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® AC/DC 250

For use with machines having Code Numbers: **9491; 9512; 9513; 9514; 9548; 9645; 9646; 9670; 9712; 9713; 9738; 9755; 9992; 9993; 9994; 9995; 9996; 9997; 9998; 11094; 11100; 11101; 11102; 11103; 11104**

SERVICE MANUAL

SVM228-A | Issue Date 13-Jan

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⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

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

FOR ENGINE powered equipment.

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

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

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

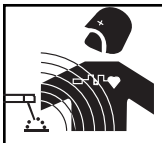
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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

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

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

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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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ELECTRIC SHOCK can kill.

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

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

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

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

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

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

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

3.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

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

3.j. Also see Items 6.c. and 8.

ARC RAYS can burn.

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

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

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

FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

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

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

5.e. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

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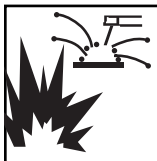

WELDING and CUTTING SPARKS can cause fire or explosion.

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

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

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

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”, AWS F4.1 from the American Welding Society (see address above).

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

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

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B “ Standard for Fire Prevention During Welding, Cutting and Other Hot Work”, available from NFPA, 1 Batterymarch Park,PO box 9101, Quincy, Ma 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-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.

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

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

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

Refer to **http://www.lincolnelectric.com/safety** for additional safety information.

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.

Electromagnetic Compatibility (EMC)

Conformance
Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

Introduction
All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

Installation and Use
The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

Assessment of Area
Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;

b) radio and television transmitters and receivers;

c) computer and other control equipment;

d) safety critical equipment, e.g., guarding of industrial equipment;

e) the health of the people around, e.g., the use of pacemakers and hearing aids;

f) equipment used for calibration or measurement

g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;

h) the time of day that welding or other activities are to be carried out.

Electromagnetic Compatibility (EMC)

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Methods of Reducing Emissions

Mains Supply
Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

Maintenance of the Welding Equipment
The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturers instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Welding Cables
The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

Equipotential Bonding
Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

Earthing of the Workpiece
Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding
Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications. [1]

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[1] Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

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TECHNICAL SPECIFICATIONS: IDEALARC AC/DC 250

INPUT - OUTPUT RATINGS		
Model	**AC/DC 250**	**AC/DC 250**
Type	K1053	K1054
AC Input Frequency	60	50
Output Rating	NEMA CLASS II (60)	IEC 974
	AC DC	AC DC
Amperes	300 250	250 250
Volts	32 30	30 30
Duty Cycle	20 30	30 30
Current Range	35-300 40-250	35-250 40-250
Max O.C.V.	72 70	72 70
Input Power		
Standard Voltages	208/230/460 230/460/575	220/380/440 380/415/500
Rated Input Current (230V 60Hz, 220V 50Hz)		
With Condensers	68	68
Without Condensers	86	86
Idle Input Current (230V)		
With Condensers	23	23
Without Condensers	6.2	6.2
Power Factor (200 Amp Load)		
With Condensers	83.3	83.3
Without Condensers	69.0	69.0

PHYSICAL DIMENSIONS			
HEIGHT	**WIDTH**	**DEPTH**	**WEIGHT**
27.00 in. 686 mm	19.00 in. 483 mm	21.50 in. 546 mm	350 lbs. 159 kg

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INSTALLATION

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from 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 SPARKS can cause fire or explosion.
- **Keep flammable material away.**
- **Do not weld on closed containers.**

ARC RAYS can burn eyes and skin.
- **Wear eye, ear and body protection.**

See additional warning information at the front of this operator's manual.

- Connect the IDEALARC AC/DC 250 grounding terminal, located under the reconnect panel (marked ⏚), to a good electrical ground per the U.S. National Electrical Code and any applicable local codes.
- Turn the power switch on the IDEALARC AC/DC 250 "OFF" before connecting or disconnecting output cables or other equipment.
- Only qualified personnel should perform this installation.

Undercarriages: If the optional K866 undercarriage is to be installed, it should be done before connecting the welder to power lines. Instructions are included with the undercarriage.

LOCATION

The machine should be located in a clean, dry place where there is free circulation of clean air such that air movement in the back and along the sides will not be restricted. Dirt and dust that can be drawn into the machine should be kept to a minimum. Failure to observe the precautions can result in excessive operating temperatures and nuisance shutdown of the machine.

INPUT CONNECTIONS

Be sure the voltage, phase and frequency of the input power is as specified on the welder rating plate located on the rear panel of the machine. Either a single phase or one phase of a three phase line can be used.

Have a qualified electrician install the machine per the following instructions:

- Remove the left side panel (viewed from the front).
- Route the input power lines through the hole in the rear panel and center baffle.
- Lug the input leads with a ring terminal for a 1/4" (6 mm) screw.
- Connect lugged leads to L1 and L2 of the reconnect panel per the Wiring Diagram pasted to the inside of the side panel.

Input connection must conform to the U.S. National Electrical Code and all local codes.

Models designed for two or three input voltages are shipped connected for the highest voltage. Reconnect instructions are on the diagram pasted to the inside of the side panel. Consult rating plate on the rear panel for machine input voltage rating.

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

Fuse the input circuit with the recommended super lag fuses. Choose an input and grounding wire size according to local codes or See ***Table A.1***. "Delay type" circuit breakers may be used in place of fuses. Using fuses or circuit breakers smaller than recommended may result in "nuisance" tripping from welder inrush currents even if not welding at high currents.

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TABLE A.1 – RECOMMENDED INPUT WIRE, GROUND WIRE AND FUSE SIZES

RECOMMENDED INPUT WIRE, GROUND WIRE AND FUSE SIZES 200 Amp Output and 50% Duty Cycle

		Input Amps		Copper Wire Sizes 75°C in Conduit			Fuse Size (Super Lag)	
Input Volts	Frequency	With P.F. Cap	Without P.F. Cap	With Cap	Without Cap	Grounding Conductor	With P.F. Cap	Without P.F. Cap
200	50/60	58	81	#8	#6	#8	70	100
208	60	55	77	#8	#6	#8	70	100
220/230	50/60	50	70	#8	#6	#8	70	90
380	50	29	41	#10	#8	#10	40	50
400	50/60	29	40	#10	#8	#10	40	50
440/460	50/60	25	35	#12	#10	#10	35	45
500	50	22	31	#14	#12	#10	30	40
575	60	20	28	#14	#12	#10	25	40

STACKING

⚠ WARNING

FALLING EQUIPMENT can cause injury.

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

A. Make sure the first or bottom unit is setting on a level, well supported surface.

B. The units must be stacked with their front flush, making sure the two holes in the base rails of the unit being stacked on top are over the two holes located on the top front corners of the unit being stacked on. Fasten the units together with 5/16" (8 mm) bolts, nuts and lockwashers through these holes.

C. Remove fastening bolts before lifting unit off stacks.

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GENERAL DESCRIPTION

The IDEALARC AC/DC 250 is a single phase constant current arc welding power source available in an AC/DC model only. Designed for stick welding, it may also be used for TIG welding when used with the K799 Hi-Freq unit.

RECOMMENDED PROCESSES AND EQUIPMENT

AC AND DC CONSTANT CURRENT WELDING

AC	35-300 Amps 60 Hz	35-250 Amps 50 Hz
DC	40-250 Amps 50/60 Hz	

Duty Cycle	60 Hz	50 Hz
	100%-140 Amps	100%-140 Amps
	50%-200 Amps	60%-180 Amps
	30%-250 Amps	30%-250 Amps
	20%-300 Amps	

TIG WELDING

The K799 can be used with this machine to provide high frequency stabilization and a gas valve for TIG welding. It operates on 115V 50/60 Hz power. A water valve (for water cooled TIG torches) is available as an option.

When TIG welding AC or DC may be used, but when AC TIG welding the duty cycle must be decreased by one-half.

DESIGN FEATURES

- Power On/Off switch.
- Polarity switch selects AC, DC+ or DC-.
- Continuous current control dials with exact welding current needed for each job. Settings are precise and free from creep.
- Spring loaded knob on the continuous current control crank pulls out for easy adjustment and snaps back out of the way when released.
- Meets NEMA Class II specifications.
- Recessed front panel protects controls.
- Large safety margins and protective circuits protect rectifiers from transient voltages and high currents.
- Submersion dipping of assembled transformer and choke in special sealing/insulating material gives extra protection against moisture and corrosive atmosphere.
- Stackability - Machines can be stacked up to three high.
- Outstanding Arc Stability - Transformer design and built-in stabilizer provide pop-out-resistant welding with all electrodes, including those which normally require an industrial type AC welder.
- Reconnect panel is provided to permit changing from one input voltage to another without reconnecting transformer leads.

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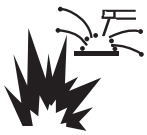
SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from 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 SPARKS can cause fire or explosion.
- **Keep flammable material away.**
- **Do not weld on closed containers.**

ARC RAYS can burn eyes and skin.
- **Wear eye, ear and body protection.**

See additional warning information at the front of this operator's manual.

Be sure the IDEALARC AC/DC 250 is properly installed, and that all accessories are properly hooked up before attempting operation.

DUTY CYCLE

This machine is rated at a 30% duty cycle at 250 amps or 50% duty cycle at 200 amp output. Duty cycle is based on a 10 minute period. Therefore, the welder can be loaded at 200 amperes for 5 minutes out of each 10 minute period. Higher duty cycles can be used at lower currents; see rating plate information.

CONTROL OPERATION

A. Current Control Handle

Rotating the hand wheel raises and lowers the output current allowing the operator to dial the desired current. Clockwise rotation reduces the current while counter-clockwise rotation increases the current. Turning the current control handle also drives the output pointer at the bottom of the nameplate which indicates the stick welding current at NEMA arc volts.

B. Polarity Switch

Turn the arc polarity switch in the upper right hand corner of the case front to AC, DC(-) or DC(+) as required for the particular application. **DO NOT CHANGE POLARITY SWITCH WHILE WELDING**. Doing this can seriously damage the switch.

C. TIG Welding

The IDEALARC AC/DC 250 with the optional Hi-Freq is an inexpensive equipment combination for part-time production or repair TIG welding of aluminum, magnesium, thin stainless steel and many space-age metals. The IDEALARC AC/DC 250 can be used for normal stick electrode welding with the Hi-Freq attached.

⚠ CAUTION

Reduce the IDEALARC AC/DC 250 duty cycle by 50% when AC TIG welding, i.e., the welder should be operated for only two and one half minutes out of every ten at rated current of 200 amperes.

The Hi-Freq includes high frequency generator, gas valve and needed controls. It operates on 115V, 50/60 Hz AC power.

NOTE: The Hi-Freq unit includes an R.F. bypass capacitor kit for power source protection. Installation instructions are in the kit. (When using the IDEALARC AC/DC 250 with any other high frequency equipment, an R.F. bypass capacitor must be installed, order Kit T12246). To provide protection, the welder grounding stud or frame must be connected to ground (see instructions on grounding in machine ***Installation*** section). Also follow the grounding instructions given in the Hi-Freq Instruction manual.

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OPTIONS / ACCESSORIES AND COMPATIBLE LINCOLN EQUIPMENT

FACTORY INSTALLED OPTIONS/ACCESSORIES

- Power Factor Capacitors

  (Reduce input amps by 30% at rated load)

FIELD INSTALLED OPTIONS

- Power Factor Capacitors

  (Reduce input amps by 30% at rated load)

- Undercarriage (K866)

  Consists of a handle, axle, wheels, front bracket and mounting hardware. Overall width 24.56 inches (624 mm).

- Hi Freq Kit (K799)

  Converts IDEALARC AC/DC 250 into a TIG welder.

  Request Bulletin E385 for full details.

- Standard Accessory Kit (K710)

  Includes electrode holder, work clamp, electrode, work cables, and headshield with lens and cover-plate.

INSTALLATION OF FIELD INSTALLED OPTIONS

For installation of compatible field installed options, See Field Installed Options section above, and refer to the instructions included with those options.

OUTPUT CABLE SIZE AND CONNECTION

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Turn the power switch of the welding power source "OFF" before connecting or disconnecting output cables.**

The output leads are connected to the output terminals marked "WORK" and "ELECTRODE". They are located at the lower right and lower left corners of the front panel. The 60 Hz IDEALARC AC/DC 250 provides 1/2" studs for weld cable connections. The 50 Hz IDEALARC AC/DC 250 provides European weld cable connector receptacles. Minimum cable sizes recommended are listed in the table below.

CABLE SIZES FOR COMBINED LENGTHS OF COPPER ELECTRODE AND WORK CABLES

	200 Amps 50% Duty Cycle	250 Amps 30% Duty Cycle
0-100 Ft.	3 (30mm²)	3 (30mm²)
100-150 Ft.	2 (35mm²)	2 (35mm²)
150-200 Ft.	1 (45mm²)	1 (45mm²)
200-250 Ft.	1/0 (55mm²)	1/0 (55mm²)

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MAINTENANCE

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

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

GENERAL MAINTENANCE

1. The fan motor has sealed ball bearings which requires no service.
2. In dusty locations dirt may clog the air channels causing the welder to run hot. Under these conditions carefully blow out the welder at regular intervals.
3. Keep the electrode and work cable connection tight.
4. Every twelve months or at the first indication of a binding current pointer, turn the input power off and remove the left case side. Wipe the pointer guide bar clean and lubricate with graphite grease.
5. When cleaning the current pointer, clean the reactor quadrant teeth, drive gear and pinion. Lubricate with graphite grease.

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FIGURE E.1 BLOCK LOGIC DIAGRAM

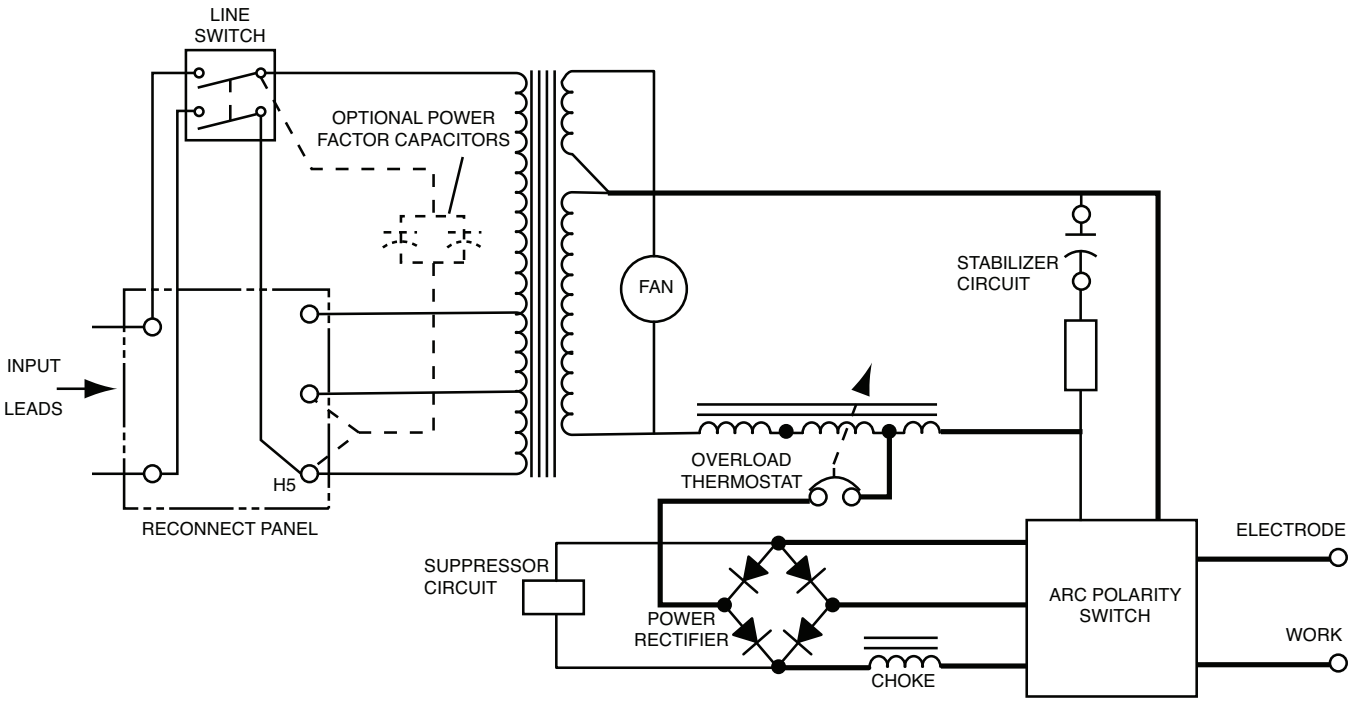
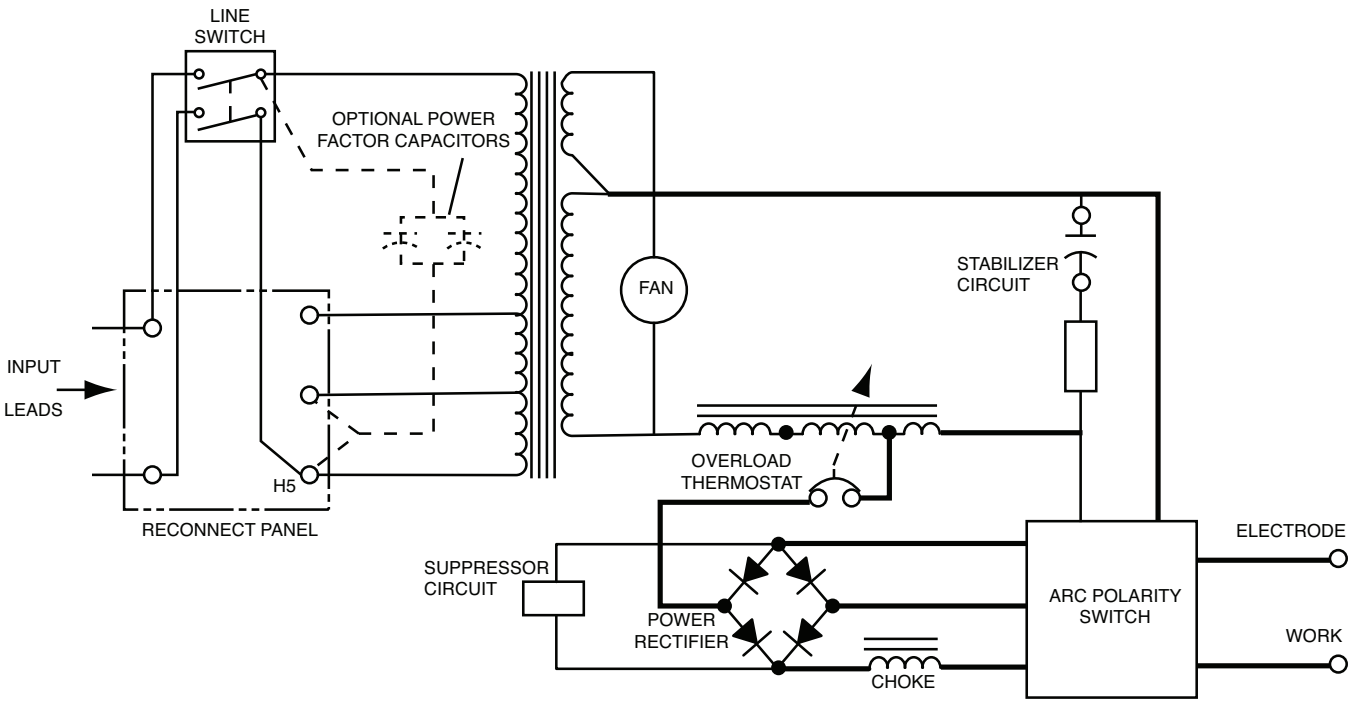


FIGURE E.2 - GENERAL DISCRIPTION



GENERAL DESCRIPTION

The IDEALARC AC/DC 250 is a single phase constant current arc welder power source available in a AC/DC model only. Designed for stick welding, it may be used for TIG welding DC or AC with an add on kit.

Current control is continuous with no taps, via a reactor. A polarity switch for ease of switching from AC to either DC positive or DC negative weld output. Field installed power factor capacitors to reduce input currents are optional.

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

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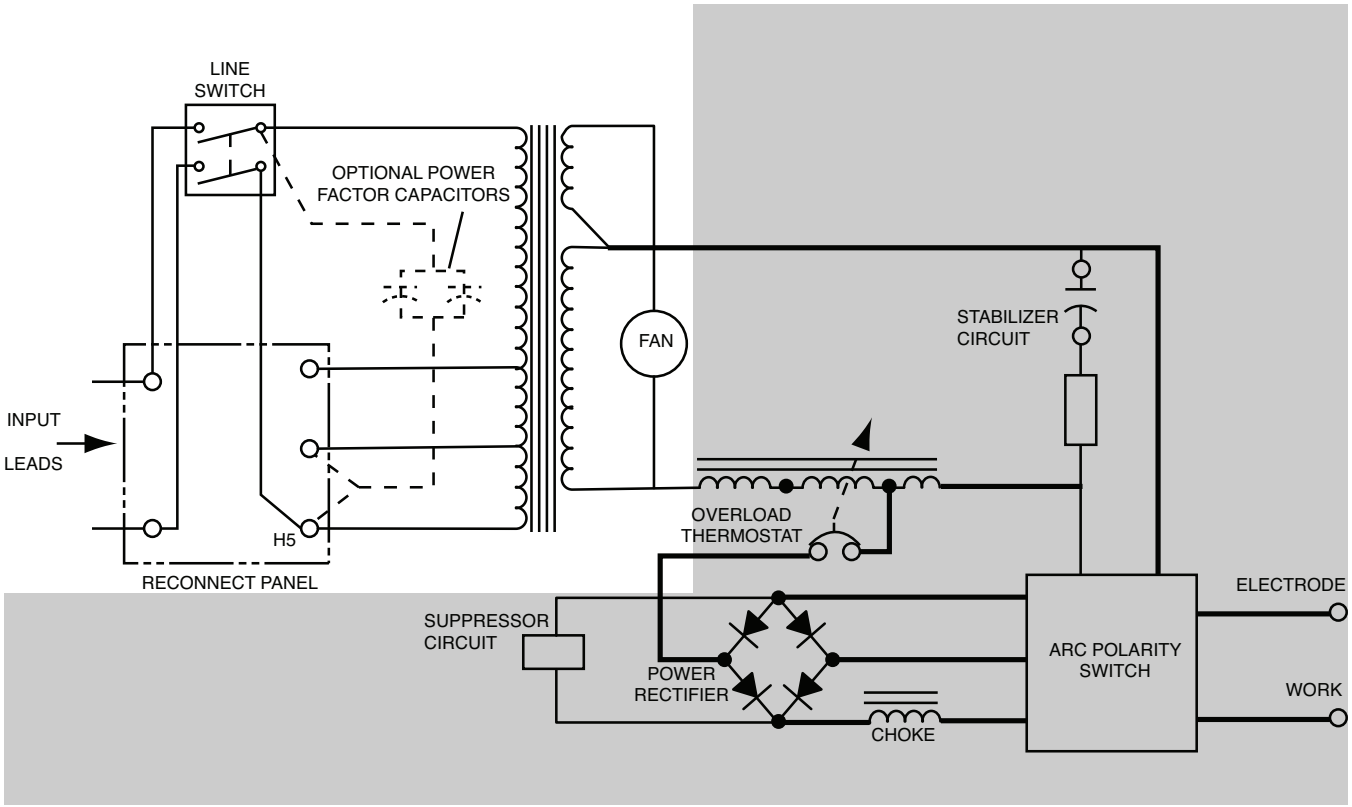
FIGURE E.3 - INPUT LINE VOLTAGE LINE SWITCH, FAN, MAIN TRANSFORMER AND POWER FACTOR CORRECTION CAPACITORS



INPUT LINE VOLTAGE LINE SWITCH, FAN, MAIN TRANSFORMER AND POWER FACTOR CORRECTION CAPACITORS

The desired single phase input power is connected to the IDEALARC AC/DC 250 through the input reconnect panel, located near the lower left of the machine. The reconnect panel area also allows the user to configure the machine for the desired input voltage. The AC input voltage is applied to the primary of the main transformer through the on/off switch on the front upper left of the machine.

The main transformer changes the high voltage, low current input power to a low voltage, high current secondary weld output. This transformer action also isolates the primary voltage from the welding secondary voltage. The secondary winding has a dedicated tap winding that is ONLY available for the 115 VAC cooling fan operation. This coil is not isolated from the weld circuit and is not available to be used for powering external equipment.

On older codes Power Factor correction capacitors are factory installed. On later codes they are field installed options.

The purpose for Power Factor Capacitors is to reduce the input current draw under load. They will reduce the input cable sizing which lowers the installation cost to run power to the welder. See ***Table A.1*** for current draw differences.

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

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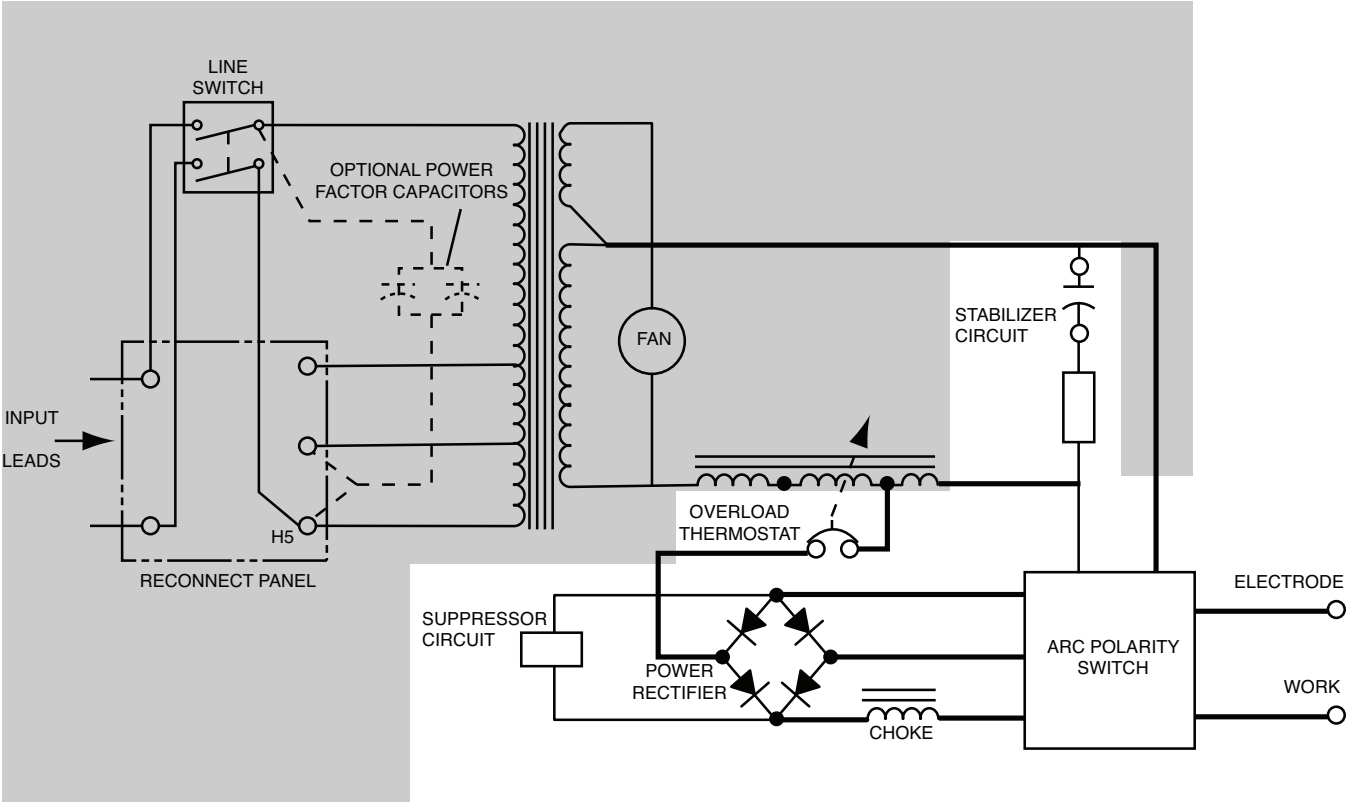
FIGURE E.4 - OUTPUT VOLTAGE RECTIFICATION POLARITY SWITCH, OVER CURRENT PROTECTION AND STABILIZER CIRCUIT



OUTPUT VOLTAGE RECTIFICATION POLARITY SWITCH, OVER CURRENT PROTECTION AND STABILIZER CIRCUIT

The main transformer secondary windings are connected to the control reactor and the polarity switch. The output of the control reactor is connected to the protection thermostat and then to the output rectifier. The other input is from the polarity switch. The rectifier converts AC weld current to DC weld current by its diode action of rectification. The suppressor circuit protects the diodes from any main transformer spikes, welding circuit spikes and/or from high frequency welding equipment options connected to the welder.

The choke is in one leg of the DC weld current to aid in the smoothing of the DC weld current after rectification.

The weld polarity switch mechanically reconnects for the AC or DC positive or negative weld voltages desired for welding. The switch keeps the operator from having to change the actual weld leads back and forth, at the welder's output terminals, in order to change polarity.

The weld stabilizer circuit is a larger capacitor and resistive wire circuit, which helps the AC welding arc from going out when the AC wave shape goes through its zero crossing.

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

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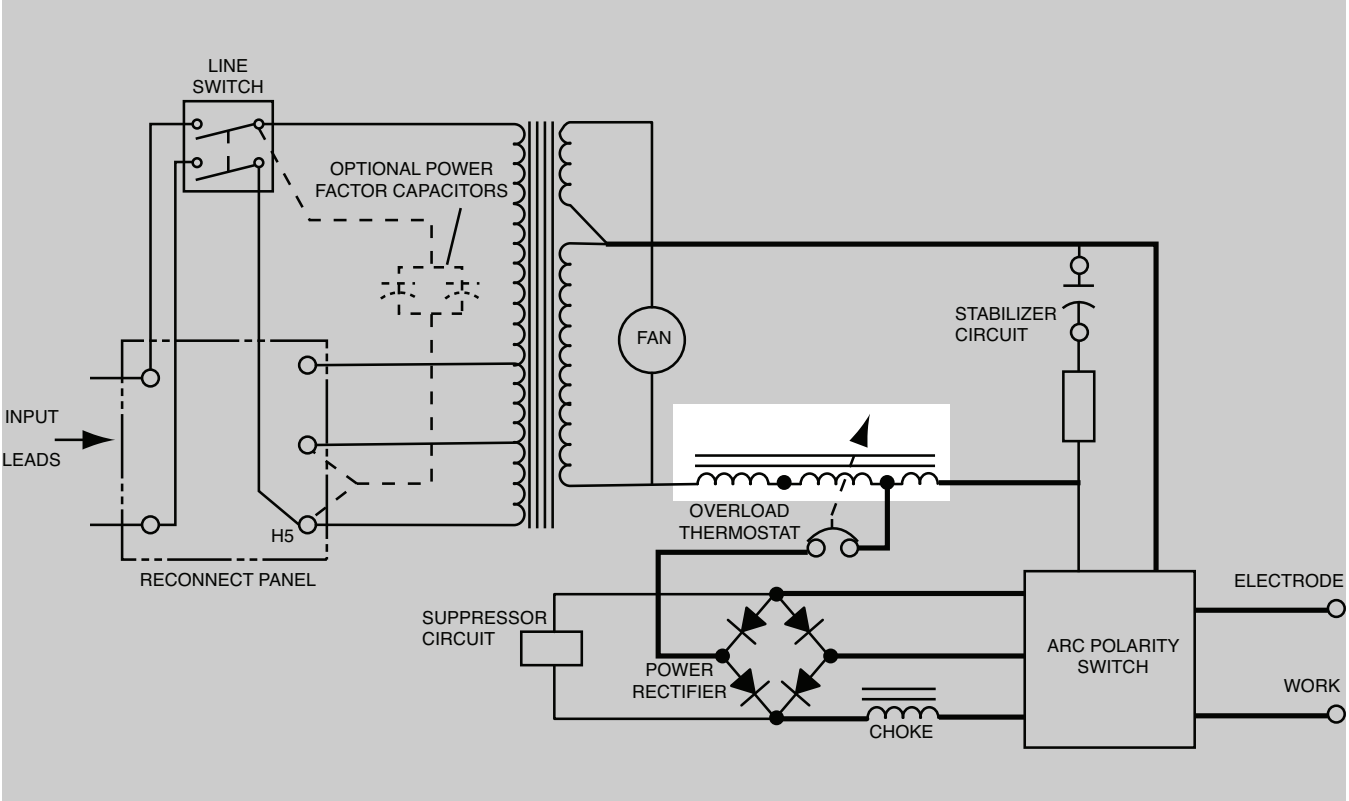
FIGURE E.5 - CONTROL REACTOR AND CHOKE



CONTROL REACTOR AND CHOKE

The control reactor is the only means of increasing or decreasing the weld current of this machine. It mechanically increases or decreases the air gap to regulate output current flow. The same reactor is used in the control for the AC and DC weld mode currents.

As the hand crank on the front of the machine is turned, the air gap between the stationary and movable iron core is changed. This changes the reactance value of the reactor.

With the crank set to minimum output (no air gap) the reactor has a maximum reactance value. This higher reactance opposes the main transformer weld windings AC current creating minimum weld current flow.

With the crank set to maximum output (max air gap) the reactance value is very low. There is low opposition to the main transformer weld winding AC current creating maximum weld current ability.

Chokes add inductance in circuits that oppose changes in current levels. Reactance does the same, opposes changing current, but in AC circuits.

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

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FIGURE E.6 – MAIN TRANSFORMER ASSEMBLY REAR VIEW

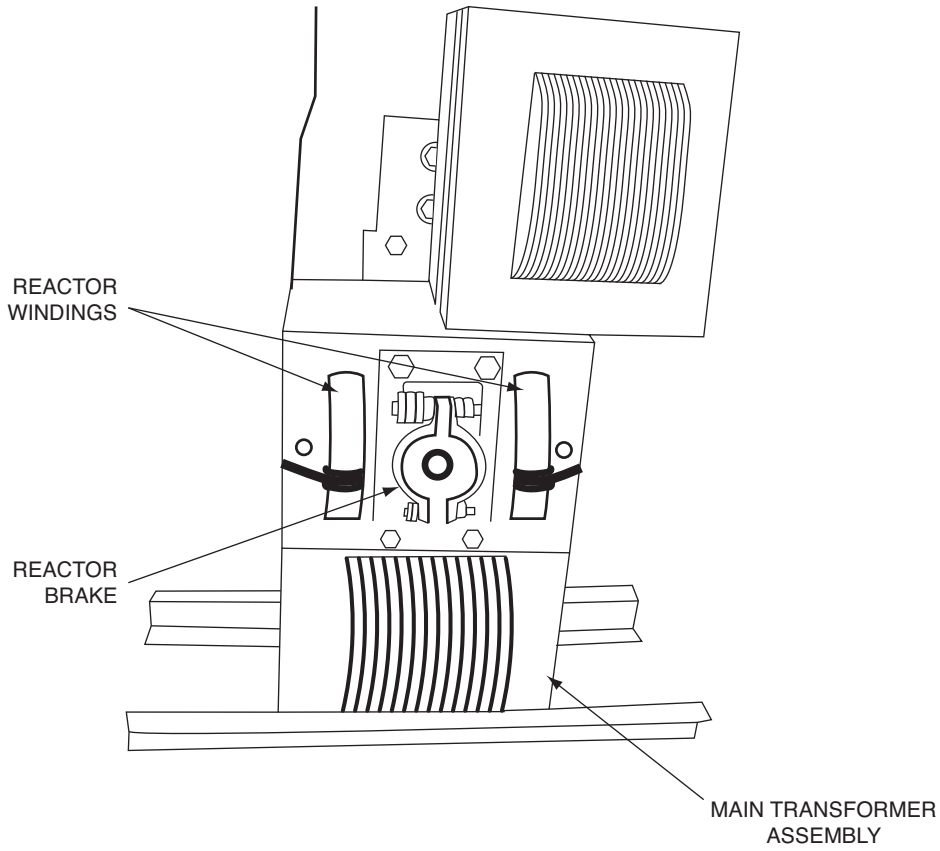
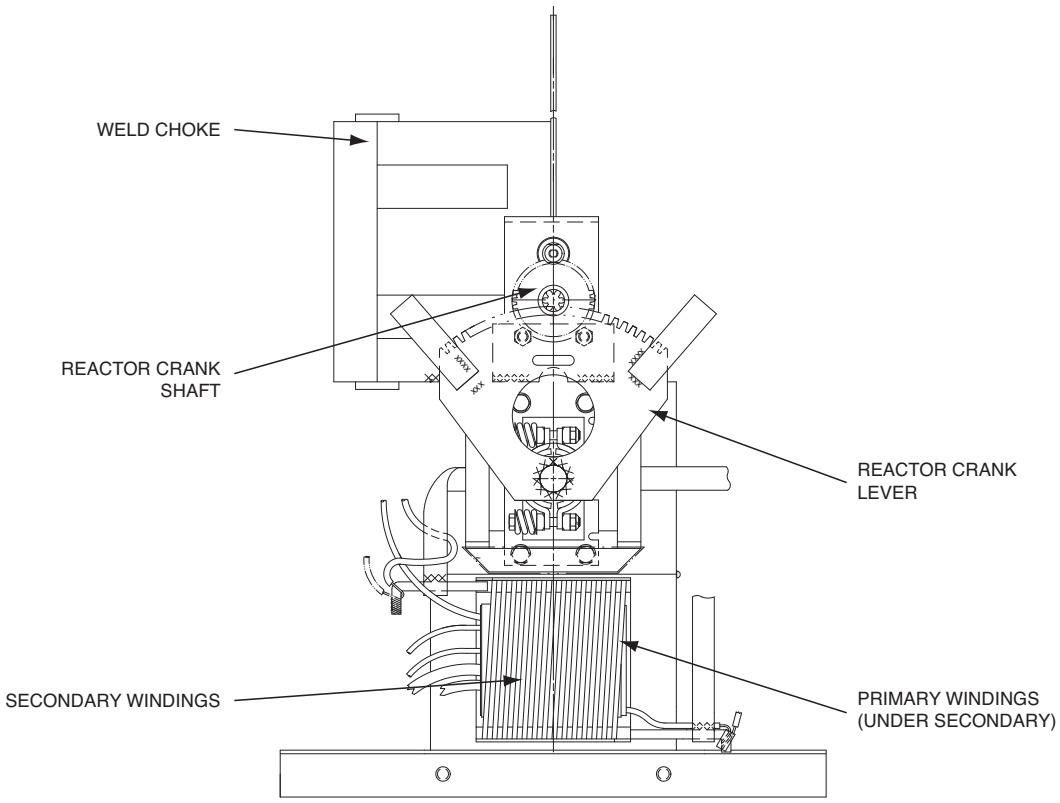


FIGURE E.7 – MAIN TRANSFORMER ASSEMBLY FRONT VIEW



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HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into the following categories: output problems, function problems and welding problems.

Step 2. PERFORM EXTERNAL TESTS.
The second column labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)" lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

Step 3. RECOMMENDED COURSE OF ACTION
The last column labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

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

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

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PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

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

⚠ CAUTION

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

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

PC board can be damaged by static electricity.

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

- 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 un-painted, 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 PC board must be either conductive, anti-static or static-dissipative.
- Remove the PC board from the static-shielding bag and place it directly into the equipment. Don't set the PC board on or near paper, plastic or cloth which could have a static charge. If the PC board can't be installed immediately, put it back in the static-shielding bag.
- If the PC board uses protective shorting jumpers, don't remove them until installation is complete.
- If you return a PC 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.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Welder will not weld.	1. Line switch not turned "ON". Supply line fuse blown. 2. Power circuit dead. 3. Broken power lead. 4. Wrong voltage. 5. Electrode or work lead loose or broken. 6. Open transformer circuit. 7. Polarity switch not centered.	1. Check supply line voltage. 2. Check voltage against rating plate. Check reconnect panel jumper. 3. Tighten and repair connections. 4. Perform the ***Main Transformer Test***. 5. Center switch handle on DC(+), DC(-), AC.
Welder welds, but soon stops welding (DC only).	1. Proper ventilation hindered. 2. Welder loaded beyond rating. 3. Fan motor inoperative. 4. Poor internal connections. 5. Excessive dust accumulation in welder. 6. Bi-metallic thermostat dirty.	1. Make sure all case openings are free for proper circulation of air. 2. Operate at normal current and duty cycle consistent with rating. See ***Technical Specifications*** pages for output current levels and duty cycle for that weld current level. 3. Check leads and motor bearings. Fan motor can be tested on 115V line; with welder on, voltage across fan motor should be approximately 115V. 4. Check for loose or hot connections and tighten. 5. Blow out welder with low pressure. 6. Carefully clean in naptha. or replace thermostat.

⚠ 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 1-888-935-3877.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
Welder will not shut off.	1. Line switch has failed mechanically.	1. Replace switch.
Polarity switch will not turn.	1. Contacts rough and pitted from improper switching under load.	1. Replace switch.
Polarity switch ARCS excessively when switching while NOT welding or NOT under load with the welder turned on. This switch is not to be switched under load or while welding.	1. Output Rectifier is shorted or leads in the welder are shorted or touching.	1. Perform the ***Output Rectifier Test***. 2. Check for arcing inside the welder on leads while the welder is energized.
Difficulty turning the current control crank. The current control knob moves while welding or under load.	1. The control reactor brake devices may need adjusted or replaced.	1. Perform the ***Control Reactor Crank Brake Adjustment*** or replace both brake devices and adjust.
Repeated failure of the output bridge rectifier when TIG welding with an HF module kit.	1. A T12246 bypass kit needs installed inside the welder.	1. With a new output rectifier installed replace / inspect the output rectifier snubber and or T12246 bypass kit.
Welder draws excessive amounts of current at idle or when under load but the unit welds excellent in all polarities. Fuses blow occasionally while not welding.	1. Some welders that have Power Factor Correction Capacitors installed do draw higher amounts of current at idle or when under load.	1. Install the proper fuse for the rated input volts to keep the smaller rated fuse from blowing.

⚠ 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 1-888-935-3877.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
Difficulty in welding with a HF unit attached to the welder.	1. A T12246 bypass kit needs installed.	1. Install the T12246 bypass kit. The Lincoln HF unit has its own weld stabilizer circuit. The one in the welder is not required. Remove and tape up the lead for the weld stabilizer circuit (series resistive wire and capacitor) in the welder at the capacitor. See Wiring Diagram. Reconnect this stabilizer circuit when going back to a stick welding processes.
Welder loads fine on a load bank, but has poor welding ability when welding.	1. Welder may have a weld circuit or main transformer grounded. 2. Choke may have a turn to turn short.	1. Perform the ***Test For Grounded Circuits***. 2. Inspect the choke for a turn to turn short in its windings. See ***Main Transformer Test,*** secondary coil section.
Variable or sluggish welding.	1. Poor work or electrode terminal connection. 2. Current too low. 3. Low line voltage. 4. Welding leads too small. 5. Old and badly frayed welding cables.	1. Check and clean all connections. 2. Check recommended currents for rod type and size. 3. Check with power company. 4. Make sure the welder is reconnected correctly for the line voltage that is going to the welder. 5. Perform the ***Control Reactor Test***.
OCV (open circuit voltage) is present at the output studs. The OCV is still present when trying to strike an arc or to weld. But no welding occurs. Fan runs at a constant speed.	1. Inspect the welding leads for any visible damage, hot spots or cuts. Most damage occurs close at the electrode or work lead handles as the cable is going into these items.	1. Replace weld cables accordingly.

⚠ 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 1-888-935-3877.

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MAIN TRANSFORMER TEST

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the Main Transformer is functioning and has no open or shorted coils.

MATERIALS NEEDED

Volt/Ohmmeter
Wiring Diagram

MAIN TRANSFORMER TEST (continued)

PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

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

---

1. Disconnect all input power to the welder.
2. Remove the roof, left and right case sides.

PRIMARY COIL

1. Remove input power switch.
2. With a digital or analog volt/ohmmeter set on x10 ohms, measure the LOAD side of the on/off switch. See Wiring Diagram for reference.

This measurement should show 0 ohms of resistance, indicating that there are no opens on the primary. If there is a shorted winding (turn to turn), the majority of the time, a winding will have a section of turns burnt or darker in color than the rest. Test for opens from the H1 lead on the load side of the on / off switch to the other taps for other line voltage selections at the reconnect panel area. A reading of 0 ohms should also be seen indicating connections to the primary taps of the welder.

GROUNDED PRIMARY COILS

1. Switch the volt meter to X 100 ohms. Check the H1 lead on the load side of the on / off switch to a good clean (rust/paint free) area on the case. Generally one of the removed case side screw holes is fine. This should read in the Meg ohms region indicating the isolation of the primary winding from earth ground. If not above the meg ohm region, then the unit must be taken out of service. Cleaning and/or drying out the welder might help remove this low resistance. If the low resistance cannot be improved, then the transformer is grounded. This is also true for shorted or open primary or secondary coils if they can not be reliably repaired.

SECONDARY COIL

1. Set the meter to X10 scale.
2. Measure the resistance across the two outer position tabs of the output bridge. See the ***Output Rectifier Test***. These are the AC inputs to the bridge. This measurement should show 0 ohms of resistance, indicating that there are no opens on the secondary or the reactor. If there is a shorted winding (turn to turn) the majority of the time a winding will have a section of turns burnt or darker than the rest.

If an open is determined, check the thermostat or the reactor coils for opens. If there are no opens check the fan leads from the main transformer they should show low resistance. If any of them show open (meg ohms), then that winding is defective.

3. When testing is complete, replace case roof and sides.

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OUTPUT RECTIFIER BRIDGE TEST

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the Output Rectifier Bridge is functioning and has no open or shorted diodes.

MATERIALS NEEDED

Wiring Diagram
Digital Volt/Ohmmeter

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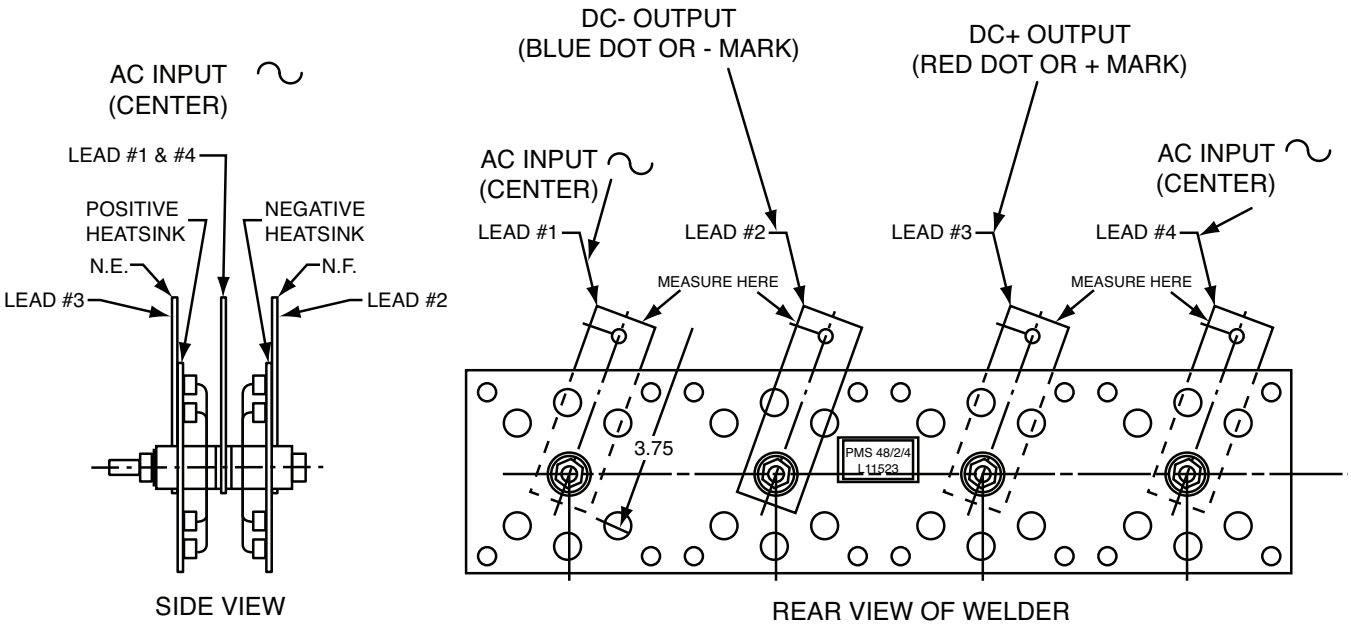
OUTPUT RECTIFIER BRIDGE TEST (continued)

FIGURE F.1 – OUTPUT RECTIFIER TEST POINTS



PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

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

1. Disconnect all the electrical power to the welder.
2. Remove the roof to get access to the output rectifier bridge at the top rear of the welder.
3. With a digital volt/ohmmeter set to DIODE TEST check the diodes in the output rectifier bridge per the below procedure.
   - The diode bridge is configured as per ***Figure F.2***. The diode clusters can be tested using a diode tester or an ohmmeter.
   - If any of the diodes read shorted or open in both directions (polarity), the diode bridge will need to be replaced. No component repair of this type of bridge can be accomplished.
4. When the test is complete, replace case and roof.

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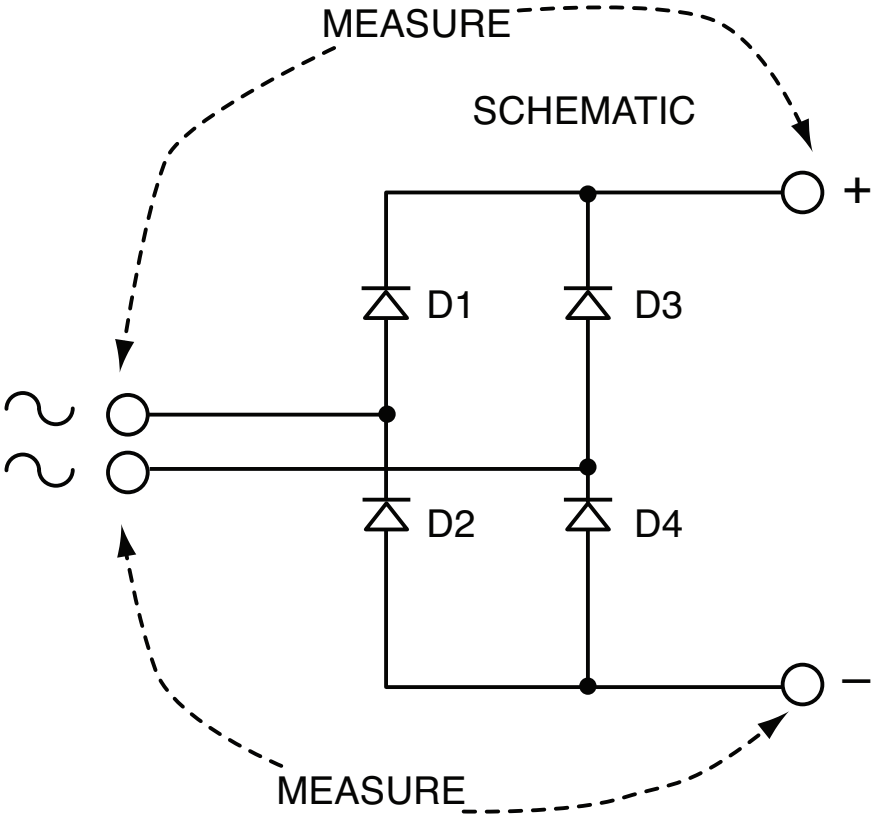
OUTPUT RECTIFIER BRIDGE TEST (continued)

FIGURE F.2 – OUTPUT RECTIFIER SCHEMATIC



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CONTROL REACTOR TEST

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the Control Reactor is functioning properly and controlling the output of the welder.

MATERIALS NEEDED

A Resistive Load Bank
4 / 0 Weld Cable About 10 Feet Long
Clamp On Amp Meter That Can Handle 30 to 400 Amps.

CONTROL REACTOR TEST (continued)

FIGURE F.3 – CONTROL REACTOR TEST READINGS

	TYPE	INPUT VOLTS	MAX. OUTPUT		MIN. OUTPUT	
			AMPS	VOLTS	AMPS	VOLTS
SHORT CIRCUIT CONDITION →	AC	226/234	345/400	0/5	15/40	0/3
LOAD BANK CONDITION →	DC	226/234	235/280	29/35	20/45	18/22

PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

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

---

1. Turn off the welder and disconnect all input power.
2. Reconnect the welder for 230 volts of input.
3. Turn the welder to the minimum current position or maximum current positions when indicated in Figure F.3.
4. Turn on the welder.
5. Perform the test as indicated in Figure F.3.
6. Apply a short circuit or load when indicated in Figure F.3.

Factors that can cause the above testing to result in error:

- Input line voltage out of tolerance.
- Primary reconnect wrong.
- Welder indicator assembly can be bent or previously repaired.
- Worn reactor brake or loose brake adjusters (4 total).
- Nameplate can be miss aligned or the wrong one.
- Diode bridge could have bad or loose connections any where in the secondary circuit, example polarity switch.
- Weld cables can be under sized or bad / loose connections.
- Reactor air gap can be misadjusted or needs adjusted. See ***Control Reactor Crank Brake Adjustment Procedure***.
- Top pivot point on indicator arm (slotted hole area) can be loose or miss adjusted.

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TEST FOR GROUNDED CIRCUITS

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the Welders' Circuits are grounded.

MATERIALS NEEDED

Piece Of Cleaned Bare sheet Metal

TEST FOR GROUNDED CIRCUITS (continued)

PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

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

Make sure the welder is dry and clean. Failure of this test is almost surely to happen if the welder is wet and/or dirty.

1. Connect an electrode to the positive output stud. Remove any external leads on the negative stud.
2. Screw in a piece of cleaned bare sheet metal to an existing case screw hole.
3. Turn on the welder.
4. Touch the electrode lead to the piece of attached bare sheet metal. The electrode should not create a weld arc. Small sparks can be normal (typical leakage).
5. Turn off the welder.
6. Connect the electrode lead to the negative output stud. The positive stud should have nothing connected to it.
7. Turn the welder on.
8. Touch the work lead to the attached bare sheet metal. The electrode should not create a weld arc. Small sparks can be normal.
9. If at any time a welding arc is established there is a ground condition in the welder. Look for output leads, secondary or choke shorted to case. Disconnecting these components and checking them with a volt / ohmmeter to case ground can help to isolate the grounded location.

POLARITY SWITCH REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Polarity Switch.

MATERIALS NEEDED

1/2 Inch Wrench
7/16 Inch Wrench

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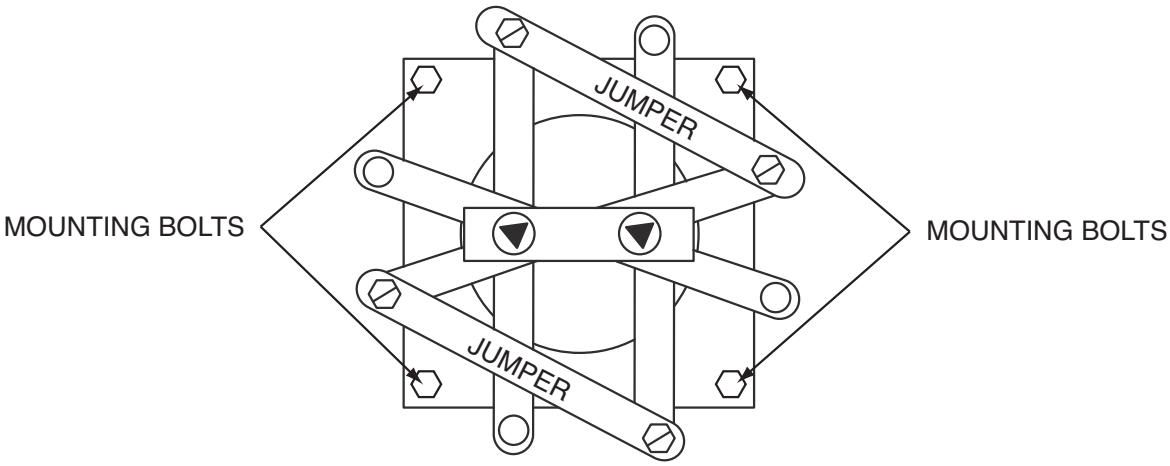
POLARITY SWITCH
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.4 – POLARITY SWITCH MOUNTING BOLTS



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

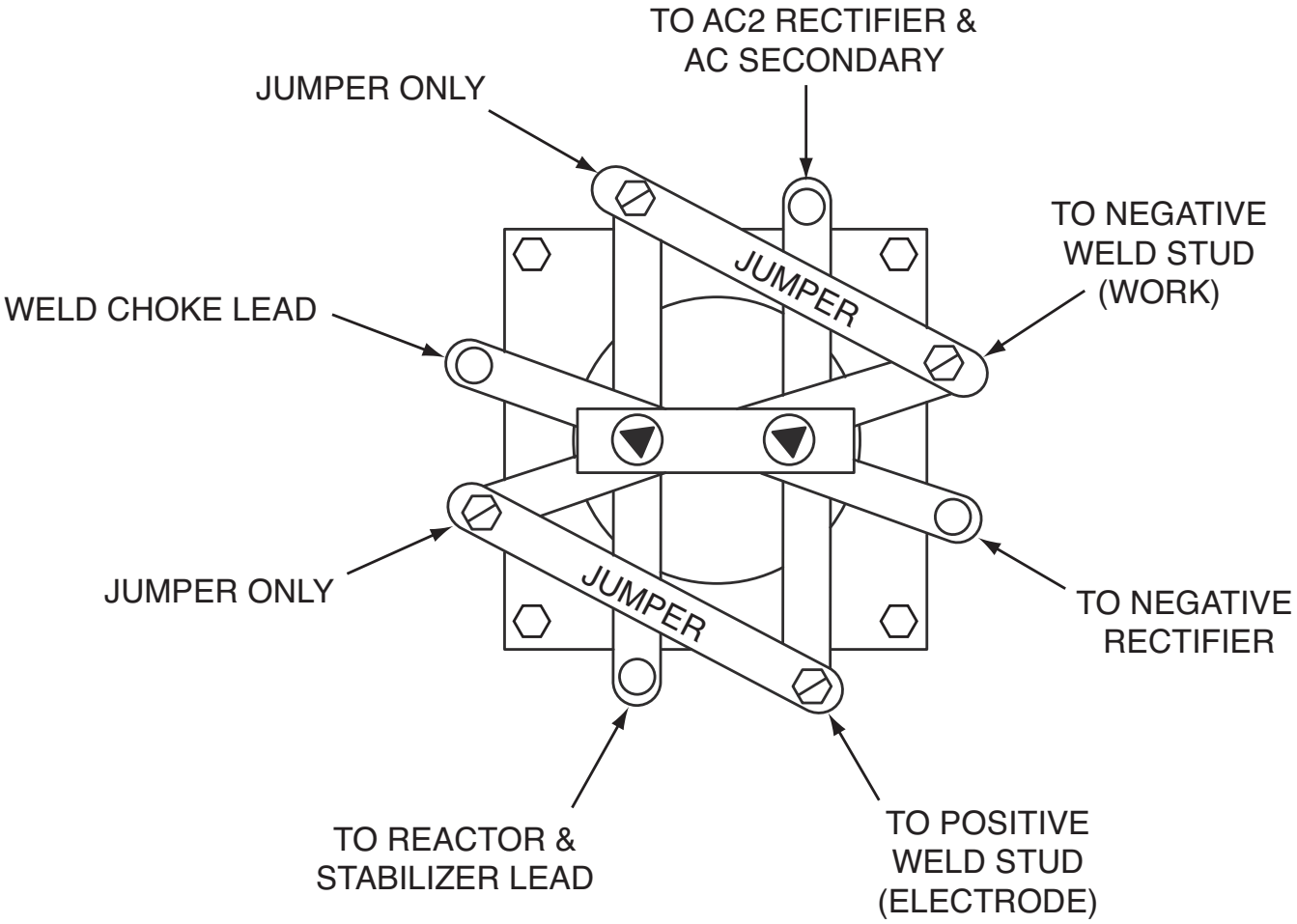
- Have a qualified individual install and service this equipment.
- Turn the input supply power OFF at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.

---

1. Turn off and disconnect the input power.
2. Remove the roof and right case side.
3. Locate the polarity switch in the top front right area. Make note of where the leads and jumpers were originally connected.
4. Label and remove the leads. Try not to bend the leads too much out of the way after removing the leads from the polarity switch terminals.
5. Locate the four mounting bolts, See Figure F.4. These bolts mount the switch to the spot welded stand offs to the back of the case front. Removing these bolts should allow you to remove the switch.

POLARITY SWITCH
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.5 – POLARITY SWITCH CONNECTIONS VIEWED FROM THE REAR



REPLACEMENT PROCEDURE

1. From the factory the new switch will have the mounting bolts secured with nuts on the handle end of the switch. For mounting, remove these nuts. Do not operate the switch in this state because of the lack of switch support. Operate only when mounted on the welders case front inner surface stand offs.
2. Reconnect the leads and jumpers to the replacement switch. See Wiring Diagram, ***Figure F.4*** and Figure F.5.
3. Replace case side and roof.

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OUTPUT RECTIFIER BRIDGE REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

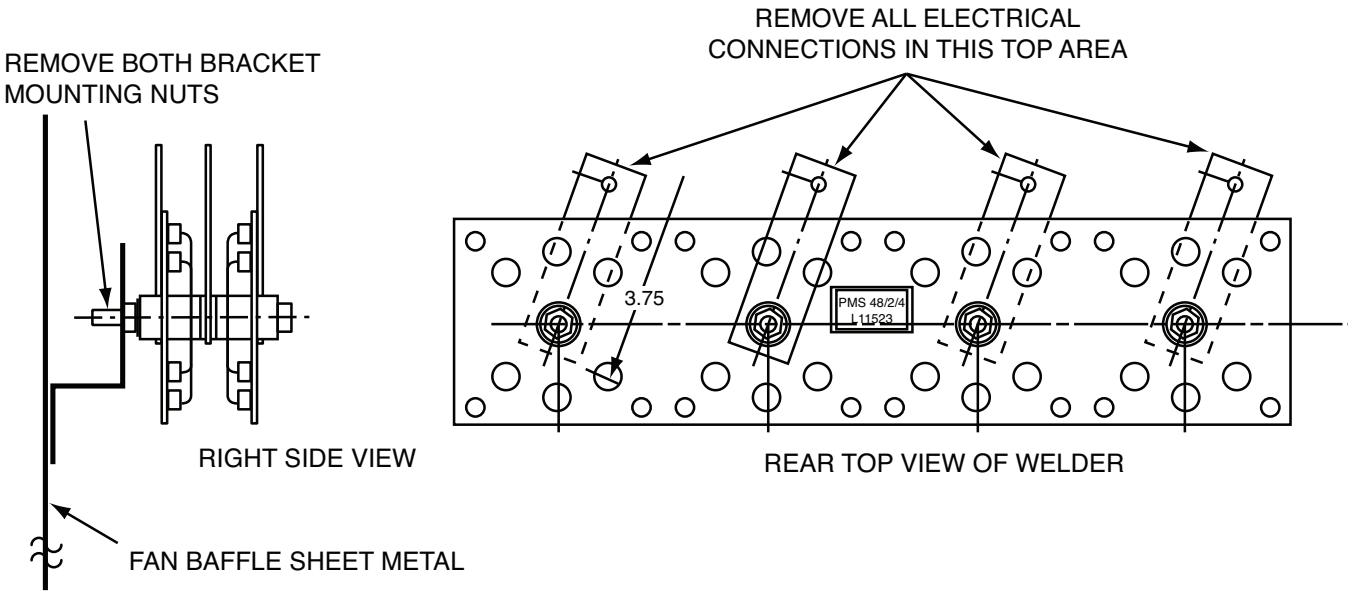
This procedure will aid the technician in the removal and replacement of the Output Rectifier Bridge.

MATERIALS NEEDED

7/16 Inch Wrench
1/2 Inch Wrench
Joint Compound (Penetrox A-13 Lincoln Part #E2529)
1/4 Inch Torque Wrench
5/16 Inch Torque Wrench

OUTPUT RECTIFIER BRIDGE
REMOVAL AND REPLACEMENT PROCEDURE (continued)

FIGURE F.6 – OUTPUT RECTIFIER LEAD LOCATIONS AND MOUNTING BOLTS



REMOVAL PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

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

---

1. Turn off and disconnect the input power to the machine.
2. Remove the roof, left and right case sides.
3. Locate the output rectifier bridge in the top rear area.
4. Label and disconnect all the leads from the top of the rectifier. Try not to bend leads too much out of the way.
5. Remove the two mounting nuts securing the rectifier, located on the forward side of the sheet metal baffle.
6. The rectifier can now be removed.

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OUTPUT RECTIFIER BRIDGE
REMOVAL AND REPLACEMENT PROCEDURE (continued)

REPLACEMENT PROCEDURE

1. Perform a visual inspection of the snubber network for missing or burnt components. Replace if necessary before installing the new bridge rectifier.
2. Apply a thin coating of joint compound (Penetrox A-13 Lincoln Part #E2529) to all electrical mating surfaces.
3. Reconnect all previously removed leads.
4. Tighten all 1/4” hardware to 50 inch pounds.
5. Tighten all 5/16” hardware to 8 foot pounds.
6. Replace case sides and roof.

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CASE FRONT CURRENT INDICATOR REMOVAL PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid the technician in the removal of the case Case Front Current Indicator.

MATERIALS NEEDED

3/8 Inch Nutdriver
5/16 Inch Nutdriver

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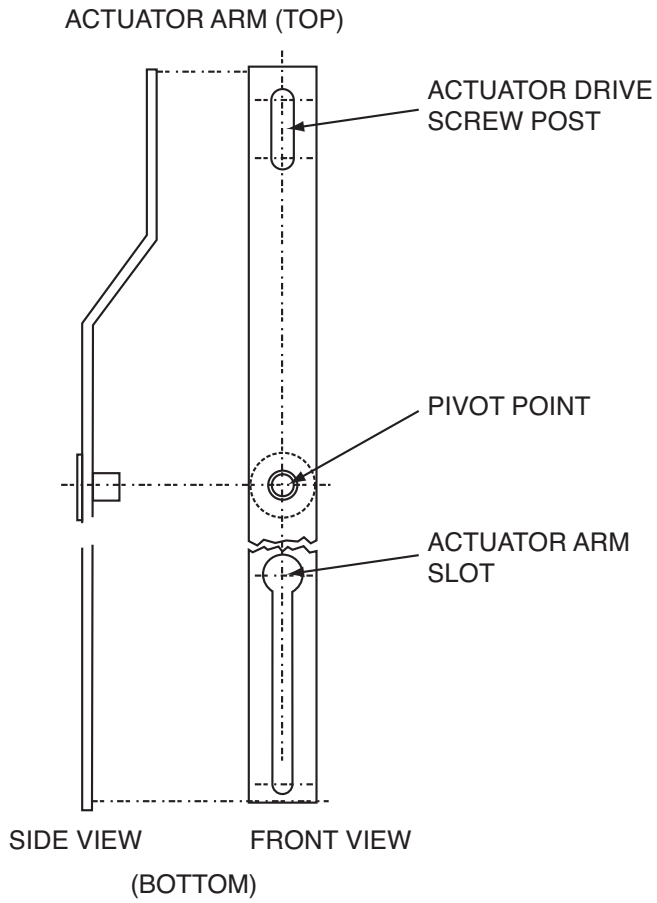
CASE FRONT CURRENT INDICATOR REMOVAL PROCEDURE (continued)

FIGURE F.7 – ACTUATOR MOUNTING POINTS



PROCEDURE

1. Remove input power to the machine.

1. Remove the screws where the case front mounts to the base and move the bottom of the case front foward an inch. This step will allow the actuator arm to be easily removed in the next steps. See Figure F.7 for reference during this removal.

2. Remove actuator arm from machine by pushing the arm forward at the actuator drive screw post. Pull the arm off the pivot point in the case front area. See Figure F.7.

3. Slide actuator arm off pointer at hole in top of actuator arm slot. See Figure F.7.

4. Remove pointer by sliding it past the **maximum** range and out the front of the machine via the larger hole in this area by turing the pointer to the horizontal flat.

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CONTROL REACTOR CRANK BRAKE ADJUSTMENT PROCEDURE

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid the technician in the adjustment of the Control Reactor Crank Brake.

MATERIALS NEEDED

7/16 Inch Wrench
9/16 Inch Wrench

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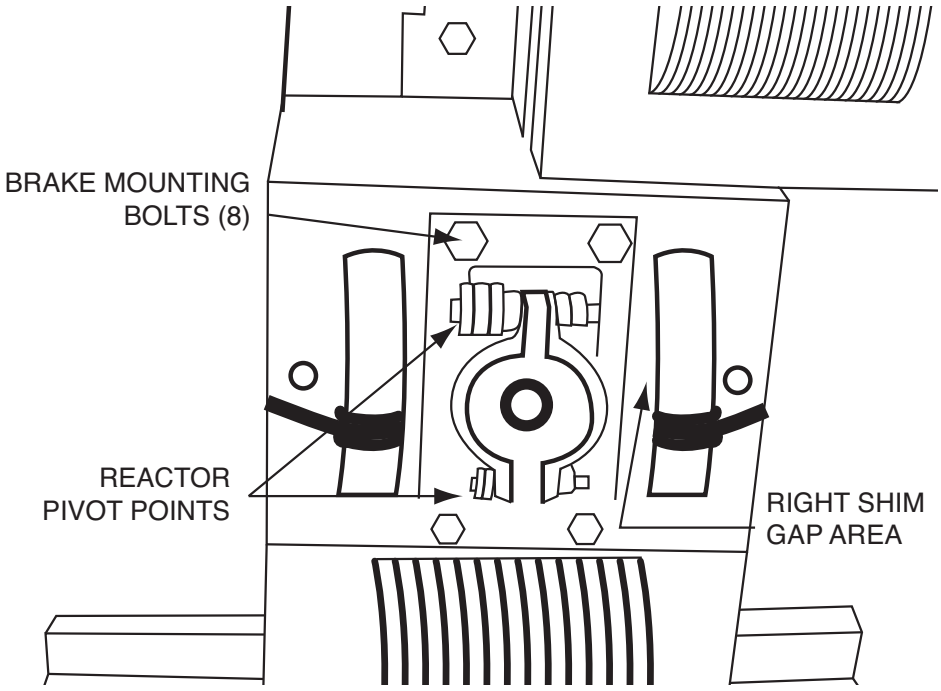
CONTROL REACTOR CRANK BRAKE ADJUSTMENT PROCEDURE (continued)

FIGURE F.8 – CONTROL REACTOR ADJUSTMENT POINTS



ADJUSTMENT PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

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

---

1. Disconnect all electrical power to the welder.
2. Remove the roof, left and right case sides in order to get access to the Control Reactor at the center of the welder.

This area of adjustment will prevent movement of the welders' front control crank and indicator while under load.

Area of adjustment on the reactor pivot points; two on the rear area and two on the front. For proper tension, compress the tension springs to .66 inches. The acceptable amount of handle movement force is between 40 to 50 inch/pounds. Test welder under full load for movement of the hand crank.

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CONTROL REACTOR CRANK BRAKE ADJUSTMENT PROCEDURE (continued)

If adjusting these 4 points does not help with your particular problem, then the brake assemblies need to be replaced. If the brakes are replaced, the air gap on both sides of the reactor must be maintained.

Reactor Air Gap Adjustment (viewed from rear)

Crank in maximum current position (gap open). Place a .020 shim on the left side, as for the right side place 0.10 shim in opening. Turn crank to minimum current setting position while the shims are still in place. Tighten the eight brake bracket mounting bolts. Remove the shims when the reactor is back in the maximum current position. Gap is set. Perform the ***Control Reactor Test***.

RETEST AFTER REPAIR

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

	TYPE	INPUT VOLTS	MAX. OUTPUT AMPS	MAX. OUTPUT VOLTS	MIN. OUTPUT AMPS	MIN. OUTPUT VOLTS
SHORT CIRCUIT CONDITION →	AC	226/234	345/400	0/5	15/40	0/3
LOAD BANK CONDITION →	DC	226/234	235/280	29/35	20/45	18/22

MISC.
FAN MOTOR VOLTS - 111/125 VAC

TYPE	INPUT VOLTS	IDLE AMPS WITH P.F. COND.	IDLE AMPS WITHOUT P.F. COND.	IDLE K.W. WITHOUT P.F. COND.
AC	226/234	18.5/28	7.1 MAX.	.65 MAX.
DC	226/234	----	----	----

TYPE	INPUT VOLTS	OPEN CIRCUIT VOLTS
AC	226/234	67.5/75.8
DC	226/234	59.3/68.3

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TABLE OF CONTENTS - DIAGRAM SECTION

*** NOTE:** Many PC Board Assemblies are now totally encapsulated, surface mounted and or multi-layered and are therefore considered to be unserviceable. Assembly drawings of these boards are no longer provided.

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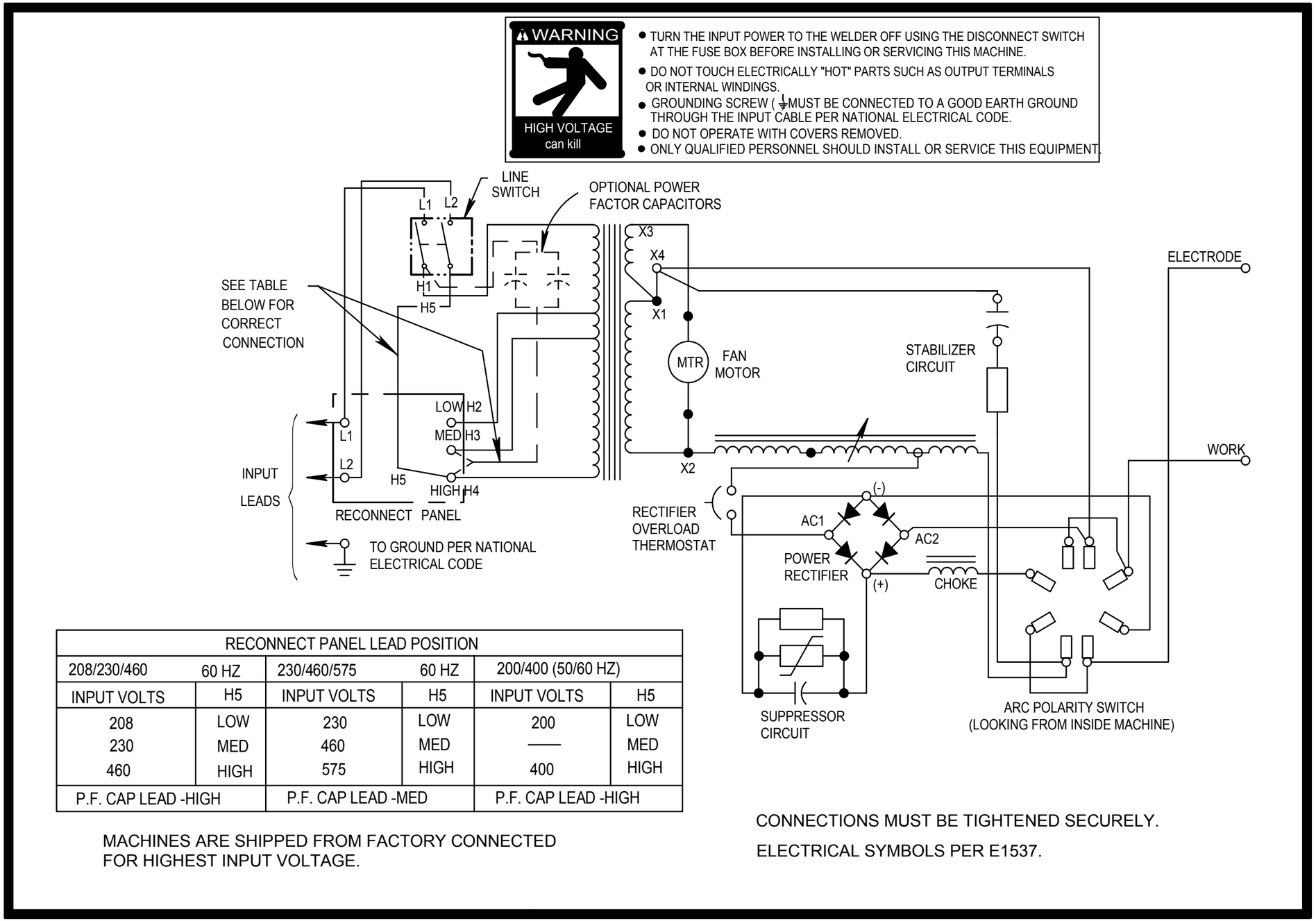
WIRING DIAGRAM - 250 AMP IDEALARC 60HZ & 50/60 HZ MACHINES ONLY - S19343



RECONNECT PANEL LEAD POSITION					
208/230/460	60 HZ	230/460/575	60 HZ	200/400 (50/60 HZ)	
INPUT VOLTS	H5	INPUT VOLTS	H5	INPUT VOLTS	H5
208	LOW	230	LOW	200	LOW
230	MED	460	MED	——	MED
460	HIGH	575	HIGH	400	HIGH
P.F. CAP LEAD -HIGH		P.F. CAP LEAD -MED		P.F. CAP LEAD -HIGH	

MACHINES ARE SHIPPED FROM FACTORY CONNECTED FOR HIGHEST INPUT VOLTAGE.

CONNECTIONS MUST BE TIGHTENED SECURELY.

ELECTRICAL SYMBOLS PER E1537.

S19343 B

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

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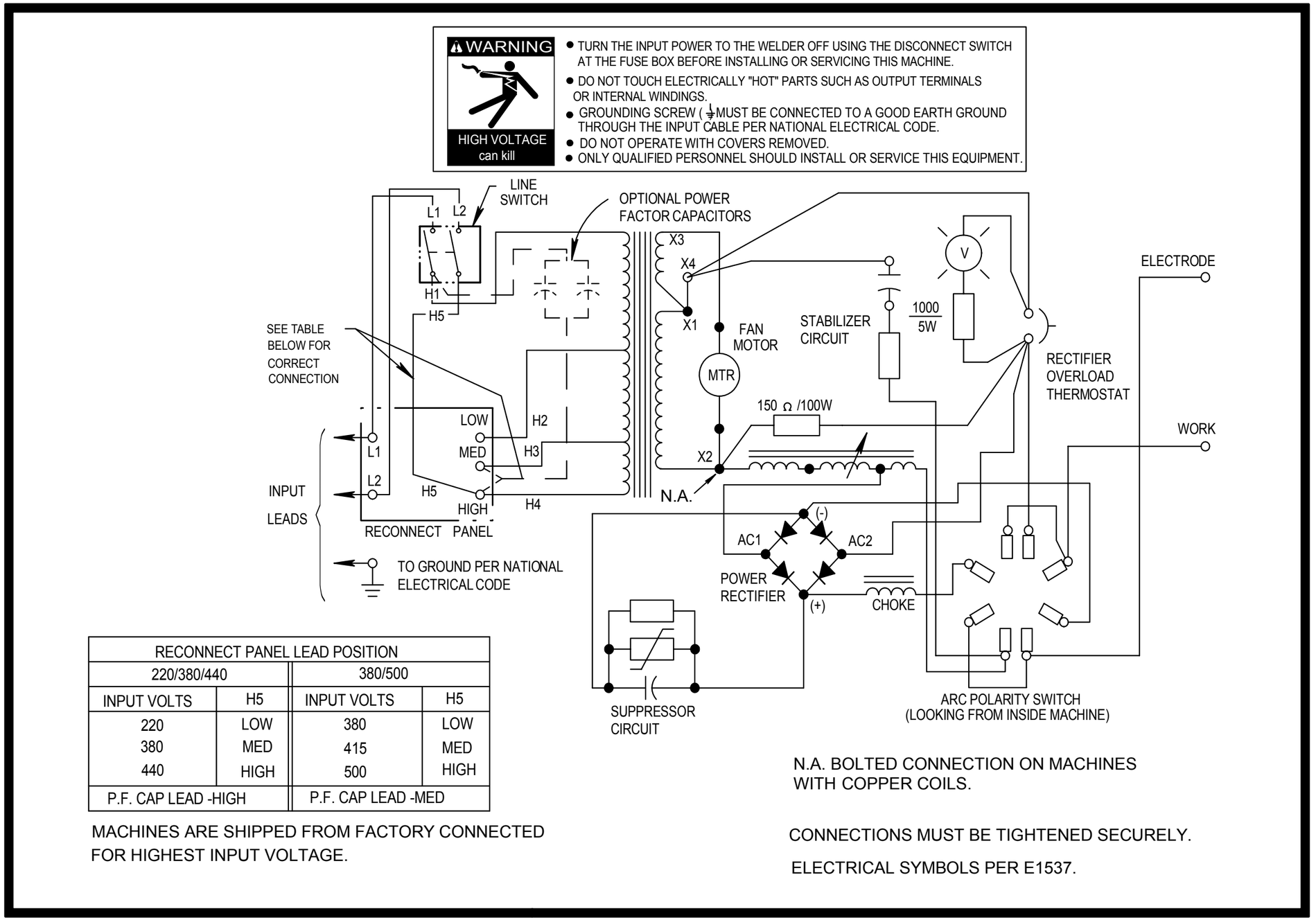
WIRING DIAGRAM - 250 AMP IDEALARC 50HZ MACHINES ONLY - S19441



RECONNECT PANEL LEAD POSITION			
220/380/440		380/500	
INPUT VOLTS	H5	INPUT VOLTS	H5
220	LOW	380	LOW
380	MED	415	MED
440	HIGH	500	HIGH
P.F. CAP LEAD -HIGH		P.F. CAP LEAD -MED	

MACHINES ARE SHIPPED FROM FACTORY CONNECTED FOR HIGHEST INPUT VOLTAGE.

N.A. BOLTED CONNECTION ON MACHINES WITH COPPER COILS.

CONNECTIONS MUST BE TIGHTENED SECURELY.

ELECTRICAL SYMBOLS PER E1537.

S19441 B

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

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