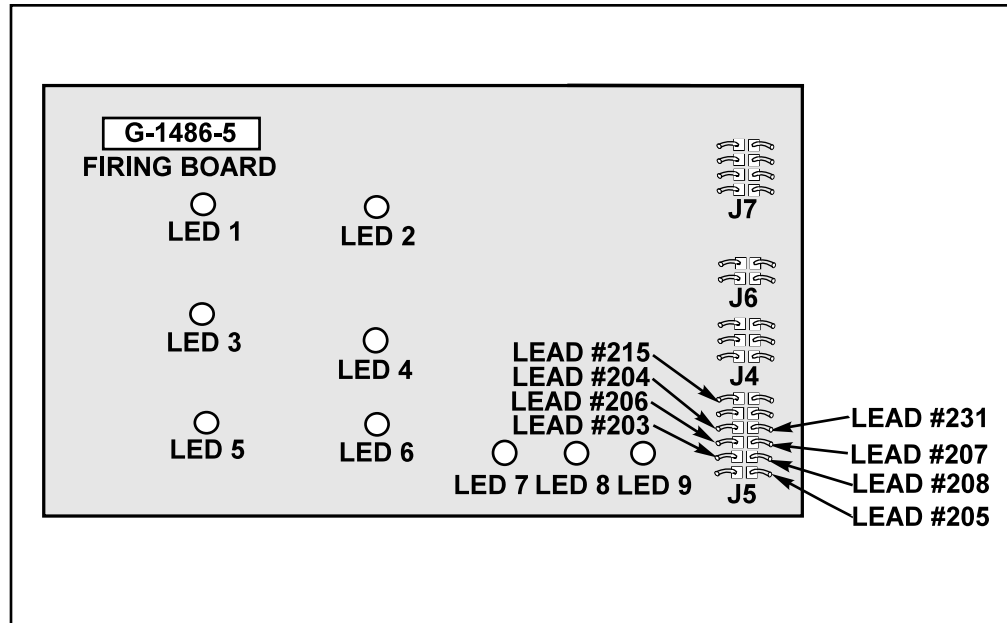


FIGURE F.6 - Firing Board LED and Molex Plug Locations

TEST PROCEDURE FOR NORMAL FIRING BOARD OPERATION

1. Disconnect main AC input power to the machine.
2. Remove screws, loosen and lower the front panel to access the Firing Board on the left side of Control Box facing the machine.
3. Visually inspect the Firing Board for loose or faulty connections.
4. Reconnect the input power and turn the DC-1000 on.
5. Locate LEDs 7, 8, and 9 on the Firing Board. See Figure F.6. Each LED should be ON and equally bright. Use Table F.1 to check LED operation.
6. Connect a jumper wire from terminal #2 to terminal #4 on the terminal strip. These can be accessed through the Front Panel Assembly door. See Figure F.7.



WARNING

JUMPERING LEADS 2 AND 4 ELECTRICALLY ENERGIZES MACHINE'S OUTPUT TERMINALS. DO NOT TOUCH ELECTRICALLY HOT COMPONENTS.

7. Locate LEDs 1 thru 6. Each LED should glow with equal brightness.

NOTE: LEDs 1 through 6 indicate that the gate firing signals are being generated to send to each of the output SCRs.

8. Set the output control switch (SW3) in the "Output Control at DC-1000" position.
9. Set the welding mode switch (SW4) in either of the "CV" positions.

IDEALARC DC-1000



FIRING BOARD TEST

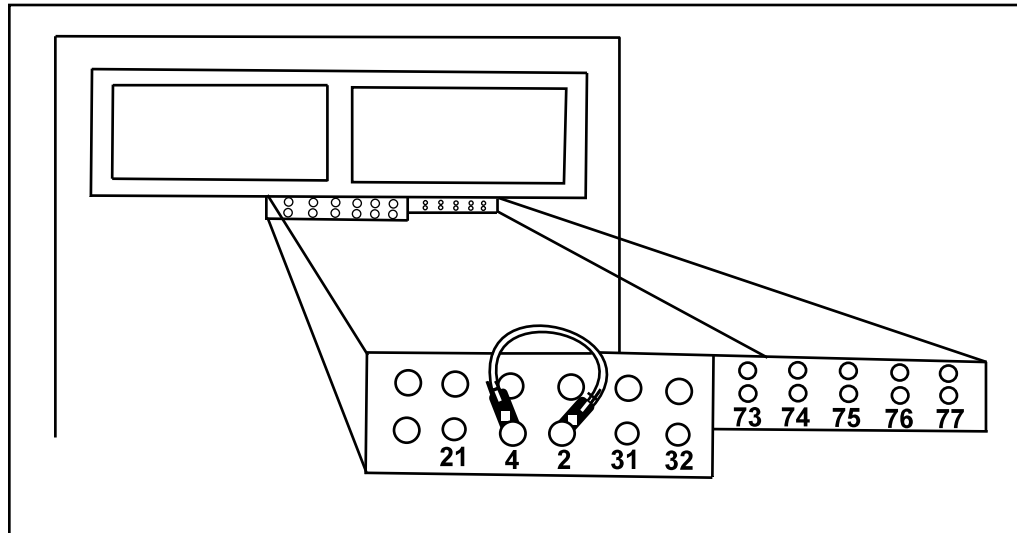


FIGURE F.7 - Terminal Strip Jumper Wire Connections

10. Rotate the output control potentiometer (R1). As the potentiometer is turned clockwise, the LEDs should glow brighter. As the potentiometer is turned counter-clockwise, the LEDs should dim.
 - a. If the LEDs glow and change in brightness equally as the potentiometer is turned and the problem continues, then the SCR bridge may be faulty. Perform the **SCR Bridge Test**.
 - b. If any or all of LEDs 1 through 6 do not glow, or do not change in brightness equally as the potentiometer is turned, continue to next step.
 - c. If one or two LEDs stay bright or dim while the others change, this could indicate either an open or shorted gate or a faulty snubber on the related SCR assembly. Perform **SCR Bridge Test**.
 11. Locate and test for 6 to 15 VDC between leads #231 and #215 on the Firing Board in the CV mode. When the output control potentiometer (R1) is rotated, the DC voltage between leads #231 and #215 should vary from 6 to 15 VDC.
 12. If an LED continues to be lit and should not be, a circuit may be faulty on the Firing Board between a Molex plug and LED. Replace Firing Board.
 13. If the DC voltage does NOT vary, as potentiometer (R1) is rotated, the Control Board may be faulty.
 14. Locate and test for approximately 5.8 VDC between leads #231 and #215 on the Firing Board in VV (CC) mode. When the output control potentiometer (R1) is rotated, the DC voltage between leads #231 and #215 should NOT vary and should remain at a constant approximate 5.8 VDC.
- NOTE: The DC voltage may vary slightly at the lower portion of the range.

FIRING BOARD TEST

15. Test the Output Pilot Relay (4CR) for operation by removing and replacing the jumper wire repeatedly from terminal #2. See Figure F.7. This should cause the relay contacts to open and close. The contacts can be seen closing and opening through the clear plastic relay case or can be heard opening and closing. If the Output Pilot Relay (4CR) does not close when energized, check for loose or faulty wiring. See Wiring Diagram and Figure F-8.
16. Replace the Firing Board if the above voltage and control relay tests are passed. It may be faulty.

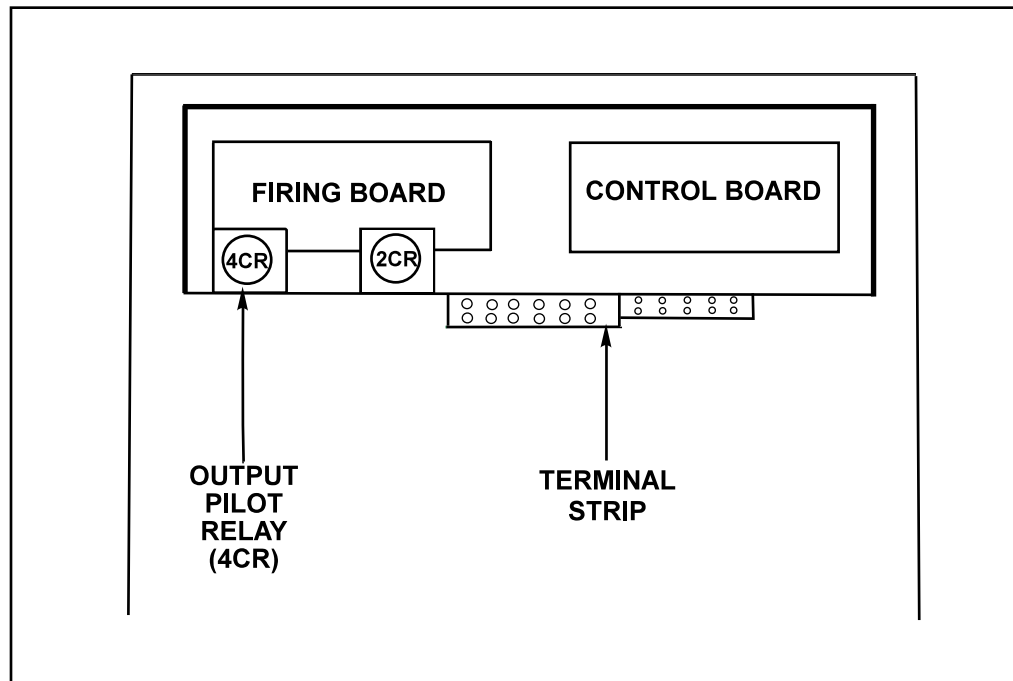


FIGURE F.8 - Output Pilot Relay 4CR Location

FIRING BOARD TEST

TABLE F.1 - LED 7, 8 and 9 Check List

IF	THEN
LED 7 is ON	AC power is being supplied to the Firing Board from leads #203 and #204 connected to the phase angle winding in the Main Transformer.
LED 7 is OFF or is DIMMER than other LEDs	The proper AC voltage may not be reaching Firing Board. Check for loose or faulty connections. Perform Main Transformer Test.
LED 8 is ON	AC power is being supplied to the Firing Board from leads #205 and #206 connected to the phase angle winding in the Main Transformer.
LED 8 is OFF or is DIMMER than other LEDs	The proper AC voltage may not be reaching Firing Board. Check for loose or faulty connections. Perform Main Transformer Test.
LED 9 is ON	AC power is being supplied to the Firing Board from leads #207 and #208 connected to the phase angle winding in the Main Transformer.
LED 9 is OFF or is DIMMER than other LEDs	The proper AC voltage may not be reaching Firing Board. Check for loose or faulty connections. Perform Main Transformer Test.

IDEALARC DC-1000



CONTROL BOARD TEST



WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

TEST DESCRIPTION

This test will determine if the Control Board is receiving the correct voltages and feedback signals.

MATERIALS NEEDED

Volt/Ohm Meter (Multimeter)

IDEALARC DC-1000 Wiring Diagram and Control Board Schematic (See Electrical Diagram Section of Manual).

IDEALARC DC-1000



CONTROL BOARD TEST

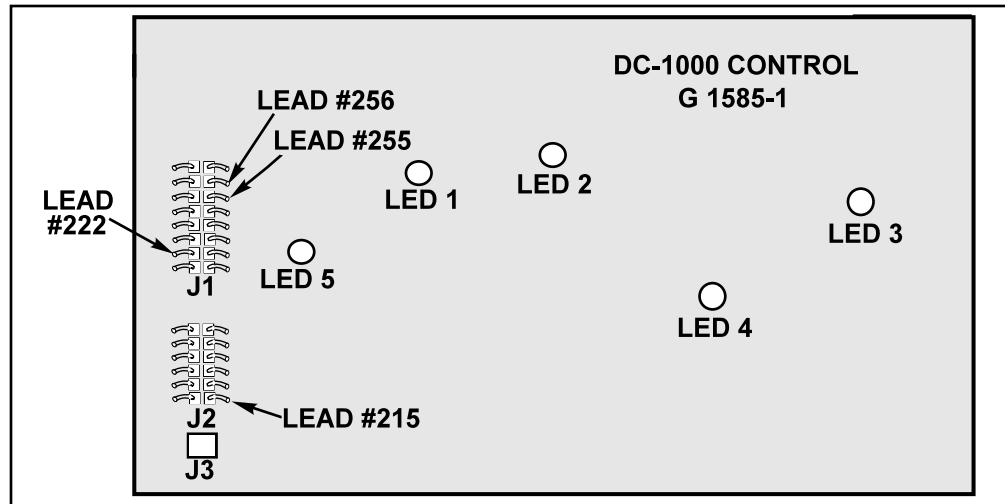


FIGURE F.9 Control Board LED and Pin Locations.

TEST PROCEDURE FOR NORMAL CONTROL BOARD OPERATION

1. Remove main supply power to the DC-1000.
2. Remove screws, loosen and lower the Front Panel to access and inspect the Control Board located in the right front control box. See Figure F.9.
3. Apply the correct three-phase input power to the DC-1000. Turn on the machine.
4. Connect a jumper wire from terminal #2 to terminal #4 on the terminal strip. These can be accessed through the front panel assembly door. See Figure F.7.
5. LED 1 should be lit indicating the presence of 115 VAC at leads #255 to #256 Plug J1.
6. LED 3 should be lit indicating power is being applied to the fault protection relay (2CR).
7. LED 4 should NOT be lit. LED 4 should light only if there is a "fault" condition.
8. LED 2 should be lit indicating output voltage feedback is being supplied to the Control Board. With the Output Control Switch (SW3) in the "Output Control At DC-1000" (Panel) position and the Welding Mode Switch (SW4) in a CV position, LED 2 should change in brightness as the Output Control Potentiometer is rotated. As the open circuit voltage is increased, LED 2 should get brighter and vice versa.
9. LED 5 indicates a control signal (lead #231) is being supplied to the firing circuit. As the output is varied, LED 5 should change in brilliancy from bright (at low output) to dim (at high output). When the Weld Mode Switch (SW4) is in the CC (Stick) position, the open circuit voltage is at maximum, and LED 5 will be very dim or not lit.

WARNING

JUMPERING LEADS 2 AND 4 ELECTRICALLY ENERGIZES MACHINE'S OUTPUT TERMINALS. DO NOT TOUCH ELECTRICALLY HOT COMPONENTS.

IDEALARC DC-1000



CONTROL BOARD TEST

POSSIBLE PROBLEMS PERTAINING TO THE CONTROL BOARD

IF LED 1 does not light, when the start switch is ON.

1. Check for 115 VAC at leads #255 to #256 plug J1
 - a. If the correct voltage is not present, check leads #255 and #256 and associated wiring for loose or faulty connections. See wiring diagram and Figure F.10.
 - b. Remove main supply power to the DC-1000. Test for continuity (zero ohms) from lead #255 plug J1 at the Control Board to lead #212 at the Start/Stop Button.
 - c. Test for continuity (zero ohms) from lead #256 plug J1 at the Control Board to the pilot light. See wiring diagram.
 - d. If the 115 VAC is present at leads #255 to #256 at plug J1 and LED 1 does not light, the Control Board may be faulty. Replace.

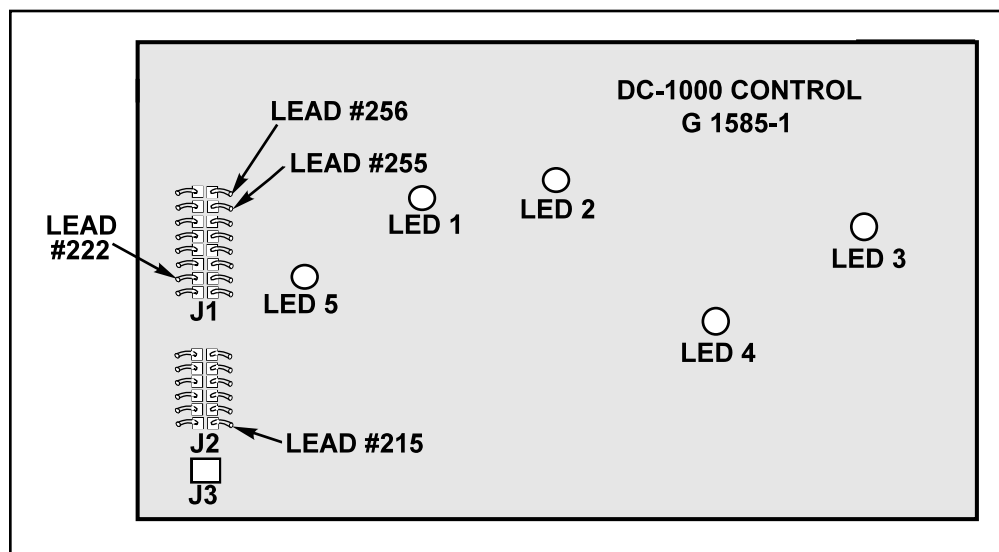


FIGURE F.10 - LED 1 Test Points

CONTROL BOARD TEST

IF LED 2 does not light when #2 and #4 are jumpered together.

1. Check for the presence of open circuit voltage at the weld output terminals (27 to 75 VDC in constant voltage mode, 75 VDC in constant current mode).
 - a. If open circuit voltage IS present at the output terminals, then check for open circuit voltage from lead #222 (-) plug J1 to lead #215 (+) plug J2 on the Control Board See Figure F.11.
 - b. If open circuit voltage is NOT present at the Control Board, then check leads #222 and #215 and associated wiring for loose or faulty connections. See wiring diagram. Remove main supply power to the DC-1000.
2. Test for continuity (zero ohms) from the output shunt to lead #215 at plug J2 on the Control Board.
3. Test for continuity (zero ohms) from the negative output terminal to lead #222 at plug J1 on the Control Board. See wiring diagram.
4. If the previous tests do not reveal the problem then the Control Board may be faulty. Replace.
5. If open circuit voltage is NOT measured at the weld output terminals, then check the Output Choke and associated heavy current carrying leads for loose or faulty connections.
 - Perform the **Main Transformer Test**.
 - Perform the **Firing Board Test**.
 - Perform the **SCR Output Bridge Test**.

See wiring diagram and Figure F.11.

If the previous tests do not reveal the problem then the Control Board may be faulty. Replace.

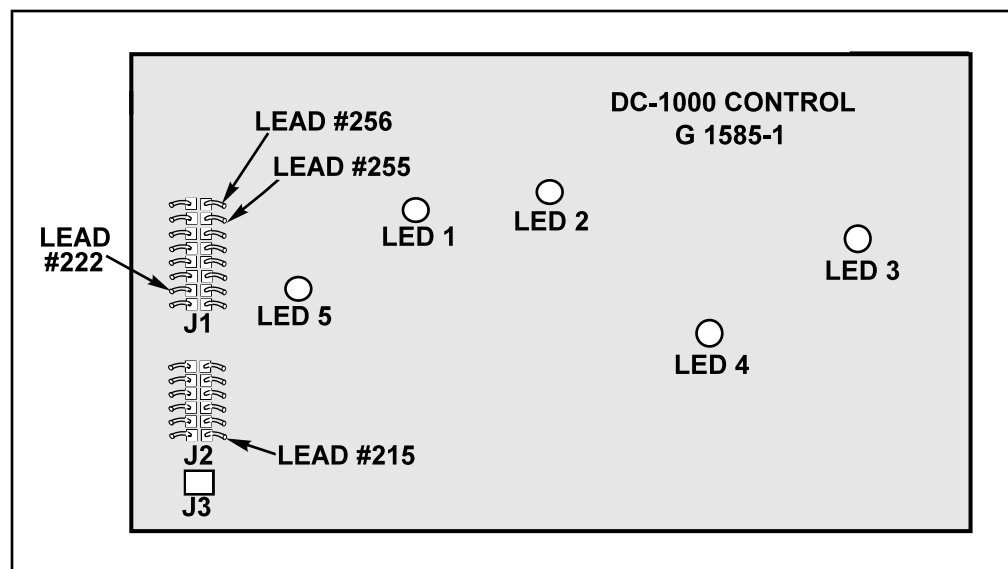


FIGURE F.11 - LED 2 Open Circuit Voltage Test Points

IDEALARC DC-1000



CONTROL BOARD TEST

IF LED 3 does not light when the Start Button is depressed (but LED 1 does light).

The Fault Protection Relay (2CR) is not receiving supply voltage (24 VDC) and the Input Contactor (1CR) will not stay closed. Check to see if LED 4 lights or “flickers” when the Start Button is held in.

If LED 4 lights,

1. There may be a “short” at the welder output terminals or the remote control circuit (leads #73, #74, # 75, #76 and #77) may be shorted to the negative welding voltage. Check the weld output terminals and associated leads and also the remote control circuitry. See wiring diagram.

2. If the above procedures do not reveal the problem, then the Control board may be faulty-Replace.

IF LED 5 does not light and varies in brightness when #2 and #4 are jumpered together, while the Output Control Potentiometer is rotated .

The Control Board may be faulty-Replace.

NOTE: The Weld Mode Switch (SW4) must be in the CV position and the Output Control Switch (SW3) in the “Output Control at DC-1000” position. Also check the Output Control Potentiometer and associated circuitry.

IDEALARC DC-1000



STATIC SCR TEST



WARNING

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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 (800) 833-9353 (WELD).

TEST DESCRIPTION

The Static SCR Test is a quick check to determine if an SCR is shorted or "leaky". See machine waveform section for normal and abnormal SCR waveforms.

MATERIALS NEEDED

Analog ohmmeter Volt/Ohm Meter (Multimeter)
DC-1000 Wiring Diagrams (See Electrical Diagram Section of Manual).

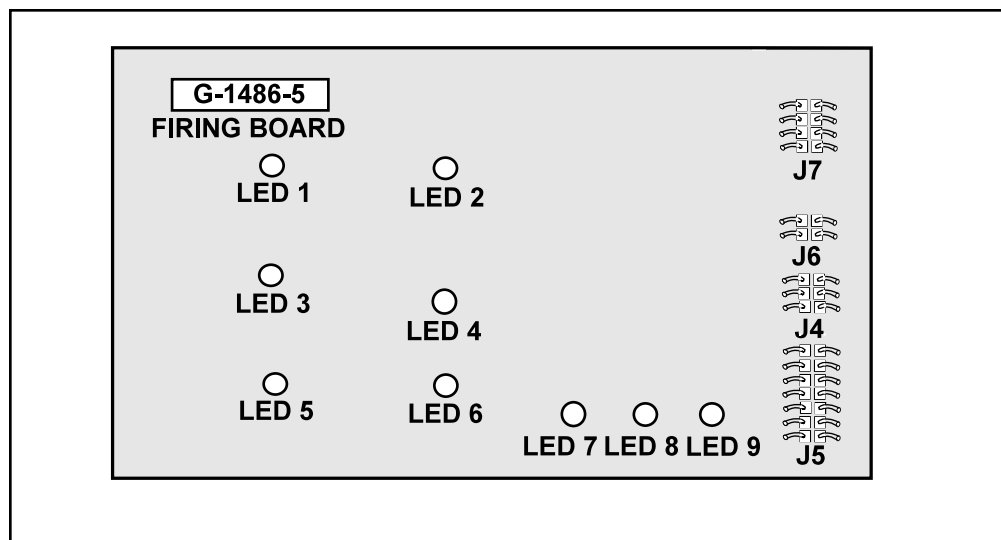
IDEALARC DC-1000



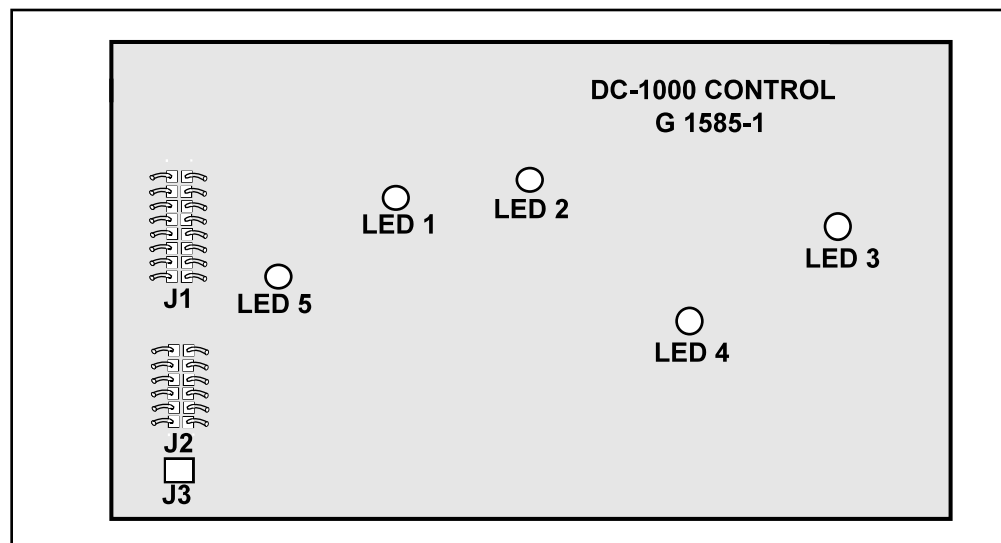
STATIC SCR TEST

TEST PROCEDURE

1. Remove main supply power to the DC-1000.
2. Remove all Molex plugs from the firing board and control board. See Figure F.12.



FIRING BOARD



CONTROL BOARD

FIGURE F.12 - Firing and Control Board Molex Plug Locations.

STATIC SCR TEST

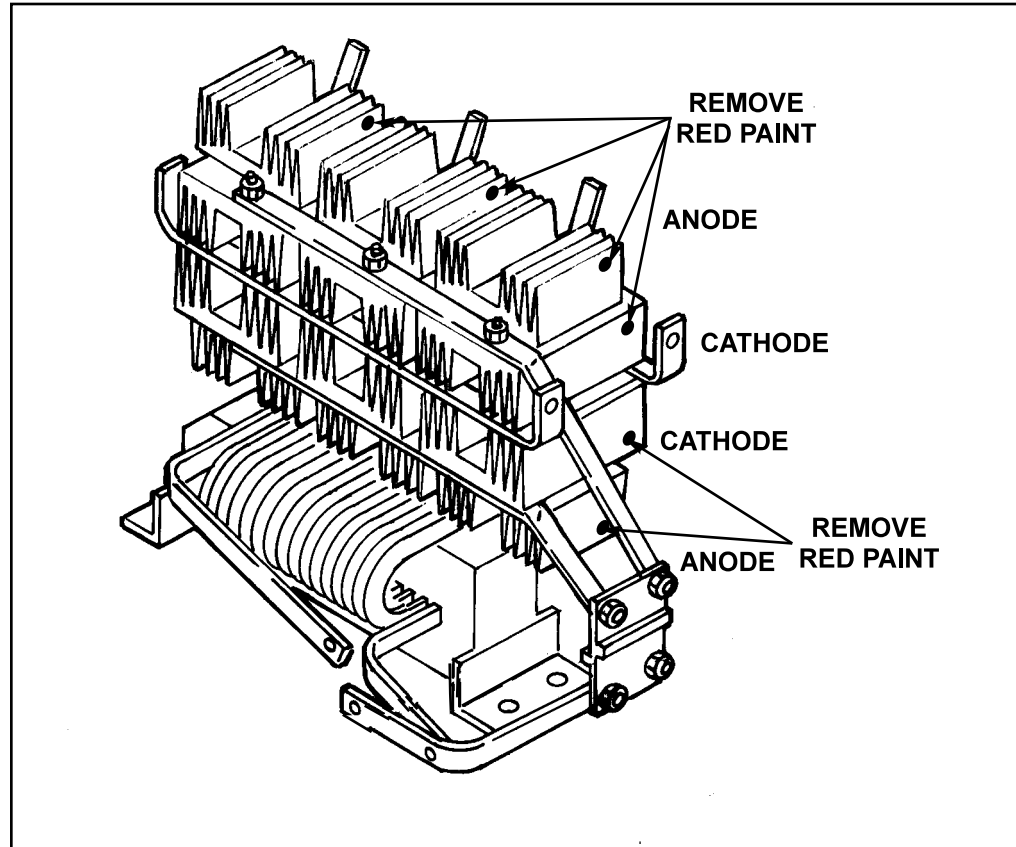


FIGURE F.13 - SCR Heat Sink Assembly Test Points.

3. Remove the red insulating paint from heat sink test points. See Figure 13.

NOTE: DO NOT DISASSEMBLE THE HEAT SINKS.

4. Using an analog ohmmeter, test the resistance from anode to cathode of SCR 1. Reverse the meter leads and check from cathode to anode of SCR 1. (R x 1000 SCALE)
 - a. If a low resistance is indicated in either direction, disconnect the snubber circuit (See wiring diagram) and retest SCR 1. If a low resistance is still indicated, SCR 1 is faulty - Replace. If a very high or infinite resistance is indicated without the snubber circuit, then replace the snubber circuit, See Figure F.14.

STATIC SCR TEST

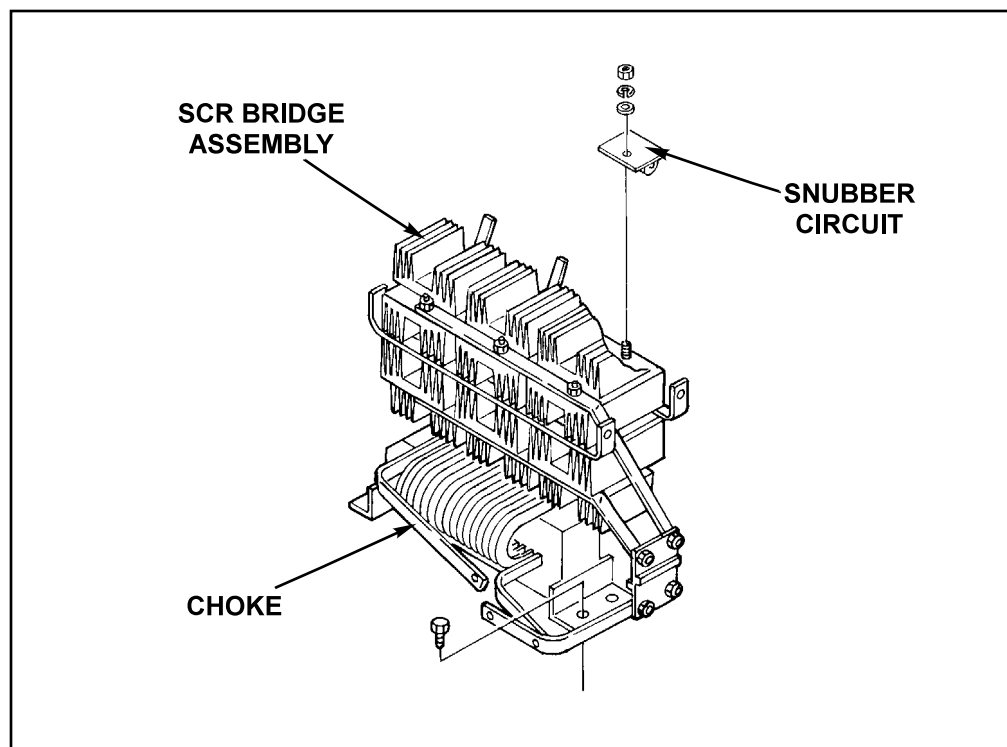


FIGURE F.14 - Snubber Location and Circuit

- Repeat Step 4 testing SCR 2, SCR 3, SCR 4, SCR 5, and SCR 6.

To further check the SCR's functions use an SCR tester and proceed to **Active SCR Test**.

ACTIVE SCR TEST**WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

TEST DESCRIPTION

The Active SCR Test will determine if the device is able to be gated "ON" and conduct current from anode to cathode.

MATERIALS NEEDED

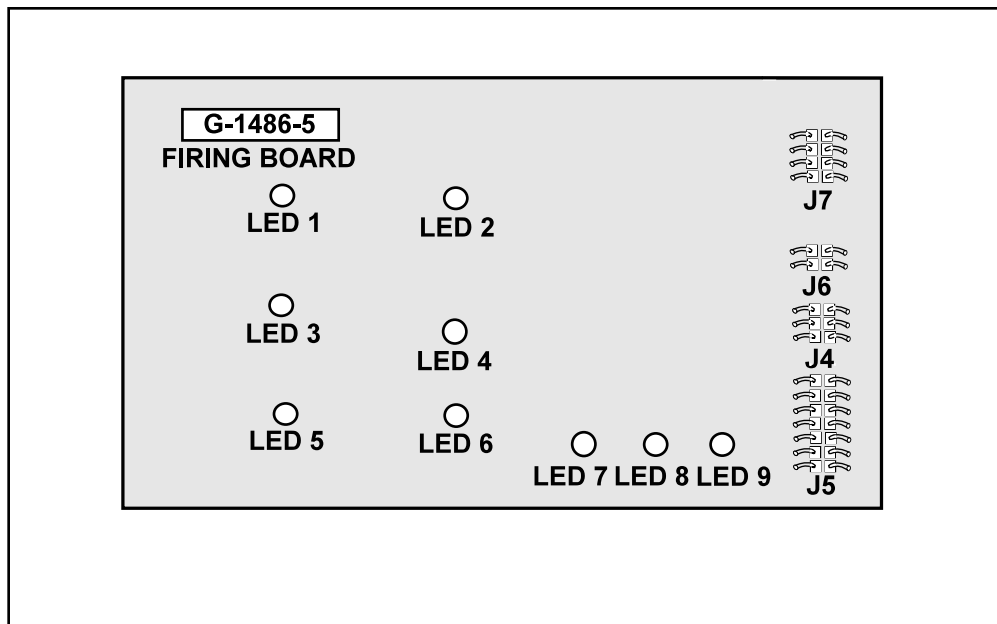
An SCR tester as outlined in this procedure.
DC-1000 Wiring Diagram (See Electrical Diagrams Section of this manual).

IDEALARC DC-1000

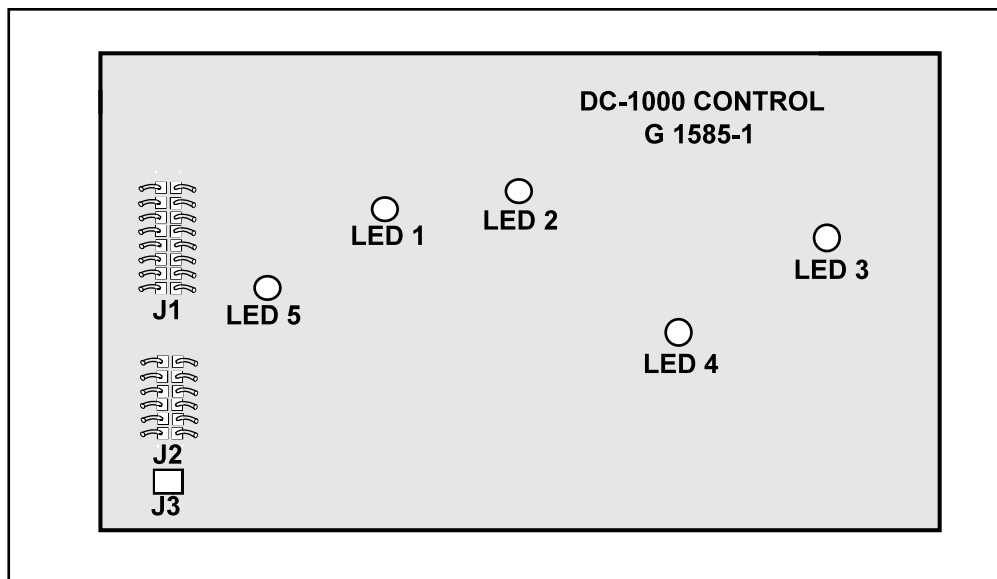


ACTIVE SCR TEST

1. Remove main supply power to the DC-1000.
2. Remove all Molex plugs from the Firing Board and Control Board. See Figure F.15.



FIRING BOARD



CONTROL BOARD

FIGURE F.15 - Firing Board and Control Board Molex Plug Locations

Return to Section TOC

Return to Master TOC

ACTIVE SCR TEST

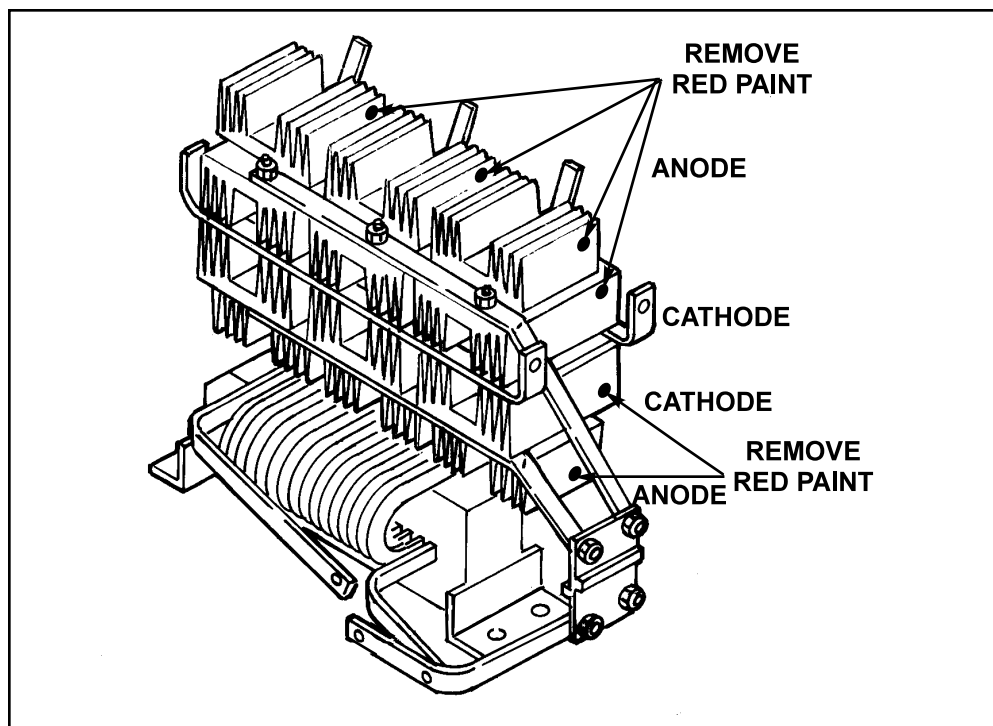


FIGURE F.16 - Heat Sink Assembly Test Points

3. Remove the red insulating paint from heat sink test points. See Figure F.16. NOTE: Do not disassemble the heat sinks.
4. Perform test procedure as follows. Refer to Figure F.17. Repeat test for all six SCRs.

ACTIVE SCR TEST

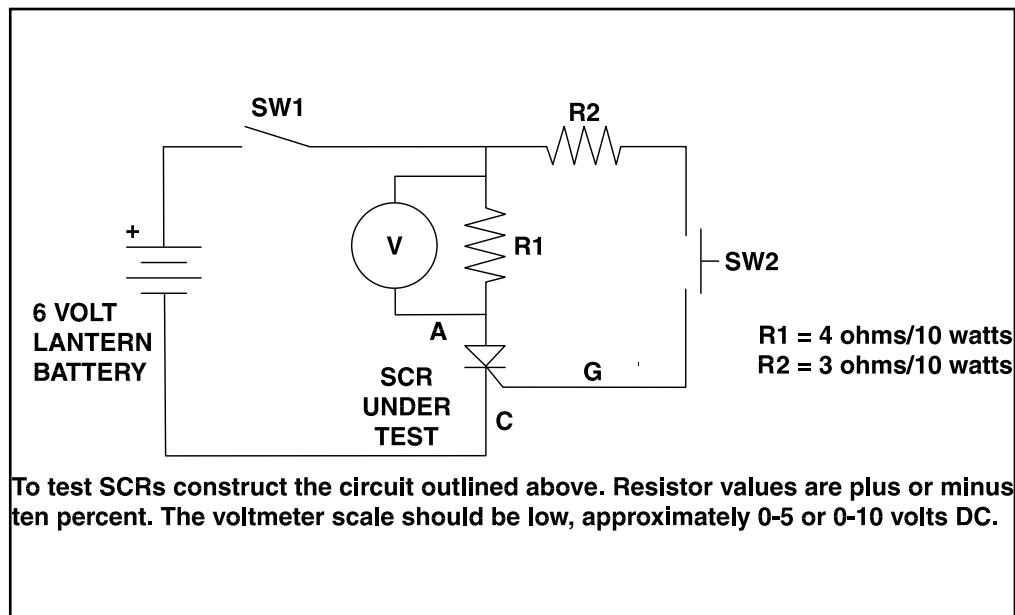


FIGURE F.17- Silicon Controlled Rectifier (SCR) Test Setup

5. To test SCRs, construct the circuit outlined in Figure F.17. Use one 6V lantern battery. Resistor values are in ohms $\pm 10\%$. The voltmeter scale should be low, approximately 0-5 or 0-10 volts.

BATTERY TEST

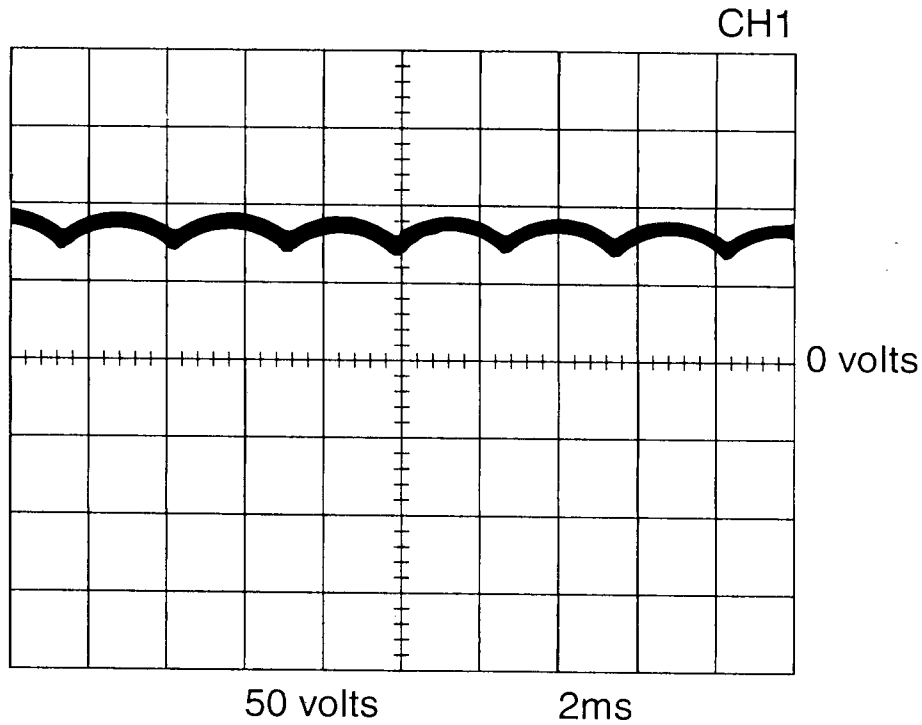
Check the battery by shorting leads (A) and (C) and then close switch SW1. Replace battery if voltage is less than 4.5 volts.

- A. Connect SCR into the test circuit as shown (A) lead to anode (C) lead to cathode and (G) lead to the gate.
- B. Close switch SW1 (switch SW2 should open), voltmeter should read zero. If the voltmeter reads higher than zero the SCR is shorted.

NOTE: Do not disassemble the heat sinks.

6. With switch SW1 closed, close switch SW2 for two seconds and release. The voltmeter should read 3 to 6 volts before and after switch SW2 is released. If the voltmeter does not read, or reads only while SW2 is depressed, the SCR or battery is defective (repeat Battery Test Procedure).
7. Open switch SW1, disconnect the gate lead (G) and reverse the (A) and (C) leads on the SCR. Close switch SW2. The voltmeter should read zero. If the voltage is higher than zero, the SCR is shorted.
8. Replace any SCR assembly that does not pass test in Step 4.

NORMAL OPEN CIRCUIT VOLTAGE WAVEFORM
CONSTANT CURRENT MODE - NO LOAD



This is the typical DC open circuit voltage waveform generated from a properly operating machine. Note that each vertical division represents 50 volts and that each horizontal division represents 2 milliseconds in time.

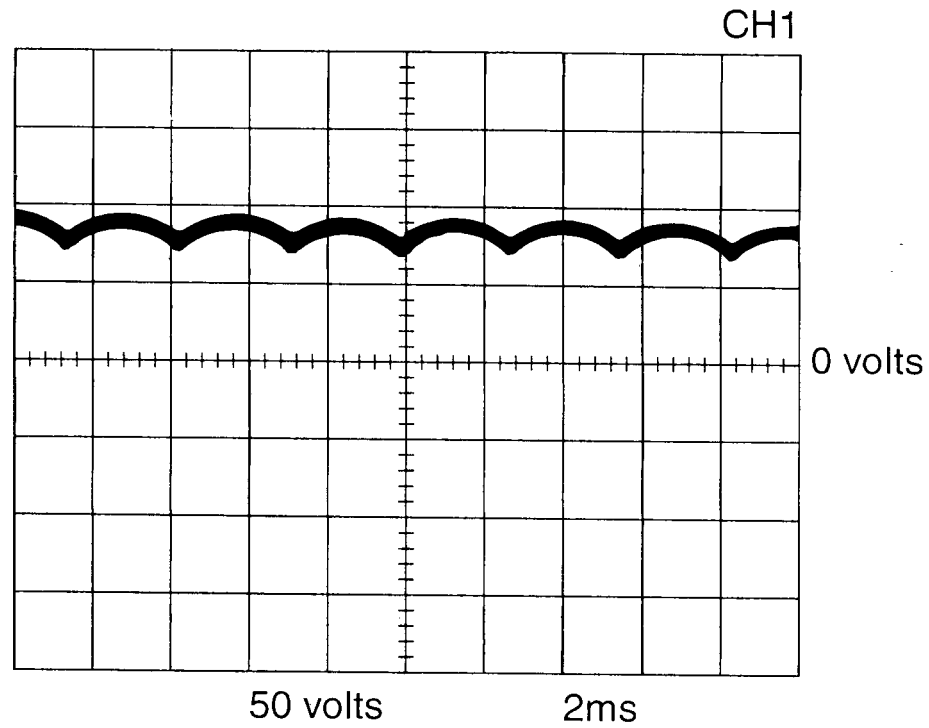
Note: Scope probes connected at machine output terminals: (+) probe to positive 1000 Amp terminal, (-) probe to negative terminal.

SCOPE SETTINGS

Volts/Div.	50 V/Div.
Horizontal Sweep	2 ms/Div.
Coupling	DC
Trigger	Internal

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

NORMAL OPEN CIRCUIT VOLTAGE WAVEFORM
CONSTANT VOLTAGE INNERSHIELD - MAXIMUM
OUTPUT SETTING - NO LOAD



This is the typical DC open circuit voltage waveform generated from a properly operating machine. Note that each vertical division represents 50 volts and that each horizontal division represents 2 milliseconds in time.

Note: Scope probes connected at machine output terminals: (+) probe to positive 1000 Amp terminal, (-) probe to negative terminal.

SCOPE SETTINGS

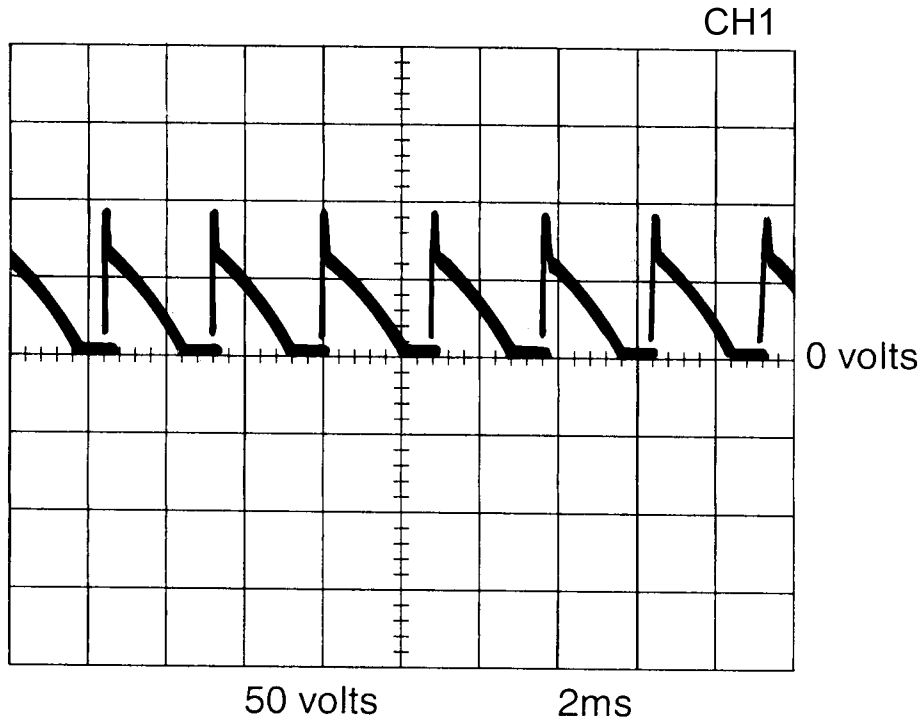
Volts/Div.	50 V/Div.
Horizontal Sweep	2 ms/Div.
Coupling	DC
Trigger	Internal

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Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

NORMAL OPEN CIRCUIT VOLTAGE WAVEFORM
CONSTANT VOLTAGE INNERSHIELD
MINIMUM OUTPUT SETTING - NO LOAD



This is the typical DC open circuit voltage waveform generated from a properly operating machine. Note that each vertical division represents 50 volts and that each horizontal division represents 2 milliseconds in time.

Note: Scope probes connected at machine output terminals: (+) probe to positive 1000 Amp terminal, (-) probe to negative terminal

SCOPE SETTINGS

Volts/Div.	50 V/Div.
Horizontal Sweep	2 ms/Div.
Coupling	DC
Trigger	Internal

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

TYPICAL OUTPUT VOLTAGE WAVEFORM -MACHINE LOADED CONSTANT VOLTAGE INNERSHIELD MODE

Return to Section TOC

Return to Section TOC

Return to Section TOC

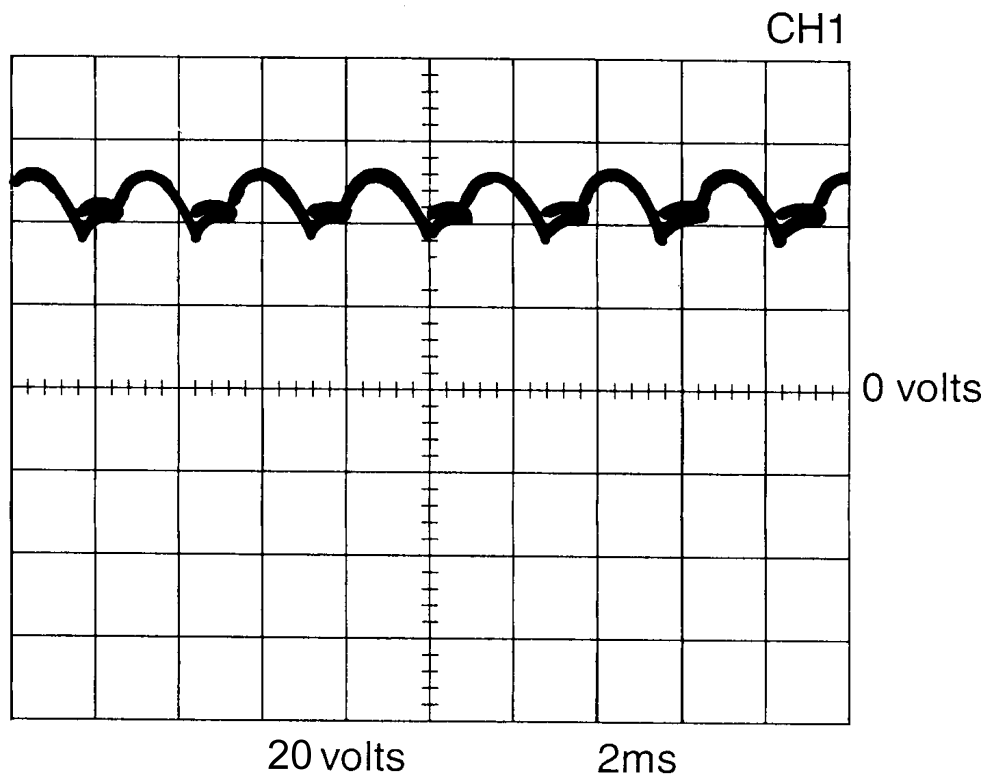
Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC



This is the typical DC open circuit voltage waveform generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 2 milliseconds in time. The machine was loaded with a resistance grid bank. The grid bank meters read 600 amps at 44 VDC.

SCOPE SETTINGS

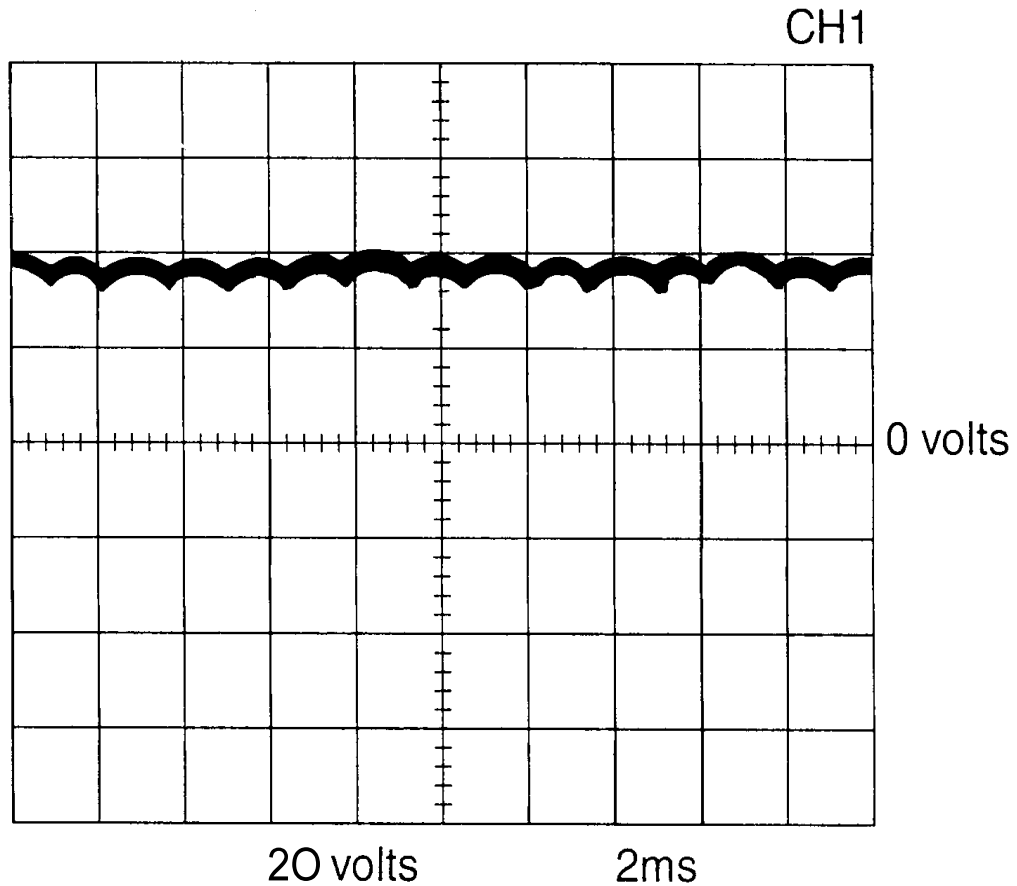
Volts/Div.	20 V/Div.
Horizontal Sweep	2 ms/Div.
Coupling	DC
Trigger	Internal

Note: Scope probes connected at machine output terminals: (+) probe to positive 1000 Amp terminal, (-) probe to negative terminal.

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TYPICAL OUTPUT VOLTAGE WAVEFORM - MACHINE LOADED - 500 AMP OUTPUT TERMINAL CONSTANT VOLTAGE INNERSHIELD MODE



This is the typical DC open circuit voltage waveform generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 2 milliseconds in time. The machine was loaded with a resistance grid bank. The grid bank meters read 400 amps at 36 VDC.

SCOPE SETTINGS

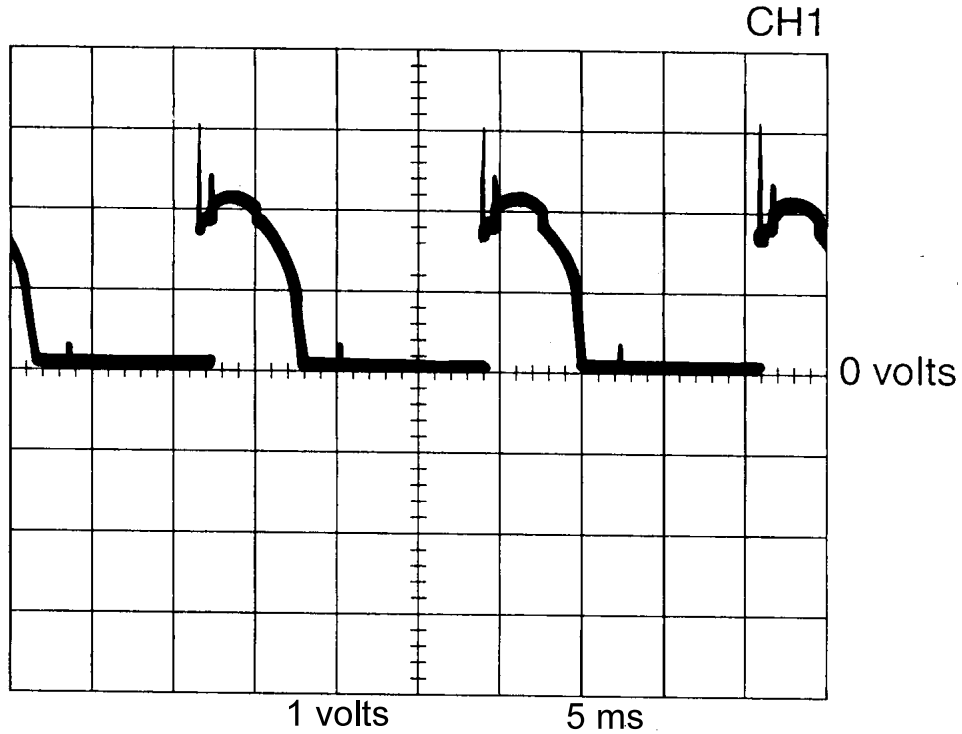
Volts/Div.....	20 V/Div.
Horizontal Sweep	2 ms/Div.
Coupling	DC
Trigger	Internal

Note: Scope probes connected at machine output terminals: (+) probe to positive 500 amp terminal, (-) probe to negative terminal.

Return to Section TOC
Return to Section TOC
Return to Section TOC
Return to Section TOC
Return to Section TOC
Return to Section TOC
Return to Section TOC
Return to Section TOC

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

TYPICAL SCR GATE VOLTAGE WAVEFORM
CONSTANT VOLTAGE INNERSHIELD
MAXIMUM OUTPUT SETTING - NO LOAD



This is the typical SCR gate pulse voltage waveform. The machine was in an open circuit condition (no load) and operating properly. Note that each vertical division represents 1 volt and that each horizontal division represents 5 milliseconds in time.

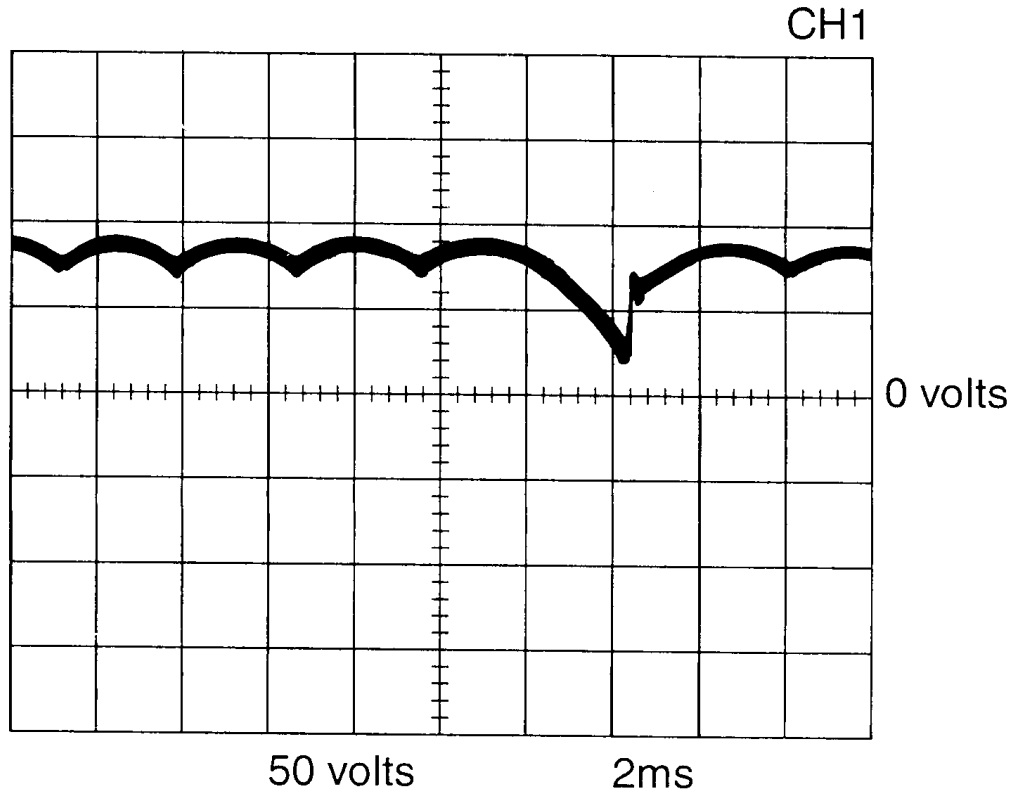
Note: Scope probes connected at SCR gate and cathode: (+) probe to gate, (-) probe to cathode.

SCOPE SETTINGS

Volts/Div.	1 V/Div.
Horizontal Sweep5 ms/Div.
Coupling	DC
Trigger	Internal

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

**ABNORMAL OPEN CIRCUIT VOLTAGE WAVEFORM
CONSTANT VOLTAGE INNERSHIELD
ONE OUTPUT SCR NOT FUNCTIONING
MAXIMUM OUTPUT SETTING**



This is NOT the typical DC output voltage waveform. One output SCR is not functioning. Note the "gap" in the waveform. One SCR gate is disconnected to simulate an open or nonfunctioning output SCR. Each vertical division represents 50 volts and each horizontal division represents 2 milliseconds in time.

Note: Scope probes connected at machine output terminals: (+) probe to positive 1000 amp terminal, (-) probe to negative terminal.

SCOPE SETTINGS

Volts/Div.	50 V/Div.
Horizontal Sweep	2 ms/Div.
Coupling	DC
Trigger	Internal

Return to Section TOC
Return to Section TOC
Return to Section TOC
Return to Section TOC
Return to Section TOC

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

INPUT CONTACTOR (1CR) CLEANING AND/OR REPLACEMENT



WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

MATERIALS NEEDED

7/16" socket wrench
1/2" open end wrench
11/16" socket wrench
Phillips head screwdriver
Flat head screwdriver
Low pressure air source

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INPUT CONTACTOR (1CR) CLEANING AND/OR REPLACEMENT

CLEANING PROCEDURE

1. Remove main input supply power to the DC-1000 and remove case top and sides.
2. Locate the input contactor. Using a 1/2" wrench, remove the cover plate

from the input contactor. Mark, label, and remove leads as necessary to access the two nuts and washers on the studs. See Figures F.18 and F.19.

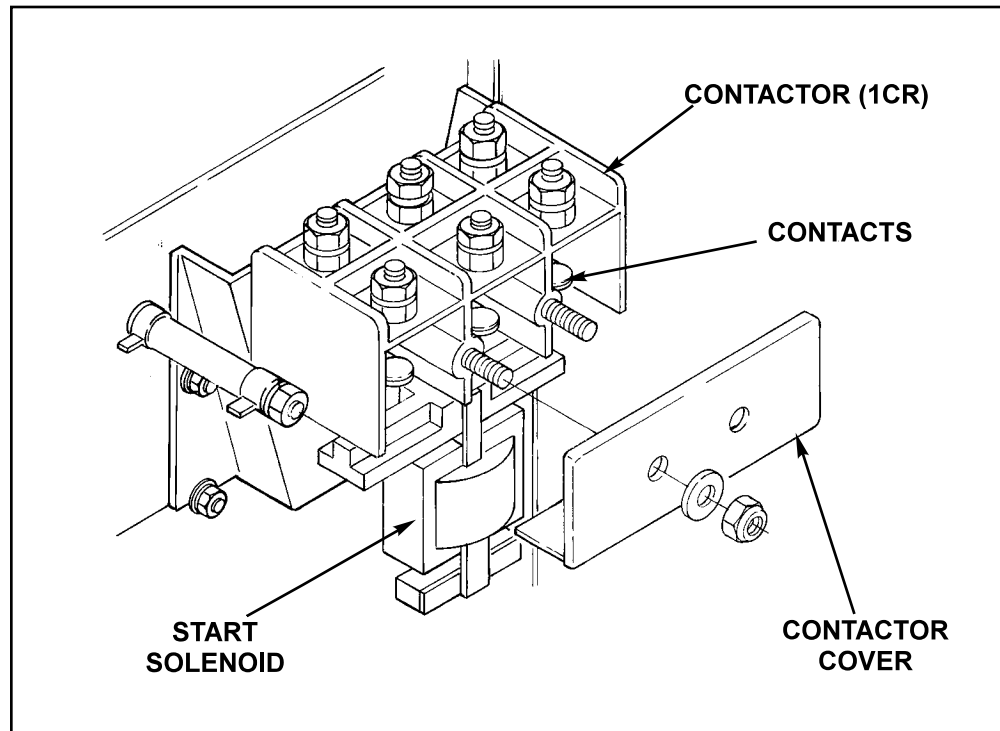


FIGURE F.18 - Input Contactor Cover Removal

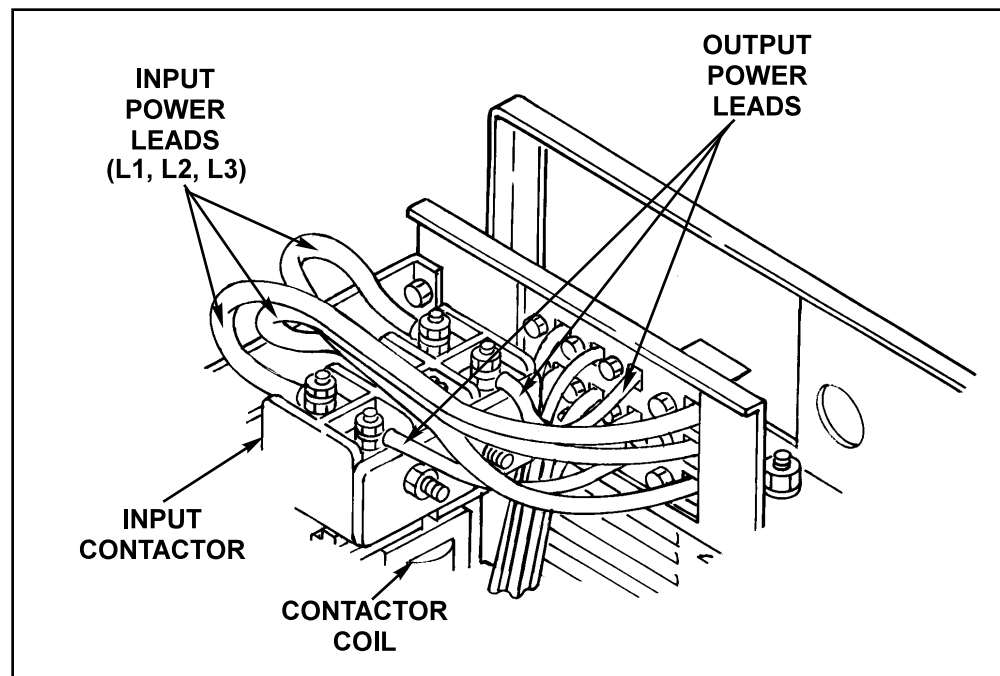


FIGURE F.19 - Input Contactor Removal

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INPUT CONTACTOR (1CR) CLEANING AND/OR REPLACEMENT

⚠ WARNING

DO NOT APPLY INPUT POWER TO THE DC-1000 WITH THE CONTACTOR COVER PLATE REMOVED. POWER APPLIED WITHOUT COVER PLATE IN POSITION MAY CAUSE SEVERE ARCING RESULTING IN BODILY INJURY.



3. Blow out any dirt or dust from in and around contacts.
4. Examine contacts for signs of wear.
5. If contacts are stuck together or overheated, parts of the contactor, or the entire assembly, should be replaced.

CONTACTOR REPLACEMENT

REMOVAL

1. Using a 11/16" wrench, remove leads L1, L2, L3 and output power leads from 1CR contactor. Mark and label all leads for proper reconnection. See Figure F.19.
2. Remove lead #257 at secondary thermostat. See Figure F.20 and refer to Wiring Diagram. Remove any cable ties and/or harness looms as necessary.
3. Remove the contactor interlock leads from quick disconnects (leads 211 and 212) and from resistor R3. See Figure F-21 and refer to Wiring Diagram.
4. Remove input contactor using a 7/16" socket wrench. Remove the four mounting bolts, nuts, and associated washers (or loosen the two bottom bolts and nuts, and remove the top two).

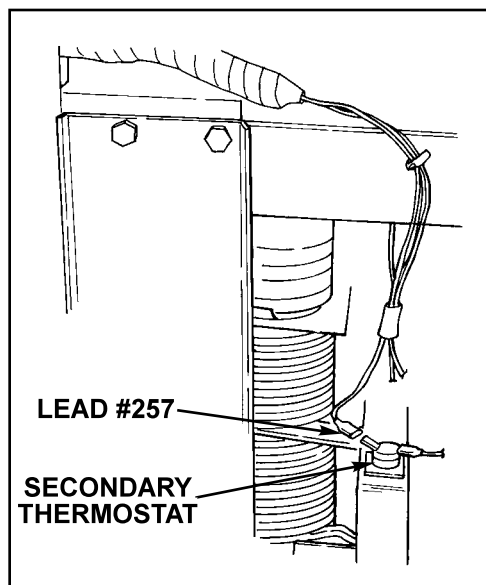


FIGURE F.20 - Lead #257 at Secondary Thermostat

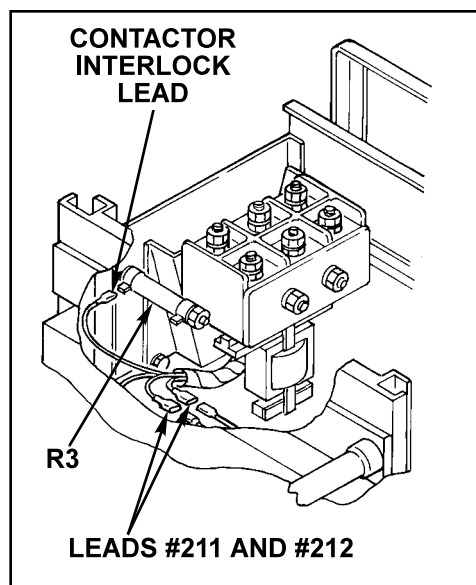


FIGURE F.21 - Lead #211 and #212 Quick Disconnects

INPUT CONTACTOR (1CR) CLEANING AND/OR REPLACEMENT

INSTALLATION

1. Install input contactor using a 7/16" socket wrench. Attach the four mounting bolts, nuts, and associated washers (or tighten the two bottom bolts and nuts, and attach the top two).
2. Attach leads to contactor interlock. Connect quick connects on leads #211 and #212. See Figure F.21.
3. Attach leads from contactor coil. Attach any cable ties and/or harness looms cut at removal. Attach lead #257 at secondary thermostat. See Figure F.20.
4. Using a 11/16" wrench, attach leads L1, L2, L3 and output power leads to 1CR contactor. See Figure F.19.

NOTE: Ensure all leads are connected correctly. See Wiring Diagram.

Return to Section TOC

Return to Master TOC

Return to Section TOC

Return to Master TOC

Return to Section TOC

Return to Master TOC

Return to Section TOC

Return to Master TOC

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SCR OUTPUT BRIDGE REPLACEMENT



WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

MATERIALS NEEDED

- 9/16" socket wrench
- 9/16" open end wrench
- 1/2" long-handled flat ratchet wrench
- 1/2" socket wrench
- 1/2" open end wrench
- 3/8" socket wrench
- 5/16" socket wrench
- Lincoln E1868 (Dow Corning #340) heat sink compound

IDEALARC DC-1000



SCR OUTPUT BRIDGE REPLACEMENT

SCR OUTPUT BRIDGE REMOVAL

1. Remove input power to machine.
 2. Using a 5/16 (8mm) nut driver or flat head screw driver, remove 20 screws (ten per side) to remove case sides and 2 screws to remove top.
 3. Using a 5/16 (8mm) nut driver or flat head screw driver, remove 6 screws, then lower the front control panel.
 4. Remove the J4 gate lead Molex plug from firing board, and feed the plug down through the hole in bottom of the PC board compartment.
 5. Using a 9/16" socket and open-end wrench, remove the two bolts and nuts holding the shunt assembly to the two positive buss leads connected to the SCR bridge. See Figure F.22.
 6. Using a 5/16" socket remove the screw and small reed switch lead (#210) from the left, top rear SCR heat sink.
- NOTE: It may be necessary to move or remove the output choke to gain access to the bottom anode leads. For access to the bottom middle screw, nut, and associated washers, a long handled flat ratchet is recommended.
7. Identify and label the six transformer secondary (heavy aluminum) leads that connect to the anodes of the SCR heat sink assemblies. Using a 1/2" socket and open-end wrench, remove the secondary leads (see Figure F.22).
 8. Support the SCR bridge assembly with a lift hook or rope.
 9. Using a 3/8" socket wrench, remove the two screws (one on each side) holding the SCR assembly rails to the front panel assembly.

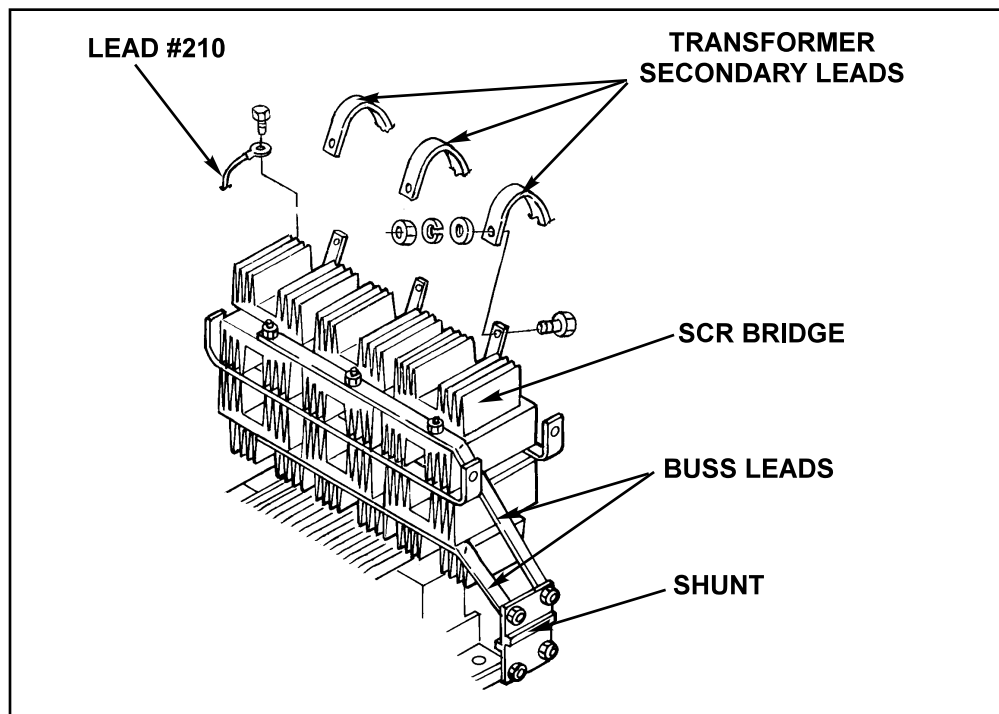


FIGURE F.22 - Preparation For SCR Output Bridge Removal

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SCR OUTPUT BRIDGE REPLACEMENT

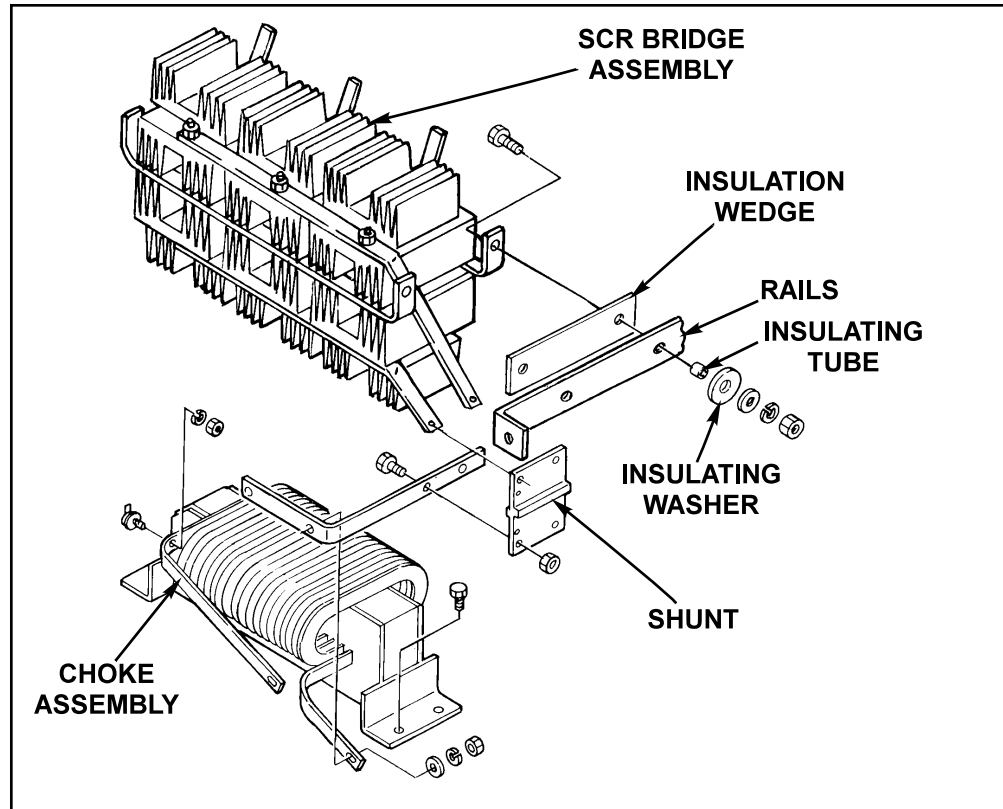


FIGURE F.23 - SCR Output Bridge Removal

10. Cut any necessary cable ties to allow for the SCR bridge assembly removal.
11. Using a 1/2" socket wrench, remove the four screws (2 on each side) holding the transformer side panels and SCR assembly rails to the main transformer. See Figure F.23.
12. Remove leads #217 and #222 from resistor R2 located on the lift bail assembly. Remove resistor R2 using a 7/16" wrench.
13. With the 5/16" socket wrench, remove the bottom six screws holding the front panel assembly to the base. Carefully pull the front panel forward to allow room to remove the SCR bridge assembly.
14. Clear all leads and carefully remove the SCR bridge assembly.

NOTE: Upon reassembly, apply a thin layer of Lincoln E1868 (Dow Corning 340) heat sink compound to all bolted electrical connections on the aluminum heat sinks.

**CAUTION**

UPON REASSEMBLY, THE SCR BRIDGE ASSEMBLY MUST BE ELECTRICALLY ISOLATED FROM GROUND.

15. Place insulators between SCR bridge assembly and the output rectifier mounting bracket (see Figure F.23). Check for electrical isolation with an **analog** ohmmeter.

**CAUTION**

MINIMUM ACCEPTABLE RESISTANCE TO GROUND IS 500,000 OHMS.

IDEALARC DC-1000



SCR OUTPUT BRIDGE REPLACEMENT

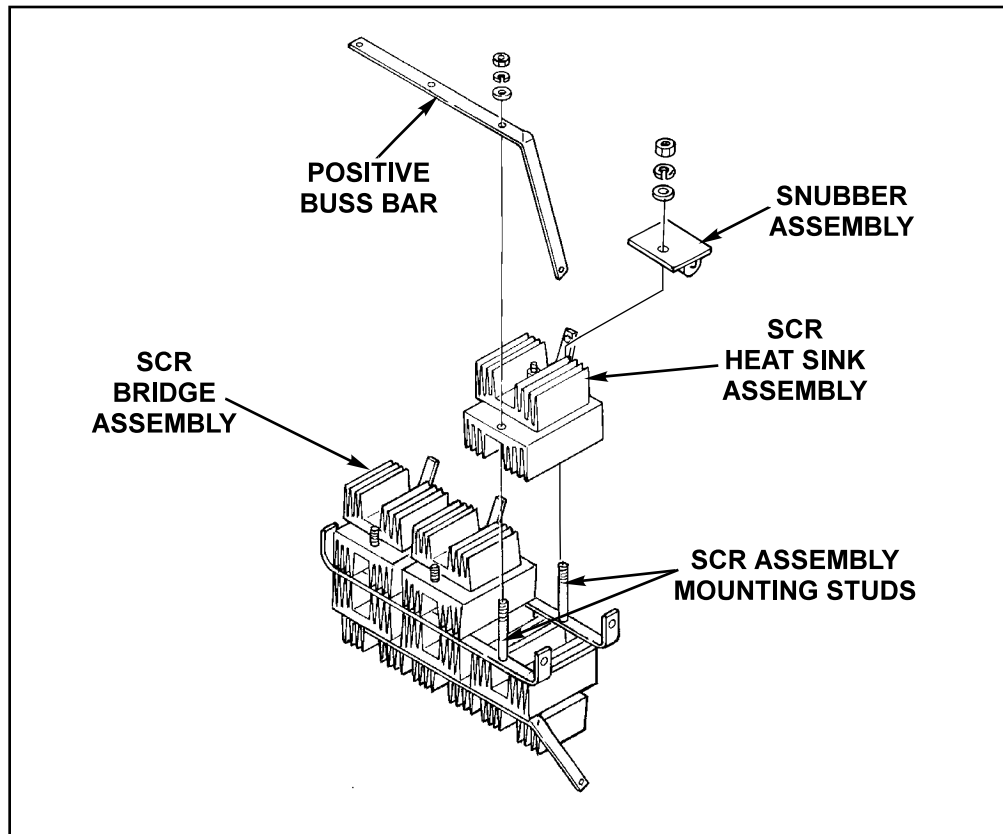


FIGURE F.24 - Individual SCR Assembly Heat Sink Removal

REMOVAL OF INDIVIDUAL SCR HEAT SINK ASSEMBLIES

1. Using a 9/16" wrench, remove two nuts, flat washers, and lock washers from the SCR assembly mounting studs. See Figure F.24.
2. Using a 5/16 (8mm) nut driver or flat head screw driver, remove snubber ground wire attachment. The snubber assembly can now be removed. Replace if necessary.
3. Carefully remove the positive buss bar from the heat sink in question. It may be necessary to remove the buss bar completely.
4. Carefully slide the SCR assembly from the mounting studs. Replacement will be made with a new SCR assembly.

 **CAUTION**

DO NOT DISASSEMBLE THE SCR FROM THE HEAT SINK. MACHINE DAMAGE MAY RESULT. REPLACE THE SCR ONLY AS AN ASSEMBLY.

IDEALARC DC-1000



SCR OUTPUT BRIDGE REPLACEMENT

SCR HEAT SINK
INSTALLATION

NOTE: Upon reassembly, apply a thin layer of Lincoln E1868 (Dow Corning #340) heat sink compound to all bolted electrical connections on the aluminum heat sinks, including positive buss bar.

1. Slide a new SCR assembly onto the mounting studs.
2. Carefully attach the positive buss bar onto the heat sink which had been removed. If it had been necessary to remove the buss bar, replace it at this time.
3. Align snubber assembly in position on SCR output bridge assembly.
4. Using a 9/16" wrench, secure the SCR output bridge and snubber assemblies with two nuts, flat washers, and lock washers.
5. Using a 5/16 (8mm) nut driver or flat head screw driver, attach snubber assembly ground wire with screws previously removed.

SCR OUTPUT BRIDGE
INSTALLATION

NOTE: Upon reassembly, apply a thin layer of Lincoln E1868 (Dow Corning #340) heat sink compound to all bolted electrical connections on the aluminum heat sinks.

1. Support the SCR bridge assembly with a lift hook or rope.
2. Clear all leads and carefully position the SCR bridge assembly in place.
3. Place insulators between SCR bridge assembly and the output rectifier mounting bracket. See Figure F.23. Check for electrical isolation with an **analog** ohmmeter. Minimum acceptable resistance to ground is 500,000 ohms.
4. With the 5/16" socket wrench, attach bottom six screws securing the front panel assembly to the base. Carefully push the front panel rearward into position.
5. Attach resistor R2 to the unit using a 7/16" wrench. Secure leads #217 and #222 to resistor R2.
6. Using a 1/2" socket wrench, attach the four screws (2 on each side) holding the transformer side panels and SCR assembly rails to the main transformer.

SCR OUTPUT BRIDGE REPLACEMENT

7. Using a 3/8" socket wrench, attach the two screws (one on each side) holding the SCR assembly rails to the front panel assembly. See Figure F-23.
8. Using a 1/2" socket and open-end wrench, attach the secondary leads that connect the anodes of the SCR heat sink assemblies to the six transformer secondary (heavy aluminum) leads as labeled during disassembly.
9. Using a 5/16" socket attach the small reed switch lead (#210) to the left, top rear SCR heat sink using the screw previously removed.
10. Using a 9/16" socket and open-end wrench, attach the two bolts and nuts holding the shunt assembly to the two positive buss leads connected to the SCR bridge.
11. Feed the J4 gate lead Molex plug up through the hole in bottom of the PC board compartment. Attach the plug onto the firing board.
12. Secure any cable ties removed previously to allow for the SCR bridge assembly removal.
13. Using a 5/16 (8mm) nut driver or flat head screw driver, attach 20 screws (ten per side) to attach the case sides. Attach the top using 2 similar screws.
14. Raise the front control panel into position, and, using a 5/16 (8mm) nut driver or flat head screw driver, secure in position using 6 screws.

NOTE: It may have been necessary to move or remove the output choke to gain access to the bottom anode leads. For access to the bottom middle screw, nut, and associated washers, a long handled flat ratchet is recommended.

REMOVAL AND REASSEMBLY OF LIFT BAIL

**WARNING**

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

MATERIALS NEEDED

3/8" socket wrench
9/16" socket wrench

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Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

REMOVAL AND REASSEMBLY OF LIFT BAIL

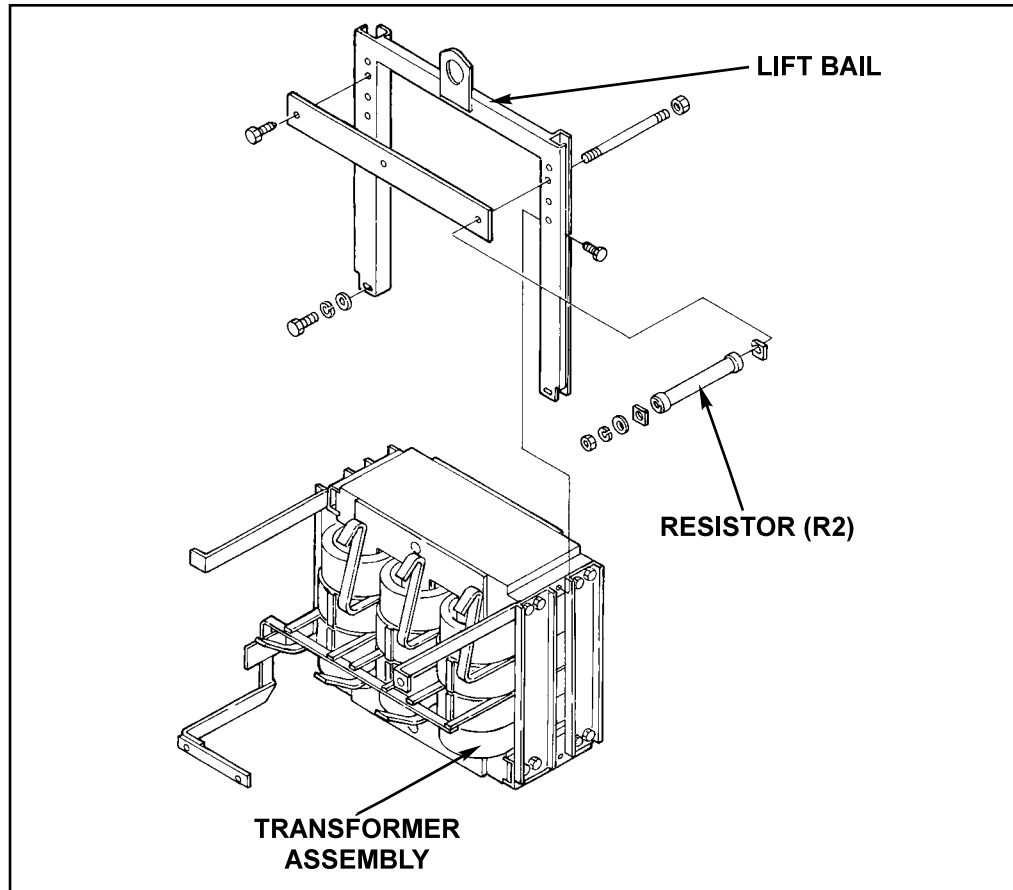


FIGURE F.25 - Lift Bail Removal

REMOVAL OF LIFT BAIL

1. Remove input power to machine.
2. Using a 5/16 (8mm) nut driver or flat head screw driver, remove 20 screws (ten per side) to remove case sides and 2 screws to remove top.
3. Remove two leads, #217 and #222 from resistor R2.
4. Using a 3/8" socket wrench, remove the two screws holding the input contactor bracket to the lift bail.
5. Using a 9/16" socket wrench, remove the four bolts mounting the lift bail to the main transformer assembly.
6. Using a 9/16" socket wrench, remove the four bolts and associated washers mounting the lift bail to the base assembly. See Figure F.25.
7. Loosen or remove any cable or wire ties necessary for lift bail removal.
8. Carefully remove the lift bail by lifting straight up and clear.

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REMOVAL AND REASSEMBLY OF LIFT BAIL

REASSEMBLY OF LIFT BAIL

1. Place the lift bail onto the IDEALARC DC-1000 from the top, lowering straight onto the unit.
2. Using a 9/16" socket wrench, attach the four bolts and associated washers mounting the lift bail to the base assembly.
3. Using a 9/16" socket wrench, attach the four bolts mounting the lift bail to the main transformer assembly.
4. Using a 3/8" socket wrench, attach the two screws holding the input contactor bracket to the lift bail.
5. Reattach leads #217 and #222 to resistor R2.
6. Reattach or reconnect any cables or wire ties previously removed.
7. Using a 5/16 (8mm) nut driver or flat head screw driver, attach 20 screws (ten per side) to secure case sides, and 2 screws to secure top.

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Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

MAIN TRANSFORMER REMOVAL AND INSTALLATION



WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

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 (800) 833-9353 (WELD).

MATERIALS NEEDED

3/8" socket wrench
1/2" socket wrench
3/4" socket wrench

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MAIN TRANSFORMER DISASSEMBLY AND ASSEMBLY

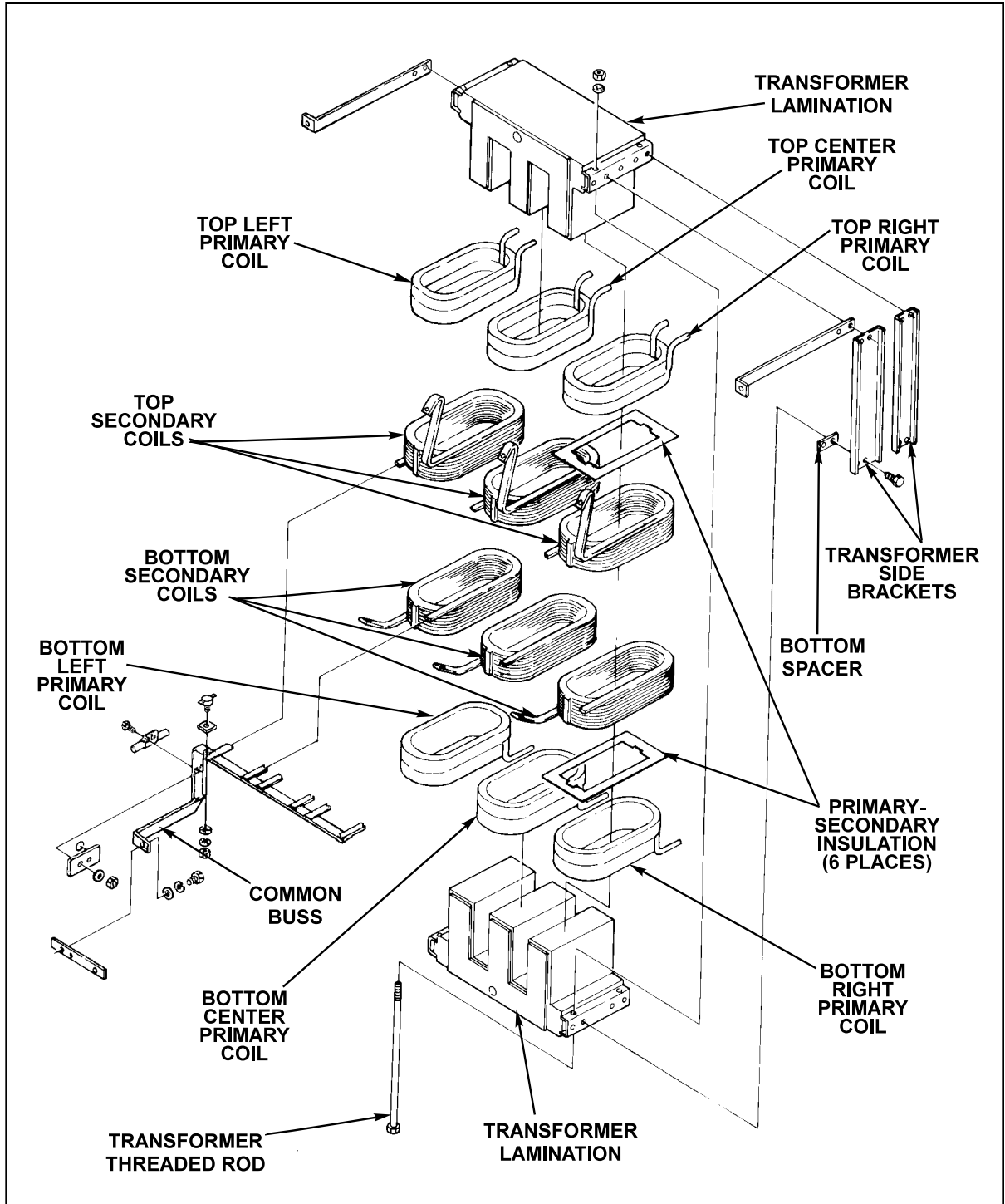


FIGURE F.26 - Main Transformer Disassembly

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MAIN TRANSFORMER DISASSEMBLY

MAIN TRANSFORMER DISASSEMBLY

1. Perform *Lift Bail Removal Procedure*.
2. Remove lead #271 from resistor R3 (located near the input contactor).
3. Separate the in-line connectors from leads #211 and #212. See Figure F.21.
4. Remove lead #256 from the choke thermostat.
5. Remove lead #220 from the reed switch (3CR).
6. Cut any necessary cable ties or restraints and clear the leads necessary for the removal of the top transformer iron.
7. Using a 3/8" socket wrench, remove two screws mounting the input contactor bracket to the case back assembly. With leads attached, carefully pull assembly up and out of the way. Set assembly aside.
8. Using a 1/2" socket wrench, move 16 screws (8 on each side) from the transformer side brackets. Taking note of placement, remove the four brackets and two bottom spacers. See Figure F.26.
9. Using a 3/4" wrench, remove the six nuts and lock washers from the transformer threaded rods. It may be necessary to hold the threaded rods to keep them from turning.
10. Using a hoist, carefully lift the top iron from the assembly. Note the placement of shims and insulators.

NOTE: Some prying and jolting may be necessary to free the iron from the coils. Replace any coils that may be faulty. If any heavy aluminum secondary coils are to be replaced, identify and label all leads to the transformer. The leads will have to be cut and then TIG welded upon reassembly.

COIL REMOVAL AND REPLACEMENT

1. Label and disconnect leads to the coils that are being removed or replaced (see Wiring Diagram).
2. Refer to Figure F.26 for proper coil locations (top, bottom, left, right, and center) of primary and secondary coils. If secondary coils are to be replaced, it will be necessary to cut the leads and TIG weld upon reassembly.
3. Remove the coils:
 - a. Some prying and jolting may be necessary to free the coils from the iron.
 - b. Note placement of insulation and wedges for reassembly (especially primary coil to lamination insulation and secondary to primary insulation).
4. Replace the coils:
 - a. Be sure to replace all insulation and wedges that were removed (lamination to coils, and primary to secondary coils).
 - b. Using a high temperature industrial epoxy, such as Lincoln E1603, glue the coils in place by applying the epoxy to the coil sides along the lamination, cell insulation, and wedges.
 - c. Glue the secondary coils in place from the iron to the coil sides.
5. Re-TIG weld the secondary coil leads (if previously cut).
6. When reconnecting any aluminum leads, apply a thin layer of Dow Corning 340 Heat Sink Compound to mating surfaces.

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TRANSFORMER INSTALLATION

TRANSFORMER
REASSEMBLY

1. Using a hoist, carefully lift the top iron onto the assembly. Lightly tap on the top of the iron.
2. Position the transformer threaded rods securing the transformer. Using a 3/4" wrench, secure the six nuts and lock washers. It may be necessary to hold the threaded rods to keep them from turning. Tighten nuts to 39 - 41 Ft.-Lbs.
3. The primary coils should be ground tested at 2700 VAC for one second. The secondary coils should be ground tested at 1500 VAC for one second. The primary to secondary insulation should be tested at 2700 VAC for one second.
4. Install the four brackets and two bottom spacers in the position noted at disassembly. Using a 1/2" socket wrench, secure in position with 16 screws (8 on each side) onto the transformer side brackets.
5. With leads still attached, carefully reposition the input contactor bracket onto the case back assembly. Using a 3/8" socket wrench, secure in position using two screws removed previously.
6. Attach lead #220 onto the reed switch (3CR).
7. Attach lead #256 onto the choke thermostat.
8. Reconnect lead #211 and #212 to the in-line connectors.
9. Attach lead #271 onto resistor R3.
10. Perform **Lift Bail Installation Procedure**.
11. Replace any cable ties or restraints which were cut to remove the top transformer iron.

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RETEST AFTER REPAIR

Testing is required after the removal of any mechanical part that could affect the machine's electrical characteristics, or if any electrical components are repaired or replaced.

INPUT IDLE AMPS AND WATTS

Input Volts/Phase/Hertz	Maximum Idle Amps	Maximum Idle KW
230/3/60	14.0	2.0
460/3/60	7.0	2.0
575/3/60	5.6	2.0

OPEN CIRCUIT VOLTAGES

Mode	Input Hertz	Open Circuit Volts
Variable Voltage	60	74/76 DC
Auxiliary Output (#31-#32)	60	122/124 AC

MAXIMUM ACCEPTABLE OUTPUT VOLTAGE - AT MINIMUM OUTPUT SETTINGS

Mode	Input Hertz	Load
Constant Voltage Innershield	60	140 Amps @ 14/18 VDC

MINIMUM ACCEPTABLE OUTPUT VOLTAGE AT MAXIMUM OUTPUT SETTINGS

Mode	Input Hertz	Load
Variable Voltage	60	1250 Amps @ 47/52 VDC
Constant Voltage Submerged Arc	60	1250 Amps @ 47/52 VDC
Constant Voltage Submerged Arc at 500 Amp Terminal	60	625 Amps @ 53/58 VDC

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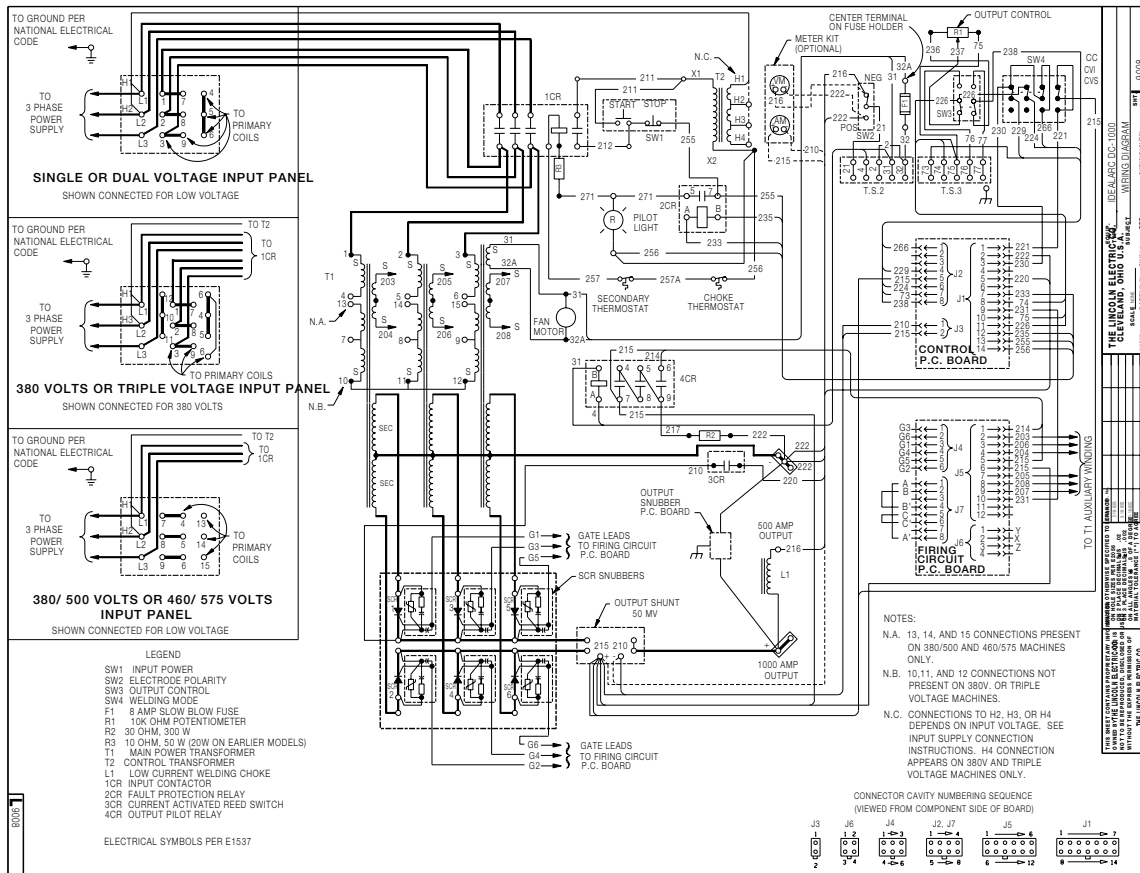
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Wiring Diagram (Codes 9919, 9920)

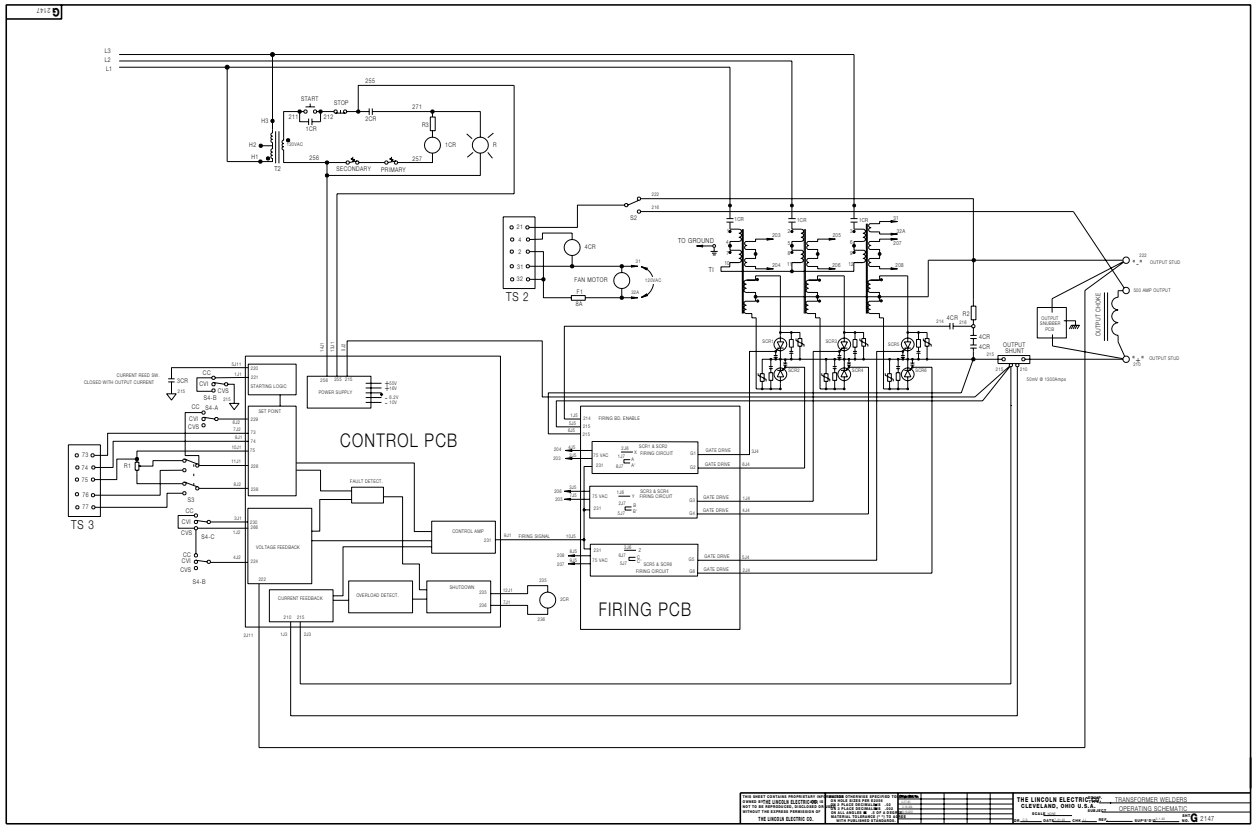


NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.



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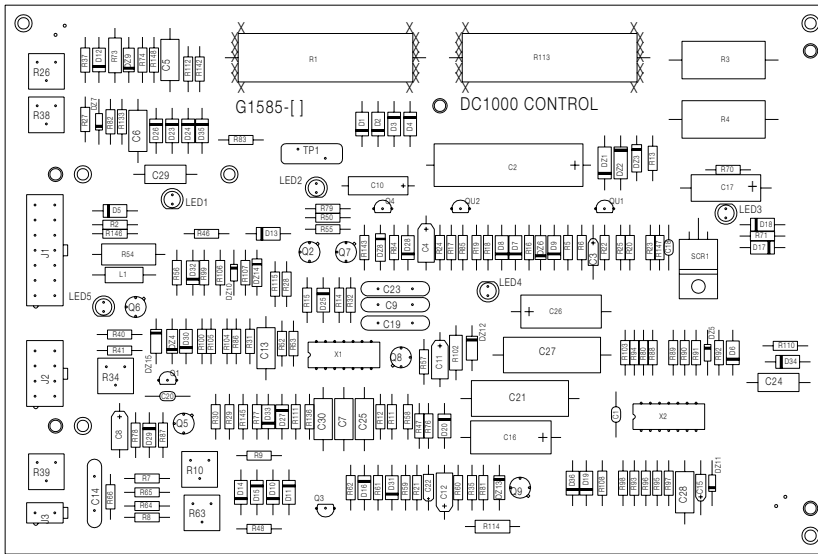


NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.



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Control PC Board (G1585) Layout



ITEM	REQ'D.	PART No.	IDENTIFICATION
C1,C18,C20	3	S18685-3	222 50
C2	1	S18490-18	57150
C3	1	S18490-19	1.520
C4,C5,C11,C12	4	S18490-20	1.515
C6,C7,C15,C24,C25,C26	9	S18490-102	347100
C8,C9,C29	2	S18490-27	2.7 MFD 75V
C10	1	S18490-63	47 50
C12	1	S18490-16	50150
C17	1	S18490-67	5.00
C17,C27	2	T11377-28	22-100
C22	1	S18490-42	1.525
C23,C28	4	T11377-38	22-500
C24,C25,C26	4	T11377-2	10000
C27	1	T12199-1	1N4004
C28	1	T12735-38	100353
C29	1	T12735-35	1N4005
D1	1	T12735-18	1N651
D2	1	T12735-27	1N414
D25,D27	2	T12735-31	1N627B
D28,D29,D27,D29	4	T12735-29	1N4744A
D3	1	T12735-36	1N6258B
D24,D24	2	T12735-12	1N6258B
D20	1	T12735-15	1N627B
D25	1	T12735-19	1N4744A
L1	1	T12218-4	33 MH
LED1,LED2,LED3,LED4,LED5	5	T13657-2	RED LED
Q1,Q3	2	T12735-68	2N4403
Q2,Q4,Q5,Q7,Q8,Q9	6	T12735-38	2N4857
Q4	1	T12735-69	2N4403
Q21,Q20	2	T12737-4	2N6027
RT1,R13	2	T12300-47	250 10W
RT1,R18	2	S18490-103	150K 1/4W
R3	1	T14648-15	750 5W
R4	1	T14648-4	100 5W
R2,R15,R24,R103,R115	5	S18490-1004	1K 1/4W
R1,R2,R3,R6,R6,R67,R67,R103,R103,R107	9	S18490-1001	1K 1/4W
R7,R8	2	S18490-2871	2.87K 1/4W
R9,R10,R10,R103,R106	5	S18490-2513	150K 1/4W
R10,R103	2	T10812-39	50K 1/4W
R11,R12	2	S18490-2013	201K 1/4W
R13,R103,R103,R103,R103	5	S18490-4912	49.1K 1/4W
R14	1	S18490-2010	201 1/4W
R15	1	S18490-4762	47.6K 1/4W
R16,R103,R103,R103,R103,R103,R103,R103,R103,R103	8	S18490-4751	4.75K 1/4W
R17,R103	2	S18490-3022	30.2K 1/4W
R18,R103,R103,R103,R103	5	S18490-1002	100K 1/4W
R19,R103,R103,R103	4	S18490-1003	100K 1/4W
C21,R103,R103	3	S18490-4750	47.5K 1/4W
R20,R147	2	S18490-2020	20.2 1/4W
R20,R103	2	T10812-48	1K 1/2W
R21,R27,R28,R31	4	S18490-2511	25.1K 1/4W
R22	1	T10812-47	100K 1/2W
R23	1	T10812-77	20K 1/2W
R24,R24,R24	3	S18490-1001	1.0K 1/4W
R25,R27,R27	3	S18490-2020	20.2 1/4W
R26,R27,R27,R27	4	S18490-3000	30K 1/4W
R28	1	S18490-4733	47.3K 1/4W
R29,R29,R142	3	S18490-1001	1.0K 1/4W
R30,R29,R110	3	S18490-2112	22.2 1/4W
R31	1	T12735-3	27K 1W
R32,R32,R104	3	S18490-2022	20.2K 1/4W
R33,R117,R126	3	S18490-4735	47.3 1/4W
R34,R34,R34	3	T12735-1	1K 1W
R35,R35	2	S18490-1000	10K 1/4W
R36,R130	2	S18490-1002	1.0K 1/4W
R37	1	S18490-8810	1.3K 1/4W
R38	1	S18490-4811	6.81K 1/4W
R39	1	S18490-1000	10K 1/4W
R40,R117,R142	2	S18490-7590	75.9 1/4W
R41	1	S18490-2432	24.3K 1/4W
SCR1	1	S18165-17	
TP1	1	T13657-11	450
XT32	2	S18128-4	

CAPACITORS - MFD/VOLTS
RESISTORS - OHMS/1/4 WATT UNLESS OTHERWISE SPECIFIED.
INDUCTANCE - HENRYS

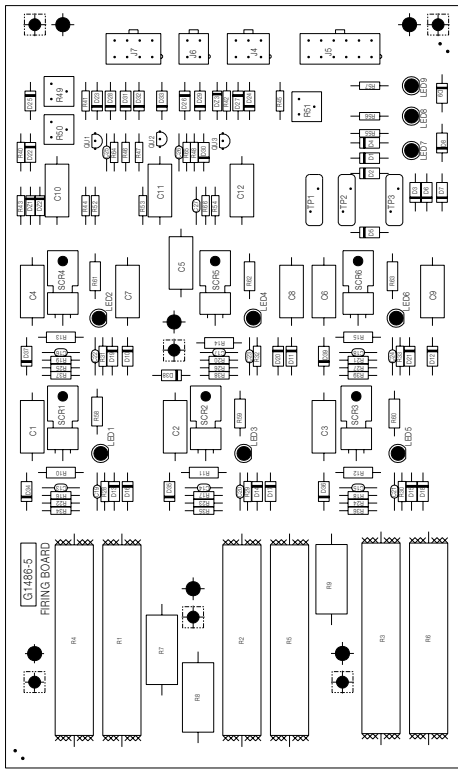
NOTE: Lincoln Electric assumes no responsibility for liabilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln Electric discourages board level troubleshooting and repair since it may compromise the quality of the design and may result in danger to the Machine Operator or Technician. Improper PC board repairs could result in damage to the machine.



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Firing PC Board (G1486-5 and above) Layout



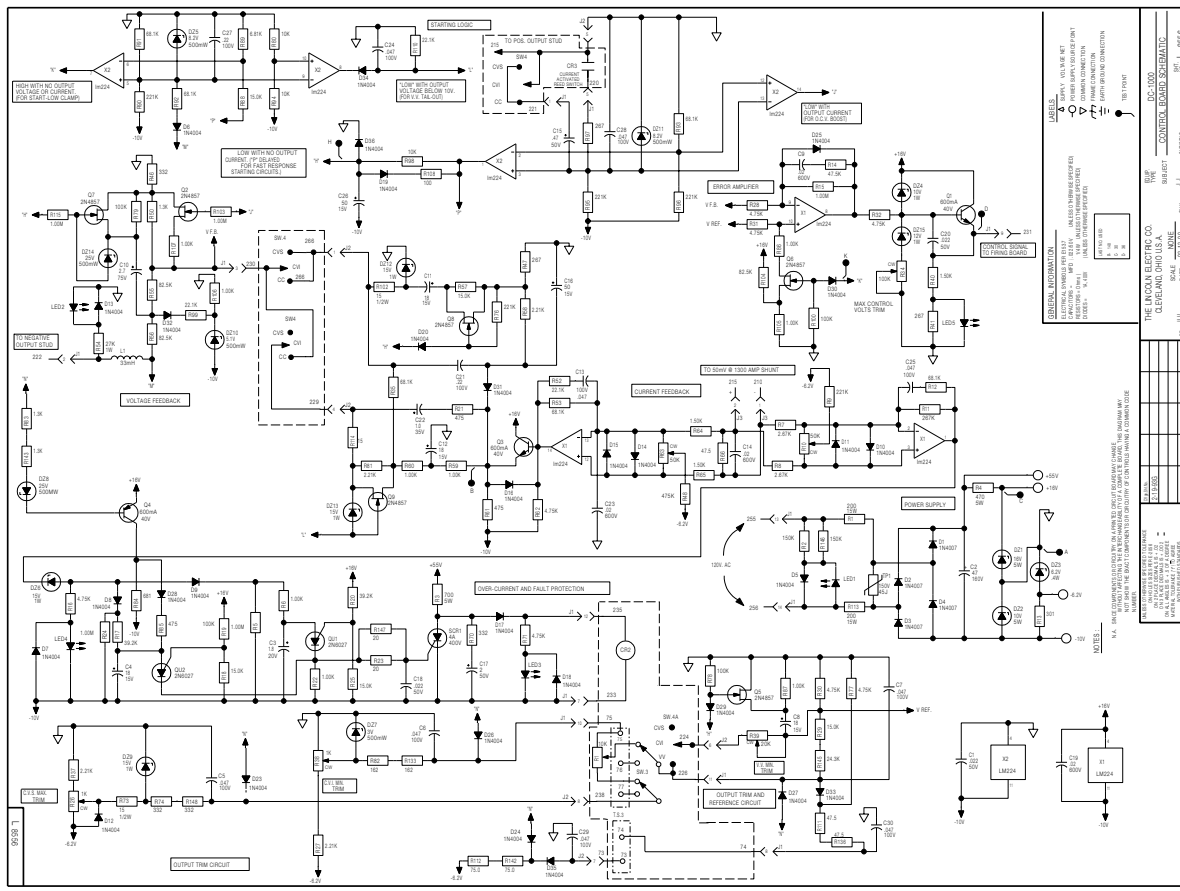
ITEM	REQ'D	PART NO.	IDENTIFICATION
C1,C2,C3,C4,C5,C6,C7,C8,C9,C10,C11,C12	12	S13490-96	.15/200
C13,C14,C15,C16,C17,C18,C19,C20,C21,C22,C23,C24,C25,C26,C27	15	S16668-5	.022/50
D1,D2,D3,D4,D5,D6,D10,D11,D12,D13,D14,D15,D16,D17,D18,D19,D20,D21	18	T12199-2	1N4007
D7,D8,D9,D22,D23,D24,D25,D26,D27,D28,D29,D30,D31,D32,D33,D34,D35,D36,D37,D38,D39	21	T12199-1	1N4004
DZ1,DZ2,DZ3	3	T12702-4	1N4747
LED1,LED2,LED3,LED4,LED5,LED6,LED7,LED8,LED9	9	T13657-2	RED LED
QU1,QU2,QU3	3	T12707-4	2N6027
R1,R2,R3,R4,R5,R6	6	T12300-73	20W 250 OHMS
R7,R8,R9	3	T14648-12	5W 1500 OHM
R10,R11,R12,R13,R14,R15	6	T14231-8	1/2W 82 OHM
R16,R17,R18,R19,R20,R21	6	S19400-1001	1/4W 1K
R22,R23,R24,R25,R26,R27,R34,R35,R36,R37,R38,R39	12	S19400-1500	1/4W 150
R28,R29,R30,R31,R32,R33,R52,R53,R54	9	S19400-2670	1/4W 267
R40,R41,R42	3	S19400-1501	1/4W 1.5 K
R43,R44,R45	3	S19400-4750	1/4W 475
R46,R47,R48	3	S19400-2671	1/4W 2.67 K
R49,R50,R51	3	T10812-67	
R55,R56,R57	3	S19400-2672	1/4W 26.7 K
R58,R59,R60,R61,R62,R63	6	T14231-6	1/2W 5.1
R64,R65,R66	3	S19400-3323	1/4W 332K
SCR1, SCR2, SCR3, SCR4, SCR5	6	S15161-19	
SCR6	n.e.		
TP1, TP2, TP3	3	T13640-11	

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Control PC Board (G1585) Schematic



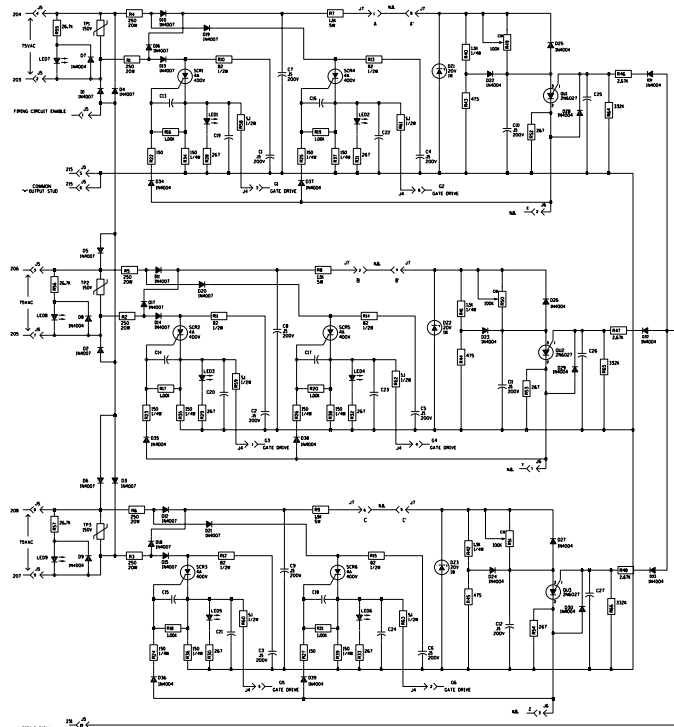
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Firing PC Board (G1486-5 and above) Schematic



NOTES:

MA: MAKE CONNECTIONS TO THIS POINT ON LAYOUTS, VERIFY BOARD BY COLOR.
 BR: BRIDGE RECTIFIER. MAKE CONNECTIONS TO THIS POINT ON LAYOUTS, VERIFY BOARD BY COLOR.
 F: FUSE. MAKE CONNECTIONS TO THIS POINT ON LAYOUTS, VERIFY BOARD BY COLOR.

MA: MAKE CONNECTIONS TO THIS POINT ON LAYOUTS, VERIFY BOARD BY COLOR.
 BR: BRIDGE RECTIFIER. MAKE CONNECTIONS TO THIS POINT ON LAYOUTS, VERIFY BOARD BY COLOR.
 F: FUSE. MAKE CONNECTIONS TO THIS POINT ON LAYOUTS, VERIFY BOARD BY COLOR.

GENERAL INFORMATION:
 ELECTRICAL SYMBOLS FOR CALLS:
 CONNECTION: - ONE-WIRELINE - WIRE NUMBER INDICATED
 CONNECTION: - TWO-WIRELINE - WIRE NUMBER INDICATED
 CONNECTION: - THREE-WIRELINE - WIRE NUMBER INDICATED
 CONNECTION: - FOUR-WIRELINE - WIRE NUMBER INDICATED

LEGEND:
 - □ - FUSE
 - ○ - FUSE SUPPLY - BOARD FUSE
 - ○ - COMMON CONNECTION
 - ○ - FUSE CONNECTION
 - ○ - COMMON CONNECTION

FIRING BOARD
 SCHEMATIC 1:11-928
 L 8337

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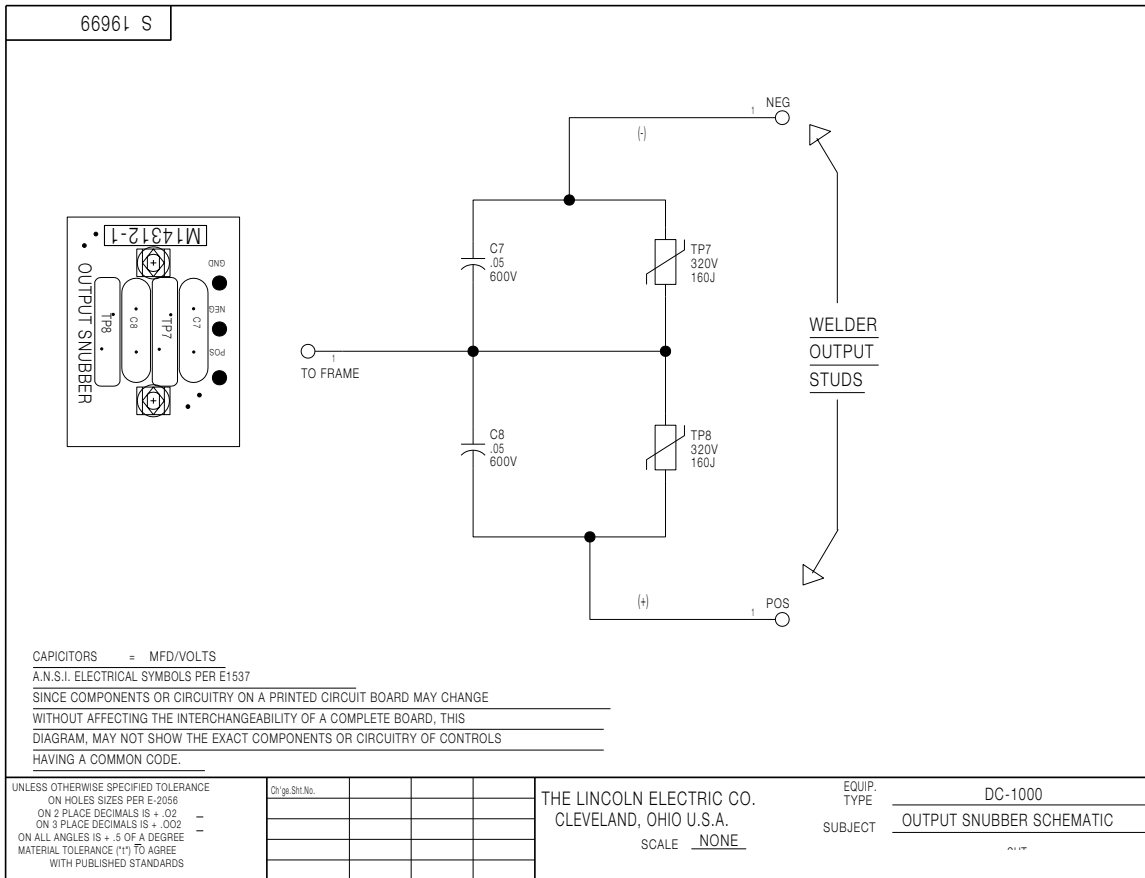
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Output Snubber (M14312) Schematic



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