LINCOLN ELECTRIC

GENUINE LINCOLN PARTS™

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

IDEALARC® SP-255

For use with machines having Code Numbers:

10164, 10165

SERVICE MANUAL

SVM115-A | Issue Date 12, Apr

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.

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ELECTRIC SHOCK can kill.

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

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

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

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

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

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

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

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

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

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

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

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

ARC RAYS can burn.

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

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

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

FUMES AND GASES can be dangerous.

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

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

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

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

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

5.f. Also see item 1.b.

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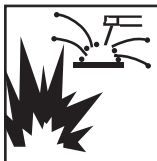

WELDING and CUTTING SPARKS can cause fire or explosion.

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

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

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

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

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

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

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

6.h. Also see item 1.c.

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

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

CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

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

FOR ELECTRICALLY powered equipment.

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

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

8.c. Ground the equipment in accordance with the U.S. National

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

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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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Electromagnetic Compatibility (EMC)

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

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

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

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

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

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

b) radio and television transmitters and receivers;

c) computer and other control equipment;

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

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

f) equipment used for calibration or measurement

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

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

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Electromagnetic Compatibility (EMC)

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

Methods of Reducing Emissions

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

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

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

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

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

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

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

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TECHNICAL SPECIFICATIONS - Idealarc® SP-255

INPUT - SINGLE PHASE/ 60 HERTZ ONLY	
Standard Voltage	**Input Current at Rated Output**
208/230/60	**53/49 Amps**
230/460/575	**50/25/20 Amps**

RATED OUTPUT		
Duty Cycle	**Amps**	**Volts at Rated Amps**
100%	145 amps	26
60%	200 amps	28
35%	250 amps	26

OUTPUT		
Current Range	**Maximum Open Circuit Voltage**	**Wire Speed Range**
30A - 250A	40V	50 - 600 IPM (1.27-15.2 m/minute)

RECOMMENDED INPUT WIRE & FUSE SIZE				
Input Voltage/ Frequency	**Fuse (Superlag) or Breaker Size**	**Type 75°C wire in Copper conduit AWG (IEC Sizes) Runs to 100ft. (30m.)**	**Runs over 100ft.(30m.)**	**Type 75°C Copper Ground Wire in Conduit**
208/60	60	8 (10mm²)	6 (16mm²)	10 (6mm²)
230/60	60	10 (6mm²)	8 (10mm²)	10 (6mm²)
460/60	30	14 (2.5mm²)	12 (4mm²)	10 (6mm²)
575/60	25	14 (2.5mm²)	12 (4mm²)	10 (6mm²)

PHYSICAL DIMENSIONS			
HEIGHT	**Width**	**DEPTH**	**WEIGHT (W/GUN)**
28.2" (719mm)	18.8" (480mm)	40.1" (1019mm)	222 lbs. (101 Kg.)

OPERATING TEMPERATURE	
STORAGE	**OPERATING**
± 40°C	-20°C to 40°C

Read entire Installation Section before installing the Idealarc® SP-255

SAFETY PRECAUTIONS

ELECTRIC SHOCK CAN KILL.

⚠ WARNING

- Only qualified personnel should install this machine.
- Turn the input power OFF at the disconnect switch or fuse box before working on the equipment.
- Do not touch electrically hot parts.
- Always connect the Idealarc® SP-255 grounding terminal (located on the side of the Case Back Assembly) to a good electrical earth ground.
- Set the Idealarc® SP-255 Power switch to the OFF position when connecting power cord to input power.

SELECT PROPER LOCATION

Place the Idealarc® SP-255 where clean air can freely circulate in through the back and out through the front louvers. Dirt, dust, or any foreign material that can be drawn into the machine should be kept at a minimum. Not following these precautions can result in the nuisance shutdown of the machine because of excessive operating temperatures.

STACKING

The Idealarc® SP-255 cannot be stacked.

INPUT CONNECTIONS

⚠ WARNING

All input power must be electrically disconnected before proceeding.

1. Before starting the installation, check with the local power company to determine if there is any question about whether your power supply is adequate for the voltage, amperes, phase, and frequency specified on the welder nameplate. Also be sure the planned installation will meet the U.S. National Electrical Code and local code requirements. This welder may be operated from a single-phase line or from one phase of a three-phase line.

2. Models that have multiple input voltages specified on the nameplate (e.g., 208/230) are shipped connected for the highest voltage. If the welder is to be operated at a lower voltage, it must be reconnected according to the instructions on the inside of the removable panel (Reconnect Access Door) near the top left side of the Case Back Assembly. Also see the ***Reconnect Section*** of this manual for details on reconnecting the machine to operate at different voltages.

3. Be sure the voltage, phase, and frequency of the input power is as specified on the machine rating plate. See Figure A.1 for the location of the machine's input cord entry, Reconnect Access Door, Reconnect Panel, and Rear Nameplate.

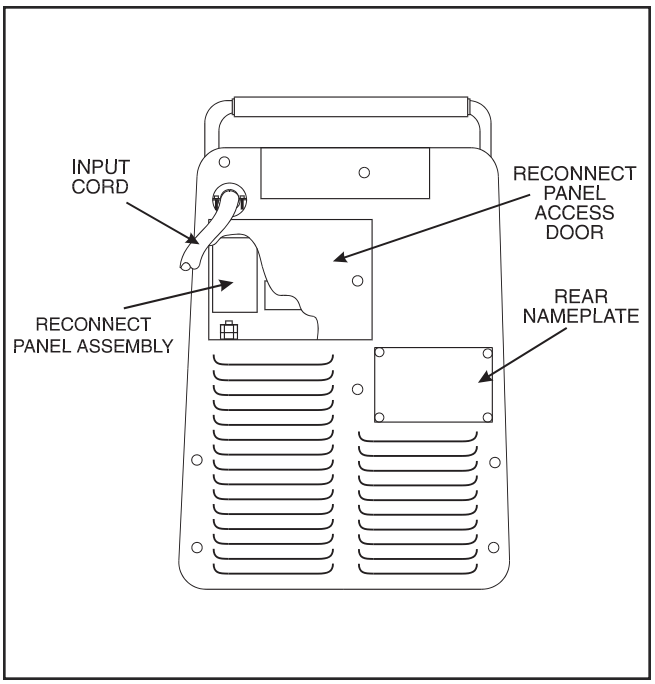

FIGURE A.1 - Case Back Assembly: Input Power Cable Entry Connections.

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FUSE AND WIRE SIZES

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

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

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

INPUT POWER CONNECTIONS AND GROUND CONNECTIONS

Have a qualified electrician connect the receptacle or cable to the input power lines and the system ground according to the U.S. National Electrical Code and any applicable local codes.

1. Follow the Input Supply Connection Diagram on the inside of the Reconnect Panel Access Door.

2. Use a single-phase line or one phase of a three-phase line.

For the 208V/230V/ 60 HZ model SP 255 shipped with a 10 ft. (3.0m) input cord and plug connected to the welder, mount the matching receptacle supplied with the machine.

1. Mount the receptacle in a suitable location using the screws provided.

2. Locate the receptacle within reach of the 10 ft. input cord attached to the welder.

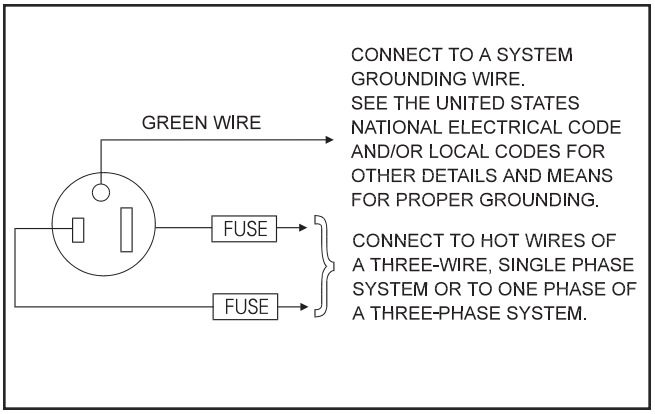
3. Mount the receptacle with the grounding terminal at the top. This allows the power cable to hang down without bending.

   a. The center terminal in the receptacle is for the grounding connection. See Figure A.2.

   b. Fuse the two hot lines of the receptacle with super lag type fuses as shown in Figure A.2. A green wire in the input cord connects this terminal to the frame of the welder. This ensures proper grounding of the welder frame when the welder plug is inserted into the receptacle.

4. Use proper wire sizes. See the ***Technical Specifications*** table for proper wire sizes. For cable lengths over 100 feet, larger copper wires should be used.

FIGURE A.2. - Ground Connections.



For the 230/460/575V/ 60 HZ model which is not equipped with a plug, an input cord, or a receptacle, the input power supply leads are connected directly to the Reconnect Panel as shown ***Figure A.3***. Refer to the specifications table at the beginning of this chapter for proper wiring sizes.

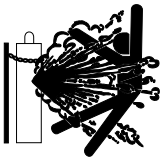
1. Have a qualified electrician connect the input power leads to terminals L1 and L2 on the Reconnect Panel Assembly. ***See Figure A.5***.

CONNECT SHIELDING GAS

(For Gas Metal Arc Welding Processes)

Customer must provide cylinder of appropriate type of shielding gas for gas metal arc welding for the process being used. ***See Figure A.4*** for the location of the components used to connect the air supply cylinder.

⚠ WARNING



CYLINDER may explode if damaged. Gas under pressure is explosive. Always keep gas cylinders in an upright position and always keep chained to undercarriage or stationary support. See American national Standard Z49.1, "Safety in Welding and Cutting" published by the American welding Society.

1. Set the gas cylinder on the rear platform of the SP 255.
2. Hook the chain in place to secure cylinder to rear of welder.
3. Remove the cylinder cap.
4. Inspect the cylinder valves for damaged threads, dirt, dust, oil or grease.
   a. Remove dust and dirt with a clean cloth.

NOTE: DO NOT ATTACH THE REGULATOR IF OIL, GREASE OR DAMAGE IS PRESENT! Inform your gas supplier of this condition. Oil or grease in the presence of high pressure oxygen is explosive.

5. Stand to one side away from the outlet and open the cylinder valve for an instant to blow away any dust or dirt which may have accumulated in the valve outlet.

BE SURE TO KEEP YOUR FACE AWAY FROM THE VALVE OUTLET WHEN OPENING THE VALVE.

6. Inspect the regulator for damaged threads, dirt, dust, oil or grease.
   a. Remove dust and dirt with a clean cloth.

NOTE: DO NOT USE THE REGULATOR IF OIL, GREASE OR DAMAGE IS PRESENT! Have an authorized repair station clean the regulator or repair any damage.

7. Attach the flow regulator to the cylinder valve and tighten the union nut(s) securely with a wrench.
   a. NOTE: If connecting the flow regulator to 100% CO_2 cylinder, insert regulator adapter provided between regulator and cylinder valve. If adapter is equipped with a plastic washer, be sure it is seated properly to connect to the CO_2 cylinder.
8. Connect one end of the inlet gas hose to the outlet fitting of the flow regulator.
9. Connect the other end of the inlet gas hose to the SP-255 rear fitting.
10. Tighten both the union nuts securely with a wrench.

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11. Before opening the cylinder valve, turn the regulator adjusting knob counter clockwise until the pressure is released from the adjusting spring.

12. Open the cylinder valve slowly a fraction of a turn.

    a. When the cylinder pressure gage pointer stops moving, open the valve fully.

NEVER STAND DIRECTLY IN FRONT OF OR BEHIND THE FLOW REGULATOR WHEN OPENING THE CYLINDER VALVE. ALWAYS STAND TO ONE SIDE.

13. Adjust the flow regulator for the flow rate recommended for the procedure and process being used before making the weld.

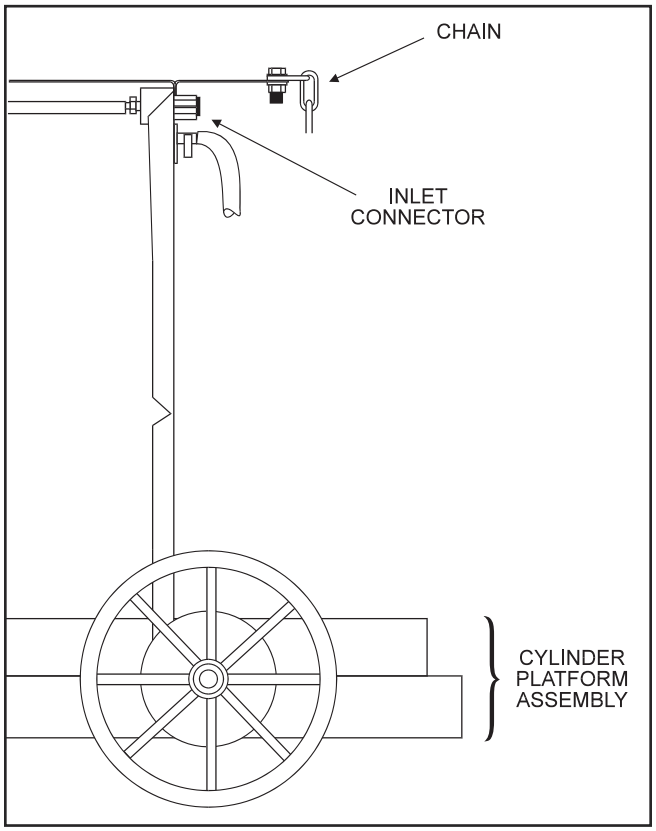

FIGURE A.3 - Shielding Gas Supply Connections

RECONNECT PROCEDURE

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

⚠ CAUTION

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

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

For code 10164 208/230/1/60 machine, ***see Figure A.4.***

For code 10165 230/460/575/1/60 machine ***see Figure A.5.***

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ALL MACHINES ARE SHIPPED FROM THE FACTORY CONNECTED FOR THE HIGHER OF THE TWO INPUT VOLTAGES LISTED ON THE NAMEPLATE. TO CHANGE VOLTAGE CONNECTION PROCEED AS FOLLOWS:

1. REMOVE THE OUTER STEEL HEX NUT FROM THE TERMINAL WHERE THE TRANSFORMER INPUT LEAD IS CONNECTED.
2. SHIFT THE TRANSFORMER INPUT LEAD TO THE TERMINAL THAT THE UNIT IS TO OPERATE ON AND FASTEN SECURELY WITH THE HEX NUT REMOVED IN STEP1. (MAKE CERTAIN THAT BRASS NUTS ARE TIGHT.)

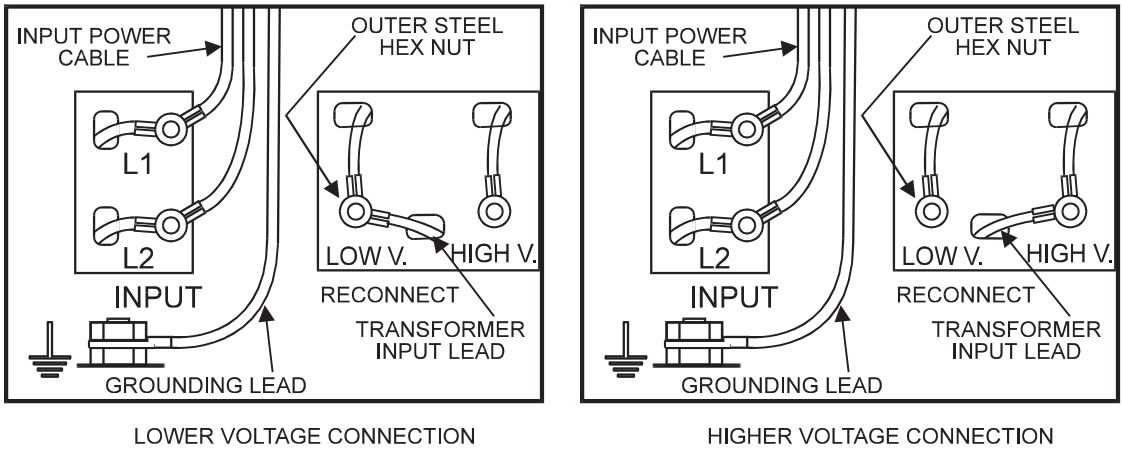

FIGURE A.4 - Reconnect Diagram For 208/230/1/60 Machines.

1. ALL MACHINES ARE SHIPPED FROM THE FACTORY CONNECTED FOR THE HIGHEST NAME-PLATED SINGLE PHASE INPUT VOLTAGE. TO CHANGE CONNECTIONS FOR A DIFFERENT INPUT VOLTAGE, RECONNECT BOTH COPPER JUMPERS PER DIAGRAM BELOW. ALWAYS CONNECT JUMPERS BETWEEN OUTER STEEL NUT AND INNER BRASS NUT ON TERMINAL STUDS.
2. CONNECT THE INPUT POWER TO THE INPUT TERMINAL BLOCK, L1 AND L2 AT THE UPPER CORNER OF THE PANEL. (TORQUE TO 16 IN-LBS)
3. CONNECT A GROUNDING LEAD TO THE GROUND STUD (⏚) ON THE MACHINE NEAR THE TERMINAL BLOCK.

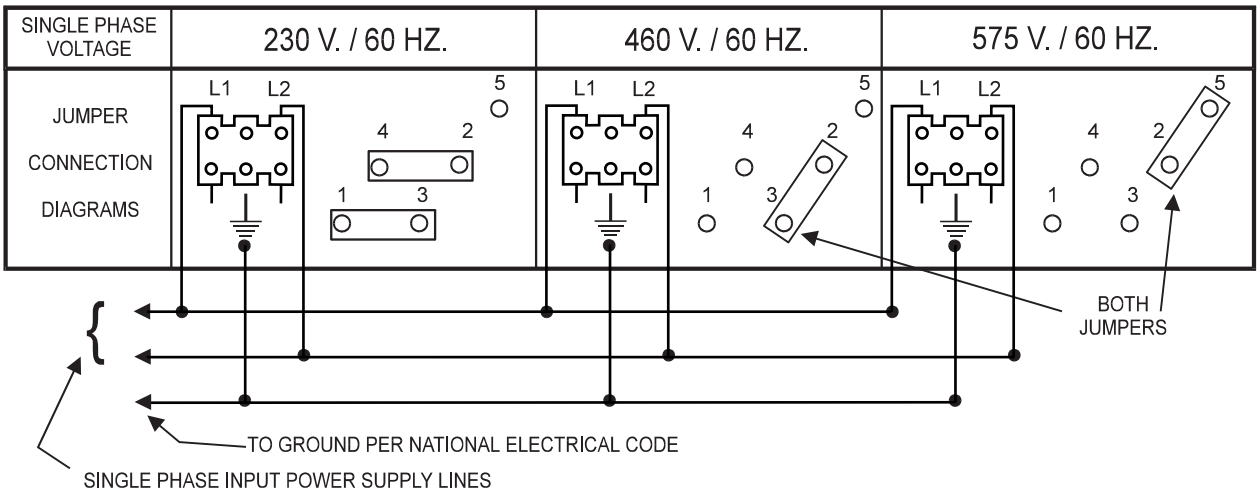

FIGURE A.5 - Reconnect Diagram For 230/460/575/1/60 Machines.

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CONNECT OUTPUT COMPONENTS

INSTALL THE WORK CLAMP

Attach the work clamp to the cable which extends from the front of the machine using the following procedure:

1. Insert the lug on the end of the work cable through the strain relief hole in the work clamp handle. See Figure A.6.

2. Slide the work cable through the hole up to the bolt and nut.

3. Fasten work cable using the bolt and nut provided.

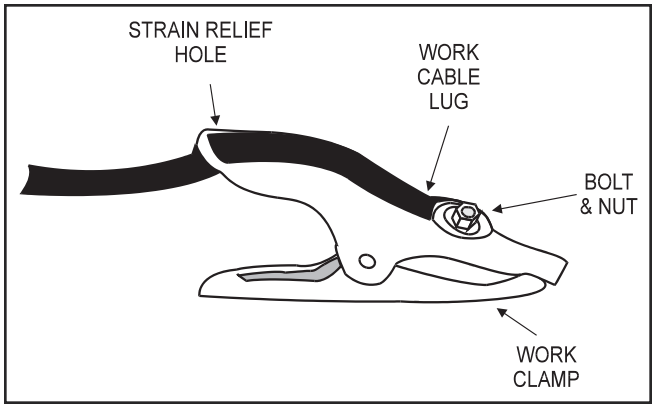

FIGURE A.6 - Installing The Work Clamp

OUTPUT POLARITY CONNECTION

⚠ WARNING

TURN THE WELDER POWER SWITCH OFF BEFORE CHANGING OUTPUT CONNECTION.

The welder is shipped from the factory connected for electrode positive (+) polarity. This is the normal polarity for GMA welding.

If negative (-) polarity is required, interchange the connection of the electrode and work cables at the output terminals located in the wire drive compartment near the front panel. The electrode cable, which is attached to the wire drive, is to be connected to the negative (-) labeled output terminal. The work cable which is attached to the work clamp is to be connected to the positive (+) labeled output terminal.

GUN LINER & CONTACT TIP

The Magnum 250 SP gun and cable provided with the SP-255 is factory installed with a liner for a .035" or .045" (0.9 or 1.2mm) diameter electrode and an .035 (0.9mm) contact tip. If a .045" diameter wire size is to be used, install the .045" contact tip (also provided). See ***Maintenance Section***.

GUN & CABLE INSTALLATION

⚠ WARNING

TURN THE WELDER POWER SWITCH OFF BEFORE INSTALLING GUN AND CABLE.

1. Lay the cable out straight.

2. Make sure all pins on the gun cable connector are aligned with the proper mating sockets on the front panel gun connector and then join the connectors and tighten the hand nut on the gun cable connector.

NOTE: If a gun and cable other than the Magnum 250 SP is to be used, it must conform to standard European style connector (Magnum Fast Mate) specifications. See Figure A.7.

NOTE: The thumb switch functions available on the Magnum 250 SP gun will only be operable from the front panel keypad. The gun trigger switch must be capable of switching 5 milliamps at 15 volts DC resistive.

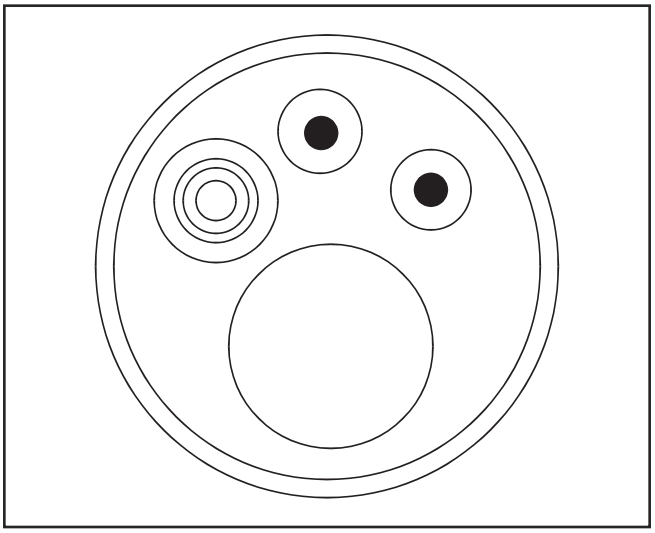

FIGURE A.7 - European(FM) Style Connector

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⚠ CAUTION

The gun trigger switch connected to the gun trigger control cable must be a normally open momentary switch. The terminals of the switch must be insulated from the welding circuit. Improper operation of or damage to the SP-255 might result if this switch is common to an electrical circuit other than the SP-255 trigger circuit.

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Read and understand this entire section before operating your Idealarc® SP-255.

SAFETY INSTRUCTIONS

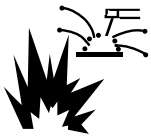
⚠ WARNING

ELECTRIC SHOCK can kill.

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

FUMES AND GASES can be dangerous.

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



WELDING, CUTTING and GOUGING SPARKS can cause fire or explosion

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

ARC RAYS can burn.

- Wear eye, ear and body protection.

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

ADDITIONAL SAFETY PRECAUTIONS

Always operate the welder with the hinged door closed and the side panels in place as these provide maximum protection from moving parts and insure proper cooling air flow.

GENERAL DESCRIPTION

Product Description

The Idealarc® SP-255 is a complete semiautomatic constant voltage DC arc welding machine built to meet NEMA specifications. This unit combines a constant voltage power source, a constant speed wire feeder, and a microcomputer-based controller to form an intelligent welding system.

A front panel touch key entry system with audible feedback, along with a two-line, 32 character alphanumeric display, provide user friendly control of the system. The system provides full range control from the keypad or from the thumb switch built into the SP-255 welding gun, which permits "on the fly" control while welding

Multi language display capability allows the SP-255 to communicate with the user in any of the following five languages: English, German, French, Spanish, or Japanese (Katakana).

Proper welding setup is simple. You only need to select the gauge size of the material to be welded and enter the welding process to be used. With that data, the system

- automatically computes the proper wire feed speed and arc voltage relationship for the process.
- selects the right procedure for optimum starting, welding, and burnback.

The system allows you to store up to five separate welding setup procedures. You can recall them at any time at the touch of a single key. All active setup selections, as well as those stored in the memory locations, are automatically saved when power is turned off or disconnected. Whatever procedure was being used when power was removed, will be recalled when power is returned. The SP-255 does not require batteries to maintain memory data.

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RECOMMENDED PROCESSES AND EQUIPMENT

The SP-255 is recommended for GMA welding processes using 10 to 44 lb. (4.5 to 20 kg) 2" (51mm) I.D. spools or Readi-Reel coils of

- .025" through .045" (0.6 - 1.2mm) solid steel using CO_2, $ArCO_2$, or ArO_2 shielding gas
- .035" (0.9mm) stainless steel using ArO_2 or $HeArCO_2$ shielding gas
- 3/64" (1.2mm) aluminum using Ar shielding gas
- .045" (1.2mm) Outershield- electrodes using CO_2 or $ArCO_2$ shielding gas
- .035" (0.9mm) and .045 (1.2mm) Innershield self-shielded electrodes.

The SP-255 is factory equipped to feed .035 (0.9mm) and .045 (1.2mm) electrodes and includes a 200A, 60% duty cycle rated, 12.5 ft. (3.8m) GMA gun and cable assembly equipped for these wire sizes. The SP-255 is factory equipped with an adjustable CO_2 or argon blend flow regulator. A supply of shielding gas is required for GMAW processes.

OPERATIONAL FEATURES AND CONTROLS

Keypad - Consists of 20 membrane keys that have large touch areas. The keys are spaced far enough apart to provide easy selection, even if wearing welding gloves. An audible feedback beep is provided whenever a key is pressed to ensure proper entry.

Display - Wide temperature range liquid crystal display combines large 0.32" (8.1mm) high characters in a 2-line by 16-character alphanumeric format. It has long life LED backlighting and a non-glare cover for easy viewing under bright or dark conditions. Multi language display capability permits the SP-255 to communicate in English, German, French, Spanish, or Japanese (Katakana).

Auto Mode - Simply set the thickness of the material being welded and the SP-255 automatically sets the proper wire feed speed and arc voltage for the process being used. This eliminates the need for look-up tables, procedure slide rules, or notebooks to find the proper settings. Auto Mode also provides one key control of the output by automatically adjusting both the wire feed speed and arc voltage for an increase or decrease in material thickness or wire feed speed. This allows the operator to easily increase or decrease his output without having to know how much to change each parameter.

Thumb Switch on Gun - Allows the operator to set or change the output of the machine, the wire feed speed, or the arc voltage from the gun, even during welding. This permits "on the fly" adjustment. In toggle operation mode, the thumb switch allows the operator to toggle between two procedures stored in memory.

Memory - There are five separate memory locations that the operator can use to save or recall a setup procedure. This eliminates dial marking and makes recalling a setup as simple as pushing one of the five memory keys for instant recall. Also, when power is removed, these five memories as well as any current setup in use is automatically saved. This feature does not require batteries. When power is restored, the procedure in use will automatically return the unit to whatever was set up was being used when power was removed.

Trigger Interlock - Selectable four-step trigger interlock allows operator to release gun trigger after weld current is established and continue welding. Breaking the arc or re-closing and then releasing the gun trigger, stops the welding process.

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DESIGN FEATURES AND ADVANTAGES

UNIT FEATURES:

Undercarriage for Hand Mobility - Heavy duty 10" (254mm) wheels and 4" (102mm) casters are factory installed along with the handle. Handle can be used for hanging the welding gun and work cable.

Gas Cylinder Platform - Factory installed on undercarriage. It permits platform mounting and support of a single gas cylinder. No full lifting of gas cylinder required during loading.

Adjustable Flow Regulator - Accommodates CO_2 or argon blend gas. Includes a cylinder pressure gauge and a dual seal flow gauge.

Easy Accessibility - Wire feeder compartment enclosure door protects wire and wire drive from dirt, dust, and damage, but allows easy access for wire reel loading, and to load or service the wire drive. A convenient parts bin is included above the wire drive to provide storage for feeder and gun replacement parts.

POWER SOURCE FEATURES:

10 Ft. (3.0m) Input Power Cable - Includes plug and mating receptacle for 208/230V unit. Convenient rear panel reconnect allows easy access for 208V re-connection.

Power Switch - Front panel toggle switch turns input power on and off.

Thermostatically Controlled Fans - Provides cooling of transformer and other components only when required. When used intermittently or at low current procedures, the fan motors stay off, reducing the amount of dust and dirt drawn into the machine. Also reduces power consumption.

Electronic Overload Protection - Protects machine from short circuit or high current overloading.

Power Source Line Voltage Regulation - Precise SCR phase control circuit holds the voltage setting constant to maintain weld quality even when the input voltage fluctuates +/-10%.

Solid State Contactor - Output is turned on and off by SCR's instead of a mechanical contactor providing extra long life in highly repetitive welding applications.
Automatic Burnback - Provides proper burnback of the electrode to prevent it from sticking in the weld puddle at the end of a weld.

Output Terminals - Easily accessible in wire drive section for quick cable connection and polarity reversal.

Work Cable - 10 ft. (3.0m) long with work clamp.

WIRE FEEDER FEATURES:

Wire Loading - Adjustable brake spindle mounts Readi-Reel® Adapter, included with SP-255, or most any 2" (51mm) I.D. wire spool. Accommodating standard 12" (305mm) and 8" (203mm) diameter coils, the spindle's adjustable brake provides appropriate de-reeling drag to prevent wire reel overrun and loop-offs.

Tachometer Controlled Wire Drive - Precision control of permanent magnet motor provides proper wire feed acceleration and speed accuracy, independent of fluctuations in line voltage and wire loading. This means reliable arc starting and weld consistency.

Selectable Run-In Speed and Volts - A user selectable feature allows the wire feeder to feed wire directly at the select speed, as factory selected, or when the trigger is pulled the wire feeder feeds wire at slow speed regardless of the set wire feed speed until welding current is drawn or 2 seconds has expired. This feature enhances starting and makes setting stick out a snap. The 2 second limit permits high speed loading of the gun and cable.
While selecting fast or slow run-in speed, the run-in output voltage level may also be adjusted, at control panel or with gun switch, to further enhance arc starting.

Solid State Wire Feed Overload Protection - No circuit breaker to reset. Simply pull the trigger to resume welding once the overload condition has been cleared.

Unique Drive Roll and Guide Tube Design - Long life, precisely aligned guide tubes and drive rolls. Quickly reloads by simply starting wire into ingoing guide tube. Adjustable tension setting minimizes 'birdnesting', eliminates milling through the wire, and gives positive feeding. The double groove, reversible drive roll included with the SP-255 allows use of .030 (0.8mm) through .045 (1.2mm) diameter wire. Drive Roll kits for other sizes and types of wire are also available.

Fast-Mate Gun Connector - European style gun connector provides electrode, shielding gas and gun control lead connections in a single connector.

Gun and Cable - A 12.5 ft. (3.8) GMAW gun and cable assembly, rated 200 amps 60% duty, is provided with the SP-255 and includes a liner, diffuser, and contact tips for .035 (0.9mm) and .045 (1.2mm) electrodes. The gun is equipped with a Fast-Mate connector with additional control lead connections for the thumb activated 2 momentary position slide switch control designed into the gun handle for use with SP-255 remote control features.

MACHINE CAPABILITY

The Idealarc® SP-255 is rated at the following duty cycles based upon 10 minute time period (i.e., for 60% duty cycle, it is 6 minutes on and 4 minutes off).

DUTY CYCLE	AMPS	VOLTS
100%	145	26
60%	200	28
35%	250	26

LIMITATIONS

The SP-255 may not operate satisfactorily if powered with a portable or in-plant generating system.

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CONTROLS AND SETTINGS

All operator controls are located on the Front Panel Keypad/Nameplate. See Figure B.1 for the location of each control.

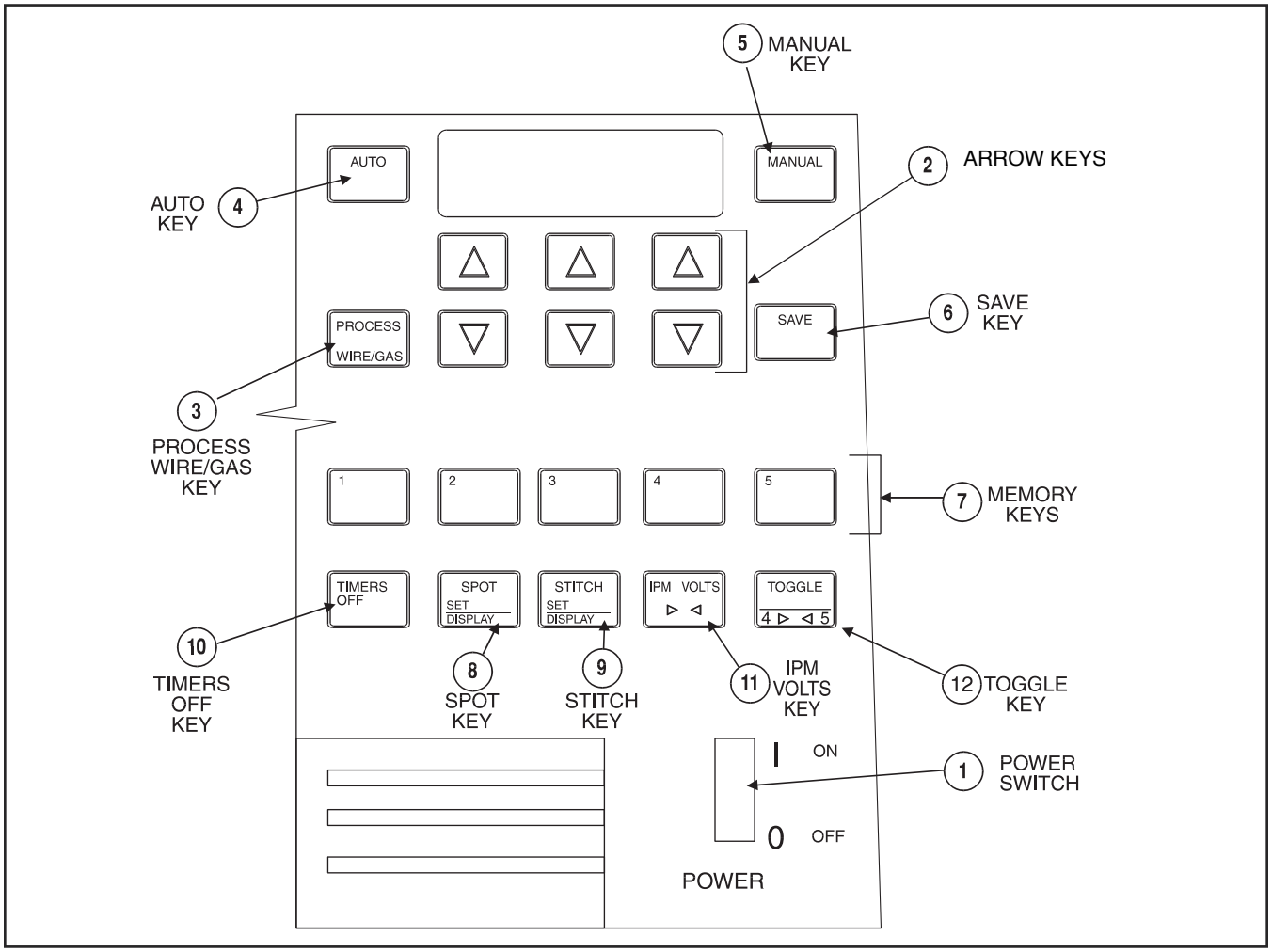

FIGURE B.1 - SP-255 Control Panel Keys

1. **POWER SWITCH:** Toggle switch to turn input power ON and OFF. When the switch is in the ON position the red LED backlighting of the LCD display lights and alphanumeric characters appear. The welding setup in operation when the power was shut off or disconnected is displayed when power is restored.

2. **ARROW KEYS:** Press keys to change the display selection directly above the keys. See Figure B.1. The left arrow keys continue to increment or decrement the selection above it at a slow, steady rate as long as the arrow key is pressed. The center and right sets of arrow keys increment and decrement the selections above them at a slow rate, but the rate will gradually increase until it becomes very rapid. This allows rapid setting from a small quantity to a large quantity or vice versa while maintaining an excellent resolution. However, when the trigger is closed, the changes will be at a steady, moderate rate to allow for proper "on the fly" control. Function of arrow keys change depending on PROCESS KEY being used. For function of arrow keys, refer to each process or procedure. See Table B.1 for summary of arrow key operation.

3. **PROCESS WIRE/GAS KEY:** Press key to display the Wire Type, Wire Diameter, and Welding Gas. Each combination of wire and gas dictates a unique relationship between the wire feed speed and the arc voltage. The SP-255 uses this unique relationship, along with the metal thickness, to set the proper values for wire feed speed and arc voltage. Therefore, it is very important that the wire type, wire diameter, and welding gas displayed match the actual wire type, wire diameter, and welding gas being used for the weld.

TABLE B.1 - Arrow Key Functions.

KEY	PRESS TO SELECT LEFT	PRESS TO SELECT CENTER	PRESS TO SELECT RIGHT	DISPLAY
PROCESS WIRE/GAS	Wire Type	Wire Diameter	Welding Gas	Wire Type: SOLID STEEL GAS / WIRE .035 $ArCO_2$ — Wire Diameter; Welding Gas
AUTO	Metal Thickness	Wire Feed Speed	Arc Voltage	Automatic Mode: AUTO: IPM VOLTS / 14GA 229 17.8 — Metal Thickness; Wire Feed Speed; Arc Voltage
MANUAL	No Function	Wire Feed Speed	Arc Voltage	Manual Mode: MANUAL: IPM VOLTS / 240 17.8 — Wire Feed Speed; Arc Voltage
SAVE	No Function	No Function	No Function	
SPOT SET DISPLAY	No Function	Spot Weld On Time	No Function	Spot Welder Timer On: SPOT: ON / 2.50s — Selected On Time
STITCH SET DISPLAY	No Function	Stitch Weld On Time	Stitch Weld Off Time	Stitch Weld Timer On: STITCH: ON - - - OFF / 1.90s 1.25s — Selected On Time; Selected Off Time
TOGGLE 4 ▷ ◁ 5	Metal Thickness (Auto Mode Only)	Wire Feed Speed	Arc Voltage	Memory Currently Active: 4 AUTO: IPM VOLTS / 14GA 229 17.8; 5 MAN: IPM VOLTS / 356 24.3

ARROW KEY OPERATION WHEN USED WITH PROCESS WIRE/GAS KEY:

See Table B.1.

Left Arrow Keys: Press to set Wire Type. Pressing the UP and DOWN arrow keys changes the Wire Type displayed.

Center Arrow Keys: Press to set Wire Diameter. Press the UP (▲) arrow key to increase the wire diameter displayed. Press the DOWN (▼) arrow key to decrease the wire diameter displayed.

Right Arrow Keys: Press to select Welding Gas. Pressing the UP and DOWN arrow keys changes the Welding Gas displayed.

The following 16 processes are programmed into the SP-255:

Wire Type	Wire Diameter	Welding Gas
Solid Steel	.025 (0.6mm)	CO_2
Solid Steel	.025 (0.6mm)	$ArCO_2$
Solid Steel	.030 (0.8mm)	CO_2
Solid Steel	.030 (0.8mm)	$ArCO_2$
Solid Steel	.035 (0.9mm)	CO_2
Solid Steel	035 (0.9mm)	$ArCO_2$
Solid Steel	.035 (0.9mm)	ArOxy
Solid Steel	.045 (1.2mm)	CO_2
Solid Steel	.045 (1.2mm)	$ArCO_2$
Stainless	.035 (0.9mm)	ArOxy
Stainless	035 (0.9mm)	HeArCo2
Aluminum (5356)	3/64 (1.2mm)	Argon
Outershield	.045 (1.2mm)	CO_2
Outershield	.045 (1.2mm)	$ArCO_2$
Innershield	.035 (0.9mm)	None
Innershield	.045 (1.2mm)	None

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4. **AUTO KEY:** Press for automatic welding set up of recommended Wire Speed and Arc Voltage based on Metal Thickness selected.

ARROW KEY OPERATION WHEN USED WITH AUTO KEY:

See Table B.1.

Left Arrow Keys: Press to change the metal thickness displayed. Press the UP (▲)arrow key to increase metal thickness. Press the DOWN (▼) arrow key to decrease the metal thickness. Increasing or decreasing metal thickness automatically increases or decreases both wire feed speed (IPM) and arc voltage (VOLTS) simultaneously. See gauge chart on the instruction label on the inside of SP-255 door for available sizes.

NOTE: If the spot or stitch timers are on, metal thickness is not displayed and, therefore, the left arrow keys will not function. Also, the left arrow keys do not function when trigger is closed.

Center Arrow Keys: Press to change wire feed speed setting. Press the UP (▲) arrow key to increase the wire feed speed setting displayed. Press the DOWN (▼) arrow key to decrease the wire feed speed setting displayed. Increasing or decreasing the wire feed speed simultaneously causes an increase or decrease in the arc voltage and can change the metal thickness setting.

Right Arrow Keys: Press to change arc voltage setting. Press the UP (▲) arrow key to increase the arc voltage setting displayed. Press the DOWN (▼) arrow key to decrease arc voltage setting displayed. An up arrow indicator appears below the V in VOLTS if the arc voltage has been set higher than the recommended value. A down arrow indicator appears below the V in VOLTS if the arc voltage is below the recommended value. No arrow indicates that you are set to the recommended value.

Pressing the AUTO key again resets the wire feed speed and arc voltage settings to the recommended values for the metal thickness displayed. (NOTE: If the spot or stitch timers are on, metal thickness is not displayed and, therefore, the reset function does not work.)

5. **MANUAL KEY:** Press to set wire feed speed and arc voltage for manual procedure setup. The manual screen displays wire feed speed, arc voltage, and a cursor that indicates when the wire feed speed or arc voltage is being controlled by the thumb switch on the SP-255 gun.

ARROW KEY OPERATION WHEN USED WITH MANUAL KEY:

See Table B.1.

Left arrow keys: Do not function in Manual mode.

Center arrow keys: Press the UP (▲) arrow key to increase wire feed speed. Press the DOWN (▼) arrow key to decrease wire feed speed.

Right arrow key: Press the UP (▲) arrow key to increase arc voltage. Press the DOWN (▼) arrow key to decrease arc voltage.

NOTE: If the spot or stitch timers are ON, it will be indicated in the bottom left corner of the display. See Figure B.2.

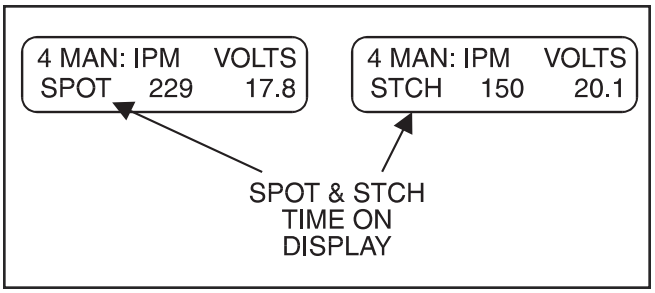

FIGURE B.2 - Display when Stitch or Spot Weld Timers are ON.

6. **SAVE KEY:** Press to save the current set up. The process, procedure, and timer functions (if used) are saved to one of five memory locations by pressing one of the five memory keys. When the Save key is pressed, a prompting message instructing the operator to "PRESS MEMORY 1-5 TO SAVE SETUP" is displayed. See Figure B. 3 for sample SAVE sequence. This message remains displayed until a memory number key is selected or one of the other keys, such as Auto, Manual, or Process, is pressed. If a memory number key is selected, a message will be displayed for 2.5 seconds that confirms that the setup was saved to that memory number.

The six arrow keys perform no function when saving a setup.

NOTE: When a setup is saved to a memory location, the previous contents of that memory is lost because it is replaced by the present setup. Removing input power does not effect the setup in memory.

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7. **MEMORY KEYS:** Press memory key location number in which you want to save a procedure or from which you want to recall a procedure from memory. See ***SAVE Key***.

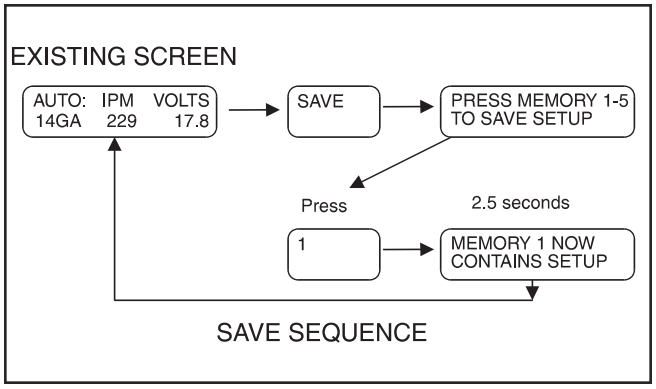

FIGURE B.3 - Sample SAVE Sequence.

8. **SPOT KEY:** Press to turn ON the Spot Weld Timer and display the spot weld ON time. Pressing the SPOT KEY a second time returns the screen to the previous display without turning off the spot timer. Anytime the Spot weld timer is on and the display is in the Auto or Manual mode, the word SPOT will appear in the bottom left corner of the display. ***See Figure B.2***.

ARROW KEY OPERATION WHEN USED WITH SPOT KEY:
See Table B.1.

Left arrow keys: Do not function.

Center arrow keys: Press UP (▲arrow key to increase Spot Weld ON time from 0.20 seconds to 2.5 seconds. Press DOWN (▼) arrow key to decrease Spot ON time from 2.5 seconds to 0.20 seconds.

Right arrow keys: - Do not function.

9. **STITCH KEY:** Press to turn Stitch Weld timers ON and display the Stitch Weld ON and OFF times. Pressing the STITCH key a second time returns the screen to the previous display without turning off the stitch timers. Anytime the Stitch weld timers are on and the display is in the Auto or Manual mode, the abbreviation STCH will appear in the bottom left corner of the display. See Figure B.2.

ARROW KEY OPERATION WHEN USED WITH STITCH KEY:

See Table B.1.

Left arrow keys: Do not function.

Center arrow keys: Press UP (▲) arrow key to increase Stitch time ON from 0.20 seconds to 2.50 seconds. Press the DOWN (▼) arrow key to decrease Stitch ON time from 2.50 seconds to 0.20 seconds.

Right arrow keys: Press UP (▲) arrow key to increase Stitch OFF time from 0.20 seconds to 2.50 seconds. Press DOWN (▼) arrow key to decrease Stitch OFF time from 2.50 seconds to 0.20 seconds.

10. **TIMERS OFF KEY:** Press to turn OFF both Spot and Stitch timers. When the TIMERS OFF key is pressed the indicating letters from the bottom left corner of the Auto and Manual mode display disappears.

The six arrow keys do not function with this key.

11. **GUN SWITCH CONTROL IPM VOLTS KEY:** Press to engage the gun thumb switch to control IPM or VOLTS. Pushing the gun thumb switch forward (toward the tip) increases IPM or VOLTS . Pulling gun thumb switch back decreases IPM or VOLTS. The underlining cursor always indicates the selection being controlled by the gun thumb switch. See Figure B.4.

If the cursor is not present, the gun thumb switch does not function. This prevents any inadvertent actuations. Each time this IPM VOLTS key is pressed, the cursor moves in the following sequence: IPM to VOLTS to no cursor. The sequence continues each time the key is pressed.

NOTE: In Auto Mode, changing IPM changes arc voltage. This can result in a change in metal thickness setting as well.

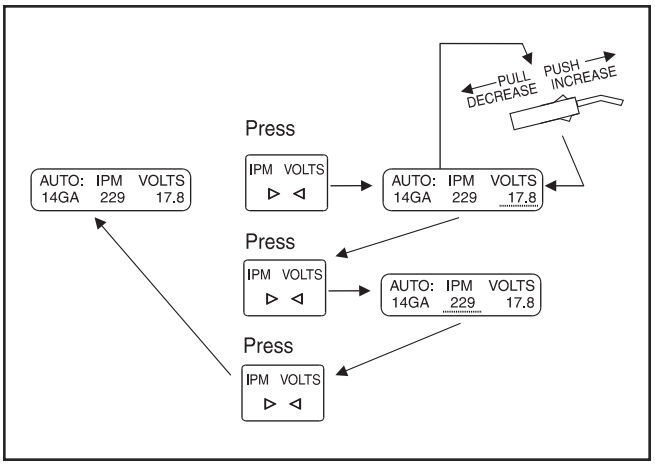

FIGURE B.4 - Using the IPM VOLTS key.

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12. TOGGLE KEY: When first pressed, this key turns ON the TOGGLE MODE and recalls the weld setup in memory 4. Pressing the key again switches to the weld setup in memory location 5. Each time the key is pressed, it alternates between the two memory locations. When the TOGGLE key is pressed, the LED screen displays the memory number the current setup was recalled from, indicates automatic (AUTO:) or manual (MAN:) mode, displays wire gauge (Auto Mode), wire feed speed, and arc voltage. The cursor underlines the memory number currently selected.

If in AUTO mode, an up or down arrow shows whether the arc voltage has been adjusted above or below the recommended level. Spot or Stitch timer status is displayed in the lower left-hand corner if either timer is active.

The gun thumb switch functions as a Toggle key in Toggle mode. Pushing the gun thumb switch forward (toward the tip) selects the setup in memory 5. Pulling gun thumb switch back selects the setup in memory 4. The gun thumb switch also functions with the trigger closed for "on the fly" changes during a weld. See Figure B.5.

To turn the toggle mode off, press the AUTO, MANUAL, or any MEMORY Number key.

NOTE: Any changes made to settings in toggle mode are not automatically saved when power is removed, or if toggle mode is turned off. To save these changes

Press the SAVE key
Press the MEMORY number key that is currently displayed on the screen (4 or 5)
Press the SAVE key
Press other MEMORY Number key that was displayed after the toggle (5 or 4).

When power is returned, the machine will not be in the toggle mode. However, the weld setting placed in memory when power was removed will return so you may continue to weld right where you left off. Press the TOGGLE key to return to toggle mode.

ARROW KEY OPERATION WHEN USED WITH THE TOGGLE KEY

See Table B.1.

Left arrow keys: If metal thickness is displayed, Press the UP (▲) arrow key to increase metal thickness. Press the DOWN (▼) arrow key to decrease metal thickness. The Left arrow keys do not perform any function in any other mode.

Center arrow keys: Press the UP (▲) arrow key to increase wire feed speed. Press DOWN (▼) arrow key to decrease wire feed speed setting. If in Auto Mode, increasing or decreasing wire feed speed simultaneously causes an increase or decrease in the arc voltage and can change the metal thickness setting.

Right arrow keys: Press the UP (▲) arrow key to increases arc voltage setting. Press the DOWN (▼) arrow key to decrease the arc voltage setting. When in the Auto Mode, an up arrow indicator appears below the V in VOLTS if the arc voltage has been set higher than the recommended value. A down arrow indicator appears below the V in VOLTS if the arc voltage is below the recommended value. No arrow indicates that you are set to the recommended value.

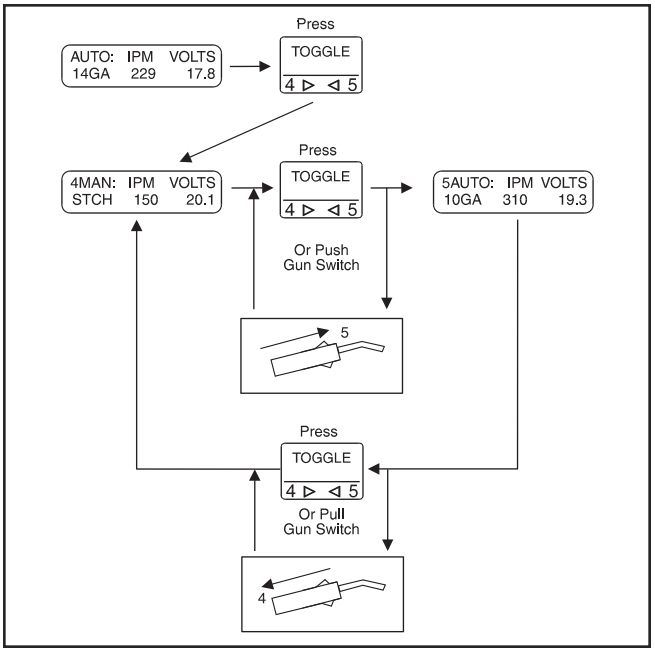

FIGURE B.5 - Using the TOGGLE Function.

4-STEP TRIGGER INTERLOCK KEYS

Pressing PROCESS WIRE/GAS and TOGGLE 4 ▷ ◁ 5

Controls whether 4-step trigger interlock is activated or deactivated. (See “Using 4-step Trigger Interlock Function” section.

NOTE: 4-Step Trigger is automatically deactivated if either the spot or stitch timer mode is being used.

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OPERATING STEPS

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

DISPLAY LANGUAGE SELECTION

The SP-255 has multilingual display capability permitting the SP-255 prompts, messages, and other display information to be in any of five languages: English, German, French, Spanish, and Japanese (Katakana). The user may select the chosen language by simultaneously pressing the PROCESS Key and the appropriate Number Key per the instructions given in the appropriate language on the Keypad Instruction Decal inside the SP-255 door, also shown below:

For ENGLISH display press both keys at the same time.	PROCESS WIRE/GAS	and	1
Für die optische Anzeige auf DEUTSCH sind beide Tasten gleichzeitig zu drüken.	PROCESS WIRE/GAS	und	2
Pour l'affichage en FRANCAIS appuyez les deux touches en même temps.	PROCESS WIRE/GAS	et	3
Para monstrar en ESPAÑOL pulsar las dos teclas a la vez.	PROCESS WIRE/GAS	y	4
ニホンゴノヒョージハ リョーホーノ キーヲ ドージニ オス	PROCESS WIRE/GAS	ト	5

START MODE SELECTIONS

The SP-255 permits selection of Fast/Slow Run-in wire feed speed as well as adjustment of the start striking voltage, to optimize arc starting, using the starting screen display.

PROCESS WIRE/GAS
TIMERS OFF

The starting screen (see Figures B.6 and B.7) is displayed by pressing and holding both the PROCESS key and the TIMERS OFF key at the same time.

FIGURE B.6

1. **Run-In Speed**
   The SP-255 is factory set for FAST run-in (Figure B.6) where the wire feed will accelerate directly to the preset speed. SLOW run-in will initially feed at 50 IPM until welding current is sensed, or for 2 seconds if feeding without welding (loading wire).

   SLOW run-in may be selected using the left arrow keys which will toggle the starting screen display to SLOW (Figure B.7) or back to FAST (Figure B.6)

FIGURE B.7

2. **Start Voltage**
   The START voltage setting (FIGURES B.6 and B.7) may be offset from the factory programmed level (00%) by up to ±30% above or below programmed level using the right arrow keys, or from the gun thumbswitch by positioning the screen cursor beneath the START display using the IPM-VOLTS key. (See "Gun Switch Keys" In this section.

3. **Spool Gun Start Mode**
   If using optional spool gun mode (see "Making a Weld with the Spool Gun" in Accessories section), the RUN-IN portion of the starting screen is not functional and will not be displayed. The START voltage is adjusted as described above. The starting screen is exited by pressing any key on the keypad except TIMERS OFF, IPM-VOLTS or any arrow key. Closing Gun Trigger will also not clear the starting screen.

NOTE: It is not necessary to repeat the above procedure each time the unit is powered up. That is, the unit will remember the start mode settings from the previous power down and return you to that same state upon your next power up. Thus, you need only perform the above procedure when you want to change the start mode settings.

When saving to Memory locations 1-5, the start mode at the time of saving will be saved into the memory location as well. Thus, the operator should be aware that when recalling a memorized procedure, he is also recalling particular start mode which will override any present start mode setting and remain in effect until either the mode is changed using the above procedure containing another start mode is recalled.

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LOADING THE WIRE REEL

To mount a 22-30 lb. (10-14 kg) Readi-Reel package using the Readi-Reel adapter provided:

1. Remove the locking collar from the 2” (51 mm) O.D. spindle and mount the K363P Adapter so the spindle pin engages the hole provided in the Adapter. Replace and tighten the locking collar.

2. Rotate the spindle and adapter so the retaining spring is at the 12 o'clock position.

3. Position the Readi-Reel so that it will rotate in a clockwise direction when wire is dereeled from the top of the coil. See Figure B. 8.

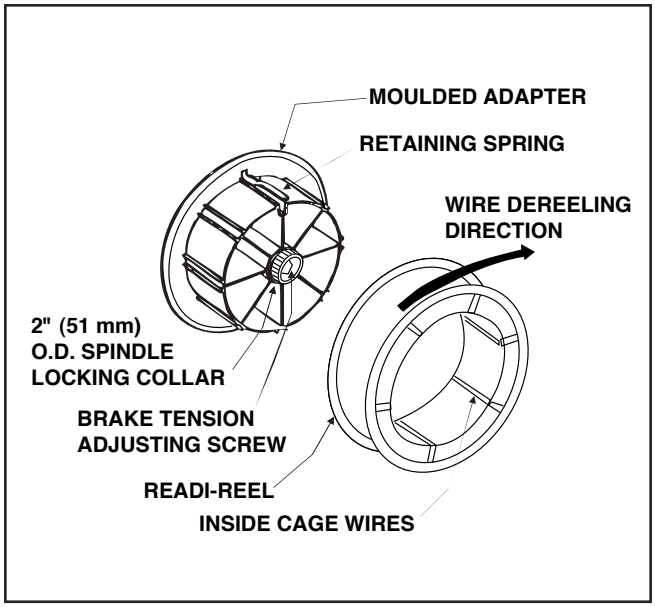

FIGURE B. 8 - Wire Reel Loading.

4. Set one of the Readi-Reel inside cage wires on the slot in the retaining spring tab.

5. Lower the Readi-Reel to depress the retaining spring and align the other inside cage wires with the grooves in the molded adapter.

6. Slide the cage all the way onto the adapter until the retaining spring "pops up" fully.

⚠ WARNING

Check to be sure the the retaining spring has fully returned to the locking position and has securely locked the readi-reel cage in place. Retaining spring must rest on the cage, not the welding electrode.

NOTE: The retaining spring side of the adapter should be facing the center (inner) panel of the SP-255.

7. To remove the Readi-Reel from Adapter, depress retaining spring tab with thumb while pulling the Readi-Reel cage from the molded adapter with both hands. Do not remove adapter from spindle.

To mount 10 to 44 lb. (4.5 to 20 kg) spools: 8" (200mm) [use K468 Adapter] and 12" (300 mm) diameter:

1. Remove the locking collar and the Readi-Reel adapter (if installed) on the 2 inch (51 mm) diameter spindle.

2. If using an 8” (200 mm) spool, place the K468 adapter on the spindle first. The hole in the adapter arm is to engage the pin on the spindle.

3. Place the spool on the spindle, making certain the brake driving pin enters one of the holes in the back side of the spool. Be certain the wire comes off the reel in a clockwise direction when dereeled from the top of the coil.

4. Replace and tighten the locking collar for several seconds.

STARTING THE WELDER

Turn the "Power" switch to "ON". This lights the red LED back lighting of the LCD display and a readable screen should be visible on the display. Operate the gun trigger for welder output and to energize the wire feed motor.

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FEEDING ELECTRODE

⚠ WARNING

When inching, the electrode and drive mechanism are always “hot” to work and ground. The electrode remains “hot” several seconds after the gun trigger is released.

NOTE: Check that the proper drive rolls and gun parts are used for the wire size and wire type being used.

1. Turn the Readi-Reel or spool until the free end of the electrode is accessible.

2. While tightly holding the electrode, cut off the bent end and straighten the first six inches (152 mm). Cut off the first inch (25 mm). (If the electrode is not properly straightened, it may not feed properly into the outgoing guide tube or welding gun causing a "birdnest".)

3. Turn off weld timers by pressing the timers off key.

4. Push the wire through the ingoing guide tube, then press the gun trigger and push the electrode into the drive roll. If the electrode fails to thread itself into the outgoing guide tube of the wire drive, open the quick release idle roll arm, thread the electrode manually, and reclose the arm.

5. Inch the electrode through the gun.

NOTE: If using the low speed starting feature of the SP-255, the wire will feed at low speed for 2 seconds while inching, then come up to the set speed.

6. Check that the welding process is set for the wire type, diameter, and gas per instructions on nameplate.

SETTING IDLE ROLL PRESSURE

The idle roll pressure wing screw is set at the factory backed out 21/2 turns from full pressure. This is an approximate setting. The optimum idle roll pressure varies with type of wire, wire diameter, surface condition, lubrication, and hardness. As a general rule, hard wires may require greater pressure, and soft, or aluminum wire, may require less pressure than the factory setting. The optimum idle roll setting can be determined as follows:

1. Press end of gun against a solid object that is electrically isolated from the welder output and press the gun trigger for several seconds.

2. If the wire "birdnests", jams, or breaks at the drive roll, the idle roll pressure is too great. Back the thumb screw out 1/2 turn and run new wire through the gun. Repeat above step.

3. If the drive roll slips, loosen the gun cable Fast-Mate connection nut from the front of the SP-255. Pull the gun cable forward about 6" (152 mm). There should be a slight waviness in the exposed wire. If there is no waviness, the pressure is too low. Tighten the thumb screw 1/4 turn and lock the gun cable in place. Repeat the above procedure.

MAKING A WELD IN AUTO MODE

1. Check that the polarity is correct for the process being used.
2. Turn the ON/OFF POWER SWITCH to ON.
3. Press PROCESS key.
4. Press LEFT UP or DOWN ARROW Keys to select wire type being used.
5. Press CENTER UP or DOWN ARROW Keys to select wire diameter being used.
6. Press RIGHT UP or DOWN ARROW Keys to select welding gas type being used.
7. Press AUTO key. When the AUTO key is pressed, an alarm will beep three times. The following message is displayed for 2.5 seconds: PROCESS MUST MATCH WIRE & GAS.
8. Press UP or DOWN ARROW Keys to select metal thickness.
9. If SPOT or STITCH timing modes are NOT required, go to Step 12.
10. If SPOT timing mode required:
    a. Press SPOT key.
    b. Press CENTER UP or DOWN ARROW keys to select SPOT ON TIME required.
    c. Press SPOT key to return to previous display.
    d. Go to Step 12.
11. If STITCH timing mode required:
    a. Press STITCH key.
    b. Press CENTER UP and DOWN ARROW keys to select STITCH ON time required.
    c. Press RIGHT UP or DOWN ARROW keys to select STITCH OFF time required.
    d. Press STITCH key to return to previous display.
    e. Go to Step 12.
12. Inch the electrode through the gun and cable.
13. Cut the electrode within approximately 3/8" (9.5 mm) of the end of the contact tip (3/4" 19mm for Outershield).
14. If welding gas is to be used, turn on the gas supply and set the required flow rate (typically 25-35 CFH/12-16.5 l/min.).

NOTE: When using an Innershield electrode, the gas nozzle may be removed from the insulation on the end of the gun. This will give improved visibility and eliminate the possibility of the gas nozzle overheating.

15. Connect work clamp to metal to be welded. Work clamp must make good electrical contact to the work. The work must be grounded.

⚠ WARNING

WHEN USING AN OPEN ARC PROCESS, IT IS NECESSARY TO USE CORRECT EYE, HEAD, AND BODY PROTECTION.

16. Position electrode over joint. End of electrode may be lightly touching the work.
17. Lower welding helmet, close gun trigger, and begin welding. Hold the gun so the contact tip to work distance is about 3/8 inch (9.5 mm) (3/4" 19 mm for Outershield).
18. To stop welding, release the gun trigger and then pull the gun away from the work after the arc goes out.
19. When no more welding is to be done, close valve on gas cylinder (if used). Momentarily operate gun trigger to release gas pressure.
20. Turn the ON/OFF POWER SWITCH to OFF.

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USING THE 4-STEP INTERLOCK FUNCTION IN AUTO MODE

When the 4-Step Interlock function is not activated, the trigger functions in the normal mode so that welding happens only when the trigger is closed.

When the 4-Step Interlock function is activated, it functions as follows:

When the arc is struck, the gun trigger may be released. The welding continues until welding is stopped by either of these two methods:

1) The arc is extinguished by manually jerking the gun away from the work.

2) The gun trigger is closed and then released at the end of the weld. This action returns the trigger function to the normal mode so the weld stops when the trigger is released. Releasing the trigger reinstates the trigger interlock function for the next weld. This is the preferred Interlock mode because it provides better control at the end of the weld and allows automatic burnback to prevent excessive wire feed speed overrun.

The 4-step trigger feature does not function when using SPOT or STITCH timed welding modes.

MAKING A SPOT WELD IN AUTO MODE

Arc spot plug welds are used when continuous welds are not needed or to hold thin sheet metal together prior to stitch welding or continuous welding. Arc spot plug welds are made by using a punch to make a 3/16 inch (5 mm) diameter hole in the top sheet and arc welding through the hole into the back sheet.

To make an arc spot plug weld

1. Punch 3/16” (5 mm) hole in top sheet.

2. Set the procedure for the metal thickness to be welded.

3. Press the SPOT key. SPOT : ON is displayed.
4. Press the CENTER UP & DOWN ARROW keys to set the required Spot On time. Suggested initial setting is 1.2 seconds.

5. Press the SPOT key. Display returns to Auto screen. Spot timer status is shown in bottom left corner of screen.

6. Install spot weld nozzle (if available) on gun.

7. Press spot weld nozzle against the top sheet so the top and bottom sheets are tight together. If a spot weld nozzle is not used, smoother welds will result by moving the welding wire in a small circle while making the weld.

8. Close the trigger and hold it closed until the arc goes out.

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MAKING A STITCH WELD IN AUTO MODE

A stitch weld is used to weld thin material because warpage and burnthrough are a problem. Properly adjusting the ON and OFF times and arc travel speed, permits welding thin sheet metal using small welds that result in minimum distortion and no burnthrough.

To make a stitch weld

1. Set the procedure for the metal thickness to be welded.

2. Press STITCH key. Stitch screen is displayed.

3. Press CENTER ARROW keys to set Stitch ON time. Start with a Stitch ON time setting of 0.5 seconds. Increase the Time ON setting to increase penetration and weld size. Decrease the Time ON setting to reduce burnthrough and distortion.

4. Press the RIGHT ARROW keys to set the Stitch OFF time. Start with a Time OFF setting of 0.5 seconds. Increase the Time OFF setting to reduce burnthrough. Decrease the Time OFF setting to produce a flatter and smoother weld.

5. Press STITCH key. Auto screen is displayed. Stitch timer status is display in lower left portion of screen.

6. Close the gun trigger and hold it closed for the length of seam. Hold gun in one place during ON time and move gun just beyond edge of molten metal during OFF time. For smoothest welds on thinner metal, point gun slightly towards the direction of travel.

USING THE GUN TRIGGER SWITCH

The Gun Trigger Switch turns on arc voltage, wire feeder, and gas solenoid (except with Innershield) when the Gun Trigger Switch is closed. When closed, the LED screen displays the Auto or Manual screens, depending on which mode is being used. When the Gun Trigger Switch is released, or opened, arc voltage, wire feeder, and gas solenoid are turned off.

NOTE: When the trigger is pulled, the wire feeder feeds wire at low speed regardless of the set wire feed speed until the welding arc starts or 2 seconds has elapsed. This feature enhances starting and makes it easier to set the stick out. The 2 second limit permits high speed loading of the gun and cable.

USING THE GUN THUMB SWITCH (MAGNUM 250SP GUN ONLY)

The Gun Thumb switch is used to control wire feed speed, arc voltage, or to switch, or toggle, between memory locations 4 and 5. See IPM VOLTS key and TOGGLE key for control details. The Thumb switch is used to increase or decrease IPM or VOLTS.

THE WIRE DRIVE ROLL

The drive roll provided with the SP-255 has two grooves, one for .030”-.035” (0.8-0.9mm) solid steel electrode, and the other for .045” (1.2mm) solid steel electrode. The welder is shipped with the drive roll installed in the .030”-.035” (0.8-0.9mm) position as indicated by the stenciling on the exposed side of the drive roll. If .045” (1.2mm) electrode is to be used or one of the optional drive rolls is required, then the drive roll must be reversed or changed per the instructions provided on the instruction decal inside the SP-255 Drive Roll Access door.

FAN CONTROL

The fan motor is thermostatically controlled to provide cooling for the transformer and other components only when required. Even though the power switch is on, the fan motor will not run when the machine does not require fan cooling, such as when first turned on, or when welding at low current of duty cycle procedures.

INPUT LINE VOLTAGE PROTECTION

HIGH LINE VOLTAGE -- If the line voltage exceeds 121% of rated input voltage, the output will be reduced to the lower level to protect voltage rating of the capacitor bank. A HIGH LINE message will be displayed if the output has been reduced (see Section on ***Explanation of Prompting and Error Messages*** in Troubleshooting Section.)

LOW LINE VOLTAGE -- You may not be able to get maximum output from the machine if the line voltage is less than rated input. If the output you want is not obtainable because of insufficient line voltage, a LOW LINE message will be displayed (see Section on ***Explanation of Prompting and Error Messages*** in Troubleshooting Section.) The unit will continue to weld, but the output will be less than what is set.

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WIRE FEED OVERLOAD PROTECTION

The SP-255 has solid state overload protection of the wire drive motor. If the motor becomes overloaded, the protection circuitry turns off the arc voltage, wire feed speed and gas solenoid and then causes the alarm to beep 3 times. The screen displays a message for 2.5 seconds stating that the motor is being overloaded and the gun and wire drive should be checked. Check for proper size tip, liner, and drive rolls, for any obstructions or bends in the gun cable, and any other factors that would impede the wire feeding. To resume welding, simply pull the trigger.

WELDING THERMAL OVERLOAD PROTECTION

The SP-255 has built-in protective thermostats that respond to excessive temperature. They open the wire feed and welder output circuits if the machine exceeds the maximum safe operating temperature because of a frequent overload, or high ambient temperature plus overload. The thermostats automatically reset when the temperature reaches a safe operating level.

OVERCURRENT PROTECTION

The machine will automatically reduce the output if the load on the machine exceeds 260 to 280 amperes. This protects the welding power SCR's from excessive short circuit currents and from exceeding their temperature rating before the thermostats can react. A CURRENT OVERLOAD message is displayed when the overcurrent protection is active (see Section on ***Explanation of Prompting and Error Messages*** in Troubleshooting Section).

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DRIVE ROLL KITS

Drive Rolls available to feed different sizes and types of electrode:

Drive Rolls	Drive Roll Part No.
Steel Wire Sizes: .025-.035" (0.6-0.9 mm) .030-.045" (0.8-1.2 mm) .045" Cored (1.2 mm)	 KP674-035S KP674-045S KP674-045C
Aluminum Wire Sizes: 3/64" (1.2 mm)	 KP674-3/64A

3/64" (1.2 mm) ALUMINUM FEEDING KIT (K673-1)

The kit provides gun and wire drive conversion parts to weld with 3/64" (1.2 mm) aluminum wire. 5356 alloy aluminum wire is recommended for best push feeding performance.

Kit includes drive roll and incoming guide tube for the wire drive, and a 450 gun tube, liner and two contact tips for the gun. Install per the S21529 Installation Instructions provided with the kit.

8" SPOOL ADAPTER (K468)

Permits use of 8" (200 mm) spools on the SP-255 spindle.

DUAL CYLINDER MOUNTING KIT (K671-1)

Permits stable side-by-side mounting of two full size [9" (225 mm) dia. x 5' (1.6 m) high] gas cylinders, with "no lift" loading. Simple installation with installation kick stand and easy instructions. Includes upper and lower cylinder supports, wheel axles and mounting hardware.

SPOOL GUN DESCRIPTION

The optional Magnum SG Spool Gun is a lightweight, well-balanced, hand held semi-automatic wire feeder. It is available in two models, the K469-25 and the K487-25 with remote wire speed control.

SPOOL GUN ADAPTER KIT (OPTIONAL K672-1)

The K672-1 Spool Gun Adapter Kit provides recessed panel "up front" direct connection for use of the recommended K487 Spool Gun (with remote speed control), or the optional K469 Spool Gun (requires K518 Connection Adapter).

It also provides single switch transfer of Trigger and Wire Speed Controls between the 250 SP gun or the spool gun for same polarity welding with different wire and gas processes.

The kit includes a spool gun adapter module assembly with plug for front installation and connects to the machine. Also includes a rear gas inlet fitting with hose, a gun and cable holder, mounting hardware, and installation and operation instructions. (L-9696).

For spool gun installation refer to L9696 instructions included with spool gun adapter kit (K672-1).

⚠ CAUTION

The spool gun module is intended for use with Lincoln Electric® Magnum™ Spool Guns only. Use with other units may cause damage to the equipment. For Spool Gun operation, refer to the instruction manual provided with the Magnum™ Spool Gun.

MAKING A WELD WITH THE SPOOL GUN ADAPTER AND SPOOL GUN INSTALLED

The toggle switch on the front of the spool gun adapter box permits quick transfer between the use of the SP-255 with its feeder gun and the connected spool gun for same polarity electrodes.

⚠ CAUTION

In <u>either</u> transfer switch position, closing the gun trigger will cause the electrode of <u>both</u> guns to be electrically "HOT". Be sure unused gun is positioned so that electrode or tip will not contact metal case or other metal common to work.

1 Transfer switch in FEEDER position:

a. Disables spool gun trigger, wire feed and gas output.

b. Closing feeder gun trigger starts feeder gun welding and makes both electrodes electrically "HOT".

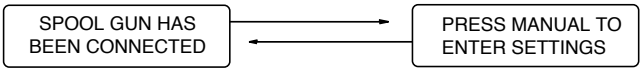
2. Transfer switch in SPOOL position:

a. Disables feeder gun wire feed and gas output. However, closing feeder gun trigger will make both electrodes electrically "HOT" and activate spool gun gas output.

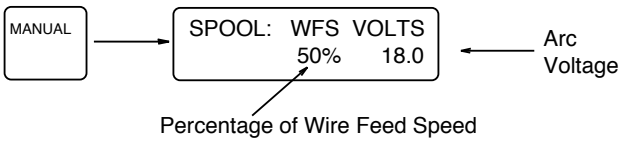
b. Closing spool gun trigger starts spool gun welding and makes both electrodes electrically "HOT".

3. Operation with SP-255:

a. Turn the input power ON. With the transfer switch in SPOOL gun position, the display will flash the messages:



b. Pressing the Manual key will change the display to the spool screen.



c. Pressing the up or down arrow keys under volts on the display will increase or decrease your welding voltage.

The 1-99% on the display represents a percentage of wire feed speed. This is the set speed for the K469 spool gun and the maximum set speed for the K487 spool gun (with the remote control in gun handle at maximum). The remote control turned to minimum will give you approximately 50% of the maximum set WFS.

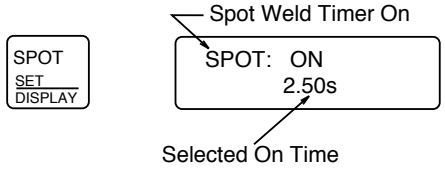
Left arrow keys -- do not function.

Center arrow keys -- Increase (up arrow) or decrease (down arrow) percent of wire feed speed.
Right arrow keys -- Increase (up arrow) or decrease (down arrow) arc voltage.

d. Procedure settings may be stored in memory for later recall. (See ***Memory Keys*** in Operation Section.)

4. The following procedure settings can be used as initial settings for making test welds to determine final settings:

Wire Diameter In. (mm)	WFS Setting	Arc Voltage Setting
.030 (0.8)	42%	15V
.035 *(0.9)	39%	16V
3/64 (1.2)	32%	21V

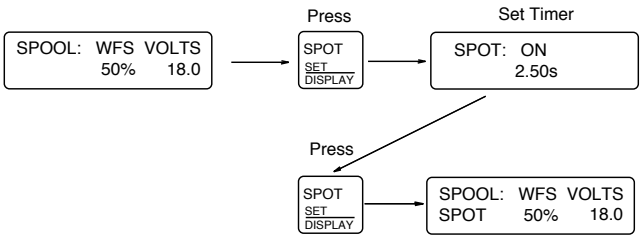


SPOT KEY

Anytime the Spot weld timer is on and the display is in Spool Mode, the word SPOT will appear in the bottom left corner of the display.

TYPICAL SPOT KEY PRESS SEQUENCE

Spool screen is displayed prior to pressing Spot key. Spot key is pressed, Spot On timer is activated and the display changes to Spot screen. Spot On timer can now be adjusted using the center arrow keys. Once the timer has been set, pressing the Spot key again returns the display to the original Spool screen with the Spot timer status indicated in the bottom left corner.



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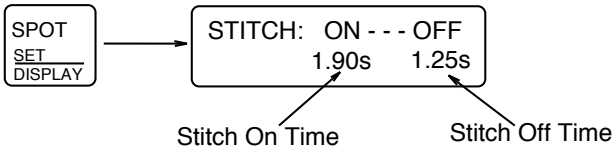
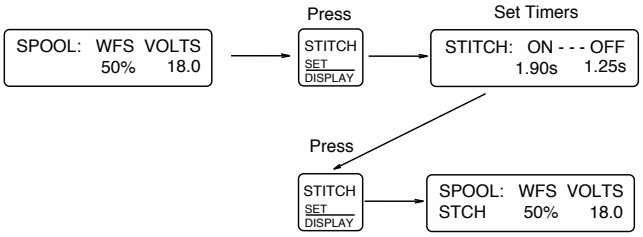
STITCH KEY

Anytime the Stitch weld timers are on and the display is in Spool Mode, the abbreviation STCH will appear in the bottom left corner of the display.

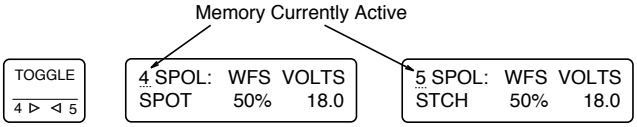


TYPICAL STITCH KEY PRESS SEQUENCE

Spool screen is displayed prior to pressing Stitch key. Stitch timers are activated and the display changes to Stitch screen. Stitch ON and OFF timers can now be adjusted using the center and right arrow keys. Once the timers have been set, pressing the Stitch key again returns the display to the original Spool screen with the Stitch timer status indicated in the bottom left corner.



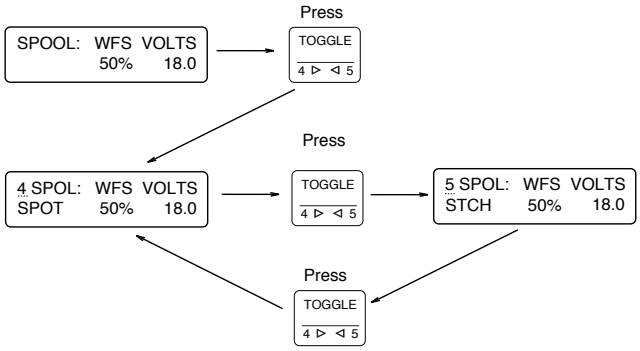
TOGGLE KEY



The first time this key is pressed it turns on toggle mode and recalls the setup in memory 4. This mode allows you to toggle between the setups in memory 4 and memory 5. Each time the key is pressed, it alternates between the two memories. The toggle screen displays the memory number the current setup was recalled from, indicates spool (SPOL:) mode, displays percentage of wire feed speed, and set arc voltage. The cursor underlines the memory number currently selected.

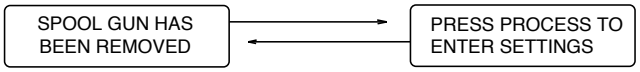
TYPICAL TOGGLE KEY PRESS SEQUENCE

Spool screen is displayed prior to pressing Toggle key. Toggle key is pressed, memory 4 is recalled and appears on the display. The unit is now in toggle mode. Pressing the Toggle key again “toggles” the unit, and memory 4 is recalled and appears on the display. This whole cycle is repeatable as long as the unit remains in Toggle mode.

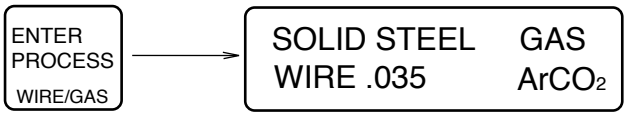


DISABLING SPOOL GUN

When the Spool Gun Adapter box transfer switch is set to FEEDER Gun position, the display will flash between these two messages:



Pressing the Process key will return you to the last process entered before the Spool gun was attached.



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SAFETY PRECAUTIONS

⚠ WARNING

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

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

ROUTINE AND PERIODIC MAINTENANCE

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

Perform the following daily:

1. Check that no combustible materials are in the welding area or around the machine.
2. Remove any debris, dust, dirt, or materials that could block the air flow to the machine for cooling.
3. Inspect the electrode cables for any slits, punctures in the cable jacket, or any condition that would affect the proper operation of the machine.

Perform Periodically:

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

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

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

Drive Rolls and Guide Tubes

After every coil of wire, inspect the wire drive mechanism. Clean it as necessary by blowing with low pressure compressed air. Do not use solvents for cleaning the idle roll because it may wash the lubricant out of the bearing. All drive rolls are stamped with the wire sizes they will feed. If a wire size other than that stamped on the roll is used, the drive roll must be changed.

Cable Cleaning

Clean cable liner after using approximately 300 pounds (136 kg) of electrode. Remove the cable from the wire feeder and lay it out straight on the floor. Remove the contact tip from the gun. Using an air hose and only partial pressure, gently blow out the cable liner from the gas diffuser end.

⚠ CAUTION

Excessive pressure at the start may cause dirt to form a plug.

Flex the cable over its entire length and again blow out the cable. Repeat this procedure until no further dirt comes out.

Gun Tubes and Nozzles

1. Replace worn contact tips as required.
2. Remove spatter from inside of gas nozzle and from tip after each 10 minutes of arc time or as required.

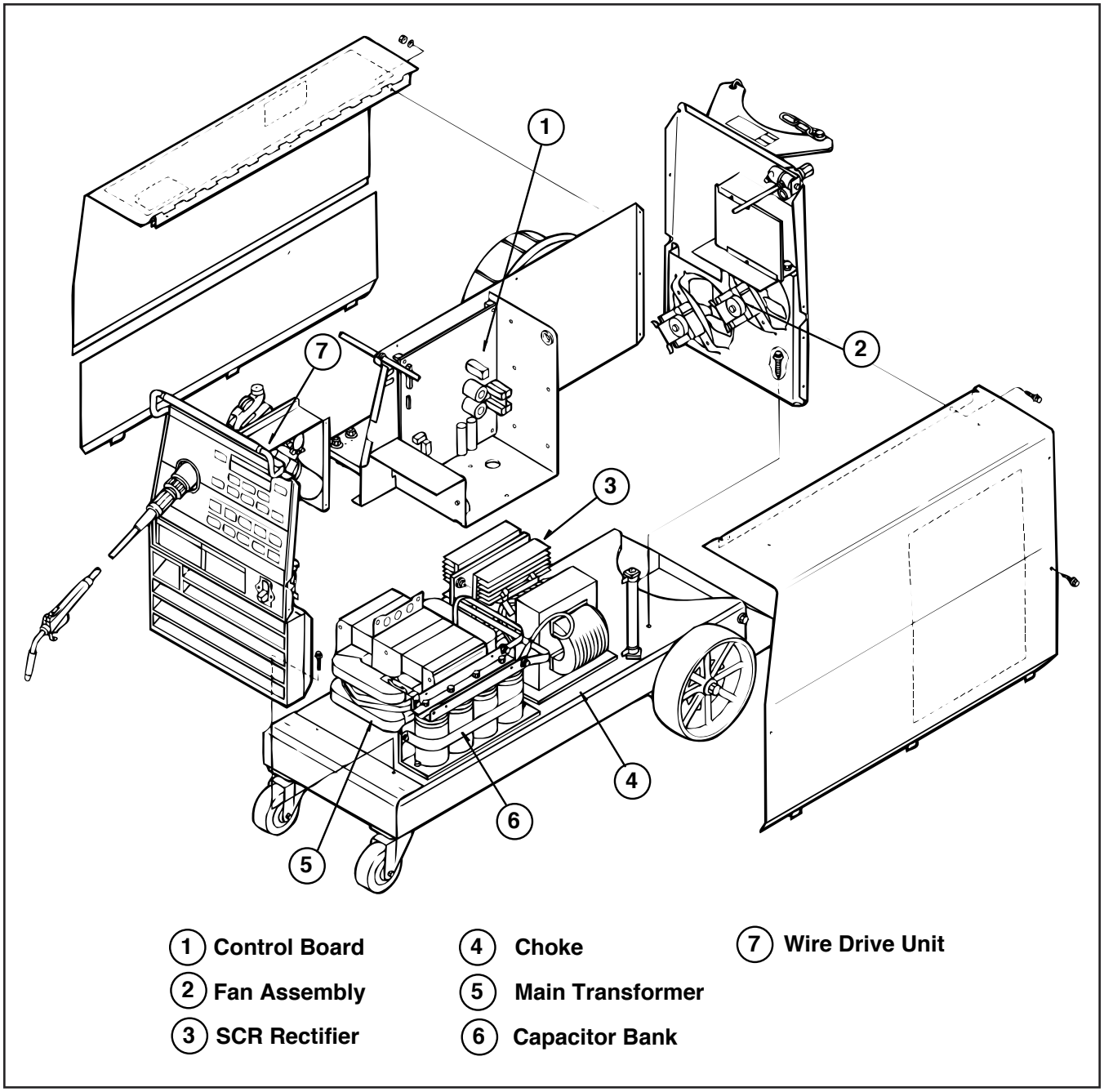

Figure D.1 - Component Locations

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CONTACT TIP AND GAS NOZZLE INSTALLATION

1. Choose the correct size contact tip for the electrodes being used (wire size is stenciled on the side of the contact tip) and screw it snugly into the gas diffuser.

2. Screw the appropriate fixed gas nozzle fully onto the diffuser. Either the standard .50" (12.7 mm) flush nozzle or other optional flush or recessed (spray arc) nozzle sizes may be used. (See table at the end of this section.)

3. Be sure the nozzle insulator is fully screwed onto the gun tube and does not block the gas holes in the diffuser.

4. If using an optional adjustable slip on nozzle, slip the appropriate gas nozzle onto the insulator. Either a standard .40" (12.7 mm) or optional .62" (15.9 mm) I.D. slip-on gas nozzle may be used and should be selected based on the welding application.

5. Adjust the gas nozzle as appropriate for the GMAW process to be used. Typically, the contact tip end should be flush to .12" (3.2 mm) extended for the short-circuiting transfer process and .12" (3.2 mm) recessed for spray transfer.

LINER REMOVAL AND REPLACEMENT

NOTE: Changing the liner for a different wire size requires replacement of the gas diffuser per the table below to properly secure the different liner.

Diameter of Electrodes Used	Replacement Liner Part Number	Size Stencilled on End of Liner Bushing	Fixed Nozzle Gas Diffuser Part No. (and Stencil)	Adjustable Nozzle Gas Diffuser Part No. (and Stencil)
.025-.030” Steel (0.6-0.8 mm)	KP1934-2 (M16087-2)	.030” (0.8 mm)	KP2026-3 (S19418-3)	KP2026-2 (S19418-2)
.035-.045” Steel (0.9-1.2 mm)	KP1934-1 (M16087-1)	.045” (1.2 mm)	KP2026-3 (S19418-3)	KP2026-1 (S19418-1)
3/64” Aluminum (1.2 mm)	KP1936-1 (M16107-1)	(Plastic Liner)	KP2026-3 (S19418-3)	KP2026-1 (S19418-1)

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LINER REMOVAL, INSTALLATION, AND TRIMMING INSTRUCTIONS FOR MAGNUM 250SP

NOTICE: The variation in cable lengths prevents the interchange ability of liners between guns. Once a liner has been cut for a particular gun, it should not be installed in another gun unless it can meet the liner cutoff length requirement. Liners are shipped with the jacket of the liner extended the proper amount.

1. Remove the gas nozzle (and nozzle insulator, if used) to locate the set screw in the gas diffuser which is used to hold the old liner in place. Loosen the set screw with a 5/64" (2.0 mm) Allen wrench.

2. Remove the gas diffuser from the gun tube.

3. Lay the gun and cable out straight on a flat surface. Remove the liner nut from the Fast-Mate™ connector end of the cable and pull the liner out of the cable.

4. Insert a new untrimmed liner into the connector end of the cable. Be sure the liner busing is stenciled appropriately for the wire size being used.

5. Fully seat the liner bushing into the connector. Finger tighten the liner nut onto the cable connector. The gas diffuser, at this time, should not be installed onto the end of the gun tube.

6. With the gas diffuser still removed from the gun tube, be sure the cable is straight, and then trim the liner to the length shown in Figure D.2. Remove any burrs from the end of the liner.

7. Screw the diffuser onto the end of the gun tube and securely tighten. Be sure the gas diffuser is correct for the liner being used. (See table and diffuser stencil.)

8. Tighten the set screw in the side of the gas diffuser against the cable liner using a 5/64" (2.0 mm) Allen wrench.

⚠ CAUTION

This screw should only be gently tightened. Over tightening will split or collapse the liner and cause poor wire feeding.

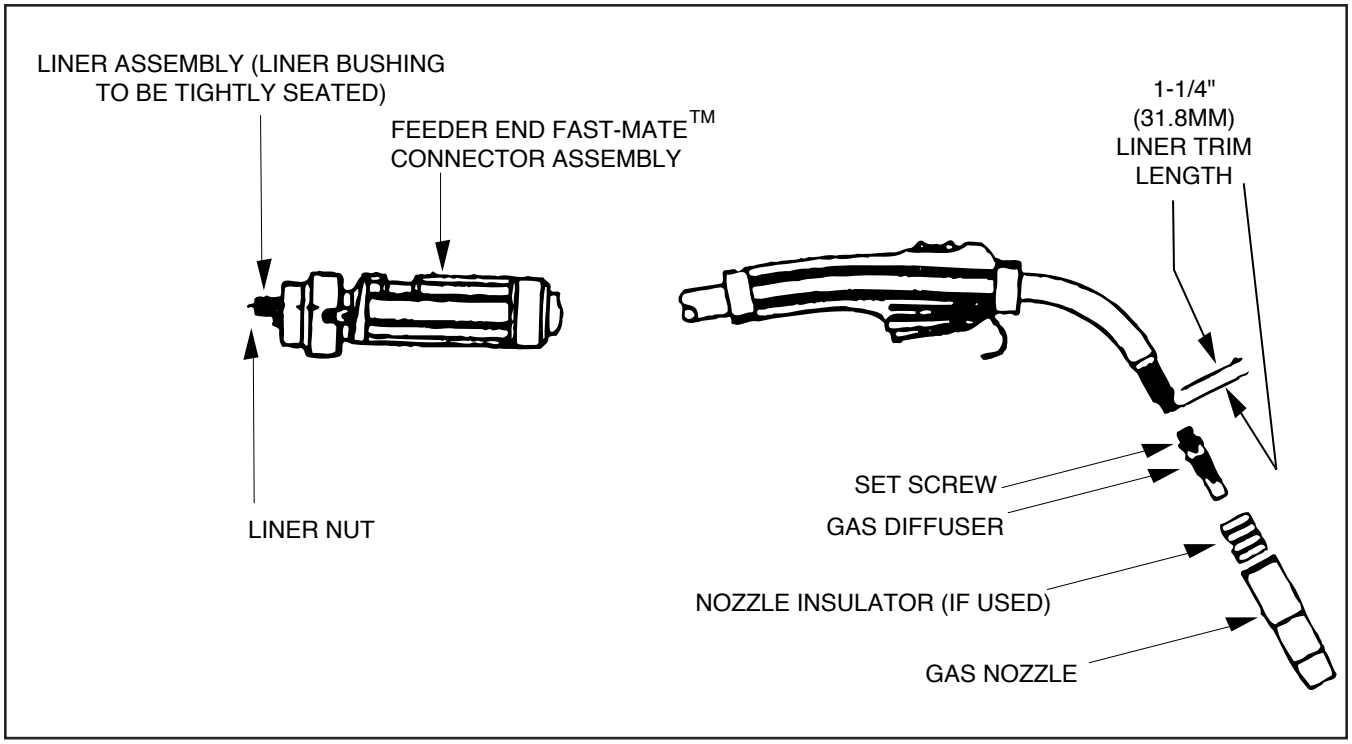

Figure D.2 - Liner Trim Length for the 250SP Gun.

GUN HANDLE DISASSEMBLY

The internal parts of the gun handle may be inspected or serviced if necessary.

The gun handle consists of two halves that are held together with a collar on each end. To open up the handle, turn the collars approximately 60 degrees counterclockwise (the same direction as removing a right hand thread) until the collar reaches a stop. Then pull the collar off the gun handle. If the collars are difficult to turn, position the gun handle against a corner, place a screwdriver against the tab on the collar and give the screwdriver a sharp blow to turn the collar past an internal locking rib. See Figure D.3.

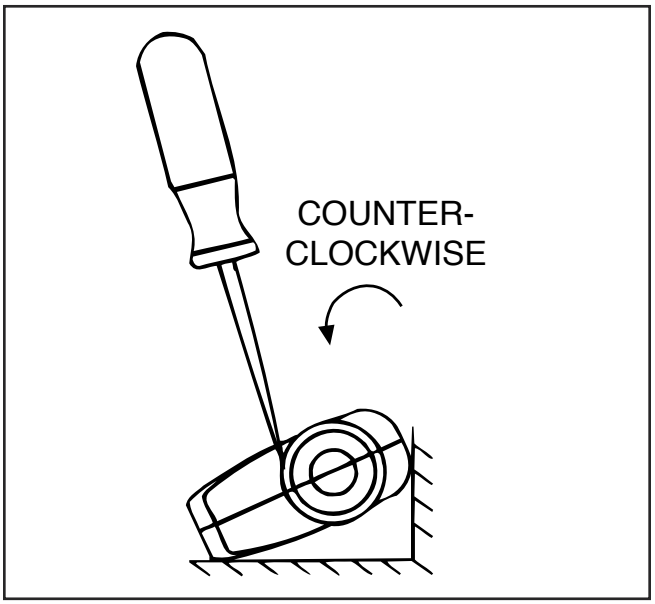

Figure D.3 - Gun Handle Disassembly.

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MAGNUM 250SP GUN PARTS AND ACCESSORIES

Description	Part Number	English Size	Metric Size
CABLE LINER For 15' (4.5 m) or shorter Cable	 KP1934-1 KP1934-1* KP1955-1**	 .025 - .030" .035-.045" 3/64" (Alum. wire)	 0.6 - 0.8 mm 0.9 - 1.2 mm 1.2 mm (Alum. wire)
CONTACT TIPS Standard Duty	 KP2020-6B1 KP2020-7B1 KP2020-1B1* KP2020-2B1*	 .025" .030" .035" .045"	 0.6 mm 0.8 mm 0.9 mm 1.2 mm
Heavy Duty	KP2021-1B1 KP2021-2B1	.035" .045"	0.9 mm 1.2 mm
Tapered	KP2022-5B1 KP2022-6B1 KP2022-1B1 KP2022-2B1	.025" .030" .035" .045"	0.6 mm 0.8 mm 0.9 mm 1.2 mm
Tab (For Aluminum)	KP2010-5B1**	3/64" (Alum. wire)	1.2 mm
GAS NOZZLES Fixed (Flush)	 KP1931-1 KP1931-2* KP1931-3	 3/8" 1/2" 5/8"	 9.5 mm 12.7 mm 15.9 mm
Fixed (Recessed)	KP1930-1 KP1930-2 KP1930-3	3/8" 1/2" 5/8"	9.5 mm 12.7 mm 15.9 mm
Requires: Gas Diffuser As'bly Adjustable Slip-On Requires: Nozzle Insulator As'bly Requires: Gas Diffuser As'bly	 KP2026-3 KP1935-2 KP2025-1 KP2026-2 KP2026-1	 .025-.045 1/2" .025-.030" .035-.045"	 0.6-1.2 mm 12.7 mm 0.6-0.8 mm 0.9-1.2 mm
Gasless Nozzle (For Innershield)	KP1947-1***		
GUN TUBE ASSEMBLIES Standard (60^0) 45^0	 KP2015-1* KP2041-1***		

* Included with Idealarc® SP-255.

** Included with K673-1 3/64" (1.2 mm) Aluminum Feeding kit.
5356 Alloy aluminum wire is recommended to alleviate potential soft wire feeding problems with push-type wire feeding.

*** Requires KP2026-1 Gas Diffuser Assembly.

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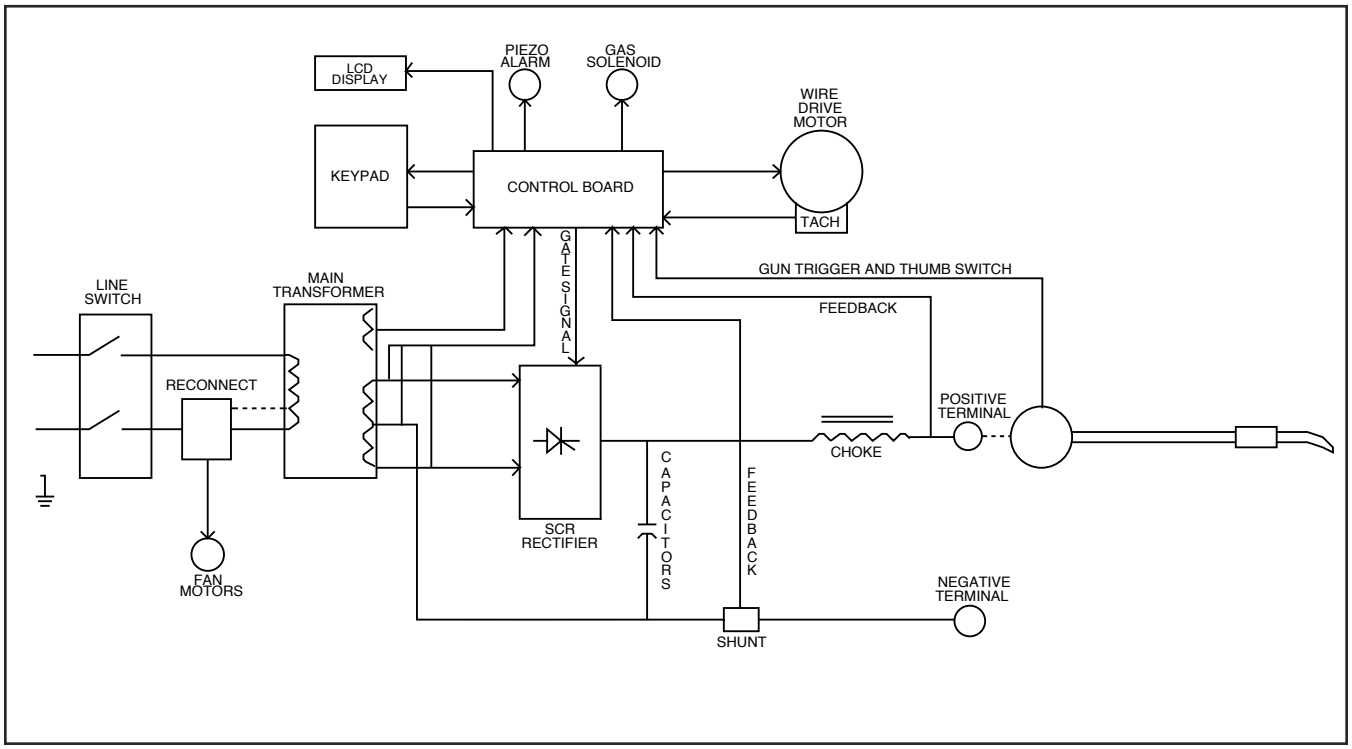

Figure E.1 -Block Logic Diagram

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

POWER SUPPLY OPERATION

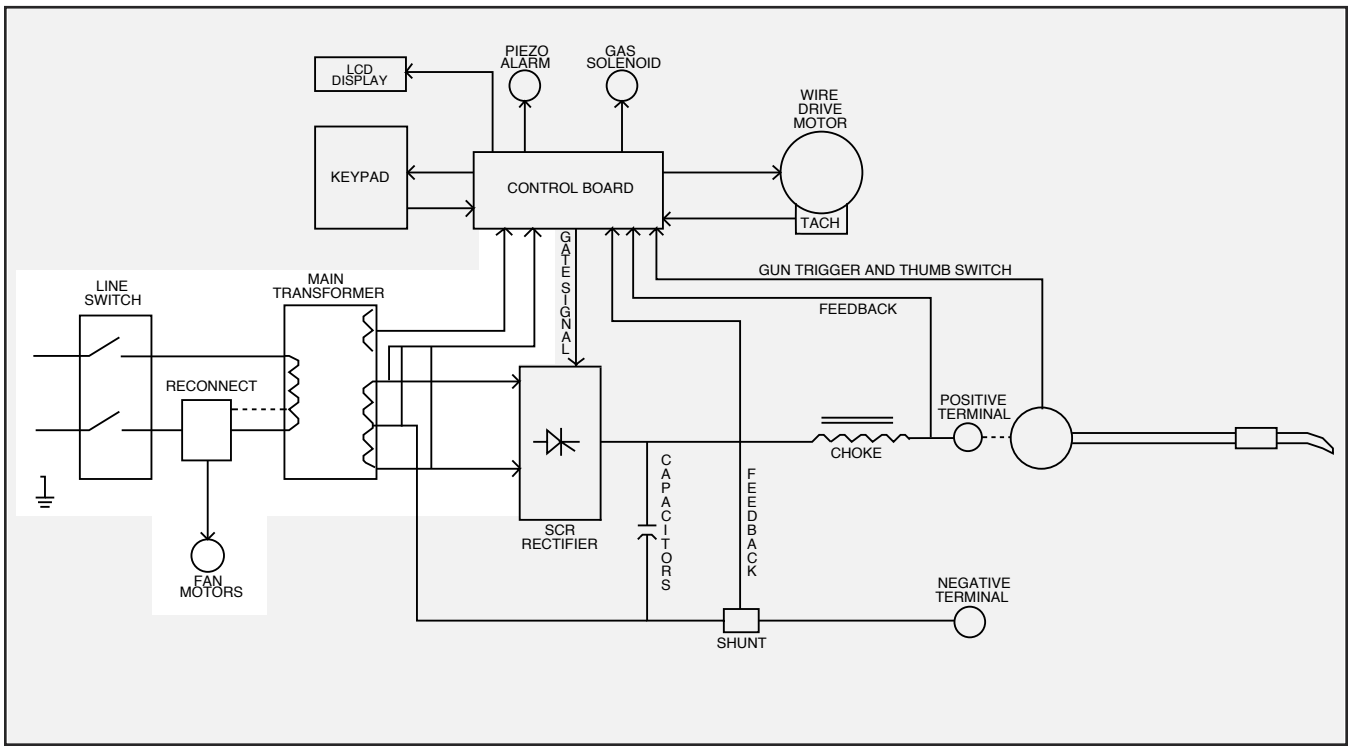

Figure E.2 - Input Line Voltage and Main Transformer

INPUT LINE VOLTAGE AND MAIN TRANSFORMER

The desired single phase input power is connected to the SP-255 through a line switch located on the front panel.

A reconnect panel allows the user to configure the machine for the desired input voltage. This AC input voltage is applied to the primary of the main transformer and to the thermostatically controlled fan motors. The transformer changes the high voltage, low current input power to a low voltage, high current output. In addition, the main transformer also has an isolated center tapped 30VAC auxiliary winding that supplies power to the Control Board for SCR gate drive and gas solenoid operation. The weld power windings connect to the Control Board as well as to the main SCR Rectifier.

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

POWER SUPPLY OPERATION (CONTINUED)

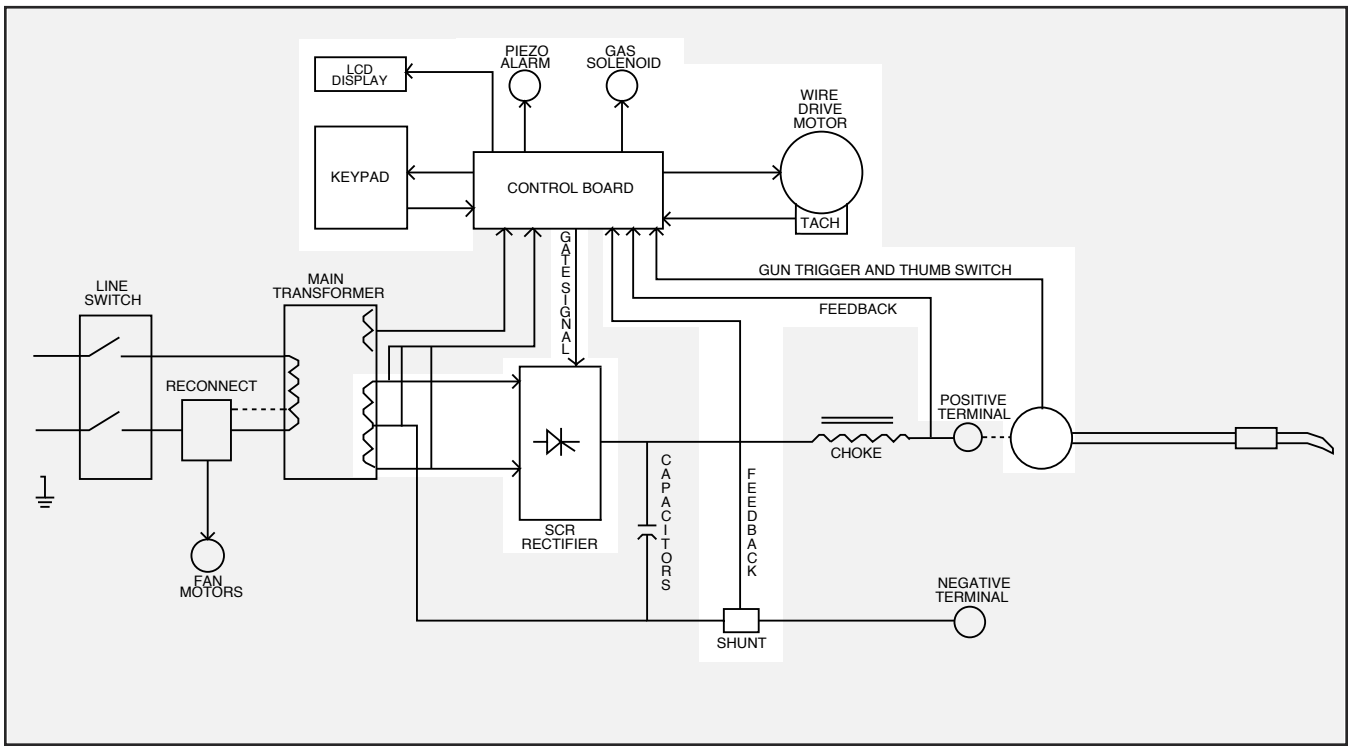

Figure E.3 - Output Rectification and Feedback Control

OUTPUT RECTIFICATION AND FEEDBACK CONTROL

The AC output from the main transformer secondary weld winding is rectified and controlled through the SCR rectifier assembly. Output voltage and current are sensed at the shunt and output terminals and fed back to the control board. The control board compares the commands of the keypad (or gun thumb switch) with the feedback signals. The appropriate gate firing pulses are generated by the control board and applied to the SCR rectifier assembly. The control board controls the firing of the SCRs, thus controlling the output of the machine. ***See SCR Operation***. The control board also powers and commands the keypad, the LCD Display, the piezo alarm, the gas solenoid and the wire drive motor.

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

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POWER SUPPLY OPERATION (CONTINUED)

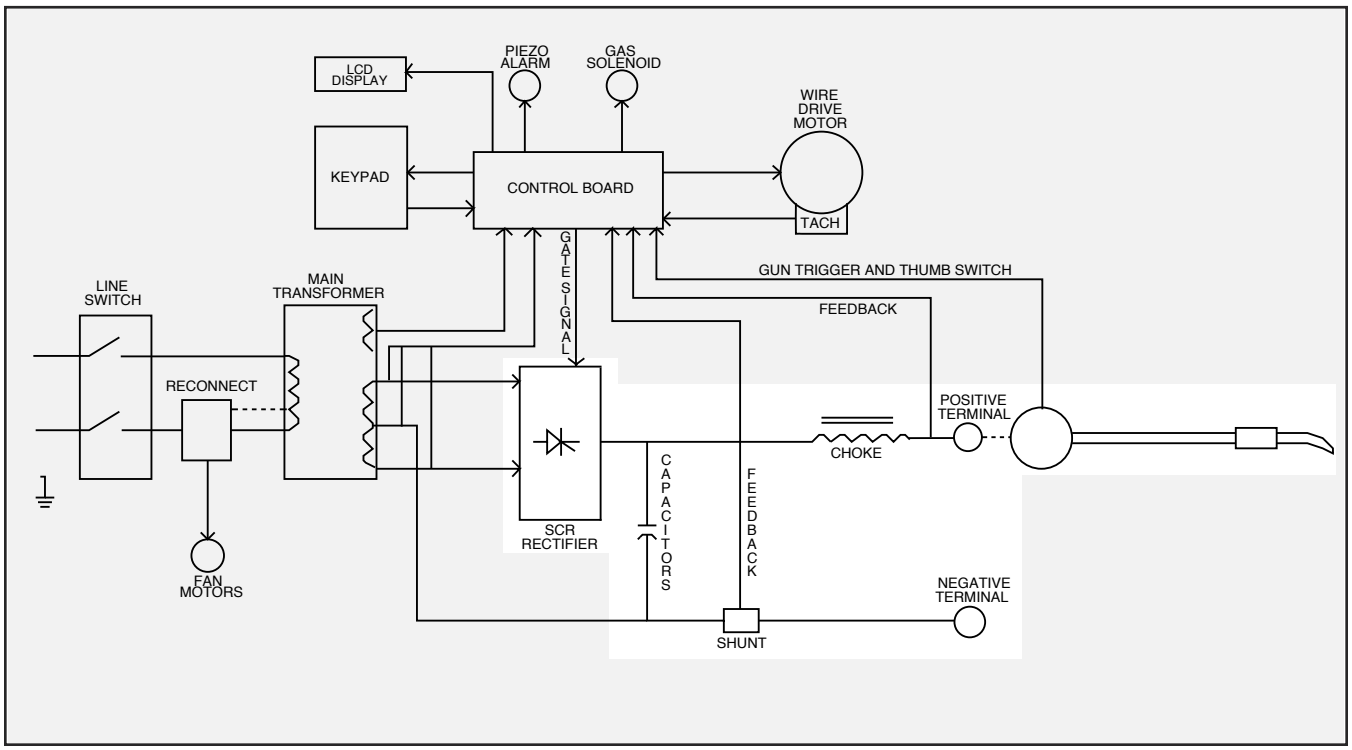

Figure E.4 - Constant Voltage Output

CONSTANT VOLTAGE OUTPUT

The controlled DC output from the SCR rectifier assembly is filtered by the capacitor bank and the output choke, which is in series with the gun and welding load, resulting in a constant voltage output at the output terminals of the machine.

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

POWER SUPPLY OPERATION (CONTINUED)

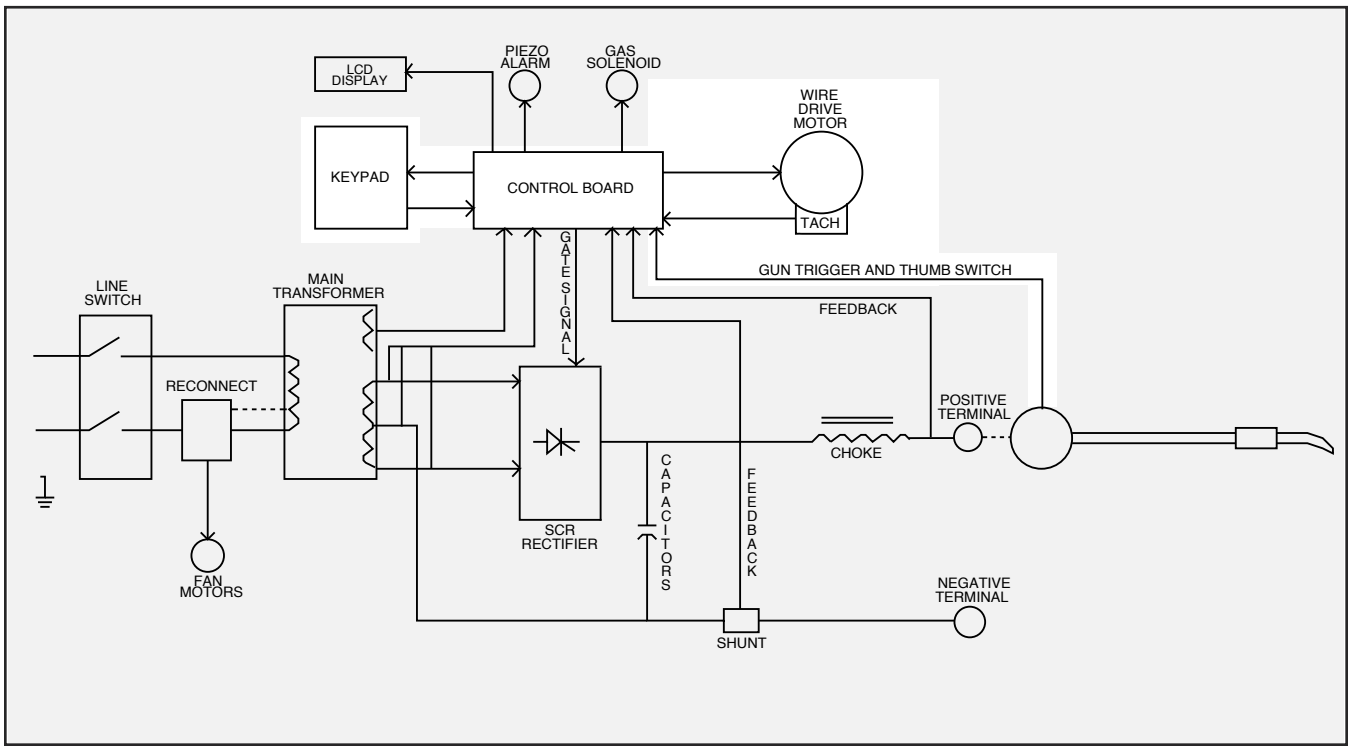

Figure E.5 - Wire Drive Motor and Feedback

WIRE DRIVE MOTOR AND FEEDBACK

The wire drive motor is controlled by the control board. A motor speed feedback signal is generated at the motor tach and sent to the control board. The control board compares this feedback signal with the commands set forth by the keypad (or the gun thumb switch) and sends the appropriate armature voltage to the wire drive motor. The drive motor speed is thus controlled which in turn regulates the electrode wire feed speed through the gun.

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

THERMAL PROTECTION

A thermostat protects the machine from excessive operating temperatures.. Excessive operating temperatures may be caused by a lack of cooling air or operating the machine beyond the duty cycle and output rating. There are three thermostats within the SP-255 machine. One of the thermostats, located on the output choke, energizes the cooling fan motors when required. The other choke thermostat "opens" the trigger circuit, preventing machine weld output and wire feed, if excessive operating temperatures are detected. The third thermostat insures that the fan motors are operating when required.

The thermostats are self-resetting once the machine cools sufficiently. It the thermostat shutdown is 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 input power must be removed and the fan problem or air obstruction be corrected.

SCR OPERATION

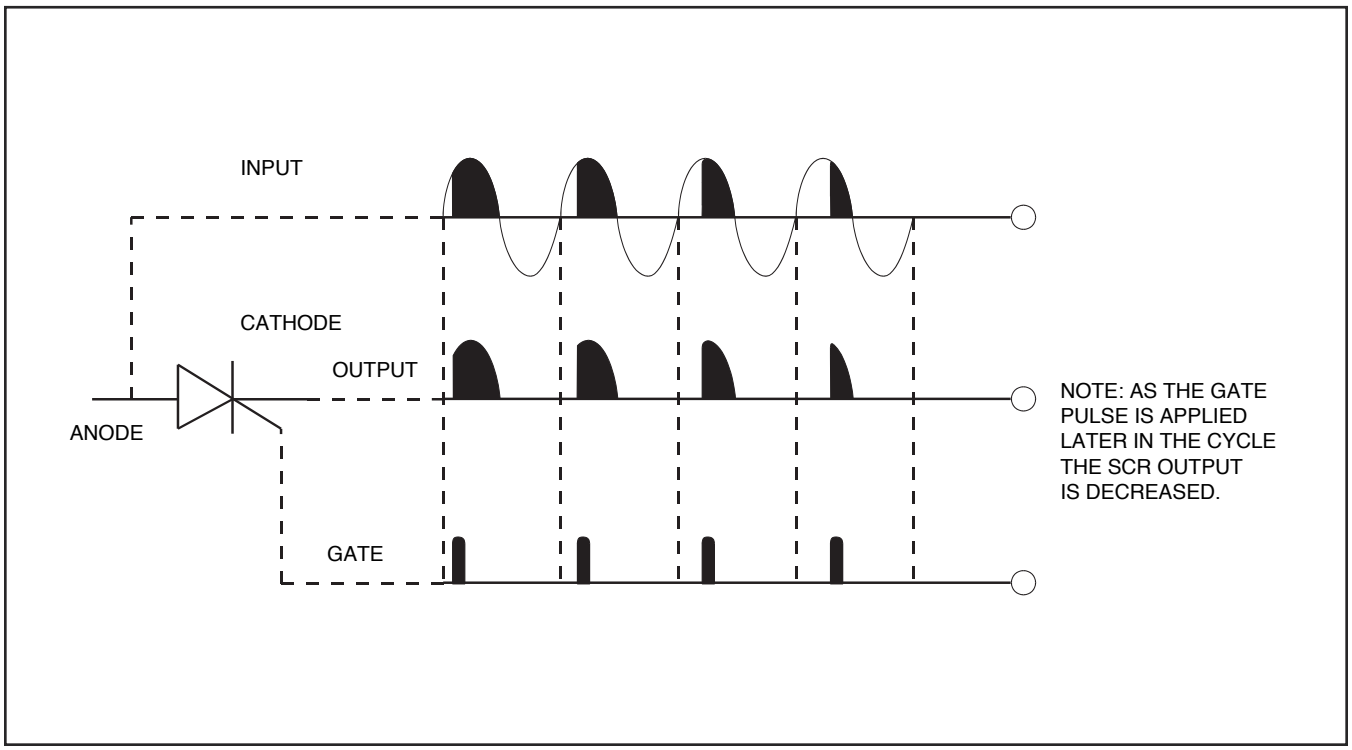

Figure E.6 - SCR Operation

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

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

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HOW TO USE TROUBLESHOOTING GUIDE

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 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 four main categories: Output Problems, Engine 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 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 section. 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.

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

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

⚠ CAUTION

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

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

PC board can be damaged by static electricity.

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

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

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

- Tools which come in contact with the PC board must be either conductive, anti-static or static-dissipative.

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

- If the PC board uses protective shorting jumpers, don't remove them until installation is complete.

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

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

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

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

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.
   a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.
   b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.
6. Always indicate that this procedure was followed when warranty reports are to be submitted.

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

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TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major Physical or Electrical Damage is Evident	1. Contact your local Lincoln Electric Authorized Field Service Facility.	1. Contact The Lincoln Electric Service Dept. 1-888-935-3877.
Machine is dead - No Open Circuit Voltage output and No Wire Feed when gun trigger is pulled. No Display.	1. Make certain that the input power switch is in the "ON" position. 2. Check the input voltage at the machine. Input voltage must match the rating plate and the reconnect panel. 3. Blown or missing fuses in the input line.	1. Check input power switch (S1). It may be faulty. 2. Check for loose or broken wires at the reconnect panel. 3. Perform ***Main Transformer Test***.
No Open Circuit Voltage output but wire feeds normally when gun trigger is pulled. - Display lights properly.	1. Check the input voltage at the machine. Input voltage must match the rating plate and the reconnect panel - High or Low Line message may be displayed. 2. The gun may be faulty. Check or replace.	1. Check for loose or broken connections at the output terminals, the choke, the capacitor bank and all heavy current carrying leads. 2. Make sure that the transformer secondary leads are securely connected to the SCR Rectifier Assembly. 3. Perform the ***SCR Rectifier Assembly Test***. 4. The Control board may be faulty - Replace.

⚠ CAUTION

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

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
No Open Circuit Voltage output and no wire feed when gun trigger is pulled. Display is functioning properly.	1. The thermostats may be open due to machine overheating. If machine operates normally after a cooling off period then check for proper fan operation and ventilation for both fans. Make certain that the machine's duty cycle is not being exceeded. 2. Check the gun trigger circuit. Leads #324 to #325 should have continuity (zero ohms) when the gun trigger is pulled. If not then the gun may be faulty - replace.	1. Check thermostats and associated leads for loose or broken connections. See Wiring Diagram. 2. Perform ***The Main Transformer Test***. 3. The control board may be faulty. Replace.
Wire feeds but welding output is low causing wire to "stub". Welds are "cold". Machine cannot obtain full rated output of 250 amps at 26 volts.	1. If an error message is displayed on the display then proceed to ***Explanation of Prompting and Error Messages Section***. 2. Make sure that the proper wire and procedures are being used. 3. Check gun and work cable for loose or faulty connections.	1. Check for loose or faulty connections of the heavy current carrying leads. 2. The output capacitor bank may be faulty. Check for loose connections at the capacitors. Also check for leaky capacitors. Replace if necessary. **WARNING: The liquid electrolyte in these capacitors is toxic. Avoid contact with any portion of your body.** 3. Perform the ***SCR Rectifier Assembly Test***. 4. Perform the ***Main Transformer Test***. 5. The control board may be faulty. Replace.

⚠ CAUTION

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

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
The output voltage and wire feed is present continuously or pulsing when gun trigger is NOT activated.	1. Remove the gun. If the problem is resolved the gun trigger circuit is faulty. Repair or replace. 2. If the problem is not resolved then contact your Local Lincoln Electric Authorized Field Service Facility.	1. Check the machine's internal trigger leads for grounds or shorts. See Wiring Diagram. 2. The control board may be faulty. Replace.
Output settings (voltage and/or wire feed speed) are being changed even though gun thumb switch or keypad keys are not being activated.	1. Remove the gun. If the problem is resolved the gun thumb switch circuit may be faulty. Repair or replace. 2. If the problem persists after gun removal then the keypad may be faulty. Check for burned or damaged areas on the keypad.	1. Check leads #326 and #327 for grounds or shorts. See Wiring Diagram. 2. The Keypad may be faulty. Perform the ***Keypad Test***. 3. The control board may be faulty. Replace.
No wire feed or open circuit voltage when gun trigger is pulled. The display lights up but the audio alarm and the display do not function properly.	1. Check the input voltage at the machine. Input voltage must match the rating plate and the reconnect panel - High or Low Line message may be displayed. 2. Remove the gun. If the problem is resolved the gun is faulty.- Replace.	1. Perform the ***Keypad Test***. 2. Perform the ***Main Transformer Test***. 3. The control board may be faulty.- Replace. 4. The LCD display may be faulty. - Replace.

⚠ CAUTION

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

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The audio alarm does NOT sound when a key is pressed, but display changes.	1. The background noise may be too loud for user to hear beeper.	1. Check the voltage across pins 1J7 (+) to 2J7 (-) on the control board. When the keys are pressed there should be a brief indication, or pulse, of a DC voltage. If the voltage "pulse" is present then the audio alarm may be defective.- Replace. If the DC voltage pulse is NOT present when the keys are pressed then the control board may be defective.-Replace.
The audio alarm does not sound when a key is pressed, and the display does NOT change.	1. Remove the gun. If the problem is resolved the gun is faulty.- Replace.	1. Perform the ***Keypad Test***. 2. The control board may be faulty. - Replace. 3. The LCD Display may be faulty.- Replace.
There is no gas flow when gun trigger is pulled. Wire feeds and weld voltage is present. The display functions properly.	1. Make certain that a process is selected that requires gas flow. 2. Check gas source and hoses for leaks or kinks.	1. Check the gas solenoid by disconnecting it from Plug J21 and applying a 12VDC external supply to the gas solenoid. If the solenoid does NOT activate then it may be faulty. - Replace. 2. Check wiring to Plugs J20 and J21 (see wiring diagram). Make sure Jumper Plug is in place 3. The control board may be faulty.- Replace.
No readable message on the display. Backlight is lit indicating there is power to the machine.	1. Check the input voltage at the machine. The input voltage must match the rating plate and the reconnect panel. 2. Turn the line switch (S1) off. Wait a minute and turn power on. If problem is not resolved contact your local Lincoln Electric Authorized Field Service Facility.	1. The display board may be faulty. Replace. 2. The control board may be faulty. Replace.

⚠ CAUTION

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The display backlight does not function.	1. Check the input voltage at the machine. Input voltage must match the machine rating plate and the reconnect panel.	1. With the display board disconnected test for 12VDC from pins 1J1(+) to 2J1(-). If the 12VDC is present and the display board backlight does NOT function then replace the display board. See Wiring Diagram. 2. If the 12VDC is not present at pins 1J1 to 2J1 then perform the ***Main Transformer Test***. 3. The control board may be faulty. Replace.
The machine stops feeding wire while welding and the MOTOR OVERLOAD message appears on the display.	1. Check for mechanical restrictions in the wire feeding path. The gun cable may be clogged.	1. Check the motor armature current. Normal armature current is 1.5 - 2.5 amps. If the motor armature current is normal the control board may be faulty.-Replace. 2. If the motor armature current is high (over 3 amps) and there are NO restrictions in the wire feeding path then the motor or gear box may be defective.-Replace.
"CURRENT OVERLOAD" message appears while welding	1. Check procedures. 2. Check line volts. 3. Check shunt. 4. Check output capacitors.	1. Max current is 250 Amps. 2. Must be ±10% of rated line volts. 3. Shunt rating is 50mv @ 300 Amps.

⚠ CAUTION

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

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
WIRE FEEDING PROBLEMS		
No control of wire feed speed. Other machine functions are normal.	1. The thumb switch circuit in the gun may be faulty. Check or replace.	1. Perform the ***Wire Drive Motor and Tach Feedback Test***. 2. The control board may be faulty. - Replace.
There is no wire feed when gun trigger is pulled. Normal open circuit voltage is present.	1. If the drive rolls are turning then check for a mechanical restriction in the wire feed path, or improper drive roll pressure. 2. The gun liner may be clogged. Check or replace. 3. If the drive rolls are NOT turning when the gun trigger is pulled then contact your local Lincoln Electric Authorized Field Service Facility.	1. Perform the ***Wire Drive Motor and Tach Feedback Test***. 2. The control board may be faulty. - Replace.

⚠ CAUTION

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

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The arc is unstable and or "hunting".	1. Check for worn or melted contact tip. 2. Check for loose or faulty connections on the work and electrode cables. 3. Make sure electrode polarity is correct or welding process being used. 4. Check for rusty or dirty wire. 5. Make sure machine settings and gas are correct for process being used.	1. Check for loose connections at the output terminals, the choke, the capacitor bank and all heavy current carrying leads. 2. Make sure that the transformer secondary leads are securely connected to the SCR Rectifier Assembly. 3. The output capacitor bank may be faulty. Check for loose connections at the capacitors. Also check for leaky capacitors. Replace if necessary. **WARNING: The liquid electrolyte in these capacitors is toxic. Avoid contact with any portion of your body.** 4. The control board may be faulty. Replace.
Weld bead is narrow or ropey. May have porosity with electrode stubbing into plate.	1. Make sure the weld procedure and electrode polarity is correct for the process being used. 2. Make sure shielding gas is correct and flow is proper. 3. Make sure the weld joint is not "contaminated".	1. The output capacitor bank may be faulty. Check for loose connections at the capacitors. Also check for leaky capacitors. Replace if necessary. **WARNING: The liquid electrolyte in these capacitors is toxic. Avoid contact with any portion of your body.** 2. Perform the ***SCR Rectifier Assembly Test***. 3. The control board may be faulty. Replace.

⚠ CAUTION

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

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The contact tip seizes in the gas diffuser.	1. The tip is being over heated due to excessive high current and /or high duty cycle welding. 2. A light application of high temperature antisieze lubricant (such as Lincoln E2607 Graphite Grease) may be applied to the contact tip threads.	

⚠ CAUTION

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

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EXPLANATION OF PROMPTING AND ERROR MESSAGES

ON SCREEN ERROR MESSAGE	MESSAGE EXPLANATION
PROCESS MUST MATCH WIRE & GAS	Reminder that in Auto mode the process entered with the Process key must match the process installed in the machine .
ONLY SET UP FOR .035 STAINLESS	Unit is only programmed for .035” (0.9mm) diameter in stainless steel wire. Other wire diameters can be accommodated by using the Manual mode.
ONLY ARGON USED WITH ALUMINUM	Unit is programmed to use only argon gas with aluminum electrodes. Other gases can be accommodated by using the manual mode.
ONLY SET UP FOR . 045 OUTERSHIELD	Unit is only programmed for .045” (1.1mm) diameter in Outershield® electrode wire. Other wire diameters within the SP-255 rating can be accommodated by using the Manual mode.
NO GAS REQUIRED WITH INNERSHIELD	Innershield® electrode wire does not require a shielding gas. In the Auto mode, the SP-255 automatically leaves the solenoid de-energized even when the trigger is closed.
MEMORY 1 NOW CONTAINS SETUP	Verifies that the setup was saved to memory number 1. The actual memory number is determined by the memory number key that was pressed following Save.
MEMORY 2 IS EMPTY	An attempt was made to recall a setup from a memory that does not contain one. The actual memory number is determined by the memory number key that was just pressed.
MEMORY 4 DOESN’T MATCH WIRE & GAS	An attempt was made to enter Toggle mode and the process of the Auto setup in memory 4 does not match the process in the machine. Press memory 4 to find out what process is required. The memory number indicates which memory, 4 or 5, does not match.
REQ'S: STAINLESS WIRE .035 Ar/O_2 ↓ PRESS PROCESS WHEN INSTALLED	An attempt was made to recall from memory an Auto setup whose process does not match the process in the machine. This message indicates the process required and alternates with the second message until the Process key is pressed.

EXPLANATION OF PROMPTING AND ERROR MESSAGES (CONT'D)

ON SCREEN ERROR MESSAGE	MESSAGE EXPLANATION
DATA ***ERROR*** CHECK SETTINGS ↓ PRESS PROCESS TO CHECK SETTINGS	An attempt was made to recall a setup from memory that has improper settings due to excessive electrical interference. The SP-255 will recall the setup and reset the improper data to within machine limits. However, all settings should be checked, properly set if needed, and then resaved to that memory. This message alternates with the second message until the Process key is pressed.
MOTOR OVERLOADED CHECK GUN, DRIVE	Unit shut down even though trigger was closed. There is an excessive current draw on the motor. Check for proper size tip, liner and drive rolls, for any obstructions or bends in the gun cable, and any other factors that would impede the wire feeding. To resume welding, simply pull the trigger.
XXXX ***ERROR*** CHECK SETTINGS ↓ PRESS PROCESS TO CHECK SETTINGS	Indicates that an error has occurred due to excessive electrical interference. All of these error types turn off the arc voltage, wire feed speed, and solenoid. Press the Process key, per second message, and check all settings before continuing to weld. **XXXX** IC3I RTI SWI IOT XIRQ PWOF DATA This table shows all of the actual lettering which appears in place of XXXX. There is no reason to note which of these occurred unless it occurs frequently.
GUN SWITCH BEING USED FOR TOGGLE	Reminds the operator that the gun switch is being used to toggle between memory 4 and memory 5 and, therefore, is not able to control IPM or arc VOLTS.
CONNECT FOR NEG. POLARITY	Reminds the operator to change the electrode polarity to negative when Innershield wire type is selected.
LOW LINE: CHECK RECONNECT PANEL PRESS ANY KEY TO STOP MESSAGE	Indicates to operator that the input line voltage is too low to obtain the output set on the machine. The operator can continue to weld, but the voltage will be less than what is set on the machine. This message occurs when the line voltage is less than 75% of nominal line or if the voltage level set on the machine is not obtainable at that line voltage and load current. The operator should check if the reconnect panel is wired properly. Lowering the set VOLTS and/or IPM can eliminate the message. Pressing any key or gun switch when the operator is not welding will stop the message from being displayed . Pressing any increment or decrement arrow keys or gun switch while welding will temporarily stop the message from being displayed (approximately 1.3 sec.) allowing the operator to view the increase or decrease in that setting.

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EXPLANATION OF PROMPTING AND ERROR MESSAGES (CONT'D)

ON SCREEN ERROR MESSAGE	MESSAGE EXPLANATION
HIGH LINE: CHECK RECONNECT PANEL PRESS ANY KEY TO STOP MESSAGE	Indicates to operator that the line voltage is too high, and the output voltage has been reduced to protect the capacitor bank voltage rating limits. The operator can continue to weld, but the voltage will be less than what is set on the machine. This message occurs when the line voltage is greater than 121% of nominal line. The operator should check if the reconnect panel is wired properly. Pressing any key or gun switch when the operator is not welding will stop the message from being displayed. Pressing any increment or decrement arrow keys or gun switch while welding will temporarily stop the message from being displayed (approximately 1.3 sec.) allowing the operator to view the increase or decrease in that setting.
CURRENT OVERLOAD REDUCE OUTPUT PRESS ANY KEY TO STOP MESSAGE	Indicates to operator that too much current is being drawn from the machine, and the output has been reduced to prevent the current from exceeding safe levels. This will typically occur in Manual mode using .045" (1.2mm) wire and WFS greater than 275 IPM (0.7m/min.). Lowering the WFS will reduce the output requirement and allow operation within the machine rating. Pressing any key or gun switch when the operator is not welding will stop the message from being displayed. Pressing any increment or decrement arrow keys or gun switch while welding will temporarily stop the message from being displayed (approximately 1.3 seconds) allowing the operator to view the increase or decrease in that setting.
SXXXXX -X ROM ASSEMBLY	Only displayed at power-up. Displays the part number of the ROM ASSEMBLY currently on the PC board.
C SXXXXX -X ROM ASSEMBLY	Indicates a checksum error in the software. Turn power off and back on again. If this message persists, then replace the ROM assembly on the PC board. Earlier units did not display the SXXXXX-X ROM ASSEMBLY number.
R	Indicates a fault in system RAM. Turn power off and back on again. If this message persists, then replace the control PC board assembly.
SPOOL GUN HAS BEEN CONNECTED PRESS MANUAL TO ENTER SETTINGS	Reminder that the Spool gun has been switched in and connected and the Manual key must be pressed to enter any Spool gun welding procedures.
SPOOL GUN HAS BEEN REMOVED PRESS PROCESS TO TO ENTER SETTINGS	Reminder that the Spool gun has been switched out or removed and the Process key must be pressed to enter SP-255 weld settings. This message may also be displayed if there is an open lead in the spool gun 6-pin plug assembly.

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MAIN TRANSFORMER TEST

⚠ WARNING

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

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

TEST DESCRIPTION

This test will determine if the correct voltages are being

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

b. induced on the weld winding and auxiliary windings.

MATERIALS NEEDED

5/16” (8 mm) Nut Driver
Volt-Ohm Meter

MAIN TRANSFORMER TEST

TEST PROCEDURE

⚠ WARNING

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

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

1. Disconnect the main input power supply to the machine.
2. Remove the Case Top and Side Panels with a 5/16” nut driver.
3. Locate Plug J3 and Plug J6 on the G2801 Control PC Board. See Figure F.1.

NOTE: The location of Plugs may vary depending on the machine code.

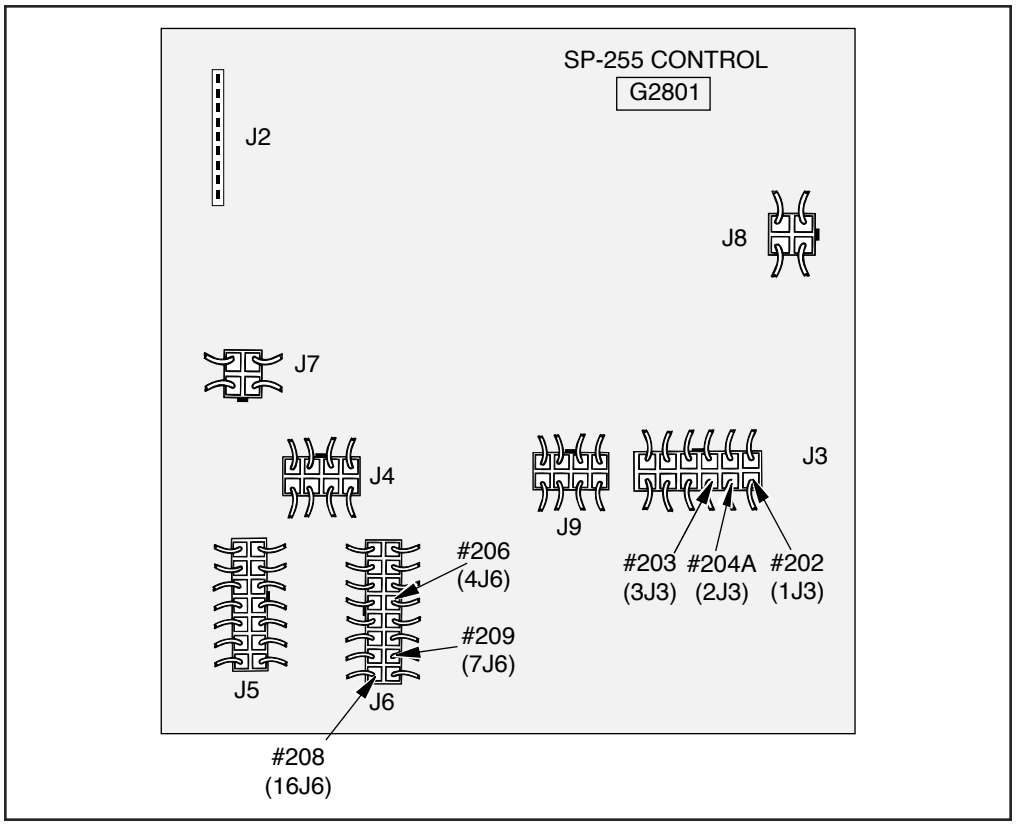

FIGURE F.1 - G2801 Control PC Board Main Transformer Test Points.

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MAIN TRANSFORMER TEST

4. Locate the following leads on Plug J3 on the Control Board.
G2801:

LEAD	PLUG LOCATION
#202 #203 #204 A	1J3 3J3 2J3

5. Connect main input power to the machine.

6. Turn the Idealarc® SP-255 ON/OFF POWER SWITCH to ON.

7. Make the following voltage tests at Plug J3.

   a. Turn the machine OFF between each test.

   b. Carefully insert the meter probes into the back of each Molex Plug pin cavity to perform the test.

G2801:

8. Turn OFF the machine

FROM LEAD	TO LEAD	EXPECTED VOLTAGE
#202 (1J3)	#203 (3J3)	30 VAC
#202 (1J3)	#204 A (2J3)	15 VAC
#203 (3J3)	#204 A (2J3)	15 VAC

9. Locate the following leads on Plug J6 on the G2801 Control PC Board. See Figure F.1.
G2801:

LEAD	PLUG LOCATION
#206 #208 #209	4J6 16J6 7J6

10. Turn ON the machine.

11. Make the following voltage tests at Plug J6 on the G2801 Control PC Board.

   a. Turn the machine OFF between each test.

   b. Carefully insert the meter probes into the back of each Molex Plug pin cavity to perform the test.

G2801:

   c. If any of the voltages tested are

FROM LEAD	TO LEAD	EXPECTED VOLTAGE
#208 (16J6)	#209 (7J6)	60 VAC
#208 (16J6)	#206 (4J6)	30 VAC
#209 (7J6)	#206 (4J6)	30 VAC

   incorrect, check for loose or broken leads between the test points and the main transformer.

   d. If ALL the voltages tested are incorrect or missing, go to Step 12.

12. Test for correct nameplate input voltage between the H1 lead at the ON/OFF POWER SWITCH to H2 or H3 at the reconnect panel. Voltage tested will vary depending on Input Voltage Connection. See wiring diagram for test point locations.

   a. If the voltage test is incorrect,

   - check for loose or broken leads between the reconnect panel and the ON/OFF POWER SWITCH.

   - test the ON/OFF POWER SWITCH for proper operation.

   b. If the correct nameplate voltage is being applied to the main transformer and one or more of the secondary voltages are missing or are incorrect, the main transformer may faulty. Replace.

Return to Section TOC
Return to Master TOC

STATIC SCR RECTIFIER ASSEMBLY TEST

⚠ WARNING

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

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

TEST DESCRIPTION

The Static SCR Test is used to quickly determine if an SCR is shorted or "leaky." See the Waveform Section in this manual for normal and abnormal SCR waveforms.

MATERIALS NEEDED

Analog Ohmmeter (Multimeter)
Idealarc® SP-255 wiring diagrams (See Electrical Diagrams Section of this Manual).
5/16” Nut Driver
1/2" open end or socket wrench

STATIC SCR RECTIFIER ASSEMBLY TEST

TEST PROCEDURE

1. Disconnect main AC input power to the machine.

2. Disconnect Plugs J3 and J6 from the G2801 Control Board. This electrically isolates the SCR bridge assembly. See Figures F.2.

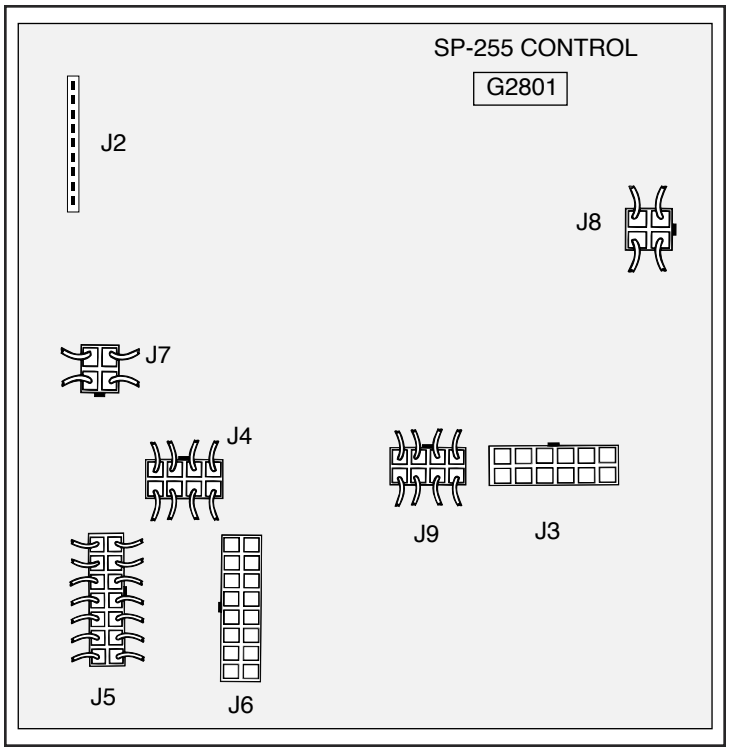

FIGURE F.2 - Remove Plugs J3 and J6 to Perform Static SCR Rectifier Assembly Test.

3. Test with an Analog Volt-Ohm meter that capacitors have completely discharged.

4. Disconnect leads X2 and X3 from the negative capacitor bank using a 1/2" open end wrench. See Figure F.3.

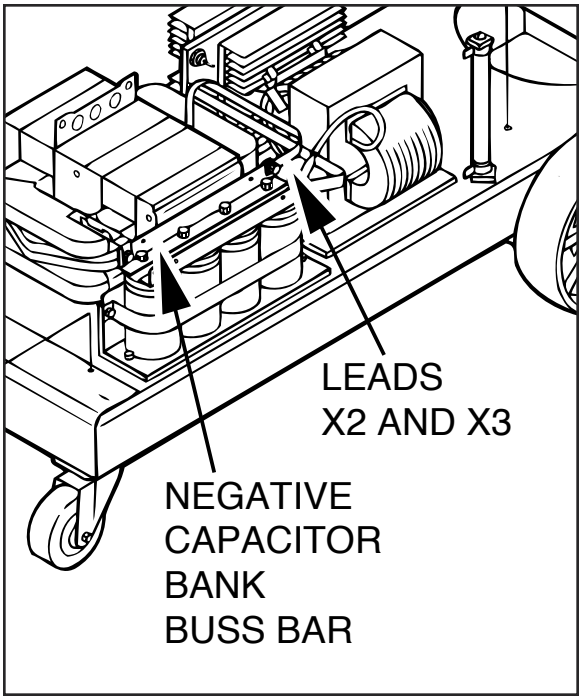

FIGURE F.3 - Location of Leads X2 and X3.

5. Separate leads X2 and X3 from the negative capacitor bank buss bar. Be sure there is no electrical contact. See Figure F.3.

Return to Section TOC
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STATIC SCR RECTIFIER ASSEMBLY TEST

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

6. Test for high or infinite resistance from the anode to the cathode of SCR 1. See Figure F.4. Use an analog ohmmeter (Multimeter).

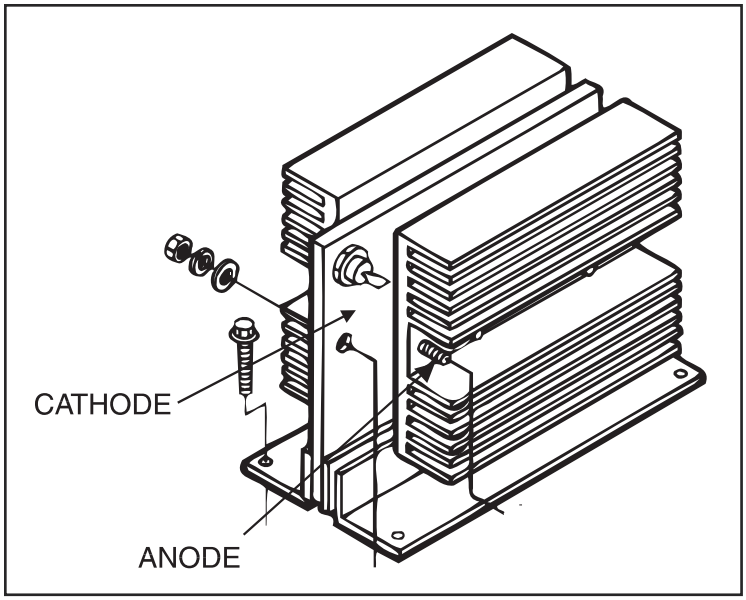

FIGURE F.4 - SCR 1 Test Points.

7. Test for high or infinite resistance from the cathode to the anode of SCR 1 by reversing the meter leads. See Figure F.4.

    a. If a high or infinite resistance is indicated for both tests 6 and 7, the SCR 1 is not “shorted”.

    b. If a low resistance is indicated in either tests 6 or 7, the SCR is faulty. Replace SCR Assembly.

8. Repeat Steps #7 to test SCR 2.

9. Reconnect leads X2 and X3.

10. Reconnect Plugs J3 and J6.

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

ACTIVE SCR RECTIFIER ASSEMBLY TEST

⚠ WARNING

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

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

TEST DESCRIPTION

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

MATERIALS NEEDED

An SCR Tester as specified in this procedure.
Idealarc® SP-255 wiring diagrams (See Electrical Diagrams Section of this Manual).
SCR Heat Sink Assembly Drawings

ACTIVE SCR RECTIFIER ASSEMBLY TEST

TEST PROCEDURE

1. Disconnect main AC input power to the machine.

2. Disconnect Molex Plugs J3 and J6 from the G2801 Control Board. See Figure F.5.

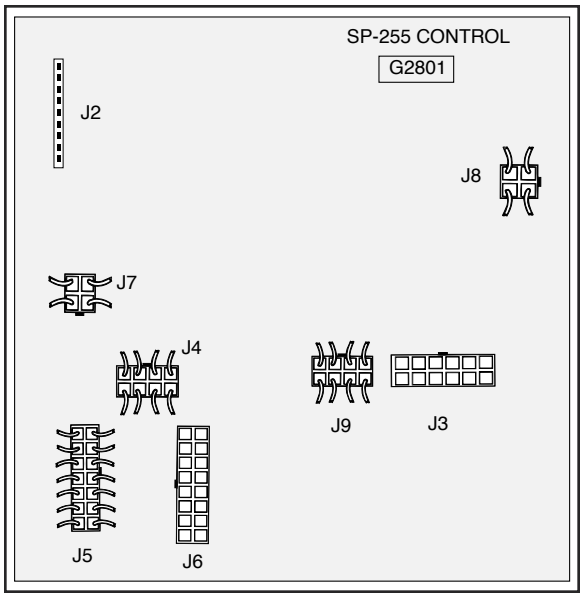

FIGURE F.5 - Control Board Molex Plug Locations for G2801 PC Control Board.

3. Test with an Analog Volt-Ohm meter that capacitors have completely discharged.

4. Disconnect leads X2 and X3 from the negative capacitor bank using a 1/2" open end wrench. See Figure F. 6.

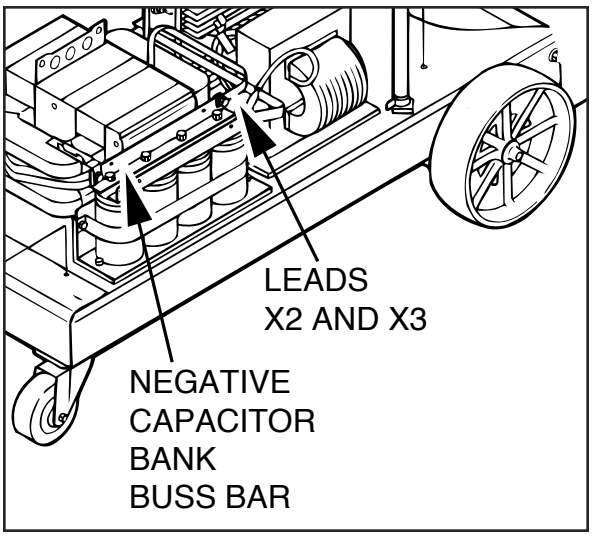

FIGURE F.6 - Location of Leads X2 and X3.

5. Separate leads X2 and X3 from the negative capacitor bank buss bar. Be sure there is no electrical contact. See Figure F6.

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

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

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

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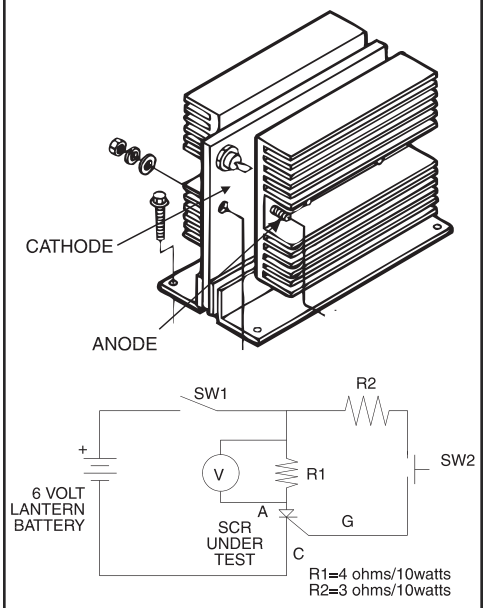
ACTIVE SCR RECTIFIER ASSEMBLY TEST

7. Connect the Tester to the SCR 1 as shown in Figure F.7.

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

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

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



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

FIGURE F.7 - SCR Tester Circuit and SCR connections.

8. Close switch SW-1.

NOTE: Switch SW-2 should be open.

9. Read meter for zero voltage.

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

10. Close or keep closed switch SW-1

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

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

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

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

12. Open switch SW-1.

13. Reconnect the Tester leads. See Figure F.8.

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

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

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

14. Close switch SW-1.

15. Read meter for zero voltage.

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

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

16. Perform the Active Test Procedure outlined in Steps 5-13 for SCR 2.

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

18. Replace all Molex Plugs onto the Control Board and connect leads X2 and X3.

SP-255 KEYPAD RESISTANCE TEST

⚠ WARNING

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

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

TEST DESCRIPTION

This test will determine if any key is not functioning properly.

MATERIALS NEEDED

5/16” Nut Driver
Analog volt-ohmmeter

Return to Section TOC
Return to Master TOC

SP-255 KEYPAD RESISTANCE TEST

TEST PROCEDURE

1. Disconnect main input power to the machine.

2. Remove the Case Top and Side Panels using the 5/16” nut driver.

3. Locate and disconnect Plug J2 connected to the Control PC Board. See Figure F.8.

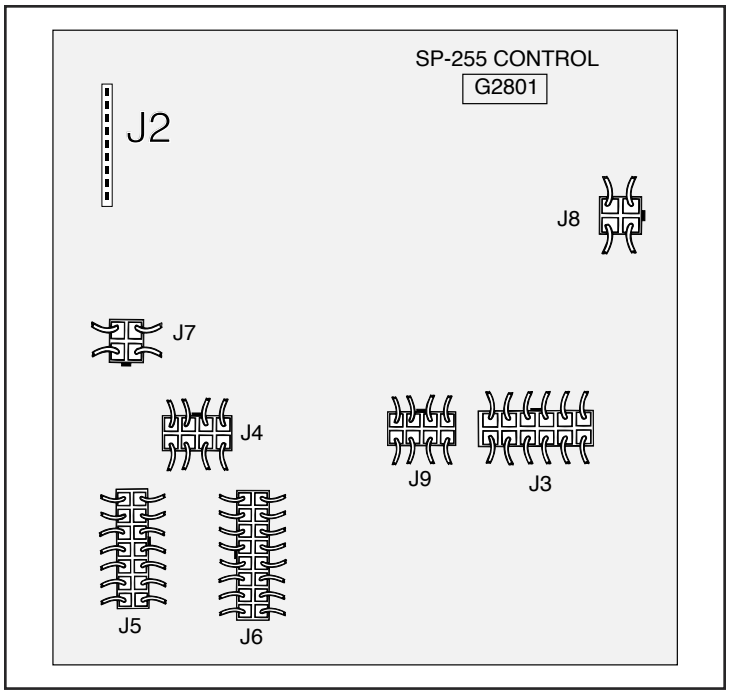


FIGURE F.8 - Plug J2 Location on G2801 PC Control Board.

4. Measure the resistance of each key at Plug J2 using an analog volt-ohm meter as described in ***Table F.1***.

   a. The resistance measurements are taken from the pin locations on Plug J2. See Figure F.9 for each pin location.

   b. If any of the resistance tests are not correct, the keypad may be faulty. Replace.

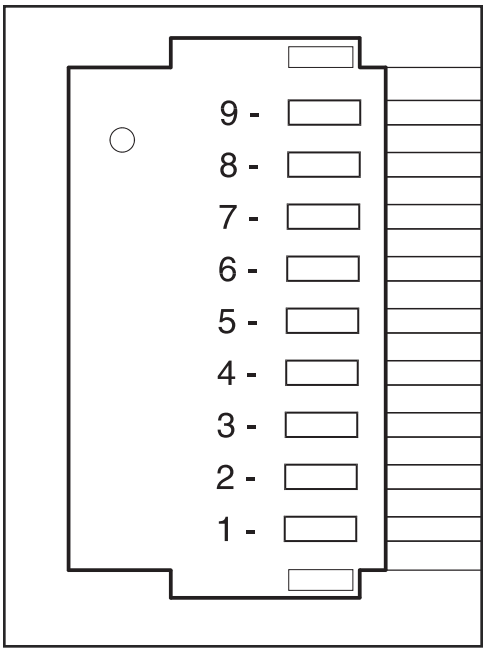


FIGURE F.9 - Plug J2 Test Points.

SP-255 KEYPAD RESISTANCE TEST

TABLE F.1 - SP-255 KEYPAD RESISTANCE TESTS

NOTE: THERE SHOULD NOT BE CONTINUITY BETWEEN PINS UNTIL A KEY IS PRESSED ON THE KEYPAD.

TEST POINTS		KEY PRESSED	MAXIMUM ALLOWABLE RESISTANCE (TYPICAL RESISTANCE)
FROM PIN	TO PIN		
1J2	6J2	CENTER UP ARROW	100 OHMS (30 TYPICAL)
1J2	8J2	CENTER DOWN ARROW	100 OHMS (30 TYPICAL)
1J2	2J2	MEMORY 3	100 OHMS (30 TYPICAL)
1J2	4J2	SWITCH SET DISPLAY	100 OHMS (30 TYPICAL)
2J2	9J2	MEMORY 5	100 OHMS (30 TYPICAL)
2J2	7J2	MEMORY 4	100 OHMS (30 TYPICAL)
2J2	3J2	MEMORY 2	100 OHMS (30 TYPICAL)
2J2	5J2	MEMORY 1	100 OHMS (30 TYPICAL)
3J2	6J2	LEFT UP ARROW	100 OHMS (30 TYPICAL)
3J2	8J2	LEFT DOWN ARROW	100 OHMS (30 TYPICAL)
3J2	4J2	SPOT	100 OHMS (30 TYPICAL)
4J2	9J2	TOGGLE	100 OHMS (30 TYPICAL)
4J2	7J2	IMP VOLTS	100 OHMS (30 TYPICAL)
4J2	5J2	TIMERS OFF	100 OHMS (30 TYPICAL)
5J2	6J2	AUTO	100 OHMS (30 TYPICAL)
5J2	8J2	PROCESS WIRE/GAS	100 OHMS (30 TYPICAL)
6J2	9J2	MANUAL	100 OHMS (30 TYPICAL)
6J2	7J2	RIGHT UP ARROW	100 OHMS (30 TYPICAL)
7J2	8J2	RIGHT DOWN ARROW	100 OHMS (30 TYPICAL)
8J2	9J2	SAVE	100 OHMS (30 TYPICAL)

Return to Section TOC
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WIRE DRIVE MOTOR AND TACHOMETER FEEDBACK TEST

⚠ WARNING

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

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

TEST DESCRIPTION

This test will determine if the wire drive motor and voltage feedback circuit are functioning properly.

MATERIALS NEEDED

5/16” Nut Driver
Volt-Ohmmeter

WIRE DRIVE MOTOR AND TACHOMETER FEEDBACK TEST

TEST PROCEDURE

NOTE: POLARITY MUST BE OBSERVED FOR THESE TESTS.

Test for Correct Wire Drive Motor Armature Voltage

1. Disconnect main input power to the machine.
2. Remove the Case Top and Side Panels using a 5/16" nut driver.
3. Locate Plug J5 on the G2801 Control Board. See Figure F.10.

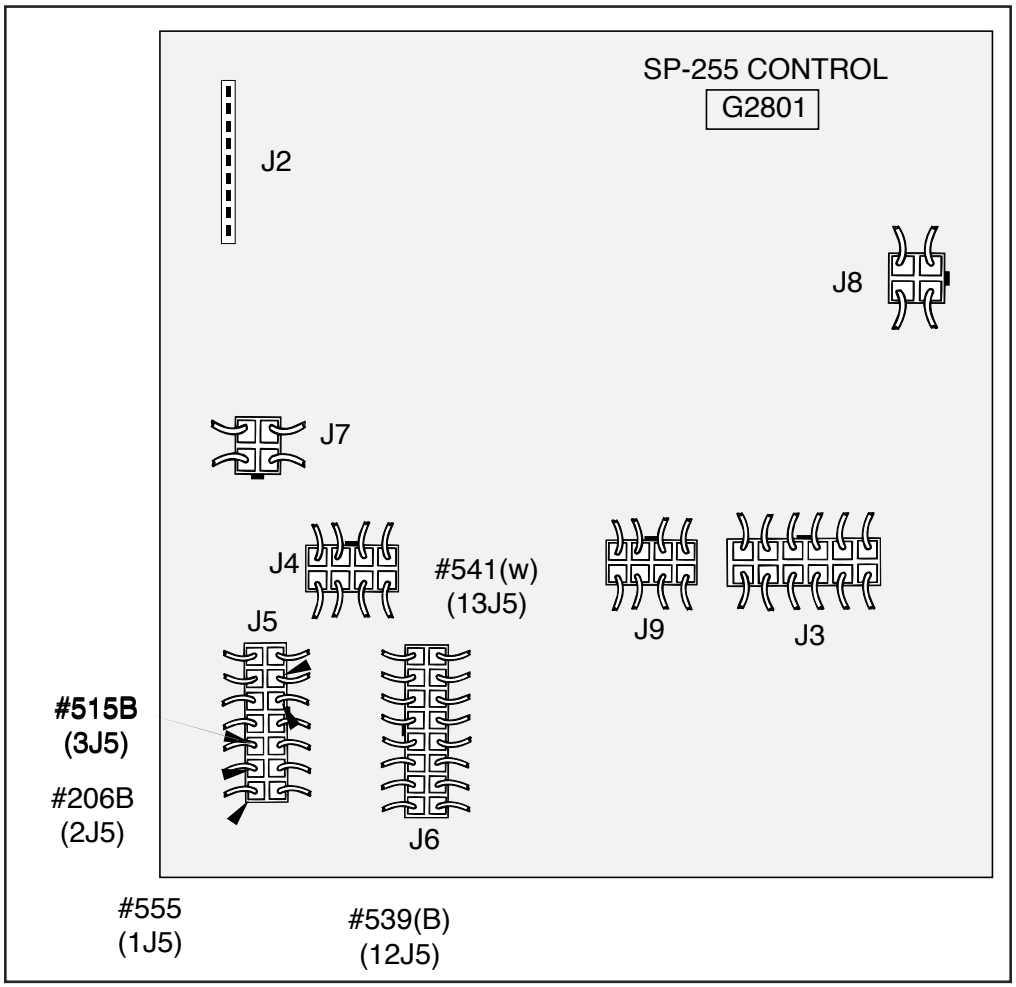

FIGURE F.10 - Plug J5 Location on G2801 PC Control Board.

WIRE DRIVE MOTOR AND TACHOMETER FEEDBACK TEST

4. Test for 2-25 VDC between lead #539(B) (positive) and lead #541(W) (negative) to determine if the correct armature voltage is being supplied. ***See Figure F.10***.

    a. Insert probes into the Molex pin cavities.

5. Pull the gun trigger.

6. Read meter. Normal DC volts is from 2 - 25 VDC. VDC varies depending on wire feed speed.

    a. If voltage to the wire drive motor armature is zero, check the wires between Plug J5 and the wire drive motor. (Check J11, J12 and J15) See wiring diagram.

    b. If the wires and plugs are okay and voltage to the drive motor armature is zero, the Control Board may be faulty. Replace.

    c. If the correct DC armature voltage is present at the wire drive motor, the motor or motor brushes may be faulty. Test and/or replace.

    d. If the motor is running at high speed and the armature voltage is high and uncontrollable, proceed with the tachometer test.

Test for Supply Voltage to Tachometer

1. Test for 15 VDC between lead #515B (positive) and lead #206B (negative). ***See Figure F.10*** for pin locations.

    a. Insert probes into Molex pin cavities.

2. Pull gun trigger.

3. Read meter for 15 VDC.

    a. If the 15 VDC is present, check the leads to the tach circuit.

    b. If the leads are okay and 15 VDC is present, the correct voltage is being received from the Control Board. Go to Feedback Test.

    c. If the 15 VDC is not present and the leads are okay, check Plug J15. The Control Board may be faulty. Replace.

Test for Feedback Voltage to the Control Board

1. Test for 1.5 - 3.5 VDC between lead #555 (positive) and lead #206B (negative). ***See Figure F.10*** for pin locations.

    a. Insert probes into Molex pin cavities.

2. Pull gun trigger.

3. Read meter for 1.5 - 3.5 VDC.

    a. If the 1.5 - 3.5 VDC is present, the tach circuit is sending the correct feedback signal to the Control Board.

NOTE: IF THE MOTOR IS NOT RUNNING, THE FEEDBACK VOLTAGE MAY BE FROM 0 TO 5 VDC.

    b. If the 1.5 - 3.5 VDC is not present or not correct, the Control Board is not receiving the proper feedback voltage from the tach circuit. Check the leads from the tach circuit to the Control Board for loose or broken connections. (Plug J15).

    c. If the leads are okay, the tach circuit may be faulty. Replace.

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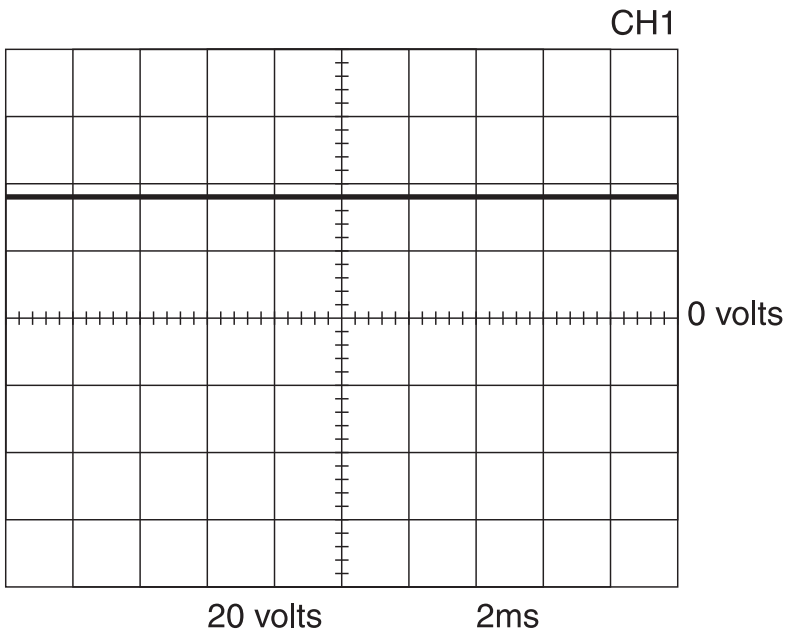
NORMAL OPEN CIRCUIT VOLTAGE WAVEFORM



SCOPE SETTINGS

This is a typical DC output voltage waveform generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 2 milliseconds in time. Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .2 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

Return to Section TOC
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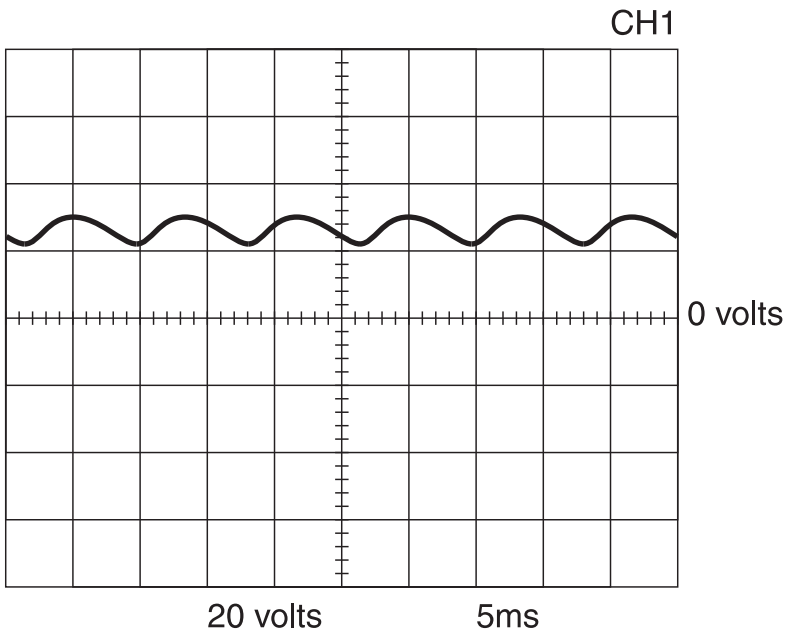
TYPICAL OUTPUT VOLTAGE WAVEFORM - MACHINE LOADED



MACHINE LOADED TO 250 AMPS AT 26 VDC

SCOPE SETTINGS

This is a typical DC output voltage waveform generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 5 milliseconds in time. The machine was loaded with a resistance grid bank. Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

Return to Section TOC
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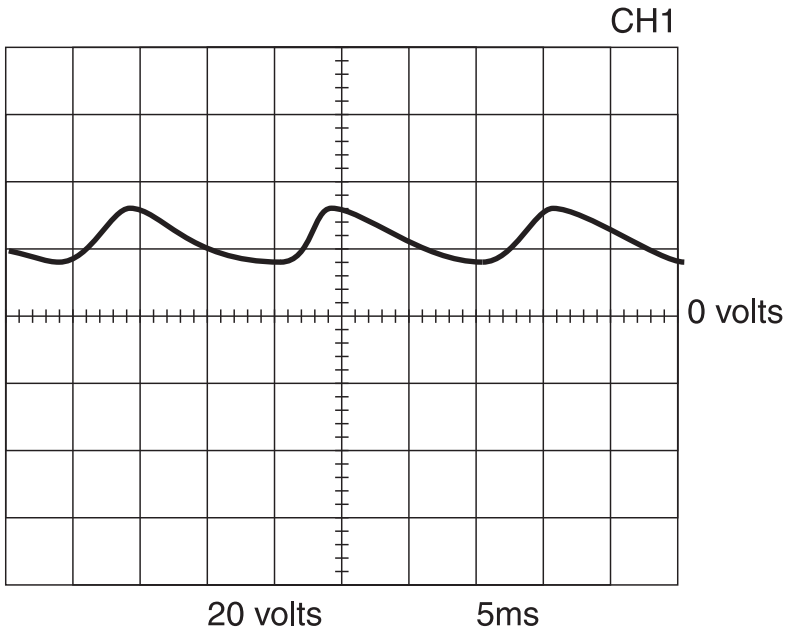
ABNORMAL OUTPUT VOLTAGE WAVEFORM - MACHINE LOADED ONE OUTPUT SCR NOT FUNCTIONING



MACHINE LOADED TO 220 AMPS AT 22 VDC

SCOPE SETTINGS

This is NOT a typical DC output voltage waveform. One output SCR is not functioning. Note the increased ripple content. One SCR gate was disconnected to simulate an open or non-functioning output SCR. Each vertical division represents 20 volts and each horizontal division represents 5 milliseconds in time. The machine was loaded with a resistance grid bank. Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

Return to Section TOC
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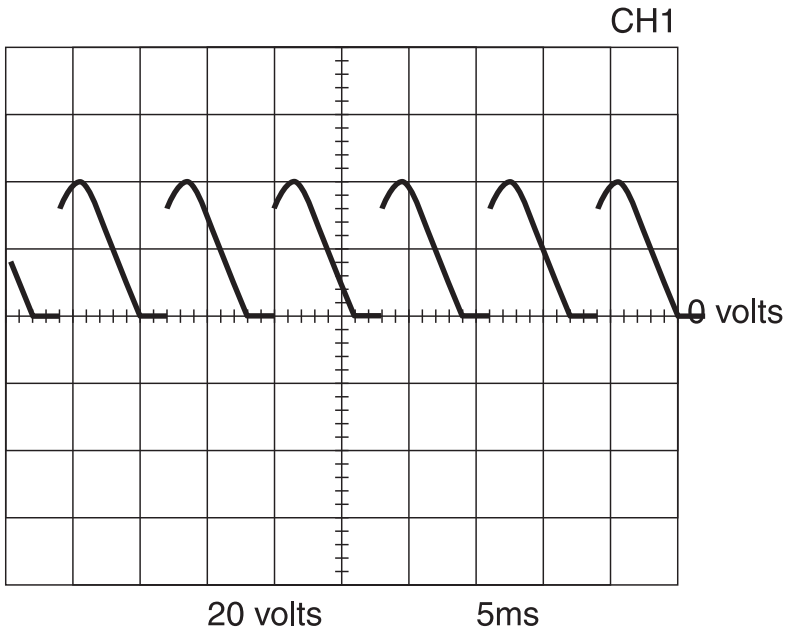
ABNORMAL OPEN CIRCUIT VOLTAGE OUTPUT CAPACITOR BANK NOT FUNCTIONING



SCOPE SETTINGS

This is NOT the typical DC output voltage waveform. The output capacitors are not functioning. Note the lack of "filtering" in the output waveform. The output capacitor bank was disconnected. Each vertical division represents 20 volts and each horizontal division represents 5 milliseconds in time. Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

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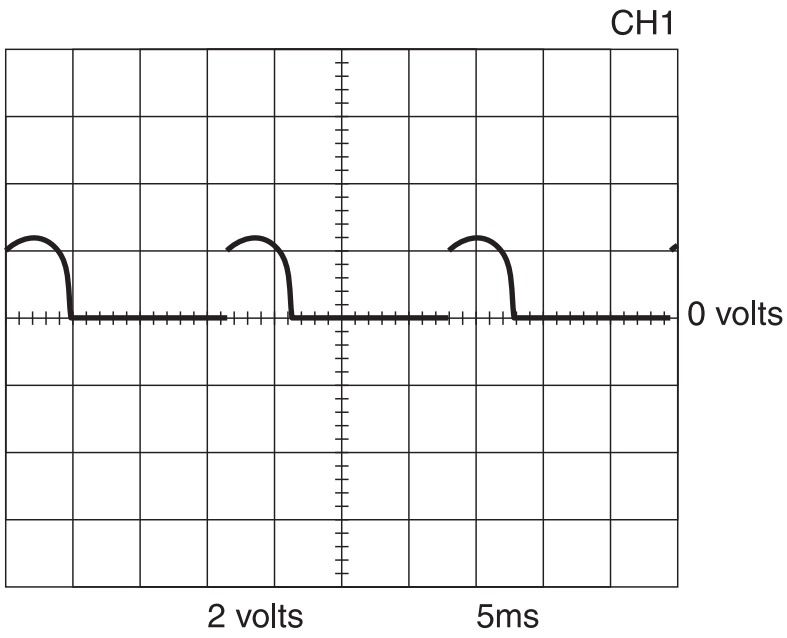
Return to Section TOC
Return to Master TOC

TYPICAL SCR GATE VOLTAGE WAVEFORM



SCOPE SETTINGS

This is a typical SCR gate pulse voltage waveform. The machine was in an open circuit condition (no load) and operating properly. Note that each vertical division represents 2 volts and each horizontal division represents 5 milliseconds in time. Note: Scope probes connected at Plug J3 on the control board. The (+) probe to lead G2, and the (-) probe to lead 204.	Volts/Div . . . . . .2 V/Div. Horizontal Sweep . . . . . .5 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

CONTROL PC BOARD REMOVAL AND REPLACEMENT

⚠ CAUTION

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

REMOVAL AND REPLACEMENT PROCEDURE

MATERIALS NEEDED

5/16" Nut Driver
Phillips Head Screwdriver
Static Electricity Grounding Strap

1. Disconnect main input power the machine.

2. Remove the Case Top and Side Panels using 5/16" nut driver.

3. Disconnect all wiring harness plugs and Molex Plugs connected to the Control Board. See Figure F.11.

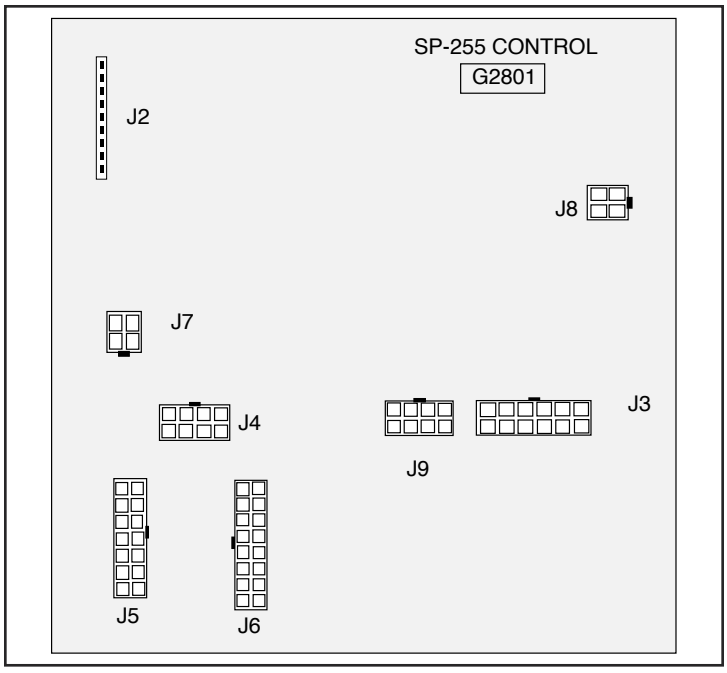


FIGURE F.11 - Wiring Harness and Molex Plug Locations.

CONTROL PC BOARD REMOVAL AND REPLACEMENT

4. Carefully remove P.C. Board from mounting standoffs. See Figure F.12.

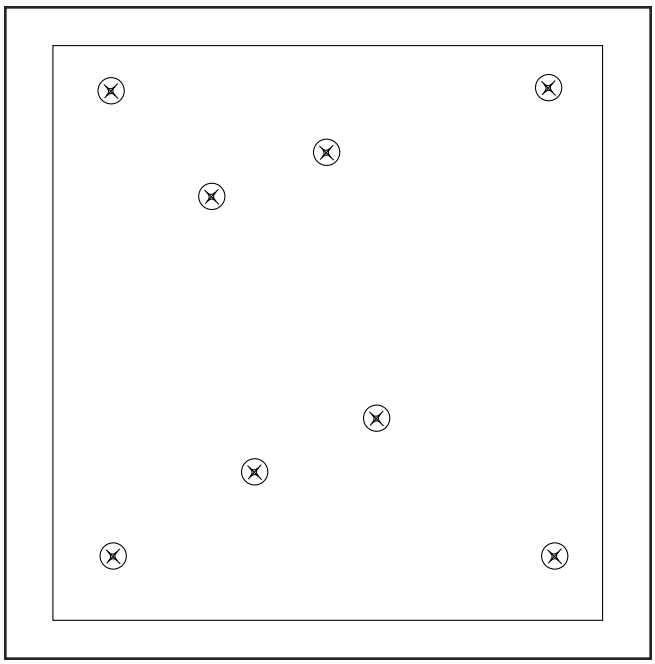


FIGURE F.12 - Control Board Mounting Locations may vary with different Code Machines.

5. Lift the Control Board straight up and out from the machine.

6. When re-installing the Control Board carefully secure Board to mounting standoffs.

KEYPAD REMOVAL AND REPLACEMENT

⚠ WARNING

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

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

MATERIALS NEEDED

5/16” Nut Driver
1/4" Nut Driver

KEYPAD REMOVAL AND REPLACEMENT

PROCEDURE

NOTE: BEFORE REMOVING THE KEYPAD, PERFORM THE KEYPAD RESISTANCE TEST TO BE SURE THE KEYPAD IS FAULTY.

1. Disconnect main input power to the machine.

2. Remove the Case Top and Side Panels with 5/16” nut driver.

3. Disconnect Keypad Plug J2 from the Control Panel.

4. Remove the two screws holding the POWER SWITCH and bezel using a 1/4" nut driver.

5. Grasp the upper right hand corner of the Keyboard and peel it off the front panel.

    a. The back of the Keypad is an adhesive material that bonds the Keypad to the Front Panel.

6. Install a new Keypad.

    a. Remove the paper backing from the new Keypad to uncover the adhesive backing.

    b. Install the new Keypad by carefully pressing the Keypad to the Front Panel. Be sure to smooth out any air bubbles that become trapped under the Keypad.

WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT

⚠ WARNING

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

MATERIALS NEEDED

Large slot head screwdriver
5/16” Nut Driver
Small slot head screwdriver

Return to Section TOC
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WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT

PROCEDURE

1. Disconnect main input power to the machine.

2. Remove the Case Top and Side Panels.

3. Remove the drive roll. See Figure F.13.

   a. Remove the thumb screw, drive hub, and the spacer.

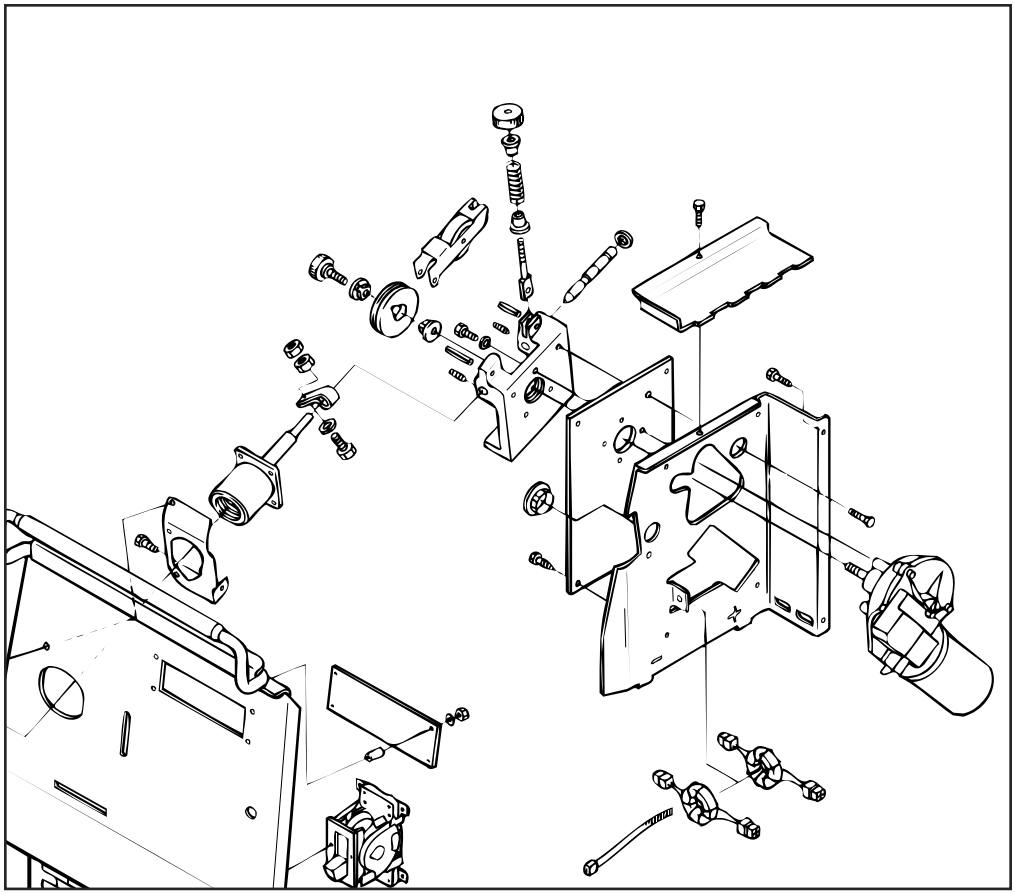

FIGURE F.13 - Wire Drive Assembly Removal

4. Remove the three screws from the gear box housing using a 5/16" nutdriver.

WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT

5. Remove the screw holding the gun connector assembly to the Case Front Panel. See Figure F.14.

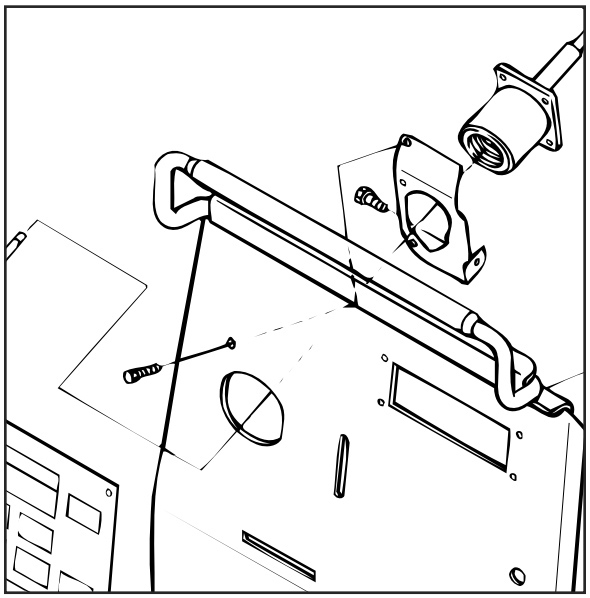

FIGURE F.14 - Location of Screw Holding the Gun Connector Assembly to the Case Front Panel.

6. Slide the entire wire drive assembly carefully toward the Case Back and approximately 2" (51 mm) away from the center baffle to gain access to the drive motor and wiring.

    a. The gas hose and gun connector leads will limit the travel distance.

7. Disconnect the drive motor from the drive roll assembly.

    a. Remove the three large phillips head screws on the outboard side of the drive roll assembly face plate using a phillips head screw driver.

8. Separate the drive roll assembly from the drive motor.

    a. Grip the drive motor in one hand and the drive assembly in the other hand.

    b. Wiggle the drive motor and drive assembly gently back and forth until the two parts separate.

9. Disconnect molex plugs J15, J12, and J11. See wiring diagram.

10. Remove the drive roll assembly.

    a. Remove the two screws mounting the drive roll assembly to the insulator board using a 5/16" nut driver.

    b. Loosen the set screw using a slot head screwdriver that holds the outgoing guide tube into the drive roll assembly.

    c. Remove the drive assembly by sliding it off the out going guide tube and towards the Case Back at the rear of the machine.

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SCR OUTPUT RECTIFIER REMOVAL

⚠ WARNING

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

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

MATERIALS NEEDED

5/16” Nut Driver
1/2” Open End Wrench
1/2” Socket wrench, universal tool, and extension
3/8" Open End Wrench
Slot head screwdriver
Wire cutters

SCR OUTPUT RECTIFIER REMOVAL

PROCEDURE

1. Disconnect lead #208 and Transformer Lead X1 from the heat sink on the left side of the machine (facing the front) using a 1/2” socket wrench. See Figure F.15.

   a. Thin lead is always on the outboard side of the connection.

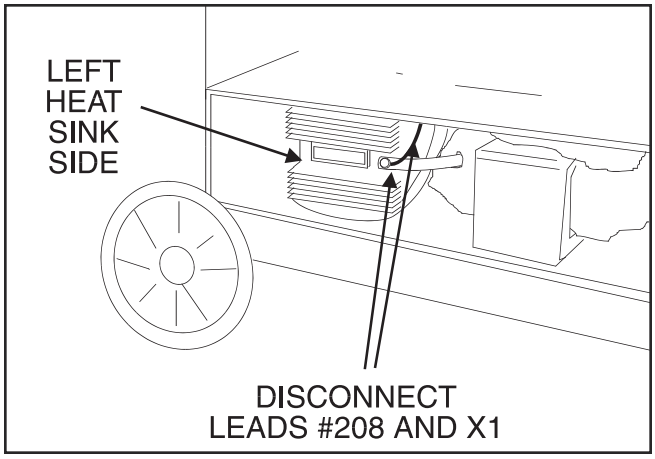

FIGURE F.15 - Heat Sink lead disconnection.

2. Disconnect lead #204 and heavy lead from the middle heat sink with a 1/2” socket wrench and 1/2” open end wrench. See Figure F. 16.

3. Remove the diode lead from the negative capacitor band buss bar on the right side of the machine using a slot head screwdriver and 3/8" open end wrench.

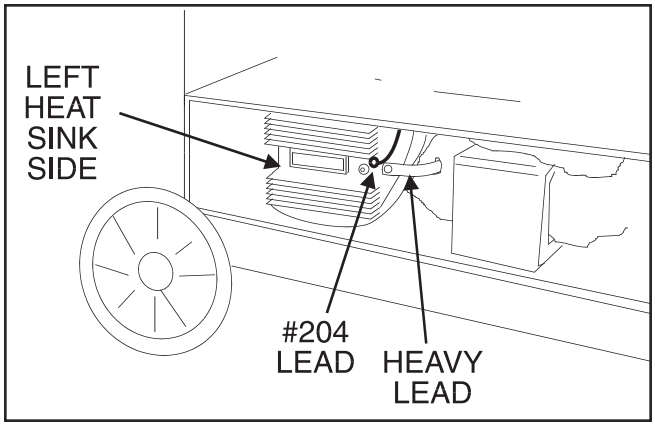

FIGURE F.16 - Heat Sink lead disconnection.

4. Cut the SCR gate leads G1 and G2 (see wire markers and wiring diagram) using wire cutters.

   a. The easiest access to these leads is from the right side of the machine.

   b. Cut any necessary cable ties.

5. Remove the four screws holding the SCR Assembly to the floor of the machine using a 5/16” nut driver.

6. Pivot the SCR Assembly counterclockwise to provide access to the right side heat sink. See Figure F.17.

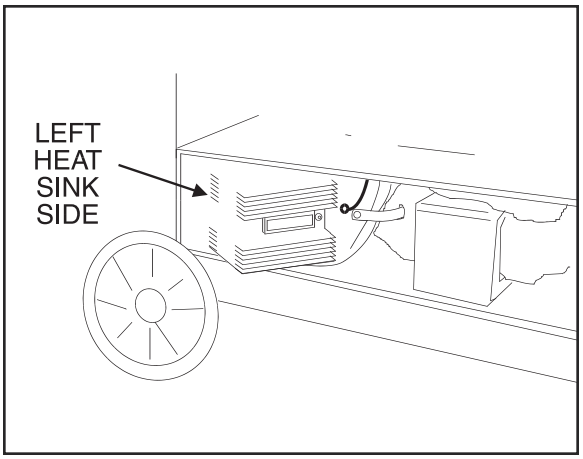

FIGURE F.17 - Heat Sink Lead Disconnection

7. Remove lead #209 and Transformer Lead X4 from the right side heat sink using a 1/2” socket wrench and 1/2” open end wrench.

8. Clear the leads and carefully remove the SCR Rectifier Assembly.

NOTE: When installing the SCR Rectifier Assembly, apply a thin coating of Dow Corning #340 Compound to the electrical connections.

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CAPACITOR BANK REMOVAL AND REPLACEMENT

⚠ WARNING

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Call 1-888-935-3877.

⚠ WARNING

⚠ WARNING

WARNING: THE LIQUID ELECTROLYTE IN THE CAPACITORS IS TOXIC. DO NOT TOUCH THE CAPACITORS WITH ANY PART OF YOUR BODY.

MATERIALS NEEDED

5/16” Nut driver
5/16” socket wrench, extension, and universal tool
1/2” Open end wrench
3/8" open end wrench
Slot head screwdriver
Wiring diagram

CAPACITOR BANK REMOVAL AND REPLACEMENT

PROCEDURE

See Figure F.18 for location of Capacitor Bank Removal and Replacement components.

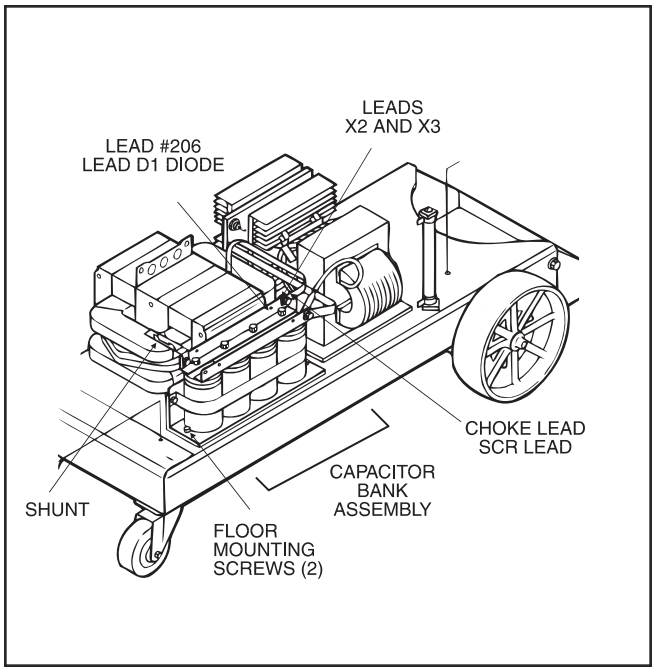

FIGURE F.18 - Location of Capacitor Bank Removal and Replacement Components

1. Disconnect main input power to the machine.

2. Test that the capacitors are discharged using a volt ohmmeter. Polarity must be observed.

3. Remove the two transformer secondary leads (X2 and X3) for the negative capacitor bank buss bar using two 1/2” open end wrenches.

4. Remove the output choke lead and the heavy lead extending from the SCR Rectifier Assembly to the positive capacitor bank buss bar using a 1/2” (13 mm) open end wrench.

5. Remove lead #206 and the D1 diode lead from the negative capacitor bank buss bar using a slot head screwdriver and 3/8” open end wrench.

6. Remove the #204 lead from the positive buss bar.

7. Remove the shunt from the negative capacitor bank buss bar using a 1/2” socket wrench with a universal tool adapter.

   a. Two people may be required to remove the shunt. One person may have to reach through from the left side of the machine to keep the bolt in position while the other person loosens the nut.

8. Remove the two screws holding the capacitor bank to the floor of the machine using a 5/16” nut driver.

9. Clear the leads and carefully remove the capacitor bank assembly from the machine.

MAIN TRANSFORMER REMOVAL AND REPLACEMENT

⚠ WARNING

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Call 1-888-935-3877.

MATERIALS NEEDED

5/16” Nut Driver
1/2” Open end wrench
3/8" Open end wrench
1/2” Socket wrench, extender, universal adapter
Wire cutters

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MAIN TRANSFORMER REMOVAL AND REPLACEMENT

PROCEDURE

1. Disconnect main input power to the machine.
2. Remove the Case Top and Side Panels.
3. Perform the Capacitor Bank Removal Procedure.
4. Remove lead X1 from the left side SCR heat sink assembly using a 1/2" socket wrench, extender and universal adapter.
5. Remove lead X4 from the right side heat sink assembly using a 1/2" socket wrench, extender and universal adapter.
6. Disconnect all leads from the reconnect panel using a 3/8" open end wrench.
7. Disconnect all leads from the POWER SWITCH.
8. Remove the POWER SWITCH.
9. Label and cut leads #202, #203, #204A.
   a. Cut lead #204A at a point just in front of the transformer.
   b. These leads must be re-spliced during reassembly.
   c. An alternative to cutting these leads is to remove them from Molex Plug J3 and pull them free of any wire bundles.
10. Remove all cable ties, wire mounts, - and any harness tape that could get in the way during transformer removal using wire cutters and screwdriver.
11. Remove the four screws mounting the transformer to the floor of the machine using a 5/16" nut driver.
12. Carefully remove the main transformer.
    a. Be sure all leads are clear.

FAN MOTOR AND FAN REMOVAL AND REPLACEMENT

⚠ WARNING

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

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

MATERIALS NEEDED

3/4” Open end wrench
1/2” Socket wrench with extension
Phillips head screwdriver

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FAN MOTOR AND FAN REMOVAL AND REPLACEMENT

PROCEDURE

See Figure F.19 for fan motor and fan removal components.

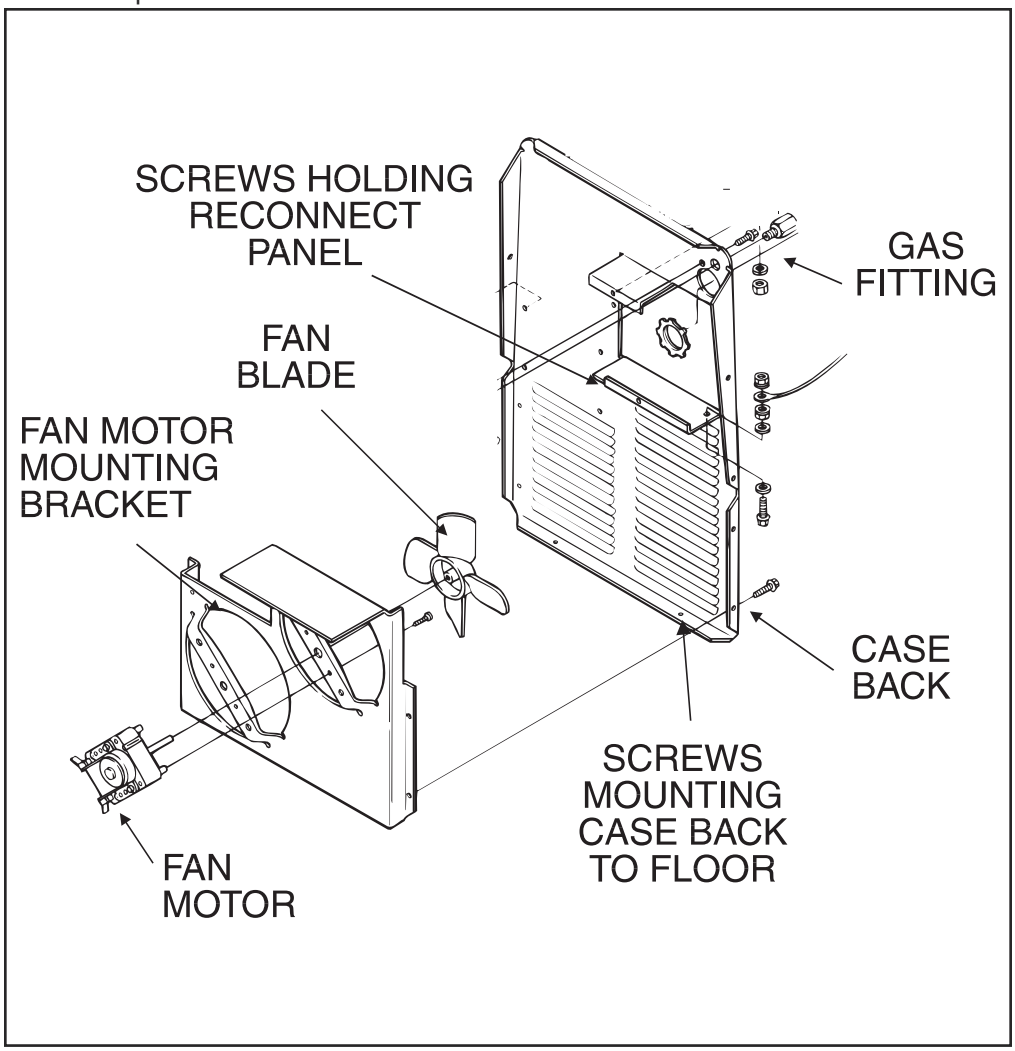

FIGURE F.19 - Fan Motor and Fan Removal Components

1. Remove the Case Back screws.

2. Remove the gas solenoid using a 3/4" open end wrench.

3. Using a 5/16" wrench, remove the 5 screws holding the fan motor mounting bracket to the case back.

4. With a 7/16" wrench remove the bolt holding the Case Back to the vertical baffle. Tilt the Case Back away from the machine and remove the screws holding the Case Back to the floor of the machine using a 5/16" socket wrench with extension.

5. Loosen the two screws holding the reconnect panel in place and slide the reconnect panel from the frame.

6. Remove the fan blade. Note fan blade position on motor shaft for reference for replacing fan.

   a. Pry the fan blade off the motor.

   b. Slide the fan blade off the motor shaft.

FAN MOTOR AND FAN REMOVAL AND REPLACEMENT

7. Remove the fan motor.

    a. Loosen and remove the two screws from the motor mounting bracket using a phillips head screw driver.

    b. When the motor is free from the mounting bracket, place it carefully on the bottom of the machine.

    c. Cut any necessary wire wraps bundling the motor leads.

    d. Remove the leads from the fan motor.

8. Install the replacement motor in the reverse order of removal.

9. Install the fan blade. When installing the fan blade, the blade is flush with the end of the motor shaft.

    a. Spin the fan to be sure it is free to rotate.

10. Reassemble the remaining components in reverse order of removal.

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RETEST AFTER REPAIR

INPUT IDLE AMPS AND WATTS

Input Volts/Hertz	Maximum Idle Amps	Maximum Idle Watts
230/60	6.4	375

OPEN CIRCUIT VOLTAGE

10 to 40 VDC	35-40 VDC Strike Voltage

WIRE SPEED RANGE

50 - 600 IPM (1.27 - 15.2 m/minute)

NOTES

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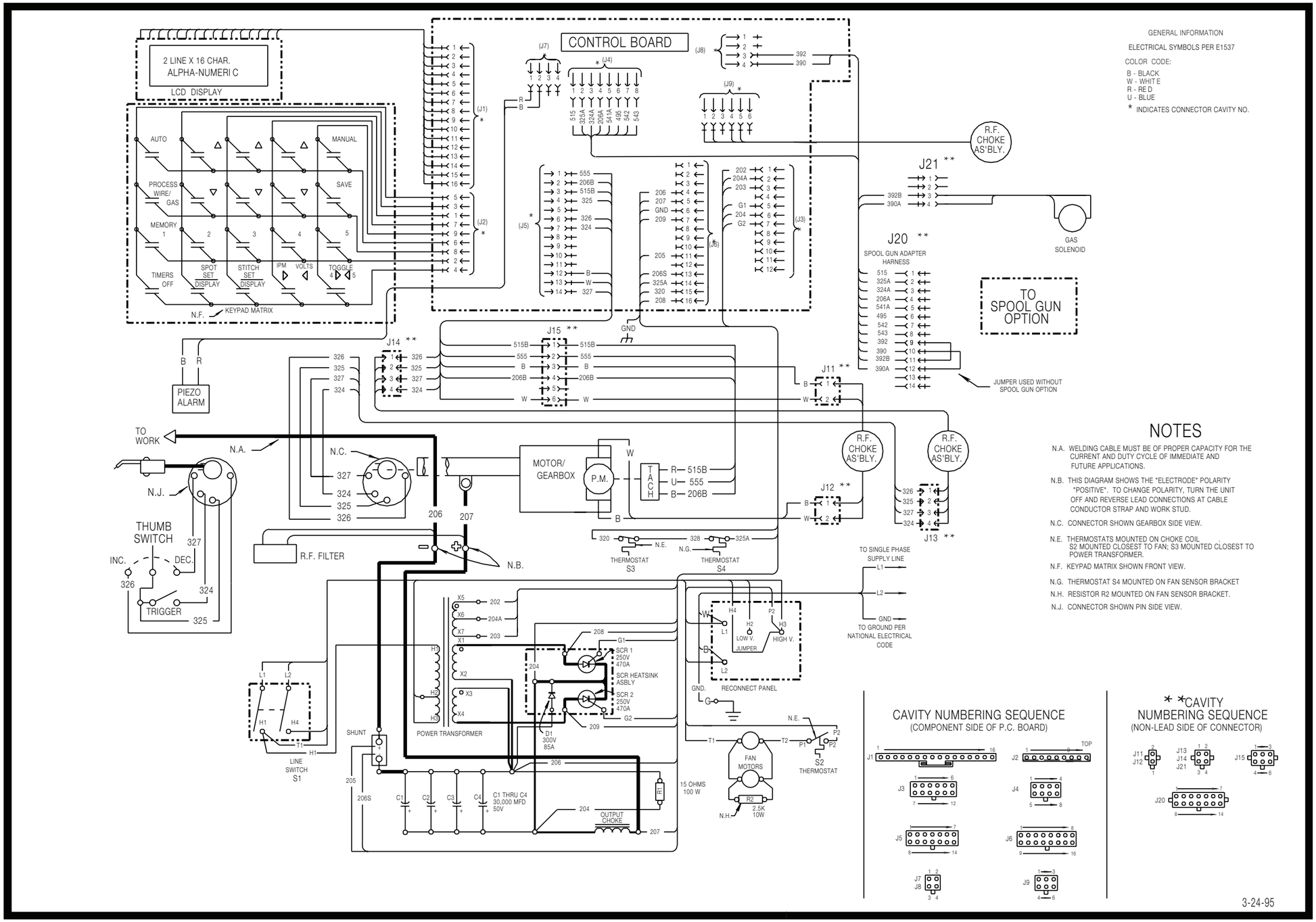
WIRING DIAGRAM - (CODE 10164) (L9688)

SP - 255 (DUAL VOLTAGE)



L9688

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

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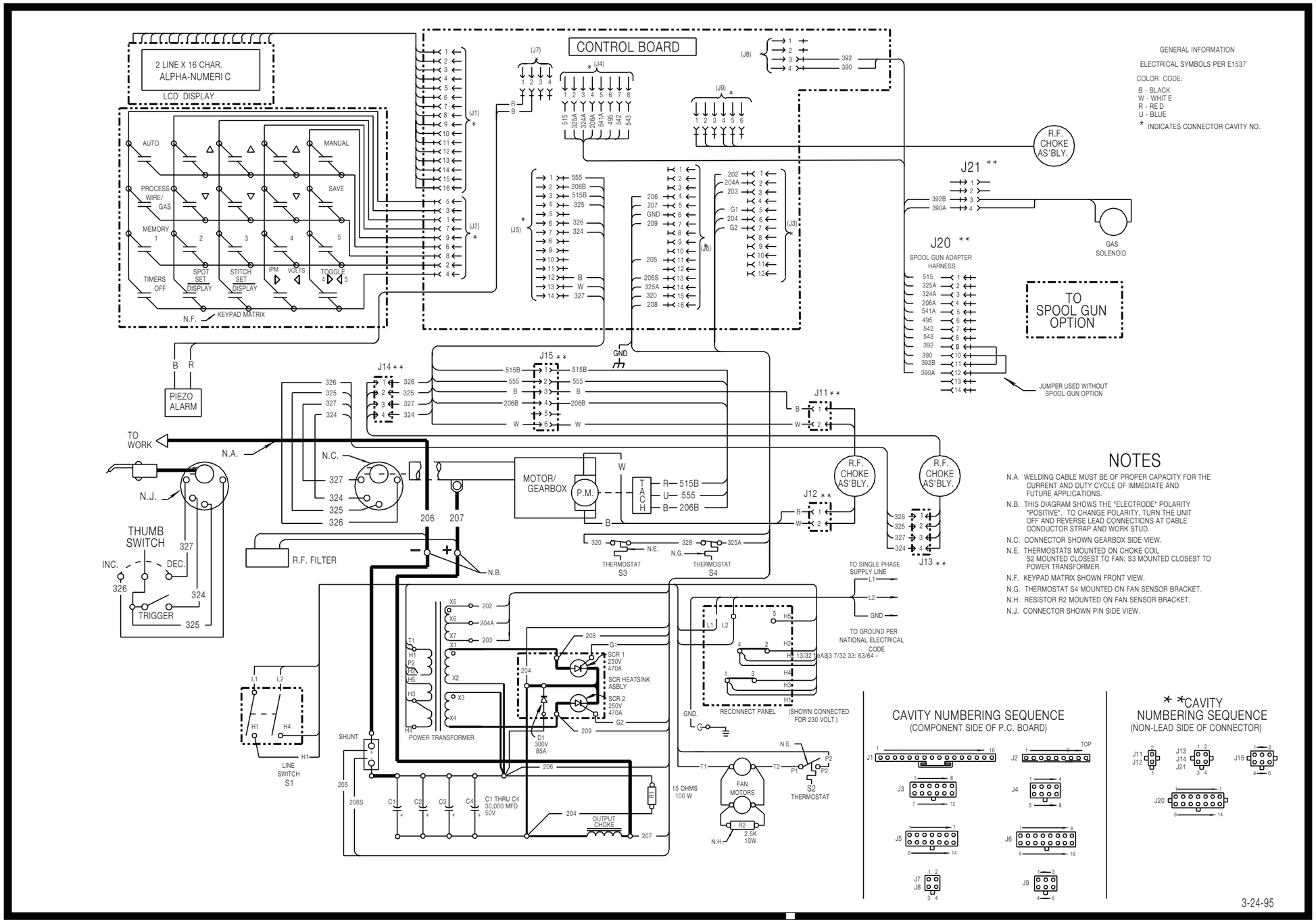
WIRING DIAGRAM - (CODE 10165) (L9689)

SP-255 (230 / 460 / 575V)



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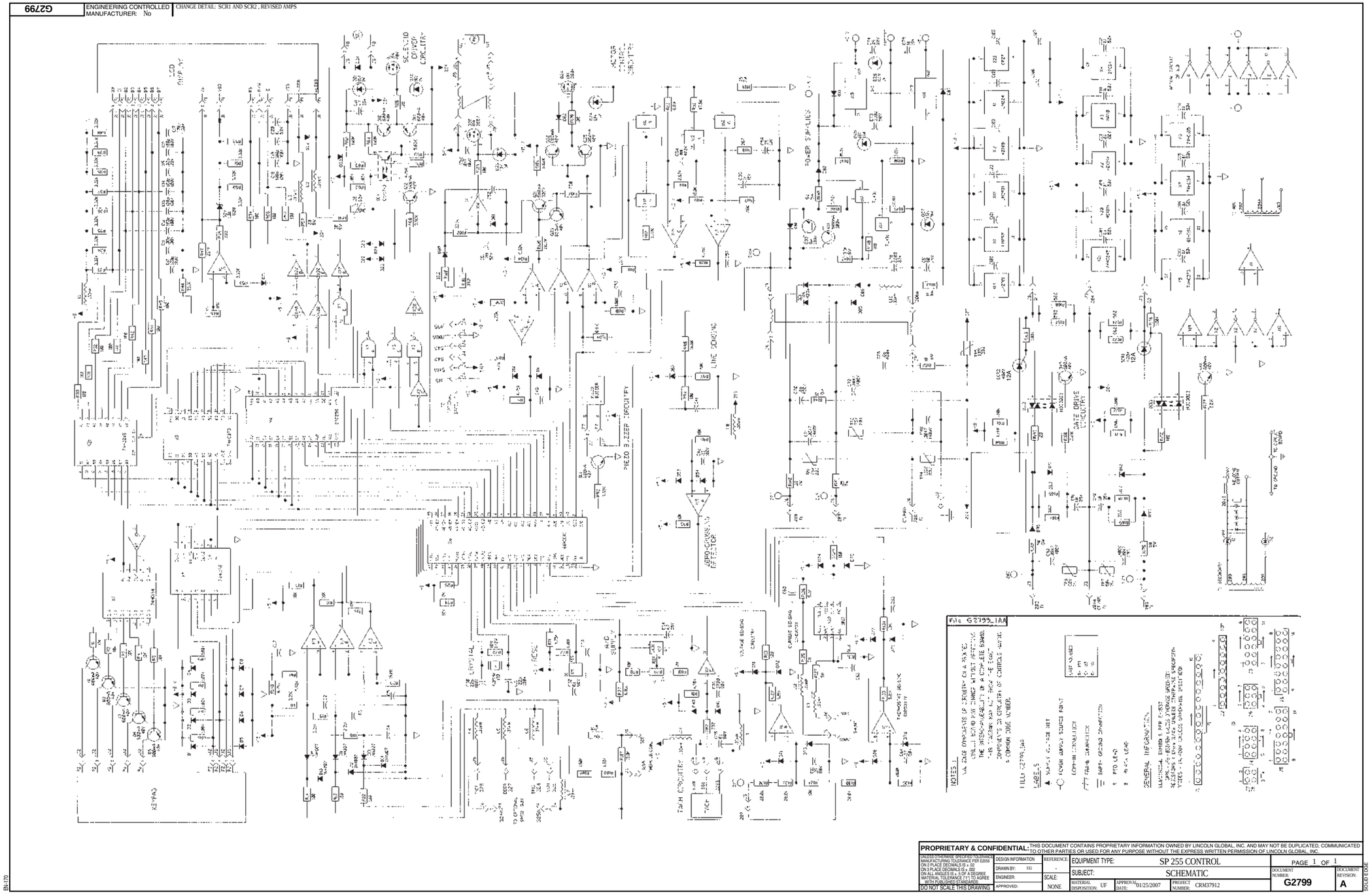
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

SCHEMATIC - COMPLETE MACHINE (G2799)



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

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