LINCOLN ELECTRIC

GENUINE LINCOLN PARTS™

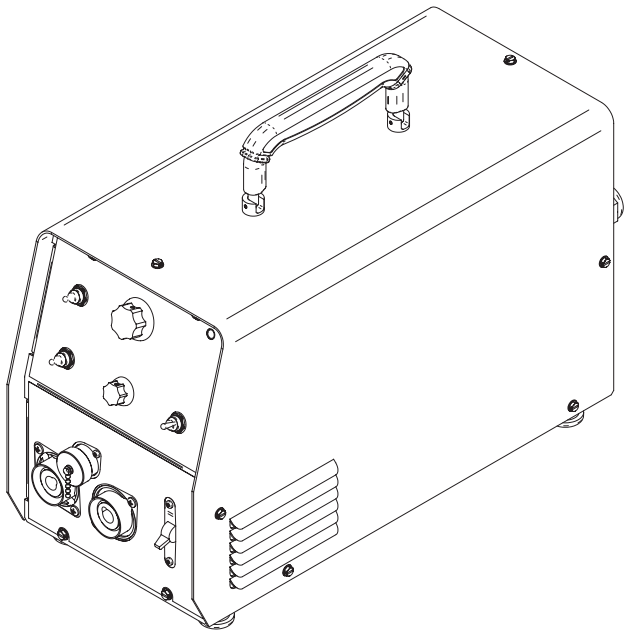
NOTE: This manual will cover most of the troubleshooting and repair procedures for the code numbers listed. Some variances may exist when troubleshooting/repairing later code numbers.

INVERTEC V275-S

For use with machines having Code Numbers:

10993, 11001, 11164, 11165, 11224, 11225, 11267, 11268

SERVICE MANUAL



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THE LINCOLN ELECTRIC COMPANY
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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.

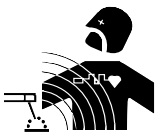
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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.

LINCOLN® ELECTRIC

SAFETY

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 below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

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

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

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

5.e. Also see item 1.b.

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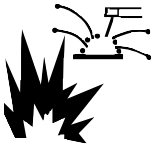


WELDING SPARKS can cause fire or explosion.

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

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

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

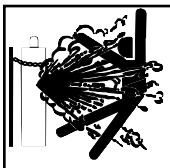
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe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

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

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

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

6.h. Also see item 1.c.



CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

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

FOR ELECTRICALLY powered equipment.

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

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

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

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PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté 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.

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INSTALLATION

Technical Specifications - Invertec V275-S

INPUT AT RATED OUTPUT - THREE PHASE ONLY

INPUT VOLTS-Hz	OUTPUT CONDITIONS	INPUT CURRENT AMPS	IDLE POWER	EFFICIENCY @ RATED OUTPUT
208/230/460/575V - 60Hz	200A@28V.100% 250A@30V. 60% 275A@31V. 35%	27/25/13/11 34/33/17/14 38/37/19/16	150W Max	87%
220/380/400/415/440 - 50Hz	200A@28V.100% 250A@30V. 35%	25/15/15/14/13 32/20/19/18/17		

INPUT AT RATED OUTPUT - SINGLE PHASE ONLY

INPUT VOLTS-Hz	OUTPUT CONDITIONS	INPUT CURRENT AMPS	IDLE POWER	EFFICIENCY @ RATED OUTPUT
208/230/460/575V - 60Hz	200A@28V.100% 250A@30V. 60% 275A@31V.* 35%	49/48/26/21 63/62/33/27 68/67/38/31	150W Max	87%
220/380/400/415/440 - 50Hz	200A@28V.100% 250A@30V. 35%	48/32/30/29/27 63/42/40/38/36		

OUTPUT (THREE AND SINGLE PHASE)

WELDING CURRENT RANGE	NO LOAD VOLTAGE
5-275 Amps	70 VDC

RECOMMENDED MINIMUM INPUT WIRE AND FUSE SIZES

THREE PHASE

Input Voltage-Hz	Cord Size AWG(mm²) based on a type S, SJ, SJO or SJT Flexible cord in 30°C Ambient	Fuse Size (Time Delay Fuse) Amps
208/230-60 460/575-60	8(8.4) 14(2.5)	60 35
220-50 380/400/415-50 440-50	8(8.4) 12(4) 14(2.5)	60 35 35

SINGLE PHASE

Input Voltage-Hz	Cord Size AWG(mm²) based on a type S, SJ, SJO or SJT Flexible cord in 30°C Ambient	Fuse Size (Time Delay Fuse) Amps
208-60 230-60 460/575-60	6(16)[1] 6 (16)[1] 10 (6)	100 100 60
220-50 380/400/415-50 440-50	6(16)[1] 8(10) 10(6)	100 60 60

PHYSICAL DIMENSIONS

Height	Width	Depth	Weight (With Cord)
13.6in.(345mm) - Handle Folded Down 16in.(406mm) - Handle Up	9.0 in.(229mm)	20.25 in.(514mm) 21.7 in.(551)-With Cord Strain Relief	54.5lbs. (24.7Kg)

TEMPERATURE RANGES

OPERATING TEMPERATURE RANGE	STORAGE TEMPERATURE RANGE
-20°C to +40°C	-40°C to +40°C

(1) When operating on these inputs, the line cord may need to be changed

* On 208VAC Single Phase the 35% duty cycle output rating is 275A @ 29V

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INSTALLATION

Read this entire installation section before you start installation.

SAFETY PRECAUTIONS

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.**
- **Be sure to discharge capacitors with the procedure outlined in the Maintenance Section of this manual before working in that area of the equipment.**

SELECT SUITABLE LOCATION

The Invertec V275-S will operate in harsh environments. Even so, it is important that simple preventative measures are followed in order to assure long life and reliable operation.

- The machine must be located where there is free circulation of clean air such that air movement in the back and out the front will not be restricted.
- Dirt and dust that can be drawn into the machine should be kept to a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdown.
- Keep machine dry. Shelter from rain and snow. Do not place on wet ground or in puddles.
- **DO NOT MOUNT OVER COMBUSTIBLE SURFACES.**

CAUTION

Where there is a combustible surface directly under stationary or fixed electrical equipment, that surface shall be covered with a steel plate at least .06”(1.6mm) thick, which shall extend not less than 5.90”(150mm) beyond the equipment on all sides.

STACKING

V275-S’s cannot be stacked.

TILTING

Place the machine directly on a secure, level surface or on a recommended undercarriage. The machine may topple over if this procedure is not followed.

HIGH FREQUENCY PROTECTION

Locate the Invertec V275-S away from radio controlled machinery.

CAUTION

The normal operation of the Invertec V275-S may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

INPUT CONNECTIONS

The Invertec V275-S should be connected only by a qualified electrician. Installation should be made in accordance with all local and national electric codes and the information detailed below.

INPUT FUSE AND SUPPLY WIRE

Refer to the **Technical Specifications** page at the beginning of this chapter for the proper fuse sizes and supply cable sizes.

- Fuse the input circuit with recommended super lag fuses or delay type circuit breakers.
- Install the proper fuse in the fuse holder in the main disconnect panel.

INPUT SUPPLY CONNECTIONS

Be sure the voltage phase and frequency of the input power is as specified on the rating plate, located on the rear of the machine.

Supply line entry provision is in the case rear panel.

POWER INPUT CONNECTION

A 10 ft. power cord is provided and wired into the machine. Follow the power cord connection instructions. Incorrect connection may result in equipment damage.

Single Phase Input: Connect green lead to ground per National Electrical Code. Connect black and white or brown leads to power. Wrap red lead with tape to provide 600V insulation.

Three Phase Input: Connect green lead to ground per National Electrical Code. Connect black, red and white or brown leads to power.

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INPUT VOLTAGE RECONNECT PROCEDURE

When received directly from the factory, units are connected for, 460 VAC. If 460 VAC is the desired input, then the machine may be connected to the power system without any setup required inside the reconnect door. For other voltages refer to the instructions located on the Reconnect Panel Access Door or follow the instructions below.

CAUTION

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

1. Open the access door on the left side of the machine.
2. For 208-230: Position the large switch to 208-230. For 380-575: Position the large switch to 380-575.
3. Move the “A” lead to the appropriate terminal. Refer to figure A.1 below.

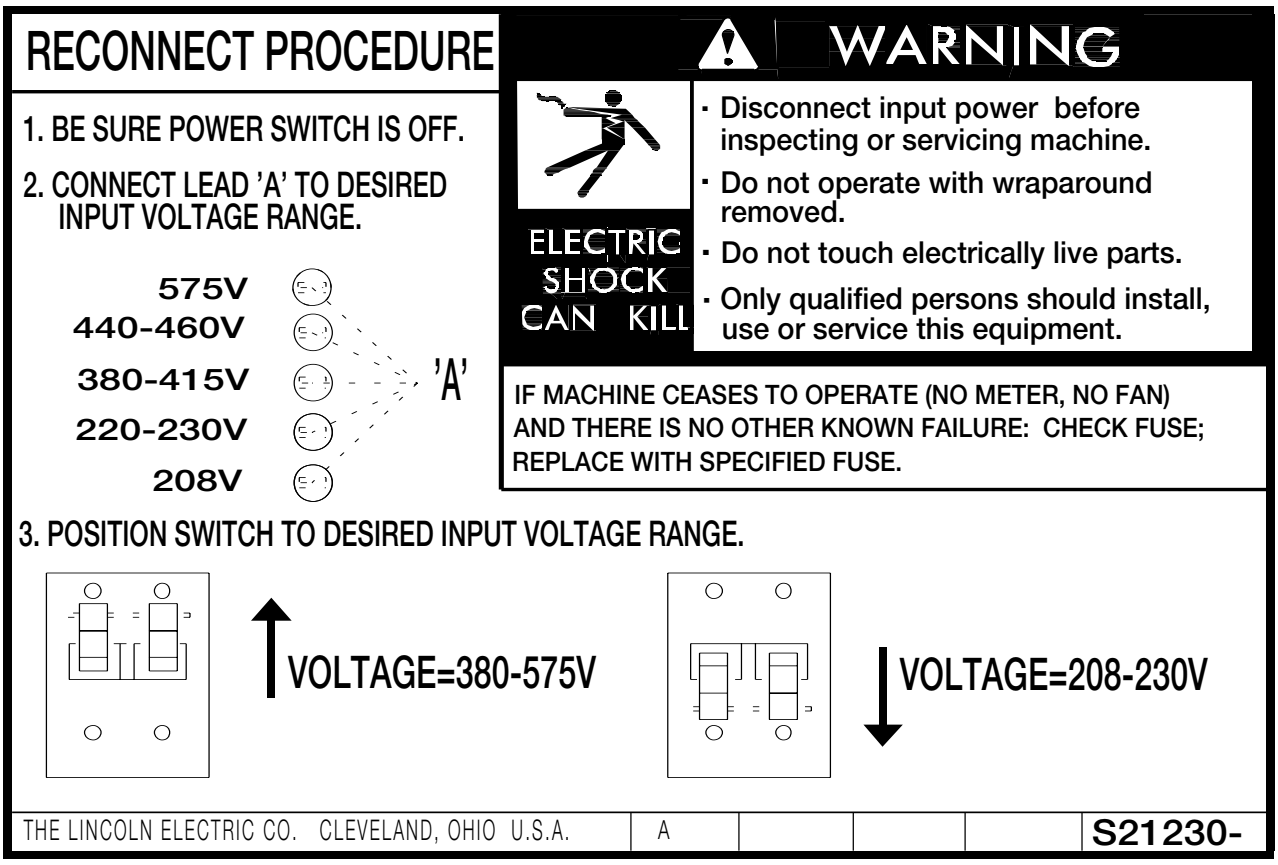

Figure A.1 Input Voltage Reconnect Instructions

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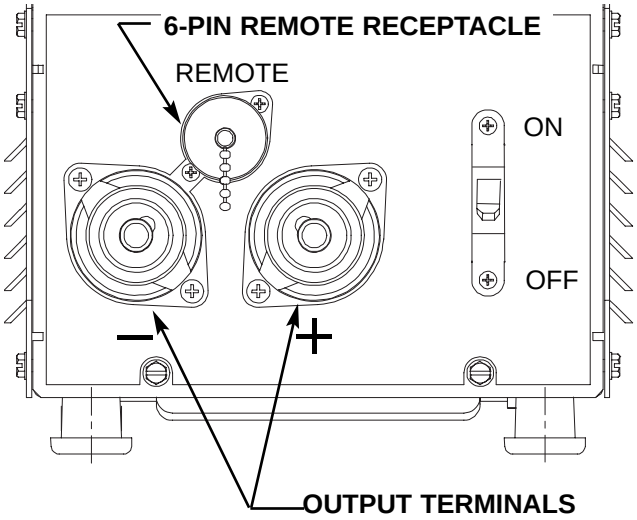
OUTPUT CONNECTIONS

Refer to figure A.2 for the location of the 6-Pin Remote Receptacle and the Output Terminals.

FIGURE A.2 OUTPUT CONNECTIONS



REMOTE CONTROL RECEPTACLE

Remote control (K857), Hand amptrol (K963) and Foot amptrol (K870) connect directly to 6-pin amphenol on the front of the unit.

OUTPUT CABLES

Select the output cable size based on Table A.1.

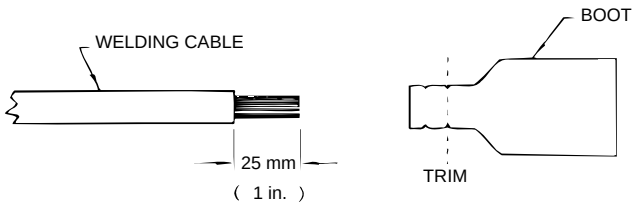
TABLE A.1
Cable Sizes for Combined Length of Electrode and Work Cable (Copper Cable Rated at 75°C).

Length	Cable Size
up to 150 ft.(46m)	1/0 (50mm²)
up to 250 ft.(72m)	2/0 (70mm²)

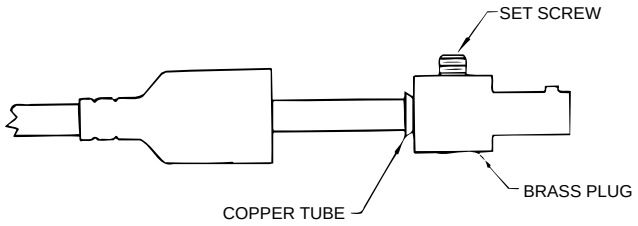
QUICK DISCONNECT PLUGS

A quick disconnect system is used for the welding cable connections. The welding plug included with the machine is designed to accept a welding cable size of 1/0 to 2/0.

1. Remove 1 in. (25mm) of welding cable insulation.
2. Slide rubber boot onto cable end. The boot end may be trimmed to match the cable diameter. Soap or other lubricant will help to slide the boot over the cable.



3. Slide the copper tube into the brass plug.
4. Insert cable into copper tube.
5. Tighten set screw to collapse copper tube. Screw must apply pressure against welding cable. The top of the set screw will be well below the surface of the brass plug after tightening.



6. 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.

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NOTES

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Read and understand this entire section before operating your machine.

SAFETY PRECAUTIONS

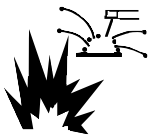
⚠ WARNING

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.

GENERAL DESCRIPTION

The Invertec V275-S is a 275 amp arc welding power source that utilizes single or three phase input power, to produce constant current output. The welding response of this Invertec has been optimized for stick (SMAW) and TIG (GTAW).

OPERATIONAL FEATURES

The Invertec V275-S provides continuous total range output current adjustment, selectable welding modes and local or remote output control. Welding characteristics can be controlled via an arc force control. Additionally, starting characteristics can be adjusted via a “hot start” control.

WELDING CAPABILITY

The Invertec V275-S is rated at 275 amps, 35% duty cycle (based on a 10 minute cycle). It is also rated at 200 amps, 100% duty cycle, and 250 amps, 60% duty cycle.

LIMITATIONS

The V275-S is not recommended for pipe thawing.

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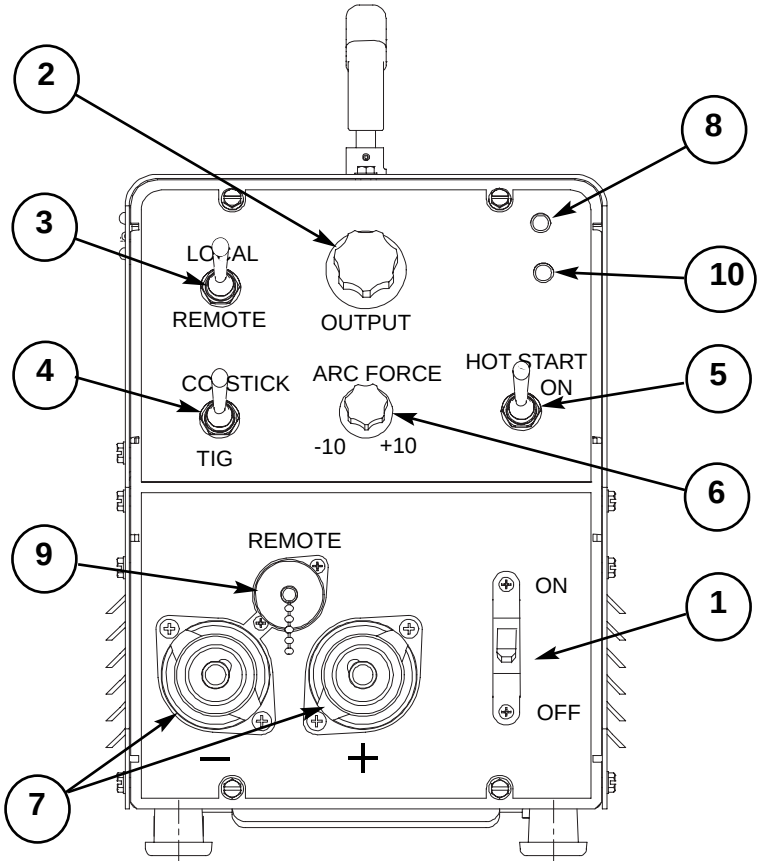
CONTROLS AND SETTINGS

All operator controls and adjustments are located on the case front of the V275-S. Refer to Figure B.1 and corresponding explanations.

FIGURE B.1 — CASE FRONT CONTROLS.



1. POWER SWITCH - Place the lever in the "ON" position to energize the machine. When the power is on the output will be energized in STICK (SMAW) mode and TIG (GTAW) if the remote is set to local control. At power up the thermal Light and Fan will turn on for approximately 3 seconds.

2. OUTPUT CONTROL - This controls the output current. Control is provided over the entire output range of the power source with (1) turn of the control knob. This control may be adjusted while under load to change power source output. When using remote control this function becomes the limit setting.

3. LOCAL/REMOTE SWITCH - Place in the "LOCAL" position to allow output adjustment at the machine. Place in the "REMOTE" position to allow output adjustment at remote pot or amptrol. In Remote, the machine output control pot is the limit setting for remote control.

4. MODE SWITCH

CC -Stick (SMAW) Use this mode for all stick welding. Output energized when machine is on.

TIG (GTAW) Optimized for touch start use. Short circuit current is limited to approximately 20 amps to aid in touch starting.

In TIG (GTAW) mode, the Local/Remote switch also controls if the output is energized.

MODE	LOCAL/REMOTE SWITCH	OUTPUT
GTAW	LOCAL	ENERGIZED
GTAW	REMOTE	CONTROL BY REMOTE ARC SWITCH
SMAW	LOCAL & REMOTE	ENERGIZED

5. HOT START - Controls the amount of starting energy in CC Stick (SMAW). The Hot Start can be either turned on or off. When on, it provides a striking current at 160% of the set current or 275A whichever is larger then quickly reverts to the set current in 0.4 second.

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6. ARC FORCE - This control functions in CC Stick SMAW modes to adjust the Arc Force. The arc is soft at the minimum settings and more forceful or driving at the maximum settings. Higher spatter levels may be present at the maximum settings. **Full range is from -10(Soft) to +10(Crisp)**

7. OUTPUT TERMINALS - These quick disconnect terminals provide connection points for the electrode and work cables. Refer to **Output Connection** in the Installation chapter for proper cable sizes. For positive polarity welding connect the electrode cable to the positive terminal and the work cable to the negative terminal. To weld negative polarity reverse the electrode and work cables.

8. THERMAL SHUTDOWN INDICATOR - This light will illuminate if an internal thermostat has been activated. Machine output will return after the internal components have returned to a normal operating temperature. See **Thermal Protection** later in this Operation chapter.

9. 6-PIN REMOTE RECEPTACLE
(Refer to **Output Connection** in the Installation chapter.)

10. POWER LIGHT - This Light will illuminate when the power switch is in the "ON" position.

CONSTANT CURRENT PROCESSES

MANUAL ARC WELDING (STICK)*

The Invertec may be utilized as a manual DC arc welder with the electrode cable, work cable, and electrode holder being the only equipment required.

AIR CARBON ARC CUTTING*

Air carbon arc cutting may be performed with the Invertec within its output rating using 3/16" diameter carbon rods. Output cables, an air carbon arc electrode cable assembly, and a source of compressed air are required.

TIG WELDING*

The Invertec V275-S is capable of touch start TIG welding. An electrode cable, work cable, TIG torch, and gas supply with regulator are required. Refer to **Accessories** section of this manual.

Touch starting is done as follows:

1. Place the shield cup edge on the work piece.
2. Rock the tungsten down to touch.
3. Trigger the output, if using remote control.
4. Gently rock back the tungsten from the workpiece.

Note: The short circuit current is limited to 20 amps to aid in touch starting. Panel output control becomes the current limit setting when in remote control.

*** Note:** Operating this machine with the output control set to maximum may cause the machine to phase back and the arc to go out. This occurs because the welding current exceeded 300 amps and the machine's protection circuitry activated. Turn the output control down to correct this condition.

PARALLEL OPERATION

The Invertec's are operable in parallel. For best results, the currents of each machine should be reasonably well shared. As an example, with two machines set up in parallel for a 300 amp procedure, each machine should be set to deliver approximately 150 amps, not 200 amps from one and 100 amps from the other. This will minimize nuisance feedback conditions. In general, more than two machines in parallel will not be effective due to the voltage requirements of procedures in that power range.

To set machine outputs, start with output control pots and arc force pots in identical positions. Adjust outputs and arc forces to maintain current sharing while establishing the proper output current.

OVERLOAD PROTECTION

The machine is electrically protected from producing high output currents. Should the output current exceed 300A, an electronic protection circuit will reduce the current to less than 200A. The machine will continue to produce this low current until the protection circuit is reset. Reset occurs when the output load is removed.

Note: When TIG welding with the Output Knob at or above 275 Amps the Arc may go out.

THERMAL PROTECTION

Thermostats protect the machine from excessive operating temperatures. Excessive 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 thermostats will prevent output voltage or current.

Thermostats are self-resetting once the machine cools sufficiently.

FAN

The cooling fan on the V275-S operates once 15 amps of welding current is drawn and for 7 minutes after the output current has stopped flowing.

The fan will also run anytime the machine has over heated.

POWER-UP SEQUENCE

At power up the thermal light (and Power light on codes 11164 and above) turns on and the fans run for approximately 3 seconds. This is the pre-charge time for the main capacitors. After this time the fans and thermal light turn off and the pre-charge relay closes to apply full line power to the capacitors. At this time the machine is ready to weld.

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OPTIONS / ACCESSORIES

REMOTE OUTPUT CONTROL - Consists of a control box with choice of two cable lengths. Permits remote adjustment of output, 6 pin connection.
Order K857 for 25 ft. (7.6m) or
K857-1 for 100 ft. (30.5m)

Twist-Mate Cable Plug - For connecting welding cable to output terminal receptacles. For 1/0-2/0 (50-70mm^2) cable.
Order K852-70

Twist-Mate Cable Plug - For connecting welding cable to output terminal receptacles. For 2/0-3/0 (70-95mm^2) cable.
Order K852-95

Twist-Mate Cable Receptacle - For connecting welding cable to Twist-Mate cable plug. For 1/0-2/0 (50-70mm^2) cable.
Order K1759-70

Twist-Mate Cable Receptacle - For connecting welding cable to Twist-Mate cable plug. For 2/0-3/0 (70-95mm^2) cable.
Order K1759-95

TIG OPTIONS

Twist-Mate Torch Adapter - For connection of PTA-9 or PTA-17V torches (1 piece cable) to power sources without as passing through the Twist-Mate connection.
Order K960-1

Foot Amptrol™ - Varies current while welding for making critical TIG welds and crater filling. Depress pedal to increase current. Depressing pedal fully achieves maximum set current. Fully raising the pedal finishes the weld and starts the after flow cycle. Includes 25 ft. (7.6m) control cable.
Order K870

TIG OPTIONS

Hand Amptrol - may be used in place of the Foot Amptrol. Fastens to the torch for convenient thumb control. Comes with a 25 ft. (7.6m) cable.
Order K963-1 (for smaller handle 9, 17 or 20 series torches.)
Order K963-2 (for larger handle 18 or 26 series torches.)

STICK OPTIONS

Accessory Kit - Complete kit for stick welding. Includes 30 ft. (9.1m) #3 electrode cable, 25 ft. (7.6m) #3 work cable, headshield, work clamp and electrode holder.
Order K704 for 400 Amps
Order K875 for 200 Amps.

K2269-1, V275-S Includes:

- V-275-S
- Twist-Mate Cable Plugs (K852-70), qty 2

K2199-2, V275-S 8-Pack Inverter Rack Includes:

- Inverter Rack
- An ideal system to group several inverter power sources in an industrially designed portable package. Entire system meets National Electric Code (NEC) standards.
- Includes 8 Invertec V275-S rack model power sources. This special rack version has all the same features as the standard V275-S. Standard power cord is replaced by individual stranded wires to meet NEC standards.

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⚠ 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.
- Prior to Performing preventative maintenance, perform the following capacitor discharge procedure to avoid electric shock.

INPUT FILTER CAPACITOR DISCHARGE PROCEDURE

1. Turn off input power or disconnect input power lines.

2. Remove the 5/16" hex head screws from the side and top of the machine and remove wrap-around machine cover.

3. Be careful not to make contact with the capacitor terminals that are located in the top and bottom of the Power Board.

4. Obtain a high resistance and high wattage resistor (25-1000 ohms and 25 watts minimum). This resistor is not supplied with machine. NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.

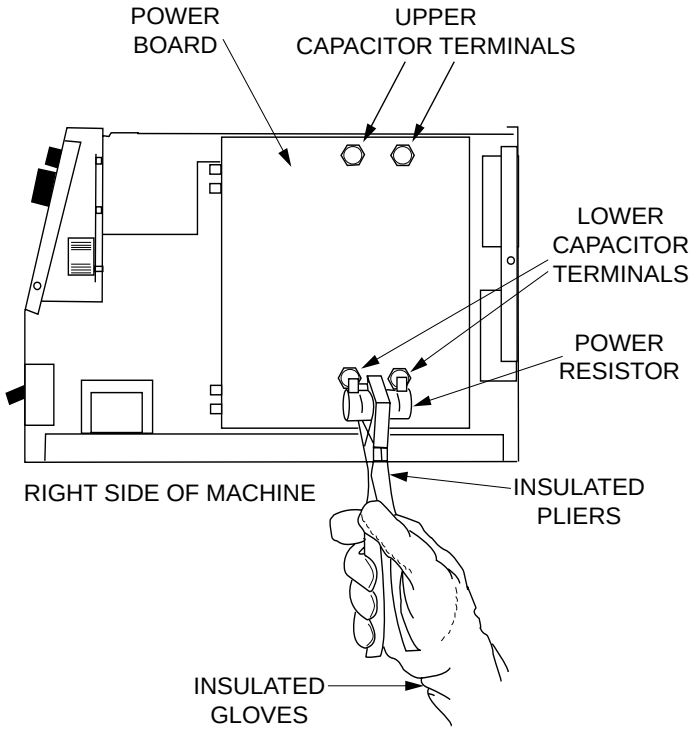
5. Locate the four capacitor terminals (large hex head cap screws) shown in Figure D.1. One pair at the top and one pair at the bottom of the Power Board.

6. Use electrically insulated gloves and insulated pliers. Hold body of the resistor and connect resistor leads across the two capacitor terminals. Hold resistor in place for 10 seconds. DO NOT TOUCH CAPACITOR TERMINALS WITH YOUR BARE HANDS.

7. Repeat discharge procedure for the capacitor on other two terminals.

8. Check voltage across terminals of all capacitors with a DC voltmeter. Polarity of capacitor terminals is marked on PC board above terminals. Voltage should be zero. If any voltage remains, repeat this capacitor discharge procedure.

FIGURE D.1 — LOCATION OF INPUT FILTER CAPACITOR TERMINALS.



LINCOLN® ELECTRIC

MAINTENANCE

ROUTINE MAINTENANCE

1. Perform the following preventive maintenance procedures at least once every six months. It is good practice to keep a preventive maintenance record; a record tag attached to the machine works best.

2. Remove the machine wrap-around cover and perform the input filter capacitor discharge procedure (detail at the beginning of this chapter).

3. Keeping the machine clean will result in cooler operation and higher reliability. Be sure to clean the following areas with a low pressure air stream. See ***Figure D.2*** for component locations.

    - •Power and control printed circuit boards
    - •Power switch
    - •Main transformer
    - •Input rectifier
    - •Heat sink fins
    - •Input Filter Capacitors
    - •Output Terminals

4. Examine capacitors for leakage or oozing. Replace if needed.

5. Examine the sheet metal case for dents or breakage. Repair the case as required. Keep the case in good condition to ensure that high voltage parts are protected and correct spacings are maintained. All external sheet metal screws must be in place to assure case strength and electrical ground continuity.

6. Check electrical ground continuity. Using an ohmmeter, measure resistance between either output terminal and an unpainted surface of the machine case. (See ***Figure D.2*** for locations.) Meter reading should be 500,000 ohms or more. If meter reading is less than 500,000 ohms, check for electrical components that are not properly insulated from the case. Correct insulation if needed.

7. Replace machine cover and screws.

MAINTENANCE

FIGURE D.2 — LOCATION OF MAINTENANCE COMPONENTS.

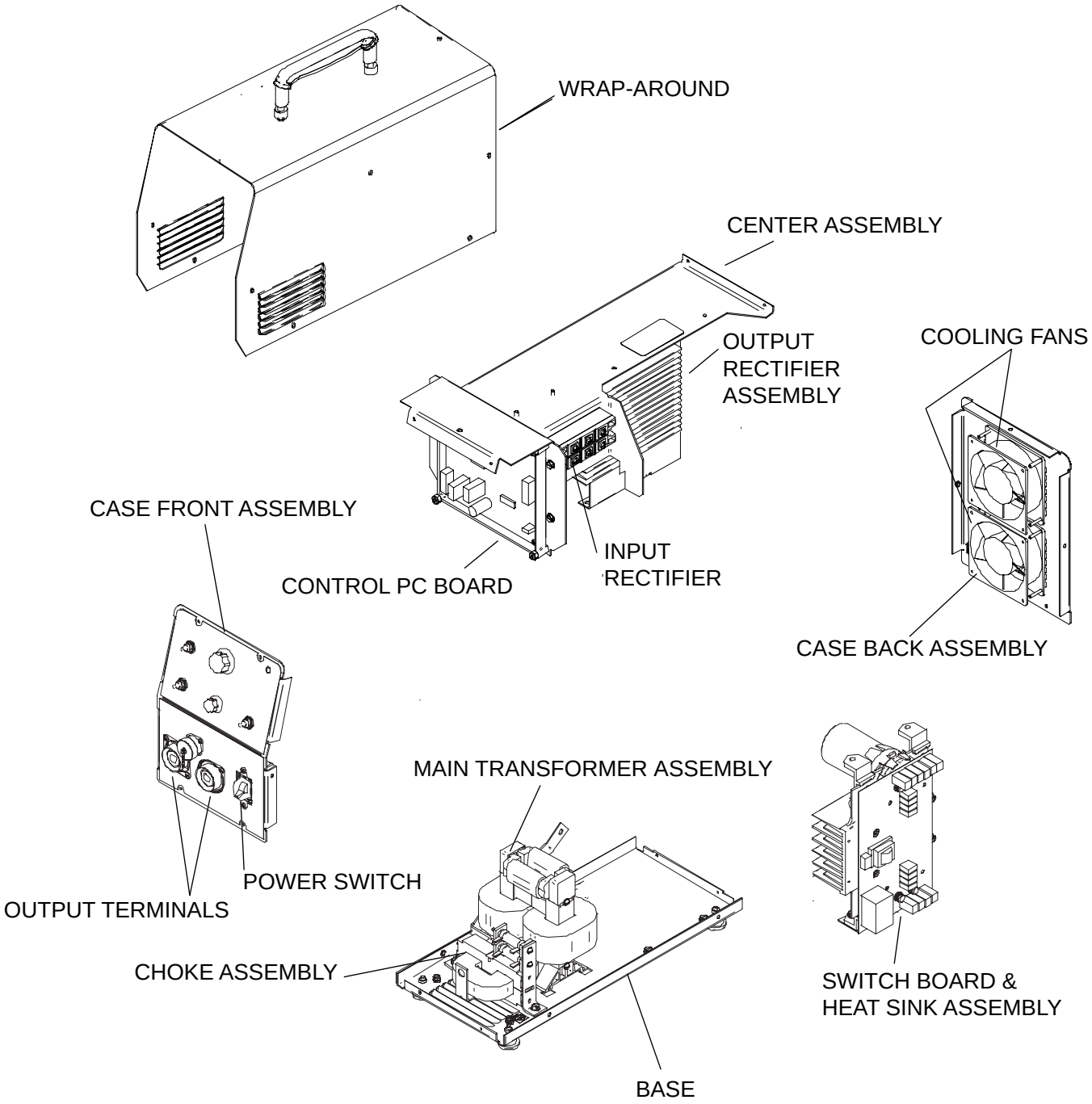


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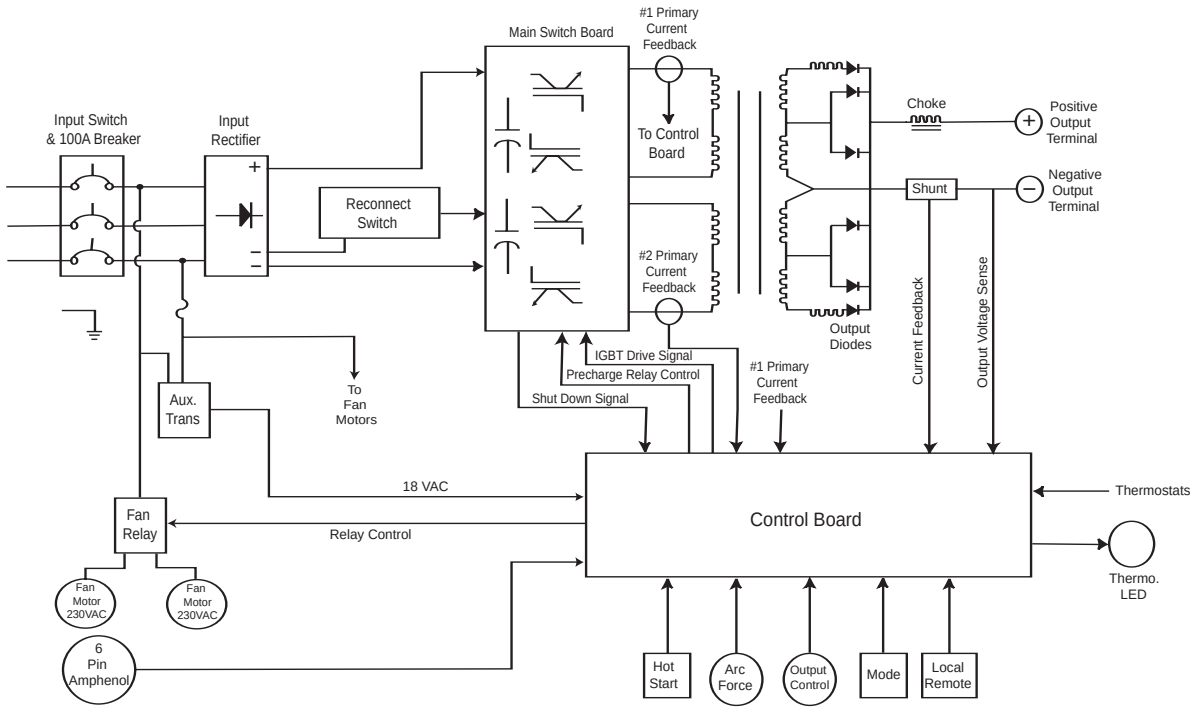
FIGURE E.1 – V275-S BLOCK LOGIC DIAGRAM



THEORY OF OPERATION

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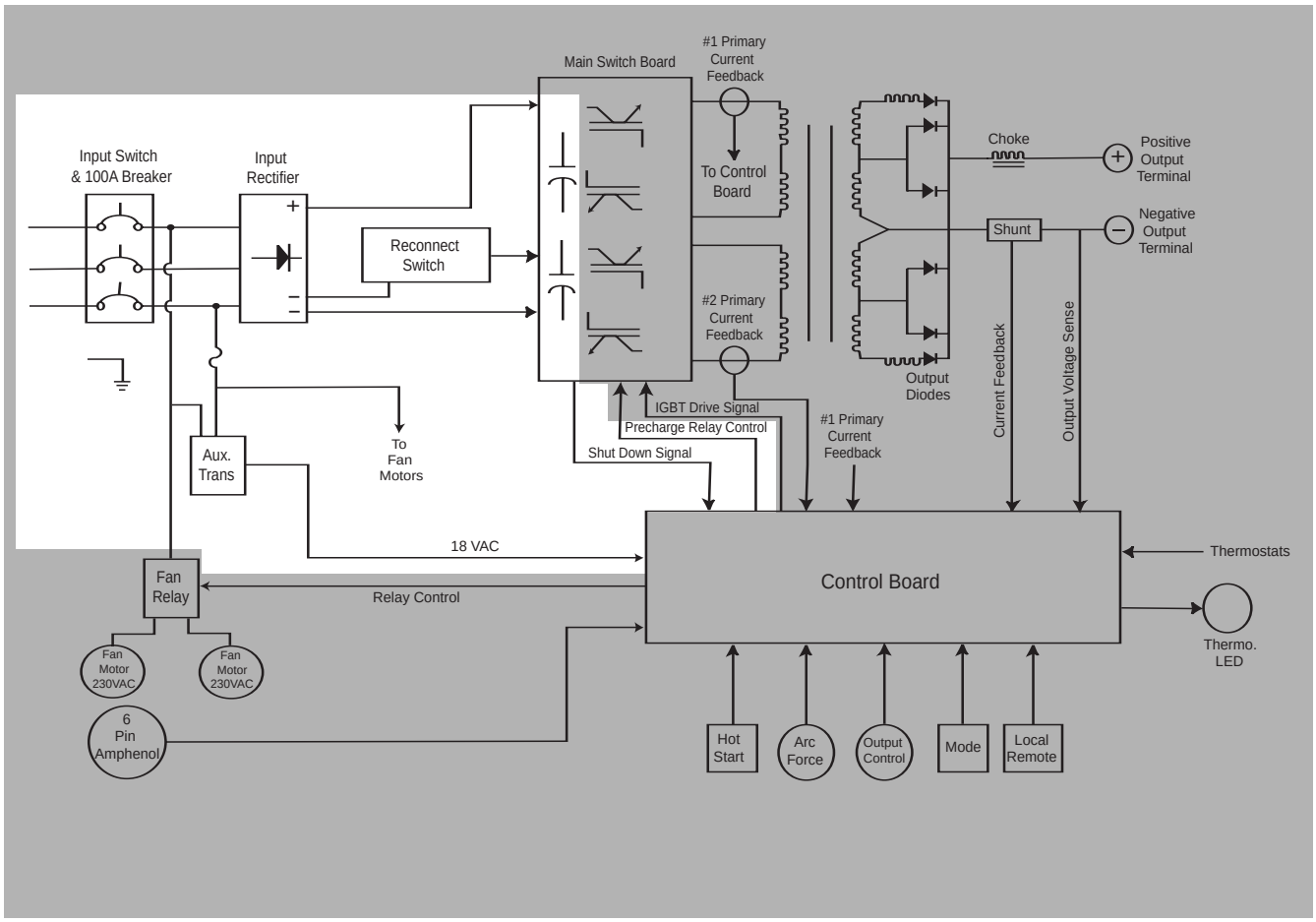
FIGURE E.2 – GENERAL DESCRIPTION, INPUT BOARD & AUXILIARY TRANSFORMER



GENERAL DESCRIPTION

The Invertec V275-S is an inverter based welding power source that offers multi-mode (TIG and Stick) constant current welding and is rated at 275 amps at 31VDC at a 35% duty cycle. The machine can be operated on either single phase or three phase input power. The welding response of this Invertec has been optimized for the stick (SMAW) and TIG (GTAW) welding processes.

INPUT LINE VOLTAGE, AUXILIARY TRANSFORMER, AND PRECHARGE

The Invertec V275-S can be connected to a variety of three-phase or single-phase input voltages. The initial power is applied to the V275-S through a line switch located on the front of the machine. Two phases of the input voltage are applied to the auxiliary transformer. The auxiliary transformer develops an 18VAC secondary voltage. This 18VAC is applied to the control board and is rectified and regulated to power the electronic circuits that are incorporated in the control board.

The input voltage is rectified by the input rectifier and the resultant DC voltage is applied to the switch board via the reconnect switch assembly located at the left side of the machine. The reconnect switches connect the two input capacitors either in a parallel (lower voltage) or in a series (higher voltage) configuration to accommodate the applied input voltage.

When the machine is first turned on a precharge sequence is initiated. During the precharge time the DC input voltage is applied to the input capacitors through a current limiting circuit that is located on the switch board. The input capacitors are charged slowly and current limited. An over or under voltage protection circuit located on the switch board monitors the capacitor voltages. This protection signal is coupled to the control board. When the input capacitors have charged to an acceptable level, the control board energizes the input relay located on the switch board, making all of the input power, without current limiting, available to the input capacitors. If the capacitors become under or over voltaged the control board will de-energize the input relay and the V275-S output will be disabled.

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

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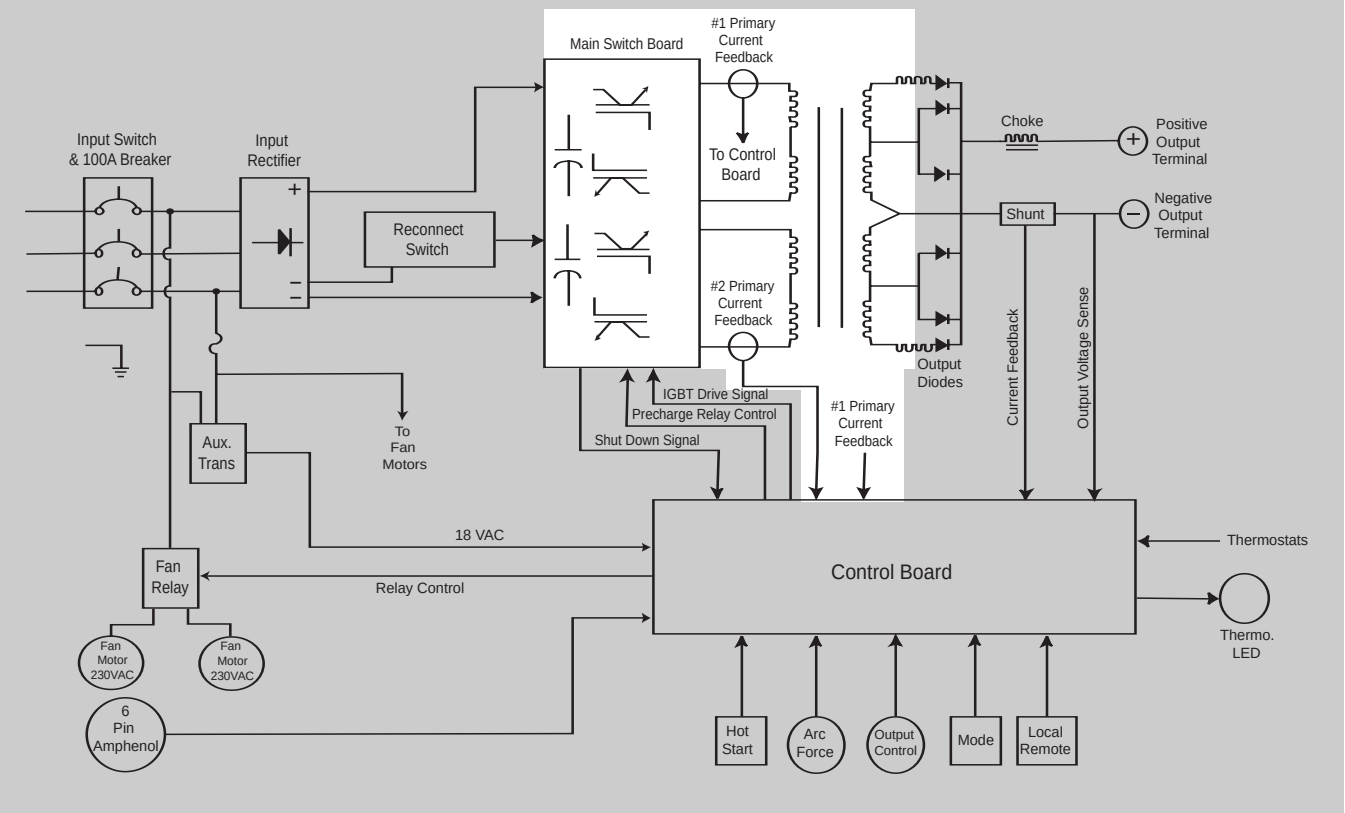
THEORY OF OPERATION

FIGURE E.3 – MAIN IGBT SWITCH BOARD & MAIN TRANSFORMER



SWITCH BOARD AND MAIN TRANSFORMER

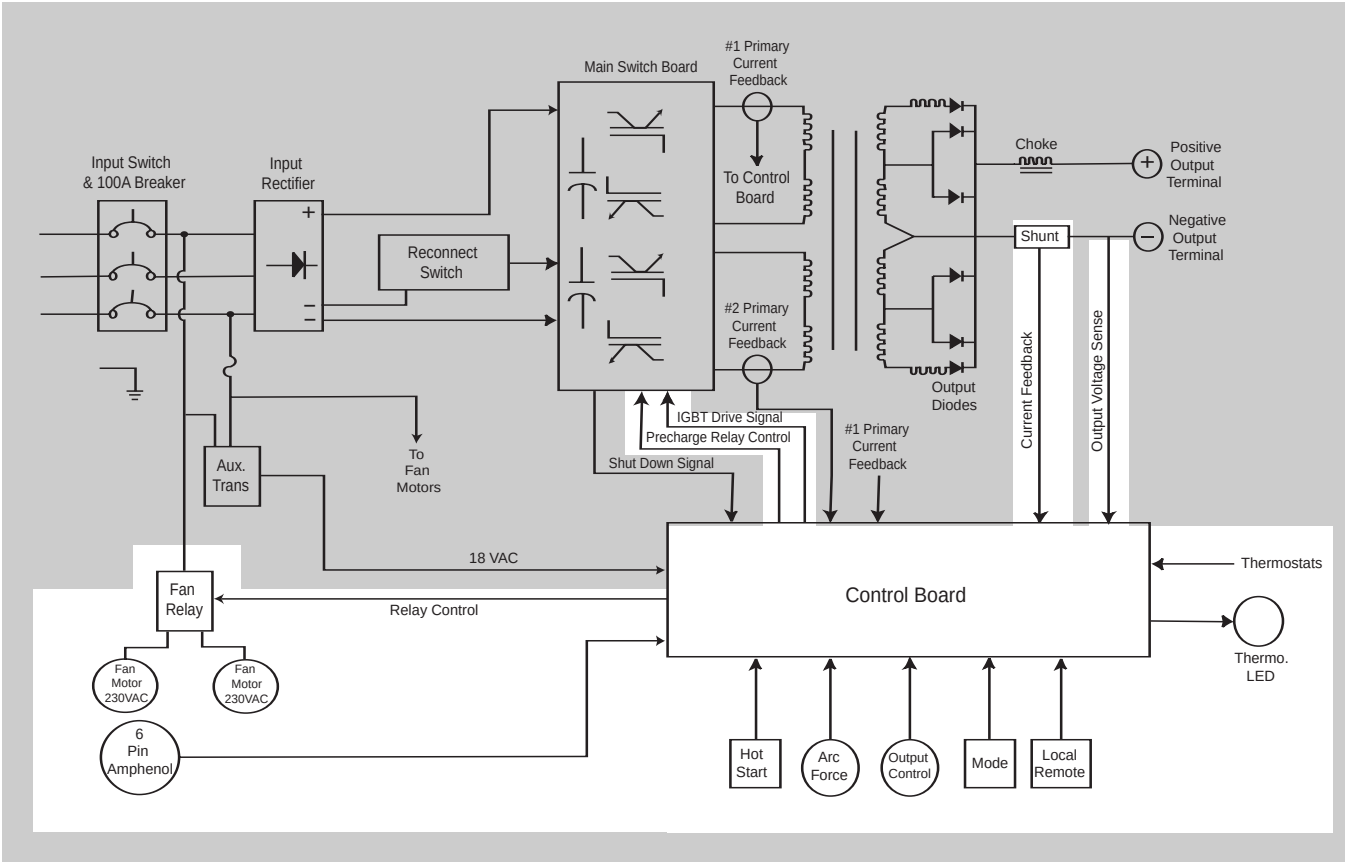
There is one switch board in the Invertec V275-S. This board incorporates two input capacitors, two insulated gate bipolar transistor (IGBT) switching circuits, a precharge circuit, an over and under voltage protection circuit and two isolated +15VDC supplies that are derived from the input capacitors. The two +15VDC supplies are utilized by the electronic circuitry housed on the Switch Board.

When the reconnect switch is in the lower voltage position the two input capacitors are in parallel. When the reconnect switch is in the higher voltage position the two input capacitors are in series. This series configuration is required to accommodate the higher input voltages. Thus, the higher input voltage is shared between the two capacitors. When the input capacitors are fully charged they act as power supplies for the IGBT switching circuits. When welding output is required the Insulated Gate Bipolar Transistors switch the DC power from the input capacitors "on and off" thus supplying a pulsed DC current to the main transformer primary windings.

See IGBT Operation and Discussion in this section. Each IGBT switching circuit feeds current to a separate, oppositely wound primary winding in the main transformer. The reverse directions of current flow through the main transformer primaries and the offset timing of the IGBT switching circuits induce an AC square wave output signal at the secondary of the main transformer. The two current transformers (CT), located on the transformers primary winding leads, monitor the two primary winding currents. If the primary currents become abnormally high the control board will shut off the IGBTs, thus disabling the machine's output.

The DC current flow through each primary winding is clamped back to each respective input capacitor when the IGBTs are turned off. This is needed due to the inductance of the transformers primary windings. The firing of the two IGBT switching circuits occurs during halves of a 33 microsecond interval, creating a 30 KHZ switched output Due to the full wave rectification of the transformers secondary output voltage a 60KHZ DC output is presented at the machine's output terminals.

FIGURE E.4 – CONTROL BOARD AND FANS CIRCUIT



CONTROL BOARD AND FANS CIRCUIT

The control board performs the primary interfacing functions to establish and maintain control of the machines output. The control board receives commands from the user-operated controls that are connected to the control board. These switches and potentiometer's allow the operator to set the current output of the machine and also to select either local or remote control of the output. Other controls allow for the adjusting of the Arc Force the selection of the Hot Start option and the Stick or TIG mode of operation.

The control board processes and compares these commands with the voltage and current feedback information it receives from the output current shunt and the output voltage sensing leads. The appropriate pulse width modulation (PWM) signals (***See Pulse Width Modulation*** in this section) are sent to the switch board IGBTs. As a result a high-speed welding waveform is created and regulated.

At the initial start-up of the V275-S the closing of the precharge relay is delayed and controlled by the circuitry on the control board. When the input capacitors are charged to an acceptable voltage level the control board energizes the precharge relay.

The 230VAC fans operate once 15 amps of welding current is drawn and for seven minutes after the welding output has stopped flowing. The fans will also operate anytime the machine has over heated and the opening of the normally closed thermostats signal the control board to energize the fan relay. When the normally closed thermostats are open the control board also energizes a thermal LED to signal the operator that an overheated condition exists.

In addition to the thermostats, the control board also monitors the welding output current and the main transformers primary currents. If any of these feedback signals are beyond normal limitations the control board will stop providing PWM signals to the main IGBTs and welding output voltage and current will cease.

The 6-pin remote control receptacle is also connected directly to the control board. When the local/remote switch is in the “remote” position the control board processes these remote operator commands to control welding output.

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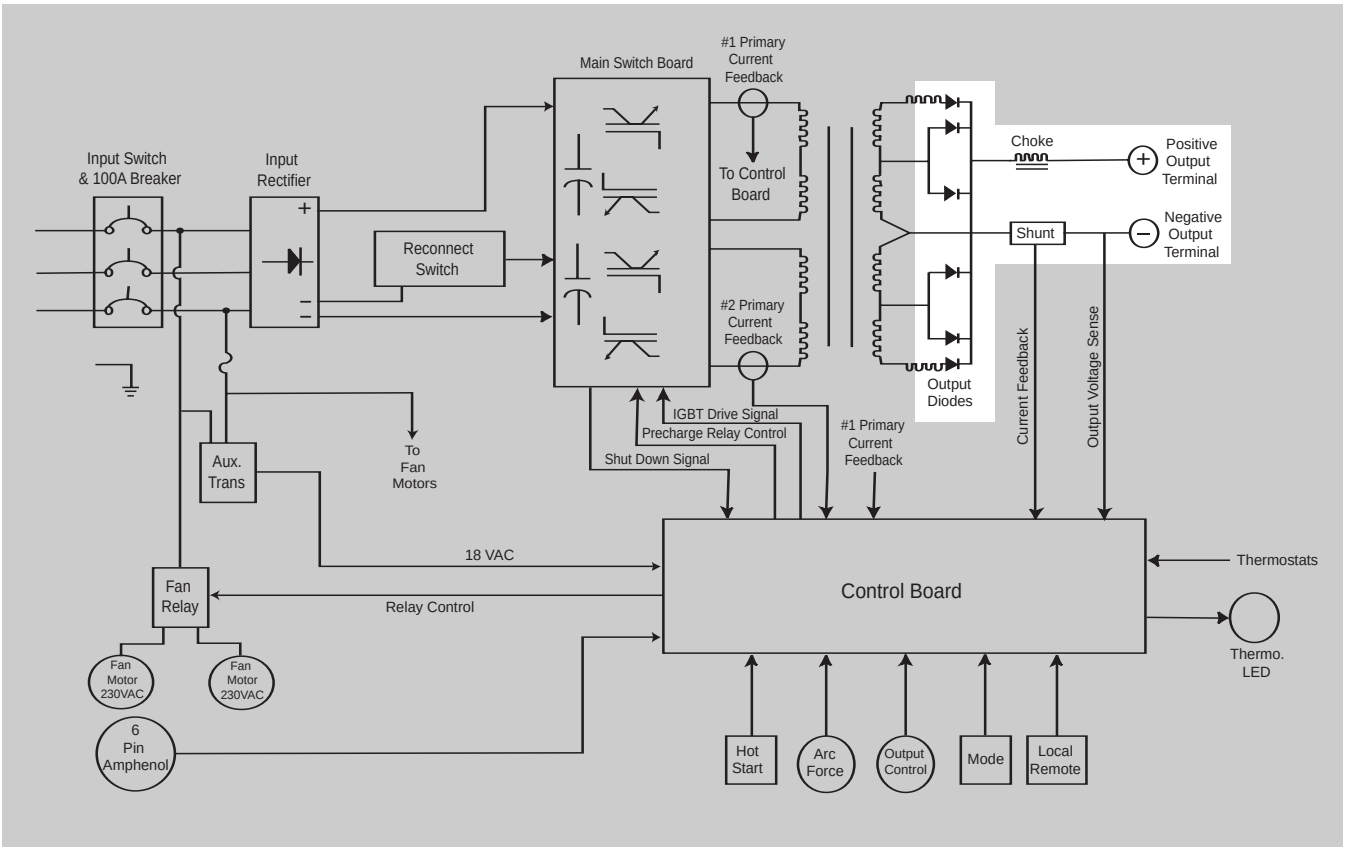
THEORY OF OPERATION

FIGURE E.5 – OUTPUT RECTIFIER AND CHOKE



OUTPUT RECTIFIER AND CHOKE

The output rectifier receives the AC output from the main transformer secondary windings and rectifies it to a DC voltage level. Since the output choke is in series with the positive leg of the output rectifier and also in series with the welding load, a filtered DC output current is applied through the machine's output terminals.

THEORY OF OPERATION

THERMAL PROTECTION

Three normally closed (NC) thermostats protect the V275-S from excessive operating temperatures. These thermostats are wired in series and are connected to the control board. One of the thermostats is located on the heat sink of the switch board. The second is located on the output choke coil. The third thermostat is located on the output heat sink. Excessive temperatures may be caused by a lack of cooling air (one fan running) or operating the machine beyond its duty cycle or output rating. If excessive operating temperatures should occur, the thermostats will prevent welding output from the machine. The yellow thermal LED, located on the front of the machine, will be illuminated. The thermostats are self-resetting once the machine cools sufficiently. If the thermal shut down was caused by excessive output or duty cycle and the fans are operating normally the power switch may be left on and the reset should occur within a 15 minute period. If the fans are not turning or the air intake louvers are obstructed, then the power must be removed from the machine and the fan problem or air obstruction be corrected.

PROTECTIVE CIRCUITS

Protective circuits are designed into the V275-S to sense trouble and shut down the machine before damage occurs to the machine's internal components. There are resetable fuses on the control board for the remote amphenol circuit in the event that a remote cable is damaged.

OVER CURRENT PROTECTION

The maximum current is 290-300 amps. If reaching that, then the output will be limited to 200 amps until the load is removed.

UNDER/OVER VOLTAGE PROTECTION

Protective circuits are included on the switch board to monitor the voltage across the input capacitors. In the event that a capacitor voltage is too high, or too low, the machine's output will be disabled. The protection circuits will prevent output via the control board if any of the following conditions exist

1. Voltage across a capacitor pair exceeds 455VDC. (High line surges or improper input voltage connections.)

2. Voltage across a capacitor is under 235 VDC. (Due to improper input voltage connections.)

3. Internal component damage.

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INSULATED GATE BIPOLAR TRANSISTOR (IGBT) OPERATION

An IGBT is a type of transistor. IGBT are semiconductors well suited for high frequency switching and high current applications.

Example A in Figure E.7 shows an IGBT in passive mode. There is no gate signal, zero volts relative to the source, and therefore, no current flow. The drain terminal of the IGBT may be connected to a voltage supply; but since there is no conduction, the circuit will not supply current to components connected to the source. The circuit is turned OFF like a light switch.

Example B shows the IGBT in an active mode. When the gate signal , a positive DC voltage relative to the source, is applied to the gate terminal of the IGBT, it is capable of conducting current. A voltage supply connected to the drain terminal will allow the IGBT to conduct and supply current to the circuit components coupled to the source. Current will flow through the conducting IGBT to downstream components as long as the positive gate signal is present. This is similar to turning ON a light switch.

FIGURE E.7 – IGBT

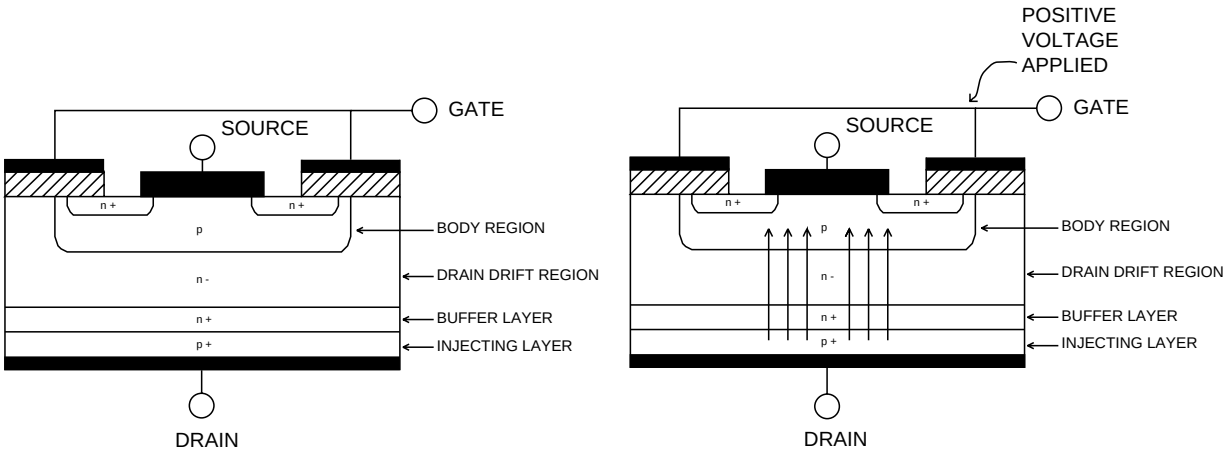
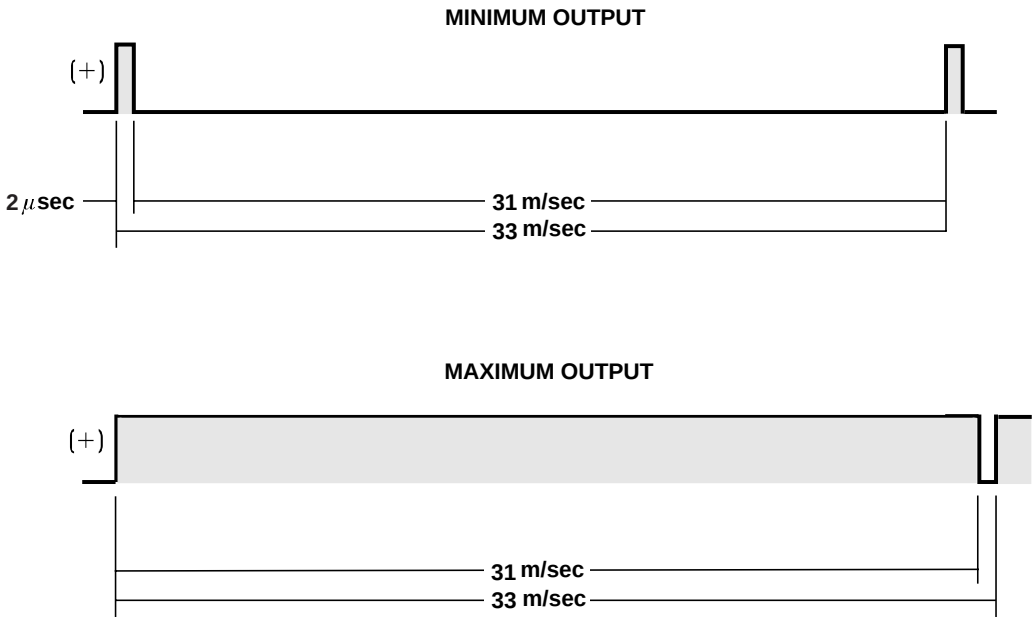


Figure E-8



PULSE WIDTH MODULATION

The term PULSE WIDTH MODULATION is used to describe how much time is devoted to conduction in the cycle. Changing the pulse width is known as MODULATION. Pulse Width Modulation (PWM) is the varying of the pulse width over the allowed range of a cycle to affect the output of the machine.

MINIMUM OUTPUT

By controlling the duration of the gate signal, the IGBT is turned on and off for different durations during a cycle. The top drawing shows the minimum output signal possible over a 33-microsecond time period.

The shaded portion of the signal represents the IGBT, conducting for 2 microseconds. Since only 2 microseconds of the 33-microsecond time period is devoted to conducting, the output power is minimized.

MAXIMUM OUTPUT

By holding the gate signals on for 31 microseconds and allowing only 2 microseconds of off time during the 33 microsecond cycle, the output is maximized. The darkened area under the min. curve can be compared to the darkened area under the max. curve. The more darkened area, the more power is present.

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TROUBLESHOOTING & REPAIR

HOW TO USE TROUBLESHOOTING GUIDE

⚠ CAUTION

Service and repair should be performed by only 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 three main 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. PERFORM COMPONENT TESTS. 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 referred to 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 test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

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TROUBLESHOOTING & REPAIR

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

*Have an electrician install and service this equipment. Turn the machine OFF before working on equipment. Do not touch electrically hot parts.

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

PC Boards 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 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.

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OUTPUT PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major physical or electrical damage is evident when the sheet metal cover is removed.	1. Contact your local authorized Lincoln Electric Field Service Facility for assistance.	1. Contact the Lincoln Electric Service Department 1-888-935-3877.
The machine is dead. No output. The thermal light and fan do not cycle on when the machine is turned on.	1. Make sure the input power switch is in the ON position. 2. Check the main input fuses. If open replace. Check the 0.6 amp fuse located in the reconnect switch section. 3. Make sure the reconnect switch and jumper lead is configured correctly for the input voltage being applied to the machine. 4. If the machine is being operated with single phase input voltage make sure the red lead is not connected. See the ***Installation Section.***	1. Check the input power switch for proper operation. Also check the associated leads for loose or faulty connections. See wiring diagram. 2. Perform the ***Auxiliary Transformer Test.*** 3. Perform the ***Main Switch Board Test.*** 4. The Control Board may be faulty. Perform the ***Control Board Test.***

⚠ CAUTION

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.

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OUTPUT PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
The V275-S does not have welding output.	1. Make certain the reconnect switch and jumper lead are configured correctly for the input voltage being applied. 2. Make sure the Local/Remote switch is in the "Local" position. See the ***Operation Section***. If the problem is solved check the remote control device and associated machine circuitry.	1. Check the reconnect switch and associated leads for loose or faulty connections. See the wiring diagram. 2. Perform the ***Main Switch Board Test.*** 3. Perform the ***Output Diode Module Test.*** 4. The input filter capacitors may be faulty. Check, and if either is faulty replace both. 5. The Control board may be faulty. Perform ***Control Board Tests.***

⚠ CAUTION

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.

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OUTPUT PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
The V275-S will not produce full output.	1. The input voltage may be too low, limiting the output capability of the machine. Make certain the input voltage is correct for the machine and the reconnect switch and jumper lead configuration. 2. The welding current may be too high. The machine will fold back to less than 200 amps if the welding current exceeds 300 amps. 3. Make sure the machine is in "Local" output control. If the problem is resolved the remote control device or associated machine circuitry may be faulty.	1. Perform the ***Output Module Test.*** 2. Perform the ***Main Switch Board Test.*** 3. Perform the ***Output Current Shunt Test.*** 4. The output Control potentiometer (R1) may be faulty Normal value is 10,000 ohms. Also check associated wiring for loose or faulty connections. See wiring diagram. 5. The control board may be faulty. Perform the ***Control Board Test.***
The machine's welding output is very high and uncontrollable.	1. Put the Local/Remote switch in the Local position. If the problem is solved the remote control device or associated circuitry may be faulty.	1. Perform the ***Output Current Shunt Test.*** 2. The output control potentiometer or associated leads may be faulty. See the wiring diagram. 3. The Control Board may be faulty. Perform ***Control Board Test.***

⚠ CAUTION

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.

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FUNCTION PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The machine regularly overheats and the yellow thermal light is ON indicating a thermal overload.	1. The welding application may be exceeding the recommended duty cycle of the V275-S. 2. Dirt and dust may have clogged the cooling channels inside the machine. 3. The air intake and exhaust louvers may be blocked due to inadequate clearance around the machine. 4. Make certain the fan as needed (F.A.N.) circuit is operating properly. The fan should operate when 15 amps of welding current is present and/or when there is an over temperature condition. When the machine is turned on the fans should operate for approximately 3 seconds.	1. The 230 VAC fan motors are controlled by the control board via the fan relay (CR1). Perform the ***Fan Motors and Control Test.*** 2. One of the thermostats or associated circuitry may be faulty. One normally closed thermostat is located on the output choke, another is on the main switch board heat sink and the third thermostat is mounted on the output rectifier heat sink. See the wiring diagram. Note: The ***Main Switch Board Removal Procedure*** will be required to gain access to the thermostat located on the main switch board heat sink.

⚠ CAUTION

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.

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FUNCTION PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The main input fuses or breakers repeatedly fail.	1. Make certain the fuses or breakers are properly sized for the input draw of the machine. 2. Make sure the reconnect switch and jumper leads are configured correctly for the applied input voltage. 3. The welding procedure may be drawing too much input current or the duty cycle may be too high. Reduce the welding current and/or reduce the duty cycle.	1. Check the reconnect switches and associated wiring for loose or faulty connections. See the wiring diagram. 2. Perform the ***Input Rectifier Test.*** 3. Perform the ***Main Switch Board Test.*** 4. Perform the ***Output Diode Module Test.*** 5. The input filter capacitors may be faulty. Check, and if either is faulty replace both.
The machine operates normally when connected for 200-230 VAC input. There is no output when the machine is connected to 380VAC or higher.	1. Check the input voltage and input voltage reconnect procedures. See the ***Installation Section.***	1. Perform the ***Capacitor Balance Test.*** 2. Perform the ***Main Switch Board Test.*** 3. Perform the ***Auxiliary Transformer Test.***
The machine's output stays at minimum-no control of output. The Open Circuit Voltage is abnormally high. Normal maximum Open Circuit Voltage is 70 VDC.	1. Make sure the machine is in the Local position. If the problem is solved the remote control device may be defective.	1. Perform the ***Output Current Shunt Test.*** 2. Check for loose or faulty connections between the output potentiometer and the control board. See the wiring diagram.
The Mode Selector does not function properly.	1. Refer to the ***Operation Section*** of this manual for normal operation characteristics.	1. Check for loose or faulty connections between the Mode Selector Switch and the control board. See the wiring diagram. 2. The Mode Selector Switch may be faulty. 3. The control board may be faulty.

⚠ CAUTION

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.

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WELDING PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
Poor stick electrode welding performance. The arc pops out.	1. Make sure the Arc Force Control is set properly for the process. See the ***Operation Section.*** 2. Check for loose or faulty welding cables. 3. Is the electrode Dry? Try welding with another electrode from a different container. Make sure you have the correct electrode for the application. 4. Make sure the machine's setting are correct for the process being used.	1. Check the Mode switch for proper operation. Also check the associated leads for loose or faulty connections. See the wiring diagram. 2. The control board may be faulty. Perform the ***Control Board Test.*** 3. Check the resistance of the primary current transducers. Normal resistance is less than 1 ohm. See the wiring diagram.
For no apparent reason the welding characteristics have changed.	1. Check the welding cables for loose or faulty connections. 2. Make sure the machine's mode and output are set correctly for the process being used. (CC or TIG) 3. If in the TIG mode make sure the shielding gas is correct for the process.	1. Perform the ***Output Current Shunt Test.*** 2. Perform the ***Output Diode Module Test.*** 3. The Arc Force Potentiometer or associated circuitry may be faulty. Normal potentiometer resistance is 10K ohms. See the wiring diagram. 4. The Hot Start switch may be defective. See the wiring diagram. 5. The Output Bypass Assembly may be defective.

⚠ CAUTION

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.

TROUBLESHOOTING & REPAIR

Observe Safety Guidelines
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TROUBLESHOOTING GUIDE

WELDING PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The machine's welding output is reduced to 200 amps.	1. This may be normal operation. If the output current exceeds 300 amps, an electronic protection circuit will reduce the current to less than 200 amps. The machine will continue to produce this low current until the protection circuit is reset. Reset occurs when the load is removed from the output terminals. 2. Check the input voltage and input voltage reconnect switches. ***See Input Voltage Reconnect Procedure.*** 3. Check for loose or faulty welding cables.	1. Perform the ***Output Current Shunt Test.*** 2. Perform the ***Output Diode Module Test.*** 3. Check the heavy current carrying leads for loose or faulty connections. See the wiring diagram. 4. The control board may be faulty. Perform the ***Control Board Test.***
Poor welding, the weld settings drift, or output power is low.	1. Make sure the machine's settings are correct for the weld process being used. 2. Check the machine's performance on Local control. If the performance is OK then the remote control device may be faulty. Check or replace. 3. Check the input voltages and input voltage reconnect switches. See ***Input Voltage Reconnect Procedure.*** 4. Check for loose or faulty welding cables.	1. Perform the ***Output Current Shunt Test.*** 2. Perform the ***Output Diode Module Test.*** 3. Check the heavy current carrying leads for loose or faulty connections. See the wiring diagram. 4. The control board may be faulty. Perform ***Control Board Test.***

⚠ CAUTION

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.

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INPUT FILTER CAPACITOR DISCHARGE PROCEDURE

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

This procedure will drain off any charge stored in the two capacitors that are part of the main IGBT inverter board assembly. This procedure **MUST** be performed, as a safety precaution, before conducting any test or repair procedure that requires you to touch internal components of the machine.

MATERIALS NEEDED

5/16” Nut Driver
Insulated Pliers
Insulated Gloves
High Wattage Resistor (25-1000 ohms and 25 watts minimum)
DC Volt Meter

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INPUT FILTER CAPACITOR DISCHARGE PROCEDURE *(continued)*

⚠ WARNING

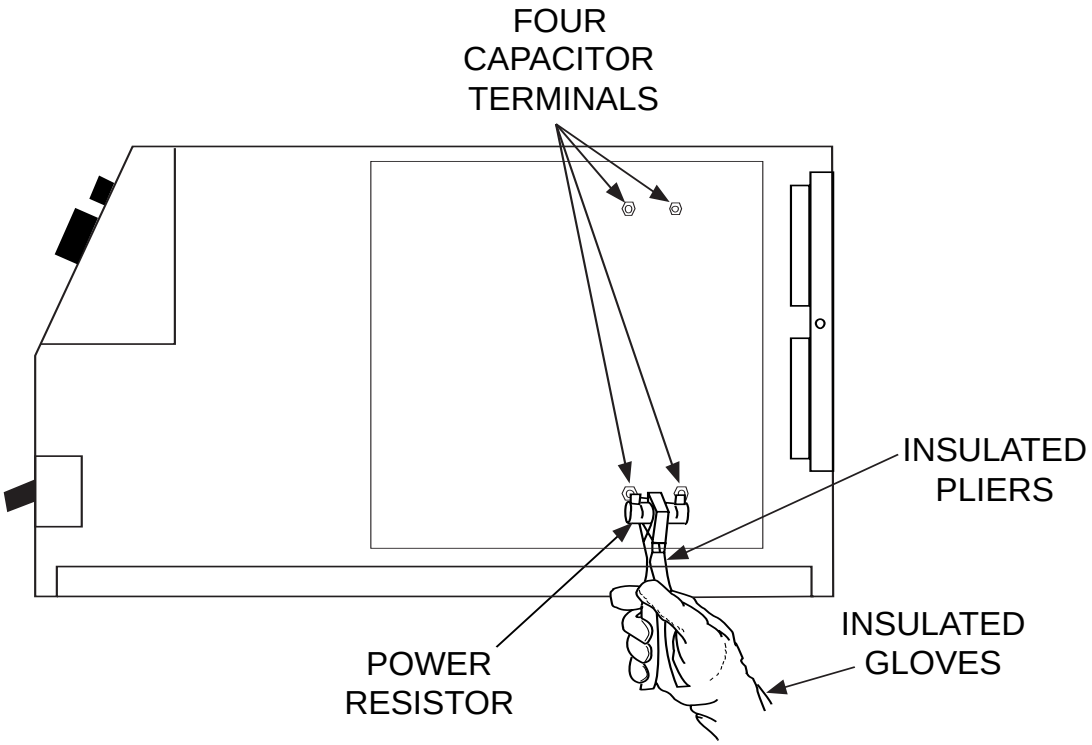
ELECTRIC SHOCK can kill.

- 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.
- Prior to performing preventative maintenance, perform the following capacitor discharge procedure to avoid electric shock.

DISCHARGE PROCEDURE

1. Remove the input power to the machine.
2. Using a 5/16" nut driver remove the screws securing the case wraparound cover.
3. Be careful not to make contact with the capacitor terminals located at the top and bottom of the switch board.
4. Obtain a high resistance and high wattage resistor (25-1000 ohms and 25 watts minimum). This resistor is not with the machine. NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.
5. Locate the four capacitor terminals shown in Figure F.1.
6. Using electrically insulated gloves and pliers, hold the body of the resistor with the pliers and connect the resistor leads across the two capacitor terminals. Hold the resistor in place for 10 seconds. DO NOT TOUCH CAPACITOR TERMINALS WITH YOUR BARE HANDS.
7. Repeat the discharge procedure for the other capacitor. (2 total)
8. Check the voltage across the terminals of both capacitors with a DC voltmeter. Voltage should be zero. If any voltage remains, repeat this capacitor discharge procedure.

FIGURE F.1 – Location of Input Filter Capacitor Terminals



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CAPACITOR BALANCE TEST

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

This test will help determine if the input filter capacitors are being charged equally and to the correct voltage levels. Note: This test should only be conducted with the V275-S reconnect switch and "A" jumper configured for 380VAC and above.

MATERIALS NEEDED

Volt/Ohmmeter (Multimeter)
5/16" Nut Driver
Wiring Diagram

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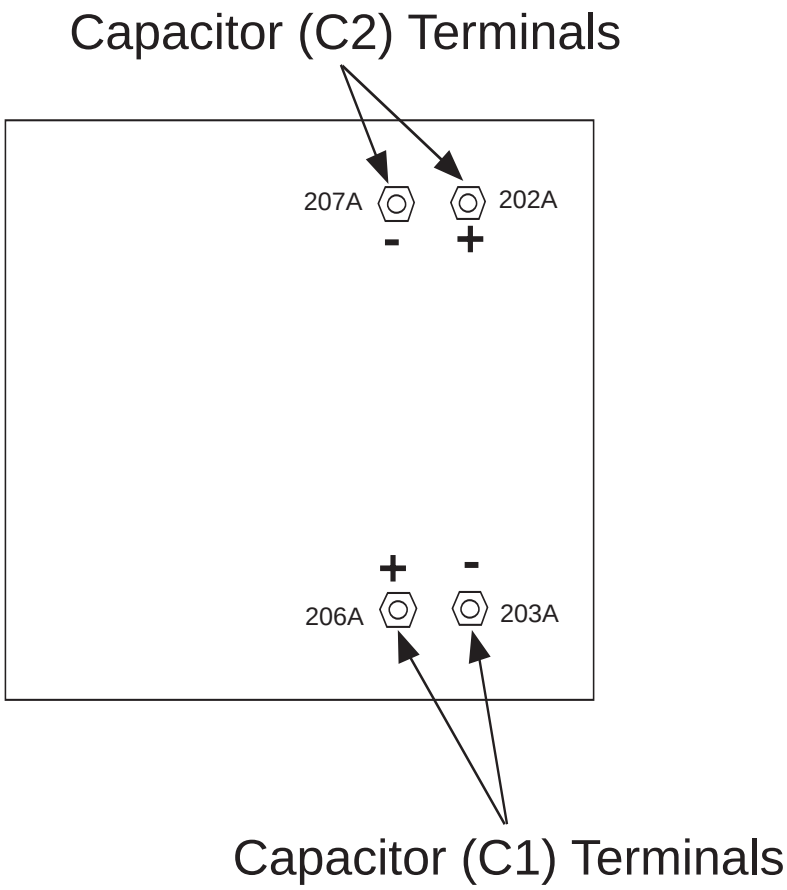
CAPACITOR BALANCE TEST *(continued)*

FIGURE F.2 - Capacitor Terminal Locations on the Main Switch Board



TEST PROCEDURE

1. Remove input power to the V275-S.
2. Using a 5/16" nut driver, remove the case wrap-around.
3. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.
4. Put the mode switch in the SMAW position and put the Local/Remote switch in the LOCAL position.
5. Put the output control R1 at the minimum position.
6. Locate and familiarize yourself with the capacitor test locations on the main switch board. See Figure F.2.
7. The following tests will be performed with the input power applied to the V275-S. **BE CAREFUL. ALWAYS REMOVE THE INPUT POWER AND PERFORM THE *INPUT FILTER CAPACITOR DISCHARGE PROCEDURE* BEFORE TOUCHING ANY MACHINE COMPONENT.**
8. Apply the correct input power and turn ON the V275-S.

NOTE: This test should only be conducted with the V275-S reconnect switch and "A" jumper configured for 380VAC and above.

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CAPACITOR BALANCE TEST *(continued)*

9. Check for the appropriate voltages outlined in Table F.1.

NOTE: Voltages may vary with the input line voltage. In the event that the capacitor voltage is too high or too low, the protection circuit will prevent output.

10. If the capacitor voltages are NOT balanced, the capacitors may be in need of "conditioning". See ***Maintenance section.***

NOTE: The capacitors or other components on the switch board may be faulty. Replace the main switch board.

TABLE F.1 Capacitor Voltages

INPUT APPLIED	EXPECTED VOLTS DC AT CAPACITOR TERMINALS
575 VAC	406 VDC
460 VAC	325 VDC
440 VAC	311 VDC
415 VAC	293 VDC
380 VAC	269 VDC

NOTE: The following machine parts must be replaced in matched sets. If Capacitor C1 is found to be defective, both Capacitors C1 and C2 must be replaced at the same time.

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MAIN SWITCH BOARD TEST

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

This test will help determine if the “power section” of the switch board is functioning properly. This test will NOT determine if the entire PC board is functional.

MATERIALS NEEDED

Analog Volt/Ohmmeter
5/16” Nut Driver
Fluke meter with frequency counter

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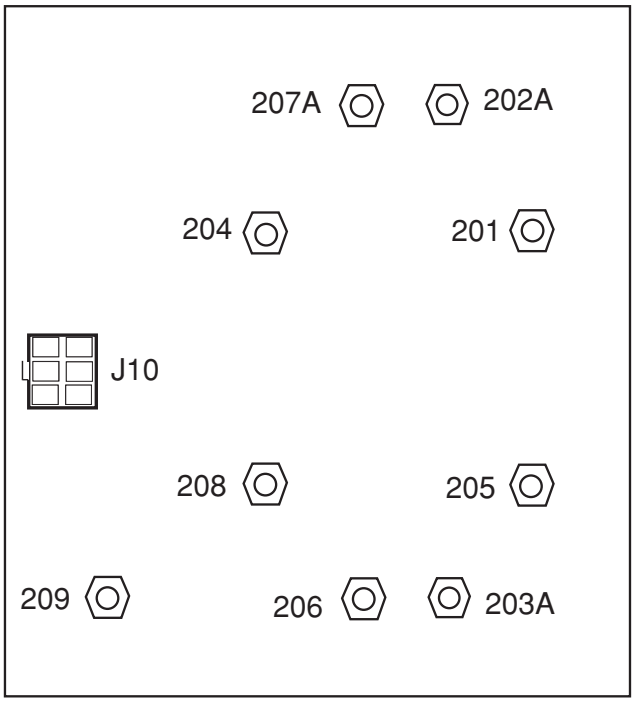
MAIN SWITCH BOARD TEST (CONTINUED)

Figure F.3 - Main Switch Board Lead location



TEST PROCEDURE

1. Remove input power to the V275-S machine.
2. Using a 5/16” nut driver, remove the case wraparound cover.
3. Perform the ***Input Filter*** **Capacitor Discharge Procedure** detailed earlier in this section.
4. Locate the Main switch board. ***See Figure F.1***

Main IGBT Resistance Test

5. Use a analog volt/ohmmeter check for shorted IGBT’s. See Figure F.3.
6. The resistance from leads 205 to 206 should be very high. Less than 30 ohms is a shorted IGBT. See Figure F.3.
7. The resistance from leads 203A to 208 should be very high. Less than 30 ohms is a shorted IGBT. See Figure F.3.
8. The resistance from leads 202A to 204 should be very high. Less than 30 ohms is a shorted IGBT. See Figure F.3.
9. The resistance from leads 207A to 201 should be very high. Less than 30 ohms is a shorted IGBT. See Figure F.3.

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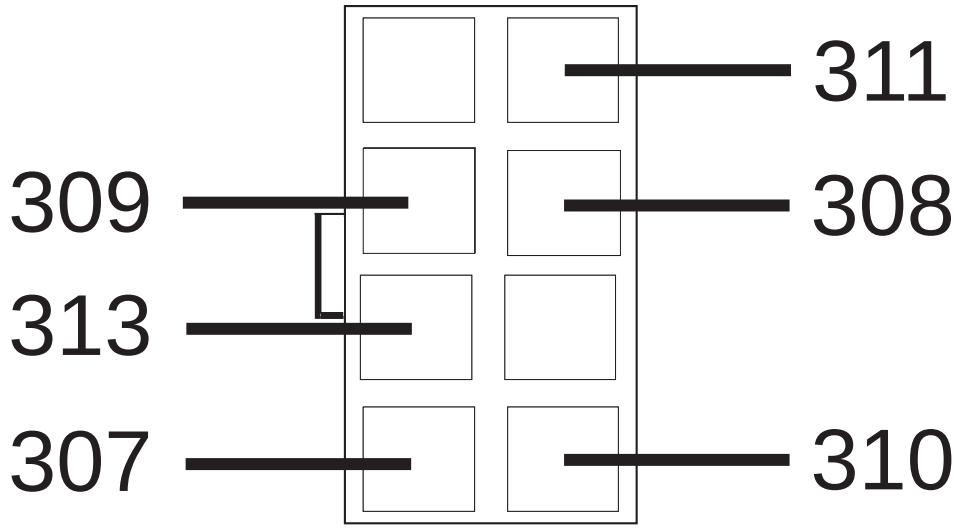
MAIN SWITCH BOARD TEST (CONTINUED)

Figure F.4 - Plug J10



Input Signal Test

10. Locate leads 308 and 309 on plug J10. See Wiring Diagram. See Figure F.4.
11. Carefully apply the correct input power to the V275-S.
12. Make sure that the Mode Switch is in the Stick position.
13. Using a fluke frequency meter carefully check for 30KHZ from leads 308 and 309.

NOTE: This is the IGBT gate drive signal from the control board to the switch board.

14. Locate leads 310(-) and 307(+) on plug J10. See Wiring Diagram. See Figure F.4.
15. Using a multimeter carefully check for 10.5VDC to 13.5VDC. This is the voltage applied to the precharge relay and should be present approximately three seconds after power is applied to the machine.

Fault Signal Test

16. Locate leads 311(+) and 313(-) on plug J10. See Wiring Diagram. See Figure F.4.
17. Carefully measure the DC voltage at leads 311(+) and 313(-). Normal expected voltage is less than 1.5VDC. This voltage should always be less than 1.5VDC unless there is a capacitor fault condition.
18. Below are the conditions that could cause this voltage to be greater than 1.5VDC.

- Input capacitors over voltage. Greater than 455VDC.
- Input capacitors under voltage. Less than 235VDC.
- The input capacitors may need conditioning. See ***Filter Capacitor Conditioning***.
- One of the input capacitors may be faulty.
- The switch board may be faulty.
- If the reconnect switch is configured for a voltage less than 380VAC and the applied voltage is greater than 380VAC, a fault condition will occur. The actual capacitor voltage will oscillate between approximately 70VDC and 135VDC.

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INPUT RECTIFIER TEST

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

This test will help determine if the input rectifier has “shorted” or “open” diodes.

MATERIALS NEEDED

Analog Volt-Ohmmeter (Multi-meter)

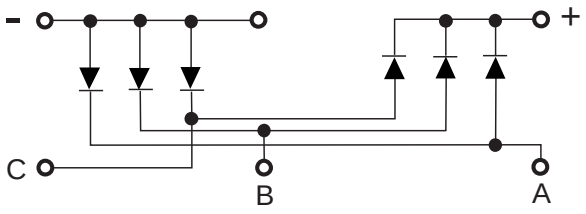
5/16” Nut Driver

Phillips Head Screwdriver

Wiring Diagram

INPUT RECTIFIER TEST (CONTINUED)

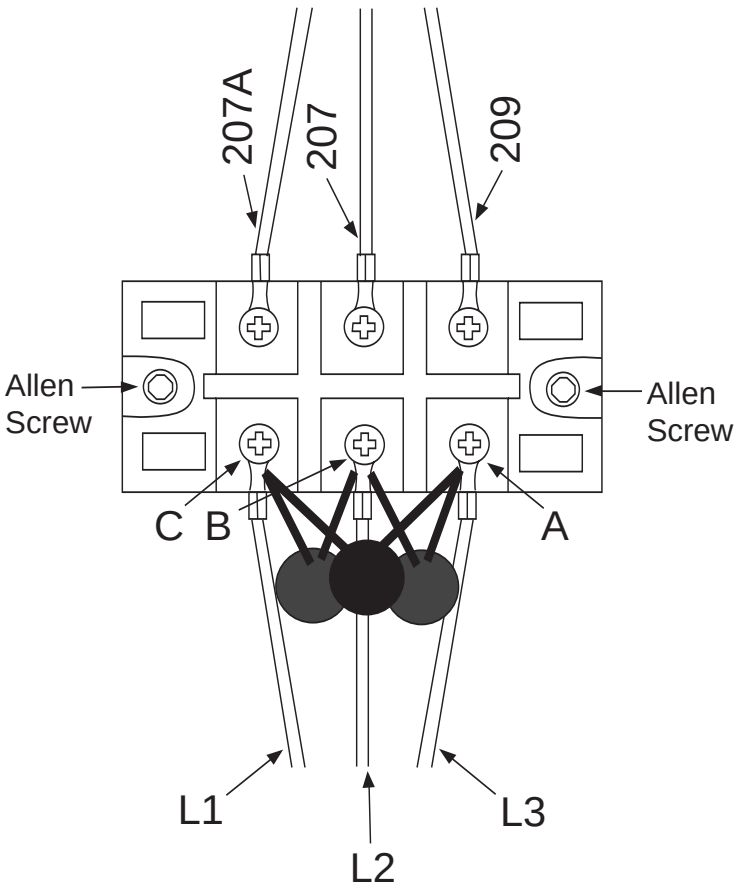
Figure F.5 - Terminal Schematic



TEST PROCEDURE

1. Remove input power to the V275-S machine.
2. Using a 5/16" nut driver, remove the case wraparound cover.
3. Perform the ***Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the input rectifier and associated leads. See Figure F.6.
5. Carefully remove the silicone sealant from output lead terminals 207, 207A, amp 209. See Figure F.6.
6. Using a phillips head screwdriver, remove leads 207, 207A, and 209 from the input rectifier.
7. Use the analog ohmmeter to perform the tests detailed in ***Table F.2.*** See the Wiring Diagram.
8. Visually inspect the three MOV'S for damage (TP1,TP2,TP3). Replace if necessary.

Figure F.6 - Input Rectifier



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INPUT RECTIFIER TEST (CONTINUED)

Table F.2 - Input Rectifier Test Points

TEST POINT TERMINALS		ANALOG METER X10 RANGE
+ PROBE	**- PROBE**	**Acceptable Meter Readings**
A	Front Terminal 207A	Greater than 1000 ohms
B	Front Terminal 207A	Greater than 1000 ohms
C	Front Terminal 207A	Greater than 1000 ohms
A	Center Terminal 207	Greater than 1000 ohms
B	Center Terminal 207	Greater than 1000 ohms
C	Center Terminal 207	Greater than 1000 ohms
A	Rear Terminal 209	Less than 100 ohms
B	Rear Terminal 209	Less than 100 ohms
C	Rear Terminal 209	Less than 100 ohms
Front Terminal 207A	A	Less than 100 ohms
Front Terminal 207A	B	Less than 100 ohms
Front Terminal 207A	C	Less than 100 ohms
Center Terminal 207	A	Less than 100 ohms
Center Terminal 207	B	Less than 100 ohms
Center Terminal 207	C	Less than 100 ohms
Rear Terminal 209	A	Greater than 1000 ohms
Rear Terminal 209	B	Greater than 1000 ohms
Rear Terminal 209	C	Greater than 1000 ohms

9. If the input rectifier does not meet the acceptable readings outlined in Table F.2 the component may be faulty. Replace

   Note: Before replacing the input rectifier, check the input power switch and perform the ***Main Switch Board IGBT Resistance Test.*** Also check for leaky or faulty filter capacitors.

10. If the input rectifier is good, be sure to reconnect leads 207, 207A, and 209 to the correct terminals and torque to 31 inch lbs. Apply silicone sealant.

11. If the input rectifier is faulty, see the ***Input Rectifier Bridge Removal & Replacement*** procedure.

12. Replace the case wraparound cover.

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OUTPUT DIODE MODULES TEST

(Below code 11250 only)

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

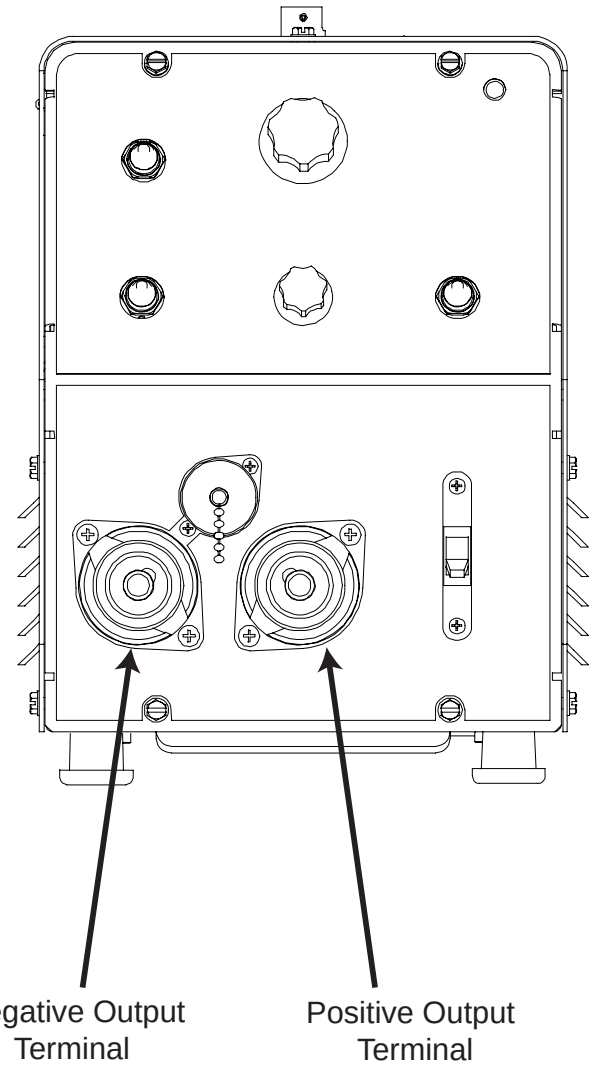
This test will help determine if any of the output diodes are “shorted”.

MATERIALS NEEDED

Analog Voltmeter/Ohmmeter
5/16” Nut Driver
Wiring Diagram

OUTPUT DIODE MODULES TEST *(continued)* (Below code 11250 only)

FIGURE F.7 - Machine Output Terminals



TEST PROCEDURE

1. Remove input power to the V275-S.
2. Locate the output terminals on the front panel of the machine. See Figure F.7.
3. Remove any output cables and load from the output terminals.
4. Using the analog ohmmeter test for more than 200 ohms resistance between positive and negative output terminals. Positive test lead to the positive terminal; Negative test lead to the negative terminal. ***See Figure F.8.***

NOTE: The polarity of the test leads is most important. If the test leads polarity is not correct, the test will have erroneous results.

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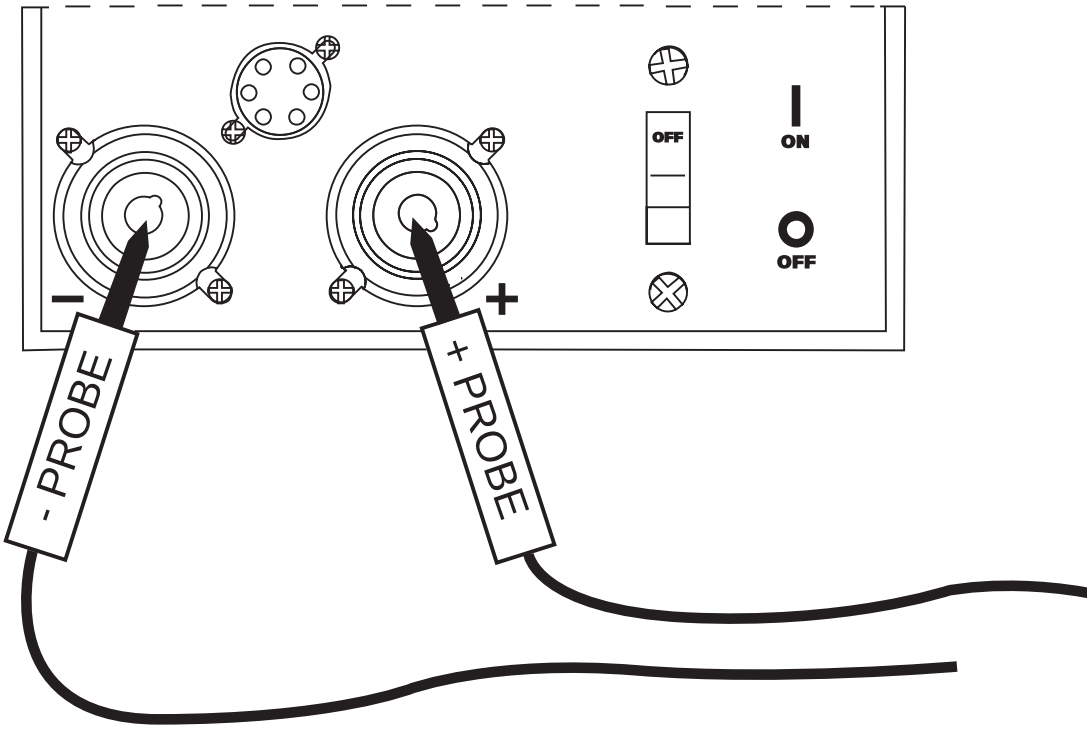
OUTPUT DIODE MODULES TEST *(continued)* (Below code 11250 only)

Figure F.8 - Terminal Probes



5. If 200 ohms is measured then the output diodes are not “shorted”.

   NOTE: There is a 200 ohm resistance across the welding output terminals. See Wiring Diagram.

6. If less than 200 ohms is measured, one or more diodes or the snubber board may be faulty.

   NOTE: This test checks for shorted diodes only.

7. Using a 5/16” nut driver remove the case wraparound cover.

8. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.

9. Locate the output diode modules and snubber board. ***See Figure F.9.***

10. Test all output diode modules individually.

    NOTE: This may require the disassembly of the leads and the snubber board from the diode modules. Refer to the ***Output Diode Modules Removal and Replacement Procedure*** for detailed instructions.

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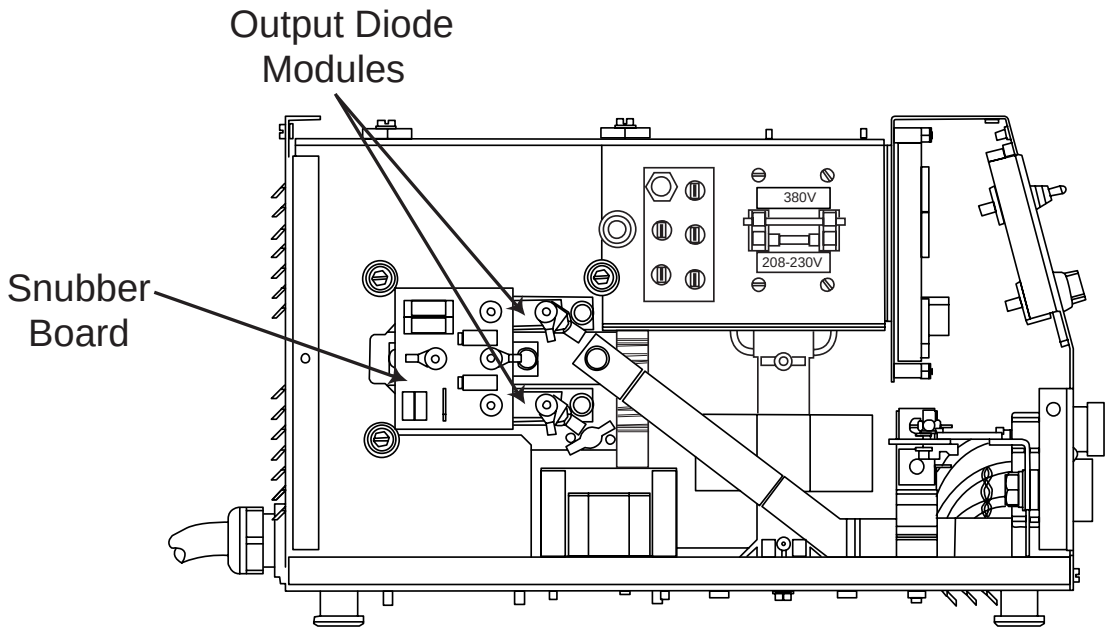
Figure F.9 - Snubber and Output Diode Locations



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AUXILIARY TRANSFORMER TEST

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

This procedure will determine if the correct voltage is being applied to the primary of auxiliary transformer and also if the correct voltage is being induced on the secondary windings of the transformer.

MATERIALS NEEDED

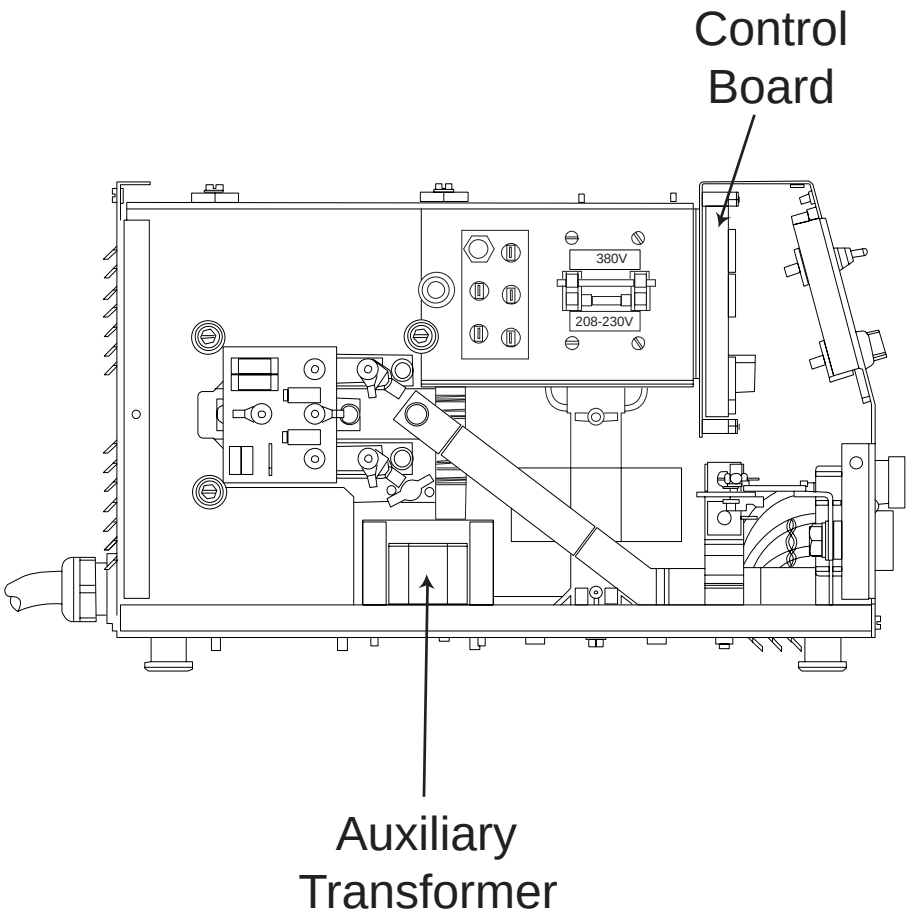
Volt-ohmmeter (Multimeter)

5/16” Nut Driver

Wiring Diagram

AUXILIARY TRANSFORMER TEST *(continued)*

FIGURE F.10 - Auxiliary Transformer



TEST PROCEDURE

1. Remove input power to the V275-S.
2. Using a 5/16" nut driver, remove the case wraparound cover.
3. Perform the ***Input Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the auxiliary transformer. See Figure F.10.
5. Locate leads 387 and 388 and also plug J2 pins 1 and 2. ***See Figures F.11 and F.12.***
6. Carefully apply the correct input power to the V275-S.
7. Make sure the reconnect jumper "A" and reconnect switches are configured correctly for the input voltage being applied to the machine.
8. Carefully check for the presence of 18VAC at plug J2 pin 1 (lead 387) to pin 2 (lead 388).

   NOTE: The secondary voltage may vary if the input line voltage varies.
9. If the 18VAC is present the auxiliary transformer is functioning properly.
10. If the 18VAC is not present check the 0.6 amp fuse in the transformers primary circuit. See the Wiring Diagram.
11. Also make certain that the correct input voltage is being applied to the transformer and the wiring is not loose or faulty. See the Wiring Diagram.
12. If the correct primary voltage is being applied to the auxiliary transformer but the 18VAC secondary voltage is NOT present the transformer may be faulty.

Return to Section TOC
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AUXILIARY TRANSFORMER TEST *(continued)*

FIGURE F.11 - Plug J2 Location on the Control Board

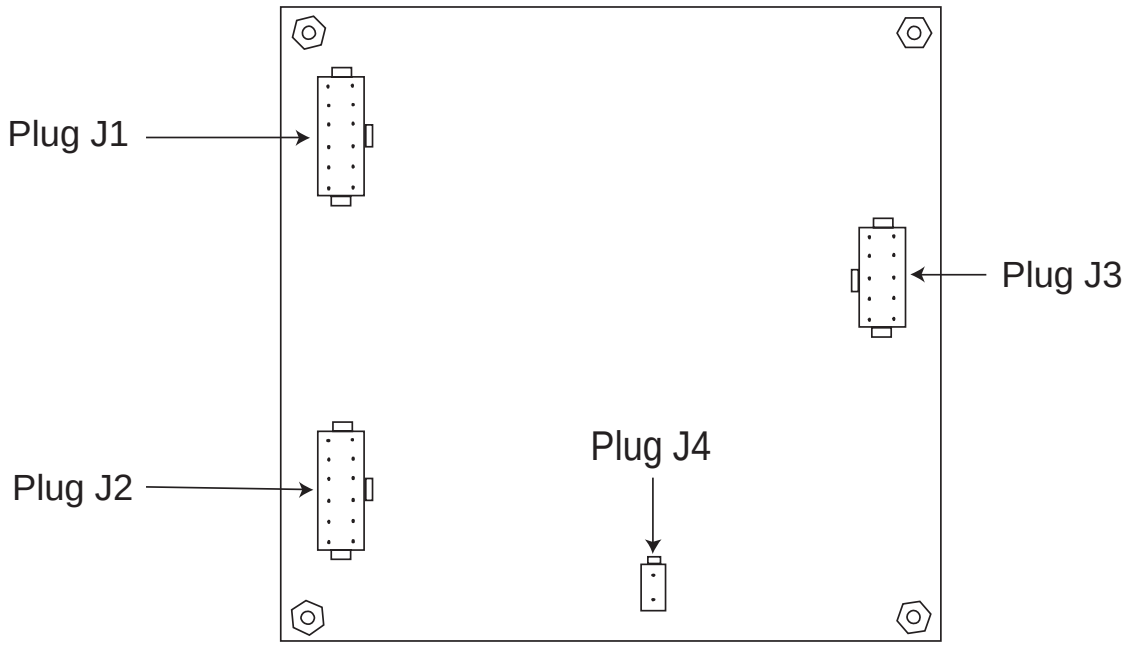
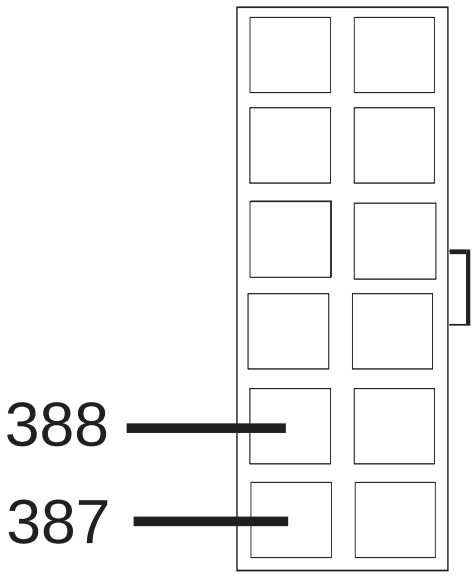


FIGURE F.12 - Plug J2



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TROUBLESHOOTING AND REPAIR

OUTPUT CURRENT SHUNT TEST

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

This test will help determine if the output current shunt and associated wiring are functioning correctly.

MATERIALS NEEDED

Volt-ohmmeter

5/16” Nut Driver

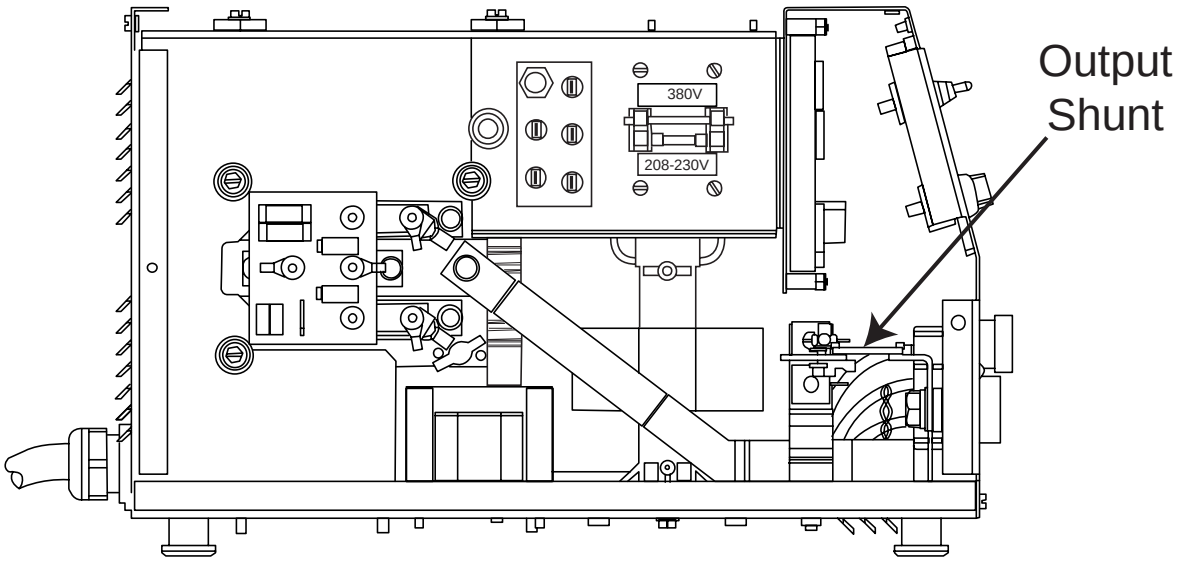
Grid Bank

External DC Ammeter

TROUBLESHOOTING AND REPAIR

OUTPUT CURRENT SHUNT TEST *(continued)*

FIGURE F.13 - Output Current Shunt Location



TEST PROCEDURE

1. Remove input power to the V275-S.
2. Using the 5/16" nut driver, remove the case wraparound cover.
3. Perform the ***Input Capacitor Discharge Procedure.***
4. Locate plug J2 on the control board. Do not remove the plug from the P.C. board. ***See Figure F.14.***
5. Locate the output shunt. See Figure F.13.
6. Apply the correct input voltage to the V275-S.
7. Apply a 200 amp resistance grid load to the output terminals.
8. Verify the 200 amp load with the external DC ammeter.
9. Carefully measure the voltage drop across the shunt. With a 200 amp load the voltage across the output shunt should be 100MV.
10. Reduce the 200 amp load to 100 amps. The voltage across the output shunt should be 50MV.
11. This voltage should also be present at plug J4 pin 2 (lead W221+) to plug J4 pin 1 (lead R222-). ***See Figure F.15.***
12. Make sure the connections are tight and the leads are in the correct pin locations in plug J4. ***See Figure F.14.*** See the Wiring Diagram.
13. If the voltages across the output shunt are not correct the output shunt may be faulty.
14. Remove the input power to the V275-S machine.
15. Replace the case wraparound cover.

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Return to Master TOC

Figure F.14 - Control Board

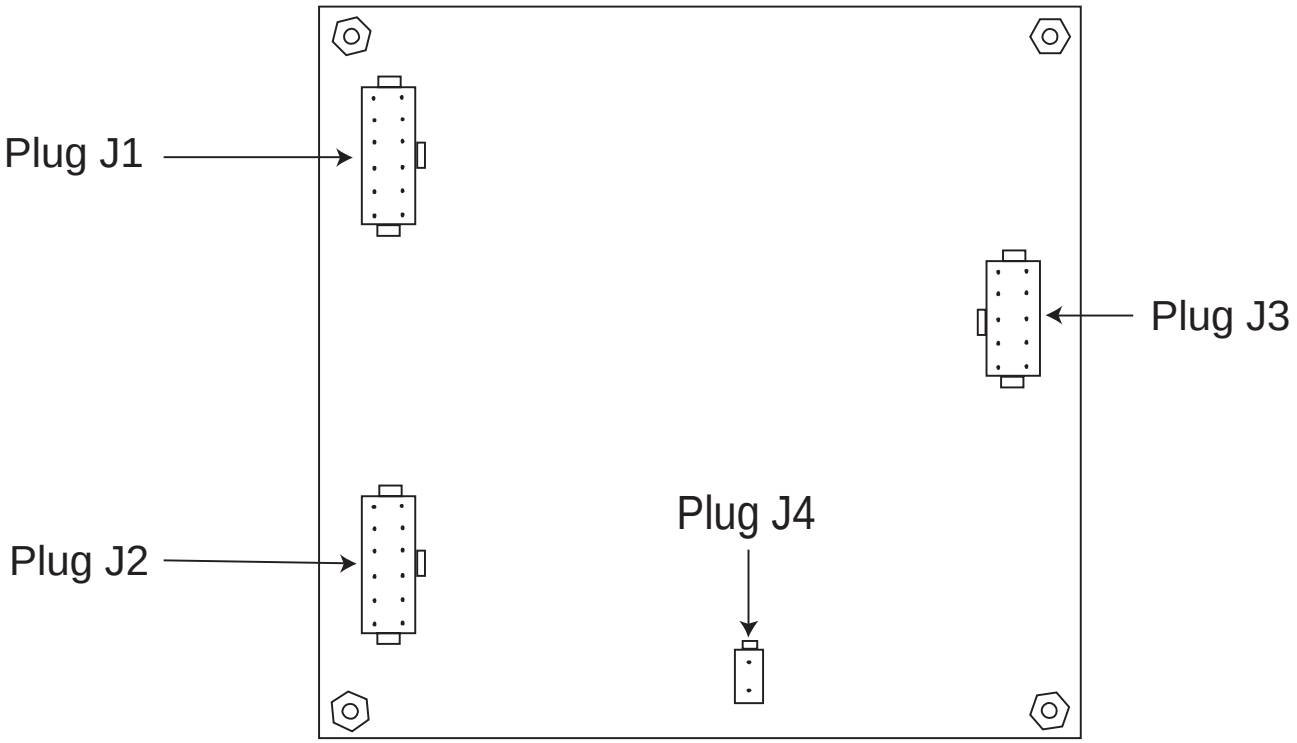
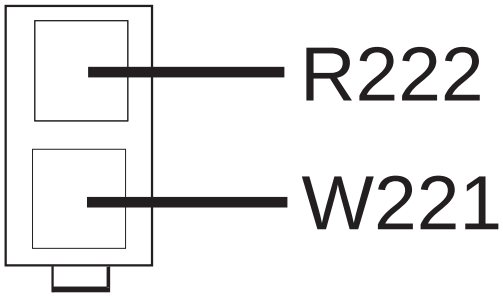


Figure F.15 - Plug J4



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FAN CONTROL AND MOTOR TEST

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

The cooling fans on the V275-S operate once the 15 amps of welding current is drawn from the output terminals and for 7 minutes after the output current has stopped flowing. The fans will also run anytime the machine has an over heated condition. This test will help determine if the fan motor(s) and fan relay(s) are functioning correctly.

MATERIALS NEEDED

Voltmeter

5/16” Nut Driver

Wiring Diagram

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

TROUBLESHOOTING AND REPAIR

FAN CONTROL AND MOTOR TEST *(continued)*

TEST PROCEDURE

1. Using a 5/16" nut driver, remove the case wrap-around cover.
2. Run a jumper at the control board from 382 on plug J2 to R222 on plug J4. ***See Figure F.18.***

NOTE: The fan motor should run. This step energizes the CR1 fan relay. CR1 contact applies 230VAC to the two fans. Make sure both fans are running.

3. Perform the ***Input Filter Discharge Procedure*** detailed earlier in this section.
4. Locate the thermostat on the output diode module heatsink. See Figure F.16.

NOTE: This step will imitate an overheated condition and should prompt the fan motors to run when the input power is applied. If the fan motors operate normally, the fan motors and the fan relay are functioning correctly. If the fan motors do not operate, continue to the next step. If the fan motors operate during an over heated condition but do not operate when a minimum of 15 amps is drawn from the output terminals, the control board may be faulty.

5. Locate plug J2 leads 383+ and 382- on the control board. ***See Figures F.17 & F.18.***
6. With the thermostat lead still removed check for approximately 10-12VDC from lead 383+ to lead 382-. If this voltage is correct, remove the input power. If this voltage is not present, the control board may be faulty. Remove the input power. ***See Figure F.18.***
7. Remove plug J2 from the control board and check the resistance of the fan relay coil. Normal resistance is approximately 82 ohms. If the coil resistance is very low, the coil may be shorted. If the resistance is very high or infinite, the coil of associated leads may be faulty. See the Wiring Diagram. ***See Figure F.17.***
8. If the coil resistance is normal, the fan relay contacts may be faulty or the fan motors may be faulty. Make sure that 230VAC is being applied to the fan motors. See the Wiring Diagram.
9. Replace the thermostat lead previously removed.
10. Replace Plug J2.
11. Replace the case wraparound cover.

FIGURE F.16 - Thermostat Location

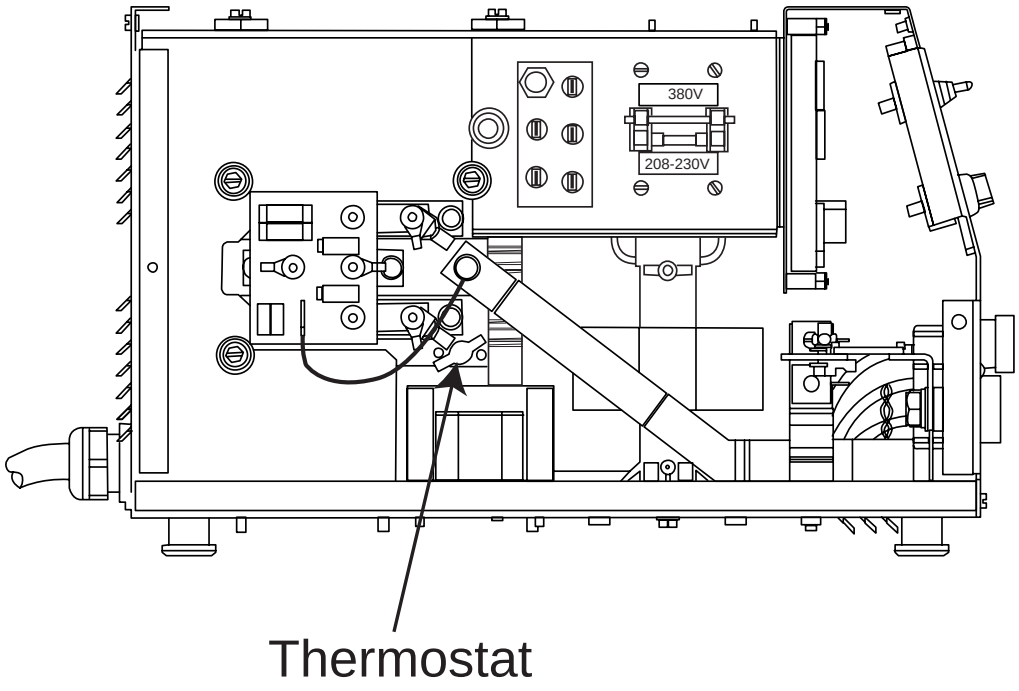

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FIGURE F.17 - Plug J2 Location on Control Board

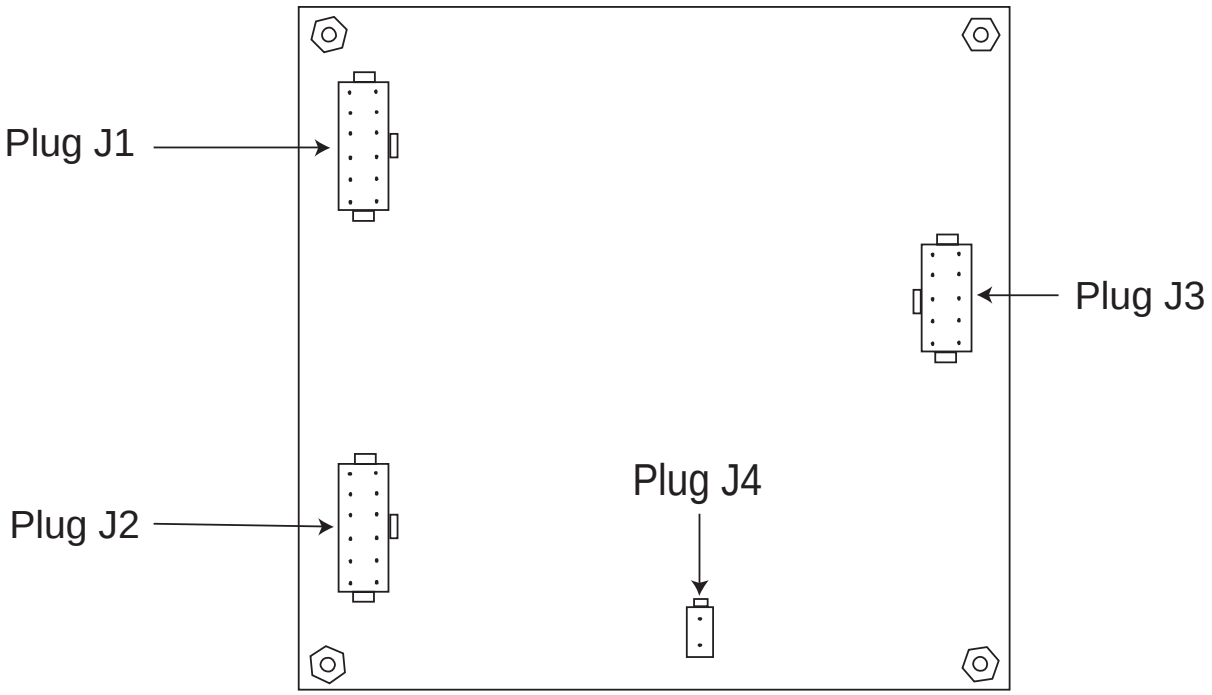
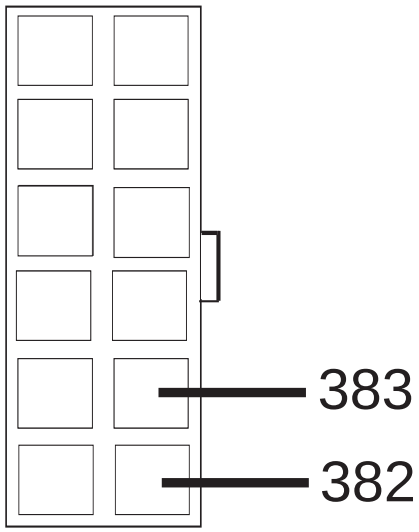


Figure F.18 - Plug J2



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TROUBLESHOOTING AND REPAIR

CONTROL BOARD TEST

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

This test will help determine if the primary operations of the control board are functioning properly.

MATERIALS NEEDED

Volt/Ohmmeter (Multi-meter)

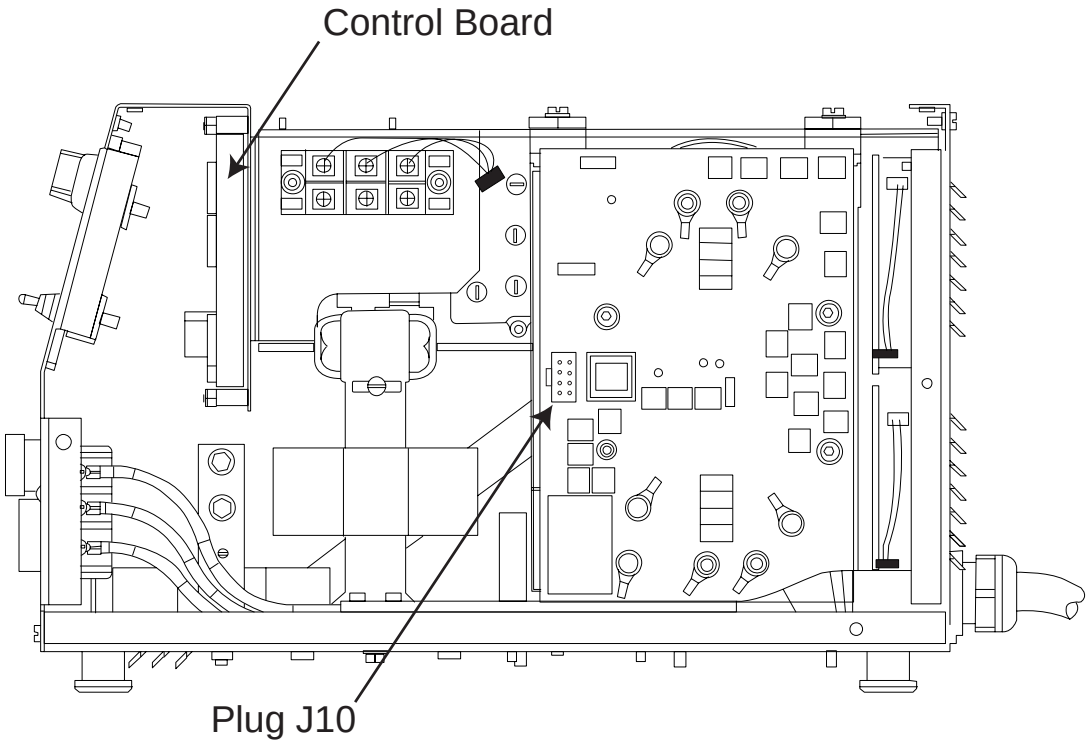
5/16” Nut Driver

Wiring Diagram

TEST PROCEDURE

1. Remove input power to the V275-S machine.
2. Using a 5/16” nut driver, remove the case wrap-around cover.
3. Perform the ***Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate plug J2 on the control board and disconnect it. ***See Figure F.20.***
5. Apply the correct input power to the V275-S and carefully check for the presence of 18VAC from J2 pin 1 (lead 387) to pin 2 (lead 388). This is the AC supply from the auxiliary transformer. If this voltage is not correct, perform the ***Auxiliary Transformer Test*** and check associated wiring. See the wiring diagram. Remove input power and reconnect plug J2 into the control board. ***See Figure F.21.***
6. Locate plug J10 on the main switch board. See Figure F.19.
7. Disconnect plug J10 from the switch board.
8. Carefully install a jumper wire from pin 7 (lead 313) to pin 1 (lead 311). This will send a signal to the control board that there are not any faults being detected on the switch board from the input capacitors. ***See Figure F.22.***
9. Set the Mode switch to the Stick position and the Local/Remote switch to the Local position.
10. Install a 10K ohm resistor from plug J10 pin 8 (lead 307) to pin 4 (lead 310).

FIGURE F.19 - Control Board & Plug J10 Location



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11. The following checks will verify that the control board is generating output signals to the switch board.
12. Apply the correct input power to the V275-S.
13. Check for the presence of approximately 12VDC across the 10K ohm resistor. This is the voltage generated at the control board to energize the precharge relay on the switch board. If this voltage is not present, the control board may be faulty. See the wiring diagram.
14. Check for the presence of 30KHZ from plug J10 pin 2 (Lead 308) to pin 6 (Lead 309). This is the pulse width modulation (PWM) signal from the control board to the switch board. See the wiring diagram. If this signal is not present the control board may be faulty.
15. Remove the above mentioned resistor and jumper wire.
16. Install plug J10 into the switch board.
17. Replace the case wraparound cover.

FIGURE F.20 - Plug J2 Location

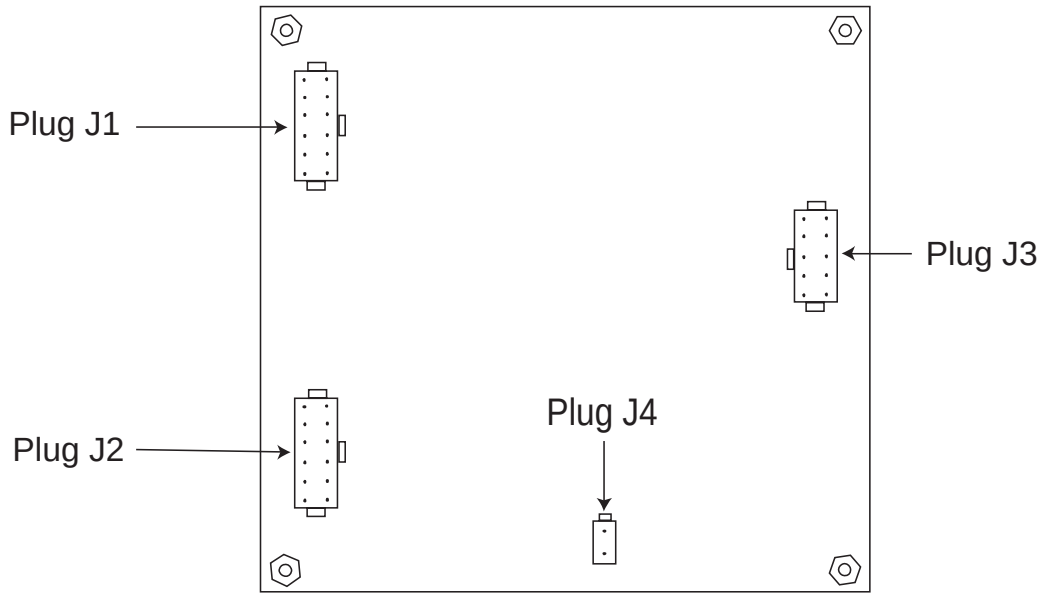


FIGURE F.21 - Plug J2 (on control board)

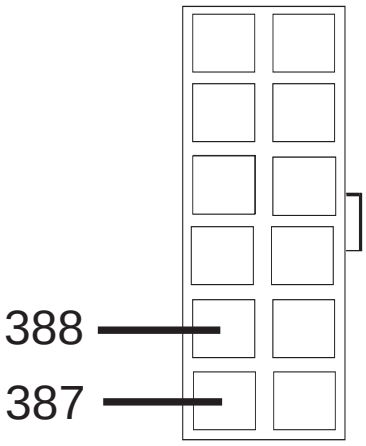
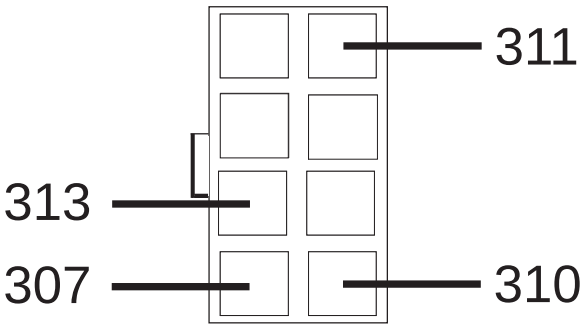


FIGURE F.22 - Plug J10 (on main board)



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MAIN SWITCH BOARD REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed by only 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 or 1-888-935-3877.

DESCRIPTION

The following procedure will aid the technician in removing the main switch board for replacement.

MATERIALS NEEDED

5/16” Nut driver

7/16” Nut Driver

3/16” Allen Wrench

Wiring Diagram

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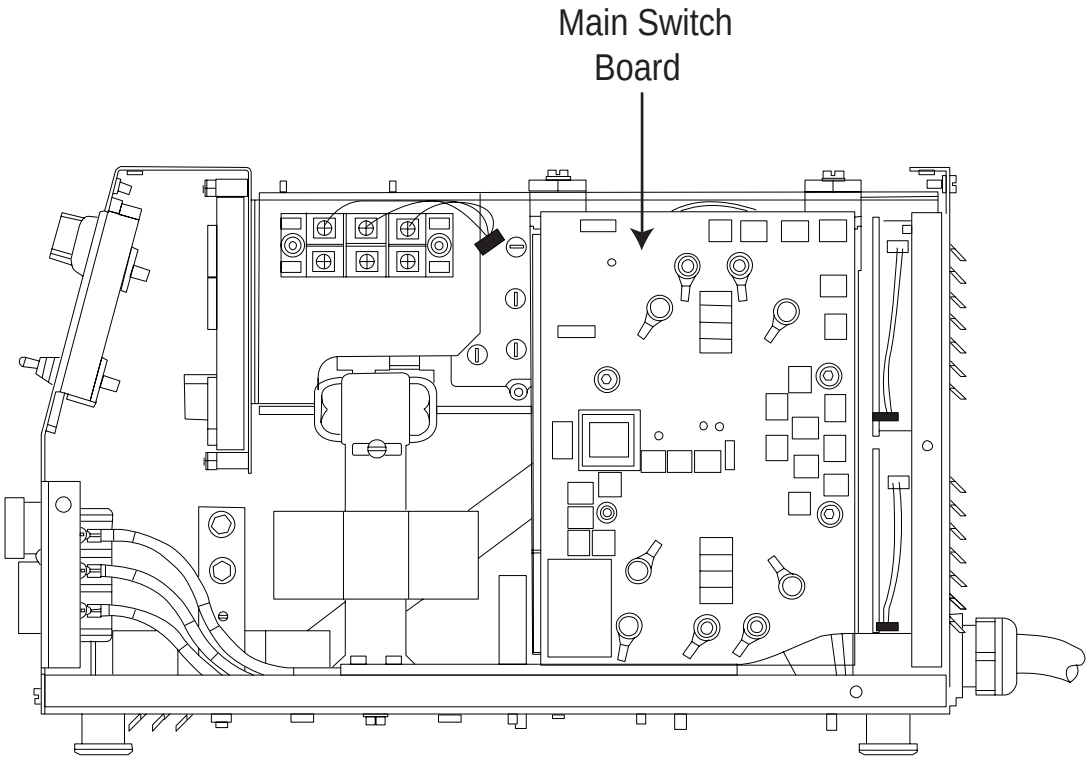
MAIN SWITCH BOARD REMOVAL & REPLACEMENT *(continued)*

FIGURE F.23 – Main Switch Board Location



PROCEDURE

1. Remove input power to the V275-S.
2. Using a 5/16” nut driver, remove the case wraparound cover.
3. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the main switch board. See Figure F.23.
5. Carefully disconnect plug J10 from the main switch board. ***See Figure F.24.***
6. Label leads and using a 7/16” nut driver, disconnect leads 201, 202A, 203A, 207, 204, 205, 206, 208, 209. Note washer positions for replacement. ***See Figure F.24.***
7. Using a 3/16” allen wrench, remove the four main switch board mounting screws. ***See Figure F.24.***
8. Carefully maneuver the board out of the machine. Replace.
9. Clean all contact surfaces.
10. Replace previously removed allen bolt mounting screws. Torque to 50 inch lbs.
11. Replace previously removed leads and torque to 50 inch lbs.
12. Reconnect plug J10.
13. Replace the case wraparound cover.

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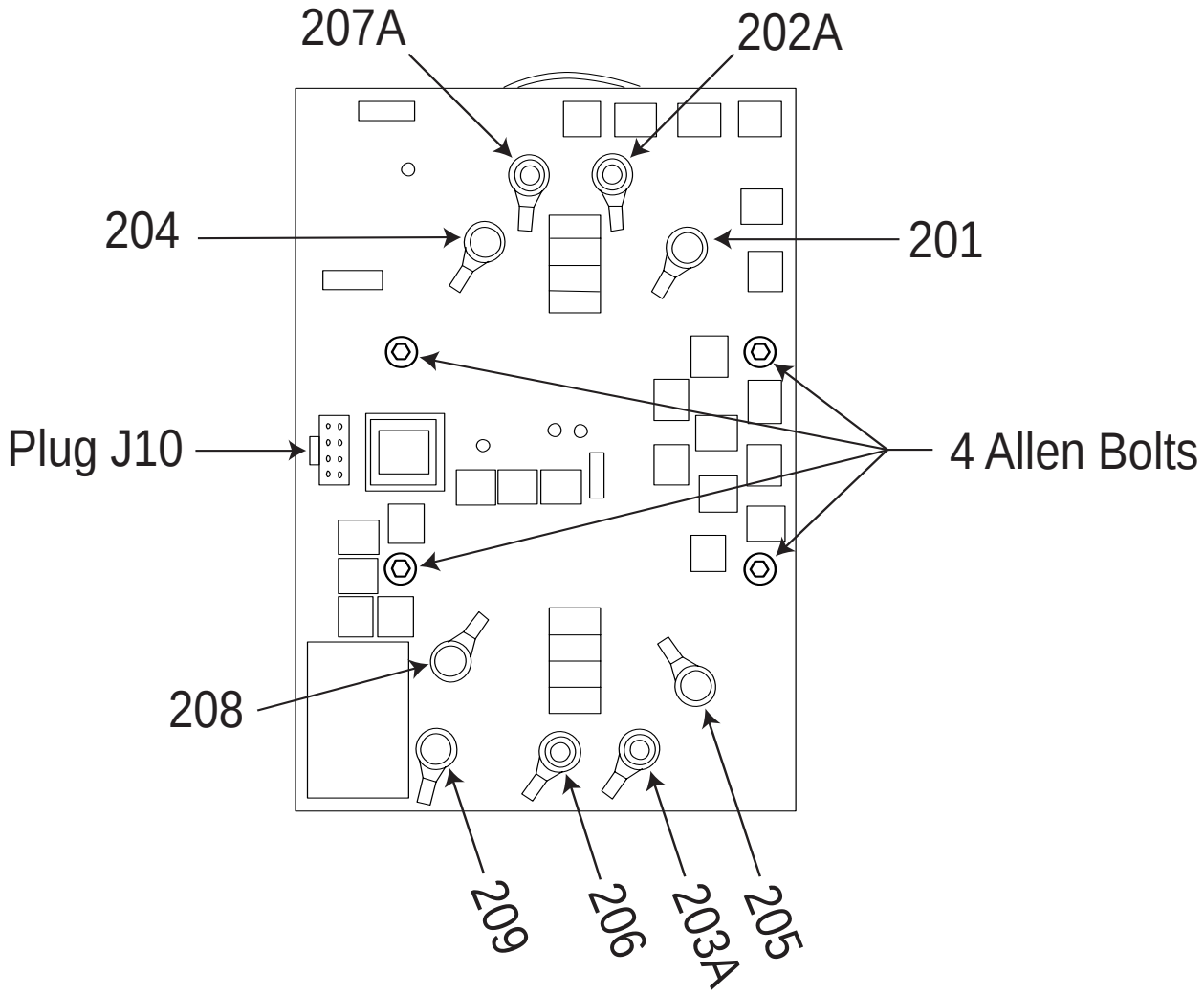
FIGURE F.24 - Main Board Plug and Mounting Screw Locations



Note: Later design Switch Boards are potted and unserviceable. The removal and replacement procedure is still the same.

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CONTROL BOARD REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

The following procedure will aid the technician in removing the control board for replacement.

MATERIALS NEEDED

5/16” Nut Driver

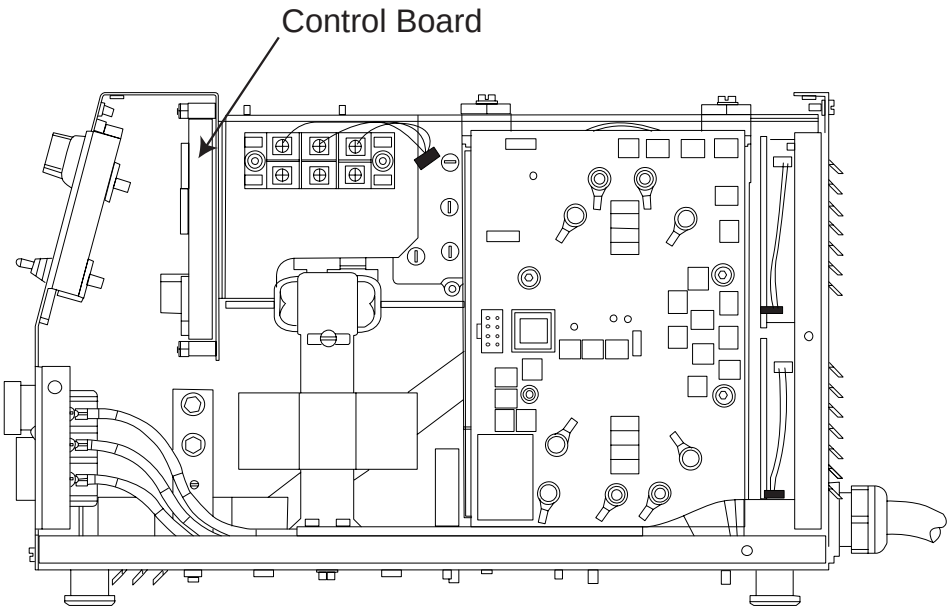
3/8” Nut Driver

Phillips Head Screwdriver

Wiring Diagram

CONTROL BOARD REMOVAL & REPLACEMENT *(continued)*

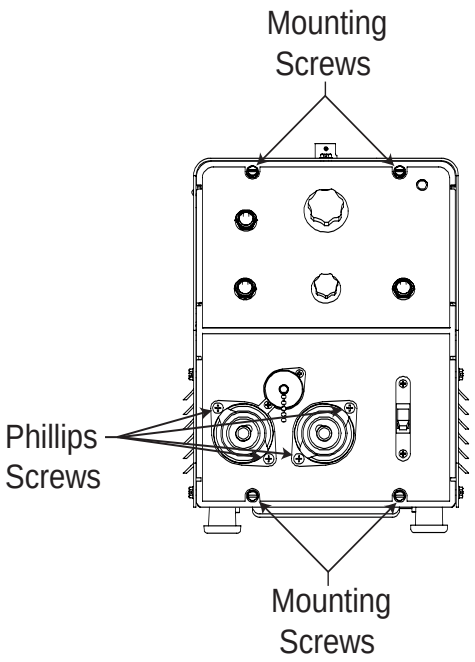
FIGURE F.25 – Control Board Location



PROCEDURE

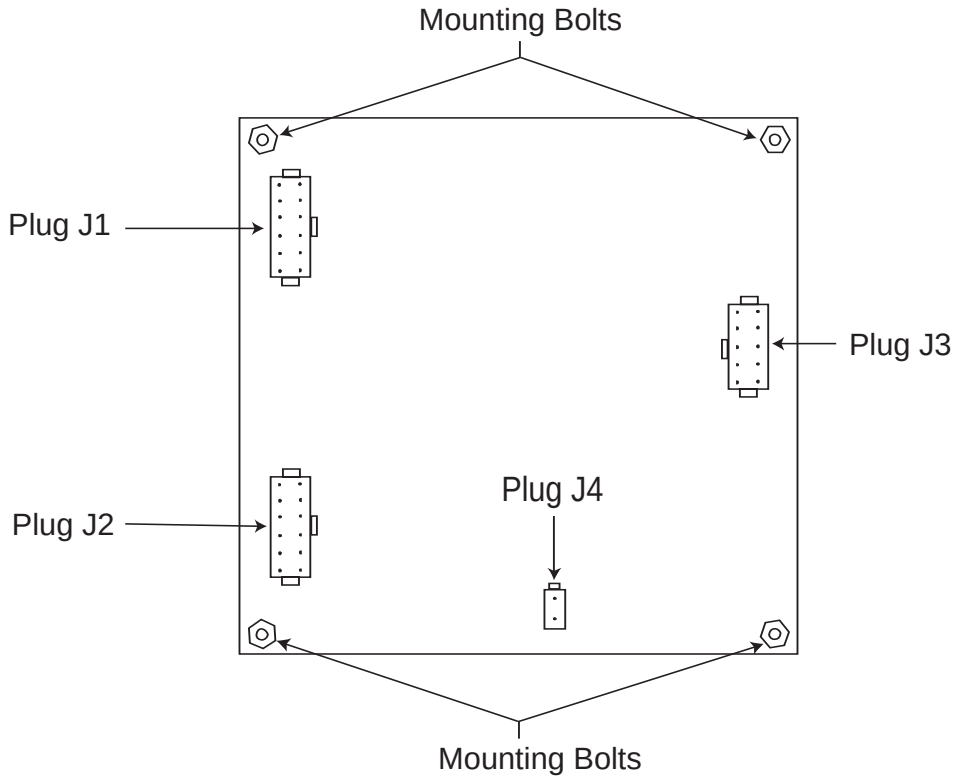
1. Remove the input power to the V275-S.
2. Using a 5/16" nut driver, remove the case wraparound cover.
3. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the control board. See Figure F.25.
5. Using a phillips head screw driver, remove the four screws from around the two output terminals. See Figure F.26.
6. Using a 5/16" nut driver, remove the four screws from the top and bottom of the case front. See Figure F.26.

FIGURE F.26 – Casefront Screw Removal



CONTROL BOARD REMOVAL & REPLACEMENT *(continued)*

FIGURE F.27 - Control Board Plug Location



7. The previous step will allow you to maneuver the casefront around to gain better access to the control board.
8. Label and disconnect plugs J1, J2, J3 & J4. See Figure F.27.
9. Using a 3/8" nut driver, remove the four control board mounting bolts. See Figure F.27.
10. Replace the control board.
11. Mount new board using previously removed mounting bolts.
12. Reconnect previously removed plugs.
13. Replace the four phillips head screws from around the two output terminals.
14. Replace the four 5/16" casefront mounting screws previously removed.
15. Replace the case wraparound cover.

Return to Section TOC
Return to Master TOC

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

SNUBBER BOARD
REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

The following procedure will aid the technician in removing the snubber board for replacement.

MATERIALS NEEDED

5/16” Nut Driver

7/16” Nut Driver

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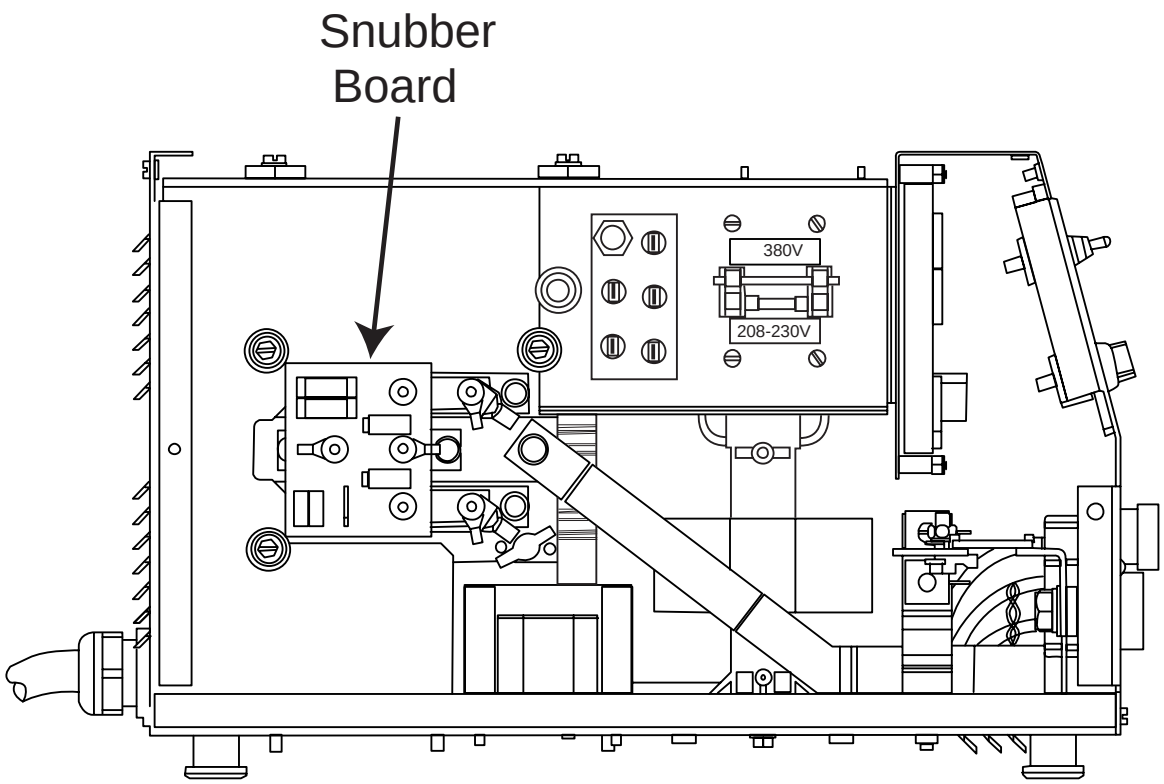
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

SNUBBER BOARD
REMOVAL AND REPLACEMENT *(continued)*

FIGURE F.28 - Snubber Board Location



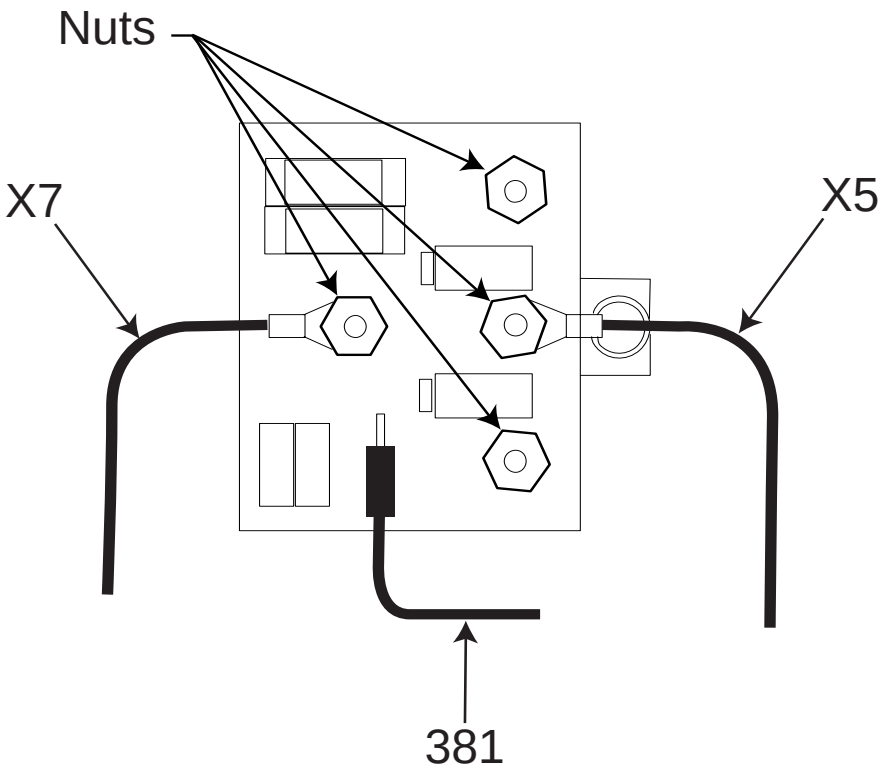
PROCEDURE

1. Remove input power to the V275-S.
2. Using a 5/16" nut driver, remove the case wraparound cover.
3. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the snubber board. See Figure F.28.
5. Using a 7/16" nut driver, remove the four nuts located on the snubber board. Be sure to label all associated leads and washer placement before removal. ***See Figure F.29.***
6. Disconnect lead 381 and remove snubber board. ***See Figure F.29.***
7. Place new snubber board in it's proper location.
8. Reconnect lead 381 previously removed.
9. Replace the four nuts, associated leads and washers previously removed.
10. Replace the case wraparound cover.

Return to Section TOC
Return to Master TOC

SNUBBER BOARD
REMOVAL AND REPLACEMENT *(continued)*

FIGURE F.29 - Snubber Board



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

OUTPUT DIODES REMOVAL AND REPLACEMENT

(Below code 11250 only)

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

The following procedure will aid the technician in removing the output diodes for replacement.

MATERIALS NEEDED

5/16” Nut Driver

7/16” Nut Driver

9/64” Allen Wrench

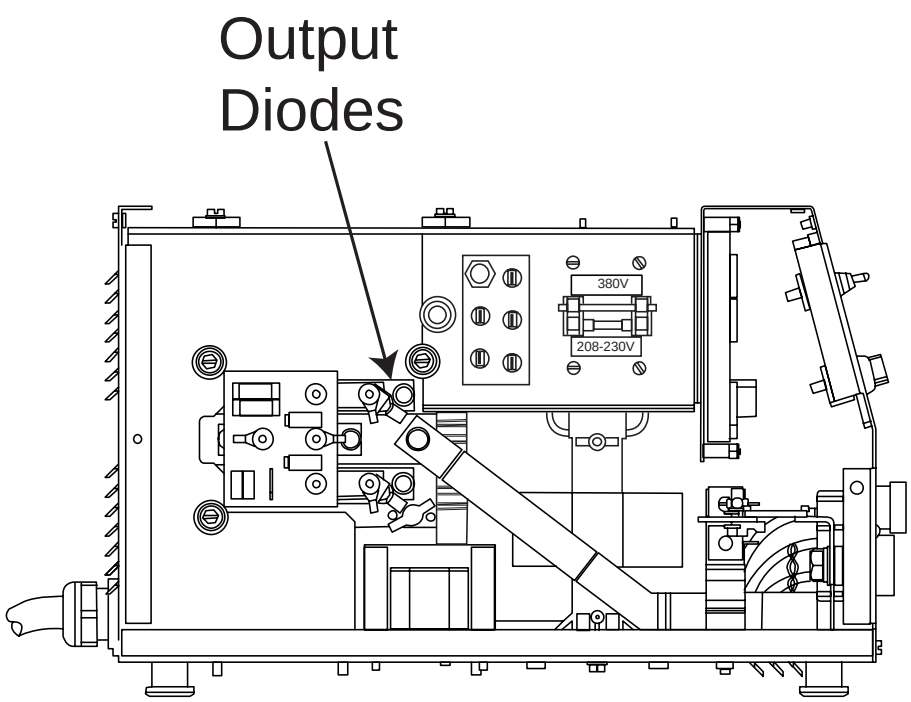
Heatsink Compound

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

OUTPUT DIODES REMOVAL AND REPLACEMENT *(continued)*

(Below code 11250 only)

FIGURE F.30 - Output Diode Location



PROCEDURE

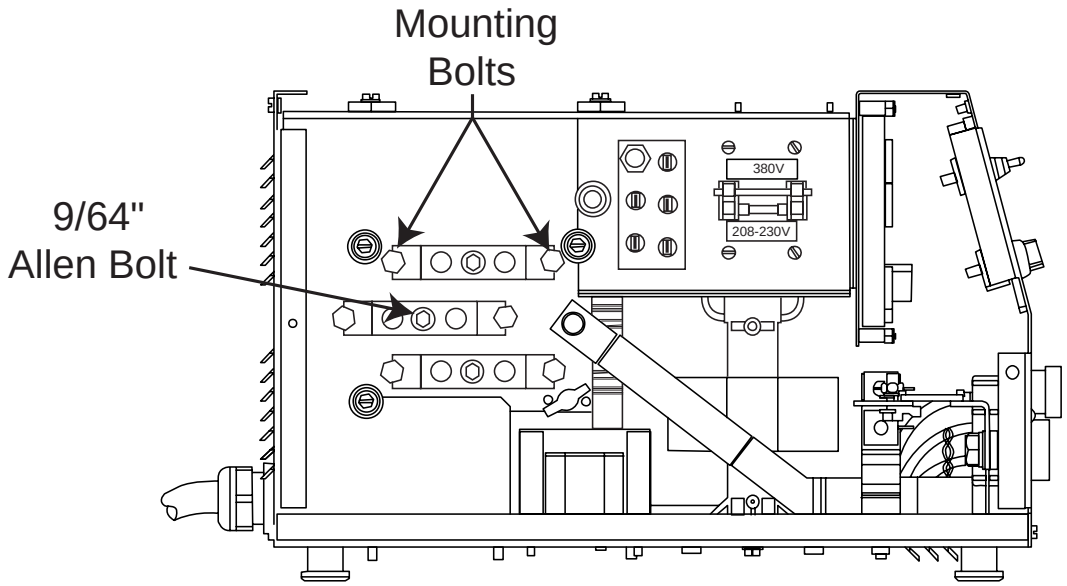
1. Remove input power to the V275-S.
2. Using a 5/16” nut driver, remove the case wrap-around cover.
3. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the output diodes. See Figure F.30.
5. Perform the ***Snubber Board Removal Procedure*** detailed earlier in this section.
6. Using a 7/16” nut driver, disconnect leads 8X and X1. Note washer placement upon removal. ***See Figure F.31.***
7. Using a 7/16” nut driver, remove heavy leads 9X and X3. Note washer placement upon removal. ***See Figure F.31.***
8. Remove the allen bolt located in the center of the output diode using a 9/64” allen wrench. ***See Figure F.31.***
9. Using a 7/16” wrench, remove the mounting bolts from either end of the faulty output diode. Replace.
10. Before replacing the diode module, apply a thin layer of Penetrox A-13 heatsink compound to the bottom surface of the diode module. Be sure to keep the compound away from the mounting holes.
12. Press the module firmly against the sink while aligning the mounting holes. Insert each outer screw through a spring washer and then a plain washer and into the holes. Start threading all three screws into the heat sink (2 or 3 turns by hand). Do not cross thread the screws.
13. Replace the mounting bolts previously removed. Tighten bolts to between 5 and 10 inch pounds.

Return to Section TOC
Return to Master TOC

OUTPUT DIODES REMOVAL AND REPLACEMENT *(continued)*

(Below code 11250 only)

FIGURE F.31 - Mounting Bolt Locations



14. Tighten the center allen screw to between 12 and 18 inch pounds.

15. Tighten each mounting bolt again (30 to 40 inch pounds this time).

16. Replace previously removed leads to their original terminals and proper positions. Torque bolts to 30-40 inch pounds.

17. Perform the ***Snubber Board Replacement Procedure***.

18. Replace the case wraparound cover

Note: Later design Rectifier Assemblies are potted and unserviceable.

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TROUBLESHOOTING & REPAIR

INPUT RECTIFIER REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

The following procedure will aid the technician in removing the input rectifier for replacement.

MATERIALS NEEDED

5/16” Nut Driver

3/16” Allen Wrench

Phillips Head Screwdriver

Heatsink Compound

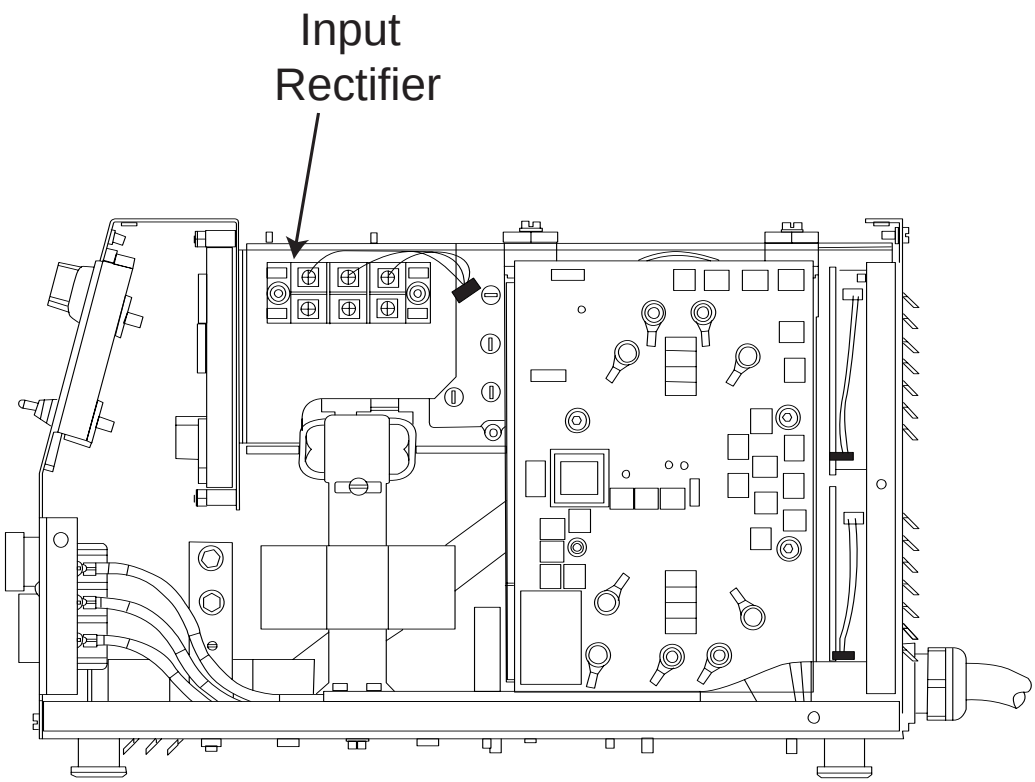
Dow Corning 340

INPUT RECTIFIER REMOVAL AND REPLACEMENT *(continued)*

PROCEDURE

1. Remove input power to the V275-S.
2. Using a 5/16” nut driver, remove the case wrap-around cover.
3. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the input rectifier. See Figure F.32.

FIGURE F.32 - Input Rectifier Location



5. Carefully remove the Dow Corning 340 that is insulating the terminals of the input rectifier.
6. Label leads and using a phillips head screwdriver, remove the six leads from the input rectifier. ***See Figure F.33.***
7. Using a 3/16” allen wrench, remove the two input rectifier mounting screws. ***See Figure F.33.***
8. When replacing the input rectifier be sure to apply a thin layer of heatsink compound to all contact surfaces.
9. Replace the to 3/16” allen screws previously removed.
10. Replace the six phillips head screws securing the leads to the input rectifier. See a wiring diagram if necessary.
11. Liberally apply a coating of Dow Corning 340 to the input rectifier terminals and their leads.
13. Replace the case wraparound cover.

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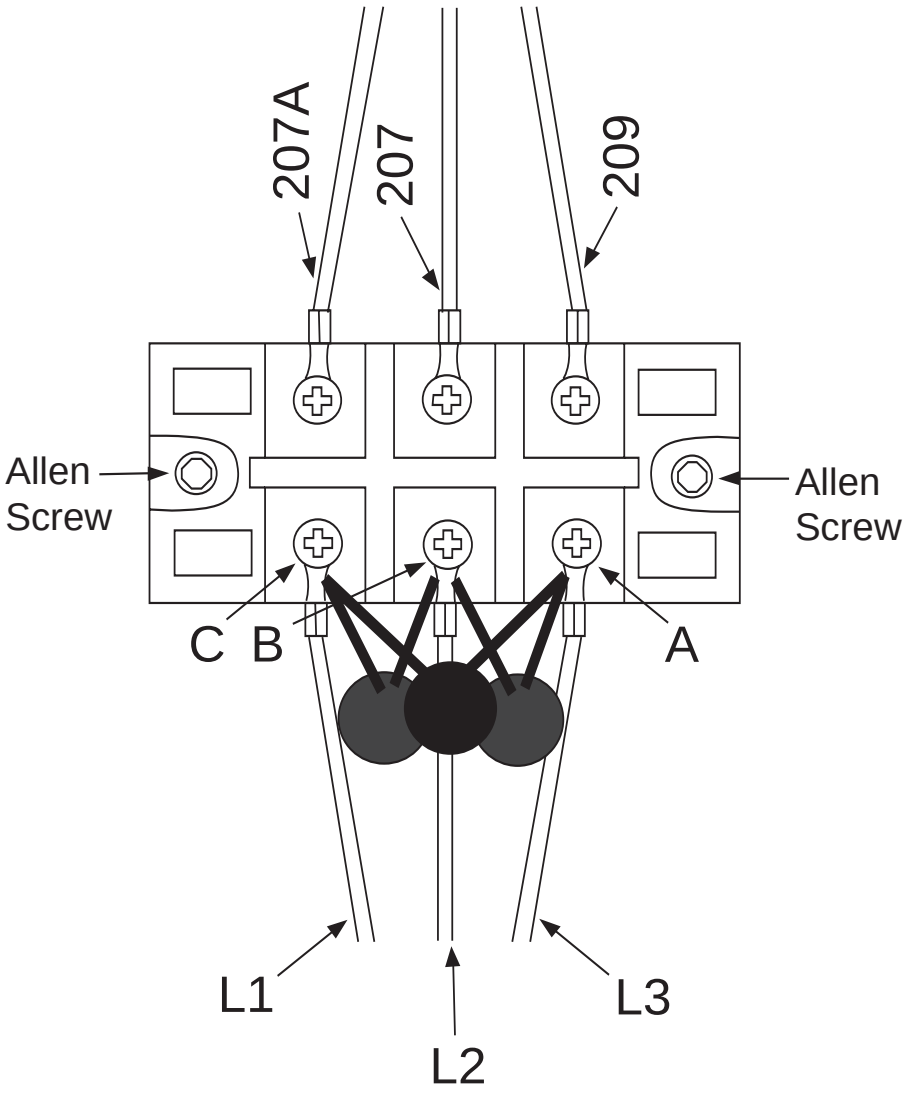
Return to Section TOC
Return to Master TOC

INPUT RECTIFIER REMOVAL AND REPLACEMENT *(continued)*

FIGURE F.33 - Input Rectifier Lead Locations



Return to Section TOC
Return to Master TOC

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

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TROUBLESHOOTING & REPAIR

FANS REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed by only 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.

DESCRIPTION

The following procedure will aid the technician in removing the fans for replacement.

MATERIALS NEEDED

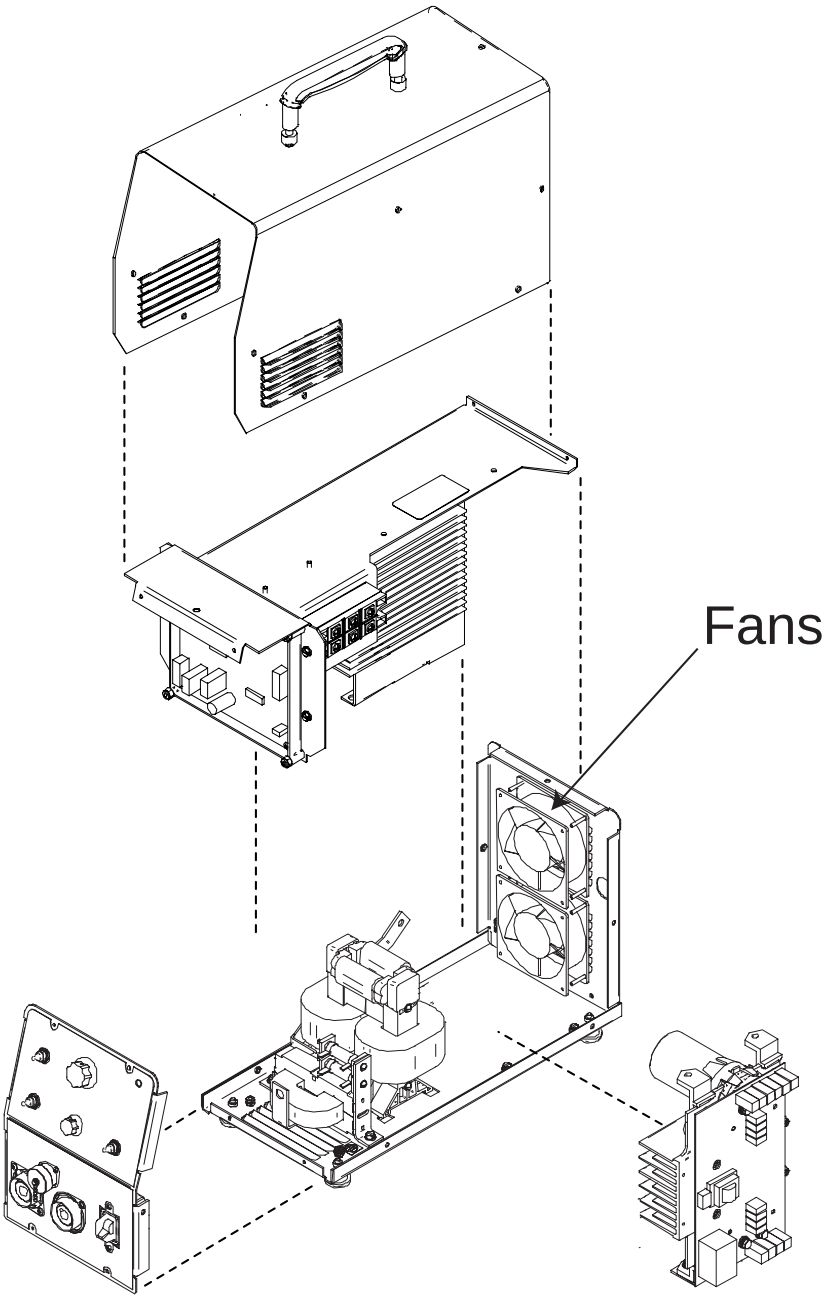
1/4” Nut Driver

5/16” Nut Driver

Phillips Head Screwdriver

FANS REMOVAL AND REPLACEMENT *(continued)*

Figure F.34 - Fans Location



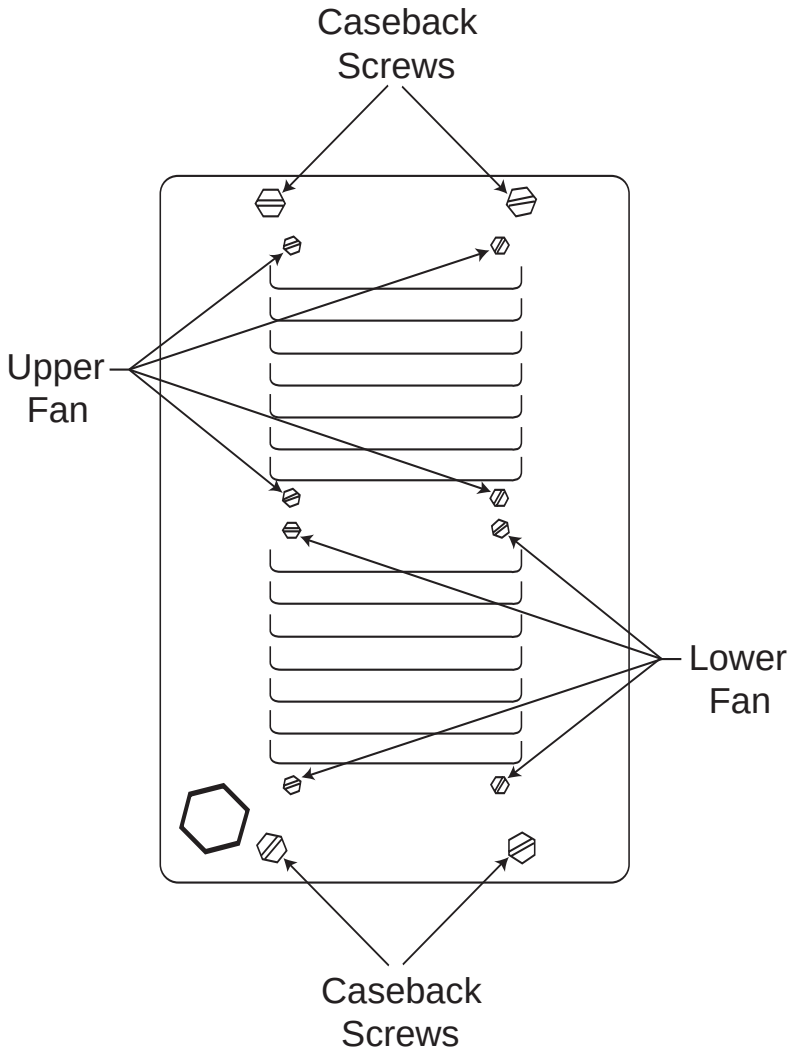
PROCEDURE

1. Remove input power to the V275-S.
2. Using a 5/16” nut driver, remove the case wrap-around cover.
3. Perform the ***Input Filter Capacitor Discharge Procedure*** detailed earlier in this section.
4. Locate the fans. See Figure F.34.

Return to Section TOC
Return to Master TOC

FANS REMOVAL AND REPLACEMENT *(continued)*

Figure F.35 - Screw Locations



5. Using a 5/16” nut driver remove the four case back mounting screws. See Figure F.35.

7. The case back can now gently be pulled away from the machine to gain access to the fans.

6. Depending upon which fan needs replacement, use a 1/4” nut driver to remove the fan mounting screws. See Figure F.35.

7. If the upper fan is to be removed, disconnect leads H3C and H1C. Remove the fan from the machine.

8. If the lower fan is to be removed, disconnect leads H1D and H3D. Remove the fan from the machine. Note the placement of the fan spacers upon removal. ***See Figure F.36.***

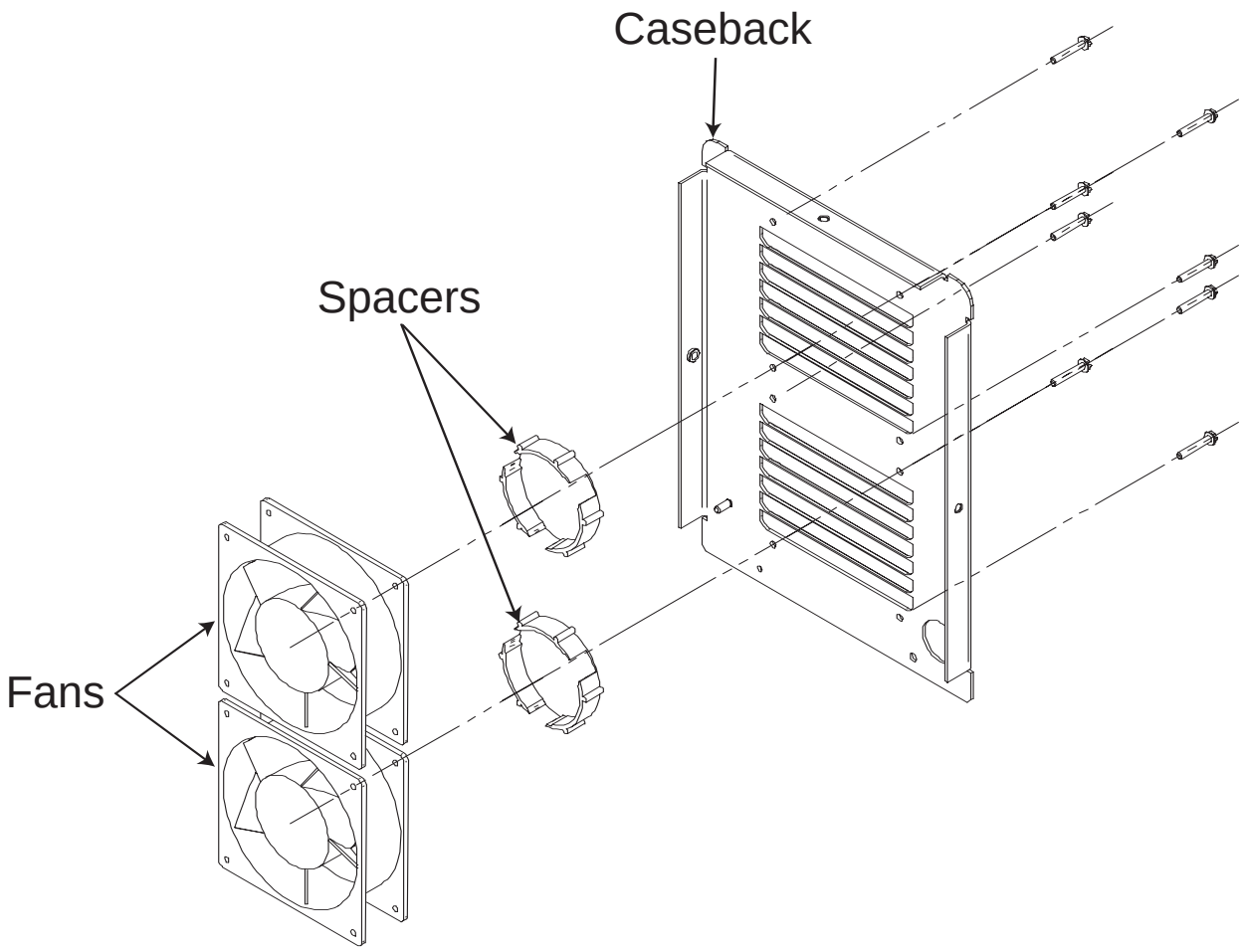
9. Reconnect previously removed leads to the new fan.

10. While positioning the fan spacers correctly, mount the new fan using the four mounting screws previously removed. See Figure F.35.

Return to Section TOC
Return to Master TOC

FANS REMOVAL AND REPLACEMENT *(continued)*

Figure F.36 - Fan Leads



11. Replace the four case back mounting screws previously removed.
12. Replace the case wraparound cover.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

RETEST AFTER REPAIR

Retest a machine:

If it is rejected under test for any reason that require you to remove any part which could affect the machine's electrical characteristics.

If you repair or replace any electrical components:

IDLE AMPS

Input Volts	Idle Watts
230 VAC	150 Watts
460 VAC	150 Watts
575 VAC	150 Watts

NOTE: The machine's output terminals should be energized with no external load on the machine

FAN AS NEEDED (F.A.N.)

The fans should turn on when the machine's output terminals are energized and a minimum of 15 amps of current is being drawn from the output terminals. The fans should stay on for approximately 7 minutes after the load is removed from the output terminals.

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Return to Section TOC
Return to Master TOC

TABLE OF CONTENTS
ELECTRICAL DIAGRAMS SECTION

* NOTE: Many PC Board Assemblies are now totally encapsulated and are therefore considered to be unserviceable. The Assembly drawings are provided for reference only.

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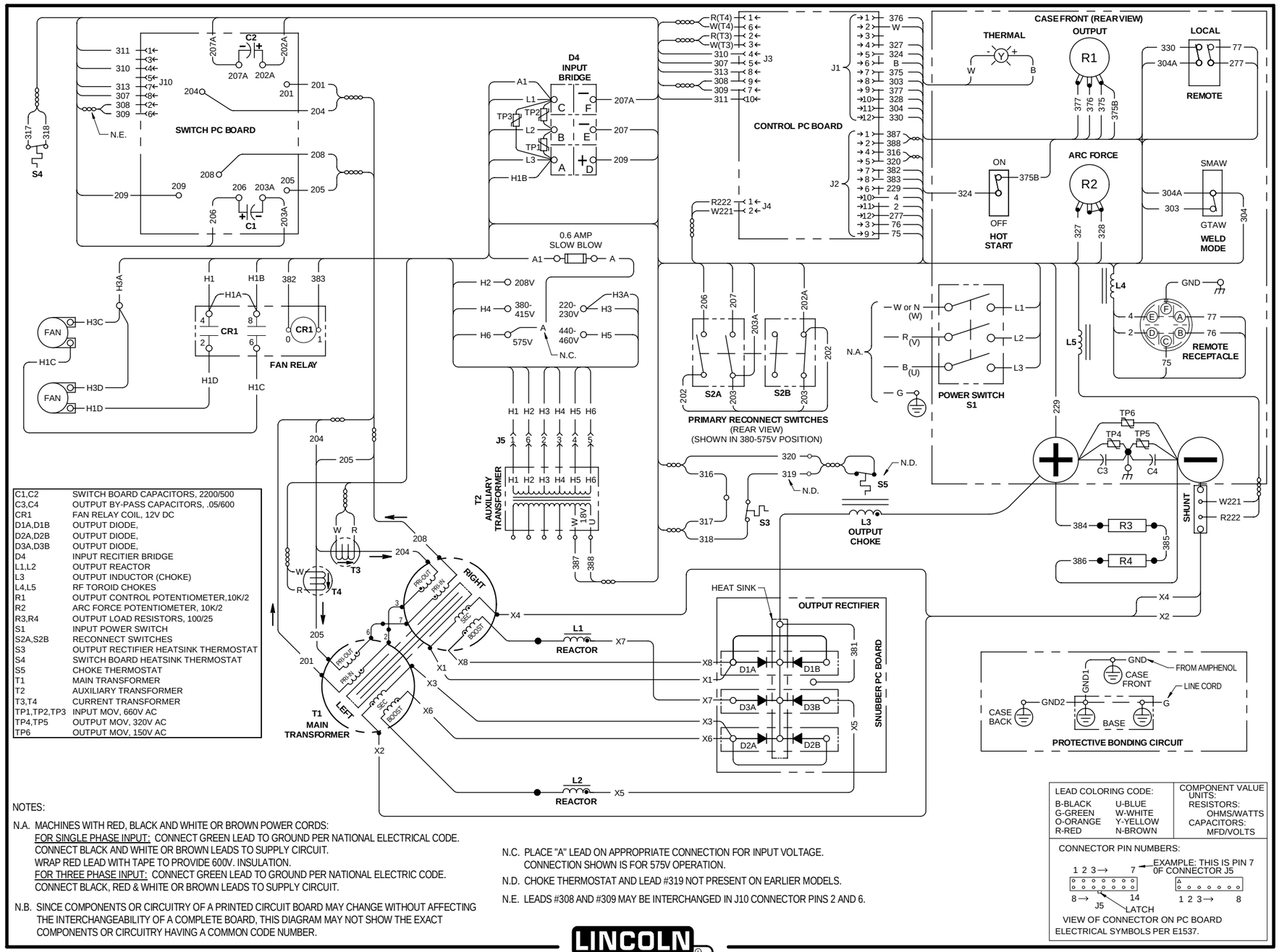
Return to Section TOC
Return to Master TOC

WIRING DIAGRAM - ENTIRE MACHINE - CODE 10993, 11001

WIRING DIAGRAM - INVERTEC V275-S



C1,C2	SWITCH BOARD CAPACITORS, 2200/500
C3,C4	OUTPUT BY-PASS CAPACITORS, .05/600
CR1	FAN RELAY COIL, 12V DC
D1A,D1B	OUTPUT DIODE,
D2A,D2B	OUTPUT DIODE,
D3A,D3B	OUTPUT DIODE,
D4	INPUT RECITIER BRIDGE
L1,L2	OUTPUT REACTOR
L3	OUTPUT INDUCTOR (CHOKE)
L4,L5	RF TOROID CHOKES
R1	OUTPUT CONTROL POTENTIOMETER,10K/2
R2	ARC FORCE POTENTIOMETER, 10K/2
R3,R4	OUTPUT LOAD RESISTORS, 100/25
S1	INPUT POWER SWITCH
S2A,S2B	RECONNECT SWITCHES
S3	OUTPUT RECTIFIER HEATSINK THERMOSTAT
S4	SWITCH BOARD HEATSINK THERMOSTAT
S5	CHOKE THERMOSTAT
T1	MAIN TRANSFORMER
T2	AUXILIARY TRANSFORMER
T3,T4	CURRENT TRANSFORMER
TP1,TP2,TP3	INPUT MOV, 660V AC
TP4,TP5	OUTPUT MOV, 320V AC
TP6	OUTPUT MOV, 150V AC

NOTES:

N.A. MACHINES WITH RED, BLACK AND WHITE OR BROWN POWER CORDS:
FOR SINGLE PHASE INPUT: CONNECT GREEN LEAD TO GROUND PER NATIONAL ELECTRICAL CODE. CONNECT BLACK AND WHITE OR BROWN LEADS TO SUPPLY CIRCUIT. WRAP RED LEAD WITH TAPE TO PROVIDE 600V. INSULATION.
FOR THREE PHASE INPUT: CONNECT GREEN LEAD TO GROUND PER NATIONAL ELECTRIC CODE. CONNECT BLACK, RED & WHITE OR BROWN LEADS TO SUPPLY CIRCUIT.

N.B. SINCE COMPONENTS OR CIRCUITRY OF A PRINTED CIRCUIT BOARD MAY CHANGE WITHOUT AFFECTING THE INTERCHANGEABILITY OF A COMPLETE BOARD, THIS DIAGRAM MAY NOT SHOW THE EXACT COMPONENTS OR CIRCUITRY HAVING A COMMON CODE NUMBER.

N.C. PLACE "A" LEAD ON APPROPRIATE CONNECTION FOR INPUT VOLTAGE. CONNECTION SHOWN IS FOR 575V OPERATION.

N.D. CHOKE THERMOSTAT AND LEAD #319 NOT PRESENT ON EARLIER MODELS.

N.E. LEADS #308 AND #309 MAY BE INTERCHANGED IN J10 CONNECTOR PINS 2 AND 6.

LEAD COLORING CODE:
B-BLACK U-BLUE
G-GREEN W-WHITE
O-ORANGE Y-YELLOW
R-RED N-BROWN

COMPONENT VALUE UNITS:
RESISTORS: OHMS/WATTS
CAPACITORS: MFD/VOLTS

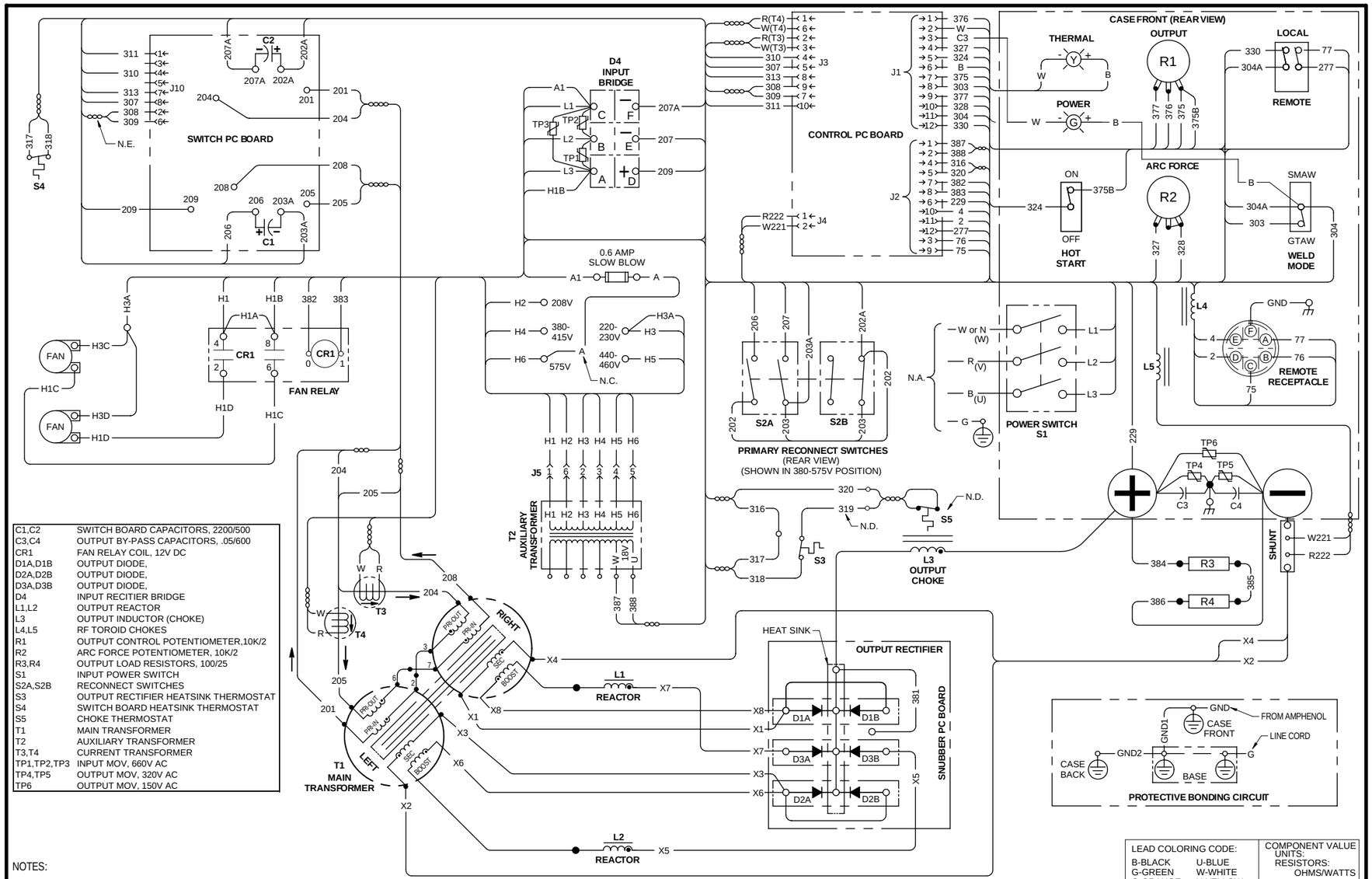
CONNECTOR PIN NUMBERS:
EXAMPLE: THIS IS PIN 7 0F CONNECTOR J5
VIEW OF CONNECTOR ON PC BOARD
ELECTRICAL SYMBOLS PER E1537.

LINCOLN ELECTRIC
CLEVELAND, OHIO U.S.A.
G4365-1 A

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.

WIRING DIAGRAM - ENTIRE MACHINE - CODE 11164, 11165, 11224, 11225

WIRING DIAGRAM - INVERTEC V275-S



C1,C2	SWITCH BOARD CAPACITORS, 2200/500
C3,C4	OUTPUT BY-PASS CAPACITORS, .05/600
CR1	FAN RELAY COIL, 12V DC
D1A,D1B	OUTPUT DIODE,
D2A,D2B	OUTPUT DIODE,
D3A,D3B	OUTPUT DIODE,
D4	INPUT RECITIER BRIDGE
L1,L2	OUTPUT REACTOR
L3	OUTPUT INDUCTOR (CHOKE)
L4,L5	RF TOROID CHOKES
R1	OUTPUT CONTROL POTENTIOMETER,10K/2
R2	ARC FORCE POTENTIOMETER, 10K/2
R3,R4	OUTPUT LOAD RESISTORS, 100/25
S1	INPUT POWER SWITCH
S2A,S2B	RECONNECT SWITCHES
S3	OUTPUT RECTIFIER HEATSINK THERMOSTAT
S4	SWITCH BOARD HEATSINK THERMOSTAT
S5	CHOKE THERMOSTAT
T1	MAIN TRANSFORMER
T2	AUXILIARY TRANSFORMER
T3,T4	CURRENT TRANSFORMER
TP1,TP2,TP3	INPUT MOV, 660V AC
TP4,TP5	OUTPUT MOV, 320V AC
TP6	OUTPUT MOV, 150V AC

NOTES:

N.A. MACHINES WITH RED, BLACK AND WHITE OR BROWN POWER CORDS:
FOR SINGLE PHASE INPUT: CONNECT GREEN LEAD TO GROUND PER NATIONAL ELECTRICAL CODE. CONNECT BLACK AND WHITE OR BROWN LEADS TO SUPPLY CIRCUIT. WRAP RED LEAD WITH TAPE TO PROVIDE 600V. INSULATION.
FOR THREE PHASE INPUT: CONNECT GREEN LEAD TO GROUND PER NATIONAL ELECTRIC CODE. CONNECT BLACK, RED & WHITE OR BROWN LEADS TO SUPPLY CIRCUIT.

N.B. SINCE COMPONENTS OR CIRCUITRY OF A PRINTED CIRCUIT BOARD MAY CHANGE WITHOUT AFFECTING THE INTERCHANGEABILITY OF A COMPLETE BOARD, THIS DIAGRAM MAY NOT SHOW THE EXACT COMPONENTS OR CIRCUITRY HAVING A COMMON CODE NUMBER.

N.C. PLACE "A" LEAD ON APPROPRIATE CONNECTION FOR INPUT VOLTAGE. CONNECTION SHOWN IS FOR 575V OPERATION.

N.D. CHOKE THERMOSTAT AND LEAD #319 NOT PRESENT ON EARLIER MODELS.

N.E. LEADS #308 AND #309 MAY BE INTERCHANGED IN J10 CONNECTOR PINS 2 AND 6.

LEAD COLORING CODE:
B-BLACK U-BLUE
G-GREEN W-WHITE
O-ORANGE Y-YELLOW
R-RED N-BROWN

COMPONENT VALUE UNITS:
RESISTORS: OHMS/WATTS
CAPACITORS: MFD/VOLTS

CONNECTOR PIN NUMBERS:
EXAMPLE: THIS IS PIN 7 OF CONNECTOR J5
VIEW OF CONNECTOR ON PC BOARD
ELECTRICAL SYMBOLS PER E1537.

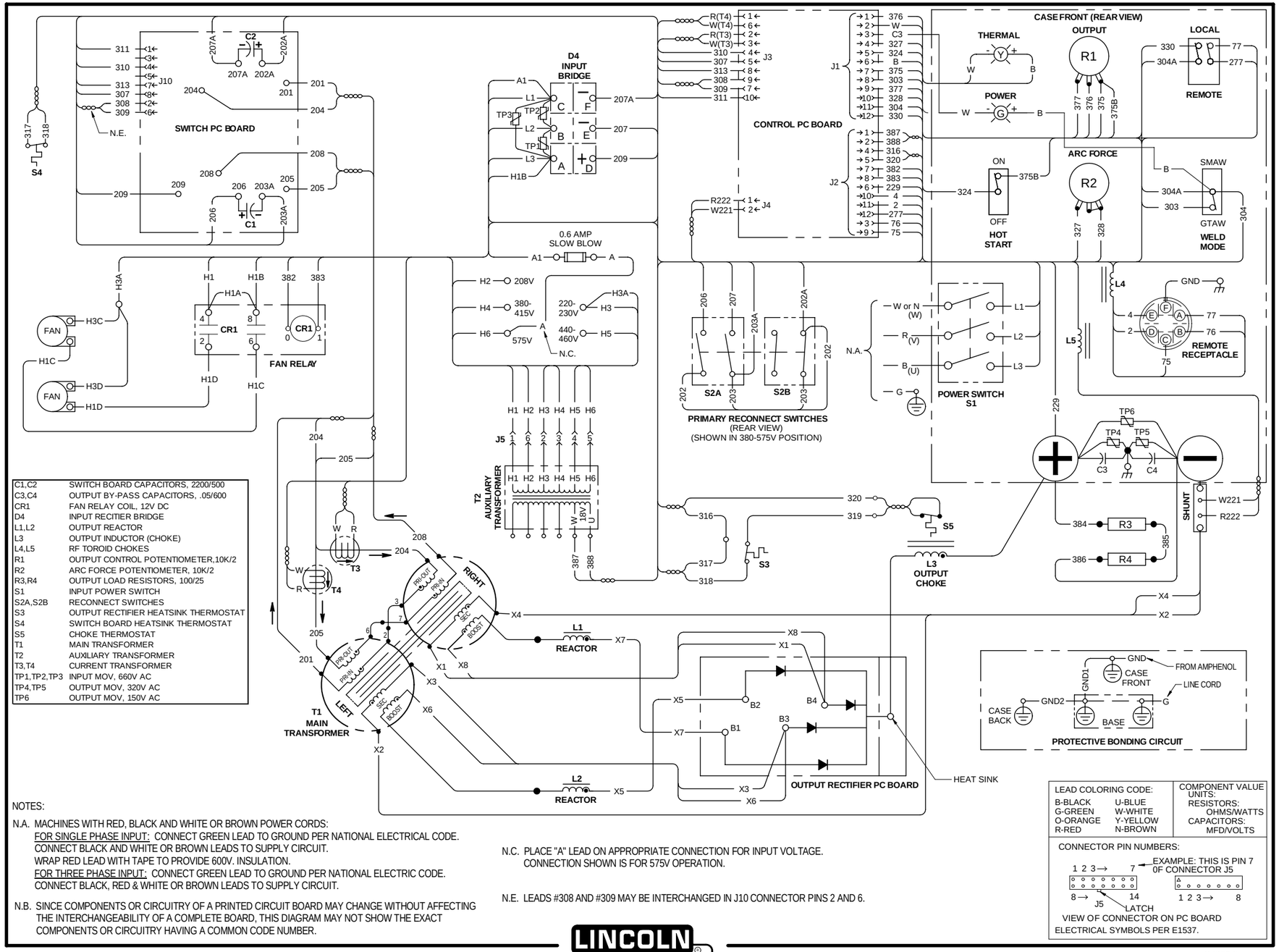
LINCOLN ELECTRIC CLEVELAND, OHIO U.S.A.

G4365-3 A

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.

WIRING DIAGRAM - ENTIRE MACHINE - CODE 11267, 11268

WIRING DIAGRAM - INVERTEC V275-S



C1,C2	SWITCH BOARD CAPACITORS, 2200/500
C3,C4	OUTPUT BY-PASS CAPACITORS, .05/600
CR1	FAN RELAY COIL, 12V DC
D4	INPUT RECITIER BRIDGE
L1,L2	OUTPUT REACTOR
L3	OUTPUT INDUCTOR (CHOKE)
L4,L5	RF TOROID CHOKES
R1	OUTPUT CONTROL POTENTIOMETER,10K/2
R2	ARC FORCE POTENTIOMETER, 10K/2
R3,R4	OUTPUT LOAD RESISTORS, 100/25
S1	INPUT POWER SWITCH
S2A,S2B	RECONNECT SWITCHES
S3	OUTPUT RECTIFIER HEATSINK THERMOSTAT
S4	SWITCH BOARD HEATSINK THERMOSTAT
S5	CHOKE THERMOSTAT
T1	MAIN TRANSFORMER
T2	AUXILIARY TRANSFORMER
T3,T4	CURRENT TRANSFORMER
TP1,TP2,TP3	INPUT MOV, 660V AC
TP4,TP5	OUTPUT MOV, 320V AC
TP6	OUTPUT MOV, 150V AC

NOTES:

N.A. MACHINES WITH RED, BLACK AND WHITE OR BROWN POWER CORDS:
FOR SINGLE PHASE INPUT: CONNECT GREEN LEAD TO GROUND PER NATIONAL ELECTRICAL CODE. CONNECT BLACK AND WHITE OR BROWN LEADS TO SUPPLY CIRCUIT. WRAP RED LEAD WITH TAPE TO PROVIDE 600V. INSULATION.
FOR THREE PHASE INPUT: CONNECT GREEN LEAD TO GROUND PER NATIONAL ELECTRIC CODE. CONNECT BLACK, RED & WHITE OR BROWN LEADS TO SUPPLY CIRCUIT.

N.B. SINCE COMPONENTS OR CIRCUITRY OF A PRINTED CIRCUIT BOARD MAY CHANGE WITHOUT AFFECTING THE INTERCHANGEABILITY OF A COMPLETE BOARD, THIS DIAGRAM MAY NOT SHOW THE EXACT COMPONENTS OR CIRCUITRY HAVING A COMMON CODE NUMBER.

N.C. PLACE "A" LEAD ON APPROPRIATE CONNECTION FOR INPUT VOLTAGE. CONNECTION SHOWN IS FOR 575V OPERATION.

N.E. LEADS #308 AND #309 MAY BE INTERCHANGED IN J10 CONNECTOR PINS 2 AND 6.

LEAD COLORING CODE:		COMPONENT VALUE UNITS:
B-BLACK	U-BLUE	RESISTORS: OHMS/WATTS
G-GREEN	W-WHITE	CAPACITORS: MFD/VOLTS
O-ORANGE	Y-YELLOW	
R-RED	N-BROWN	

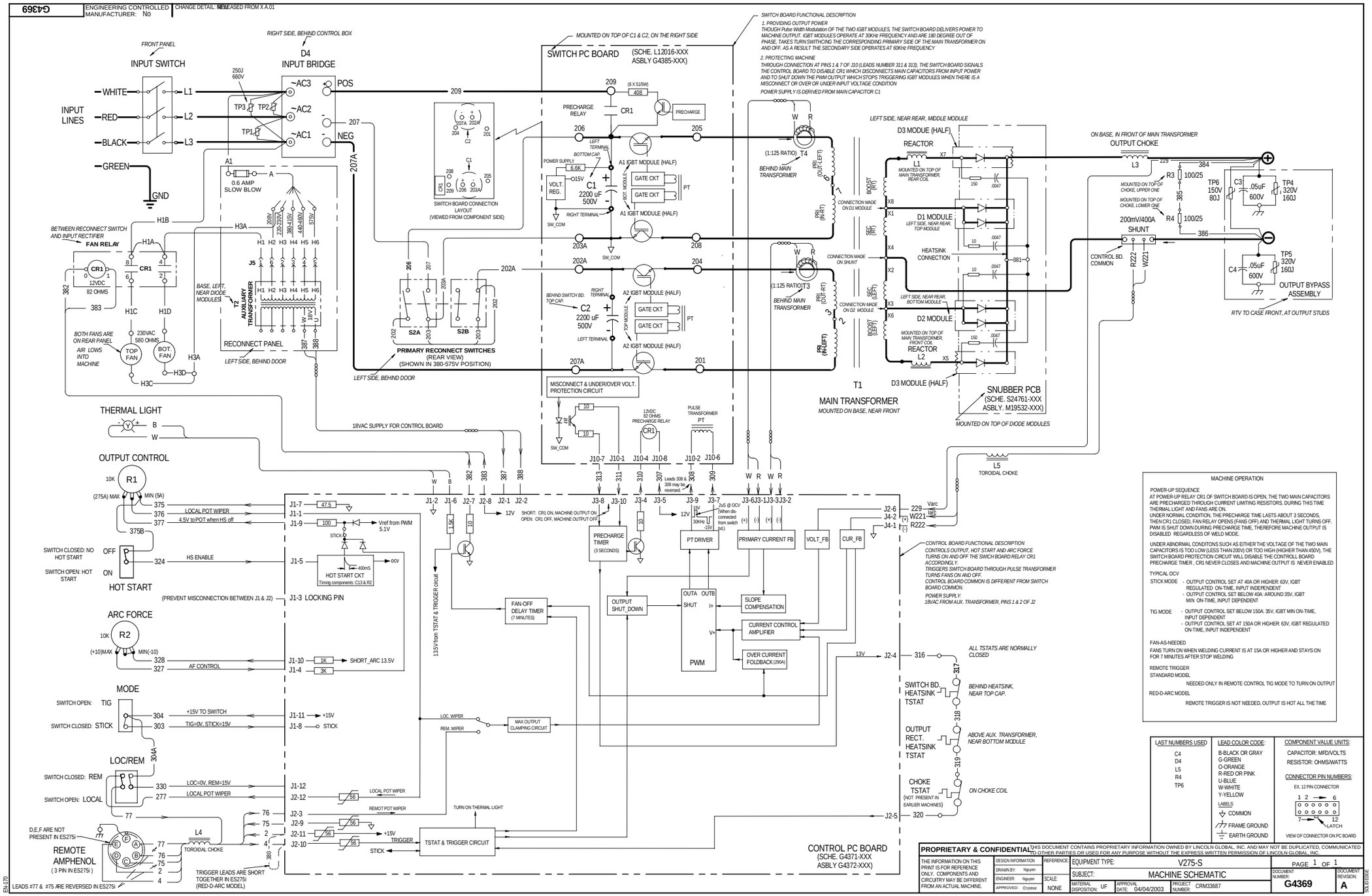
CONNECTOR PIN NUMBERS:
EXAMPLE: THIS IS PIN 7 OF CONNECTOR J5
VIEW OF CONNECTOR ON PC BOARD
ELECTRICAL SYMBOLS PER E1537.

LINCOLN ELECTRIC CLEVELAND, OHIO U.S.A.

G4365-6 A

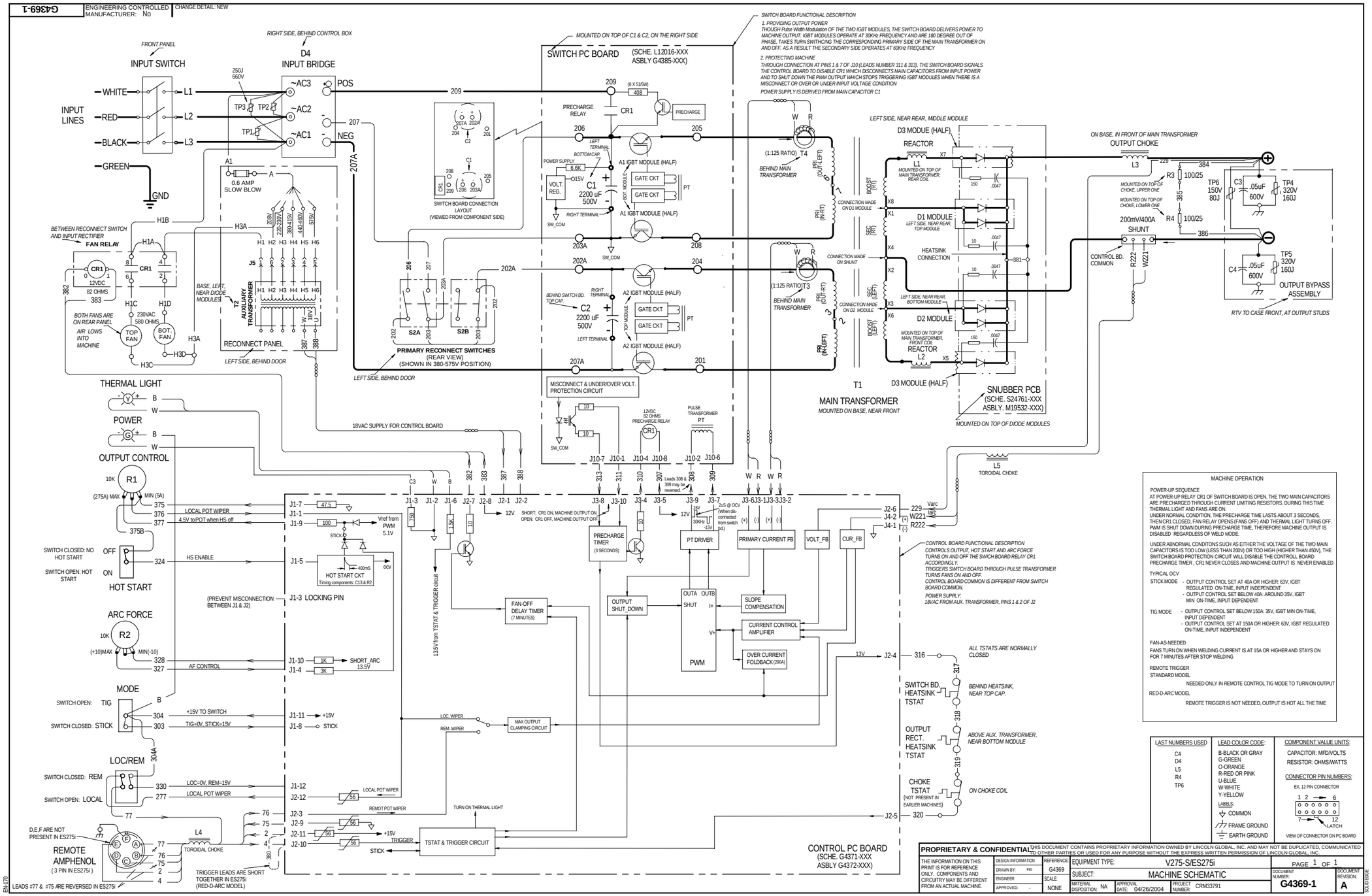
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

SCHEMATIC - ENTIRE MACHINE CODE 10993, 11001



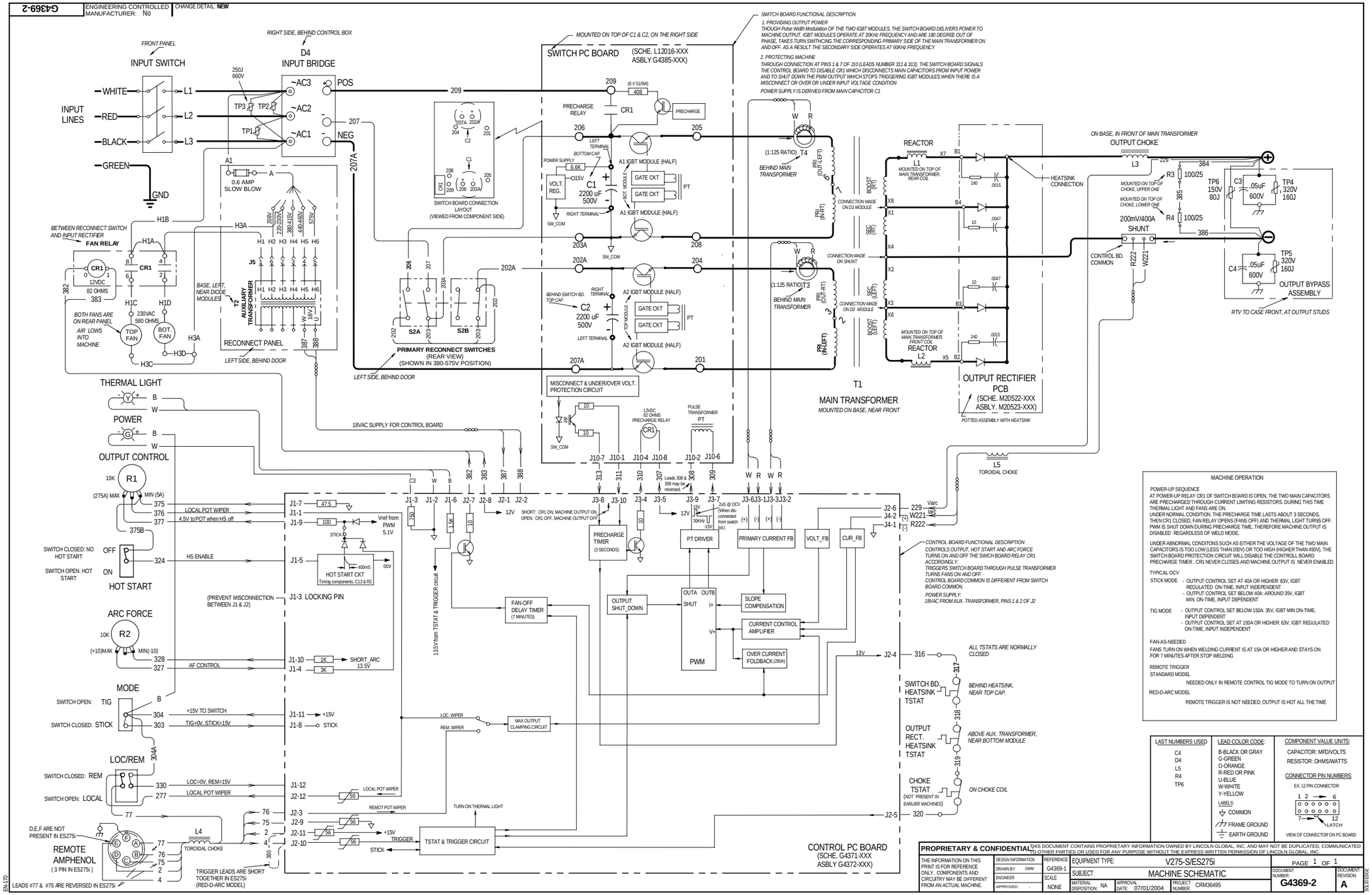
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - ENTIRE MACHINE CODE 11164,11165,11224,11225



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

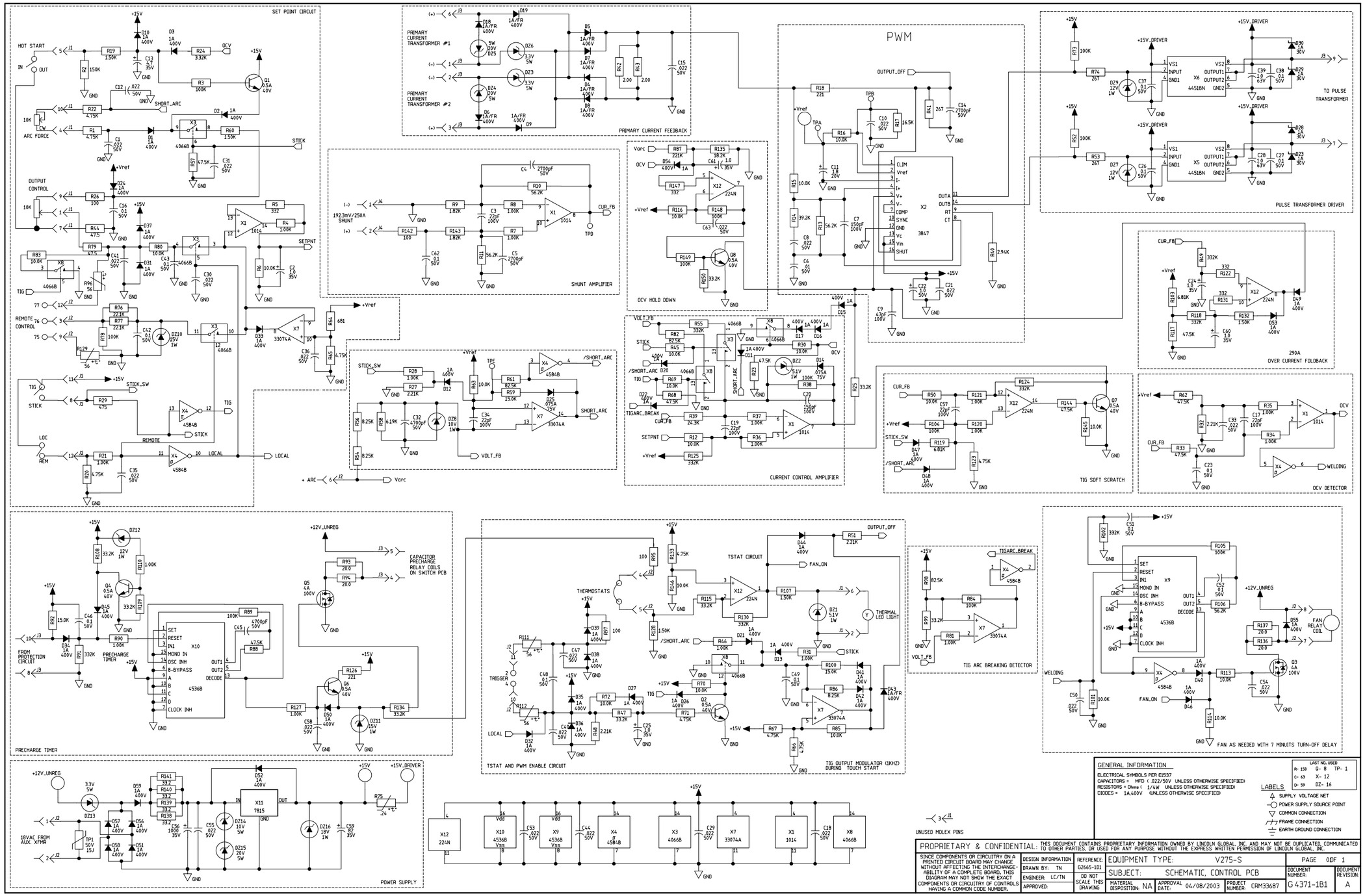
SCHEMATIC - ENTIRE MACHINE CODE 11267,11268



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

Return to Section TOC
Return to Master TOC

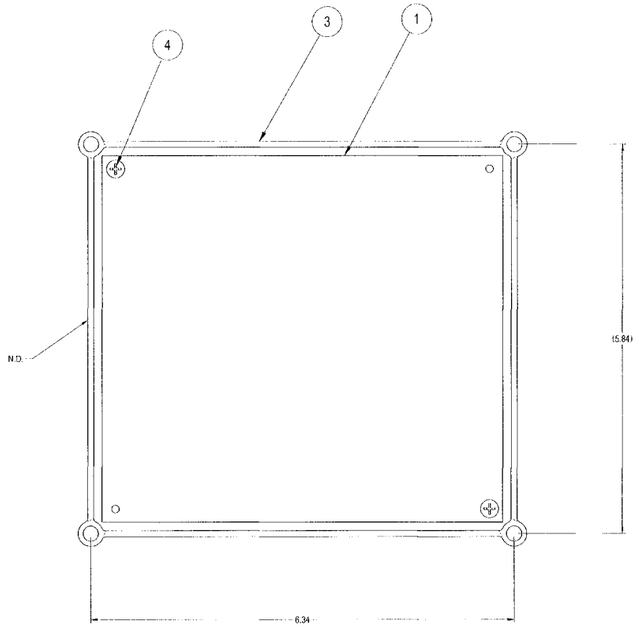
SCHEMATIC - CONTROL PC BOARD (G4371)

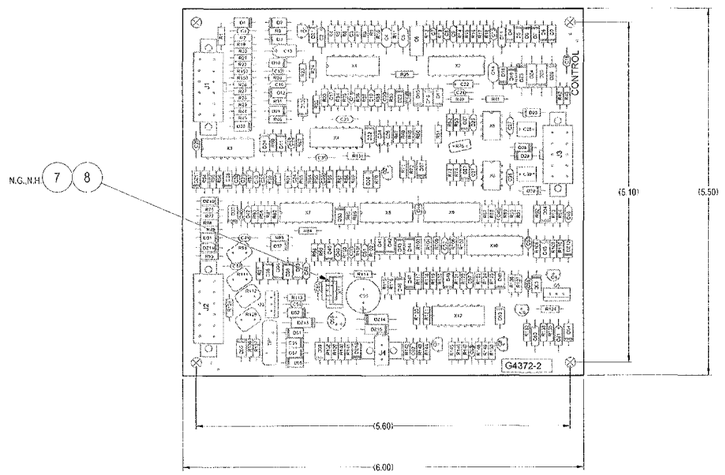


NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

PC BOARD ASSEMBLY-CONTROL (G4372)

G4372-2 | ENGINEERING CONTROLLED | CHANGE DETAIL: REVISED NOTE N.D.
MANUFACTURER: Yes





ITEM	PART NUMBER	QTY.	PC BOARD REF DESIGNATORS	DESCRIPTION
1	SEE DETAIL	1		CONTROL PC BOARD BLANK
3	M19436-5	1		POTTING TRAY
4	S8025-80	2		SELF TAPPING SCREW
5	E2527	170g		EPOXY ENCAPSULATION RESIN
6	E3539	AS REQD		ELECTRICAL INSULATING COMPOUND
7	S20500-2	1		HEATSINK
8	S25253-1	1		HEATSINK MOUNTING CLIP

FOR ITEMS LISTED BELOW REFER TO ELECTRONIC DATABASE FOR COMPONENT SPECIFICATIONS

ITEM	REFERENCES	QTY	PART NUMBER	DESCRIPTION
1	C1, C8, C10, C12, C15, C16, C21, C29, C30, C31, C33, C35, C36, C40, C41, C44, C47, C50, C53, C54, C55, C58, C63	23	S16668-5	CAPACITOR,CEMO, .022,50V,20%
2	C2, C24, C25, C60, C61	5	S13490-42	CAPACITOR,TAEL,1.0,35V,10%
3	C3, C17, C19, C34, C57	5	S16668-1	CAPACITOR,CEMO,.22pF, 100V,5%
4	C4, C5, C14	3	S16668-4	CAPACITOR,CEMO, .2700pF, 50V,5%
5	C6	1	S13490-203	CAPACITOR,PCF, .01,50V,2%
6	C7, C20	2	S16668-9	CAPACITOR,CEMO,.150pF, 100V,5%
7	C9	1	S16668-2	CAPACITOR,CEMO,47pF, 100V,5%
8	C11	1	S13490-19	CAPACITOR,TAEL,1.6,20V,10%
9	C13	1	S13490-26	CAPACITOR,TAEL,4.7,35V 10%
10	C16, C23, C26, C27, C37, C38, C42, C43, C46, C48, C49, C51, C52, C62	14	S16668-11	CAPACITOR,CEMO,0.1, 50V,10%
11	C22	1	S13490-135	CAPACITOR,TAEL,1.0,50V,10%
12	C28, C39	2	S13490-173	CAPACITOR,PEMF,1.0,63V,10%
13	C32, C45	2	S16668-6	CAPACITOR,CEMO,4700pF,50V,10%
14	C56	1	S13490-179	CAPACITOR,ALEL,1000,35V,20%
15	C59	1	S13490-197	CAPACITOR,ALEL,82,35V,20%,LOW-ESR
16	DZ1, DZ2, DZ17	3	T12702-52	ZENER DIODE, 1W,5.1V,5% 1N4733A
17	DZ3, DZ5, DZ13	3	T12702-59	ZENER DIODE,5W,3.3V,5% 1N5333B
18	DZ4, DZ5, DZ15	3	T12702-25	ZENER DIODE,5W,20V,5% 1N5357B
19	DZ7, DZ9, DZ12	3	T12702-19	ZENER DIODE, 1W,12V,5% 1N4742A
20	DZ8	1	T12702-27	ZENER DIODE, 1W,16V,5% 1N4740A
21	DZ10, DZ11	2	T12702-29	ZENER DIODE, 1W,15V,5% 1N4744A
22	DZ14	1	T12702-33	ZENER DIODE,5W,10V,5% 1N5347B
23	DZ16	1	T12702-45	ZENER DIODE, 1W,18V,5% 1N4746A
24	D1, D2, D3, D10, D11, D12, D13, D15, D16, D17, D20, D21, D22, D24, D26, D27, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D44, D45, D46, D47, D48, D49, D50, D51, D52, D53, D54, D55, D56, D57, D58, D59	44	T12199-1	DIODE,AXLDS,1A,400V
25	D4, D5, D6, D7, D8, D9, D18, D19, D43	9	T12705-34	DIODE,AXLDS,1A,400V,FR,1N4936
26	D14, D25	2	T12705-22	DIODE,AXLDS,0.15A,75V,1N914
27	D23, D28, D29, D30	4	T12705-23	DIODE,SCHOTTKY,AXLDS,1A,30V,1N5818
28	J1, J2	2	S24020-12	CONNECTOR,MOLEX,MINI,PCB,12-PIN,TIN
29	J3	1	S24020-10	CONNECTOR,MOLEX,MINI,PCB,10-PIN,TIN
30	J4	1	S24020-2G	CONNECTOR,MOLEX,MINI,PCB,2-PIN,GOLD
31	Q1, Q2, Q4, Q6, Q7, Q8	6	T12704-68	TRANSISTOR,NPN,TO226,0.5A,40V,2N4401
N.A. 32	Q3, Q5	2	T12704-80	TRANSISTOR,NMF,T220,4A,100V,IRF510(SS)
33	R1, R20, R22, R65, R66, R67, R71, R123, R133	9	S19400-4751	RESISTOR,MF, 1/4W,4.75K,1%
34	R2	1	S19400-1503	RESISTOR,MF, 1/4W,150K,1%
35	R3, R36, R52, R73, R78, R84, R89, R104, R105, R148, R149	11	S19400-1003	RESISTOR,MF, 1/4W,100K,1%
36	R4, R7, R8, R21, R28, R34, R35, R36, R37, R81, R90, R110, R120, R121, R127	15	S19400-1001	RESISTOR,MF, 1/4W,1.00K,1%
37	R5, R122, R131, R147	4	S19400-3320	RESISTOR,MF, 1/4W,332,1%
38	R6, R12, R15, R16, R30, R45, R50, R63, R69, R70, R72, R80, R83, R85, R101, R113, R114, R116, R145, R146	20	S19400-1002	RESISTOR,MF, 1/4W,10.0K,1%
39	R9, R143	2	S19400-1821	RESISTOR,MF, 1/4W,1.82K,1%
40	R10, R11, R13, R106	4	S19400-5622	RESISTOR,MF, 1/4W,56.2K,1%
41	R14	1	S19400-3922	RESISTOR,MF, 1/4W,39.2K,1%
42	R17	1	S19400-1652	RESISTOR,MF, 1/4W,16.5K,1%
43	R18, R126	2	S19400-2210	RESISTOR,MF,1/4W,221,1%
44	R19, R31, R48, R60, R107, R128, R132, R152, R153	9	S19400-1501	RESISTOR,MF, 1/4W, 1.50K,1%
45	R23, R33, R57, R62, R68, R88, R117, R144	8	S19400-4752	RESISTOR,MF, 1/4W,47.5K ,1%
46	R24	1	S19400-3321	RESISTOR,MF, 1/4W,3.32K,1%
47	R25, R47, R99, R108, R109, R115, R134, R150	8	S19400-3322	RESISTOR,MF, 1/4W,33.2K,1%
48	R26, R85, R97, R142	4	S19400-1000	RESISTOR,MF,1/4W,100,1%
49	R27, R32, R48, R51	4	S19400-2211	RESISTOR,MF, 1/4W,2.21K,1%
50	R29, R151	2	S19400-4750	RESISTOR,MF, 1/4W,475,1%
51	R39	1	S19400-2432	RESISTOR,MF, 1/4W,24.3K,1%
52	R40	1	S19400-2941	RESISTOR,MF, 1/4W,2.94K,1%
53	R41, R53, R74	3	S19400-2670	RESISTOR,MF,1/4W,267,1%
54	R42, R43	2	S19400-2R00	RESISTOR,MF, 1/4W,2.00,1%
55	R44, R79	2	S19400-47R5	RESISTOR,MF,1/4W,47.5,1%
56	R49, R55, R91, R102, R118, R124, R125, R130	8	S19400-3323	RESISTOR,MF, 1/4W,332K,1%
57	R54, R56, R66	3	S19400-8251	RESISTOR,MF, 1/4W,8.25K,1%
58	R58	1	S19400-6191	RESISTOR,MF, 1/4W,6.19K,1%
59	R59, R82, R100	3	S19400-1502	RESISTOR,MF, 1/4W,15.0K,1%
60	R61, R82, R98	3	S19400-8252	RESISTOR,MF, 1/4W,82.5K,1%
61	R64	1	S19400-6810	RESISTOR,MF, 1/4W,681,1%
62	R75	1	S18380-5	THERMISTOR,PTC,0.5-1.17 OHMS,0.5A
63	R76, R77	2	S19400-2212	RESISTOR,MF, 1/4W,22.1K,1%
64	R87	1	S19400-2213	RESISTOR,MF, 1/4W,221K,1%
65	R93, R94, R135, R137	4	S19400-20R0	RESISTOR,MF, 1/4W,20.0,1%
66	R96, R111, R112, R129	4	S18380-1	THERMISTOR,PTC,55 OHMS,90MA
67	R103, R119	2	S19400-6811	RESISTOR,MF, 1/4W,6.81K,1%
68	R135	1	S19400-1822	RESISTOR,MF, 1/4W,18.2K,1%
69	R138, R139, R140, R141	4	S19400-33R2	RESISTOR,MF, 1/4W,33.2,1%
70	TP1	1	T13640-15K	MOV,50VRMS,15J,14MM
71	X1	1	S15128-16	IC,OP-AMP,QUAD,HIGH-PERF, 1014
72	X2	1	M15458-2	IC,PWM-CONTROLLER,I-MODE,3846
N.A. 73	X3, X6	2	S15018-6	IC,CMOS,SWITCH,ANALOG,QUAD, 4066(SS)
N.A. 74	X4	1	S15018-4	IC,CMOS,INVERTER,SCHMITT, HEX,4584(SS)
N.A. 75	X5, X6	2	S15018-21	IC,CMOS,DRIVER,MOSFET,4451(SS)
76	X7	1	S15128-18	OP-AMP,QUAD, HIGH-PERF,33074
N.A. 77	X9, X10	2	S15018-13	IC,CMOS, TIMER,PROGRAMMABLE,4536(SS)
78	X11	1	S15128-6	VOLTAGE REGULATOR
79	X12	1	S15128-4	OP-AMP,QUAD, GEN-PURPOSE,224N

UNLESS OTHERWISE SPECIFIED:
RESISTANCE = OHMS

SCHEMATIC REFERENCE - G4371-2D0

NOTES:

N.A. **CAUTION:** THIS DEVICE IS SUBJECT TO DAMAGE BY STATIC ELECTRICITY. SEE E2454 BEFORE HANDLING.

N.C. SECURE P.C. BOARD ASSEMBLY IN PLACE WITH ITEM (4). (2 PLACES), 5.3 +/- .5 IN. LBS.

N.D. PRINT "G4372-[ ]" (LATEST DASH NUMBER AND I.D. CODE) ON LABEL.

N.E. ALL CONNECTORS MUST BE GREASED WITH ITEM (6) PRIOR TO ENCAPSULATION.

N.G. PART MAY TILT +/- 10° FROM PERPENDICULAR TO PC BOARD.

N.H. WHILE APPLYING ENCAPSULATION, APPLY SOME OVER THE TOP OF ITEM 11 TO HELP SECURE ITEM 11 IN PLACE.

TEST PER E4062-C

P.C. BOARD BLANK INFORMATION
BUY BLANK COMPLETE AS G4372-D (4 LAYER PER E3281)
(MAKES 6 BOARDS PER PANEL SEE ELECTRONIC FILE FOR ADDITIONAL INFORMATION
PANEL SIZE PER E1911

MANUFACTURED AS

G4372-2D0

PART NO. **IDENTIFICATION CODE**

PER E1911

BM-170

UNLESS OTHERWISE SPECIFIED TOLERANCE MANUFACTURING TOLERANCE PER E2930 ON 2 PLACE DECIMALS IS +.02 ON 3 PLACE DECIMALS IS ±.002 ON ALL ANGLES IS ± 1.0° A DEGREE MATERIAL TOLERANCE (T) TO AGREE WITH PUBLISHED STANDARDS. DO NOT SCALE THIS DRAWING

DESIGN INFORMATION
DRAWN BY: FEK
ENGINEER:
APPROVED: DTS

REFERENCE: G4372-1
SCALE: 1:1

EQUIPMENT TYPE: INVERTER WELDERS
SUBJECT: CONTROL PC BOARD ASSBLY
MATERIAL DISPOSITION: UF
APPROVAL DATE: 12/10/2004
PROJECT NUMBER: CRM22115-FD

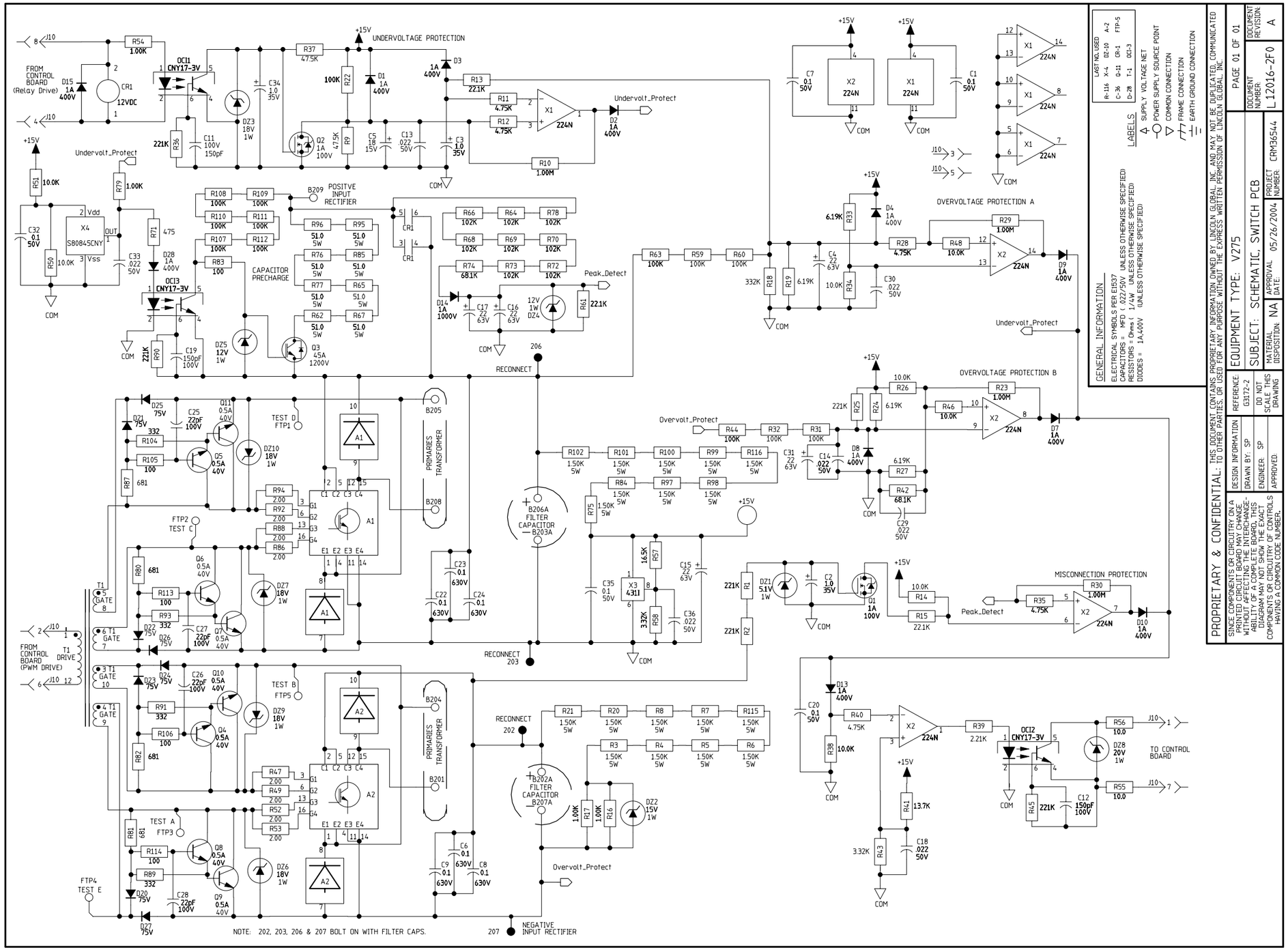
PAGE 1 OF 1
DOCUMENT NUMBER: G4372-2
DOCUMENT REVISION: D

SOLID EDGE

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.

Return to Section TOC
Return to Master TOC

SCHEMATIC SWITCH P.C. BOARD (L12016)



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

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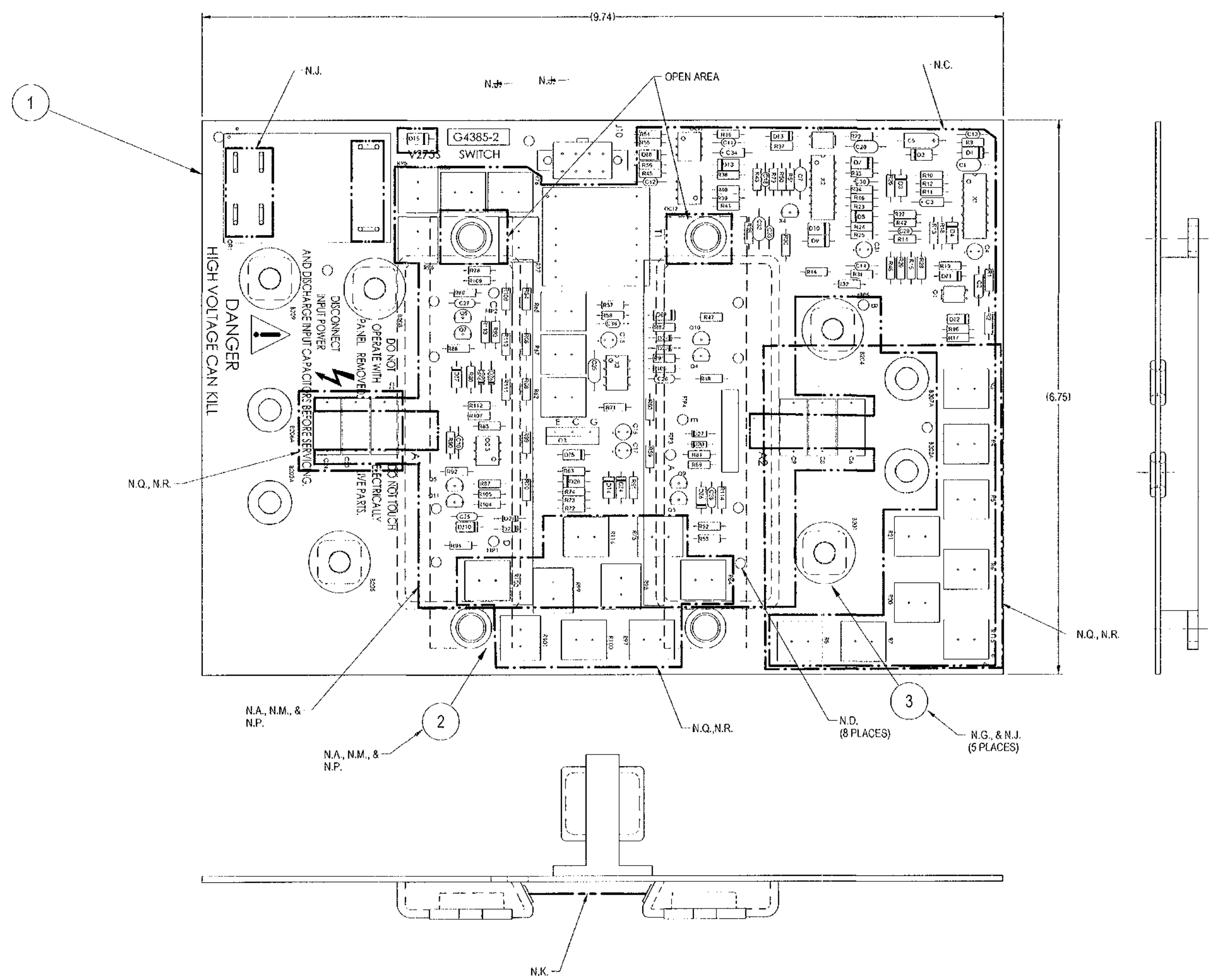
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

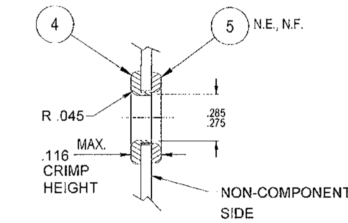
PC BOARD ASSEMBLY - SWITCH (G4372)

G4385-2

ENGINEERING CONTROLLED
MANUFACTURER: No

CHANGE DETAIL: REVISED IDENTIFICATION CODE.
REVISED R3...R116 PART NO.





EYELET DETAIL

Item	Qty	Part No.	Description
1	1	SEE BLANK	P.C. BOARD BLANK
2	2	M16100-59	ELECTRONIC MODULE (A1,A2)
3	5	S23006	CONNECTOR (B201,B204,B205,B208,B209)
4	4	T9147-15	EYELETS (MALE)
5	4	T9147-11	EYELETS (FEMALE)
6	4.0 oz	E2861	SEALANT

	ITEM	QTY	PART NO.	DESCRIPTION
	C1,C7,C20,C32,C35	5	S16668-11	CAPACITOR,CEMO,0.1, 50V,10%
	C2,C3,C34	3	S13490-42	CAPACITOR,TAEL,1.0,35V,10%
	C4,C15,C16,C17,C31	5	S13490-181	CAP,ALEL,22,63V,20%
	C5	1	S13490-39	CAPACITOR,TAEL,18,15V 10%
	C6,C8,C9,C22,C23,C24	6	S20500-17	CAPACITOR,PPMF,0.1,630V,5%,BOX
	C11,C12,C19	3	S16668-9	CAPACITOR,CEMO,150p, 100V,5%
	C13,C14,C18,C29,C30,C33 C36	7	S16668-5	CAPACITOR,CEMO,.022,50V,20%
	C25,C26,C27,C28	4	S16668-1	CAPACITOR,CEMO,22P, 100V,5%
	CR1	1	S14293-18	RELAY,DPST,12VDC,AG-CDO
	D1,D2,D3,D4,D7,D8,D9,D10 D13,D15,D28	11	T12199-1	DIODE,AXLDS,1A,400V
	D14	1	T12199-2	DIODE,AXLDS,1A,1000V
	D20,D21,D22,D23,D24,D25 D26,D27	8	T12705-22	DIODE,AXLDS,0.15A,75V,1N914
	DZ1	1	T12702-52	ZENER DIODE, 1W,5.1V,5% 1N4733A
	DZ2	1	T12702-29	ZENER DIODE, 1W,15V,5% 1N4744A
	DZ3,DZ6,DZ7,DZ9,DZ10	5	T12702-45	ZENER DIODE, 1W,18V,5% 1N4746A
	DZ4,DZ5	2	T12702-19	ZENER DIODE, 1W,12V,5% 1N4742A
	DZ8	1	T12702-4	ZENER DIODE, 1W,20V,5% 1N4747A
	J10	1	S24020-8	CONNECTOR,MOLEX,MINI,PCB,8-PIN,TIN
	OCI1,OCI2,OCI3	3	S15000-22	OPTOCOUPLER,PHOTO-Q,70V,CNY17-3/VDE
N.A.	Q1,Q2	2	T12704-73	MOSFET,4-PIN DIP,1A,100V,RFD110(SS)
N.A.	Q3	1	T12704-86	TRANSISTOR,IGBT,T247,1200V,45A,FAST(SS)
N.A.	Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11	8	T12704-68	TRANSISTOR,NPN,TO226,0.5A,40V,2N4401
	R1,R2,R25,R36,R45,R90	6	S19400-2213	RESISTOR,MF,1/4W,221K,1%
	R3,R4,R5,R6,R7,R8,R20,R21 R75,R84,R97,R98,R99,R100 R101,R102,R115,R116	18	S25923-1501	RESISTOR,STAND-UP,WW,5W,1.50K,5%
	R9,R37	2	S19400-4752	RESISTOR,MF,1/4W,47.5K ,1%
	R10,R23,R29,R30	4	S19400-1004	RESISTOR,MF,1/4W,1.00M,1%
	R11,R12,R28,R35,R40	5	S19400-4751	RESISTOR,MF,1/4W,4.75K,1%
	R13,R15,R61	3	S19400-2212	RESISTOR,MF,1/4W,22.1K,1%
	R14,R26,R34,R38,R46,R48 R50,R51	8	S19400-1002	RESISTOR,MF,1/4W,10.0K,1%
	R16,R17,R54,R79	4	S19400-1001	RESISTOR,MF,1/4W,1.00K,1%
	R18	1	S19400-3323	RESISTOR,MF,1/4W,332K,1%
	R19,R24,R27,R33	4	S19400-6191	RESISTOR,MF,1/4W,6.19K,1%
	R22,R31,R32,R44,R59,R60 R63,R107,R108,R109,R110 R111,R112	13	S19400-1003	RESISTOR,MF,1/4W,100K,1%
	R39	1	S19400-2211	RESISTOR,MF,1/4W,2.21K,1%
	R41	1	S19400-1372	RESISTOR,MF,1/4W,13.7K,1%
	R42,R74	2	S19400-6812	RESISTOR,MF,1/4W,68.1K,1%
	R43,R58	2	S19400-3321	RESISTOR,MF,1/4W,3.32K,1%
	R47,R49,R52,R53 R86,R88,R92,R94	8	S19400-2R00	RESISTOR,MF,1/4W,2.0,1%
	R55, R56	2	S19400-10R0	RESISTOR,MF,1/4W, 10.0,1%
	R57	1	S19400-1652	RESISTOR,MF,1/4W,16.5K,1%
	R62,R65,R67,R76,R77,R85 R95,R96	8	S25365-51R0	RESISTOR,STAND-UP,WW,5W,51.0,5%
	R64,R66,R68,R69,R70,R72 R73,R78	8	S19400-1023	RESISTOR,MF,1/4W,102K,1%
	R71	1	S19400-4750	RESISTOR,MF,1/4W,475,1%
	R80,R81,R82,R87	4	S19400-6810	RESISTOR,MF,1/4W,681,1%
	R83,R105,R106,R113,R114	5	S19400-1000	RESISTOR,MF,1/4W,100,1%
	R89,R91,R93,R104	4	S19400-3320	RESISTOR,MF,1/4W,332,1%
	T1	1	S13000-96	TRANSFORMER,GATE-DRIVE,PCB,AF3472
N.A.	X1,X2	2	S15128-4	OP-AMP,QUAD, GEN-PURPOSE,224N
N.A.	X3	1	S15128-10	VOLTAGE REF,ADJ, PRECISION,431I
N.A.	X4	1	M15102-3	IC,CMOS,UNDERVOLT-SENSING,RESET,MCU(SS)

NOTES:

N.A. **CAUTION:** THIS DEVICE IS SUBJECT TO DAMAGE BY STATIC ELECTRICITY. LINCOLN ELECTRIC TO SEE **E2454** BEFORE HANDLING.

N.C. UNLESS OTHERWISE SPECIFIED, THESE AREAS TO BE COVERED ON BOTH SIDES OF BOARD (WHERE POSSIBLE) WITH SEALANT PRIOR TO ENCAPSULATION.

N.D. INJECT SEALANT ITEM 6 THROUGH THE PC BOARD HOLES TO SEAL MODULE LEADS. CAVITY BETWEEN BOARD AND MODULE TO BE COMPLETELY FILLED WITH ITEM 6 SEALANT MATERIAL AS PER APPROPRIATE MANUFACTURING WORK INSTRUCTIONS. COVER ALL MODULE LEADS THAT PROTRUDE FROM THE NON-MODULE SIDE OF THE BOARD WITH ITEM 6 SEALANT.

N.E. FEMALE EYELET TO BE AGAINST THE NON-COMPONENT SIDE AS SHOWN EYELET MUST NOT SPIN AFTER CLINCHING.

N.F. SOLDER EYELET SO THAT SOLDER COVERS ENTIRE EYELET AND ALL AROUND EYELET ON COPPER SIDE ONLY. NO ICICLES OR SOLDER BLOBS PERMITTED.

N.G. AFTER SOLDERING, INSPECT POWER TERMINAL CONNECTIONS PER E1880.

N.J. THIS AREA TO BE COVERED ON OPPOSITE COMPONENT SIDE OF BOARD WITH ITEM 6 PRIOR TO ENCAPSULATION. DO NOT COAT WITH ENCAPSULATION MATERIAL ON THE TOP SURFACES NOR THE THREADS.

N.K. SEALANT HEIGHT BETWEEN MODULES NOT TO EXCEED .17" MAX. COMPONENT LEAD STICK THROUGH BETWEEN MODULES NOT TO EXCEED .16 " MAX.

N.M. ITEM 2 MODULES SHALL BE MATCHED WITHIN 2 SORT CODES FOR BOTH VCE (1ST PAIR OF DIGITS OF 4 DIGIT SORT CODE) AND VGE (2ND PAIR OF DIGITS OF 4 DIGIT SORT CODE).

N.P. ITEM 2 IS TO BE ASSEMBLED AND ENCAPSULATED PER E3875.

N.Q. SEALANT HEIGHT IN DESIGNATED AREAS NOT TO EXCEED .16" MAX. (OPPOSITE COMPONENT SIDE)

N.R. COMPONENT LEAD STICK THROUGH IN DESIGNATED AREAS NOT TO EXCEED .15" MAX.

CAPACITORS = MFD/VOLTS
RESISTORS = OHMS

MANUFACTURED AS
G4385-2E1
PART NO. **IDENTIFICATION CODE**

P.C. BOARD BLANK REFERENCE INFORMATION
BUY BLANK COMPLETE AS G4385-E
(4 LAYER BOARD PER E3281)
(MAKES 2 BOARDS PER PANEL, SEE ELECTRONIC FILE FOR ADDITIONAL INFORMATION)

MAKE PER E1911
ENCAPSULATE WITH E1844, 3 COATS
TEST PER E4062-S
SCHEMATIC REFERENCE: L12016-2E0

FOR PARTS ORDERS AND SUBSIDIARY ORDERS INCLUDE:

(1) T12837-1, (2) S25347-2, (1) S25191-1PRINT

UNLESS OTHERWISE SPECIFIED TOLERANCE MANUFACTURING TOLERANCE PER E2056 ON 2 PLACE DECIMALS IS ± .02 ON 3 PLACE DECIMALS IS ± .002 ON ALL ANGLES IS ± .5 OF A DEGREE MATERIAL TOLERANCE ("t") TO AGREE WITH PUBLISHED STANDARDS.
DO NOT SCALE THIS DRAWING

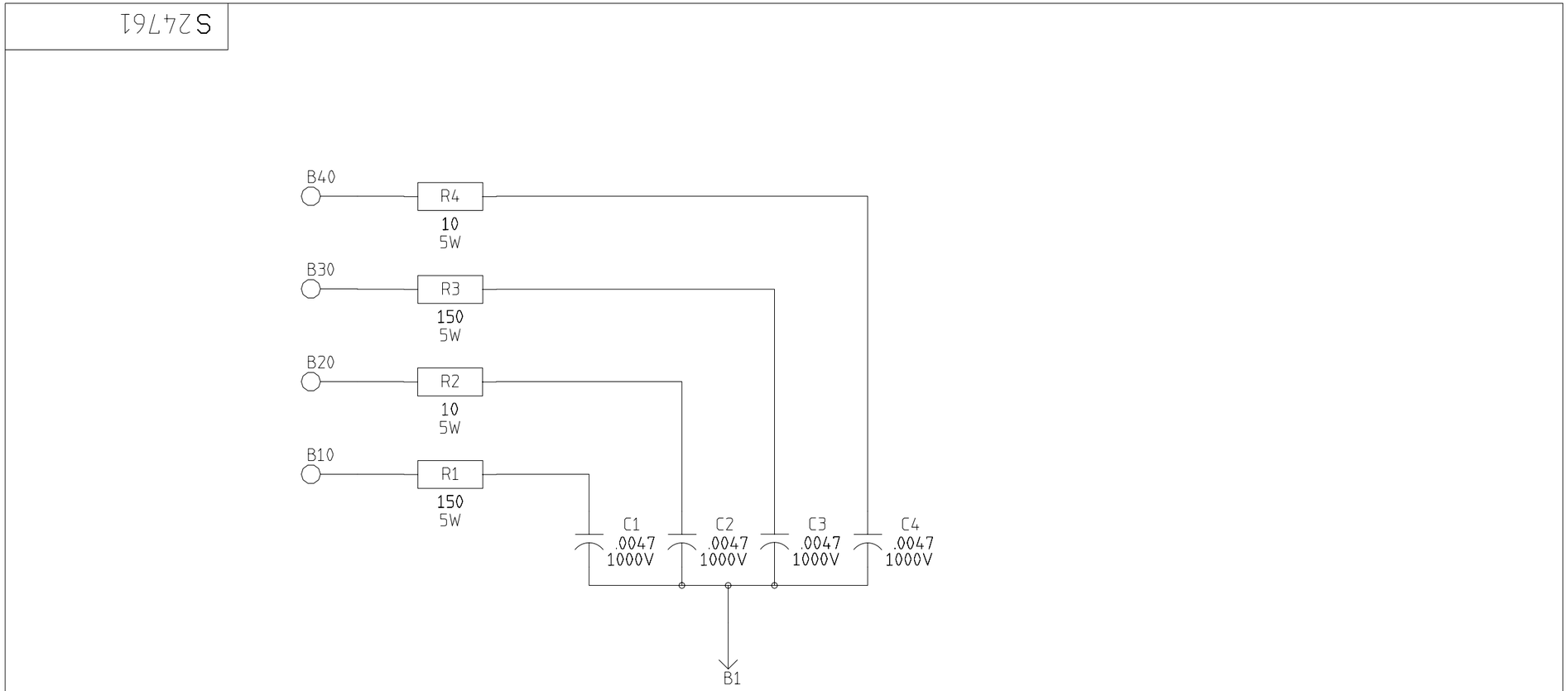
DESIGN INFORMATION	REFERENCE:	EQUIPMENT TYPE: INVERTER WELDERS	PAGE 1 OF 1
DRAWN BY: Jbarlo	G4385-1	SUBJECT: SWITCH PC BOARD AS'BLY	DOCUMENT NUMBER: G4385-2
ENGINEER: L Church	SCALE: NONE	MATERIAL DISPOSITION: UF / APPROVAL DATE: 03/19/2004 / PROJECT NUMBER: CRM36250	DOCUMENT REVISION: C
APPROVED:			

SOLID EDGE

EN-170

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.

SCHEMATIC - SNUBBER P.C. BOARD (S24761)



NOTES :

N.A. SINCE COMPONENTS OR CIRCUITRY ON A PRINTED CIRCUIT BOARD MAY CHANGE WITHOUT AFFECTING THE INTERCHANGEABILITY OF A COMPLETE BOARD. THIS DIAGRAM MAY NOT SHOW THE EXACT COMPONENTS OR CIRCUITRY OF CONTROLS HAVING A COMMON CODE NUMBER.

GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537
CAPACITORS = MFD (-------- UNLESS OTHERWISE SPECIFIED)
RESISTORS = Ohms (----- UNLESS OTHERWISE SPECIFIED)
DIODES = -------- (UNLESS OTHERWISE SPECIFIED)

LABELS

SUPPLY VOLTAGE NET
POWER SUPPLY SOURCE POINT
COMMON CONNECTION
FRAME CONNECTION
EARTH GROUND CONNECTION

LAST NO. USED	
R-	4
C-	4
D-	0

FILENAME: S24761_1AB

UNLESS OTHERWISE SPECIFIED TOLERANCE ON HOLES SIZES PER E2056 ON 2 PLACE DECIMALS IS ± .02 ON 3 PLACE DECIMALS IS ± .002 ON ALL ANGLES IS ± .5 OF A DEGREE MATERIAL TOLERANCE ("t") TO AGREE WITH PUBLISHED STANDARDS	Chg. Sheet No.		"X" INFO	DESIGN INFORMATION	
	6-2-2000		XM5626	DRAWN BY: M Didion	
			XA	ENGINEER: M. ~~Didion~~	
				REVISED BY: ~~MJH~~	
DO NOT SCALE THIS DRAWING					

EQUIPMENT TYPE: INVERTER WELDERS

SUBJECT: SNUBBER PCB SCHEMATIC

DATE: 05/23/2000 SCALE: NONE REF.: ------ DRWG. NO. S24761

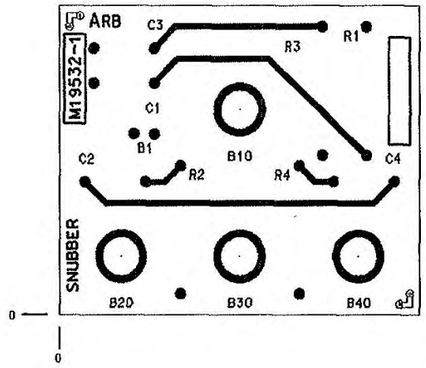
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

PC BOARD ASSEMBLY - SNUBBER (M19532)

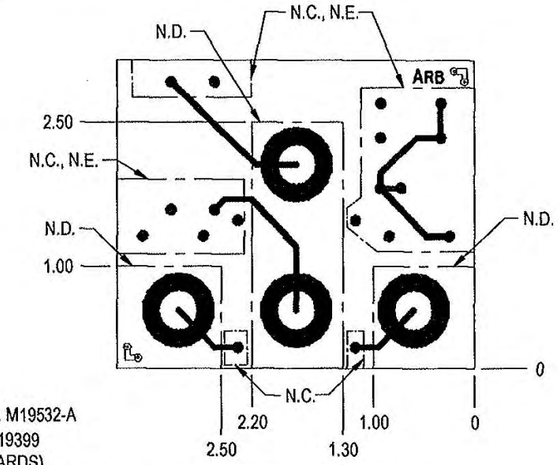
M19532-1

ENGINEERING CONTROLLED
MANUFACTURER: No

CHANGE DETAIL: REVISED NOTES N.D. AND N.E.

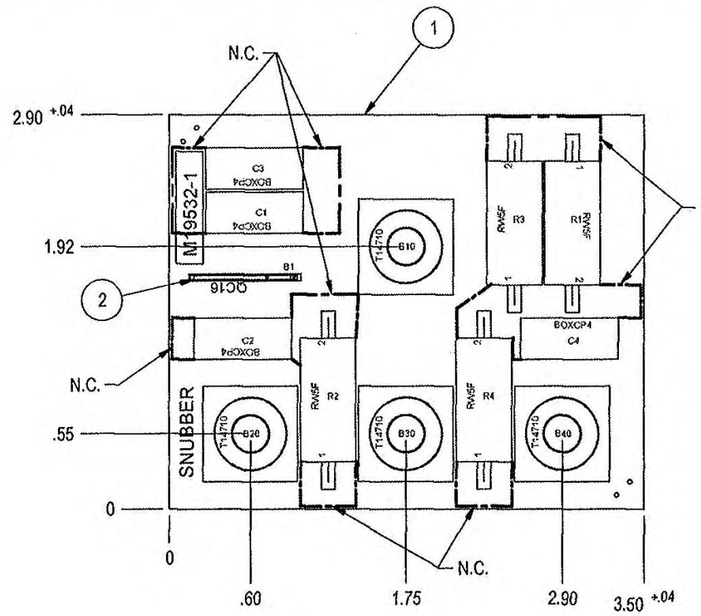


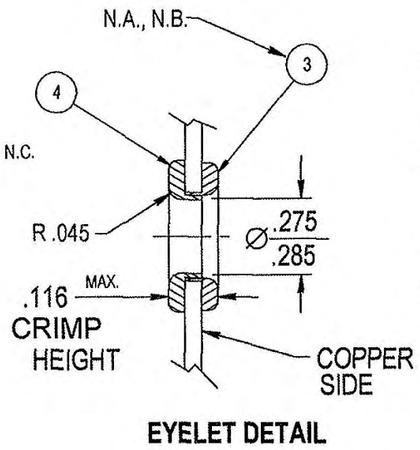
COMPONENT SIDE
CIRCUIT MULTIPLE



OPPOSITE COMPONENT SIDE
CIRCUIT MULTIPLE

BLANK PART NO. M19532-A
MAKE FROM S19399
(MAKES 20 BOARDS)
NOTE: FOR BLANK SHEARING TOLERANCE
SEE P.C. BOARD ASSEMBLY





EYELET DETAIL

ITEM	REQ'D	PART NO.	DESCRIPTION
C1,C3	2	S20500-5	CAPACITOR,.0015,2000V,BOX
C2,C4	2	S20500-4	CAPACITOR,PPMF,.0047,1000V,BOX
R1,R3	2	T14648-20	RESISTOR,WW,5W,150,5%,SQ
R2,R4	2	T14648-25	RESISTOR,WW,5W,10,5%,SQ

ITEM	PART NO.	DESCRIPTION	QTY
1	M19532-A	P.C. BOARD BLANK	1
2	T13157-16	TAB TERMINAL	1
3	T9147-11	EYELET-FEMALE	4
4	T9147-15	EYELET-MALE	4
5	E2861	SEALANT	.25 OZ.

NOTES:

N.A. *FEMALE EYELET TO BE AGAINST THE COPPER SIDE AS SHOWN* EYELET MUST NOT SPIN AFTER CLINCHING.

N.B. SOLDER EYELET SO THAT SOLDER COVERS ENTIRE EYELET AND ALL AROUND EYELET ON COPPER SIDE ONLY. NO ICICLES OR SOLDER BLOBS PERMITTED.

N.C. THESE AREAS TO BE COVERED WITH ITEM (5) SEALANT PRIOR TO ENCAPSULATION.

N.D. *THESE AREAS MUST NOT HAVE ANY ENCAPSULATION/SEALANT* HIGHER THAN .020" (BOTH SIDES OF THE BOARD). KEEP EYELETS FREE OF COATING.

N.E. SEALANT IS TO COVER AREAS SHOWN INCLUDING TIP OF THE COMPONENT LEADS (ON OPPOSITE COMPONENT SIDE). SEALANT HEIGHT MUST NOT EXCEED .20".

MAKE PER E1911
ENCAPSULATE WITH E1844, 2 COATS
TEST PER E3817-SN

SCHEMATIC REFERENCE: S24761-1A1

MANUFACTURED AS:

M19532-1A1

IDENTIFICATION CODE

UNLESS OTHERWISE SPECIFIED TOLERANCE
MANUFACTURING TOLERANCE PER E2056
ON 2 PLACE DECIMALS IS ± .02
ON 3 PLACE DECIMALS IS ± .002
ON ALL ANGLES IS ± .5 OF A DEGREE
MATERIAL TOLERANCE ("t") TO AGREE WITH PUBLISHED STANDARDS.
DO NOT SCALE THIS DRAWING

DESIGN INFORMATION
DRAWN BY: SWB
ENGINEER:
APPROVED:

REFERENCE:
SCALE: NONE

EQUIPMENT TYPE: INVERTER WELDERS
SUBJECT: SNUBBER P.C. BOARD ASSEMBLY
MATERIAL DISPOSITION: UF
APPROVAL DATE: 8/4/03
PROJECT NUMBER: CRM34627

PAGE 1 OF 1
DOCUMENT NUMBER: M19532-1
DOCUMENT REVISION: D

SOLID EDGE
STRP

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.

Return to Section TOC
Return to Master TOC

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

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:

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SD287 01/99

LINCOLN ELECTRIC