LINCOLN ELECTRIC

GENUINE LINCOLN PARTS™

NOTE: This manual will cover most of the troubleshooting and repair procedures for the code numbers listed. Some variances may exist when troubleshooting/repairing later code numbers.

IDEALARC CV-300

For use with machines having Code Numbers:

9456, 9486, 9520 9939, 9940, 10180, 10181

SERVICE MANUAL

SVM116-A | Issue Date 99, Mar

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

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

WARNING

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.

ELECTRIC SHOCK can kill.

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

1.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.**

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

1.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.

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

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

1.g. Never dip the electrode in water for cooling.

1.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.

1.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

1.j. Also see Items 4.c. and 6.

ARC RAYS can burn.

2.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

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

2.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES can be dangerous.

3.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding 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.**

3.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.

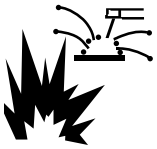
3.c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

3.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.

3.e. Also see item 7b.

Apr. '93

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



WELDING SPARKS can cause fire or explosion.

4.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

4.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.

4.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.

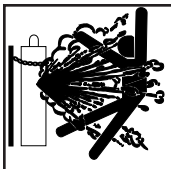
4.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe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

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

4.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.

4.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.

4.h. Also see item 7c.



CYLINDER may explode if damaged.

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

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

5.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.

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

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

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

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

FOR ELECTRICALLY powered equipment.

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

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

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

Feb. '95

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

FOR ENGINE powered equipment.

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

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

7.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.

7.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.

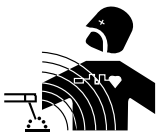
7.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

7.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.

7.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.

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

ELECTRIC AND MAGNETIC FIELDS may be dangerous



8.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

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

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

8d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

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

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

8.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.

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

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

Mar. '93

PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   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 precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se 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 lateraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.

3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Mar. '93

TABLE OF CONTENTS

TABLE OF CONTENTS
- INSTALLATION SECTION -

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

TECHNICAL SPECIFICATIONS - IDEALARC CV-300

INPUT - THREE PHASE/ 50-60 HERTZ ONLY	
Standard Voltages	**Input Current at Rated Output**
208/230/460/3/60	**66/60/30 Amps**
230/460/575/3/60	**60/30/24 Amps**

RATED OUTPUT			
	Duty Cycle	**Amps**	**Volts at Rated Amps**
CV-300	100% 60%	300A 400A	32 36

OUTPUT		
Current Range	**Maximum Open Circuit Voltage**	**Auxiliary Power**
50A - 400A	55V	115 VAC, 5AMPS 42 VDC, 10AMPS

RECOMMENDED INPUT WIRE & FUSE SIZE			
Input Voltage/ Frequency	**Fuse (Superlag) or Breaker Size**	**Type 75°C wire in Copper conduit AWG (IEC Sizes)**	**Type 75°C Copper Ground Wire in Conduit**
208/60	100	4 (25mm²)	6 (16mm²)
230/60	100	4 (25mm²)	8 (10mm²)
460/60	50	10 (6mm²)	10 (6mm²)
575/60	40	10 (6mm²)	10 (6mm²)
200/50/60	100	4 (25mm²)	6 (16mm²)
220/50/60	100	4 (25mm²)	8 (10mm²)
230/50/60	100	4 (25mm²)	8 (10mm²)
380/50/60	70	8 (10mm²)	8 (10mm²)
400/50/60	50	8 (10mm²)	10 (6mm²)
415/50/60	50	8 (10mm²)	10 (6mm²)
440/50/60	50	10 (6mm²)	10 (6mm²)
500/50/60	50	10 (6mm²)	10 (6mm²)

PHYSICAL DIMENSIONS				
HEIGHT	**WIDTH**	**DEPTH**	**LIFT HOOK ADD**	**WEIGHT**
21.5” (546mm)	19.5” (495mm)	27.0” (686mm)	3.12” (80mm)	300 lbs. (136 Kg.)

Read entire Installation Section before installing the IDEALARC CV-300.

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 working on the equipment.**
- **Turn the Power switch on the CV-300 "OFF" before connecting or disconnecting output cables, wire feeder or remote connections, or other equipment.**
- **Do not touch electrically hot parts.**
- **Always connect the IDEALARC CV-300 grounding terminal (located on the welder base near the reconnect panel) to a good electrical earth ground.**

SELECT PROPER LOCATION

The IDEALARC CV-300 can be used indoors or outdoors. It has an IP-23 degree of protection.

Place the IDEALARC CV-300 where clean, cooling air can freely circulate in through the side louvers 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

Three IDEALARC CV-300 machines can be stacked.

DO NOT stack more than three machines in one grouping.

DO NOT stack the IDEALARC CV-300 on another type of machine.

Follow these guidelines when stacking:

1. Select a firm, level surface capable of supporting the total weight of up to three machines.
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 of the bottom machine.
4. Repeat process for third machine.

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

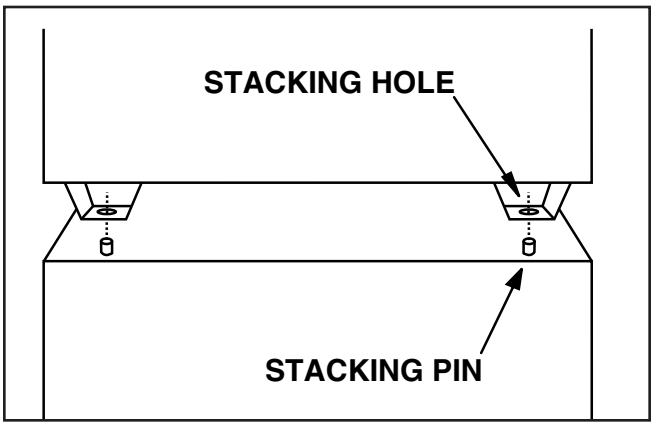


FIGURE A.1 - Stacking IDEALARC CV-300 machines.

TILTING

The IDEALARC CV-300 must be placed on a stable, level surface so it will not topple over. Do not place the machine on an incline.

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
Return to Section TOC
Return to Master TOC

INPUT ELECTRICAL CONNECTIONS

⚠ WARNING

All input power must be electrically disconnected before proceeding.

1. Before starting the installation, check with the local power company to determine if there is any question about whether your power supply is adequate for the voltage, amperes, phase, and frequency specified on the welder nameplate. Have a qualified electrician connect the input leads to L1, L2, and L3 on the input reconnect panel in compliance with the National Electrical Code, all local codes, and the connection diagram located on the inside of the Right Case Side Panel. This welder can operate on a three-phase AC voltage supply only.

2. Models that have multiple input voltages specified on the nameplate (e.g., 208/230) are shipped connected for the highest voltage. If the welder is to be operated at a lower voltage, it must be reconnected according to the instructions on the inside of the removable Right Case Side Panel. See the Reconnect Section of this manual for details on reconnecting the machine to operate at different voltages.

3. Be sure the voltage, phase, and frequency of the input power is as specified on the machine rating plate. See Figure A.2 for the location of the machine's input cord entry and Reconnect Panel.

4. Access to the input reconnect panel is achieved by removing the Right Case Side Panel of the CV-300 on the ON/OFF POWER SWITCH side of the machine.

5. The frame of the welder must be grounded. A ground terminal marked with the symbol (⏚) is located at the bottom of the input box to ground the welder. See the National Electrical Code for details on proper grounding methods.

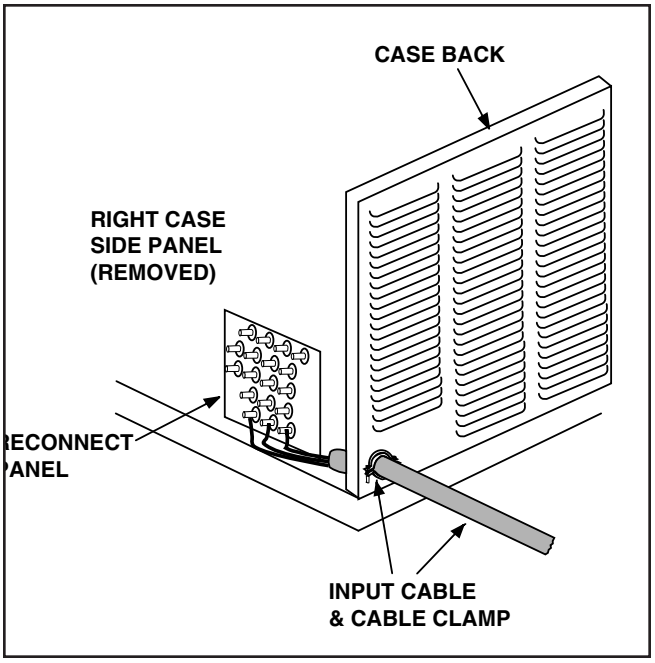


FIGURE A.2 - Input Power Cable Entry Connections and Reconnect Panel location.

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. Delay type circuit breakers may be used. The tripping action of delay type circuit breakers decreases as the magnitude of the current increases. 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.

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

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 is connected for the proper voltage.

⚠ CAUTION

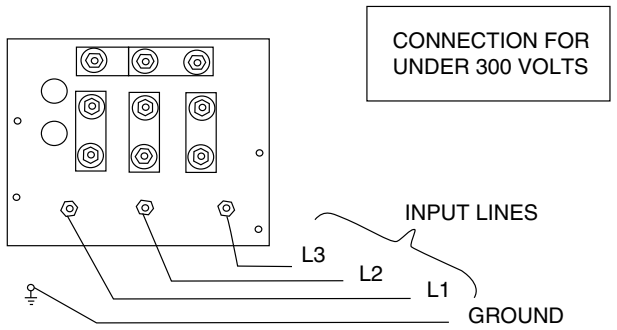
Failure to follow these instructions can cause immediate failure of components within the machine.

To reconnect a dual or triple voltage machine to a different voltage, change the position of the leads or links on the Reconnect Panel based the type of machine. Follow The Input Supply Connection Diagram located on the inside of the Right Case Side Panel.

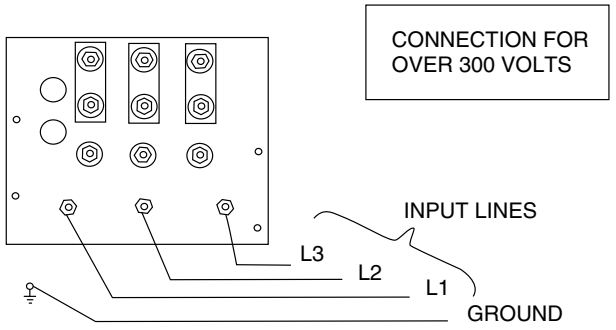
For dual voltage machines, see Figure A.3.

For 208/230/440 voltage machines, see ***Figure A.4.***

For 230/460/575 voltage machines, see ***Figure A.5.***



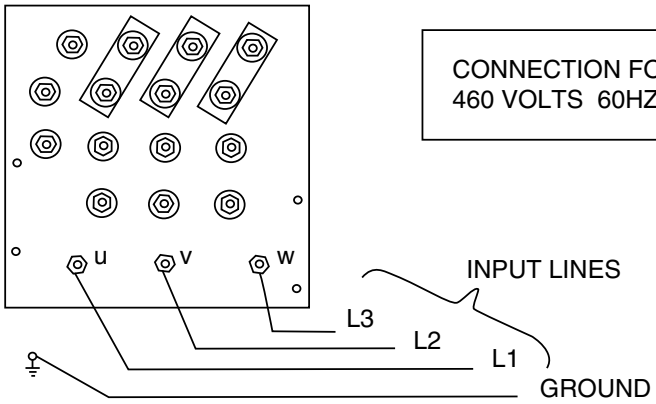
1. Check nuts on terminal board for tightness, then place the five copper links in the positions shown. Secure the links tightly with the nine hex nuts provided.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.



1. Check nuts on terminal board for tightness, then place the copper links in the positions shown. Double up the extra links in two of the positions to save the extra links for future use. Secure the links tightly with the six hex nuts provided, then secure the remaining three hex nuts in place for future use.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.

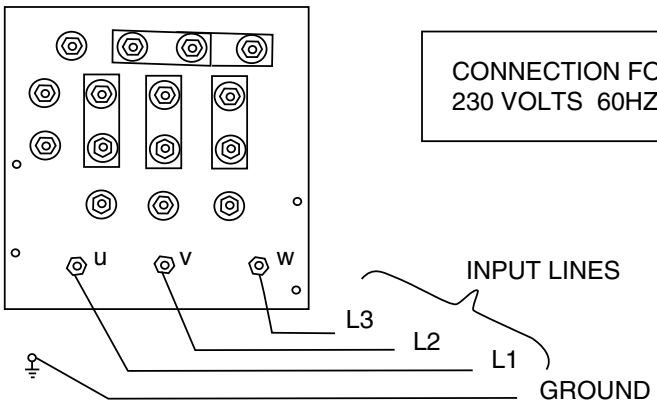
FIGURE A.3 - Reconnect Diagram For Dual Voltage Machines.

LINCOLN ELECTRIC



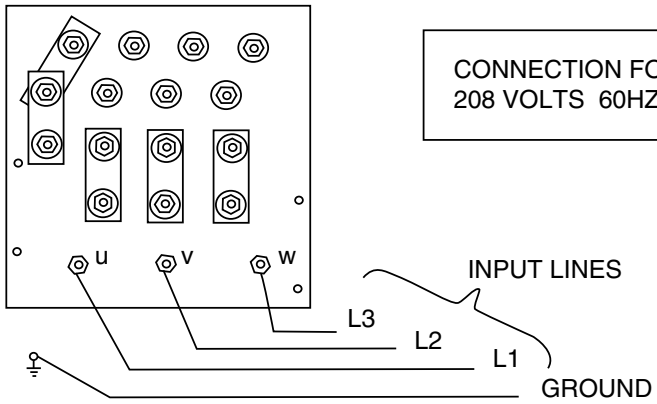
CONNECTION FOR
460 VOLTS 60HZ.

1. Check nuts on terminal board for tightness, then place the copper links in the positions shown. Double up the links in two of the positions to save them for future use. Secure the links tightly with the hex nuts provided. Secure the remaining hex nuts in place for future use.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.



CONNECTION FOR
230 VOLTS 60HZ.

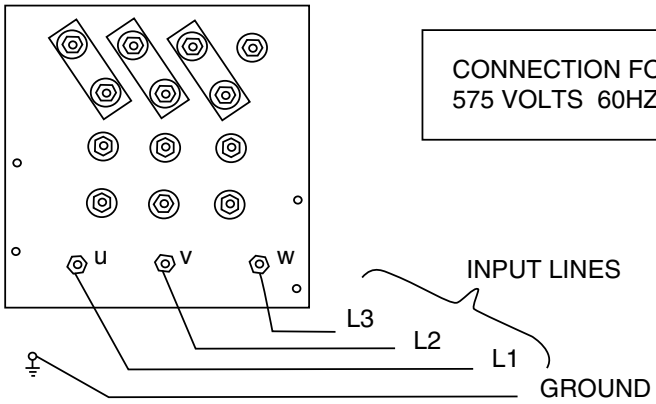
1. Check nuts on terminal board for tightness, then place the copper links in the positions shown. Secure the links tightly with the hex nuts provided.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.



CONNECTION FOR
208 VOLTS 60HZ.

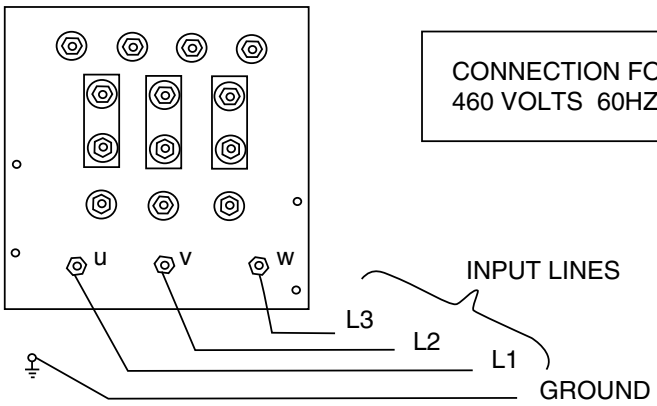
1. Check nuts on terminal board for tightness, then place the copper links in the positions shown. Secure the links tightly with the hex nuts provided.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.

FIGURE A.4 - Reconnect Diagram For 208/230/440 voltage machines.



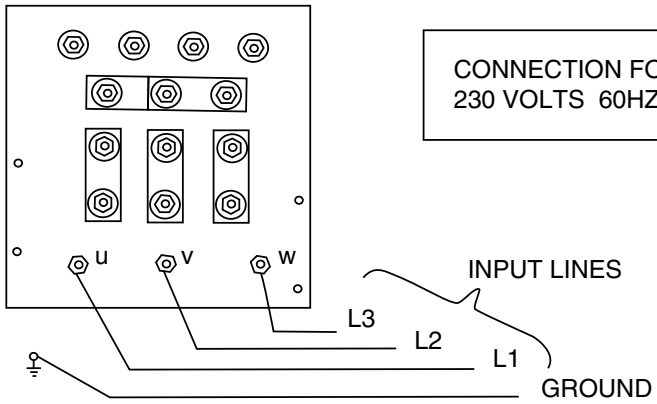
CONNECTION FOR
575 VOLTS 60HZ.

1. Check nuts on terminal board for tightness, then place the copper links in the positions shown. Double up the links in two of the positions to save them for future use. Secure the links tightly with the hex nuts provided. Secure the remaining hex nuts in place for future use.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.



CONNECTION FOR
460 VOLTS 60HZ.

1. Check nuts on terminal board for tightness, then place the copper links in the positions shown. Double up the links in two of the positions to save them for future use. Secure the links tightly with the hex nuts provided. Secure the remaining hex nuts in place for future use.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.



CONNECTION FOR
230 VOLTS 60HZ.

1. Check nuts on terminal board for tightness, then place the copper links in the positions shown. Secure the links tightly with the hex nuts provided.
2. Connect L1, L2, & L3 as shown.
3. Connect terminal marked ⏚ to ground terminal per National Electrical Code.

FIGURE A.5 - Reconnect Diagram for 230/460/575 voltage machines.

Return to Section TOC
Return to Master TOC

CONNECT OUTPUT CABLES

⚠ WARNING

ELECTRIC SHOCK CAN KILL.

TURN THE POWER SWITCH ON THE CV-300 OFF BEFORE MAKING CONNECTIONS TO THE OUTPUT TERMINALS OR WIRE FEEDER RECEPTACLE.

Note: Output cables must have Magnum Twist-Mate plugs for connection to the CV-300. Order K852-95 Magnum Twist-Mate plugs (2 required) for connecting 2/0-3/0 (70-95 mm²) cables. Order K852-95 for connecting 2/0-3/0 (70-95 mm²) cables. Refer to ***Twist-Mate Cable Plug Installation Instructions*** section of this manual.

1. Connect the positive output lead to the terminal marked (+).

2. Connect the negative output lead to either the low inductance terminal marked (⏦) or the high inductance terminal marked (⏦⏦).

Note: Use the proper cable sizes for the work and electrode cables as shown in the following table.

CABLE SIZES FOR COMBINED LENGTHS OF COPPER ELECTRODE AND WORK CABLE

Machine Size	Lengths up to 150 Ft.	Lengths from 150 to 200 Ft.
300/100% (400/60%)	2/0 (70mm^2)	3/0 (95mm^2)

PARALLELING

The CV-300 is not designed to be paralleled with any other power source.

INSTALLATION OF FIELD INSTALLED ACCESSORIES

For installation of compatible field installed accessories, refer to the instructions included with those accessories.

INSTALLATION OF WIRE FEEDERS

Follow the instructions for the wire feeder that will be used. See the ***Accessories*** section of this manual.

TWIST-MATE CABLE PLUG

⚠ WARNING

INSTALLATION INSTRUCTIONS

ELECTRIC SHOCK CAN KILL.

TURN THE POWER SWITCH OF THE WELDING POWER "OFF" BEFORE INSTALLING PLUGS ON CABLES OR WHEN CONNECTING OR DISCONNECTING PLUGS TO WELDING POWER SOURCE.

1 Check that the connector boot is marked for the appropriate cable size per table below; and strip

Boot Marking	American (Metric) Range Cable Size	Cable Skin Length
35-50	#2-#1 (35-50mm^2)	1 inch (25.4mm)
50-70	1/0-2/0(50-70mm^2)	1 inch (25.4mm)
70-95	2/0-3/0(70-95mm^2)	1.5 inch (38.1mm)

the cable jacket to length specified:

2. If necessary, trim the cable end of the boot at groove(s) to match the cable diameter. See ***Figure A.6.*** Boot must fit tightly enough to seal around outside diameter of cable.

NOTE: Some boots are designed to accommodate different cable diameters without trimming. These boots do not have grooves at the cable end. Soap or other non petroleum based lubricant will help to slide the boot over the cable.

3. Slide the rubber boot onto cable end. See ***Figure A.6.***

4. Slide the copper tube into the brass plug. See ***Figure A.6.***

5. Insert cable into the copper tube. See ***Figure A.6.***

6. Tighten the set screw(s) to collapse the tube. The screw(s) must apply firm pressure against welding cable. The top of the set screw(s) will be nearly flush or below the surface of the brass plug after tightening.

7. Slide rubber boot over brass plug. The rubber boot must be positioned to completely cover all electrical surfaces after the plug is locked into the receptacle.

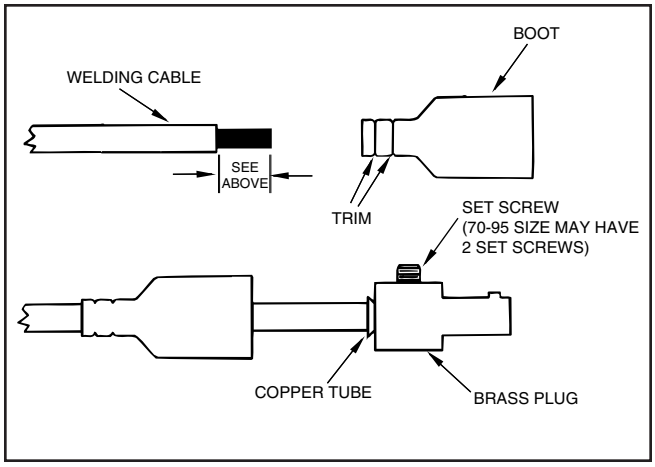


FIGURE A.6 - Installing Twist-Mate Cable Plug.

NOTES

TABLE OF CONTENTS
- OPERATION SECTION -

Read and understand this entire section before operating your Idealarc CV-300.

SAFETY INSTRUCTIONS

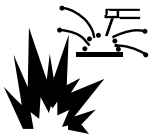
⚠ WARNING

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.

⚠ CAUTION

When using a CV-300 power source with wire feeders, there will be a small spark if the electrode contacts the work or ground within several seconds after releasing the trigger.

When use with some wire feeders with the electrical trigger interlock in the ON position, the arc might restart if the electrode touches the work or ground during these several seconds.

GENERAL DESCRIPTION

Product Description

The IDEALARC CV-300 is a constant voltage DC power source designed for the GMAW process with limited FCAW capability. It features an industrial rating of 300 amps, 32 volts, at 100% duty cycle. It complies with the requirements for a NEMA Class I (100) power source. It is available from the factory in one model only, with no options other than input voltage or frequency.

No options are available other than input voltage.

The IDEALARC CV-300 includes the following features:

- Two inductance positions: operator can choose the optimum output characteristics.
- Solid State Output Contactor: no noise, no moving parts to wear.
- Digital Voltmeter/Ammeter is standard.
- 42 VAC, 10 amp auxiliary power available for the wire feeder.
- Circuit breaker protected.
- 115 VAC, 5 amp auxiliary power available for the wire feeder; circuit breaker protected.

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

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

- Magnum Twist-Mate output receptacles.
- Single MS-type (14-pin) connection for wire feeder.
- Solid state controls, with line voltage compensation.
- Optional remote control capability.
- Simple controls - easy to operate.
- Electronic and thermostatic protection from overloads.
- Submersion dipping of assembled transformer, choke, and rectifier in special sealing/insulating material that gives extra protection against moisture and corrosive atmospheres.
- Microprocessor based Control PC Board has built-in diagnostic routines.
- Compact size, requires only 19" x 26"of space.
- Modular construction for easy servicing.
- Recessed panels protect output terminals and controls.
- Large safety margins and protective circuits protect rectifiers from transient voltages and high currents.

RECOMMENDED PROCESSES AND EQUIPMENT

The CV-300 is capable of solid wire welding within the rated output capacity of the machine. It is capable of welding with the following flux-cored wires:

NR-152
NR-211
NS-3M
NR-203 Ni 1%
Outershields 70 and 71

The CV-300 is recommended for use with the following wire feeders:

LN-7
LN-742
LN-25

Duty Cycle (10-Minute Period)	Amps.	Volts
100%	300	32
60%	400	36

MACHINE CAPABILITY

LIMITATIONS

The CV-300 is intended only for use with the following FCAW electrodes:

NR-152
NR-211
NR-203 Ni 1%
NS-3M
Outershield 70 and 71

The machine has been designed primarily for the GMAW process. The results with FCAW electrodes other than those listed may or may not be satisfactory.

CONTROLS AND SETTINGS

All operator controls and welding connections are located on the Case Front of the machine. See Figure B.1 for the location of each control and connection.

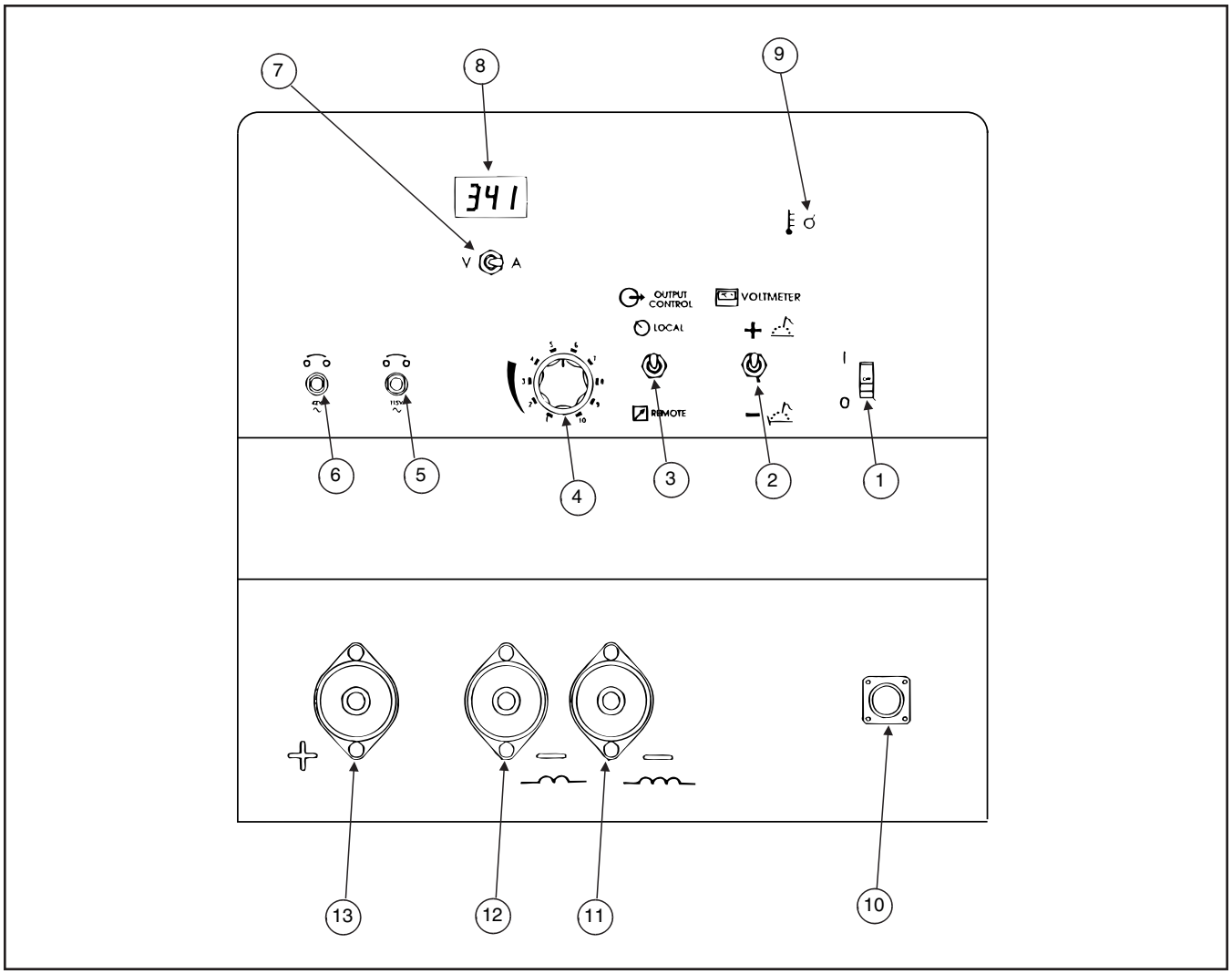


FIGURE B.1- CV-300 Operator Controls and Connections.

1. **ON/OFF POWER SWITCH** - Two position toggle switch that controls input power to the machine.

2. **WIRE FEEDER VOLTMETER SWITCH** - This switch selects the polarity of the wire feeder voltmeter, if so equipped. When welding electrode positive (MIG, Outershield and some Innershield processes) set the switch to "+".

When welding electrode negative (most Innershield electrodes), set the switch to "-".

NOTE: This switch has no effect on the welding polarity. In fact, if the wire feeder being used does not have a voltmeter, the setting of this switch has no effect.

3. **LOCAL/REMOTE SWITCH** - When switch is in the LOCAL position, the welding voltage is controlled at the CV-300. When the switch is the REMOTE position, the welding voltage is controlled remotely by a remote output control.

4. **VOLTAGE ADJUSTMENT CONTROL KNOB** - Controls the CV-300 output voltage.

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

5. **115-VOLT CIRCUIT BREAKER** - Protects the 115-volt 31-32 circuit in the wire feeder receptacle from overloads and shorts. If this circuit breaker opens, the CV-300 will operate normally. However, any equipment powered by the 115-volt circuit will not operate.

NOTE: Earlier models may have one 10amp circuit breaker for both the 115 and 42 volt AC circuits.

6. **42-VOLT CIRCUIT BREAKER** - Protects the 42-volt 41-42 circuit in the wire feeder receptacle from overloads and shorts. If this circuit breaker opens, the CV-300 will operate normally. However, any equipment powered by the 42-volt circuit will not operate.

7. **VOLTS/AMPS SWITCH** - When in the “V” position, output voltage is displayed on the digital meter. When in the “A” position, the output current is displayed on the digital meter.

8. **DIGITAL VOLTMETER/AMMETER** - The meter displays the CV-300 output current or the arc voltage.

NOTE: Due to voltage drops in the welding cables and at the cable connection points, the actual arc voltage may be lower than that displayed on the voltmeter. Use welding cables of the proper capacity and make sure all connections are tight to minimize this effect.

9. **THERMAL PROTECTION INDICATION LIGHT** - When lit, the light indicates that the protection thermostat has activated. The digital meter will display "E10" when this occurs. The machine will not operate. When the light turns off, the machine has cooled sufficiently to provide welding output power again.

NOTE: Leaving the ON/OFF POWER SWITCH in the "ON" position will result in the most rapid cooling.

10. **WIRE FEEDER RECEPTACLE** - This is a 14-pin MS style receptacle. It provides connections for auxiliary power, contactor closure, remote output control, wire feeder voltmeter sense lead, and ground.

11. **HIGH INDUCTANCE NEGATIVE OUTPUT TERMINAL** - The high inductance connection is typically used for short arc welding heavier welds or when using 75% Argon/25% CO shielding gas. This connection produces a softer arc and a flatter bead with more wash-in than the low inductance connection. A spray type transfer is possible with either connection.

12. **LOW INDUCTANCE NEGATIVE OUTPUT TERMINAL** - The low inductance connection is typically used for short arc welding of mild steel, particularly on thin materials or when using CO shielding gas.

13. **POSITIVE OUTPUT TERMINAL**

NOTE: The positive and negative output terminals are Magnum Twist-Mate receptacles. Insert a matching Twist-Mate plug and twist clockwise to engage.

For GMAW processes, and some FCAW processes, the positive output connection goes to the wire feeder. One of the negative output connections goes directly to the work.

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

OPERATING STEPS

STARTING THE MACHINE

Turn the ON/OFF POWER SWITCH to the ON position. See ***Figure B.1.***

ADJUSTING THE OUTPUT VOLTAGE USING THE DIGITAL METER

The digital meter in the CV-300 incorporate a voltage preset function. This allows the operator to set the desired welding voltage before striking an arc. The digital meter can also display welding current.

To make use of the voltage preset function, the Volts/Amps switch must be in the "Volts" position. Turn the Voltage Adjust knob until the digital meter displays the desired welding voltage. (See below if an external power source remote control is installed.)

NOTE: When an arc is struck, the digital meter displays the actual welding voltage, as measured at the CV-300 output terminals. The arc voltage at the electrode may be as much as two volts different from the CV-300 output terminal voltage. This is due to voltage drops present in the welding cables, cable connections, and welding gun. To minimize these drops, use cables of adequate capacity, and make sure all connections are clean and tight. Because of these voltage drops, you may have to preset the CV-300 for a slightly higher welding voltage than your procedure calls for.

To read welding current, set the Volts/Amps switch to the "Amps" position. The welding current will be displayed whenever an arc is struck.

USING LOCAL/REMOTE SWITCH OPERATION

If controlling the voltage at the CV-300, the Local/Remote switch must be in the "Local" position. The Voltage Adjust Knob on the front panel can be used to adjust the CV-300 output. (The remote control, even if connected, will have no effect if the switch is in
the "Local" position).

To use a remote control, such as the K857, place the Local/Remote switch in the "Remote" position. The remote control now controls the output voltage. This control may be adjusted while welding to change the CV-300 output.

USING AUXILIARY POWER

A 42-volt AC auxiliary power source required for some wire feeders is available through the wire feeder receptacle. A 10-amp circuit breaker protects the 42-volt circuit from overloads.

The CV-300 machine can also supply 115 volt AC auxiliary power through the wire feeder receptacle. A 5-amp circuit breaker protects the 115 volt circuit from overloads.

NOTE: Earlier models may have one 10amp circuit breaker for both the 115 and 42 volt AC circuits.

NOTE: Do not use circuits 2 or 4 for control of auxiliary loads because the 2-4 circuit is isolated from the

⚠ CAUTION

31-32 and 41-42 circuits.

Note that some types of equipment, especially pumps and large motors, have starting currents which are significantly higher than their running current. These higher starting currents may cause the circuit breaker to open. If this situation occurs, the user should refrain from using the CV-300 auxiliary power for that equipment.

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

MACHINE AND CIRCUIT PROTECTION

The CV-300 Control PC Board has built-in diagnostic routines to alert the operator when trouble exists. When a trouble condition occurs, the CV-300 meter will display an error code, in the form "EXX"' where "XX" refers to a specific error. See ***Troubleshooting Section*** for an explanation of the error codes.

The power source is thermostatically protected against overload or insufficient cooling. If the machine is overloaded, the thermostat will open, thermal protection indicator light will turn on, and the output will be zero. The fan will continue to run and auxiliary power will still be available. The thermostat will remain open until machine cools, at which time it will close and the output will again be available.

The CV-300 is electronically protected against overloads and accidental short circuits. The overload protection circuit automatically reduces the output current to a safe value when an overload is detected. If the circuitry senses a short circuit, it will shut off the CV-300 output. The short circuit protection circuit can be reset by turning the CV-300 Power Switch OFF for at least 10 seconds. Remove the short before turning the Power Switch ON again.

NOTES

TABLE OF CONTENTS
- ACCESSORIES SECTION -

Return to Section TOC
Return to Master TOC

FIELD INSTALLED ACCESSORIES

NOTE: The instructions for installing and operating each accessory is included with the accessory.

REMOTE VOLTAGE CONTROL (K857)

The K857 Remote Voltage Control consists of a control box with 25 feet (7.6 m) of four conductor cable. Installation of a K857 Remote Voltage Control in the CV-300 requires a K864 Remote Control Adapter. Refer to the instructions provided with the K857 for hookup to the CV-300. When properly connected and the CV-300 LOCAL/REMOTE SWITCH in the "Remote" position, the K857 functions the same as the CV-300 Voltage Adjust control. This enables minimum to maximum output voltage adjustment of the CV-300.

ONE CYLINDER UNDERCARRIAGE (K835)

The undercarriage includes front casters, a handle, a bracket, and a rear wheeled platform that is capable of carrying one gas cylinder. The CV-300 lifting eye is not functional with the K835 undercarriage installed.

TWO CYLINDER UNDERCARRIAGE (K874)

The two-cylinder undercarriage platform type can accommodate either one or two gas bottles, or one gas bottle and a Magnum water cooler. The CV-300 lifting eye is not functional when the K874 undercarriage is installed.

WIRE FEEDER SWIVEL MOUNT (K178-1)

This allows an LN-7 or LN-742 to be securely mounted on the roof of a CV-300.

UNIVERSAL ADAPTER (K867)

This provides a means of connecting auxiliary equipment to the wire feeder receptacle on the CV-300 power source. It consists of a 14-pin MS-type (Amphenol) plug with 8-inch (0.2 meter) long flex leads, one for each circuit present in the wire feeder receptacle. This adapter is not required when using a standard Lincoln Electric wire feeder input cable, such as a K480.

CONNECTING WIRE FEEDER TO THE CV-300

Based on the type of wire feeder being used follow the directions for connecting it to the CV-300.

The CV-300 is intended for use with the LN-7, LN-742, and LN-25 wire feed units. Use the Cables/Kits listed

LN-7/LN-7GMA	Requires K480 Input Cable
LN-25	Requires K484 Jumper Plug Kit
LN-25 w/K444-1 Remote Voltage Control Kit	Requires K464 Remote Control Adapter and K484 Jumper Plug Kit
LN-742/LN-742H	Requires K591 Input Cable

below to make connection easily:

LN-7 TO CV-300

1. Turn the ON/OFF POWER SWITCH to OFF.
2. Connect the LN-7 control cable to the wire feeder receptacle on the CV-300.
3. Connect the work and electrode cables.
   a. Connect the positive output lead to the terminal marked (+).
   b. Connect the negative output lead to either the low inductance terminal marked ( ) or the high inductance terminal marked ( ).

LN-25 TO CV-300

1. Turn the ON/OFF POWER SWITCH to OFF.
2. Plug a K484 jumper plug into the CV-300 wire feeder receptacle.
3. Connect the work and electrode cables.
   a. Connect the positive output lead to the terminal marked (+).
   b. Connect the negative output lead to either the low inductance terminal marked (⎓) or the high inductance terminal marked (⎓⎓).

⚠ WARNING

The output terminals are energized at all times when the K484 is plugged in.

LN-742 TO CV-300

1. Turn the ON/OFF POWER SWITCH to OFF.
2. Connect the LN-742 control cable to the wire feeder receptacle on the CV-300.
3. Connect the work and electrode cables.
   a. Connect the positive output lead to the terminal marked (+).
   b. Connect the negative output lead to either the low inductance terminal marked (⎓) or the high inductance terminal marked (⎓⎓).

CONNECTING REMOTE CONTROL (K857) TO CV-300

1. Turn the ON/OFF POWER SWITCH to OFF.

NOTE: The K864 Remote Control Adapter is required to install the K857.

2. Plug the K864 Remote Control Adapter into the power source's 14-pin receptacle.
3. Plug the K857 Remote Control into the 6-pin receptacle of the K864 adapter. If possible, tape the Remote cable to the heavy output leads, so they can protect the smaller Remote Control cable from damage and abuse.

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

NOTES

TABLE OF CONTENTS
- MAINTENANCE SECTION -

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

SAFETY PRECAUTIONS

⚠ WARNING

- **Have a qualified technician do the maintenance and troubleshooting work.**
- **Disconnect input power at main input supply prior to working inside machine.**

Read the Safety Precautions in the front of this manual before working on this machine.

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, 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.
Fan Motor Assembly.

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

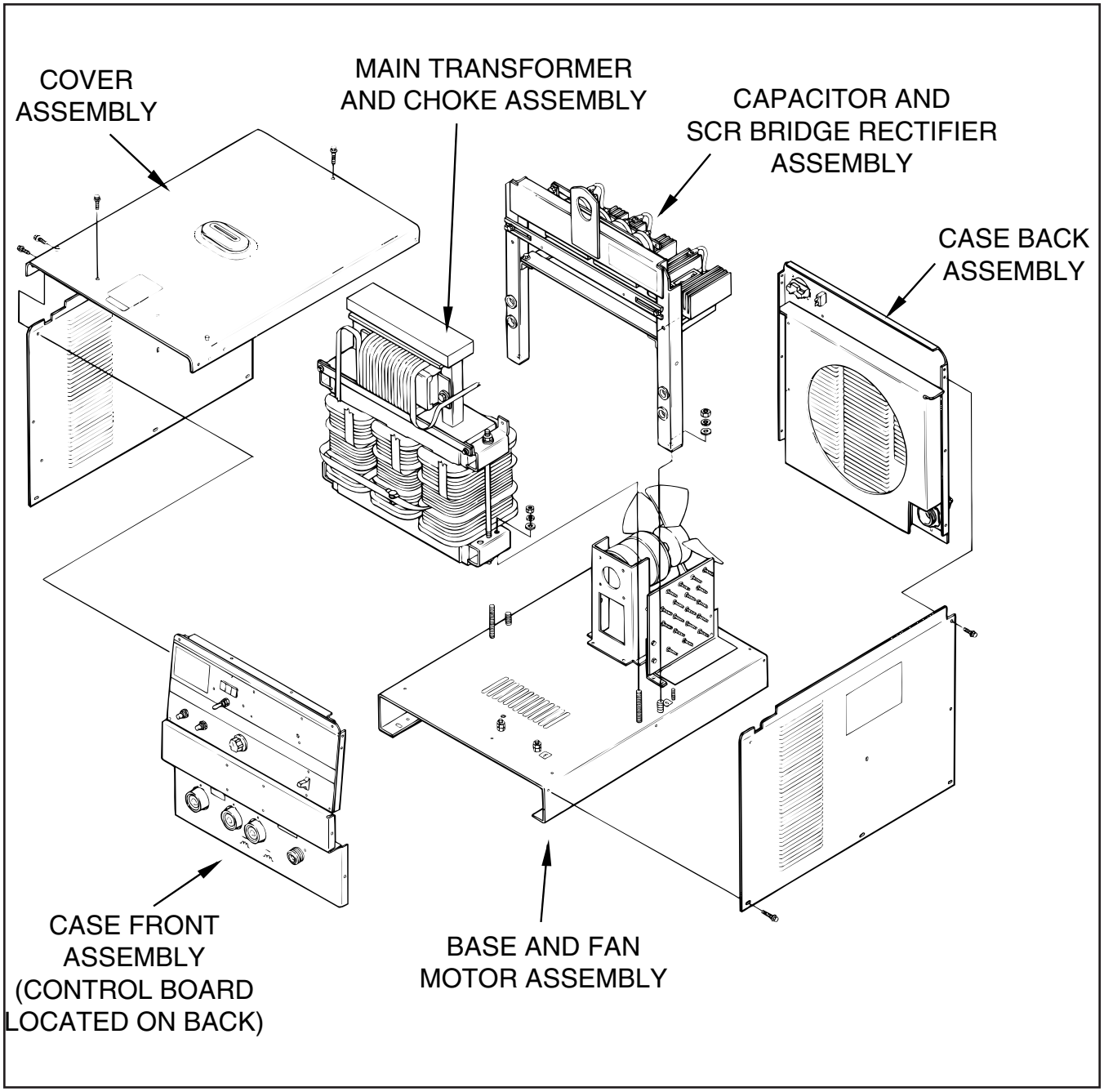


Figure D.1 - Component Locations.

NOTES

TABLE OF CONTENTS
- THEORY OF OPERATION SECTION -

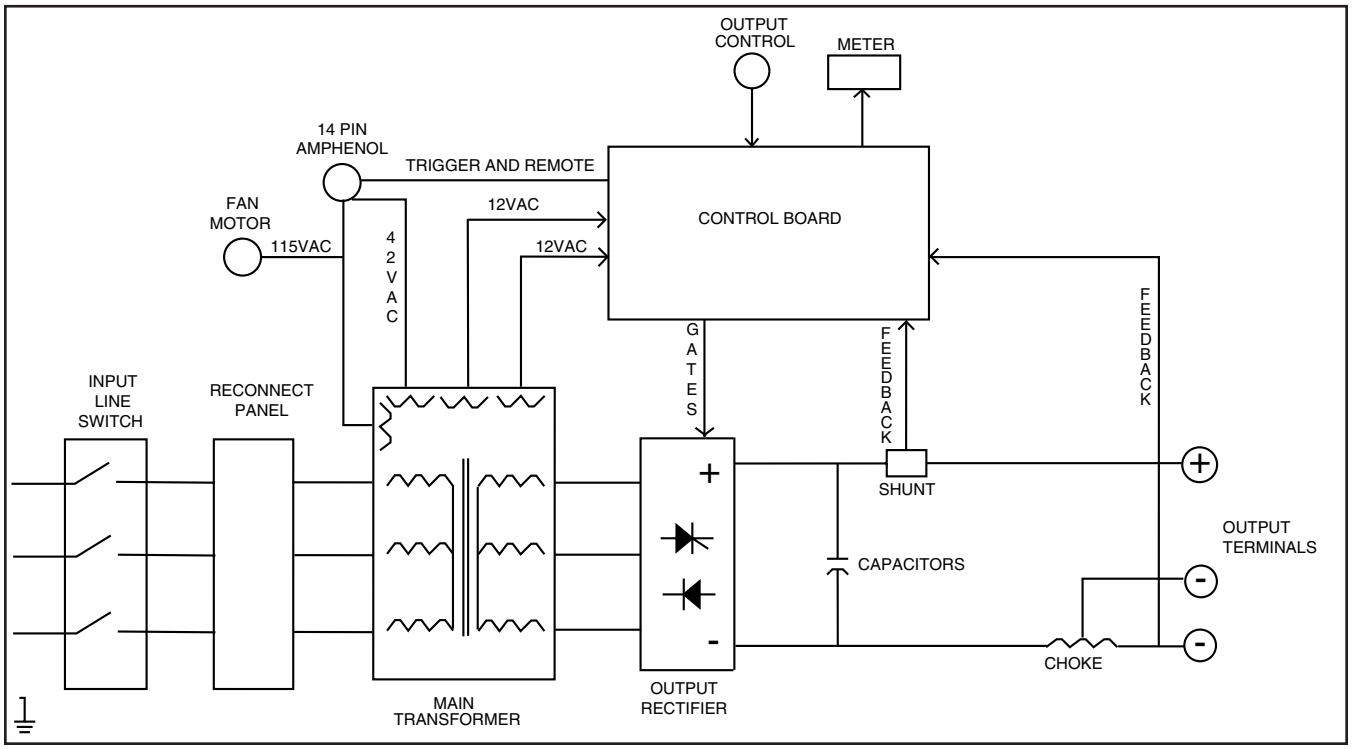


Figure E.1 - Block Logic Diagram.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

POWER SUPPLY OPERATION

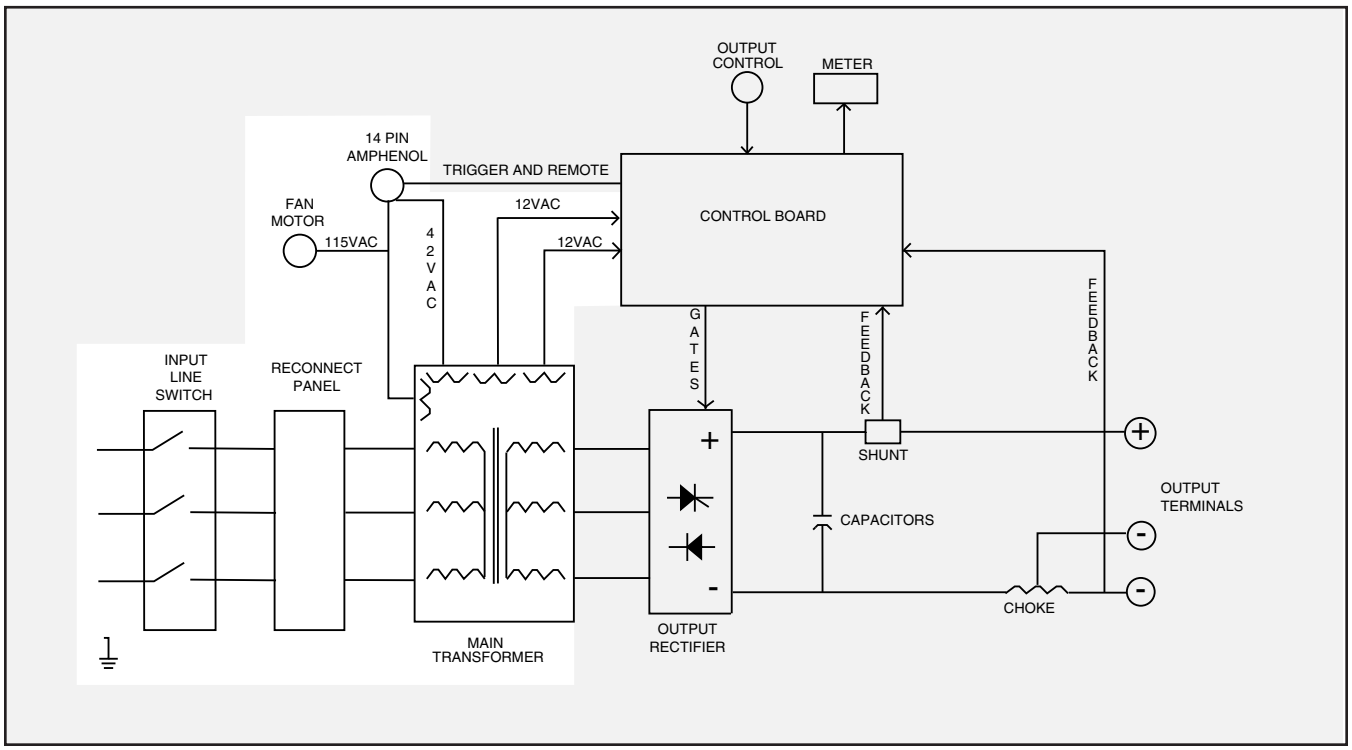


Figure E.2 - Input Line Voltage, Line Switch and Main Transformer

INPUT LINE VOLTAGE, LINE SWITCH AND MAIN TRANSFORMER

The desired three phase input power is connected to the CV 300 through an input line switch located on the front of the machine. 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 main transformer changes the high voltage, 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 three starts of the secondary windings are connected to the rectifier assembly. In addition the main transformer also has several isolated auxiliary windings. The 115 VAC auxiliary winding supplies power to operate the cooling fan and offers up to 5 amps to operate wire feeding equipment. A separate 42 VAC winding is connected to the 14 pin amphenol to supply up to 10 amps for 42 VAC wire feeders. The two isolated 12 VAC coils supply power and gate firing timing information to the control board.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

POWER SUPPLY OPERATION (CONTINUED)

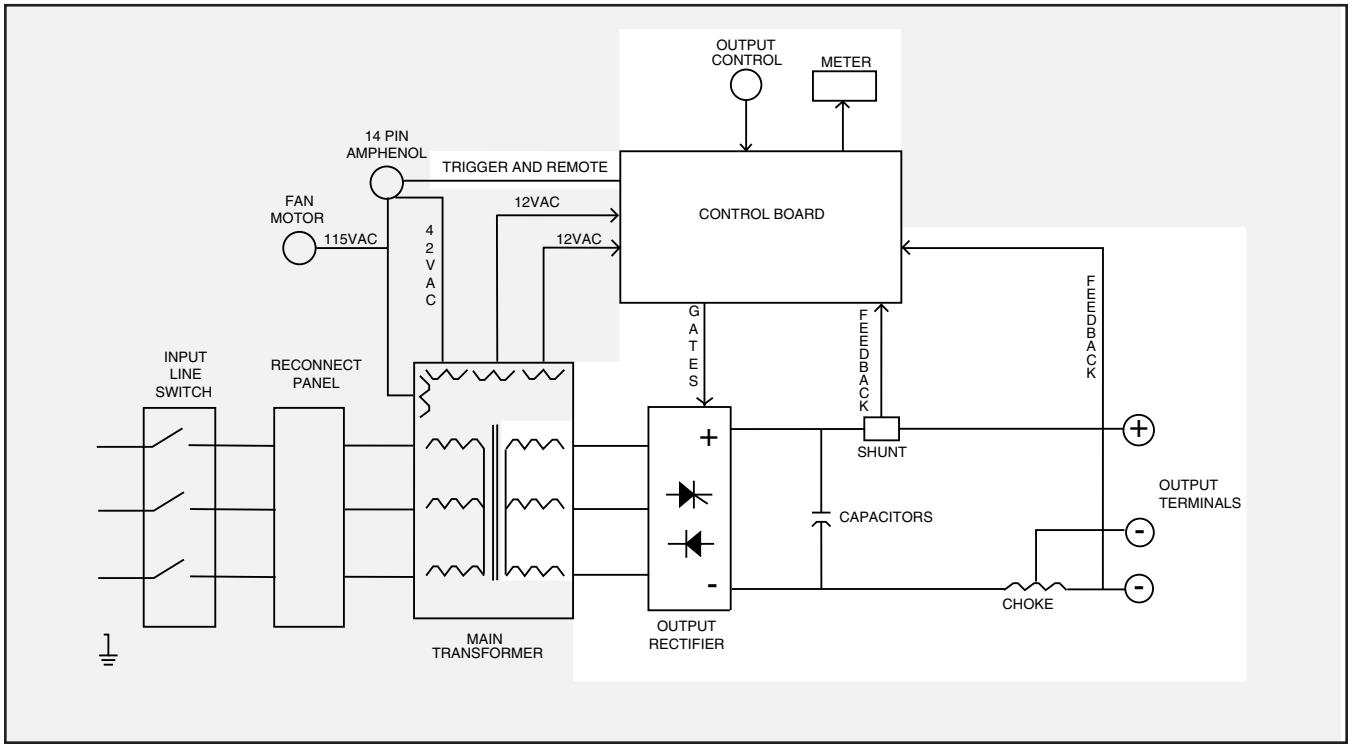


Figure E.3 - Output Rectification, Filtering, Control and Feedback

OUTPUT RECTIFICATION, FILTERING, CONTROL AND FEEDBACK

The main transformer secondary windings are connected to an SCR/Diode hybrid rectifier bridge. This three phase AC output from the main transformer secondary is rectified and controlled through the rectifier bridge. Output current and voltage are sensed at the shunt and the output terminals and fed back to the control board. This feedback information is processed in the control board. The control board compares the commands of the output control potentiometer (or remote control) with the feedback information and sends the appropriate gate firing signals to the rectifier bridge. The control board also supplies power and signals to the meter board.

The capacitors and the output choke provide the filtering for the controlled DC output of the CV 300 machine. The choke is tapped for supplying either a soft (high inductance) or a more harsh (low inductance) welding arc.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

PROTECTION DEVICES AND CIRCUITS

A thermostat protects the CV-300 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 will open and deactivate the machine's output. The thermal protection light will light (on earlier codes the pilot light will flash) and the fan will continue to run. The thermostat will remain open until the machine cools, at which time the machine will resume normal operation. 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 CV-300 is also protected against high current overloads. If this electronic protection circuit senses a current overload the machine's output will be disabled. The electronic protection circuit can be reset either by turning the line switch off for ten seconds or by opening the trigger circuit (leads #2 and #4) for five seconds.

SCR OPERATION

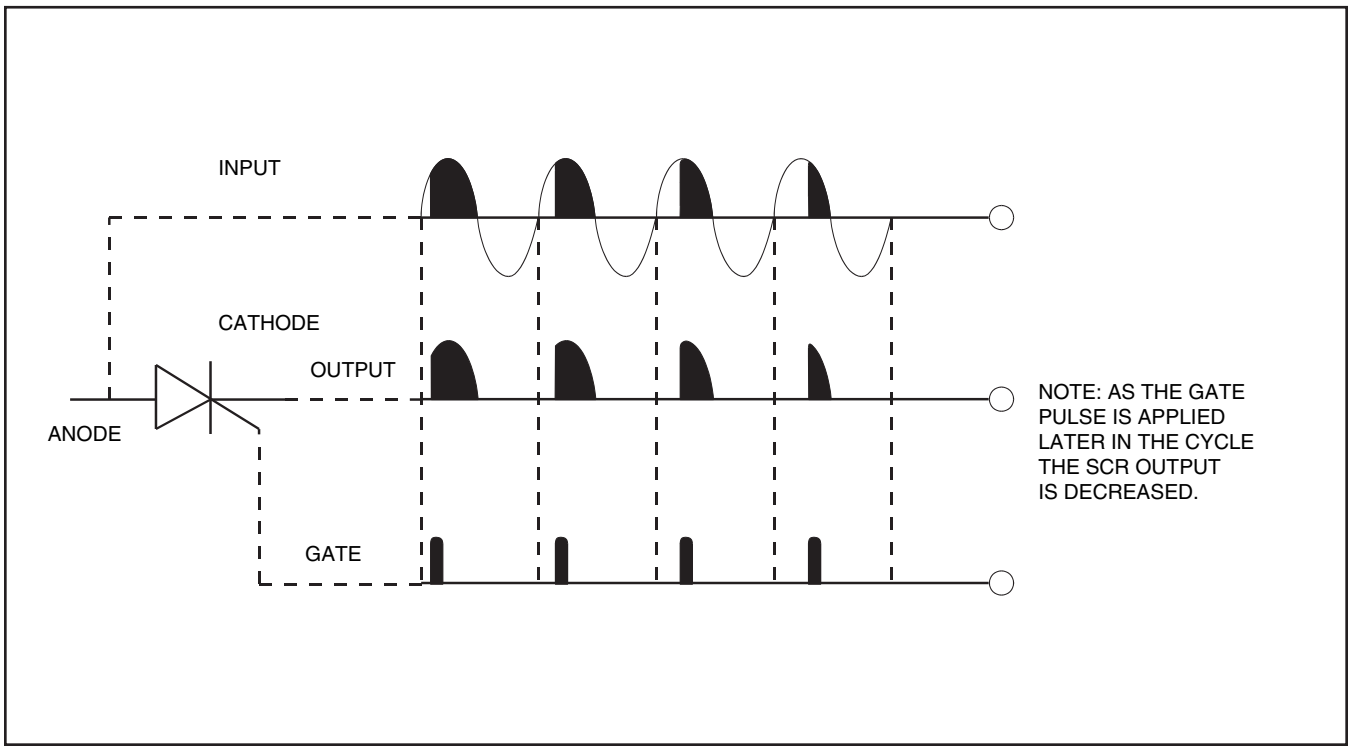


Figure E.4 - SCR Operation

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 off state and the remainder of the time in the on 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 0.6V. 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.

Return to Section TOC
Return to Master TOC

NOTES

TABLE OF CONTENTS
- TROUBLESHOOTING & REPAIR SECTION -

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

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 1-888-935-3877.

Return to Section TOC
Return to Master TOC

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:

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

Reusable Container
Do Not Destroy

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

- 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.

Return to Section TOC
Return to Master TOC

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major Physical or Electrical Damage is Evident	1. Contact your local Lincoln Electric Authorized Field Service Facility.	1. Contact The Lincoln Electric Service Dept. (216) 383-2531 or 1-888-935-3877
Machine is dead - No output, no fan, no display.	1. Check for blown or missing fuses in the input line. 2. Check the three phase input line voltage at the machine. Input voltage must match the rating plate and the reconnect panel.	1. Check input line switch may be faulty. Check or replace. 2. Remove the input power and check for loose or broken leads at the reconnect panel and at the main transformer primary coils. 3. Perform ***Main Transformer Test***.
The machine has no output. The fan runs and the display lights.	1. Make sure the thermal light is NOT lit (earlier codes the pilot light is NOT blinking). If either condition exists, then the machine may be overheated. 2. If an error message is displayed, see ***Explanation of Error Messages.*** 3. Make sure the three phase input voltage matches the reconnect panel configuration and that all three phases are applied to the machine. 4. Place a jumper wire from pin "C" to pin "D" at the 14 pin amphenol connection. If output is restored, then check the wirefeeder and associated control cable. 5. Place the remote switch in machine control. If output is restored, then the remote control unit may be faulty. Check or replace.	1. Check the trigger circuit (#2 and #4) for continuity from the 14 pin amphenol to the control board. See wiring diagram. 2. If the machine has output in machine control but not in remote control, check the remote switch (S4). Check the wiring to the control board and to the 14 pin amphenol. 3. Perform the ***Main Transformer Test.*** 4. Perform the ***Output Rectifier Bridge Test.*** 5. Check the latching resistor (R1) and the associated leads. See wiring diagram. 6. Check for leaking or faulty capacitors. 7. Check for loose or faulty connections at the output terminals and the heavy current carrying leads. 8. 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 1-888-935-3877

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
The machine has low output and no control. The fan runs and the display is lit.	1. Place the remote switch in machine control. If normal output is restored then the remote control unit may be faulty. Check or replace. 2. If an error message is displayed see ***Explanation of Error Messages***. 3. Make sure the three phase input voltage matches the reconnect panel configuration and that all three phases are applied to the machine.	1. If the machine has normal output in machine control, but not in remote control, check the remote switch (S4). Check the wiring to the control board and to the 14 pin amphenol. 2. If the machine has low output in machine control check the output control (R2) and associated leads. 3. Check the feedback leads from the shunt and the output terminals to the control board. See wiring diagram. 4. Perform the ***Main Transformer Test.*** 5. Perform the ***Output Rectifier Bridge Test.*** 6. Check the latching resistor (R1) and the associated leads. See wiring diagram. 7. Check for loose or faulty connections at the output terminals and the heavy current carrying leads. 8. 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 1-888-935-3877

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

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Machine has high output and no control.	1. Place the remote switch in machine control. If normal output is restored then the remote control unit may be faulty. Check or replace. 2. Turn off the machine. Wait one minute. If the problem is resolved when restarted, switch positions of any two of the input lines.	1. Perform the ***Main Transformer Test.*** 2. Perform the ***Output Rectifier Bridge Test.*** 3. Check the output control (R2) and associated leads. 4. The control board may be faulty. Replace.
Machine does not have maximum output.	1. Place the remote switch in machine control. If normal output is restored then the remote control unit may be faulty. Check or replace. 2. The input voltage may be "dipping" when the machine is under load. Check. 3. Make sure all three input phases are applied to the machine.	1. Check the output control (R2) and associated leads. 2. Perform the ***Main Transformer Test.*** 3. Perform the ***Output Rectifier Bridge Test.*** 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 1-888-935-3877

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

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The meter does not light. The machine operates properly.	1. The meter board may be faulty. Contact your local Lincoln Authorized Field Service Facility.	1. Check for 5 VDC from lead #208(+) to lead #210(-) at plug J7 located on the meter board. If the correct voltage is present the meter board may be faulty. Replace. 2. If the correct voltage is NOT present at leads #208 and #210, then check the continuity (zero ohms) of the leads between plugs J4 and J7. See wiring diagram. 3. If the leads and connections are good and the voltage is NOT correct, then the control board may be faulty. Replace.
The meter display reading is incorrect.	1. The meter voltage reading may be different then the actual arc voltage because the CV-300 meter is measuring voltage at the machine's output terminals. There may be a voltage drop in the welding cables.	1. Check the continuity (zero ohms) of the leads between plug J7 on the meter board and plug J4 on the control board. 2. Check for loose or faulty connections on the feedback leads #219, #218, #213B, #214B and #224B. See wiring diagram. 3. Check the connections at the shunt. See wiring diagram. 4. The meter board may be faulty. Replace. 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 1-888-935-3877

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The machine will NOT shut off.	1. Make sure the three phase input lines are connected to the machine correctly. 2. Contact your local Lincoln Authorized Field Service Facility.	1. The input line switch may be faulty. Replace.
The output voltage cannot be pre-set.	1. Place the remote switch in machine control. If normal operation is restored then the remote control unit may be faulty. Check or replace. 2. If an error message is displayed see ***Explanation of Error Messages***.	1. Check the output control (R2) and associated circuitry. 2. The meter board may be faulty. Replace. 3. 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 1-888-935-3877

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

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The output voltage cannot be pre-set.	1. Place the remote switch in machine control. If normal operation is restored then the remote control unit may be faulty. Check or replace. 2. If an error message is displayed see ***Explanation of Error Messages***.	1. Check the output control (R2) and associated circuitry. 2. The meter board may be faulty. Replace. 3. The control Board may be faulty. Replace.
The weld output terminals are always electrically “hot”.	1. Remove any control cable that may be connected to the 14 pin amphenol. If the problem is resolved the fault is in the control cable or the wire feeder. 2. If some open circuit voltage is present (over 3 VDC.) after performing Step #1 then the problem is within the CV300. Contact your local Lincoln Authorized Field Service Facility.	1. Check for an internal short between leads #2 and #4. See wiring diagram. 2. Perform the ***Output Rectifier Bridge Test***. 3. The snubber 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 your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

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

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The welding arc is variable and sluggish.	1. Check the welding cable connections for loose or faulty connections. 2. Make sure the wire feed speed, voltage, and shielding gas are correct for the process being used.	1. Perform the ***Output Rectifier Bridge Test.*** 2. The control board may be faulty. Replace.
The arc striking is poor.	1. Check the welding cable connections for loose or faulty connections. 2. Make sure the wire feed speed, voltage, and shielding gas are correct for the process being used.	1. 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 1-888-935-3877

Return to Section TOC
Return to Master TOC

DIAGNOSTIC ROUTINES AND ERROR CODES

The CV-300 Meter PC Board displays error codes when certain trouble conditions exist. The error codes, trouble conditions and possible remedies are listed below.

ERROR CODE	TROUBLE	REMEDY
E00	1. Output short circuited. 2. May be encountered while starting or welding with 1/16" aluminum wire.	1. Turn power off. Remove short circuit. 2. (a) Turn power off to clear error. Use recommended wfs, voltage settings and angle of approach of wire to work. (b) If problem persists, call Lincoln Authorized Field Service Facility.
E10	Thermostat circuit has opened.	Allow machine to cool. Be sure to provide adequate ventilation to machine.
E20	Memory error.	Perform ***Main Transformer Test*** to verify PC Board input voltages. Control Board may be faulty.
E30	1. Voltage Adjust potentiometer not connected. 2. Remote Control not functioning correctly.	1. Check wiring between Voltage Adjust and the Control PC Board. 2. See ***Troubleshooting Guide (Function Problems)***.
E40	Input line voltage too low.	Turn Power off. Insure machine input voltage is within specifications. Turn power back on.
E50	Input line voltage too high.	Turn Power off. Insure machine input voltage is within specifications. Turn power back on.
E60	Overload condition.	Reduce load on machine.

If, after attempting the remedies listed above, the error condition still exists, the problem may be with the wiring in the following areas: the shunt (leads 218 and 219), or voltage feedback (leads 213B, 214B, and 224B).

⚠ 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 1-888-935-3877

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

MAIN TRANSFORMER 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 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the correct voltages are being:

a. Applied to the primary windings of the Main Transformer.

b. Induced on the secondary and auxiliary windings of the main transformer.

MATERIALS NEEDED

Volt-Ohm Meter (Multimeter).
IDEALARC CV-300 wiring diagrams (See Electrical Diagrams Sections of this manual).

Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER TEST (CONTINUED)

TEST PROCEDURE

⚠ WARNING

The ON/OFF POWER SWITCH will be "hot" during these tests.

NOTE: Secondary voltages will vary proportionably with the primary AC input voltage.

1. Disconnect the main input power to the machine.
2. Remove the case roof and case side panels.
3. Test for correct three-phase voltage being applied to the main transformer.
   a. If the correct three-phase voltage is being applied to the main transformer, continue test.
   b. If the incorrect three-phase voltage is not being applied to the main transformer, correct before proceeding with test.
4. Locate plug J3 on the Control PC Board.
5. Locate the following leads on plug J3: #200, #201, #202, and #203.
6. Re-connect main input power to the machine.
7. Turn the ON/OFF POWER SWITCH to ON.
8. Test for 12 VAC

FROM LEAD	TO LEAD
#200	#201
#202	#203

   a. Insert the meter probes carefully into the back of each Molex Plug pin cavity until electrical contact is made to perform the test.
9. Locate lead # 33 connected to circuit breaker CB2 and pin "J" (lead #31) on the 14 pin amphenol connector located on the Case Front. See Figure F.1.

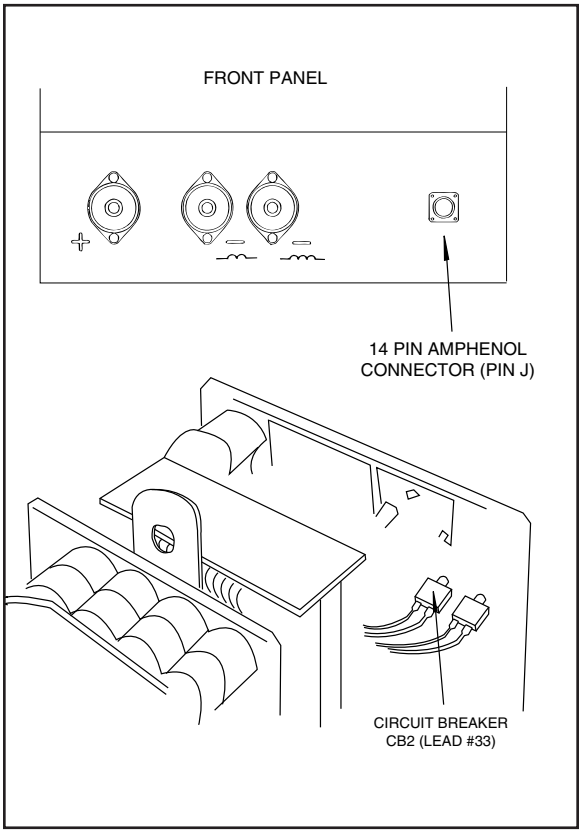


FIGURE F.1 - Main Transformer Test Points.

10. Test for 115 VAC between lead #33 at circuit breaker and pin "J" (lead #31) on the amphenol connector.
    a. If voltage is missing, check for loose or broken wires between test points and main transformer. See CV-300 wiring diagram.
    b. If voltage is present, continue test.

MAIN TRANSFORMER TEST (CONTINUED)

11. Locate lead #42A (lead #33 on machine codes below 9900) connected to circuit breaker CB1 and pin "I" on the 14 pin amphenol connector on the Case Front. See Figure F.2.

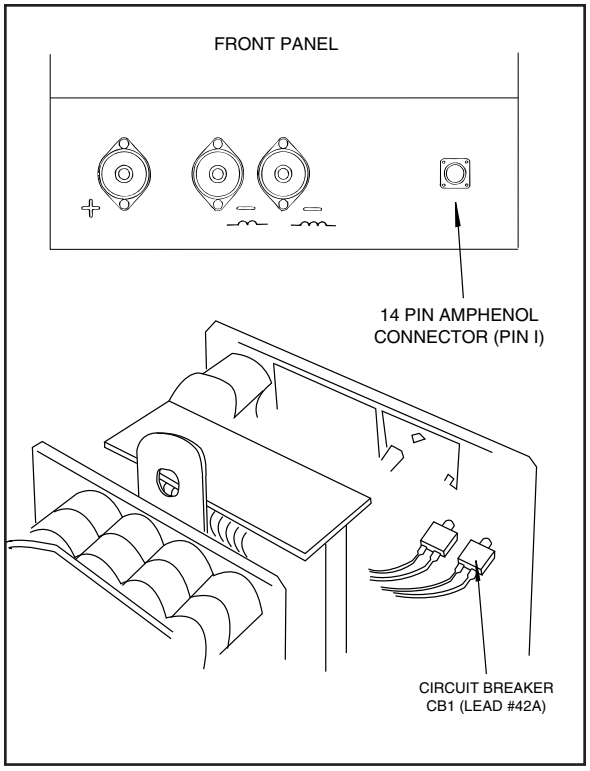


FIGURE F.2 - Main Transformer Test Points.

12. Test for 42 VAC between lead #42A at the circuit breaker (lead #33 on machine codes below 9900) and pin "I" on the on the amphenol connector.

    a. If voltage is missing, check for loose or broken wires between the test points and the main transformer. See wiring diagram.

    b. If voltage is present, continue test.

13. Locate the following heavy leads connected to output rectifier bridge: #221, #222, and #223. See Figure F.3.

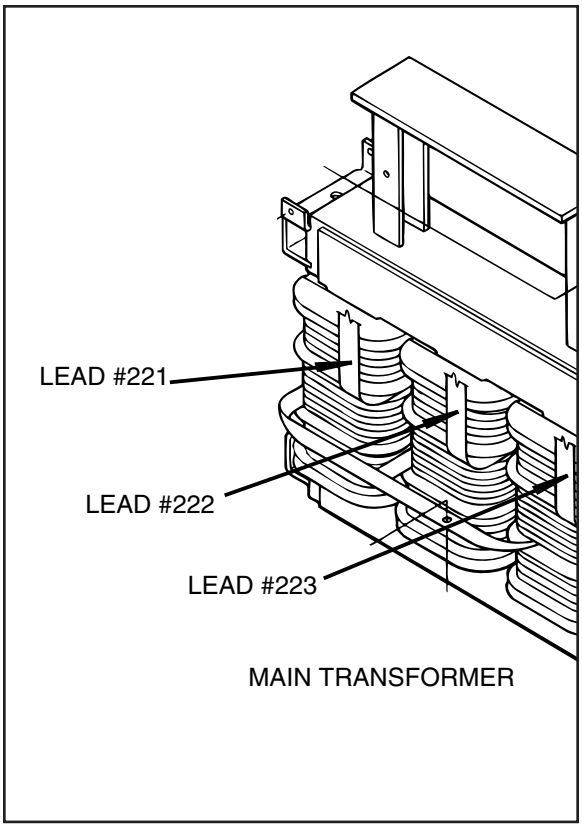


FIGURE F.3 - Location of leads #221, #222, and #223.

14. Test for 36 VAC.

FROM LEAD	TO LEAD
#221	#222
#223	#221
#222	#223

15. If the correct three-phase input voltage is being applied to the main transformer and some or all of the secondary voltages are incorrect or missing, the transformer may be faulty. Replace.

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

STATIC OUTPUT RECTIFIER BRIDGE 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 1-888-935-3877.

TEST DESCRIPTION

This test is used to quickly determine if an SCR or diode is shorted or "leaky." See the Machine Waveform Section in this manual for normal and abnormal output waveforms.

MATERIALS NEEDED

Analog Volt-Ohm Meter (Multimeter).
CV-300 Wiring Diagrams (See Electrical Diagrams Section of this Manual).
1/2" Wrench.
7/16" Wrench.

STATIC OUTPUT RECTIFIER BRIDGE TEST (CONTINUED)

TEST PROCEDURE

1. Disconnect main AC input power to the machine.

2. Locate and remove the following plugs:

Note: Location of plugs will vary depending on code.

PLUG	LOCATION
J5	Snubber board
J1	Control board
J3	Control Board

See Figure F.4.

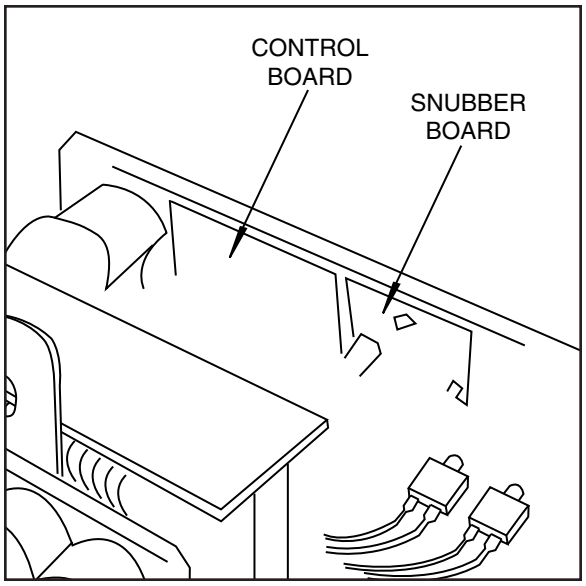


FIGURE F.4 - Plug locations. Location of plugs will vary depending on code.

3. Locate resistor R1 and remove lead #224. See wiring diagram

4. Disconnect the strap from the positive heat sink to the capacitor bank using a 1/2" wrench. See Figure F.5.

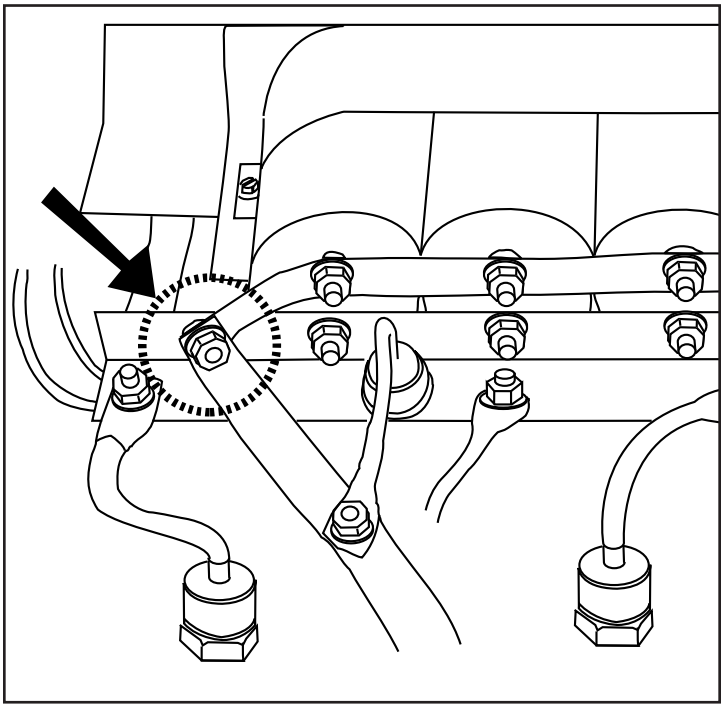


FIGURE F.5 - Procedure to disconnect the strap from the positive heat sink to the capacitor bank.

5. Disconnect the D5 diode pigtail from the negative capacitor buss using a 1/2" wrench. See Figure F.6.

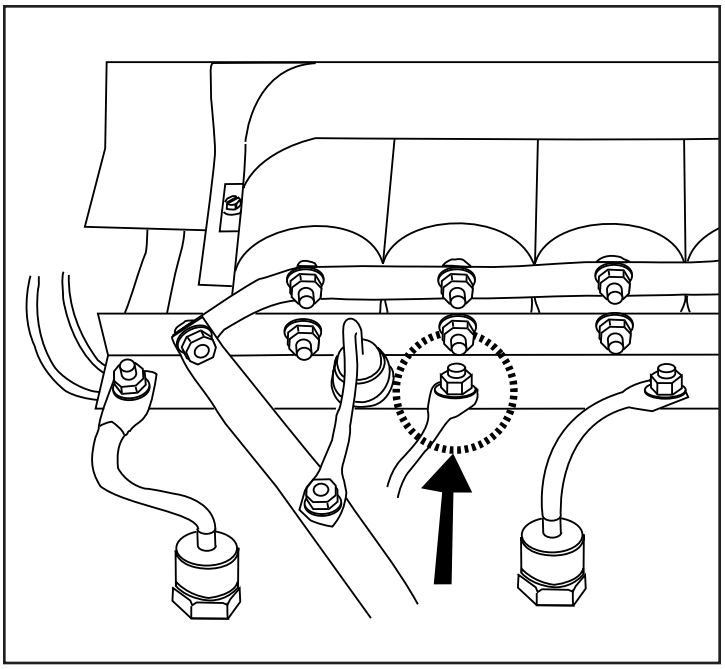
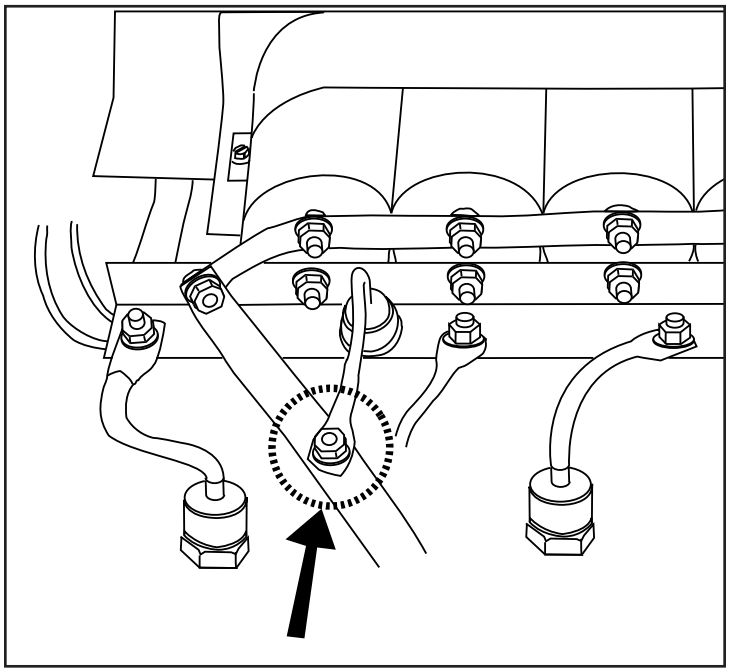


FIGURE F.6 - Procedure to disconnect the D5 diode pigtail from the negative capacitor buss.

STATIC OUTPUT RECTIFIER BRIDGE TEST (CONTINUED)

6. Disconnect the D4 diode pigtail from the positive strap. See Figure



F.7.

FIGURE F.7 - Procedure to disconnect the D4 diode pigtail from the positive strap.

7. Remove the red insulating paint from the heat sink test points. See

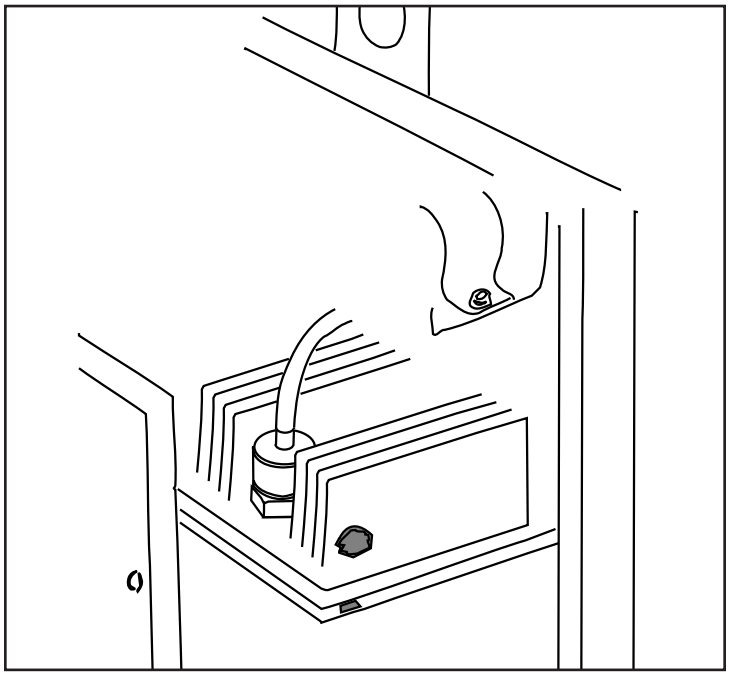
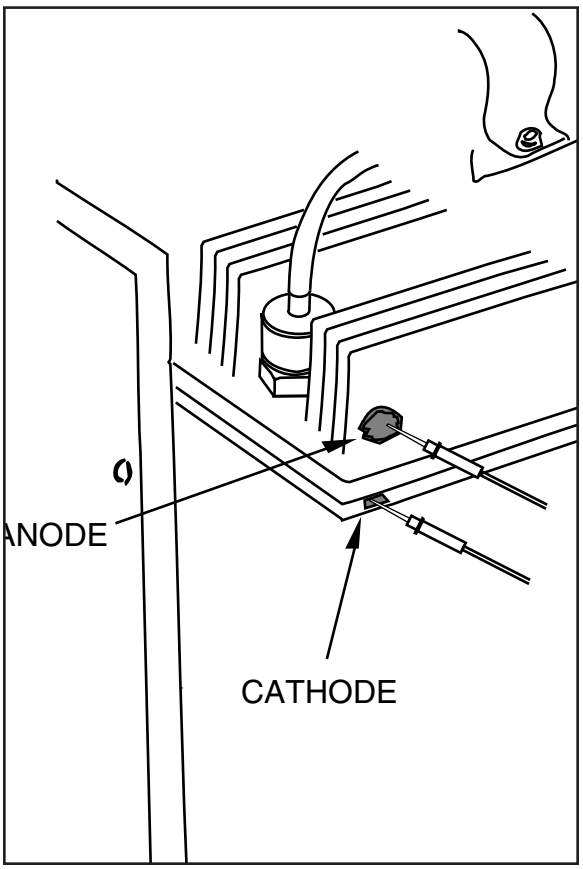


Figure F.8.

FIGURE F.8 - Heat sink test points.
NOTE: DO NOT DISASSEMBLE THE HEAT SINKS.

8. Test SCR1 for proper resistance. Resistance should be high or infinite.

   a. Measure the resistance from the anode to cathode of SCR1 using an analog volt-ohm meter (Multi meter) set at R X 1000



scale. See Figure F.9.

FIGURE F.9 - SCR test points.

   b. Reverse the meter leads and measure the resistance from the cathode to anode of SCR1. See Figure F.9.

   c. If a low resistance is measured for either test a or b, SCR1 is faulty. Replace the SCR assembly.

9. Test the resistance of SCR2 and SCR3 using the same procedure

STATIC OUTPUT RECTIFIER BRIDGE TEST (CONTINUED)

10. Test diode D1 for proper operation.

    a. Measure the resistance of diode D1 from the anode (+ probe) to the cathode (- probe) using an analog volt-ohm meter (Multimeter) set at R X 1000 scale. Resistance should be low. See Figure F.10.

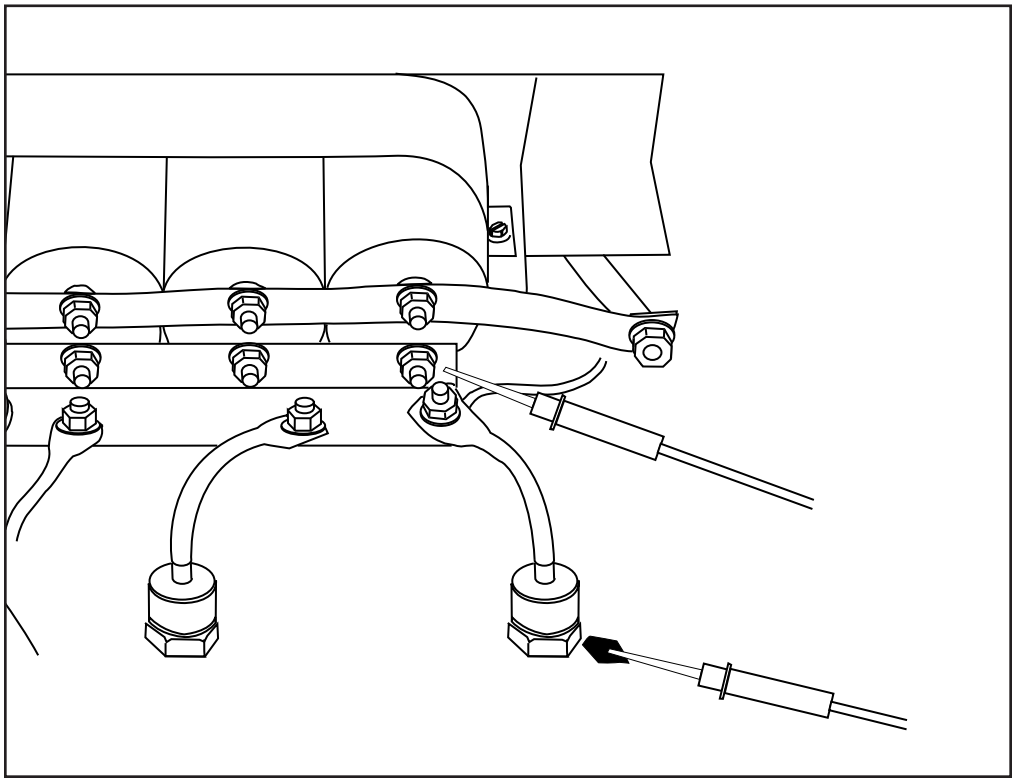


FIGURE F.10 - Diode D1 test points.

    b. Reverse the meter leads and measure the resistance from the cathode (+ probe) to anode (- probe) of D1. Resistance should be High. See Figure F.10.

    c. If the resistance is low for both tests a and b, the diode is shorted. Replace.

    d. If the resistance is high for both test a and b, the diode is open. Replace.

11. Test Diodes D2, D3, and D4 for proper operation using the same procedure described in Step 10.

12. Reconnect all leads and Molex plugs disconnected for this test.

13. If this test did not identify the problem or to further test the SCR, go to the ***Active SCR Test***.

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

ACTIVE SCR RECTIFIER ASSEMBLY 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 1-888-935-3877.

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 specified in this procedure.
IDEALARC CV-300 wiring diagrams (See Electrical Diagrams Section of this Manual).
Output Rectifier Bridge Heat Sink Assembly Drawings.

ACTIVE SCR RECTIFIER ASSEMBLY TEST (CONTINUED)

TEST PROCEDURE

1. Disconnect main AC input power to the machine.

2. Locate and remove the following plugs:

PLUG #	LOCATION
J5	Snubber board
J1	Control board
J3	Control Board

See Figure F.11.

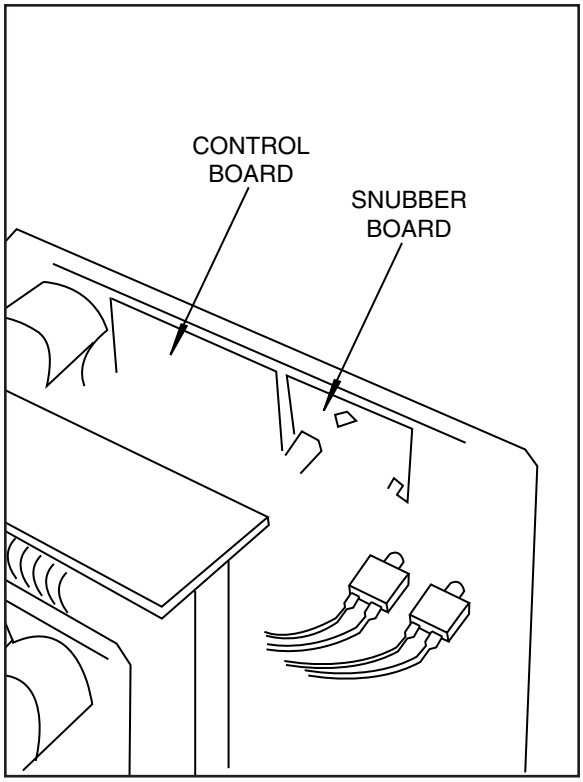


FIGURE F.11 - Molex plug locations.

3. Locate resistor R1 and remove lead #224. See wiring diagram.

4. Disconnect the strap from the positive heat sink to the capacitor bank using a 1/2" wrench. See Figure F.12.

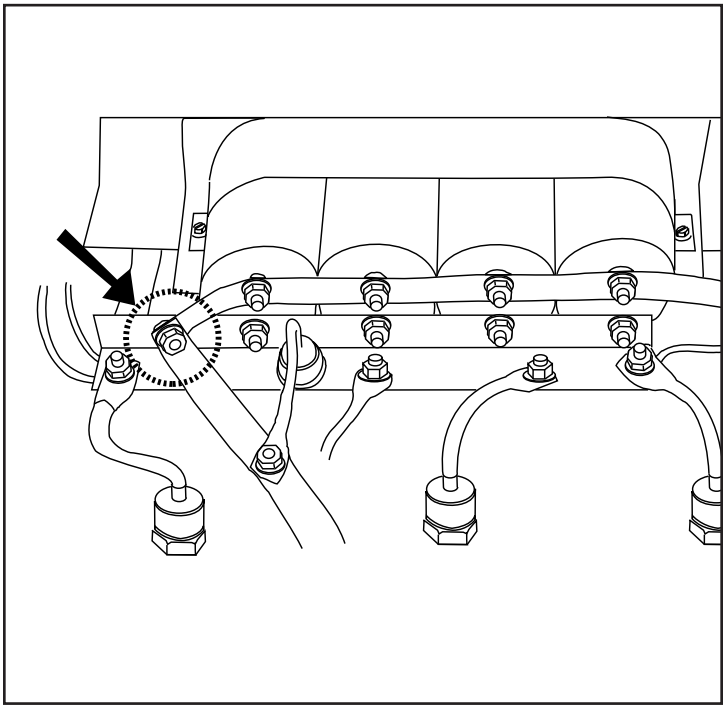


FIGURE F.12 - Procedure to disconnect the strap from the positive heat sink to the capacitor bank.

5. Disconnect the D5 diode pigtail from the negative capacitor buss using a 1/2" wrench. See Figure F.13.

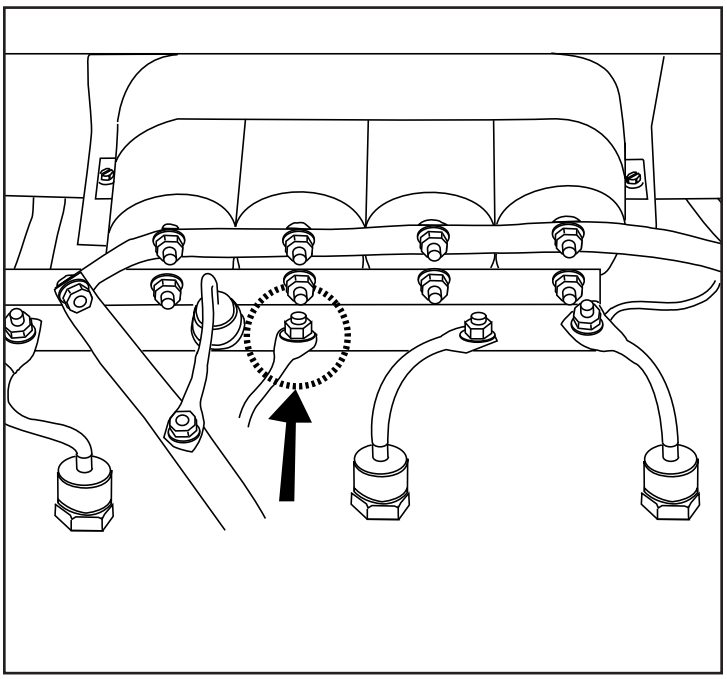


FIGURE F.13 - Procedure to disconnect the D5 diode pigtail from the negative capacitor buss.

ACTIVE SCR RECTIFIER ASSEMBLY TEST (CONTINUED)

6. Disconnect the D4 diode pigtail from the positive strap. See Figure F.14.

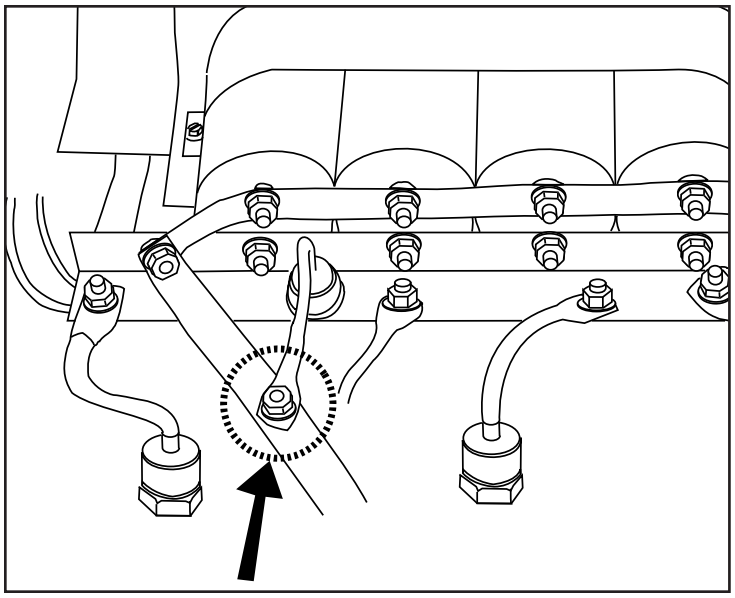


FIGURE F.14 - Procedure to disconnect the D4 diode pigtail from the positive strap.

7. Remove the red insulating paint from the heat sink test points. See Figure F.15.

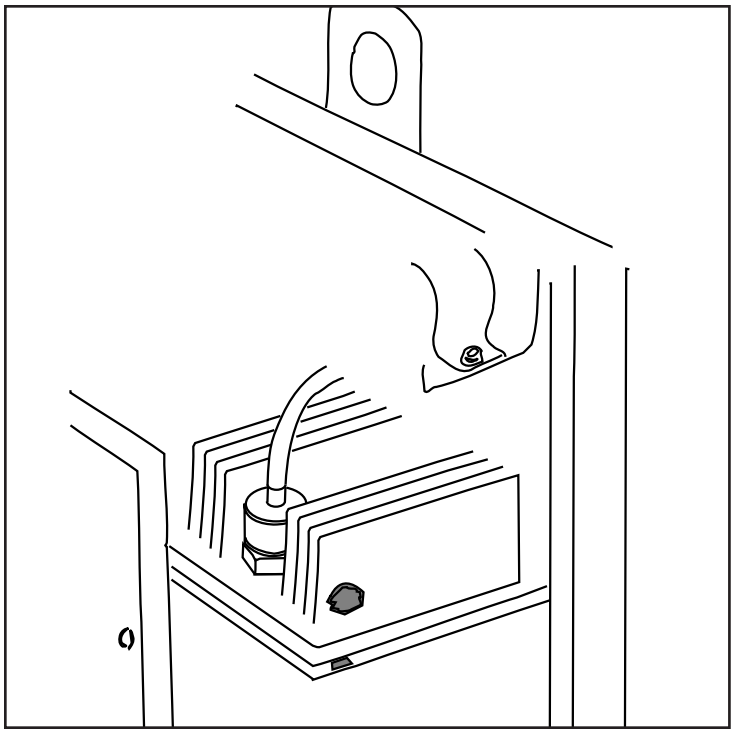


FIGURE F.15 - Heat sink test points.

NOTE: DO NOT DISASSEMBLE THE SCR RECTIFIER HEAT SINK ASSEMBLY.

8. Construct the circuit shown in Figure F.16. One 6-volt lantern battery can be used. R1 and R2 resistor values are 010%. Set voltmeter scale low, at approximately 0-5 volts or 5-10 volts.

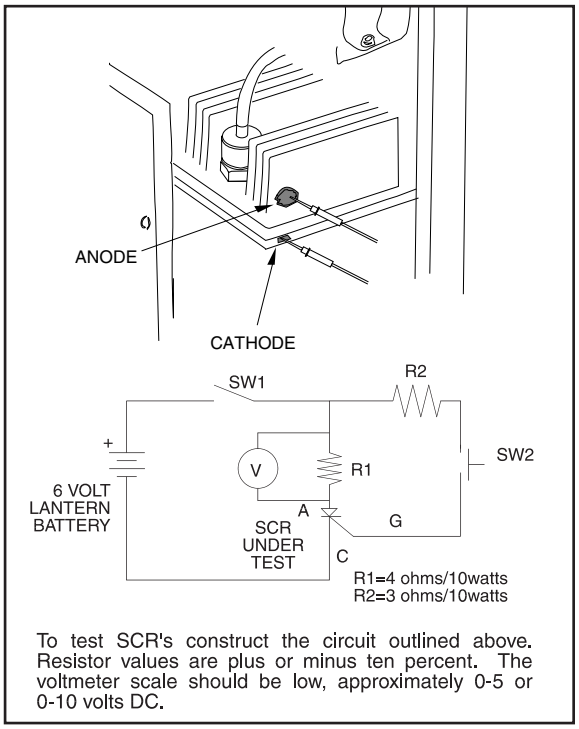
   a. Test the voltage level of the battery. Short leads (A) and (B). Close switch SW-1. Battery voltage should be 4.5 volts or higher. If lower, replace the battery.

9. Connect the Tester to the SCR 1 as shown in Figure F.16.

   a. Connect Tester lead (A) to the anode.

   b. Connect Tester lead (C) to the cathode.

   c. Connect Tester lead (G) to the gate.



To test SCR's construct the circuit outlined above. Resistor values are plus or minus ten percent. The voltmeter scale should be low, approximately 0-5 or 0-10 volts DC.

FIGURE F.16 - SCR Tester Circuit and SCR connections.

ACTIVE SCR RECTIFIER ASSEMBLY TEST (CONTINUED)

10. Close switch SW-1.

NOTE: Switch SW-2 should be open.

11. Read meter for zero voltage.

    a. If the voltage reading is higher than zero, the SCR is shorted.

12. Close or keep closed switch SW-1.

13. Close switch SW-2 for 2 seconds and release and read meter.

    a. If the voltage is 3 - 6 volts while the switch is closed and after the switch is open, the SCR is functioning.

    b. If the voltages is 3-6 volts only when the switch is closed or there is no voltage when the switch is closed, the SCR is defective.

NOTE: Be sure battery is functioning properly. A low battery can affect the results of the test. Repeat Battery Test Procedure in Step 6 if needed.

14. Open switch SW-1.

15. Reconnect the Tester leads. See ***Figure F.16.***

    a. Connect Tester lead (A) to the cathode.

    b. Connect Tester lead (C) to the anode.

    c. Disconnect Test lead (G) from the gate.

16. Close switch SW-1.

17. Read meter for zero voltage.

    a. If the voltage is zero, the SCR is functioning.

    b. If the voltage is higher than zero, the SCR is shorted.

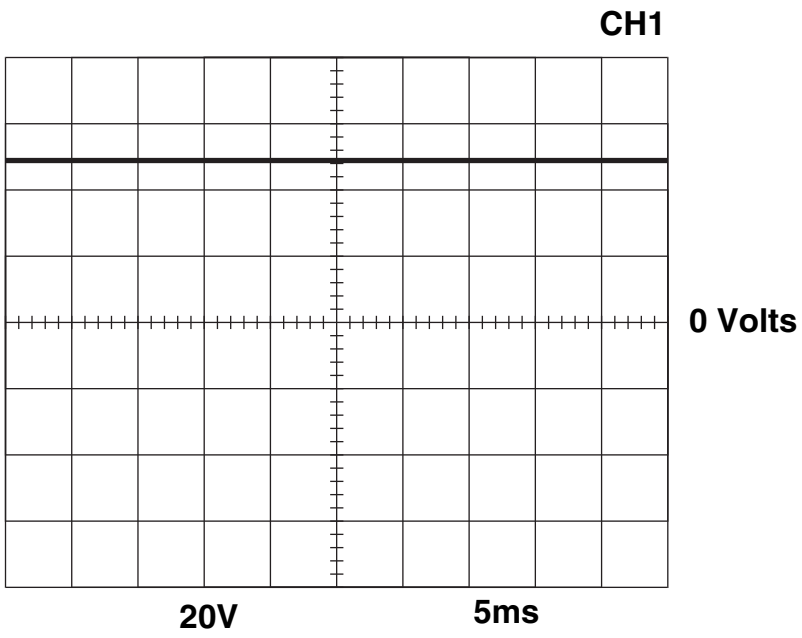
18. Perform the Active Test Procedure outlined in Steps 9-17 for SCR 2.

19. Replace all SCR assemblies that do not pass the above tests.

20. Replace all disconnected leads and Molex Plugs.

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 WELD VOLTAGE WAVEFORM NO LOAD - OUTPUT CONTROL AT MAXIMUM

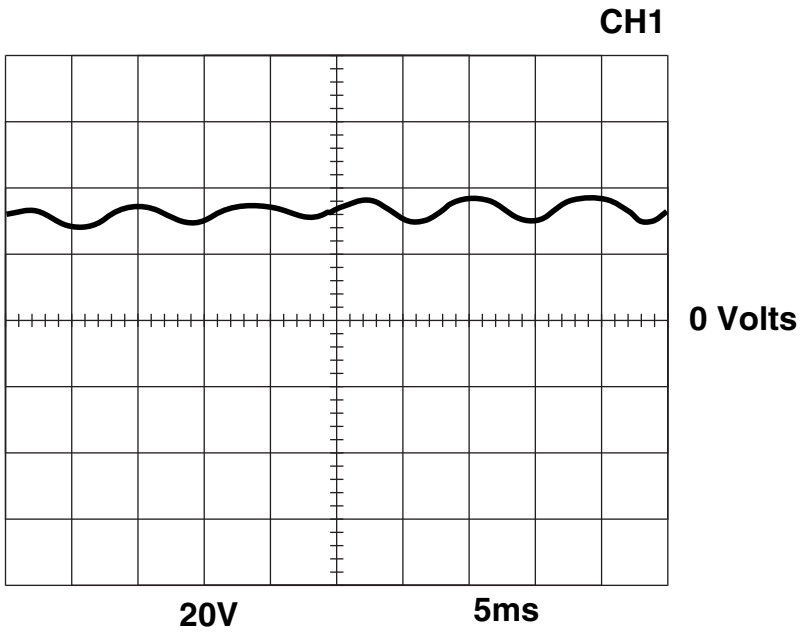


SCOPE SETTINGS

This is a typical output voltage generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 5 milliseconds in time. Note: Scope probes connected at machine high inductance output terminals.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 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 DC WELD OUTPUT - MACHINE LOADED



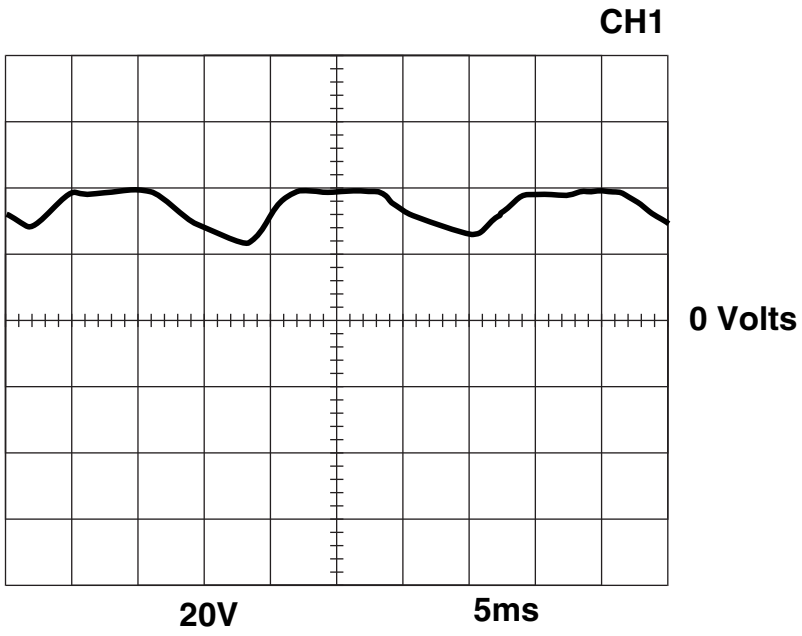
MACHINE LOADED TO 300 AMPS AT 32 VDC

SCOPE SETTINGS

This is a typical CV output voltage generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 5 milliseconds in time. The machine was loaded with a resistance grid bank. Note: Scope probes connected at machine high inductance output terminals.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 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 OUTPUT WELD VOLTAGE WAVEFORM - MACHINE LOADED ONE OUTPUT SCR NOT FUNCTIONING



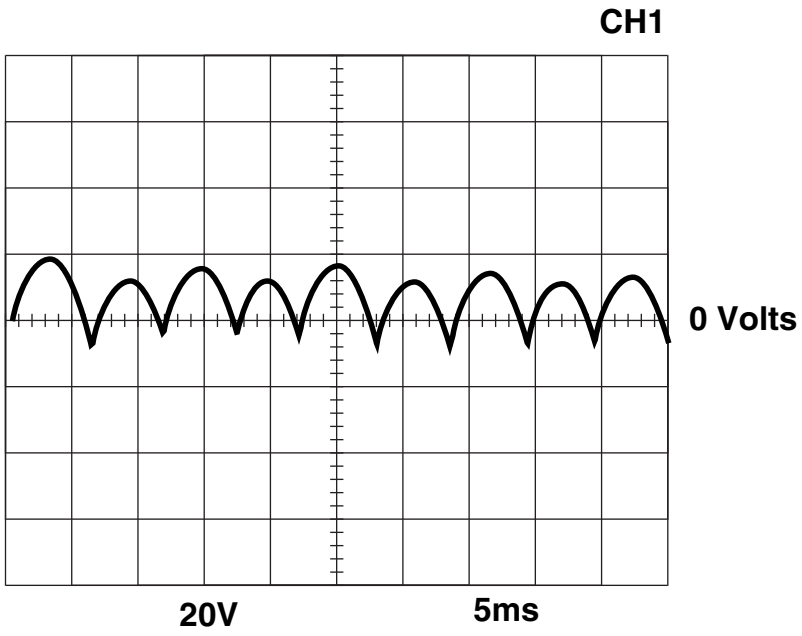
MACHINE LOADED TO 300 AMPS AT 32 VDC

SCOPE SETTINGS

This is not a typical CV output voltage waveform. Note the "ripple" in the waveform. One output SCR was disconnected to simulate an open or non-functioning output SCR. Note that each vertical division represents 20 volts and each horizontal division represents 5 milliseconds in time. Note: Scope probes connected at machine high inductance output terminals.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 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 OUTPUT WELD VOLTAGE WAVEFORM - MACHINE LOADED CAPACITOR BANK NOT FUNCTIONING



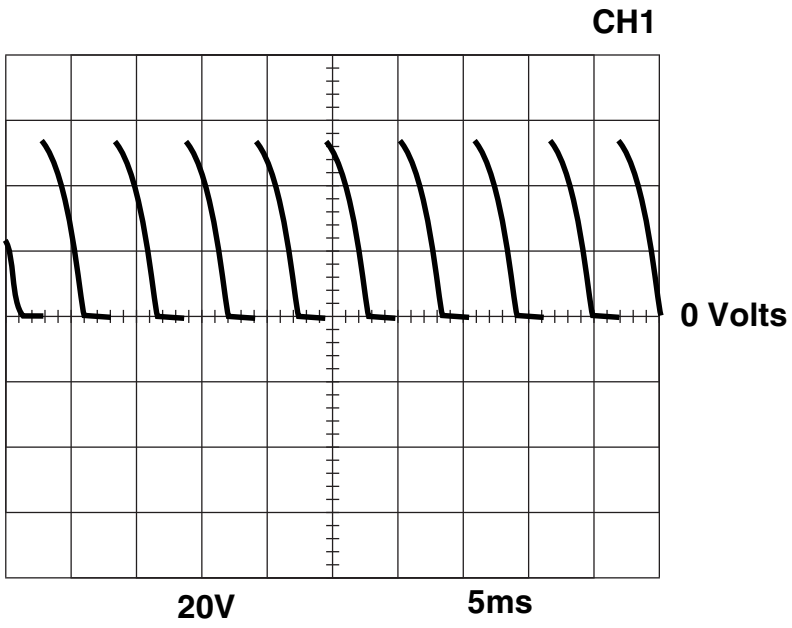
MACHINE LOADED TO 300 AMPS AT 32 VDC

SCOPE SETTINGS

This is NOT the typical output voltage waveform. Note the increased "ripple" in the output waveform. The output capacitors were disconnected to simulate a faulty capacitor bank. Note that each vertical division represents 20 volts and each horizontal division represents 5 milliseconds in time. Note: Scope probes connected at machine high inductance output terminals.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 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 WELD VOLTAGE WAVEFORM NO LOAD - CAPACITOR BANK NOT FUNCTIONING

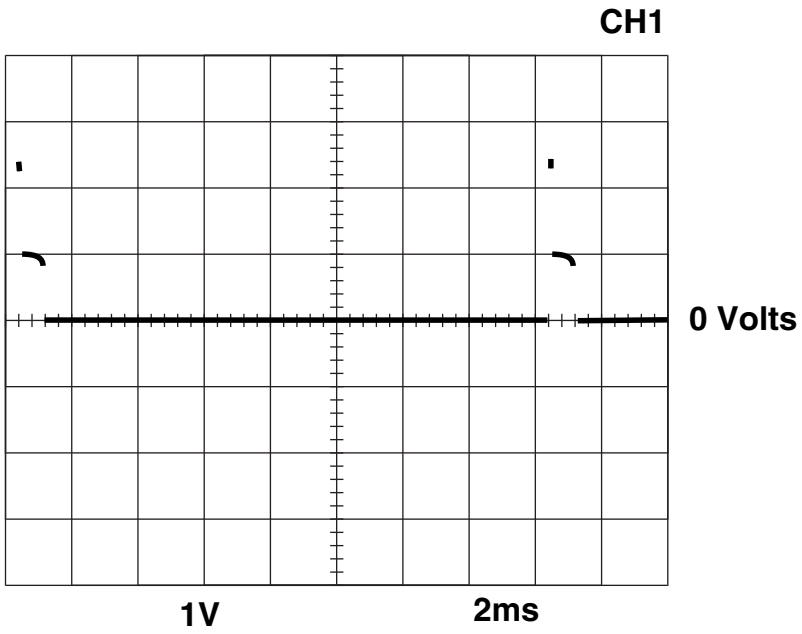


SCOPE SETTINGS

This is not the typical output voltage waveform. The output capacitors were disconnected to simulate a faulty capacitor bank. Note the absence of "filtering" in the waveform. Note that each vertical division represents 20 volts and each horizontal division represents 5 milliseconds in time. Note: Scope probes connected at machine high inductance output terminals.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 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 SCR GATE VOLTAGE WAVEFORM



SCOPE SETTINGS

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 2 milliseconds in time. Note: Scope probes connected at SCR gate and cathode: (+) probe to gate, (-) probe to cathode.	Volts/Div . . . . . .1 V/Div. Horizontal Sweep . . . . . .2 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

CONTROL PC BOARD REMOVAL AND 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 1-888-935-3877.

⚠ CAUTION

Printed Circuit Boards can be damaged by static electricity. Follow static handling guidelines detailed in “PC Board Troubleshooting Procedures” at the beginning of this chapter.

REMOVAL AND REPLACEMENT PROCEDURE

PROCEDURE DESCRIPTION

This procedure will aid the technician in removing and replacing the Control PC Board for maintenance or replacement.

MATERIALS NEEDED

5/16" Nutdriver.
3/8" Nutdriver.
Phillips head screwdriver.
Wiring Diagram.

CONTROL PC BOARD REMOVAL AND REPLACEMENT

PROCEDURE

1. Disconnect main AC input power to the machine.
2. Remove the Case Roof.
3. Disconnect the Molex plugs from the control board.
4. Remove the four screws located on the outboard side of the Case Front panel that mount the control board to the front panel.
5. Remove the control board from the mounting studs carefully.
6. Replace all insulating material, mounting screws, and Molex plugs when installing the control board.

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

CAPACITOR BANK REMOVAL AND 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 1-888-935-3877.

⚠ WARNING

THE LIQUID ELECTROLYTE IN THE CAPACITORS IS TOXIC. DO NOT TOUCH THE CAPACITORS WITH ANY PART OF THE BODY. USE INSULATED GLOVES WHEN HANDLING CAPACITORS.

MATERIALS NEEDED

5/16" Nutdriver.
3/8" Nutdriver.
1/2" Open end wrench.
7/16" Open end wrench.
Wiring diagram.

CAPACITOR BANK REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE

1. Disconnect main AC input power to the machine.

2. Test that the capacitors are discharged using a voltmeter.

   a. Polarity must be observed.

3. Disconnect the following components from the capacitor bank assembly: See ***Figure F. 17.***

PART TO REMOVE	LOCATION	TYPE WRENCH
Diode D1 pigtail and lead #224A	Negative capacitor bank buss	1/2" open end wrench
Diode D2 pigtail	Negative capacitor bank buss	1/2" open end wrench
Diode D3 pigtail, output choke lead, and leads #224 and #224B	Negative capacitor bank buss	1/2" open end wrench
Diode D5 pigtail	Negative capacitor bank buss	1/2" open end wrench
Diode D4 pigtail	Positive capacitor jumper strap	7/16" open end wrench
Positive capacitor jumper strap	Positive capacitor buss	1/2" open end wrench
Positive capacitor output lead	Positive capacitor buss	1/2" open end wrench

4. Remove the two screws holding the capacitor mounting strap to the lift bail assembly using a 5/16" Nutdriver.

   a. Note placement of insulation.

5. Carefully remove the capacitor bank assembly.

CAPACITOR BANK REMOVAL AND REPLACEMENT (CONTINUED)

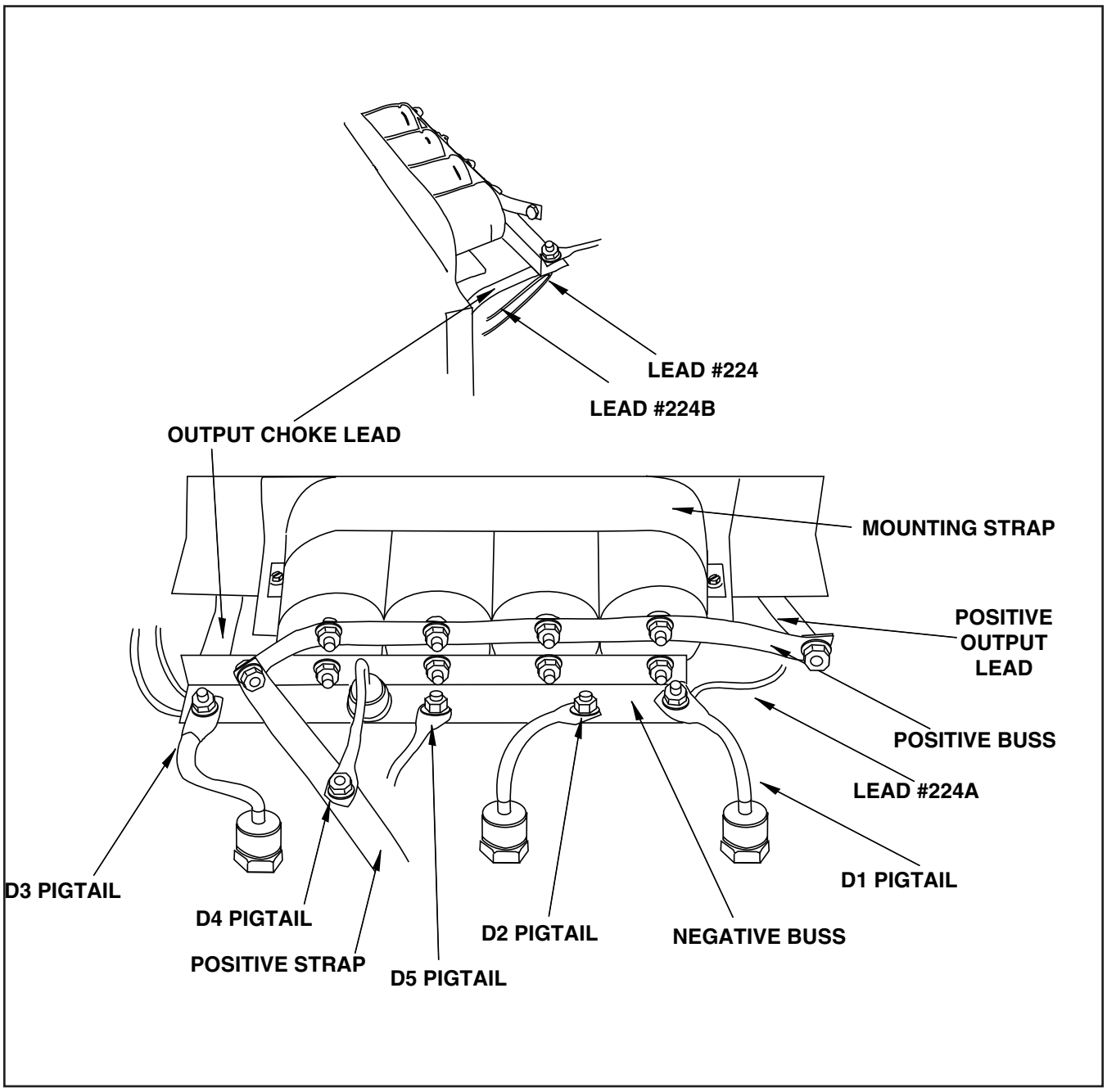


FIGURE F.17 - Capacitor Bank Removal.

OUTPUT RECTIFIER BRIDGE REMOVAL & 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 1-888-935-3877.

MATERIALS NEEDED

5/16" Nutdriver.
3/8" Nutdriver.
1/2" Open end wrench.
7/16" Open end wrench.
Wiring diagram.

OUTPUT RECTIFIER BRIDGE REMOVAL & REPLACEMENT (CONTINUED)

PROCEDURE

1. Disconnect main AC input power to the machine.
2. Remove the Case Roof and Case Sides.
3. Test the capacitors are discharged using a voltmeter.
   a. Polarity must be observed.
4. Remove the Capacitor Bank Assembly
   a. Use the steps given in the Capacitor Bank Assembly Removal Procedure in this section of the manual.
5. Disconnect the three transformer secondary leads connected to the three SCR heat sinks using a 1/2" open wrench. See Figure F. 18.
   a. Disconnect leads #221, #222, and #223.
   b. Note placement of leads for re-assembly.
6. Remove plug J1 from the control board.
7. Cut any cable ties that would restrict the removal of the assembly.
8. Disconnect the three #204 leads connected to the bottom of the positive SCR heat sink using a 7/16" open end wrench. See Figure F.18.
9. Remove the four mounting screws that fasten the rectifier assembly to the lift bail assembly.
   a. Note the placement of the arrangement of the insulating materials on the mounting screws for re-assembly. See Figure F.19.
10. Remove the rectifier bridge assembly carefully from the machine.
    a. Clear or cut any cable ties or leads that may hamper the removal of the assembly.

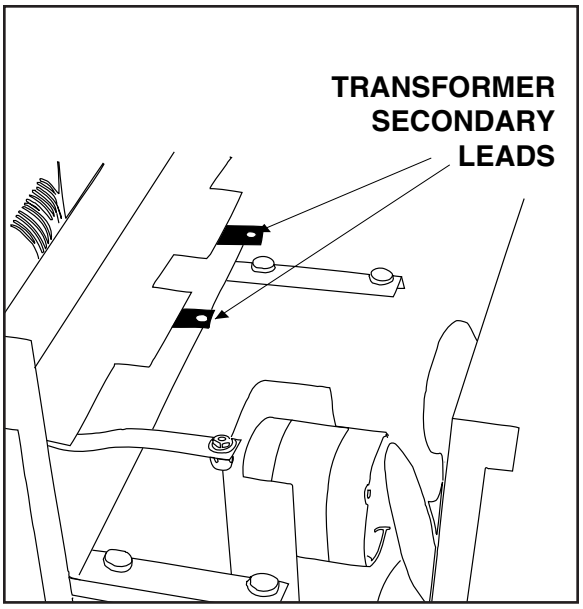
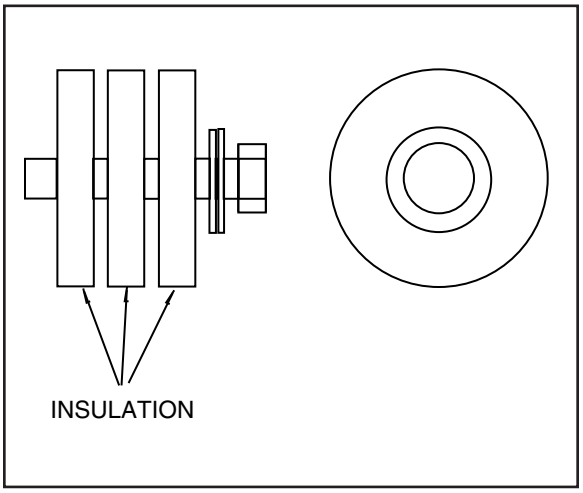


FIGURE F.18 - Output Rectifier Bridge



Assembly removal.
FIGURE F.19 - Mounting screw insulating material arrangement.

NOTE: If further disassembly is required, see ***SCR Removal and Replacement Procedure*** and ***Diode Mounting Instruction***.

MOUNTING OF STUD TYPE DIODES TO ALUMINUM HEAT SINKS

⚠ 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 1-888-935-3877.

MATERIALS NEEDED:

1/2" Open end wrench.
Lincoln E1868 (Dow Corning 340) Heat Sink Compound.
"Slip" type torque wrench.

MOUNTING OF STUD TYPE DIODES TO ALUMINUM HEAT SINKS (CONT'D)

PROCEDURE

1. Loosen the appropriate diode nut and remove the diode that is to be replaced.

2. Clean the area on the heat sink around the diode mounting surface using a putty knife, or similar tool, DO NOT SCRATCH THE DIODE MOUNTING SURFACE.

3. Polish each heat sink's mounting surface using NO. 000 fine steel wool. Wipe surface clean with a lint free cloth or paper towel.

4. Inspect the mounting surfaces of each new diode. Remove all burrs and wipe clean. Do not use steel wool or any abrasive cleanser on the diode mounting surface.

5. Apply a thin (0.0003" to 0.0007") uniform layer of E1868 (Dow Corning 340) heat sink compound to the heat sink mounting surface.

   a. Do not apply compound to diode stud or mounting threads.

   b. The diode threads must be clean and free of defects so that the nut can be finger tightened before applying torque. A "slip" type torque wrench must be used to tighten the diode nut.

6. Tighten the diode nuts to the specifications in the following table.

   a. The nuts for diodes with steel studs are to be started by hand and then torqued as per the following table.

   b. The nuts for diodes with copper studs are to run on all the way by hand then torqued as per the following table.

   c. Turn a minimum of 1/2 turn more while torquing per the table.

DIODE STUD SIZE	FOOT-POUNDS	INCH-POUNDS
3/4 - 16	25-27	300-324
3/8 - 24	10±.5	125+0/-5
1/4 - 28		22-25

SCR REMOVAL AND 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 1-888-935-3877.

MATERIALS NEEDED:

NO.000 Fine Steel Wool.
Penetrox A-13 (Lincoln E2529) or Penetrox A.
7/16” Open end wrench.
Allen head type wrenches.

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

Return to Section TOC
Return to Master TOC

SCR REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE:

Note: Before disassembling the existing rectifier, note which heat sink the outer metal ring of the power SCR is mounted towards. Also, note the positioning of the gate lead of the SCR. Failure to reinstall the new SCR in the same orientation as the original may result in subsequent damage to the new SCR and other components of the welder. See Figure 20.

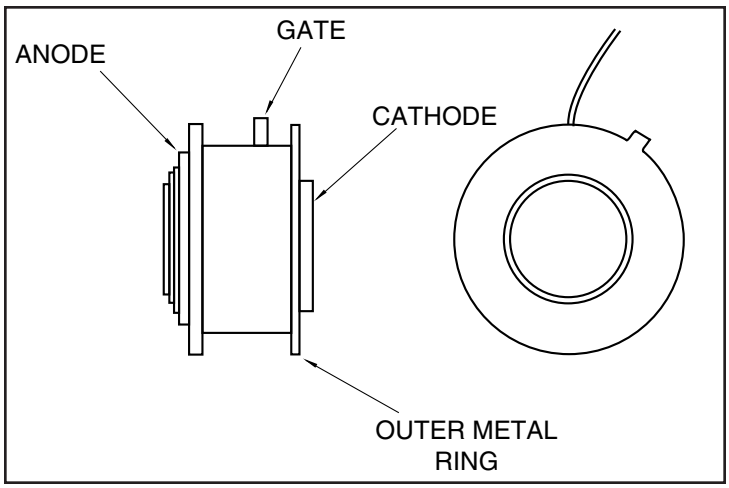


Fig. F.20 -SCR

⚠ CAUTION

The unclamping and clamping procedure outlined below is critical for the prevention of internal SCR damage. Failure to follow this procedure may result in subsequent damage of the SCR. Handle all SCRs with care.

1. Alternately loosen nuts 1/2 turn each until heat sinks are loose. Remove nuts and leaf spring. IT IS RECOMMENDED THAT NEW HARDWARE, LEAF SPRING AND HOUSING BE USED FOR REASSEMBLY.

2. Remove the old SCR.

3. Clean the area on the heat sink around the SCR mounting surface. Using a putty knife, or similar tool. DO NOT SCRATCH THE SCR MOUNTING SURFACE.

4. Polish each heat sink's mounting surface using NO. 000 fine steel wool. Wipe surface clean with a lint free cloth or paper towel.

5. Inspect the mounting surfaces of each new SCR.

   a. Remove all burrs and wipe clean. Do not use steel wool or any abrasive cleanser on the SCR mounting surfaces.

6. Apply a thin (0.001" to 0.003") layer of PENETROX A-13 (L.E. CO. #E2529) or PENETROX A, heat sink compound, to each heat sink's SCR mounting surface.

   a. Care must be used to prevent foreign material contamination of the SCR to heat sink junction.

7. Place the new SCR between the heat sinks. Be sure that the outer metal ring of the SCR is facing towards the same heat sink as the old SCR's metal ring. Be sure that the roll pin of the heat sink engages the "hole" in the SCR. The SCR contact surfaces must sit flat against both heat sink surfaces.

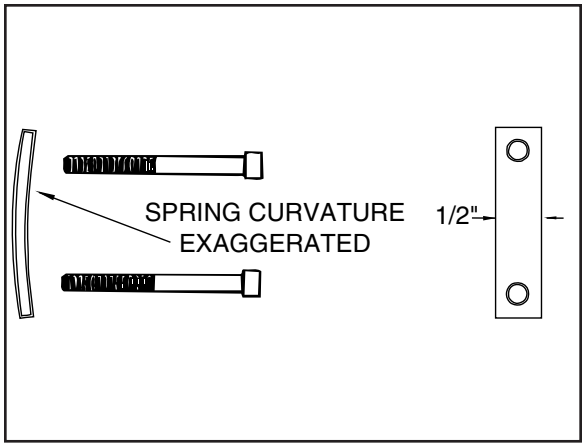
SCR REMOVAL AND REPLACEMENT (CONTINUED)

8. Go to procedure that matches cap screws. NOTE WHICH THREAD IS ON YOUR CAP SCREWS BEFORE PROCEEDING TO THE ASSEMBLY PROCEDURE. Two different designs of leaf springs and housings have been used to clamp the SCR to the rectifier. The two different designs can be identified by the size of the leaf spring. One design uses a 1/2 inch wide leaf spring and the other uses a 5/8 inch wide spring. The different designs require different assembly and clamping procedures. The assembly procedure will be different depending upon the thread on the cap screws. A 1/4-28 thread requires a different tightening procedure than a 1/4-20 thread.

PROCEDURE FOR THE 1/2 INCH WIDE SPRING

1. Place a piece of sleeving around each bolt.

2. Insert bolts thru the leaf spring. Orient the leaf spring so that it's ends are curved upward toward the bolt heads. See figure F.21. Pressing on the bolt heads should produce a "rocking" motion of the spring in its housing. If the spring does NOT rock it is installed upside down. Remove the spring and turn it over. Check for "rocking" motion.



See Figure F.21.

Fig. F.21 - 1/2" Wide Leaf Spring

3. Insert bolts and leaf spring into the plastic housing.

4. Insert clamp assembly thru heat sinks. Install nuts. Tighten clamp nuts equally on bolts until finger tight. (See Figure F.22. Heat sinks may not be exactly as pictured.)

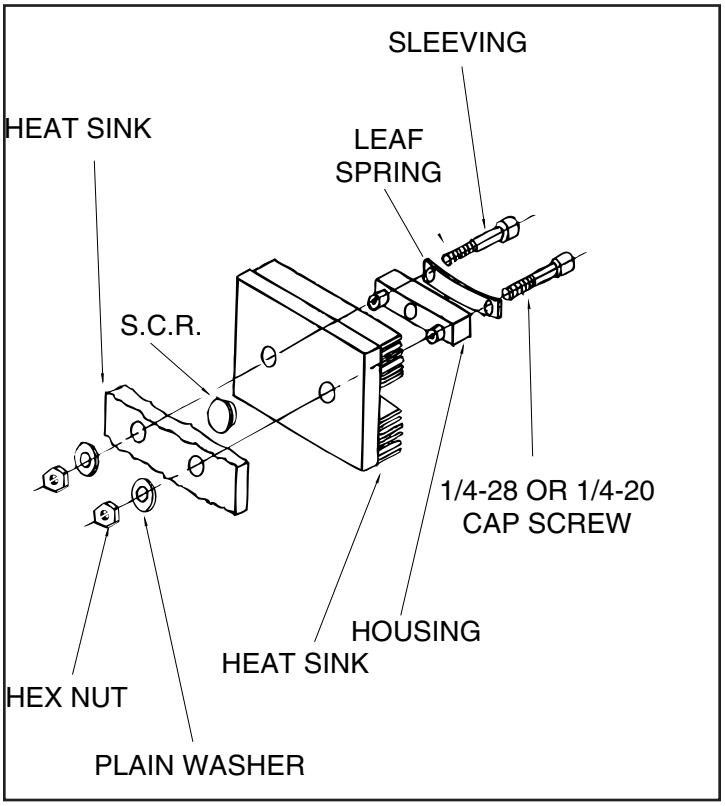


Fig. F.22 - Clamp Assembly.

5. Re-inspect the SCR for proper seating.

SCR REMOVAL AND REPLACEMENT (CONTINUED)

CLAMPING PROCEDURE FOR 1/4-28 BOLTS.

Note: This procedure can only be used with 1/4-28 bolts.

Do not use bolts with any other type thread or new SCR will be damaged.

Do not over tighten cap screws. The leaf spring will apply the required clamping force to the SCR.

1. Do not turn the nuts. While holding the nuts stationary, turn the cap screws only with the following procedure.
2. Tighten first cap screw 1/4 turn.
3. Tighten second cap screw 1/2 turn.
4. Tighten first cap screw 1/2 turn.
5. Tighten second cap screw 1/2 turn.
6. Tighten first cap screw 1/4 turn.
7. Assembly now has proper clamping force.
8. Perform the ***Active SCR Test.***

CLAMPING PROCEDURE FOR 1/4-20 BOLTS.

Note: This procedure can only be used with 1/4-20 bolts.

Do not use bolts with any other type thread or new SCR will be damaged.

Do not over tighten cap screws. The leaf spring will apply the required clamping force to the SCR.

1. Do not turn the nuts. While holding the nuts stationary, turn the cap screws only with the following procedure.
2. Tighten first cap screw 1/4 turn.
3. Tighten second cap screw 1/2 turn.
4. Tighten first cap screw 1/2 turn.
5. Tighten second cap screw 1/4 turn. STOP.
6. Assembly now has the proper clamping force.
7. Perform the ***Active SCR Test***.

SCR REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE FOR THE 5/8 INCH WIDE SPRING

1. Place a piece of sleeving around each bolt.

2. Insert bolts thru the leaf spring. The leaf spring is flat so the orientation of the leaf spring does not matter.

3. Place the steel pressure pad in the housing with the 1/8 inch wide standoff facing up. See Figure F.23.

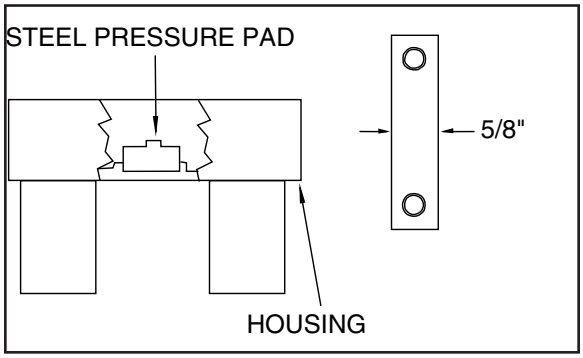


Figure F.23 - Housing and Pressure Pad for 5/8" Wide leaf spring.

4. Insert bolts and leaf spring into plastic housing being sure that the steel pressure pad remains in position. Pressing on the bolt heads should produce a rocking action of the spring in it's housing.

5. Insert clamp assembly thru heat sinks. Install nuts. Tighten clamp nuts equally on bolts until finger tight. Be sure that the leaf spring is not cocked in the housing. See Figure F.24. Heat sinks may not be exactly as pictured.

6. Re-inspect the SCR for proper seating.

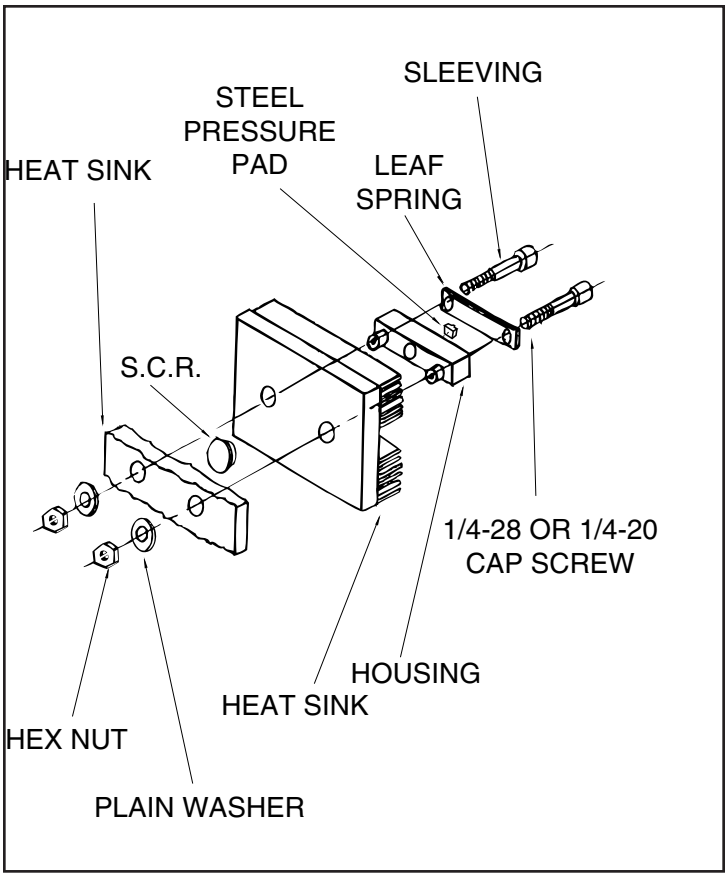


Figure F.24 - Clamp Assembly.

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

SCR REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE FOR CLAMPING 1/4-28 BOLTS.

Note: This procedure can only be used with 1/4-28 bolts.

Do not use bolts with any other type thread or new SCR will be damaged.

Do not over tighten cap screws. The leaf spring will apply the required clamping force to the SCR.

1. Do not turn the nuts. While holding nuts stationary, turn the cap screws only with the following procedure.
2. Tighten first cap screw 1/4 turn.
3. Tighten second cap screw 1/2 turn.
4. Tighten first cap screw 1/2 turn.
5. Tighten second cap screw 1/2 turn.
6. Tighten first cap screw 1/2 turn.
7. Tighten second cap screw 1/4 turn.
8. Assembly now has the proper clamping force.
9. Perform ***Active SCR Test***.

CLAMPING PROCEDURE FOR 1/4-20 BOLTS.

Note: This procedure can only be used with 1/4-20 bolts.

Do not use bolts with any other type thread or new SCR will be damaged.

Do not over tighten cap screws. The leaf spring will apply the required clamping force to the SCR.

1. Do not turn the nuts. While holding the nuts stationary, turn the cap screws only with the following procedures.
2. Tighten first cap screw 1/4 turn.
3. Tighten second cap screw 1/2 turn.
4. Tighten the first cap screw 1/2 turn.
5. Tighten the second cap screw 1/4 turn.
6. Tighten the first cap screw 1/8 turn.
7. Tighten the second cap screw 1/8 turn.
8. Assembly now has the proper clamping force.
9. Perform the ***Active SCR Test***.

FAN MOTOR AND FAN REMOVAL AND 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 1-888-935-3877.

MATERIALS NEEDED

5/16" Nutdriver.
3/8" Nutdriver.
3/8" Open end wrench.
Wire cutters.
Allen wrench.

FAN MOTOR AND FAN REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE

1. Disconnect main AC input power to the machine.
2. Remove the Case Roof and Sides.
3. Remove the three screws from the bottom of the Case Back Panel using a 5/16" nutdriver. See Figure F.25.
4. Remove the two screws that attach the reconnect panel to the Case Back Panel. See Figure F.25.
5. Remove that Case Back Panel.
6. Label and cut the fan motor leads.
7. Remove the four nuts, washers, and lock washer which attach the fan motor to the fan bracket. See figure F.25.
8. Remove the fan motor and blade assembly carefully.
9. Remove the fan blade from the motor shaft using a Allen wrench.

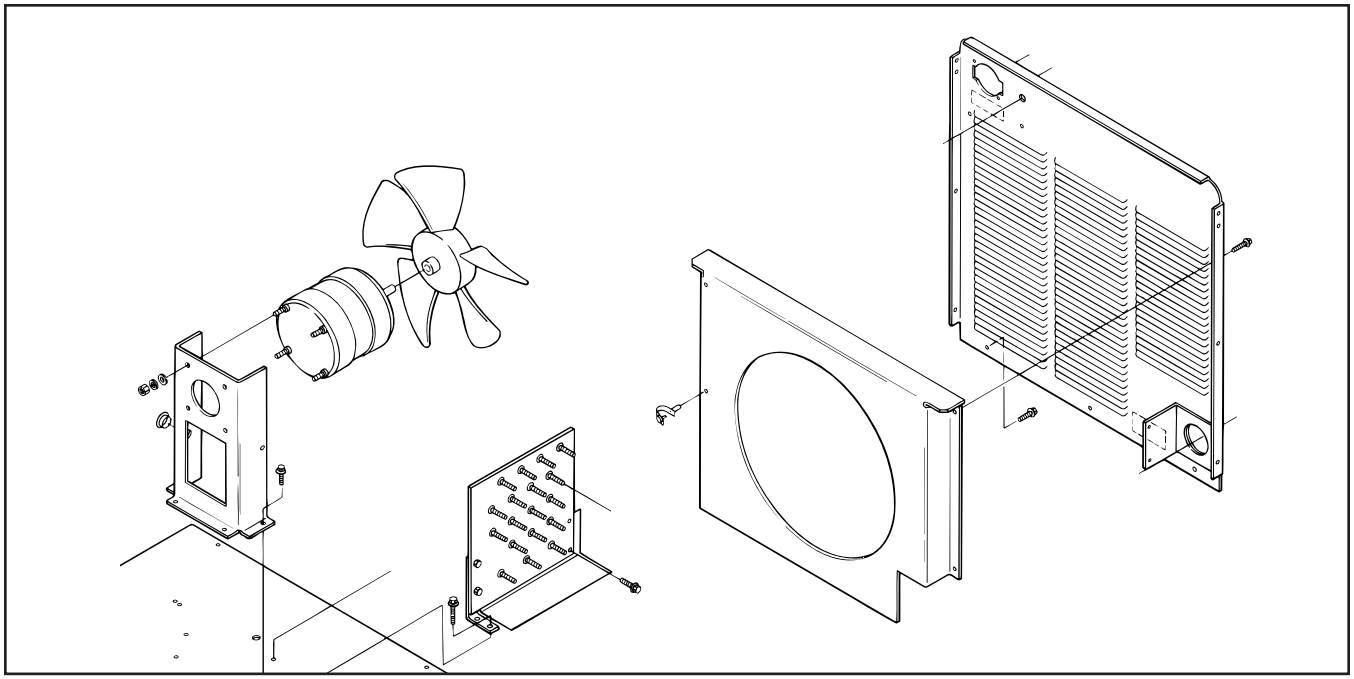


FIGURE F.25 - Fan Motor removal.

CENTER ASSEMBLY REMOVAL AND 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 1-888-935-3877.

MATERIALS NEEDED

5/16" Nutdriver.
3/8" Nutdriver.
1/2" Open end wrench.
9/16" Open end wrench.
3/4" Socket wrench.
Wire cutters.
Wiring diagram.

CENTER ASSEMBLY REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE

1. Disconnect main AC input power input leads to the machine.

2. Remove the Case Roof and Sides using a 5/16" nutdriver and 3/8" nutdriver.

3. Disconnect the leads that run from the reconnect panel to the ON/OFF POWER SWITCH.

   a. Pull all leads out through the lift bail assembly.

4. Remove all the Molex plugs from the control board and the snubber board.

5. Disconnect all leads from the circuit breakers and switches that could hamper the removal of the Center Assembly.

6. Remove any line connectors from the 14 pin amphenol connector.

   a. On some codes, the 14 pin amphenol connector may have to be removed.

7. Remove the choke leads from the negative output terminals. See wiring diagram.

8. Remove the heavy positive lead from the positive output terminal. See wiring diagram.

9. Label and cut the fan motor leads and clear leads for easy removal.

10. Remove the four screws attaching the reconnect panel to the Base Assembly using a 5/16" nutdriver.

11. Remove the two screws attaching the reconnect panel to the Case Back Panel.

    a. The reconnect panel can be removed with the Center Assembly.

12. Disconnect leads #204D and 224A connected to the resistor R1.

13. Attach a lifting device to the Center Assembly Lift Bail.

    a. **DO NOT LIFT THE CENTER ASSEMBLY FROM THE MACHINE.** This is to support the Center Assembly so you can remove the mounting bolts.

14. Remove the four mounting bolts that attach the Center Assembly to the Base Assembly using a 9/16" open end wrench and a 3/4" socket wrench. See Figure F.26.

15. Lift the Center Assembly carefully from the machine.

    a. Clear or cut any leads or cable ties that hamper the removal of the Center Assembly.

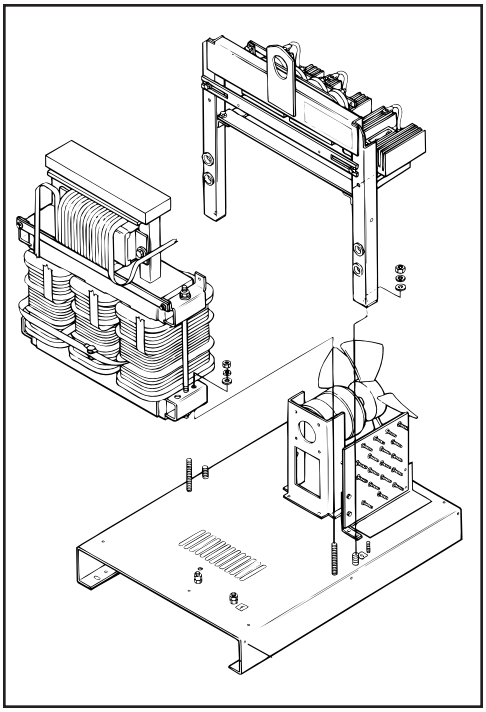


Fig. F.26 - Removal of Mounting Bolts

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

RETEST AFTER REPAIR

Should a machine under test be rejected for any reason requiring the removal of any mechanical part that could affect the machine's electrical characteristics or if any electrical components are repaired or replaced, the machine must be retested.

INPUT IDLE AMPS AND WATTS

Input Volts/Hertz	Maximum Idle Amps	Maximum Idle Watts
208/3/60	11	1000 watts
230/3/60	10	1000 watts
460/3/60	5	1000 watts
575/3/60	4	1000 watts

OPEN CIRCUIT VOLTAGE

Mode	Open Circuit Volts
Maximum	55 VDC
Normal Range	10-43 VDC
Auxiliary Output (#31 - #32)	112/119 VAC
Auxiliary Output (#41 - #42 (#32A))	39/42 VAC

OUTPUT LOAD READINGS

Output Control Setting	Amps	Volts
Minimum	40-50	1-7 VDC
Maximum	410	36 VDC Minimum

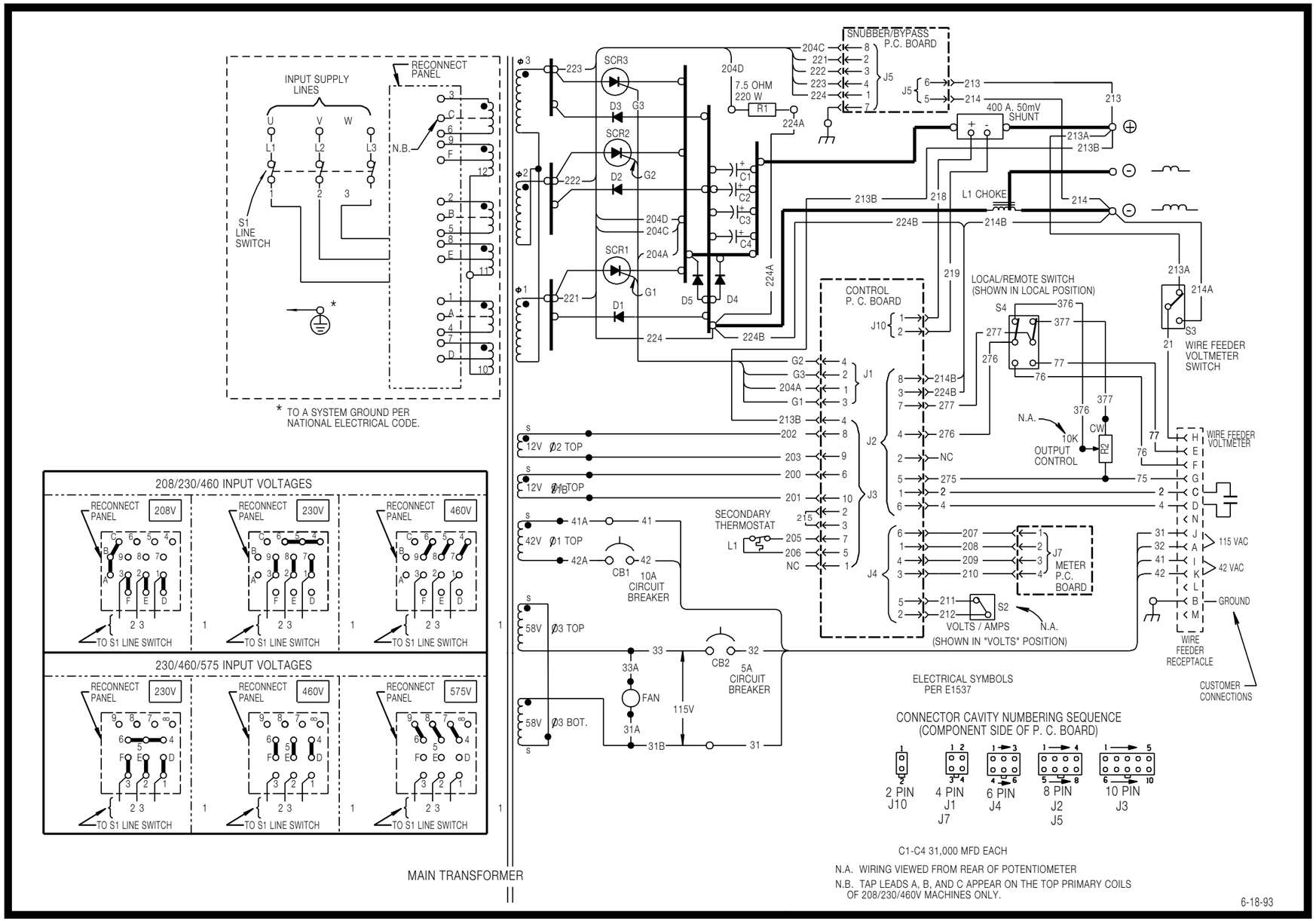
TABLE OF CONTENTS
- ELECTRICAL DIAGRAMS SECTION -

NOTES

Return to Section TOC
Return to Master TOC

WIRING DIAGRAM FOR CODES 10181, 10180, 9940, 9939

WIRING DIAGRAM CV-300 (60Hz)



CLEVELAND, OHIO U.S.A.

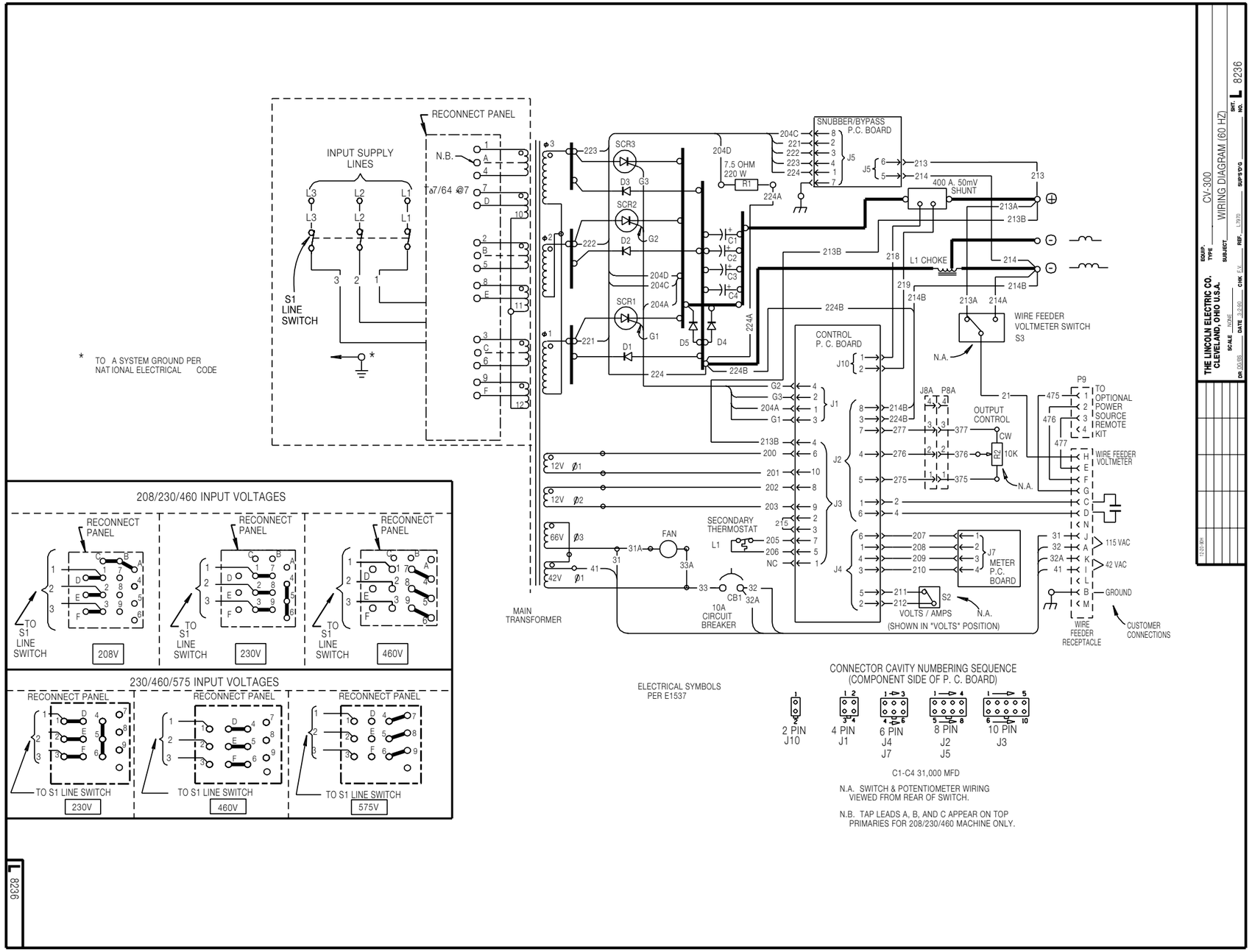
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

NOTES

G-3

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

WIRING DIAGRAM FOR CODE 9520, 9486



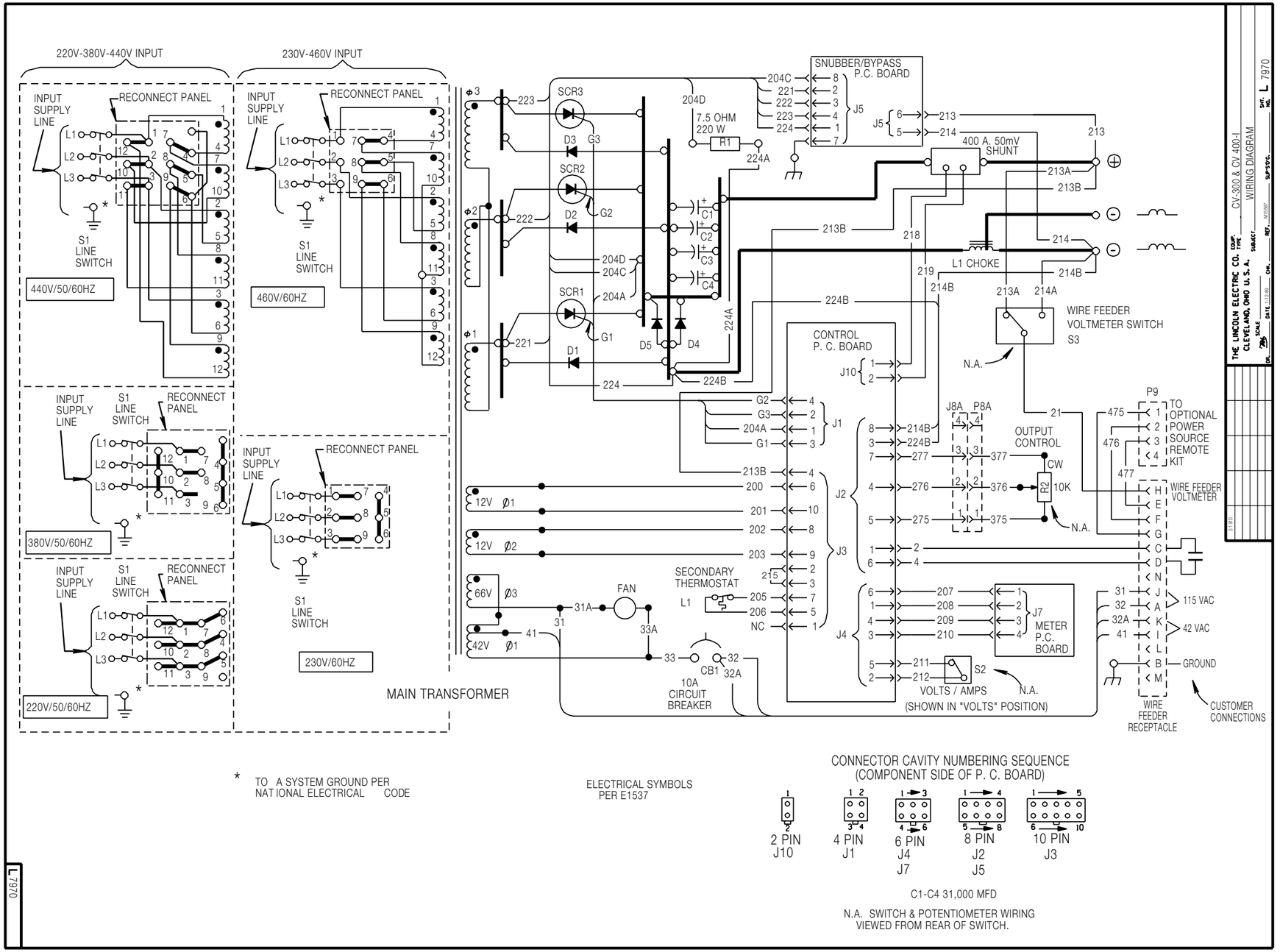
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

NOTES

G-5

Return to Section TOC
Return to Master TOC

WIRING DIAGRAM FOR CODE 9456



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

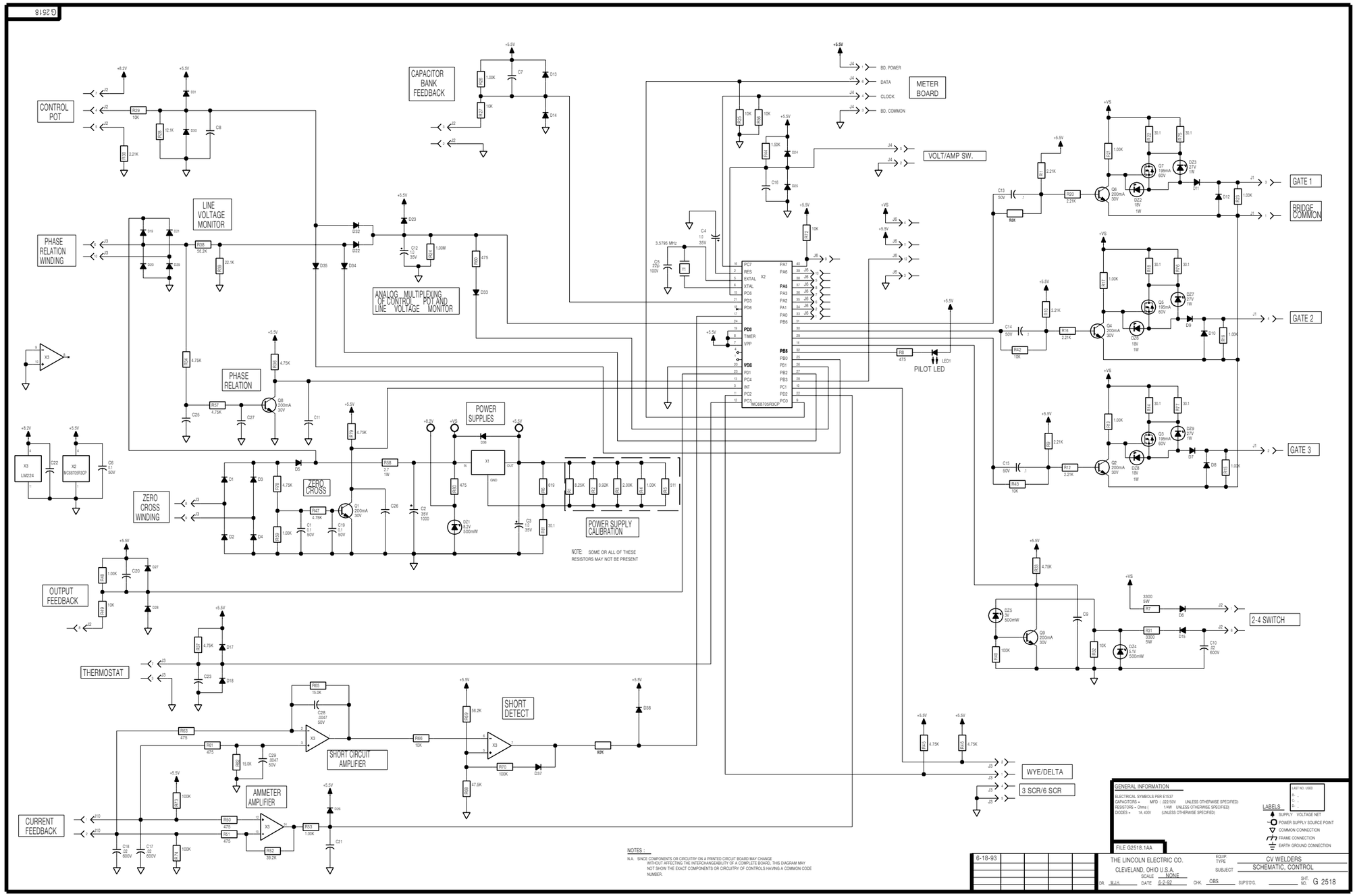
NOTES

G-7

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

L8930 CONTROL PC BOARD SCHEMATIC



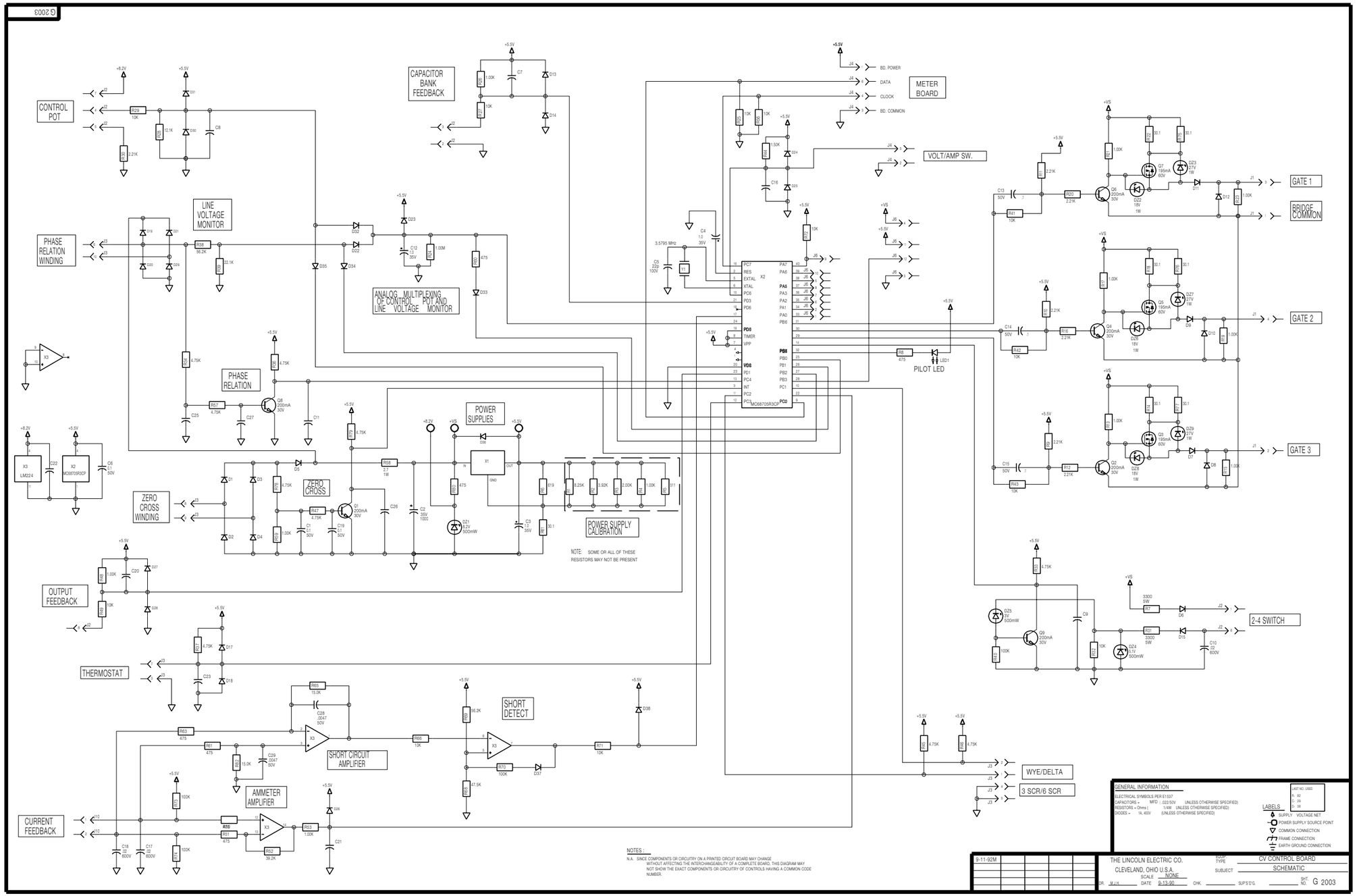
NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln 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.

NOTES

G-9

Return to Section TOC
Return to Master TOC

L8873 CONTROL PC BOARD SCHEMATIC



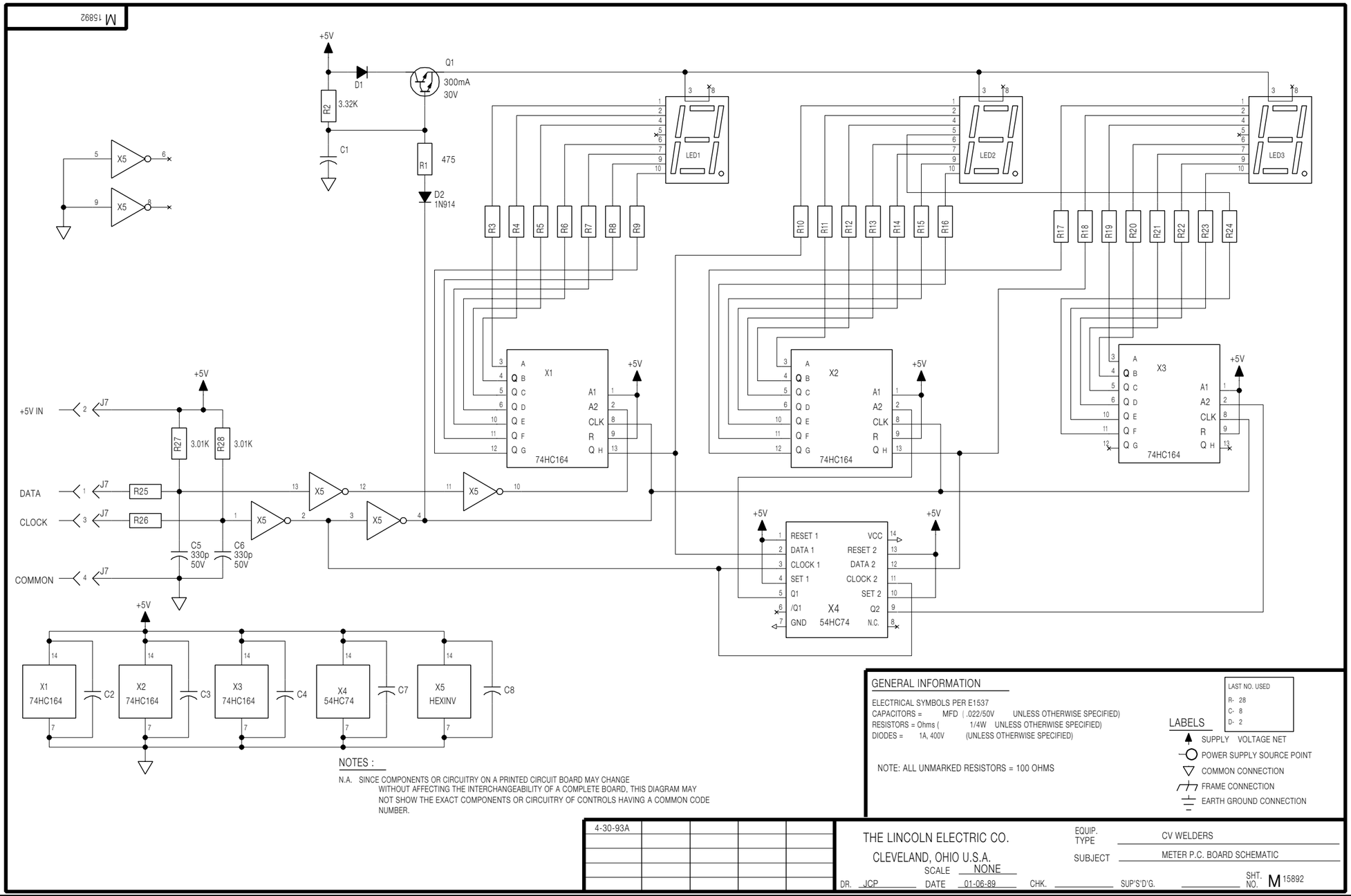
NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln 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.

NOTES

G-11

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

M15893 METER PC BOARD SCHEMATIC



NOTE: Lincoln Electric assumes no responsibility for liablilities 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.

NOTES

G-13

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

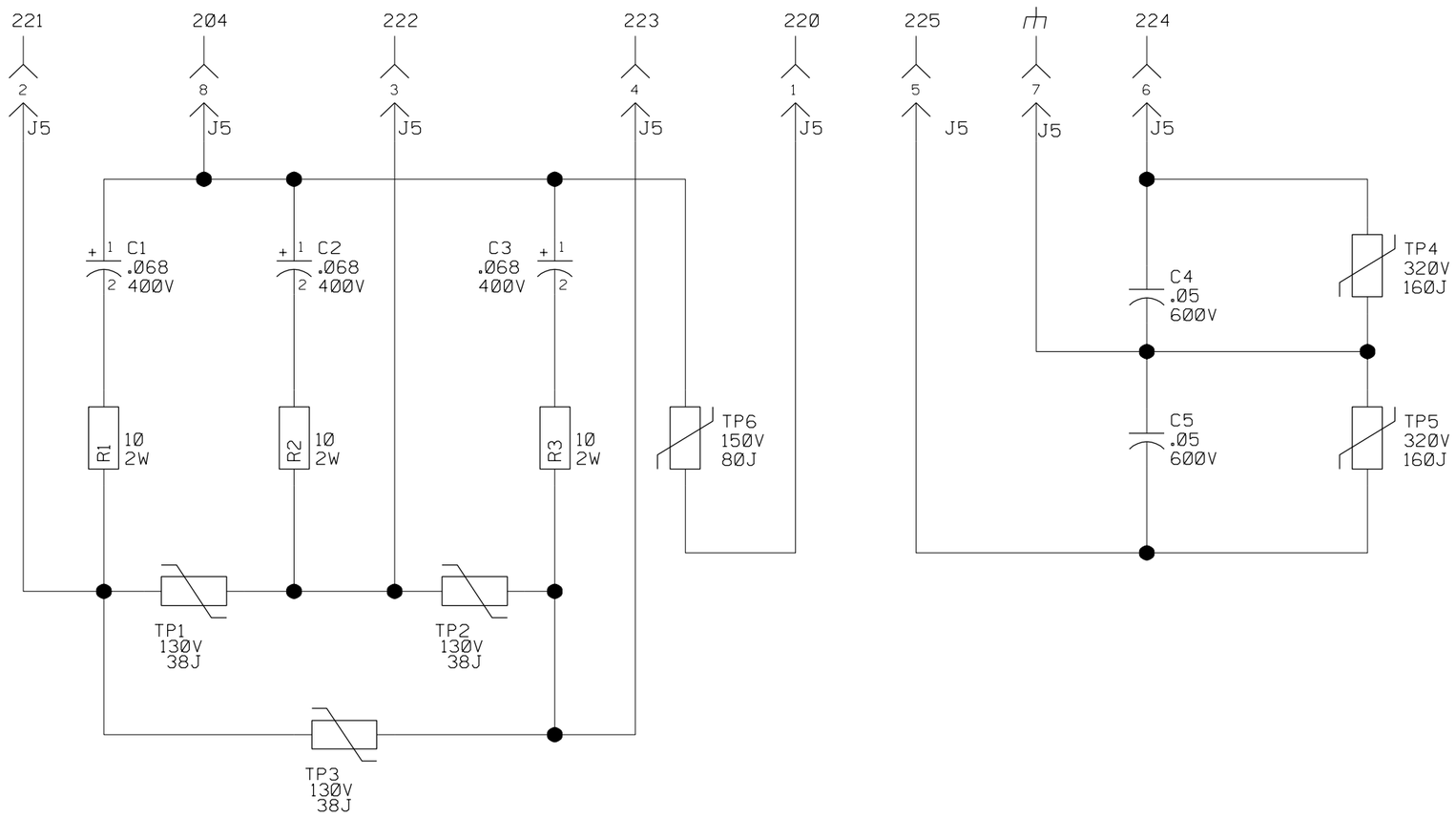
M15370 SNUBBER PC BOARD SCHEMATIC

S 19687

GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537

CAPACITORS = MFD/VOLTS
RESISTORS = OHMS,1/4 WATT (UNLESS OTHERWISE SPECIFIED)
DIODES = 1 AMP/400 VOLT (UNLESS OTHERWISE SPECIFIED)
OP AMPS = LM124 (UNLESS OTHERWISE SPECIFIED)
= COMMON CONNECTION



3-8-91G				

THE LINCOLN ELECTRIC CO.
CLEVELAND, OHIO U.S.A.

EQUIP. TYPE MISC. USE

SUBJECT SNUBBER SCHEMATIC

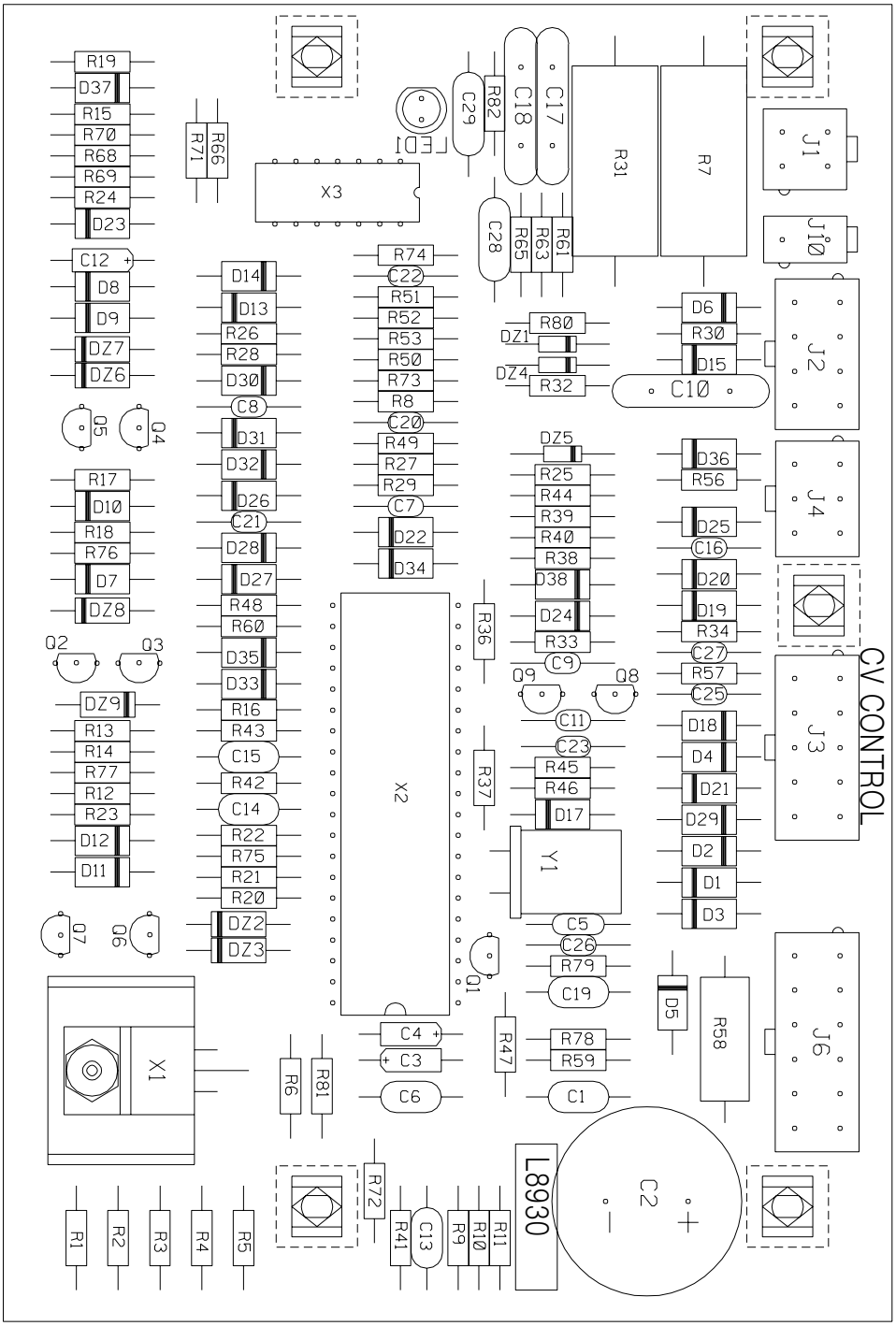
SCALE NONE

DR. MCW/CS DATE 3-26-90 CHK. _____ SUP'S'D'G. _____ SHT. NO. S 19687

NOTE: Lincoln Electric assumes no responsibility for liablilities 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.

NOTES

L8930 CONTROL PC BOARD LAYOUT

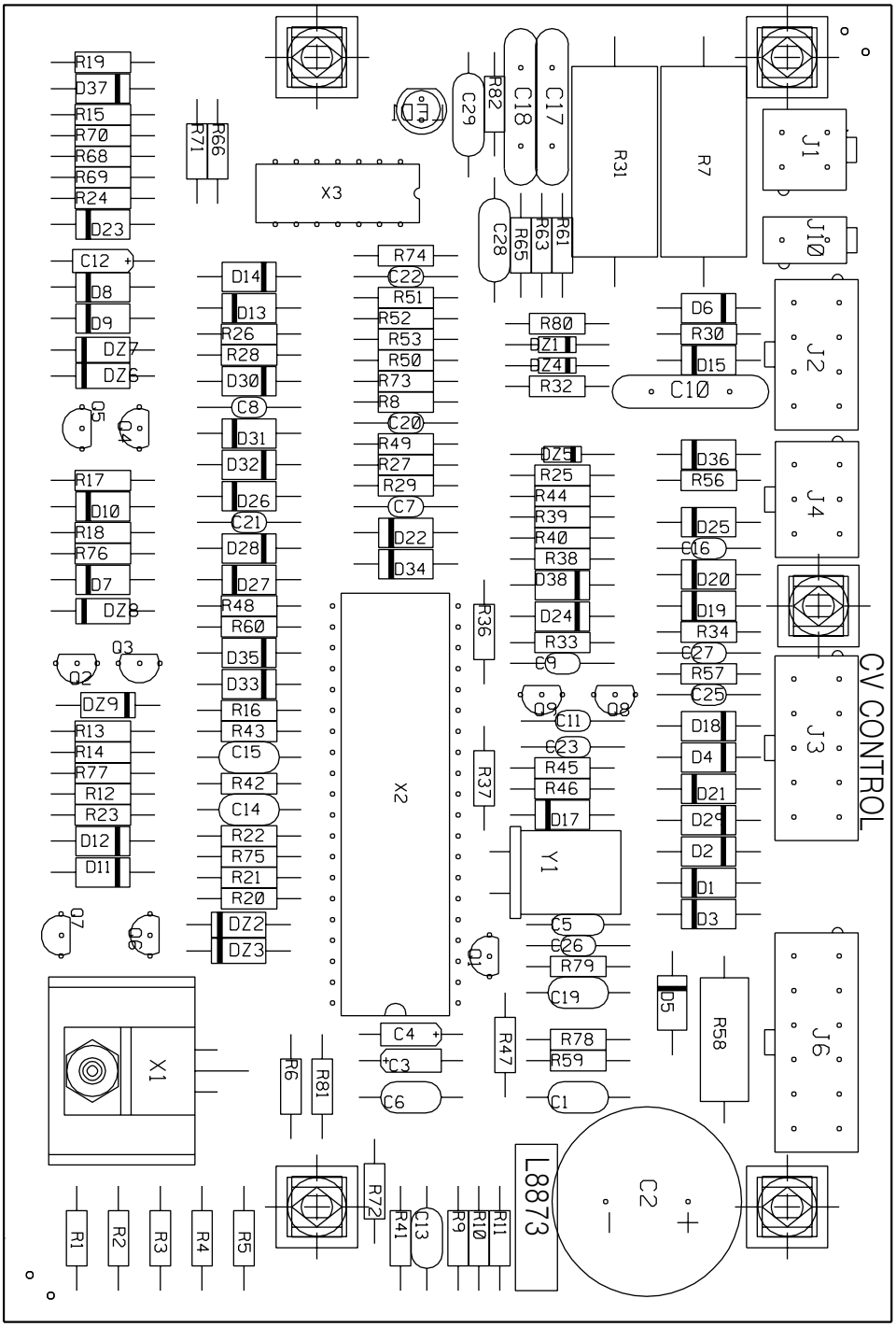


NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln 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.

L8930 CONTROL PC BOARD LAYOUT

ITEM	DESCRIPTION
C1,C6,C13,C14,C15,C19	.1/50
C2	1000/35
C3,C4,C12	1.0/35
C5	22pF/100
C7,C8,C9,C11,C16,C20,C21, C22,C23,C25,C26,C27	.022/50
C10,C17,C18	.02/600
C28,C29	4700pF/50
D1,D2,D3,D4,D5,D6,D7,D8,D9, D10,D11,D12,D13,D14,D15,D17, D18,D19,D20,D21,D22,D23,D24, D25,D26,D27,D28,D29,D30,D31, D32,D33,D34,D35,D36,D37,D38	1N4004
DZ1	1N5237B
DZ2,DZ6,DZ8	1N4746A
DZ3,DZ7,DZ9	1N4750
DZ24	1N5231B
DZ5	1N5225B
LED1	YELLOW
Q1,Q2,Q4,Q6,Q8,Q9	2N4123
Q3,Q5,Q7	.195A, 60V
R1	8.2K 1/4W
R2	3.9K 1/4W
R3	2K 1/4W
R4,R13,R15,R17,R19,R21,R23, R26,R48,R53,R59	1K 1/4W
R5	511 1/4W
R6	619 1/4W
R7,R31	3.3K 5W
R8,R50,R51,R60,R61,R63,R80	475 1/4W
R9,R10,R11,R12,R16,R20,R30	2.2K 1/4W
R14,R18,R22,R75,R76,R77,R81	30.1 1/4W
R24	1M 1/4W
R25,R27,R29,R32,R41,R42,R43, R49,R56,R66,R71,R72	10K 1/4W
R28	12.1K 1/4W
R33,R34,R36,R37,R45,R46,R47, R57,R78,R79	4.7K 1/4W
R38,R69	56.2K 1/4W
R39	22.1K 1/4W
R40,R70,R73,R74	100K 1/4W
R44	65K 1/4W
R52	39.2K 1/4W
R58	2.7 1W
R65,R82	15K 1/4W
R68	47.5K 1/4W
X1	VOLT REG 3-T(+), 1A, 5V
X2	ROM ASSEMBLY
X3	OP AMP 224N
Y1	CRYSTAL 3.57 MHZ

L8873 CONTROL PC BOARD LAYOUT

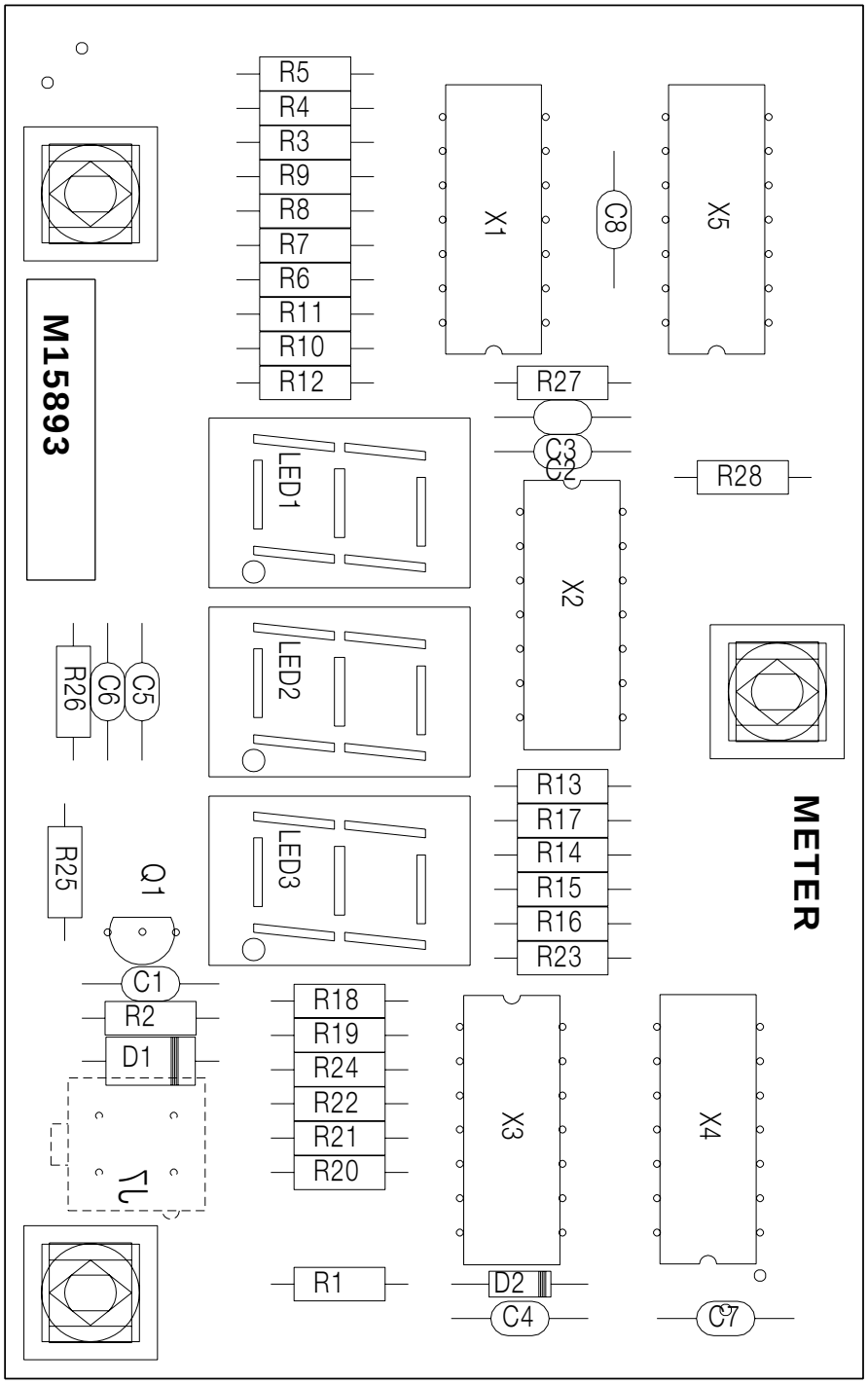


NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln 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.

L8873 CONTROL PC BOARD COMPONENTS

ITEM	DESCRIPTION
C3,C4,C12	CAPACITOR-TAEL,1.0,35V,10%
X1	IC-VOLT REG,FIXED,3-T,(+),1A,5V
Y1	CRYSTAL-QUARTZ,3.579545MHZ
C5	CAPACITOR-CEMO,22P,100V,5%
C28,C29	CAPACITOR-CEMO,4700P,50V,2%
C1,C6,C13,C14, C15,C19	CAPACITOR-CEMO,0.1,50V,10%
C7,C8,C9,C11,C16, C20,C21, C22,C23, C25,C26,C27	CAPACITOR-CEMO,.022,50V,20%
J3	MOLEX,MINI,PCB,10-PIN
J6	MOLEX,MINI,PCB,12-PIN
J10	MOLEX,MINI,PCB,2-PIN,GOLD
J1	MOLEX,MINI,PCB,4-PIN
J4	MOLEX,MINI,PCB,6-PIN
J2	MOLEX,MINI,PCB,8-PIN
R4,R13,R15,R17, R19,R21,R23, R26, R48,R53,R59	RESISTOR-MF,1/4W,1.00K,1%
R25,R27,R29,R32, R41,R42, R43,R49, R56,R66,R71,R72	RESISTOR-MF,1/4W,10.0K,1%
R40,R70,R73,R74	RESISTOR-MF,1/4W,100K,1%
R24	RESISTOR-MF,1/4W,1.00M,%
R28	RESISTOR-MF,1/4W,12.1K,1%
R44	RESISTOR-MF,1/4W,1.50K,1%
R65,R82	RESISTOR-MF,1/4W,15.0K,1%
R3	RESISTOR-MF,1/4W,2.00K,1%
R9,R10,R11,R12, R16,R20,R30,R39	RESISTOR-MF,1/4W,2.21K,1% RESISTOR-MF,1/4W,22.1K,1%
R14,R18,R22,R75, R76,R77,R81 *	RESISTOR-MF,1/4W,30.1,1%
R2	RESISTOR-MF,1/4W,3.92K,1%
R52	RESISTOR-MF,1/4W,39.2K,1%
R8,R50,R51,R60, R61,R63,R80	RESISTOR-MF,1/4W,475,1%
R33,R34,R36,R37, R45,R46, R47,R57, R78,R79	RESISTOR-MF,1/4W,4.75K,1%
R68	RESISTOR-MF,1/4W,47.5K,1%
R5	RESISTOR-MF,1/4W,511,1%
R38,R69	RESISTOR-MF,1/4W,56.2K,1%
R6	RESISTOR-MF,1/4W,619,1%
R1	RESISTOR-MF,1/4W,8.25K,1%
C10,C17,C18	CAPACITOR-CD,.02,600V,+80/-20%
D1,D2,D3,D4,D5,D6, D7,D8,D9,D10,D11, D12,D13,D14,D15 D17,D18,D19,D20, D21,D22, D23,D24, D25,D26,D27,D28 D29,D30,D31,D32, D33,D34,D35,D36, D37,D38	DIODE-AXLDS,1A,400V
DZ4	ZENER DIODE-0.5W,5.1V,5%,1N5231B
DZ3,DZ7,DZ9	ZENER DIODE-1W,27V,10%,1N4750A
DZ5	ZENER DIODE-0.5W,3.0V,5%,1N5225B
DZ1	ZENER DIODE-0.5W,8.2V,5%,1N5237B
DZ2,DZ6,DZ8	ZENER DIODE-1W,18V,5%,1N4746A
R58	RESISTOR-CC,1W,2.7,5%
LED1	LED-T-1 3/4,RED,HLMP-3003
R7,R31	RESISTOR-WW,5W,3.3K,5%,SQ
C2	CAPACITOR-ALEL,1000,35V,+30/-20%
X3	LM224 OP-AMP
Q1,Q2,Q4,Q6, Q8,Q9	TRANSISTOR-N,T226,0.2A,30V,2N4123
Q3,Q5,Q7	TRANSISTOR-NMF,T226,.195A,60V,BS170

M15893 METER PC BOARD LAYOUT

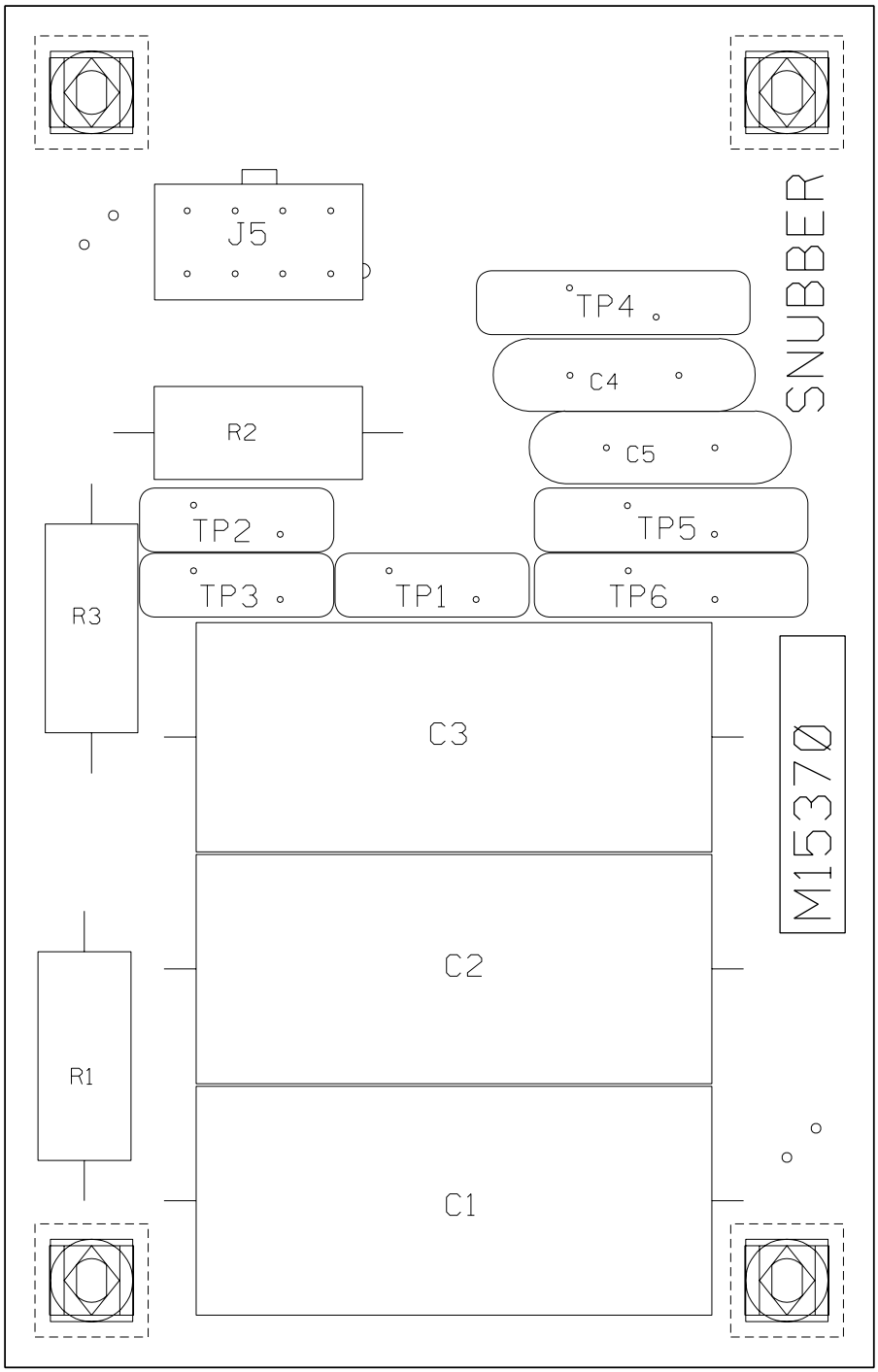


NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. Individual Printed Circuit Board Components are not available from Lincoln Electric. This information is provided for reference only. Lincoln 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.

M15893 METER PC BOARD COMPONENTS

ITEM	DESCRIPTION
LED1,LED2,LED3	LED-DISPLAY,7-SEGMENT,CA,MAN6660*
C1,C2,C3,C4,C7,C8	CAPACITOR-CEMO,.022,50V,20%
C5,C6	CAPACITOR-CEMO,330P,100V,5%
J7	CONNECTOR,MOLEX,MINI,PCB,4-PIN
D1	DIODE-AXLDS,1A,400V
D2	DIODE-AXLDS,0.15A,75V,1N914
R3,R4,R5,R6,R7,R8,R9,R10 R11,R12,R13,R14,R15,R16 R17,R18,R19,R20,R21,R22 R23,R24,R25,R26	RESISTOR-MF,1/4W,100,1%
R2	RESISTOR-MF,1/4W,3.32K,1%
R1	RESISTOR-MF,1/4W,475,1%
X5	IC-CMOS,INVERTER,SCHMITT,HEX,HC14A
X1,X2,X3	IC-CMOS,REGISTER,SHFT,SI/PO,8-BIT
X4	IC-CMOS,FLIP-FLOP,"D",DUAL,HC74
Q1	TRANSISTOR-ND,T226,0.5A,30V,MPS-A13
R27,R28	RESISTOR-MF,1/4W,3.01K,1%

M15370 SNUBBER PC BOARD LAYOUT



NOTE: Lincoln Electric assumes no responsibility for liablilities 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.

M15370 SNUBBER PC BOARD COMPONENTS

ITEM	DESCRIPTION
J5	CONNECTOR,MOLEX,MINI,PCB,8-PIN
C4,C5	CAPACITOR-CD,.05,600V,+80/-20%
C1,C2,C3	CAPACITOR-PEF,0.68,400V,10%
R1,R2,R3	RESISTOR-CC,2W,10,10%
TP1,TP2,TP3	MOV-130VRMS,38J,14MM
TP6	MOV-150VRMS,80J,20MM
TP4,TP5	MOV-320VRMS,160J,20MM

NOTES

SVM ERROR REPORTING FORM

We need to know if there are errors in our manuals. We also value any suggestions as to additional tests or procedures that would make this SVM a better tool for you.

If you discover new or different “Problems or Symptoms” that are not covered in the three column troubleshooting chart, please share this information with us. Please include the machine’s code number and how the problem was resolved.

Thank You,
Technical Services Group
Lincoln Electric Co.
22801 ST. Clair Ave.
Cleveland, Ohio 44117-1199

FAX 216-481-2309

SVM Number _____

Page Number if necessary_____

Your Company_____

Your Name_____

Please give detailed description below:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

SD287 01/99