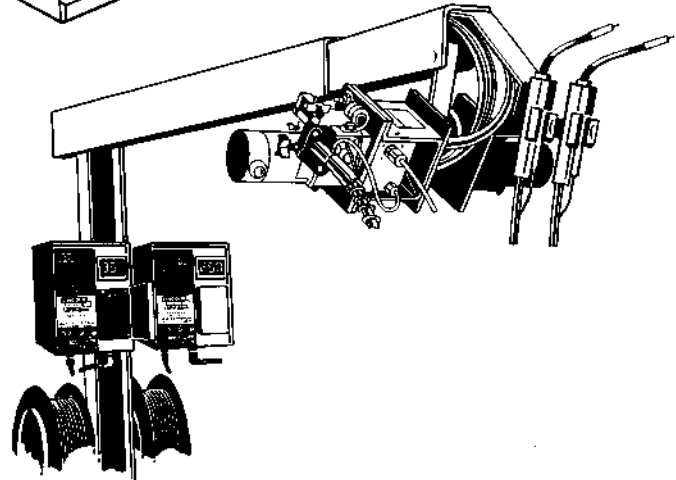
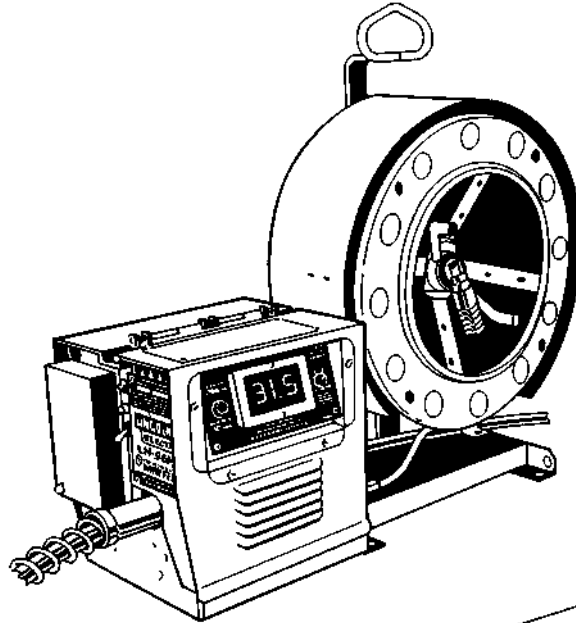


# LN-9 Wire Feeder

For use with machines having Code Numbers: 9134, 9842, 9958, 10316, 10327

## Safety Depends on You

Lincoln arc welding equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation. . . and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.



## SERVICE MANUAL



World's Leader in Welding and Cutting Products

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# SAFETY

## ⚠ 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.

LN-9 Wire Feeder





### ELECTRIC SHOCK can kill.

- 3.a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- 3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:**
- Semiautomatic DC Constant Voltage (Wire) Welder.
  - DC Manual (Stick) Welder.
  - AC Welder with Reduced Voltage Control.
- 3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".
- 3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.
- 3.e. Ground the work or metal to be welded to a good electrical (earth) ground.
- 3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- 3.g. Never dip the electrode in water for cooling.
- 3.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.
- 3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.
- 3.j. Also see Items 6.c. and 8.



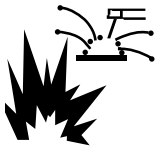
### ARC RAYS can burn.

- 4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.
- 4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.



### FUMES AND GASES can be dangerous.

- 5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**
- 5.b. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.
- 5.c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 5.d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.
- 5.e. Also see item 1.b.



## WELDING SPARKS can cause fire or explosion.

6.a. Remove fire hazards from the welding area.

If this is not possible, cover them to prevent the welding sparks from starting a fire.

Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

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

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

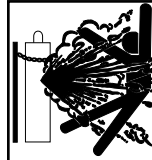
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe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

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

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

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

6.h. Also see item 1.c.



## CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.

- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

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

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

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

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



## FOR ELECTRICALLY powered equipment.

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

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

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

## PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protégez-vous contre la secousse électrique:
  - a. Les circuits à l'électrode et à la pièce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
  - b. Faire très attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
  - c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état de fonctionnement.
  - d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
  - e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas où on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.
3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:
  - a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
  - b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
  - c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.
4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.
5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans latéraux dans les zones où l'on pique le laitier.
6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû étincelles.

7. Quand on ne soude pas, poser la pince à un endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus près possible de la zone de travail qu'il est pratique de la faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'échauffement des chaînes et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particulièrement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumées toxiques.
10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgène (gaz fortement toxique) ou autres produits irritants.

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

1. Relier à la terre le chassis du poste conformément au code de l'électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce à souder doit être branché à une bonne mise à la terre.
2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.
3. Avant de faire des travaux à l'intérieur de poste, la débrancher à l'interrupteur à la boîte de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

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# INSTALLATION

## TECHNICAL SPECIFICATIONS — LN-9

### INPUT POWER

Supplied by power source: 115 VAC, 50/60 Hz., 350 VA

### WIRE FEED SPEED

50 to 600 inches per minute (1.27 to 15.2 meters per minute)

### VOLTAGE CONTROL RANGE

12.0 TO 60.0 VDC

### TEMPERATURE RANGE

OPERATION:	- 20° C to +40° C (- 4° F to +104° F) - 40° C to +40° C (- 40° F to +104° F)	Recommended Maximum Rated
STORAGE:	- 40° C to +85° C (- 40° F to +185° F)	

### WIRE DIAMETERS

.030 through 3/32" (0.8 through 2.4 mm) .045 through .120" (1.2 through 3.0 mm) .035 through 1/16" (0.9 through 1.6 mm)	Solid Electrode Cored Electrode Aluminum
---	--

### PHYSICAL DIMENSIONS

	LENGTH	WIDTH	HEIGHT	TOTAL WEIGHT LESS ELECTRODE
LN-9 (2 Roll)	12.15 in. (308.4 mm)	11.56 in. (293.4 mm)	12.19 in. (309.4 mm)	36 lbs (16.3 kg)
LN-9 (4 Roll)	12.15 in. (308.4 mm)	11.56 in. (293.4 mm)	12.19 in. (309.4 mm)	38 lbs (17.2 kg)
LN-9F Control Box	10.4 in. (264 mm)	6.17 in. (156.6 mm)	11.26 in. (293.4 mm)	See Total Weight Below
LN-9F Wire Drive (2 Roll)	8.79 in. (223.3 mm)	9.77 in. (248.2 mm)	13.76 in. (349.5 mm)	67 lbs (30.4 kg) Total Package Weight
LN-9F Wire Drive (4 Roll)	8.79 in. (223.3 mm)	9.77 in. (248.2 mm)	13.76 in. (349.5 mm)	72 lbs (32.7 kg) Total Package Weight



# INSTALLATION

## INSTALLING THE LN-9N and LN-9S 2-ROLL AND 4-ROLL MODELS

### ATTACHING THE WIRE REEL STAND

Both 2-Roll and 4-Roll LN-9 model wire feeders are shipped without a wire reel stand. The screws and washers for mounting a wire reel stand are included with the LN-9 (fastened in their respective mounting holes). To attach a stand:

1. Remove the three 3/8" hex screws from the back of the wire feed unit.
2. Place the wire reel stand mounting bracket in position against the back of the wire feed unit.
3. Replace and tighten the screws. The long screw and plain washer go into the top hole.

### MOUNTING THE UNIT

LN-9N model wire feeders can be mounted directly on top of their power source as long as it is secure and level. When portability is required, the LN-9 can be mounted on a K163 undercarriage. See the **Accessories** section for details.

A K178-1 swivel platform is available for mounting the LN-9 to the power source. See the **Accessories** section for details.

## INSTALLING THE LN-9F 2-ROLL AND 4-ROLL MODELS

### MOUNTING THE WIRE FEED UNIT

Mount the wire feed unit by means of the insulated mounting bracket attached to the bottom of the gear-box. The gearbox assembly is electrically "hot" when the gun trigger is pressed. Therefore, make certain the gearbox does not come in contact with the structure on which the unit is mounted. The wire feed unit should be mounted so that the drive rolls are in a vertical plane so dirt will not collect in the drive roll area. Position the mechanism so it will point down at about a 45° angle so the wire feed gun cable will not be bent sharply as it comes from the unit.

### MOUNTING THE CONTROL BOX

The same control box is used for both the 2-Roll and 4-Roll wire feed unit. It contains two keyhole slots and one slot for mounting. Mount the box at some convenient location close to the wire feed unit. This will enable the 16-foot control cable assembly supplied with both the LN-9F 2-Roll and 4-Roll to reach between the control box and the wire feed unit.

1. Drill the required holes in the mounting surface. Partially install 1/4-20 screws.
2. Open the control box door by removing the two door screws.
3. Mount the box.
4. Tighten the screws.
5. Close the control box door and replace the door screws.

### CONNECTING THE WIRE FEED UNIT TO THE CONTROL BOX

Both the LN-9F 2-Roll and 4-Roll include the same 16 ft. control and electrode cable assembly. Connect the wire feed unit to the control box as follows:

1. Make certain the cables are protected from any sharp corners that may damage their jackets. Mount the cable assembly along the boom so the end with the female amphenol connector pins is at the wire feed unit.
2. Connect the cable connectors to the receptacles on the back of the wire feed unit connection box.
3. At the same end, connect the electrode lead to the connection stud of the copper strap along the side of the wire feed unit.
4. At the control box end, connect the amphenol connectors of the control cable to the mating MS-type receptacles on the bottom of the control box. (See **Figure A.4**, later in this section, for the location of this connection.)

LN-9 Wire Feeder



# INSTALLATION

## ROUTING THE ELECTRODE

The electrode supply may be either from reels, Readi-Reels, spools, or bulk packaged drums or reels. Observe the following precautions:

- The electrode must be routed to the wire feed unit so that the bends in the wire are at a minimum. The force required to pull the wire from the reel into the wire feed unit must be kept at a minimum.
- The electrode is "hot" when the gun trigger is pressed and must be insulated from the boom and structure.
- If more than one wire feed unit share the same boom, their wire and reels must be insulated from each other and insulated from their mounting structure.

See the **Accessories** section for information about a K299 wire reel assembly.

## ELECTRICAL CONNECTIONS - LN-9N, S AND LN-9F

### POWER INPUT CABLE ASSEMBLY

A special cable assembly is required to connect all LN-9 models to the power source. The assembly includes control cable and electrode cable. Various sizes are available, based on length and maximum welding current. The following power source cable assemblies are available:

K196 for Terminal Strip control connection and output terminal.

K595 for 14-Pin receptacle and output terminal.

K596 for 14-Pin receptacle and "Twist-Mate" connection.

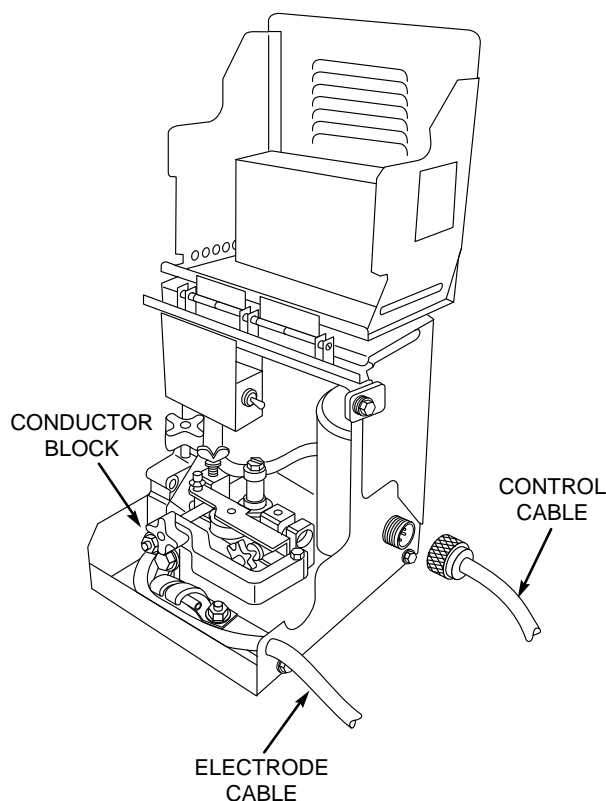
NOTE: Use of an LN-9 with a Pulse Power 500 or a DC650 PRO requires a K442-1 Pulse Power Filter Kit.

### CONNECTING THE POWER INPUT CABLE ASSEMBLY TO THE LN-9N or LN-9S WIRE FEED UNIT

The K196, K595, or K596 cable assembly consists of an electrode cable and multiconductor control cable. The control cable has a MS-type plug on the wire feeder end. To install:

1. See Figure A.1. Connect the MS-type plug of the control cable to the mating connector on the back of the wire feeder.
2. See **Figure A.2**. Remove the screws holding the cable strain relief clamp located near the rear of the wire reel stand base. Put the control cable and the electrode cable under the clamp and install the screws.
3. See Figure A.1. Pass the single electrode cable through the hole provided in the back corner of the control section and fasten it to the copper strap on the wire drive unit.

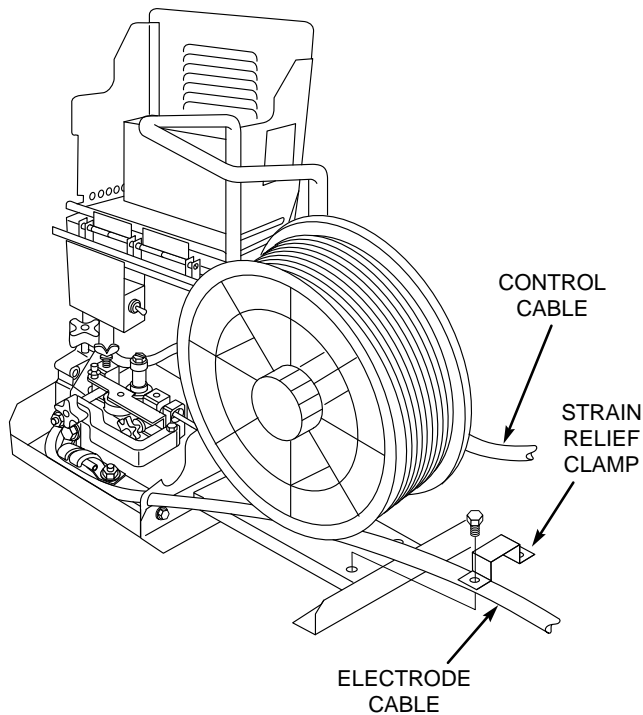
**FIGURE A.1 – INPUT CONTROL CABLE AND ELECTRODE CABLE CONNECTIONS**



LN-9 Wire Feeder



FIGURE A.2 – STRAIN RELIEF CLAMP



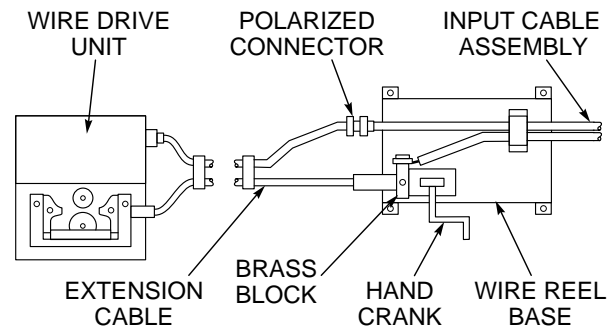
### CONNECTING THE POWER INPUT CABLE ASSEMBLY TO THE LN-9NE or LN-9SE

The hand crank drive rolls will feed all the wires used on the extension. The rolls have been stenciled for identification.

1. Position the extension assembly cable so that the amphenol plug with the threads on its O.D. can be attached to the amphenol end of the power input cable. Attach the opposite end to the wire drive unit. See Figure A.3.
2. Attach the amphenol extension assembly control cable (the one with threads on its O.D.) to the connector on the input cable assembly.

3. Remove the screws holding the cable clamp located near the rear of the wire reel base. Put the control cable and the electrode cable under the clamp and install the screws. (On cables with more than one electrode cable, leave the junction between the cables and the single 4/0 stub behind the clamp so that only the single electrode lead is under the clamp.) Connect the electrode cable of the input cable assembly to the brass block on the hand crank.
4. Insert the connector on the conductor sheath of the extension assembly into the brass block of the hand crank assembly. Tighten the locking screw with a 3/16 hex allen wrench.

FIGURE A.3 – LN-9NE/SE INPUT CONTROL CABLE AND ELECTRODE CABLE CONNECTIONS



5. At the wire drive unit, connect the amphenol of the extension control cable to the receptacle on the back of the LN-9.
6. Remove the ingoing guide tube from the rear brass block and then plug the connector of the conductor sheath into the brass block. Tighten the locking screw with a 3/16" hex allen wrench. The guide tube removed is not used when the extension assembly is installed.

LN-9 Wire Feeder



# INSTALLATION

7. If using welding currents over 450 amperes, connect a length of 1/0 cable between the brass block on the hand crank and the input strap located in the wire drive unit. Tape this cable to the extension assembly. Proper cable lengths are as follows:

22-1/2 ft. extension	26' M5906-106
45 ft. extension	46' M5906-104

8. A handle is provided and is mounted to the wire drive unit in the following manner:

Remove the two self-tapping screws that hold the hinge pin in captivity. Push the hinge pin out, leaving the covers intact. Place the handle into the slots provided. Push the hinge pin back into the assembly, making sure that the pin goes through the holes in the handle. Put the two self-tapping screws back into their respective positions and tighten.

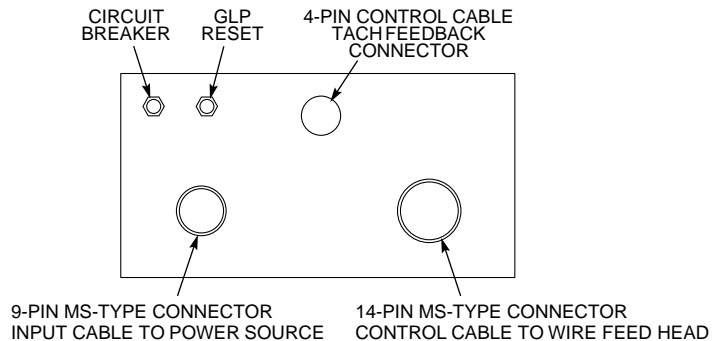
9. If the extension is being used with a K306 Wire Reel Flux Tank Assembly, the hose attached to the bottom of the flux tank may have to be shortened.

This hose is 64 feet long and is the correct length for use with the 45 foot extension. If a 22-1/2 foot extension is used, cut off 22-1/2 feet of the flux hose to give the correct length of 41-1/2 feet. (The conductor cable of the extension assembly is 22-1/2 feet long, tip to tip, and can be used to measure the length cut off.) If you tape the flux hose to the extension cables or the gun cable, be careful not to deform or collapse the flux hose.

## CONNECTING THE POWER INPUT CABLE ASSEMBLY TO THE LN-9F CONTROL BOX

1. See Figure A.4. Connect the MS-type plug of the K196, K595, or K596 control cable to the mating MS-type connector on the bottom of the LN-9F control box.
2. Bolt the electrode lead from the power source to the electrode lead to the wire feed unit using the nut and bolt supplied. Insulate the connection with electrical tape.

**FIGURE A.4 – LN-9F CONTROL BOX  
BOTTOM VIEW**



LN-9 Wire Feeder



# INSTALLATION

## CONNECTING THE POWER INPUT CABLE ASSEMBLY TO POWER SOURCES



### WARNING

Turn input supply power to the power source OFF before connecting the LN-9 or LN-9F wire feeder.

Connect to an appropriate Lincoln power source as follows:

1. If using a multipurpose source (such as the DC-250, DC-400 and DC-600), be sure it is properly set for the welding process being used. See the topic "***Making a Test Weld***," in the ***Operation*** section of this manual.

For terminal strip connections using the K196 power input cable, connect the input cable to the power source exactly as specified on the appropriate LN-9 model connection diagram:

Figure A.5 for DC-250, DC-400 and CV-400, CV-500 I

Figure A.6 for DC-600

Figure A.7 for DC-1000

Figure A.8 for Pulse Power 500

Depending on the power source and process you are using, the jumpers on the LN-9 voltage board may have to be changed. As shipped, the LN-9 is connected for use with the DC-250 DC-400, CV-400, CV-500-I and DC-600. For other power sources, refer to the appropriate connection diagram.

NOTE: If you are using the Pulse Power 500 or DC650 Pro, the K442-1 Pulse Power Filter Kit must be installed in the LN-9. See the instructions included with the kit.

LN-9 Wire Feeder



# INSTALLATION

## FIGURE A.5 – CONNECTION OF LN-9 TO DC-250, DC-400, AND CV/CVI POWER SOURCES

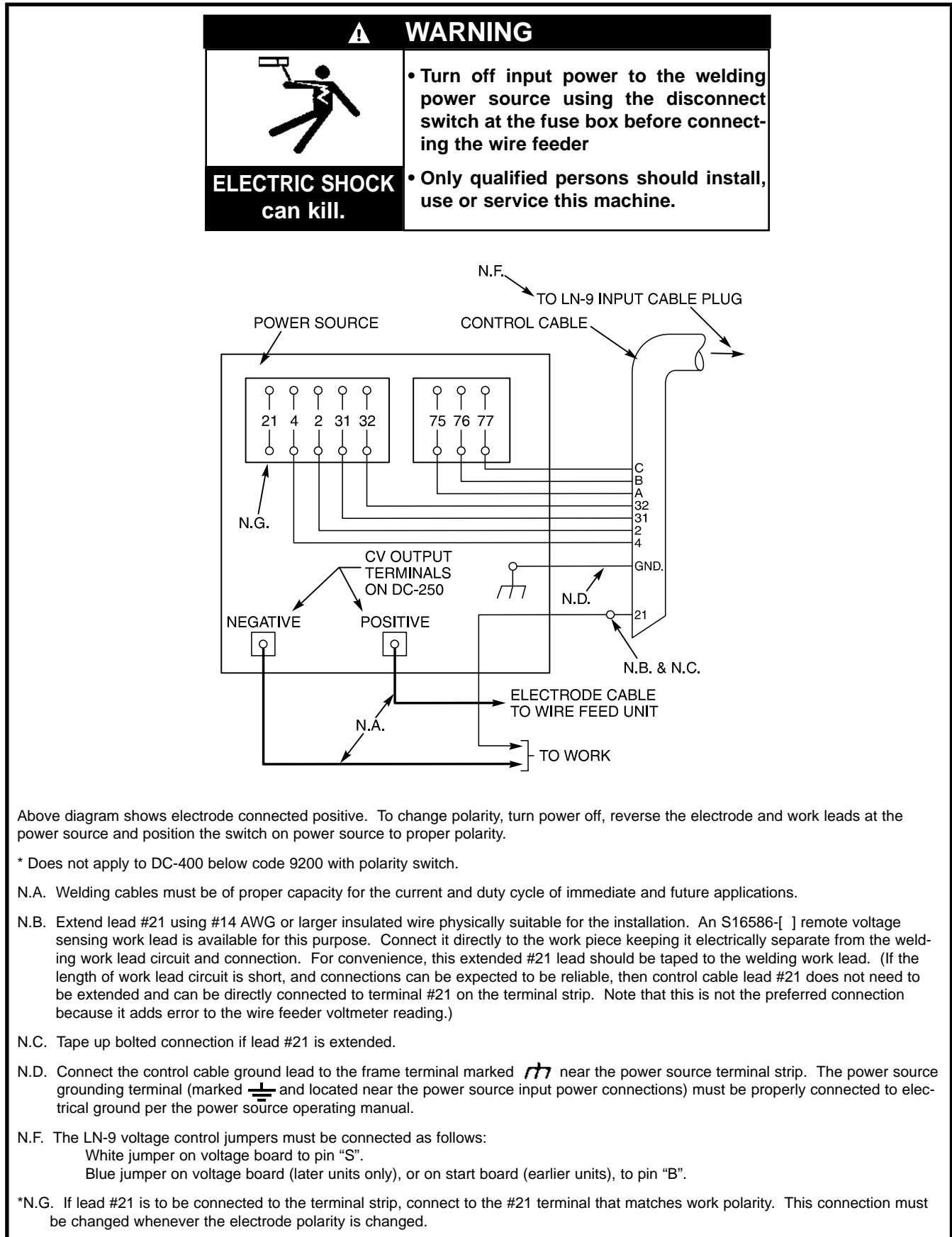

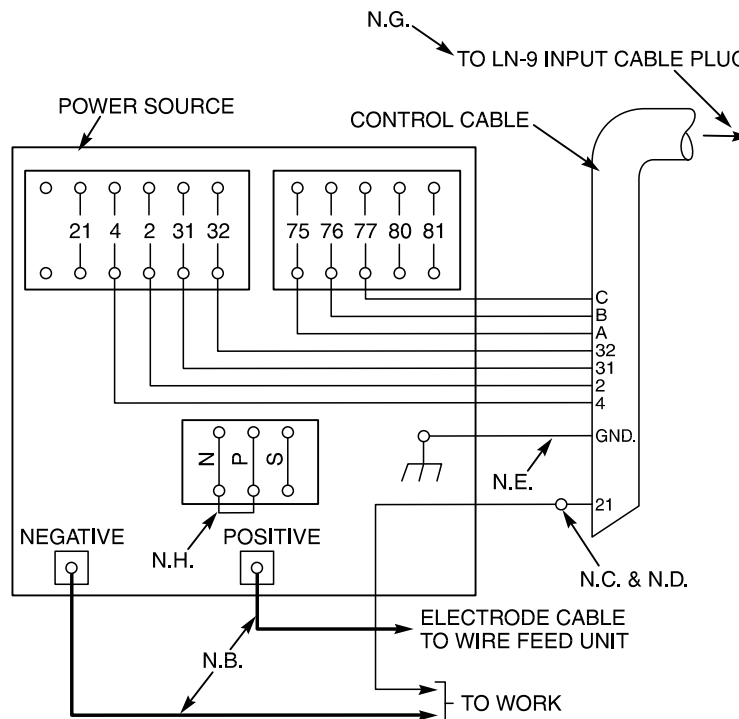


FIGURE A.6 – CONNECTION OF LN-9 TO DC-600 POWER SOURCES

	<h2>WARNING</h2>
<p><b>ELECTRIC SHOCK can kill.</b></p>	<ul style="list-style-type: none"> <li>• Turn off input power to the welding power source using the disconnect switch at the fuse box before connecting the wire feeder</li> <li>• Only qualified persons should install, use or service this machine.</li> </ul>




Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source and position the switch on power source to proper polarity.

For optimum performance with the LN-9, DC-600's with codes 8288 and above are preferred.

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

N.C. Extend lead #21 using #14 or larger insulated wire physically suitable for the installation. An S16586-[ ] remote voltage sensing work lead is available for this purpose. Connect it directly to the work piece keeping it electrically separate from the welding work lead circuit and connection. For convenience, this extended #21 lead should be taped to the welding work lead. (This extended #21 lead connection replaces the need to employ the remote work lead accessory on LN-9's which have a direct work lead jack.)

N.D. Tape up bolted connection.

N.E. Connect the LN-9 control cable ground lead to the frame terminal marked  near the power source terminal strip. The power source must be properly grounded.

N.G. The LN-9 voltage control jumpers must be connected as follows:

White jumper on voltage board to pin "S".

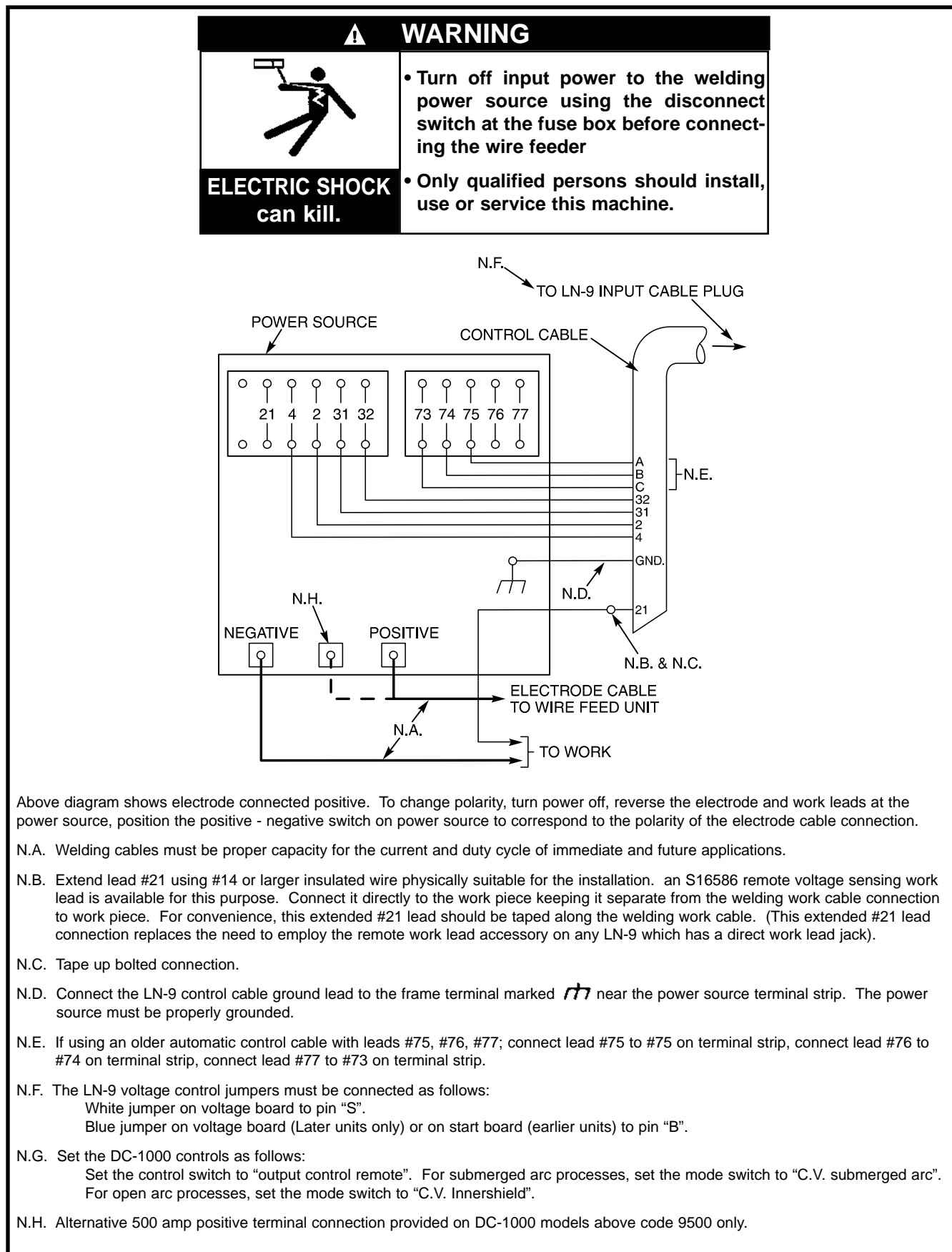
Blue jumper on voltage board (Later units only) or on start board (Earlier units) to pin "B".

N.H. For DC-600 Codes below 8200 connect a jumper from "N" to "P" on LN-9 only. There is no NPS terminal strip on codes above 8200.

LN-9 Wire Feeder



# INSTALLATION

**FIGURE A.7 – CONNECTION OF LN-9 TO DC-1000 POWER SOURCES**


## LN-9 Wire Feeder






# INSTALLATION

## FIGURE A.8 – CONNECTION OF LN-9 TO PULSE POWER 500 POWER SOURCES

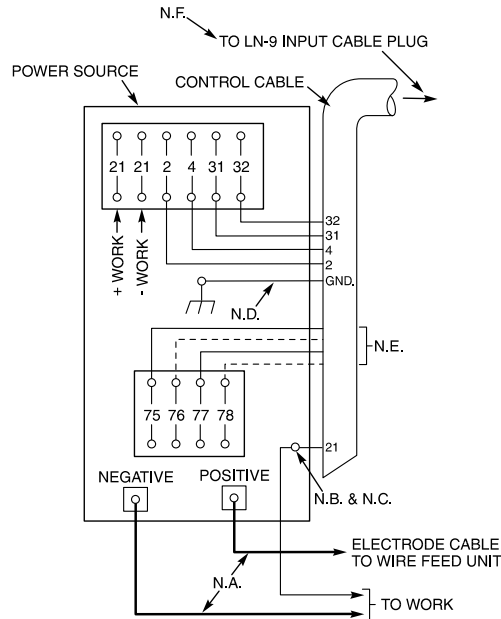
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### WARNING





- Turn off input power to the welding power source using the disconnect switch at the fuse box before connecting the wire feeder
- Only qualified persons should install, use or service this machine.

ELECTRIC SHOCK  
can kill.



Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source and properly set the feeder polarity switch.

- N.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.
- N.B. Extend lead #21 using 14 AWG or larger insulated wire physically suitable for the installation. An S16586-[ ] remote voltage sensing work lead is available for this purpose. Connect it directly to the work piece keeping it electrically separate from the welding work lead circuit and connection. For convenience, this extended #21 lead should be taped to the welding work lead.
- N.C. Tape up bolted connection.
- N.D. Connect the control cable ground lead to the frame terminal marked  near the power source terminal strip. The power source grounding terminal (marked  and located near the power source input power connections) must be properly connected to electrical ground per the power source Operating Manual.
- N.E. Connect control leads to terminal strip as follows:  
LN-9: A to 75 B to 77 C to 78
- N.F. The LN-9 voltage control jumpers must be connected as follows:  
White jumper on voltage board to pin "S".  
Blue jumper on voltage board is not connected to any pin. (Secure loose jumper clear of any possible interference.)

NOTE: For proper pulse welding operating with LN-9:

1. The LN-9 must have an L6084-3 (or higher superseding part number) voltage board installed. (Standard above code 9100.)
2. The Pulse Power Filter board must be installed and connected in the LN-9 per instructions provided with the kit.
3. The pulse current sensor assembly (with looped copper energizer) must be installed. (Standard above code 9100.) Feeder conversion kits are available for all LN-9 model codes (below 9100 and above 9100).

LN-9 Wire Feeder



# INSTALLATION

## MACHINE GROUNDING

LN-9 wire feeders are grounded to the power source through the input cable. The power source grounding cable must be properly connected to electrical ground. See your power source operating manual for details.

## WORK CABLE CONNECTION

Connect a work lead of sufficient size and length between the proper output terminal on the power source and the work. See Table A-1. Be sure the connection to the work makes tight metal-to-metal electrical contact. Poor work lead connections can activate the grounding lead protector and/or result in poor welding performance.

**TABLE A.1 – WORK CABLE SIZES**

Current 60% Duty Cycle	Copper Work Cable Size, AWG	
	Up to 50' length	50'-100' length
300 Amps	0	000
400 Amps	00	0000
500 Amps	000	0000
600 Amps	000	Two 000

## DIRECT WORK LEAD CONNECTION

Lincoln specified procedures give voltage readings taken between the work and the gun cable brass connection block of the LN-9. To match these voltage readings, the connection diagrams show the #21 lead being extended and connected directly to the work instead of #21 on the power source terminal strip (or Dual Process Kit terminal strip). This extended lead must be connected directly to the work. When using a Dual Process Kit, you must extend the lead individually for each LN-9.

As an alternative, LN-9 models are provided with a quick-connect terminal splice connection in the #21 lead between the input Amphenol connector of the LN-9 and its polarity switch. See the LN-9 wiring diagram. This in-line connection consists of a red insulated male and female .250 x .032 terminal pair located in the lead harness. It runs along the right side of the wire feed motor inside the control section of the LN-9N and S models and in the lead harness at the lower left corner of the control box (near the input Amphenol) of the LN-9F models. You may also open this #21 lead and connect your own direct work lead equipped with a .250 x .032 female quick-connect terminal to the male side of the splice. This direct work lead connection must be tape insulated, strain-relieved, and routed outside the LN-9 control box to be connected directly to the work.

With either direct work lead connection method, the LN-9 regulates the power source to hold the arc voltage constant, even with voltage drops in the electrode lead, work lead, or work lead connection. If the direct work lead becomes disconnected from the work, the LN-9 wire feeder will stop welding shortly after the arc is struck. See the topic "**Circuit Protection and Automatic Shutdown**" in the **Operation** section of this manual.

LN-9 Wire Feeder



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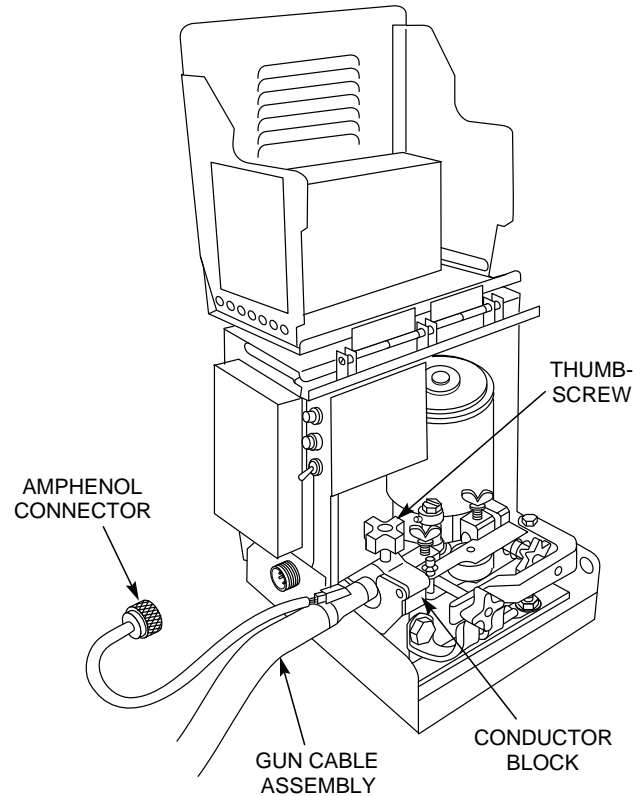
# INSTALLATION

## CONNECTING THE GUN CABLE TO THE WIRE FEEDER

A variety of gun and cable assemblies are available for the LN-9 models. See the **Accessories** section of this manual.

Lay the cable out straight. Insert the connector on the welding conductor cable into the brass conductor block on the front of the wire drive unit. See Figure A.9. Make sure the connector is fully seated and tighten the locking screws with a 3/16" Allen wrench or handscrew (if provided). Keep this connection clean and bright. Connect the control cable polarized Amphenol plug into the mating 5-cavity receptacle on the front panel of the wire drive section.

FIGURE A.9 – GUN CABLE CONNECTIONS



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LN-9 Wire Feeder



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### SAFETY INSTRUCTIONS

Read and understand this entire section of operating instructions operating the machine.

#### **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 SPARKS can cause fire or explosion.**

- Keep flammable material away.



#### **ARC RAYS can burn.**

- Wear eye, ear, and body protection.

# OPERATION

## GENERAL DESCRIPTION

The LN-9 2-Roll and 4-Roll semiautomatic wire feeder models feature the precise "set and forget" digital procedure control. They are designed to achieve higher quality control and weld quality levels more easily. The arc voltage and wire feed speed can be set on a digital meter before the arc is struck and the procedure remains precisely set day in and day out.

The wire feed speed and arc voltage can be "SET" before or during welding, and the "ACTUAL" values can be read during welding. Wire feed speed and arc voltage will be held virtually constant regardless of input voltage variation, feeding force, loading of the power source, ambient temperature changes or a voltage drop in the electrode or ground circuit.

- Two drive rolls (driven) are used with calibrated idle roll pressure setting. Rolls are available for feeding .030 thru 3/32" solid and .045 through .120" flux cored steel electrodes, as well as .035 through 1/16 aluminum wires.
- Four drive rolls (driven) are available and they work on a "quick release" mechanism for easy access to drive rolls and guide tubes. Drive roll kits are available for the same electrode sizes as the 2-roll feeders.

## RECOMMENDED PROCESSES AND EQUIPMENT

When combined with the broad selection of quality welding equipment and accessories, the LN-9 provides a versatile precision welding system to meet the specific needs of Outershield®, Innershield® or submerged arc welding processes. The capabilities of the LN-9 2-Roll and 4-Roll wire feeders are:

Rated wire size range:

- .030 through 3/32" solid wire electrode.
- .045 through .120" Outershield® cored electrode.
- .062 through 7/64" Innershield® cored electrode.

Rated wire speed range:

- 50 through 600 inches per minute.
- (1.27 through 15.2 meters per minute).

## DC CONSTANT VOLTAGE POWER SOURCES

The following welding system power sources are available for use with all LN-9 models:

The Idealarc® DC-250, DC-400, CV-400 and DC-600 are recommended for use with any LN-9 model. The Pulse Power 500 and DC650 Pro can also be used with the LN-9 with the installation of the optional K442-1 Pulse Power Filter Kit.

SAM power sources may also be used.

# OPERATION

## CONTROLS AND SETTINGS

Operator controls for LN-9N, NE, S and SE models are shown in Figure B.1. Controls for LN-9F models are shown in Figure B.2. Refer to these figures and the following descriptions of the controls.

**ELECTRODE POLARITY SWITCH:** The polarity switch is located inside the wire drive section on the LN-9 model and on the front panel of both the LN-9F 2-Roll and 4-Roll control box. Set the switch to the same polarity as the electrode lead connection to the power source. If the switch is not set for the correct polarity, the wire feeder will stop welding shortly after the arc is struck. See the topic "**Automatic Shutdown**" later in this section of the manual.

**WIRE FEED DIRECTION SWITCH:** The direction switch is located inside the wire drive section on the LN-9 model and on the front panel of both the LN-9F 2-Roll and 4-Roll control box. This switch permits the wire to be fed in either direction when the trigger is pressed or when using the cold inch switch feature of the K202 Burnback kit. Be sure this switch is set for forward feed when you are ready to weld.

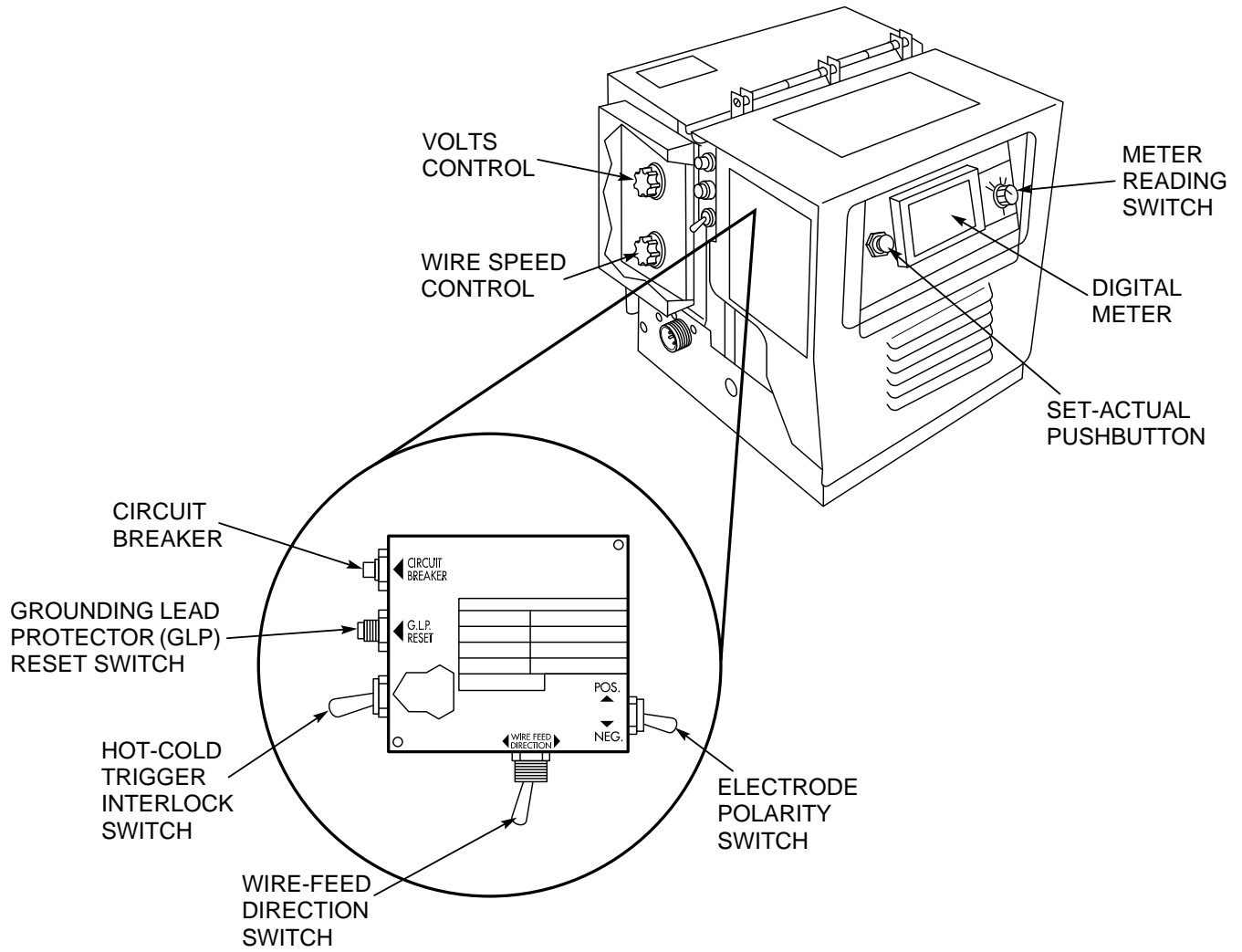
**HOT-COLD TRIGGER INTERLOCK SWITCH:** This switch is located on the front rail on the LN-9 model and on the front panel of both the LN-9F 2-Roll and 4-Roll control box. The three-position switch serves a dual purpose:

1. **"Hot-Cold" Wire Feed** - In the center position the wire will be electrically cold when feeding with the gun trigger. In either the up or down positions the wire will be "hot" when feeding with the gun trigger.
2. **Trigger Interlock Function** - In the down position the trigger interlock will be OFF, allowing the gun trigger to function in the normal mode. This stops wire feed and welding when the trigger is released. In the up position the trigger interlock will be ON. The trigger interlock feature functions as follows:
  - a) When you are not welding, the trigger will function in the normal mode, which feeds only when the trigger is closed.
  - b) Once the welding arc has been struck, the gun trigger may be released. Welding will continue until one of the following occurs:
    - The arc is extinguished by quickly pulling the gun away from the work.
    - or
    - The trigger is again depressed and released.



# OPERATION

FIGURE B.1 – WIRE FEEDER CONTROLS FOR LN-9N, NE, S, SE



LN-9 Wire Feeder



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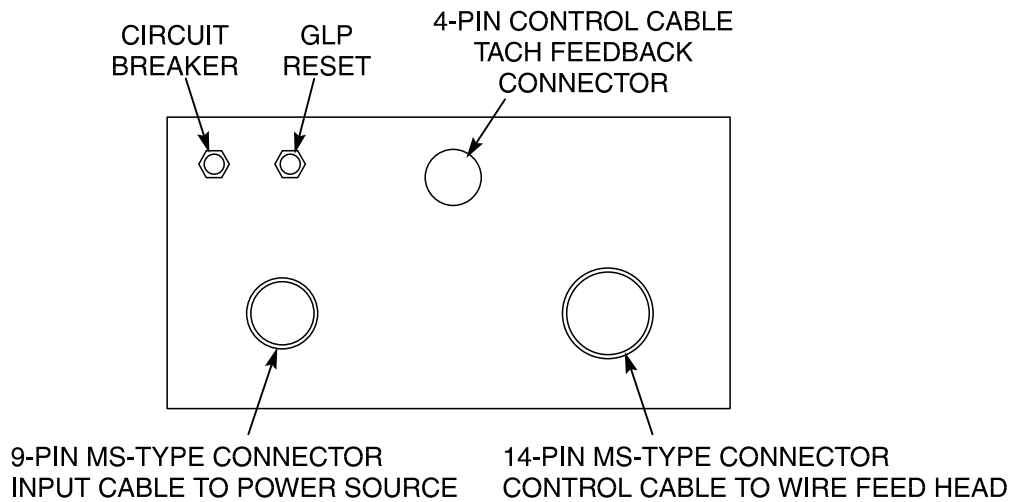
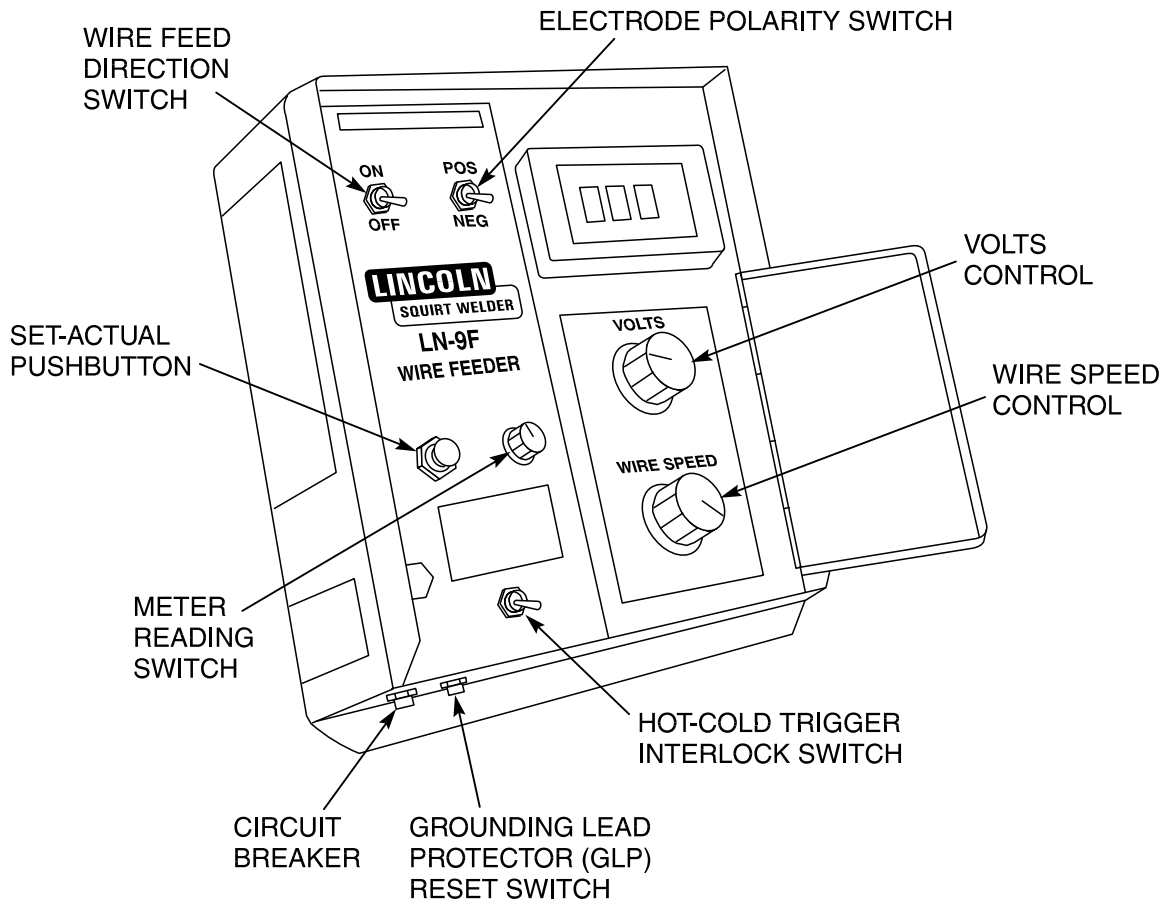
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# OPERATION

### FIGURE B.2 – WIRE FEEDER CONTROLS FOR LN-9F



### LN-9F CONTROL BOX BOTTOM VIEW

LN-9 Wire Feeder



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# OPERATION

**CIRCUIT BREAKER AND GROUNDING LEAD PROTECTOR (GLP) RESET SWITCH:** These protection circuit devices are located on the front rail of the LN-9 model and bottom panel of the LN-9F models. See the topic "*Circuit Protection and Automatic Shutdown*" later in this section of the manual.

**DIGITAL METER:** A three-digit digital meter is provided to set and monitor the welding procedure. The arc voltage is displayed in volts and the wire feed speed is displayed in inches/minute or meters/minute.

**METER READING SWITCH, VOLTS AND WIRE SPEED CONTROLS:** This four-position rotary switch is located to the right of the digital meter on LN-9 models and to the left of the digital meter on LN-9F models. When set to the "Volts" position, the meter reads the arc voltage setting as adjusted by the "Volts" control. The rated setting range for all the LN-9 models is 12.0 to 60.0 volts.

The three "Wire Speed" positions include an English position, for meter readings in inches/minute; and "LO" and "HI" range metric positions for meter readings in meters/minute. The wire feed speed setting is adjusted by the "Wire Speed" control. The rated setting range for all the LN-9 models are 50 to 600 inches/minute (1.27 to 15.2 meters/minute).

When using metric meter readings, set the switch to "LO" for more precise meter readings up to 393 in/min (9.99 m/min.). For higher wire feed speeds, the "LO" position will result in an over-range meter reading of E.EE which indicates that the "HI" range, with single decimal place resolution, should be used. Similarly, EEE will be displayed on the English position if the setting exceeds 999 inches/minute.

The procedure adjustments can be made before or during the weld. This feature permits the operator to set the welding voltage and wire speed before welding and without assistance.

Once set, the control circuits of the LN-9 will continuously monitor the volts and wire speed and correct any deviation from the set value so there will be negligible change.

Should the range of the power source output voltage be such that the unit circuit cannot keep the arc voltage as set, the unit will stop welding shortly after the arc is struck. See the topic "*Circuit Protection and Automatic Shutdown*" later in this section of the manual.

**SET-ACTUAL PUSHBUTTON:** After the weld has been started, the ACTUAL voltage or wire speed can be read by pressing the pushbutton to the left of the meter. The METER READING switch must be set in the desired position. When the pushbutton is not being operated, the meter continues to read the SET value.

## CIRCUIT PROTECTION AND AUTOMATIC SHUTDOWN

### CIRCUIT BREAKER

The circuit breaker normally trips only when excessive loading in the wire feed cable or a defective motor or control component causes an overload. After allowing a minute for cooling, push in the circuit breaker button and weld. If it trips again, be sure the wire feed cable is clean and the proper size for the wire diameter being fed. Also look for excessive drive roll pressure and readjust if necessary. If the breaker still trips, look for a defective electrical component. When the circuit breaker is tripped, the digital meter is off and the trigger circuit will not operate.

### POWER SUPPLY FUSE

The fuse on the PM power board inside the control box protects the power supply circuit. When the fuse is blown, the digital meter is off and the trigger circuit will not operate.

### VOLTAGE PC BOARD FUSE

The 1/8 amp fast-blow fuse protects the LN-9 circuitry from damage that may result from a ground, or case, faulted control lead. If this fuse blows, the LN-9 arc voltage sensing lead circuit will be opened. See the topic "*Automatic Shutdown*" below.

### MOTOR THERMAL PROTECTION

The temperature sensing thermal protector mounted in the motor frame opens the control circuit if the motor overheats. Excessive loading and/or very rapid triggering may cause overheating. The thermal sensor protects the motor without nuisance tripping. The thermal protector automatically resets itself after the motor cools sufficiently (may take 10-15 minutes). Reset time can be shortened by removing supply power to the LN-9 and also by cooling the motor with an air hose or fan. When the protector is tripped, the digital meter is lit but there will be zero reading. The trigger circuit will not operate.

## AVOIDING GROUNDING LEAD PROTECTOR (GLP) SHUTDOWN

The frames of all LN-9 wire feed units and drive motors are grounded to the frame of the power source by a lead in the control cable. An overload protector prevents welding current from damaging this lead if the electrode circuit touches the wire feeder frame while the gun trigger is pressed.

## OPERATION

If such a grounding lead fault occurs, the meter will still be on and will be reading. The trigger circuit will not operate, however. To release the circuit, press the "GLP Reset" button. See *Figure B.1 or B.2* for the location of this button.

The following precautions are recommended to avoid GLP shutdown:

- Do **not** allow the electrode to contact the case of the wire feeder or uninsulated part of its wire reel stand when the gun trigger is activated.
- Be sure that all work lead connections to the work make tight metal-to-metal electrical contact.
- Do **not** allow excess input cable or work cable to be placed closer than 3 feet to the wire feeder.
- Do **not** coil excess input cable assembly or use an uncoiled assembly as shipped from the factory. Instead, loop excess length back and forth in 3 to 6 foot straight lengths. Coiling the input cable results in a transformer action between the electrode conductor cable and ground lead in the multiconductor cable and the ground lead in the multiconductor control cable. This can cause current to flow in the ground lead, which will falsely activate the GLP.

### AUTOMATIC SHUTDOWN

If the LN-9 voltage control is unable to supply the SET value of arc voltage while welding, the automatic shutdown circuit will activate. This protection circuit immediately returns the LN-9 control to idle state within a few seconds after the arc voltage discrepancy occurs.

Typical causes for the activation of this protective shutdown circuit are as follows:

- a) SET value of arc voltage is outside the power source range.
- b) Power source voltage control not set for REMOTE.
- c) Misconnection of LN-9 control cable leads to power source.
- d) Incorrect weld polarity connections, or settings, at the LN-9 or the power source.
- e) Lost connection of LN-9 voltage sensing leads (#67 and #21) between the arc and voltage control, or a blown 1/8 amp fuse on the Voltage PC board.

Although out of range shutdown can occur with all power sources when working with very low or very high arc voltages, it is most likely to occur when using the R3S models with somewhat limited voltage range of

the various taps. For instance, if the R3S-400 triangle tap setting is for 31 volts, the range of control from the remote circuit is approximately 7 volts, i.e., 27-1/2 to 34-1/2 volts at nominal input voltage. If the LN-9 controls are set for 29 volts and the input voltage to the R3S goes up, it may not be possible for the LN-9 control circuit to hold the 29 volts. The welding will shut down. By changing to the 27 volt triangle setting, the range will be approximately 23-1/2 to 30-1/2 volts, and at high input voltage there will be sufficient control to hold the SET arc voltage. On these machines, if the LN-9 stops welding, follow this procedure:

- a) Move the LN-9 voltage set point 2 volts lower than the desired procedure and make a test weld.
  1. If the LN-9 still shuts down, go to Step b. below.
  2. If the LN-9 keeps welding, change the R3S triangle setting to the next higher voltage and reset the LN-9 set point to the desired procedure. R3S is now set properly unless there is a significant change in input voltage. Skip the following step.
- b) Move the LN-9 voltage set point 2 volts higher than the desired procedure and make a test weld.
  1. If the LN-9 now keeps welding, change the R3S triangle setting to the next lower voltage and reset the LN-9 set point to the desired procedure. R3S is now set properly unless there is a significant change in input voltage.
  2. If the LN-9 still shuts down, refer to the paragraph below and the other possible causes previously listed.

In some cases, it is also possible to hold the ACTUAL button pressed while starting the arc. Before the LN-9 shuts down, the actual arc voltage can be read on the digital meter. Comparing this reading to the SET reading will tell what change in the range controls of the power source is required to supply the desired voltage. Should the meter read zero, check the connections of LN-9 sensing leads #21 and #67. Should the meter read a minus (-) voltage, the polarity connections or settings at the LN-9 or power source are wrong.

The same general procedure can be used on other power sources. For example, if the LN-9 keeps shutting down and the other possible causes have been checked, adjust the SET voltage higher and/or lower than the desired voltage. Then you can determine what change in the range controls of the power source is required to supply the desired voltage.

# OPERATION

## DRIVE ROLL INSTALLATION AND PRESSURE SETTING

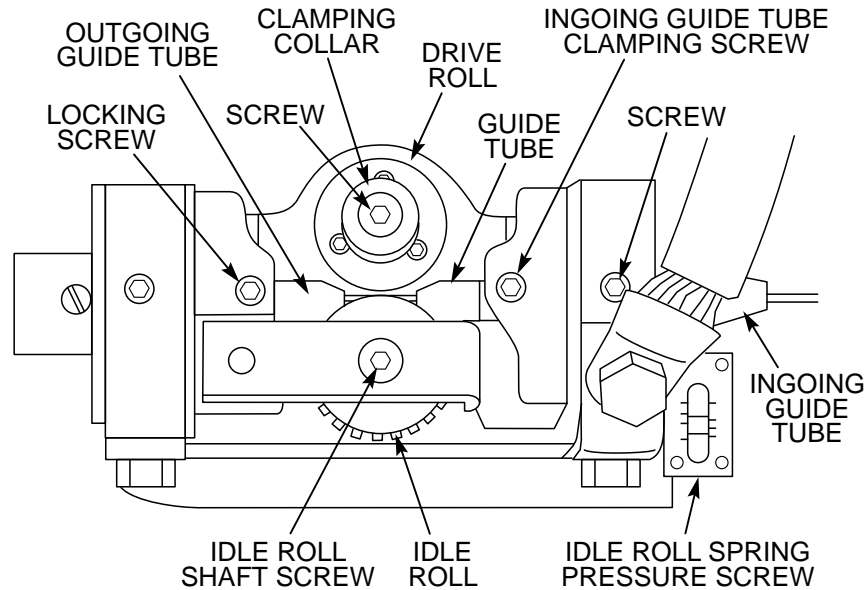
### CHANGING WIRE FEED ROLLS AND GUIDE TUBES FOR TWO-ROLL WIRE FEEDERS

To change drive or idle rolls on a two-roll wire feeder, refer to Figure B.3 and perform the following steps:

1. Loosen idle roll spring pressure screw.
2. Remove clamping collar from the drive shaft.
3. Install drive roll and replace clamping collar. Tighten screw.
4. Remove idle roll shaft screw - install idle roll. Replace screw and tighten.
5. Remove the large ingoing guide from rear brass block by loosening screw.

**NOTE:** The Aluminum Wire Drive Roll Kits have one-piece drive rolls and idle rolls with a larger chamfer on one side, instead of gear teeth. This larger chamfer side must face the gearbox when installed. The side with the smaller chamfer and wire size stencil must be installed facing out.

FIGURE B.3 – 2 ROLL WIRE FEED MECHANISM



LN-9 Wire Feeder



# OPERATION

6. Loosen the ingoing guide tube clamping screw. Install the all steel guide tube through the rear brass block. Tighten the locking screw.
7. Replace the large ingoing guide tube into rear brass block.
8. Install the outgoing guide tube with its plastic insert through front brass block. Tighten the locking screw so its dog point goes into the groove in the O.D. of the guide tube.

**NOTE:** The drive rolls and guide tubes are stamped with the wire size ranges (in inches and mm) for which they are designed. If a wire size other than that stamped is to be used, the drive rolls and guide tubes will have to be changed. Drive rolls stamped with a "(C)" or "(H)" suffix to the wire size range are recommended specifically for use with cored wires.

## SETTING THE IDLER ROLL SPRING PRESSURE (2-ROLL WIRE DRIVES)

For Steel Wire, the idle roll pressure should be adjusted as follows:

The idle roll pressure indicator should be set to the proper wire size indication shown on the appropriate "solid" or "cored" side of the idler roll spring pressure nameplate. This setting is a starting point and may have to be changed depending upon type of wire surface condition, lubrication, and hardness.

The optimum idle roll setting can be determined when there are wire stoppages. If the wire "bird nests" between the drive roll and the guide tube, the idle roll spring pressure is set too high. When set, during a stoppage the drive rolls will slip. If the electrode is removed from the cable there will be a slight waviness in the electrode for about a foot beyond the slip marks on the electrode. If there is no waviness, the pressure is set too low.

For Aluminum Wire, the idle roll pressure should be adjusted as follows:

1. With low idle roll pressure, load the feeder so it's ready for welding.
2. Run the feeder at a slow speed (about 100 IPM) and reduce the idle roll pressure until the idler roll stops rotating.
3. Slowly increase idle roll pressure until the idle roll just starts to rotate consistently with the drive roll without slippage, then add an extra 1/4 to 1/3 turn more idle roll pressure.

This pressure setting should be optimum for feeding and to avoid "bird-nesting" by allowing the drive roll to slip on the wire if a gun cable jam or stoppage occurs. If using harder or larger dia. aluminum wires, more idle roll pressure, if necessary, can be tolerated. However, if the pressure required to properly feed the aluminum wire also permits "bird-nesting," or if excessive slippage results in aluminum pickup in the drive roll groove, the loading on the wire by the gun-cable or wire reel should be inspected and adjusted.

## OPERATION

### CHANGING WIRE FEED ROLLS AND GUIDE TUBES FOR 4-ROLL WIRE FEEDERS

To change drive rolls on a 4-roll wire feeder, refer to **Figure B.4** and perform the following steps:

1. Release both quick release levers.
2. Remove clamping collars from both drive shafts.
3. Install one drive roll and replace clamping collar. Tighten screw.
4. Slide the middle guide tube into place. Do not tighten set screw.
5. Install second drive roll and replace clamping collar. Tighten screw. (Note: The middle guide tube may need to be pushed up tight against the first drive roll to allow room for installing the second roll.)
6. Center the middle guide tube and lock in place with its set screw.
7. Remove the idle roll quick release pins - install idle rolls. Replace pins.

**NOTE:** The aluminum wire drive roll kits have one-piece drive rolls and idle rolls with a larger chamfer on one side, instead of gear teeth. This larger chamfer side must face the gearbox when installed. The side with the smaller chamfer and wire size stencil must be installed facing out.

8. Loosen the ingoing guide tube clamping screw. Install the all steel guide tube. The guide tube should be slid in until it almost touches the drive rolls. Tighten the locking screw.
9. Install the outgoing guide tube with its plastic insert through the front brass block. Tighten the locking screw so its dog point goes into the groove in the O.D. of the guide tube.

**NOTE:** The drive rolls and guide tubes are stamped with the wire size ranges (in inches and mm) for which they are designed. If a wire size other than that stamped is to be used, the drive rolls and guide tubes will have to be changed. Drive rolls stamped with a "(C)" suffix to the wire size range are recommended specifically for use with cored wires.

### SETTING THE IDLER ROLL PRESSURE (4-ROLL WIRE DRIVES)

Because every feeding situation is different, the 4-roll wire drive does not have graduated markings with wire sizes indicated on it. A recommended starting pressure is indicated below for each applicable wire size and type. Depending on the particular application, these starting pressures may need to be adjusted up or down. Some of the variables that affect tension settings are type and brand of electrode, surface condition, lubrication, harness, type and length of cables and conduits, routings of cables and conduits, and drive roll wear.

In most applications, the front and rear drive roll pressures should be adjusted the same. To adjust, start by releasing both "quick release" arms. Tighten the tension adjusting screws to full pressure and then back off per the particular instructions for your electrode size and type as outlined below.

#### For Steel Wire

1. .030-.052" solid-----4 turns from maximum  
.045-.052" cored-----12 turns from maximum

The optimum pressure setting can be determined when there are wire stoppages. If the wire "birdnests" between the rolls and guide tubes, the pressure is too great. When properly set, during a stoppage the drive rolls will slip. If the electrode is removed from the cable there will be a slight waviness in the electrode for about a foot beyond the slip marks on the electrode. If there is no waviness, the pressure is too low.

2. 1/16" solid-----2 to 4 turns from maximum  
.062" cored-----7 to 8 turns from maximum

These settings should be accurate unless the electrode is unusually soft or the feeding path is excessively long or curved.

3. .068-3/32" solid----8 to 10 turns from maximum  
.068-.120" cored----6 or 7 turns from maximum

Larger wire settings are accurate for nearly all applications. Some unusual circumstances will require "fine tuning."

# OPERATION

## For Aluminum Wire

Each set of rolls should have their pressure set independent of the other. To do this, release and open the other quick release arm while making each adjustment. Follow the procedure below for each adjustment.

1. With low idle roll pressure, load the feeder so it's ready for welding.
2. Run the feeder at a slow speed (about 100 IPM) and reduce the idle roll pressure until the idle roll stops rotating.
3. Slowly increase idle roll pressure until the idle roll just starts to rotate consistently with the drive roll without slippage, then add an extra 1/4 to 1/3 turn more idle roll pressure.

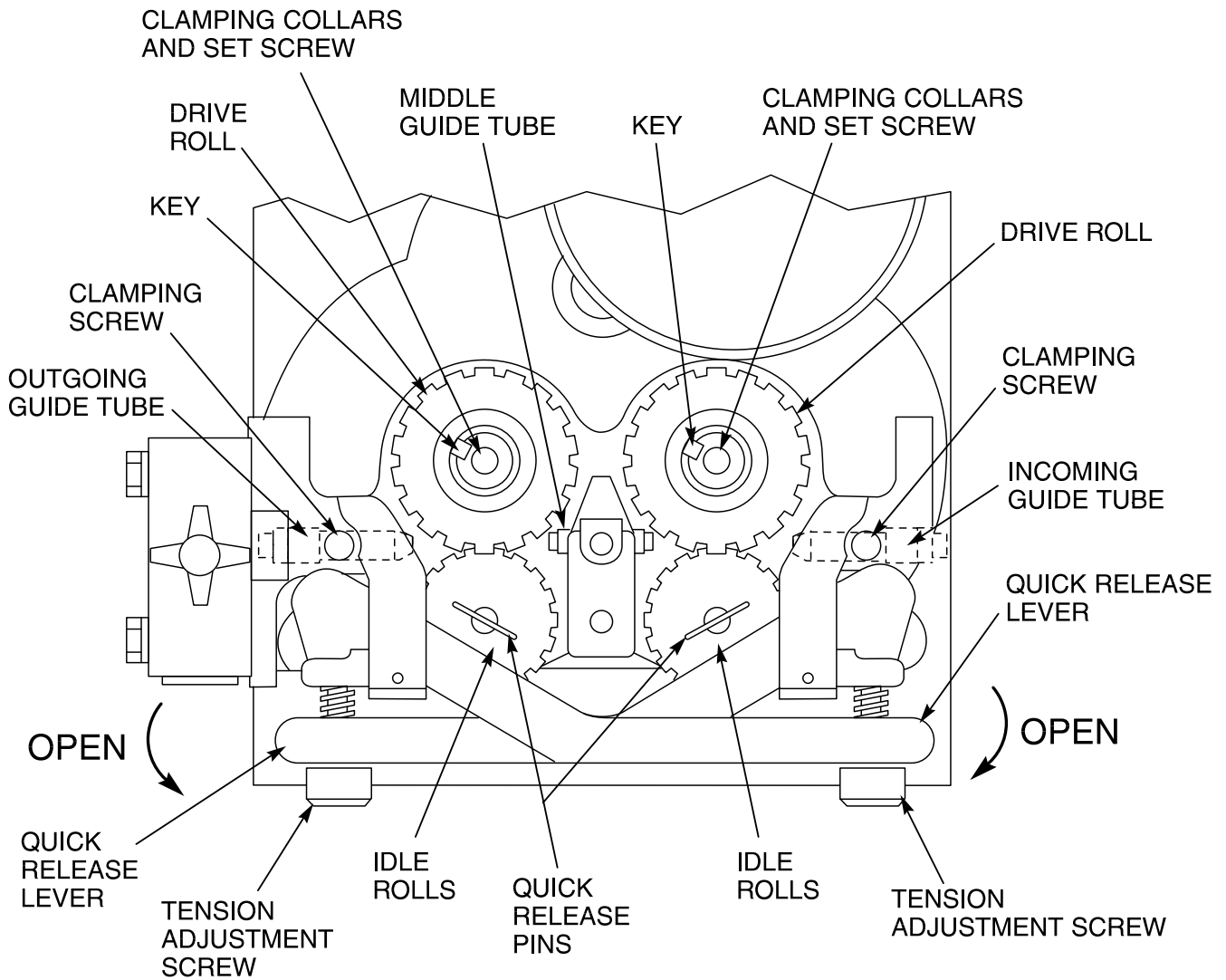
This pressure setting should be optimum for feeding and to avoid "bird-nesting" by allowing the drive roll to slip on the wire if a gun cable jam or stoppage occurs. If using harder or larger dia. aluminum wires more idle roll pressure, if necessary, can be tolerated. However, if the pressure required to properly feed the aluminum wire also permits "bird-nesting," or excessive slippage results in aluminum pickup in the drive roll groove, the loading on the wire by the gun-cable or wire reel should be inspected and adjusted.

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



# OPERATION

## FIGURE B.4 – INSTALLING DRIVE ROLLS ON A 4-ROLL FEEDER



Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

# OPERATION

## WIRE LOADING

### LOADING AND FEEDING READI-REELS OR SPOOLS

#### LOADING A 22 TO 30 LB. READI-REEL PACKAGE USING THE MOLDED PLASTIC K363-P TYPE ADAPTER:

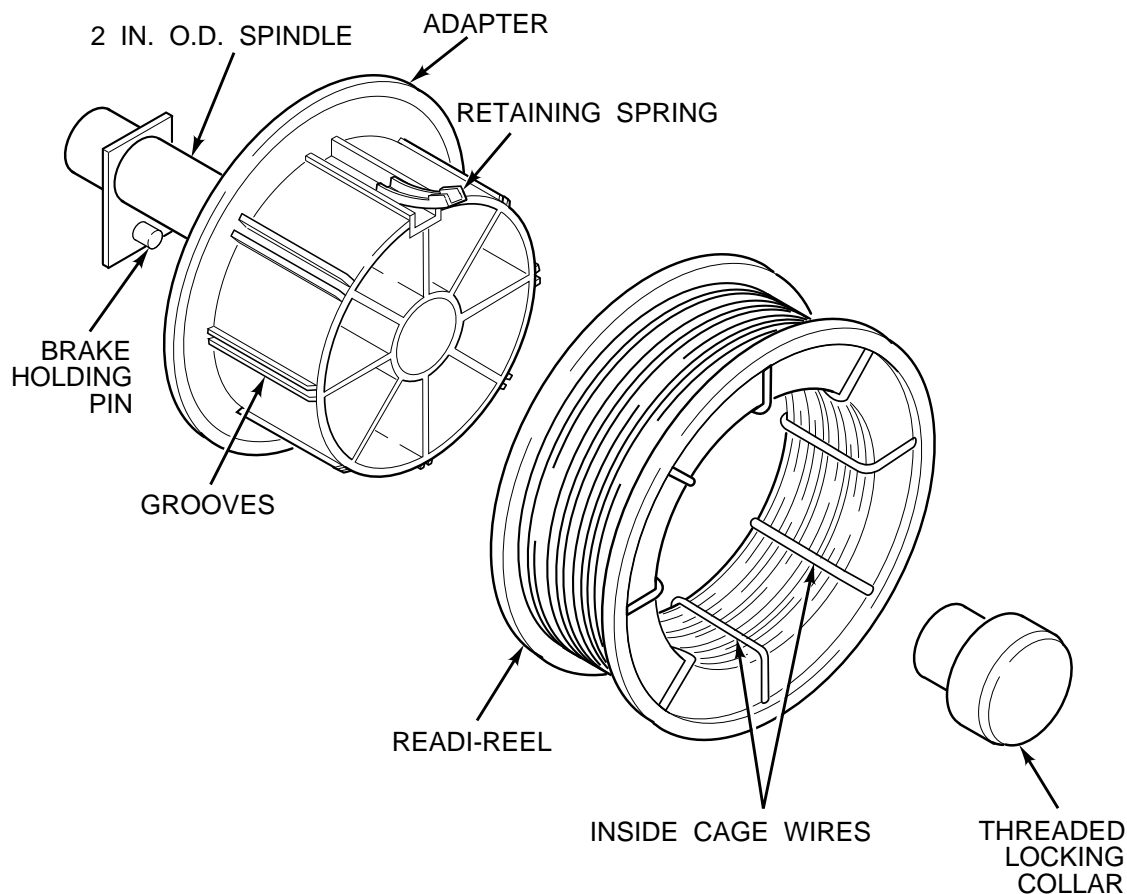
1. Make certain that the threaded locking collar is tight and securely locks the adapter on the spindle. See Figure B.5.
2. Rotate the spindle and adapter so that the retaining spring is at the 12 o'clock position.
3. Position the Readi-Reel so that it will rotate in a clockwise direction when feeding (wire de-reels from the bottom of the coil).

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 RETAINING SPRING HAS FULLY RETURNED TO THE LOCKING POSITION AND HAS SECURELY LOCKED THE READI-REEL CAGE IN PLACE. THE RETAINING SPRING MUST REST ON THE CAGE, NOT THE WELDING ELECTRODE.

FIGURE B.5 – INSTALLING A 30-LB. READI-REEL PACKAGE



LN-9 Wire Feeder



# OPERATION

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

## LOADING A 15 TO 30 LB. SPOOL (12" DIAMETER):

(For 8" spools, a K468 spindle adapter must be used.)

- Remove the locking collar and the Readi-Reel adapter shipped on the 2" diameter spindle (adapter is not required).
- Place the spool on the spindle making certain the brake holding 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 de-reeled from the bottom of the coil.
- Replace and tighten the locking collar.

## ELECTRODE FEEDING AND BRAKE ADJUSTMENT

- Turn the Readi-Reel or spool until the free end of the electrode is accessible.
- While tightly holding the electrode, cut off the bent end. Straighten the first six inches. Cut off the first inch. (If the electrode is not properly straightened, it may not feed or may not go into the outgoing guide tube, causing a "birdnest.")
- Insert the free end through the incoming guide tube.
- Press the gun trigger or "cold inch" (if used) and push the electrode into the drive roll.

### **⚠ WARNING**

USE THE "COLD" TRIGGER SWITCH POSITION, OR "COLD INCH" OPTION WHEN LOADING. WHEN INCHING WITH A "HOT" GUN TRIGGER, THE ELECTRODE AND DRIVE MECHANISM ARE ALWAYS "HOT" TO WORK AND GROUND AND COULD REMAIN "HOT" SEVERAL SECONDS AFTER THE GUN TRIGGER IS RELEASED.

- Inch the electrode through the gun.

**NOTE:** When feeding soft jacket electrodes such as Lincore 60-0, remove tip from the gun tube before feeding electrode through the gun. When the electrode is cut off, the start end of the electrode is usually too large to fit through the tip.

- Adjust the brake tension with the thumbscrew on the spindle hub, until the reel turns freely but with little or no overrun when wire feeding is stopped. Do not overtighten.

## WHEN USING THE EXTENSION ASSEMBLY (models LN-9NE and LN-9SE)

- Slide the ingoing guide tube of the hand crank to the forward position.
- Remove start end of coil from hole in wire reel cover, straighten the first six inches or so of the wire and then insert this end in the ingoing guide tube. Push a foot or so of wire through.
- Pull the ingoing guide tube back to the rear position and rotate it 90° so that it will remain in this position during the cranking operation.
- Pull the plastic hand crank handle to the "out" position in the arm.
- Pull the shaft and drive roll assembly to the "out" position with the left hand.
- Apply a downward pressure to the idler roll pressure arm with the right hand. Maintain this pressure and start cranking the wire through the system. Keep the conductor cable as straight as possible during the loading operation. This will make it much easier to crank the wire through. Crank until the wire touches the drive rolls and feed the wire the rest of the way through the cable and gun assembly.

### **⚠ WARNING**

The electrode is "HOT" to ground while inching with the gun trigger.

- Push the plastic of the hand crank to the "in" position and shift the ingoing guide tube to the forward position.

LN-9 Wire Feeder



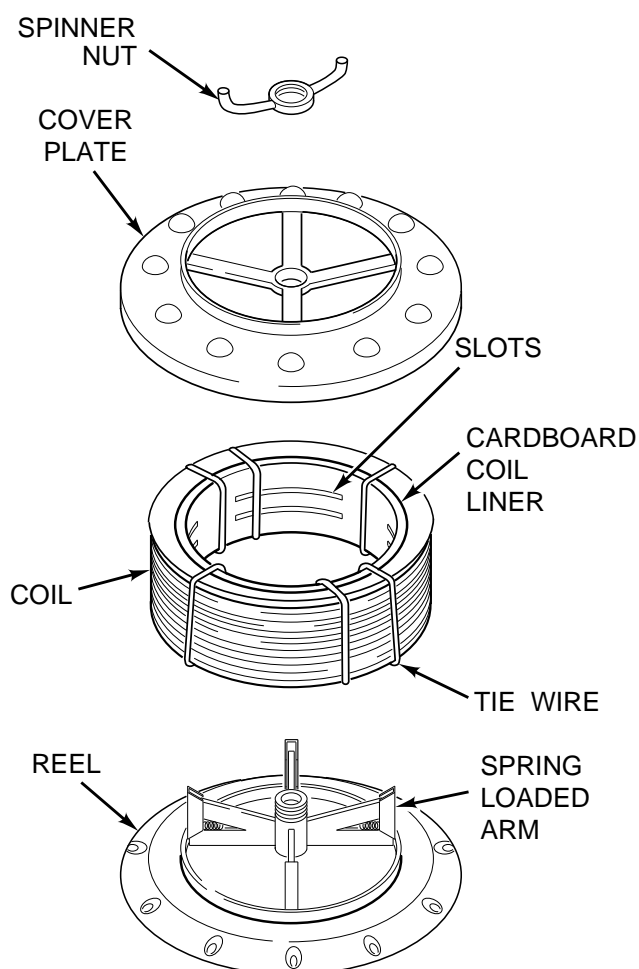
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# OPERATION

## LOADING 50 AND 60 LB. COILS AND BRAKE ADJUSTMENT (K299 or K303 Wire Reel Stand)

1. To remove the wire reel from its shaft, grasp the spring loaded knob and pull it out. This straightens the knob so that it seats into the shaft when released. Remove the reel.
  2. Lay the reel flat on the floor, loosen the spinner nut and remove the cover plate.
  3. Before cutting the tie wires, place the coil of electrode on the reel so that it unwinds as the reel rotates clockwise.
- a) Be sure the coil is placed so that the spring loaded arms will not interfere with the later removal of the coil tie wires. See Figure B.6.
- b) When loading 0.030, 0.035 and 0.045" electrode, be certain the coil is placed on the reel so that the spring loaded arms are at the center of the slots in the cardboard coil liner. This provides the positive compression of the coil sides needed for trouble free wire feeding. See Figure B.6.
  - c) Put the cover plate on the reel so that the four arms of the cover straddle and are in line with the spring loaded arm of the reel.
4. Tighten the cover as much as possible by hand. DO NOT hammer on the spinner nut arms.
  5. Cut and remove only the tie wire holding the free end of the coil. Insert the free end into one of the holes in the cover and secure it by bending it back. Cut and remove the remaining tie wires.

FIGURE B.6 – LOADING A 50 OR 60 LB. COIL



### ⚠ CAUTION

Always be sure the free end of the coil is securely held while the tie wires are being cut and until the wire is feeding through the drive rolls. Failure to do this will result in "backlashing" of the coil, which may tangle the wire. A tangled coil will not feed; therefore it must either be untangled or discarded.

6. Replace the reel on the wire feeder. Grasp the shaft knob, pull it out and swing it across the reel hub, locking the reel in place.
7. The mount for standard 50 and 60 pound electrode coils includes a two-position brake assembly. Generally the brake should be at the inner position (nearest to the wire reel shaft) for wire feed speeds below 400 in/min. It should be at the outer position for the faster wire speeds often used when feeding small diameter electrode.

To adjust the brake position, remove the wire reel. Pull the cotter pin that holds the brake shoe to the arm, move the shoe and replace the cotter pin. Do not bend the cotter pin - it is held in place by a friction fit.

LN-9 Wire Feeder



# OPERATION

## ELECTRODE FEEDING

1. Turn the reel until the free end of the electrode is accessible.
2. While tightly holding the electrode, cut off the bent end. Straighten the first 6 inches.
3. Cut off the first inch. Insert the free end through the incoming guide tube.
4. Insert the free end through the incoming guide tube.
5. Press the gun trigger or "cold inch" (if used) and push the electrode into the drive roll. (If the electrode is not properly straightened, it may not feed or may not enter the outgoing guide tube, causing a "birdnest.")
6. Inch the electrode through the gun.

### **⚠ WARNING**

USE THE "COLD" TRIGGER SWITCH POSITION, OR "COLD INCH" OPTION WHEN LOADING. WHEN INCHING WITH A "HOT" GUN TRIGGER, THE ELECTRODE AND WIRE FEEDING SYSTEM ARE ALWAYS "HOT" TO WORK AND GROUND AND COULD REMAIN "HOT" SEVERAL SECONDS AFTER THE GUN TRIGGER IS RELEASED.

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## LOADING AND FEEDING 13-14 LB. INNERSHIELD COILS (K378 REEL MOUNTING STAND AND K435 SPINDLE ADAPTER)

The K378 small mounting stand for the 14 pound Innershield coil does not have an adjustable brake. It has a fixed drag built into the reel spindle.

To load a 14 pound coil:

1. Remove the snap-on lid from the plastic canister.
2. Remove the center clamping nut and the cover plate from the wire reel.
3. Unpack the 14-pound coil of wire. Be sure not to bend the side tangs of the coil liner. Straighten any tangs that may have been bent.
4. Remove the start end of the coil from its holding slot in the coil liner, cut off the bent end, straighten the first six inches, and cut off the first inch. (If the electrode is not properly straightened, it may not feed or may not go into the outgoing tube, causing a "birdnest.") Thread it through the canister wire feed liner until about four inches of electrode are exposed.
5. Place the coil onto the disc support.
6. Replace the front reel cover and center clamping nut, keep the reel from turning and tighten the clamping nut securely.
7. Thread the exposed end of the electrode into the wire feeder until it touches the drive rolls. Actuate the gun trigger, and feed the electrode through the system.

# OPERATION

## MAKING A TEST WELD AND ADJUSTING LN-9 RESPONSE AND STARTING CHARACTERISTICS

### ADJUST THE POWER SOURCE

#### DC-250, DC-400, or DC-600\*

1. Connect electrode lead to terminal of desired polarity.
2. Set toggle switch to same polarity as the electrode cable connection.
3. Set toggle switch to "Output Control Remote."
4. Set mode switch to the desired position for the process to be used.

\* DC-600 codes 8288 and above are preferred.

#### CV-400, CV-500-I

1. Connect electrode lead to terminal of desired polarity.
2. Connect #21 control lead to the work polarity terminal (+21 or -21), at the terminal strip, matching the same polarity as the work cable connection.
3. Set toggle switch to "Output Control Remote."

#### R3S-400, R3S-600, R3S-800

1. Connect electrode lead to terminal of desired polarity.
2. Set toggle switch to same polarity as the electrode cable connection.
3. Set the toggle switch to "Remote."
4. Install voltage triangle to a position as close as possible to desired arc voltage. See **Automatic Shutdown** in the Operation section.

**NOTE:** Since the LN-9 cannot control the fixed OCV of R3S power sources, starting difficulties may be experienced when striking the arc of processes which use a low voltage or a narrow voltage range. The following steps should remedy this difficulty:

1. The electrode stickout when starting should be as close to procedural length as possible, and the tip of the electrode should be clean and held nearly touching the work.

2. Install the R3S voltage triangle to the position higher than the desired arc voltage, provided it does not result in out of range shutdown of the LN-9 while welding. See **Automatic Shutdown** in the Operation section of this manual.

#### SAM

1. Set "Electrode Polarity" switch to the appropriate "Constant Voltage" or "Variable Voltage" position of the desired polarity for the process being used on the SAM-400, or set desired polarity on the SAM-650.
2. Set the toggle switch to "Constant Voltage."
3. Set the "Constant Voltage Control" rheostat to Number 5 for Innershield and other open arc processes. (Use the maximum slope Innershield tap of SAM-650.) Set the "Constant Voltage Control" rheostat to Number 7 and the "Current Control" rheostat to 500 for CV subarc processes. (Use 300-575 tap of SAM-650.)

#### PULSE POWER 500, DC650 PRO

Refer to each machine Instruction Manual. The LN-9 requires the K442-1 Pulse Power Filter Kit. For LN-9 codes below 9100, use kit K442-2. (See the **Accessories** section of this manual.)

LN-9 Wire Feeder



# OPERATION

## ADJUST THE LN-9 CONTROLS

1. Set the "Electrode Polarity" switch to same polarity as the electrode lead.
2. Connect the "Direct Work Lead" if it is going to be used.
3. Check that "Feed Direction" is set to forward.
4. Set the "Trigger Interlock" switch as desired.
5. Set the "Meter Reading" switch to "Wire Speed" and adjust the "Wire Speed" rheostat so the meter reads the desired wire feed speed.
6. Set the "Meter Reading" switch to "Volts" and adjust the "Volts" rheostat so the meter reads the desired arc voltage. **IMPORTANT:** Make certain this setting is within the voltage output range of the power source setting.
7. Load the LN-9 with electrode.

## VOLTAGE CONTROL RESPONSE

The LN-9 is provided with selectable voltage control response. Proper setting depends on the power source and process being used. Refer to the appropriate power source connection diagram for the proper connection of the jumpers located on the LN-9 Voltage PC Board and Start PC Board (only in models using L-6084 Voltage PC Board).

To change the voltage control response:

1. Turn OFF the control power to the LN-9 at the power source.
2. Remove the screws holding the control section cover in place and swing open.
3. Position the jumper plugs on the Voltage Board and Start Board (where used) according to the appropriate power source connection diagram.
4. Reassemble.

## STARTING CHARACTERISTICS

### SELECT ACCELERATION

The LN-9 models can provide optimum starting for different processes. The wire feeder is designed to start with two different speeds of controlled acceleration. As shipped, it is connected for fast acceleration, which is the best for most open arc procedures. However, the slower acceleration may be more desirable for Linc-Fill long stickout applications and most submerged arc

procedures. If the electrode being used does not give satisfactory starting because of "stopping" or "blasting off," slower acceleration can be obtained by modifying the LN-9 models as follows:

1. Turn OFF the control power to the LN-9 at the power source.
2. Remove the screws holding the control section cover in place and swing it open.
3. Move the jumper plug on the Control PC board from pin "F" to pin "S."
4. Reassemble.

### START VOLTAGE TRIM

The start voltage is the voltage provided by the welding power source before establishing the welding arc. This start voltage setting is a function of the open circuit voltage characteristic of the power source, the SET value of the weld voltage, and the start voltage trimmer (R41) setting on the LN-9 Voltage PC Board. As set at the factory, the start voltage trim level is typically about 20% higher than the LN-9 SET level. This generally gives good starting for steel cored and MIG processes using CO<sub>2</sub> or Argon/CO<sub>2</sub> blended shielding gas. If you are using "hotter" gases (such as Argon/Oxygen blends) and other processes (such as stainless steel MIG), arc flaring may occur at start, which requires lowering the start voltage trim as follows:

1. Turn off the control power to the LN-9 at the power source.
2. Remove the screws holding the control section cover in place and swing it open.
3. On the voltage board, locate trimmer R41 (below R40 next to the 1/8 amp fuse) and labeled START.
4. The slot on the START trimmer is marked with a red seal for factory setting. To decrease the factory setting, turn the slot CCW (opposite to the labeled arrow direction).

**NOTE:** If the start trim is set too low, stopping may occur at start, requiring increasing the START trimmer by turning the slot CW (in the direction of the labeled arrow).

5. Reassemble.

LN-9 Wire Feeder



## OPERATION

### MAKING A WELD

1. Inch the electrode through the gun and cable and then cut the electrode within approximately 3/8" of the end of the contact tip for solid wire and within approximately 3/4" of the extension guide for cored wire.
2. Connect the work cable to the metal to be welded. The work cable must make good electrical contact to the work. The work must also be grounded as stated in the Safety section at the beginning of this manual.
3. Be sure the welding power source and the shielding gas supply (if used) are turned on.
4. Position the electrode over the joint. The end of the electrode should be slightly over the joint.
5. Lower the welding helmet, close the gun trigger and begin welding. Hold the gun so that the contact tip to weld distance gives the correct electrical stickout as required for the procedure being used.
6. To stop welding, release the gun trigger and then pull the gun away from the work after the arc goes out.

### PROCEDURE AT END OF COIL

When the wire on the reel is used up, follow this procedure for removing the old wire from the conductor cable and loading a new reel.

1. Cut the end of the electrode off at the gun end. Do not break it off by hand since this puts a slight bend in the wire and makes it difficult or impossible to pull it back through the nozzle.
2. Uncouple the gun conductor cable from the wire drive unit.
3. Lay the cable out straight.
4. Using pliers to grip the wire, pull it out of the cable from the connector end. Do not pull it from the gun end.
5. Put the conductor cable back on the wire drive unit after the electrode has been removed.
6. Load a new reel of wire and feed it through the cable as described earlier in this section.

### SECURITY OF WELD PROCEDURE SETTINGS

There are two ways to prevent or limit unauthorized readjustment of the LN-9 voltage and wire feed speed controls.

1. Once the procedure is set, the security panel of the LN-9 can be locked to prevent access to the control knobs.
2. The control range of the procedure control knobs can be limited to either about 3% or about 15% of the full range control by installing a knob rotation stop screw to either or both of the control knobs. This stop screw is installed in the following manner:
  - a) Turn off the input power to the LN-9 unit.
  - b) Loosen the knob set screw and remove the control knob and the felt seal located behind the knob.
  - c) Remove the control potentiometer locknut and fiber spacer, then open the control panel and remove the potentiometer from the panel.
  - d) Install a 1/2" long, pan or round head, #4 sheet metal screw into the 0.10" dia. hole located .40" from the center of the potentiometer hole so that the head is on the back side of the panel (inside the control box).
  - e) Remount the control potentiometer with the fiber spacer under the locknut, then close and secure the control panel.
  - f) Replace the felt seal around the fiber spacer so that the #4 screw protrudes between the fiber spacer and the felt seal.
  - g) Turn on the input power to the LN-9 unit and set the desired procedure by rotating the potentiometer shaft.
  - h) Carefully replace the control knob so that the #4 screw inserts into the center of the shorter length channel on the back of the knob for about 3% of the total range of control, or the center of the longer length channel for about 15% of the total range of control.
  - i) With finger pressure on the knob against the felt seal, carefully retighten the knob set screw.

**NOTE:** Steps g) through i) will have to be repeated if you want to change the set procedure to a value outside the selected 3% or 15% control range limit.

LN-9 Wire Feeder





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# ACCESSORIES

## AUXILIARY EQUIPMENT CONTACTS

The power for 115 volt AC auxiliary equipment can be obtained from the terminals inside the LN-9 control box. The contacts are "hot" whenever the trigger is pressed or the unit is welding. The current draw of this circuit must not exceed 1/4 ampere.

### **⚠ WARNING**

**TURN THE INPUT POWER TO THE POWER SOURCE OFF AT THE DISCONNECT SWITCH BEFORE PERFORMING THE FOLLOWING WORK.**

#### **LN-9N, NE, S, SE MODELS:**

Install 1/4" quick connect terminals to the leads from the auxiliary equipment. Route the leads to the terminals marked #32A and #7 which come through the rectangular hole in the control section sheet metal near the wire feed motor.

#### **LN-9F 2-ROLL AND 4-ROLL MODELS:**

Install terminals for #6 screws to the leads from the auxiliary equipment. Route the leads to the terminals #32A and #7 on the terminal strip on the inside bottom of the control box.

**NOTE:** The K202 Burnback Delay kit does not delay the opening of the auxiliary equipment contacts. If you want to continue power to auxiliary equipment during the burnback time, this can be accomplished only if you are using an R3S, DC-400 or DC-600 power source. Connect the 115 volt AC auxiliary equipment leads to #4 and #31 on the power source terminal strip. The auxiliary equipment power requirements should not exceed 15 watts.

This alternate connection cannot be used with the DC-250, CV-I, or CV- 500-I power sources.

## OPTIONAL EQUIPMENT AND ACCESSORIES

### POWER INPUT CABLE ASSEMBLIES (K196, K595, K596)

Required to connect wire feeder to power source. Includes multiconductor control cable and the proper size electrode cable for the welding current to be used. Specify length and maximum welding current.

- K196 Input Cable Assemblies - For power sources with terminal strip wire feeder connections and stud output terminals.
- K595 Input Cable Assemblies - For power sources with MS-type (Amphenol) wire feeder receptacle and stud output terminals.
- K596 Input Cable Assemblies - For power sources with MS-type (Amphenol) wire feeder receptacle and Twist-Mate™ output connectors.

### WIRE REEL STANDS AND MOUNTINGS

#### 50-60 LB. WIRE REEL MOUNTING STAND (K303)

The assembly includes a framework to which is attached the 50-60 lb. wire reel, a mounting spindle, a dust shield, a lift bail, and a cable clamp for fastening the input cable assembly. It is easily mounted to the basic wire feed unit by three bolts. The reel mounting spindle is the pull knob type with a built-in brake.

The brake pad is adjustable for proper braking at low or high wire feed speeds.

#### 50-60 LB. READI-REEL® MOUNTING STAND (K445)

The assembly includes a framework to which is attached a 2" O.D. spindle with adjustable brake and 50-60 lb. Readi-Reel Adapter. Includes a lift bail and cable clamp for fastening the input cable assembly, and easily mounts to the LN-9 feeder. Does not include dust shield.

Can also be used for up to 60 lb. spools with 2" I.D.

LN-9 Wire Feeder



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# ACCESSORIES

## ATTACHING THE WIRE REEL STANDS

The mounting hardware for mounting the stands is included with the LN-9. Screws and washers are inserted in their respective mounting holes. To connect:

1. Remove the three 3/8 in. hex head bolts from the back of the wire feed unit.
2. Place the wire reel mounting stand mounting bracket in position against the back of the wire feed unit.
3. Replace and tighten the hex head bolts. The long screw and plain washer go into the top hole.

## WIRE REEL DOOR KIT (M-11514)

Mounts to K303 or to K445 equipped with an S14543 dust shield housing kit, to completely enclose wire reels against extremely dusty and dirty environments. Includes a hinged door and sliding bottom seal. Install the door according to instructions included with the kit.

Place the bottom seal panel in the forward position when using .030-1/16" electrode. Place the bottom seal in the rear position when using 5/64-.120" electrode.

## SPINDLE FOR READI-REELS AND 2" I.D. SPOOLS (K162-H\*)

(60 Lb. Maximum Capacity)

The 2" O.D. spindle kit is for use with the K303. The shaft for the standard 50-60 pound wire coils is removed from the mounting framework, and the K162H is installed in its place. Includes an easily adjustable friction brake for control of overrun.

When used with Readi-Reels, a Readi-Reel Adapter is required.

When used with 8" O.D. spools, a K468 Spindle Adapter is available.

14 Lb. Innershield coils can be mounted to the spindle using the K435 Adapter.

\* Replaces the K162 30 Lb. Spindle Kit.

Install the spindle according to instructions included with the kit:

K162 - 30lb (13.6 kg) – M14573 Mounting instructions  
K162H - 60 lb (27.2 kg) – M15241 Mounting instructions



## CAUTION

DO NOT USE COILS OR SPOOLS HEAVIER THAN 30 LBS. ON THE ORIGINAL K162 SPINDLE.

## READI-REEL ADAPTERS

**K363-P** Adapts Lincoln Readi-Reel coils of electrode (30 lb. and 22 lb.) to a 2" spindle. One-piece construction. Made from a durable molded plastic. Designed for easy loading; adapter remains on spindle for quick changeover. Included with K377 small mounting stand.

**K438** Adapts 50-60 lb. Lincoln Readi-Reel coils to a K162-H spindle, or similar 2 inch spindle suitable for 60 lb. spools. Two-piece construction made from a durable flame retardant molded plastic. Designed for minimum loading downtime, the coils easily load with inside adapter half on spindle. Four twist latches lock adapter halves together. Included with K445 50-60 lb. Readi-Reel stand.

## SMALL MOUNTING STAND FOR READI-REEL COILS OR 2" I.D. SPOOLS (K377)

(30 Lb. Maximum Capacity)

This assembly includes a small frame to which is attached a wire reel spindle similar to the K162 spindle. The unit is supplied with the K363 Readi-Reel Adapter for use with the Lincoln 22-30 lb. Readi-Reel Electrode Coils. Without the adapter the unit is capable of handling up to 30 lb. spools with a 2" I.D., a 12" max. O.D., and a 4" width. For spools with an 8" O.D., a K468 Spindle Adapter is available.

14 lb. Innershield coils can be mounted to the spindle using the K435 Adapter. The spindle has an easily adjustable braking system.

## SMALL MOUNTING STAND FOR 13-14 LB. INNER-SHIELD COILS (K378)

This assembly includes the same smaller frame as used in the K377 and a fully enclosed canister system for de-reeling of the 14 pound coil. This system has a fixed brake for the 14 pound coil.

## 50-60 LB. WIRE REEL ASSEMBLY FOR CUSTOMER MOUNTING (K299)

This assembly is available only when ordering either the LN-9F 2-Roll or 4-Roll model. It includes a 50-60 lb. wire reel, spindle shaft, adjustable brake, insulation and mounting hardware.

Install the assembly according to instructions included with it.

LN-9 Wire Feeder



# ACCESSORIES

## GUN AND CABLE ASSEMBLIES

A variety of standard Lincoln and Magnum gun and cable assemblies are available for the LN-9 in 10 ft.,

12 ft. and 15 ft. cable lengths. Choose the gun and cable assembly to suit the LN-9 welding application and wire size. See Table C-1.

**TABLE C.1 – LN-9 GUN AND CABLE ASSEMBLIES**

Process	Model	Electrode	60% Duty Rating
Gas Metal Arc Welding	K497 <sup>(1)</sup>	.025-.045" (0.6-1.14 mm) solid	200 amps 200 amps
	K498 <sup>(2)</sup>	.025-.045" (0.6-1.14 mm) solid	200 amps 200 amps
	Magnum K470 <sup>(1)</sup>	.035- $\frac{5}{64}$ " (0.9-2.0 mm) solid	300 amps 300 amps
	Magnum K471 <sup>(1)</sup>	.035- $\frac{5}{64}$ " (0.9-2.0 mm) solid	400 amps 400 amps
	Magnum K478 <sup>(2)</sup>	.035- $\frac{5}{64}$ " (0.9-2.0 mm) solid	300 amps 300 amps
	Magnum K479 <sup>(2)</sup>	.035- $\frac{5}{64}$ " (0.9-2.0 mm) solid	400 amps 400 amps
Innershield <sup>®</sup>	K126	.062- $\frac{3}{32}$ " (1.6-2.4 mm) Innershield	350 amps
	K115-120	for .120" and $\frac{7}{64}$ " (3.0 and 2.8 mm)	450 amps
	K115-3/32	for $\frac{3}{32}$ " (2.4 mm)	450 amps
	K115-5/64	for .068- $\frac{5}{64}$ " (1.7-2.0 mm)	450 amps
	K116-120	for 120" and $\frac{7}{64}$ " (3.0 and 2.8 mm)	600 amps
	K116-3/32	for $\frac{3}{32}$ " (2.4 mm)	600 amps
	K206 <sup>(3)</sup>	.062- $\frac{3}{32}$ " (1.6-2.4 mm) Innershield	350 amps
	K289 <sup>(3)</sup>	.068-.120" (1.7-3.0 mm) Innershield	500 amps
	K309 <sup>(3)</sup>	.062- $\frac{3}{32}$ " (1.6-2.4 mm) Innershield	250 amps
Submerged Arc	K112	$\frac{1}{16}$ " (1.6 mm) solid	500 amps
	K113-1	$\frac{5}{64}$ " (2.0 mm)	600 amps
	K113-2	$\frac{3}{32}$ " (2.4 mm)	600 amps
	K-114	$\frac{3}{32}$ or $\frac{5}{64}$ " (2.4 or 2.0 mm) solid	600 amps

<sup>(1)</sup> K466-1 connector kit required.

<sup>(2)</sup> K489 Fast-Mate™ Adapter required.

<sup>(3)</sup> Linconditioner™ guns are recommended for locations where smoke accumulation is a problem and conventional exhaust systems are ineffective. The available smoke removal type Innershield guns and vacuum units can be used in these locations. Instructions are shipped with the equipment.

LN-9 Wire Feeder



# ACCESSORIES

## WIRE FEEDER ACCESSORIES

### BURNBACK DELAY KIT (K202)

Provides a precise control of the electrode burnback at the end of the weld. Prevents crater sticking and provides proper stickout for starting the next weld. Recommended especially when welding with small (.030-1/16") diameter wire at high wire feed speeds. Also recommended when the semiautomatic gun is mounted in a fixture or on the Squirtmobile in a way that prevents the gun from lifting from the work at the end of the weld.

Install the kit according to the instructions included with the kit.

### DUAL PROCESS KIT (K317) - For Wire Feeders Using Same Polarity

This kit permits the connection of two wire feeders to a single power source. Both feeders must weld with the same electrode polarity. When the trigger of the desired wire feeder is pressed, the power source output control leads (#75, #76 and #77) will be connected to that feeder, and the procedure as set on its controls will be provided. The other connected wire feeder will not be feeding wire, but its electrode circuit will be electrically hot. The kit mounts at the power source and is connected to the power source terminal strip with the supplied leads. Standard K196 input cable assemblies are used to connect each wire feeder to the dual process control circuit while the electrode lead connects to the power source.

Install the kit according to instructions included.

### DUAL PROCESS KIT (K318) - With Electrode Polarity Change Capability

Functions essentially the same as the K317 except that the kit includes two contactors to provide different polarities on the two wire feeders. When connected in this manner and one trigger is pressed, the other electrode will be "cold" to ground but "hot" to the other electrode. This kit can also be connected to provide the same polarities on each feeder, but the electrode circuit of the one not being used will be cold to work and to the other electrode.

Install the kit according to instructions included.

**NOTE:** The K317 and K318 Dual Process Kits also include mode change capability, but only when using the DC-600 power source. This feature permits one feeder to weld in CV Innershield mode and the other feeder to weld in CV Submerged Arc mode, as well as both in the same mode.

When using the Pulse Power 500 power source, the K317 or K318 Dual Process Kits can be used only if the procedures are close enough to use the same mode setting. The K317 or K318 cannot switch modes on the Pulse Power 500. An LN-9 may not be used with an LN-7 or LN-8, although two LN-9s may be used together.

### DUAL PROCEDURE KIT (K319)

With the use of this kit, one of two different settings of wire feed speed and voltage can be selected by a toggle switch mounted on the gun handle. The kit consists of a control panel which mounts over the standard LN-9 control rheostats. This control panel has four rheostats, a transfer relay and a polarized connector. During installation, the standard security door is mounted over the new panel and functions in the same manner. All electrical connections are with plugs to speed and simplify the assembly. A 15-foot control cable with a polarized connector on one end for plugging into the new control panel is provided. On the other end of the control cable is a small selector toggle switch and a mounting bracket.

A K302 Extension Control Cable is required when using the K319 with any LN-9F model.

Install the kit according to instructions included.

### PULSE POWER FILTER CONVERSION KIT (K442-1)

Required for any LN-9 to be used with a Pulse Power 500 or DC650 Pro power source. Includes a Filter Board and connection harness, easily installed in the control section and plugged into the Voltage Board. The plug must be disconnected for use with other standard power sources.

Install the kit according to instructions included.

LN-9 Wire Feeder



## ACCESSORIES

### SWIVEL PLATFORM (K178-1)

For all LN-9 wire reel stand combinations. For mounting wire feeder-wire reel stand assembly on top of suitable Lincoln Idealarc power sources. Recommended input cable assembly length is 10 feet (3m) when using the K178-1.

Bolt the platform to the lift bail according to instructions supplied with the platform (M16260).

### UNDERCARRIAGE (K163)

For all LN-9 wire reel stand combinations. Includes mounting frame, front casters, 10" (254 mm) O.D. rear wheels, and handle. Use when portability is required. Casters mount at the front and the wheels mount at the rear. Handle bolts to the front, which allows the LN-9 to be tilted back and wheeled like a two-wheel truck.

### CONTINUOUS FLUX FEED TANK (K320)

The K320 is available to permit the LN-9 to be used for submerged arc welding using the K112 submerged arc gun and cable. Requires a supply of compressed air at 60 to 120 psi with a flow of 1.5 cubic feet per minute.

The kit is a complete continuous flux feeding system including air filter, pressure regulator, gage, tank and 18 foot flux hose. It also includes a funnel for filling the tank, plus the lift bail assembly required to mount the tank and wire feeder to a K163 undercarriage. The tank can also be used as a free standing assembly.

Install the tank according to instructions included with the kit.

### K320 FLUX TANK LOADING

Either turn off the incoming air line or remove the quick disconnect if one has been installed. Slightly loosen the tank cap and let the air in the tank escape through the holes in the side of the cap. After pressure has been released, remove the cap from the tank. Using the funnel provided, put 100 pounds of flux into the tank. It is very important that only new or properly reclaimed flux be put in the tank. Coarse particles and/or magnetic particles will stop the flux feeding process. New Lincoln flux is properly screened at the factory. All reclaimed flux must be separately screened through a vibrated screen having 0.065 - 0.075 openings and be put through a magnetic separator. The K310 vibrated Flux Screen and a K58 Magnetic Separator are available for this purpose. The screen in the funnel supplied with the tank has much larger openings, and its only purpose is to keep paper and slag out of the tank. Screw the tank cap back on and tighten it hand tight. Reconnect the incoming air line to the tank.

There will always be a small amount of air and possible drops of water coming out of the end of the tube coiled under the tank. This is an automatic disposal system in case the plant air has water and dirt in it.

### FLUX SCREEN (K310)

This unit is designed to fit the top of either the standard fill funnel of a continuous flux feed system or a K58 magnetic separator. The unit has a steel screen with 0.065 to 0.075 openings and an air vibrator attached to the frame. The vibrator can be used with air line pressure ranging from 20 psi to 100 psi.

For ease of handling, you should connect the incoming air line to the 1/8" pipe elbow with the aid of a fast disconnect type air coupling.

It is very important that reclaimed flux to be used in the continuous flux feeding system be passed through the K310 screen or its equivalent.

LN-9 Wire Feeder



# ACCESSORIES

## MAGNETIC SEPARATOR (K58)

The K58 is a permanent magnet type separator designed to fit the top of the standard fill funnel of the continuous flux feed system.

The purpose of the separator is to remove magnetic materials such as mill scale and any other extraneous magnetic materials which may have been recovered along with the flux to be processed.

It is important to remove these magnetic particles from the flux which is to be reused in the continuous flux feeding system. If the magnetic material is not removed, it will gather around the nozzle of the gun and impede or shut off the flux flow when making relatively long welds or when welding continuously. The magnetic particles can also cause porosity in the weld.

Fit the magnetic separator into the funnel or hopper. Pour the flux to be reclaimed into the top pan of the separator. The separator is designed so that the flux flows around three permanent magnets. The magnets remove all magnetic particles. When the magnets become covered with their full load, they automatically stop the flux flow. When the flux flow stops, remove the separator from the funnel or hopper. Turn it over and open the panel that covers the magnets. Remove the magnetic particles by brushing or by using an air blast.

### WARNING

WHEN USING COMPRESSED AIR BE CAREFUL TO PROTECT YOURSELF AND OTHERS IN THE AREA FROM FLYING PARTICLES.

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**NOTE:** The magnetic separator is used with all Lincoln mild steel fluxes - 700 Series, 800 Series and 900 Series. Do not use the magnetic separator with any stainless steel, alloy, or hardsurfacing flux except H-535. The magnetic separator removes some of the alloying elements from these fluxes, thus changing their characteristics.

## MECHANIZED HAND TRAVEL UNIT (K110)

Carries K114 Squirtgun along the joint at a preset travel speed to help the operator make better welds 10 to 25% faster than with manual travel. Speed range is 7-60 ipm (.18-1.5 m/min). Requires K161 Power Pack.

## SQUIRTMOBILE® (K62)

Self-propelled trackless carriage carries K114 gun on long welds for automatic welder economy without high fixture costs. Requires K161 power pack.

## MECHANIZED TRAVEL POWER PACK (K161-CABLE LENGTH)

Includes travel mag-amp circuit required when using either a K62 Squirtmobile or K110 mechanized hand travel unit with a K114 gun. Mounts near power source. Available with 25, 50, 75 or 100' (7.6, 15.2, 22.9 or 30.5 m) power pack to wire feeder leads. Connect to the power source for input power. (Not suitable for use with the LN-9F.)

## GAS SOLENOID KITS

**K425** Mounts inside K357 LN-9 model above code 9131.

**K437** Mounts outside all other LN-9 models.

## POWER EXTENDED WIRE DRIVE (K392)

Permits extending gun and cable up to 80 feet from the K357 LN-9 (code 8180 and higher).

## ENCLOSED REEL MOUNTING (K304)

Used with the LN-9SE for welding at a distance from the wire feeder. Includes a door for the wire reel housing and a hand crank. 50 and 60 lb. reels can be used.

## EXTENSION ASSEMBLY (K307 or K308)

For LN-9NE or LN-9SE. K307 is a 22½ ft. (6.9 m) extension cable. K308 is 45 ft. (13.7 m). Permits welding up to 60 ft. (18 m) from the wire reel.

## FILLET GUIDE (K70)

Attachment simplifies horizontal fillet welding when using the Mechanized Hand Travel Unit (K110).

## LINC-FILL™ GUIDES

A complete line for submerged arc and Innershield available.

LN-9 Wire Feeder



# ACCESSORIES

**TABLE C.2 – DRIVE ROLL AND GUIDE TUBE KITS**

Wire Size	Kit	
	2-Roll	4-Roll
<b><u>Solid Steel Electrode</u></b>		
.030 - .035" (0.8 - 0.9 mm)	KP502 - 035	KP545 - 035
.045 - 0.052" (1.2 - 1.4 mm)	KP502 - 052	KP545 - 052
1/16" (1.6 mm)	KP502 - 1/16	KP545 - 1/16
.068 - 3/32" (1.7 - 2.4 mm)	KP502 - 3/32	KP545 - 3/32
<b><u>Cored Electrode</u></b>		
.045 - 0.052" (1.2 - 1.4 mm)	KP502 - 052C	KP545 - 052C
1/16" (.062") (1.6 mm)	KP502 - 1/16C	KP545 - 1/16
.068 - 3/32" (1.7 - 2.4 mm)	KP502 - 3/32	KP545 - 3/32
7/64 - .120" (2.0 - 3.0 mm)	KP502 - 120	KP545 - 120
7/64" Soft Jacket (2.8 mm)	KP502 - 7/64H	_____
<b><u>Aluminum Electrode</u></b>		
.035" (0.9 - 1.0 mm)	KP503 - 035A	KP546 - 035A
3/64" (1.2 mm)	KP503 - 3/64A	KP546 - 3/64A
1/16" (1.6 mm)	KP503 - 1/16A	KP546 - 1/16A

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# MAINTENANCE

## SAFETY PRECAUTIONS

### ⚠ WARNING



#### ELECTRIC SHOCK can kill.

- Only qualified personnel should perform this maintenance.
  - Turn the input supply power OFF at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.

## ROUTINE MAINTENANCE

### DRIVE ROLLS AND GUIDE TUBES

After feeding any coil of wire, inspect the drive roll section. Clean it as necessary. Do not use a solvent for cleaning the idle rolls(s) because it may wash the lubricant out of the bearing. The drive roll(s) and guide tubes are stamped with the wire sizes they will feed. If you use a wire size other than that stamped on the rolls, the roll(s) and guide tubes must be changed.

The drive rolls using the knurled "V-groove" design have a double set of teeth so they can be reversed for additional life. Between the two knurled rolls for .068 through .120" is a shim washer which limits the damage to the wire to a minimum should wire feeding problems occur. When drive rolls are interchanged, leave the three socket head screws of the roll assembly loose until it is re-assembled on the drive shaft. Then tighten all three. Be sure the roll faces and spacer faces are thoroughly cleaned before re-assembly. Drive rolls for 1/16" and smaller solid electrodes using the smooth "V-groove" design have no teeth. They are not reversible.

See the **Operation** Section for drive roll installation instructions.

See **Table C.2** in the **Accessories** section for drive roll and guide tube kits.

### WIRE REEL MOUNTING - 50 AND 60 LB. COILS

To prolong the life of the reel shaft, periodically coat it with a thin layer of grease. No maintenance of the brake assemblies is needed. If the brake shoe wears through to metal, replace the brake assembly.

### WIRE REEL MOUNTING - READI-REELS AND 10 THROUGH 30 LB. SPOOLS

No routine maintenance required. Do not lubricate the 2" spindle.

## PERIODIC MAINTENANCE

### CONTROL BOX

Every six months open and inspect the control section. The accumulated dirt should be gently blown off all of the electrical components. See **Figure D.3** for component locations. Be sure the air that is being used is dry. Check the contacts of the large plug-in relay.

A spatter resistant shield protects the digital meter. This shield must always be installed. If it breaks or becomes damaged, replace it by removing the two screws securing its frame, installing a new shield, and reattaching the frame.

### WIRE DRIVE MOTOR AND GEAR BOX

Every year examine the gearbox. Paint the gear teeth with molydisulfide-filled grease such as Non-Fluid Oil Corporation's A-29 Special/MS Lubricant. Do not use a graphite grease.

Check the motor brushes. Replace if they are worn down to 1/4" or less. When ordering feed motor brushes, give all information from the motor nameplate.

**GUN AND CABLE MAINTENANCE**

For instructions on periodic maintenance for the welding gun and cables, refer to the manual for your specific model of welding gun. Also see IM-294.

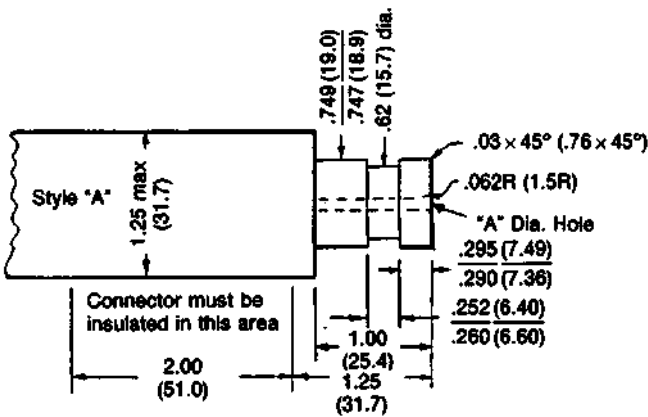
**GUN CABLE CONNECTOR REQUIREMENTS TO PERMIT PROPER CONNECTION TO LINCOLN LN-9 AND LN-9F WIRE FEEDER**

The following Figures D.1 and D.2 should serve as a guide to determine if a particular gun or switch can be connected to the LN-9 and LN-9F models.

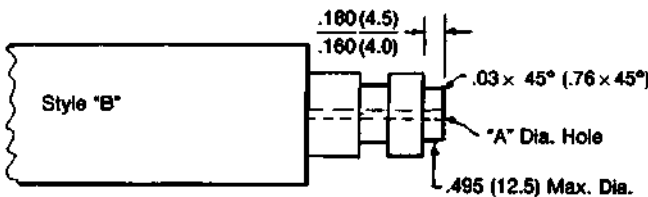
Wire Size	"A" Diameter Hole to be Concentric to .749/.747 Dia. Within .008 F.I.M.
7/64 & .120"	.152 (#24 Drill)
.068 Thru 3/32"	.125 (1/8 Drill)
1/16 or .062"	.078 (5/64 Drill)
.045 & .052"	.062 (1/16 Drill)
.030 & .035"	.055 (#54 Drill)

All dimensions in inches and (millimeters).

**FIGURE D.1 – LN-9 CONNECTORS**



**LN-9 CONNECTOR FOR 1/16-120" (1.6-3.0 MM) WIRE)**

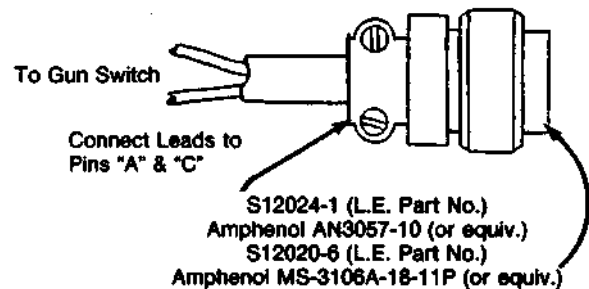


**LN-9 CABLE CONNECTOR FOR .030-.052" (0.8-1.3 mm) WIRE (FOR ALL OTHER DIMENSIONS, SEE DIAGRAM ABOVE).**

**NOTE:** Connector part with .7459/.747 (19.0/18.9) diameter should be made from brass if it is to be part of the welding current carrying circuit.

**FIGURE D.2 – SWITCH REQUIREMENTS**

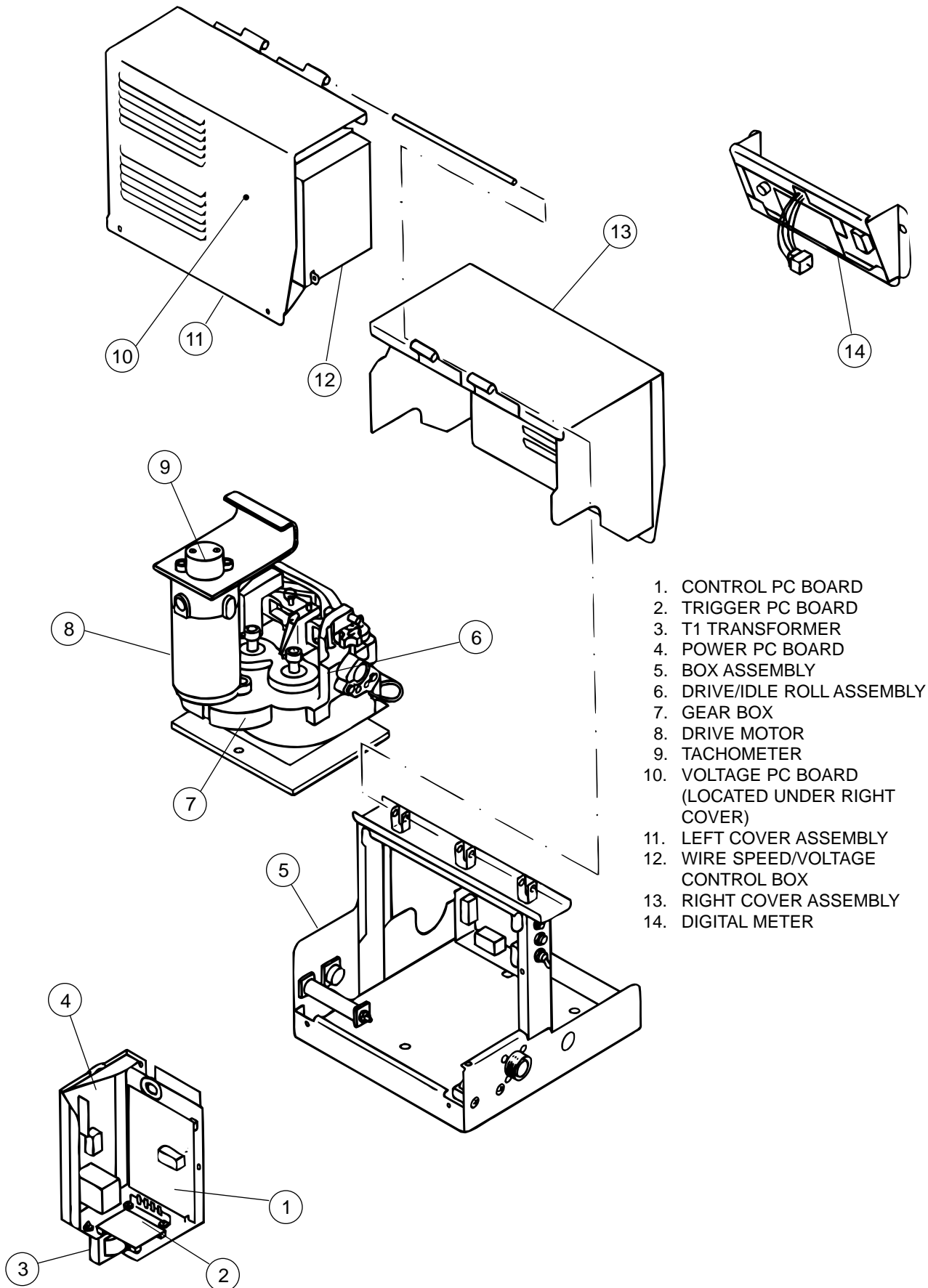
1/2 Amp AC 24 Volts — Inductive  
1/2 Amp DC 24 Volts — Inductive



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# MAINTENANCE

### FIGURE D.3 – GENERAL COMPONENT LOCATIONS



- 1. CONTROL PC BOARD
- 2. TRIGGER PC BOARD
- 3. T1 TRANSFORMER
- 4. POWER PC BOARD
- 5. BOX ASSEMBLY
- 6. DRIVE/IDLE ROLL ASSEMBLY
- 7. GEAR BOX
- 8. DRIVE MOTOR
- 9. TACHOMETER
- 10. VOLTAGE PC BOARD (LOCATED UNDER RIGHT COVER)
- 11. LEFT COVER ASSEMBLY
- 12. WIRE SPEED/VOLTAGE CONTROL BOX
- 13. RIGHT COVER ASSEMBLY
- 14. DIGITAL METER

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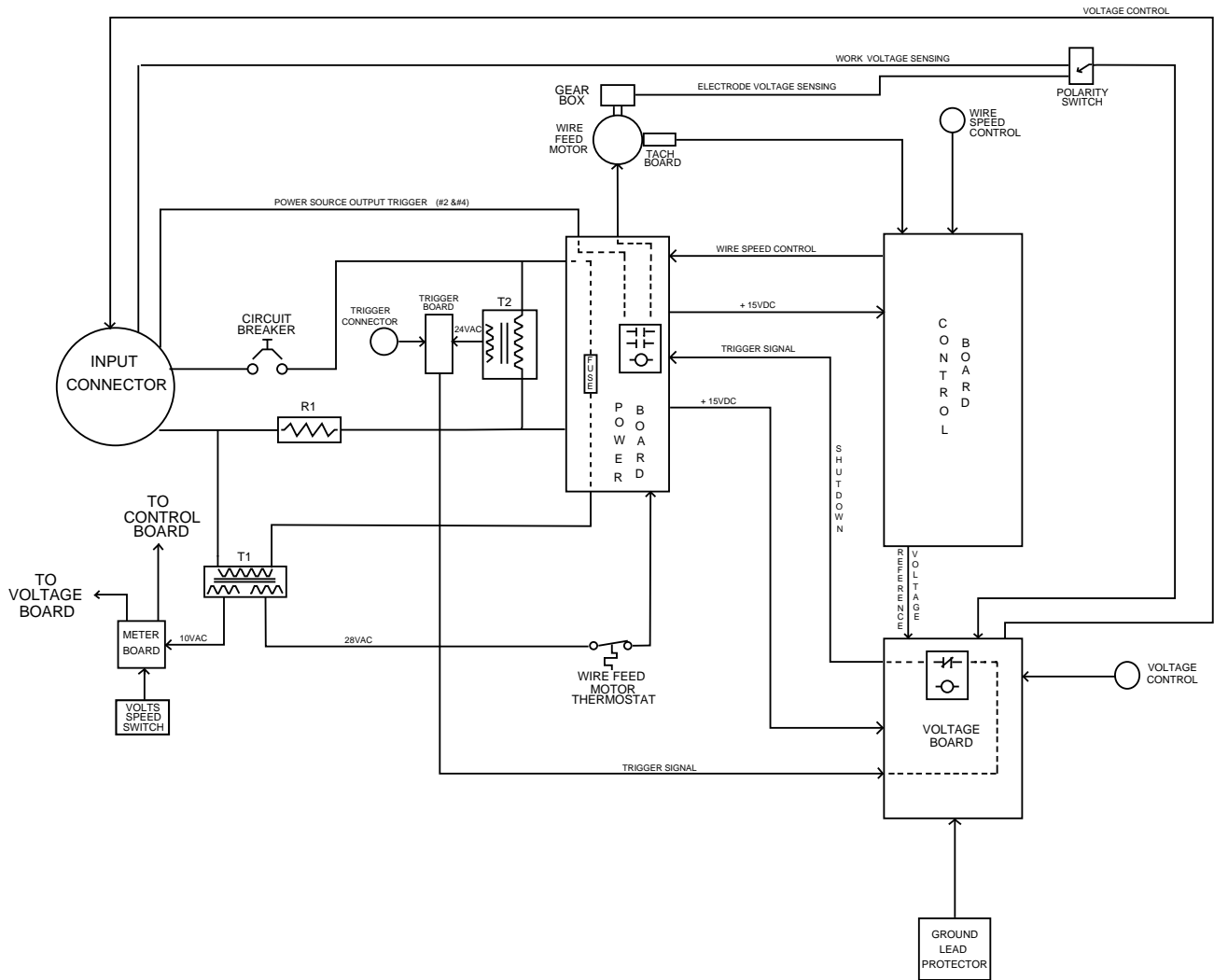


FIGURE E.1 – LN-9 BLOCK LOGIC DIAGRAM

LN-9 Wire Feeder



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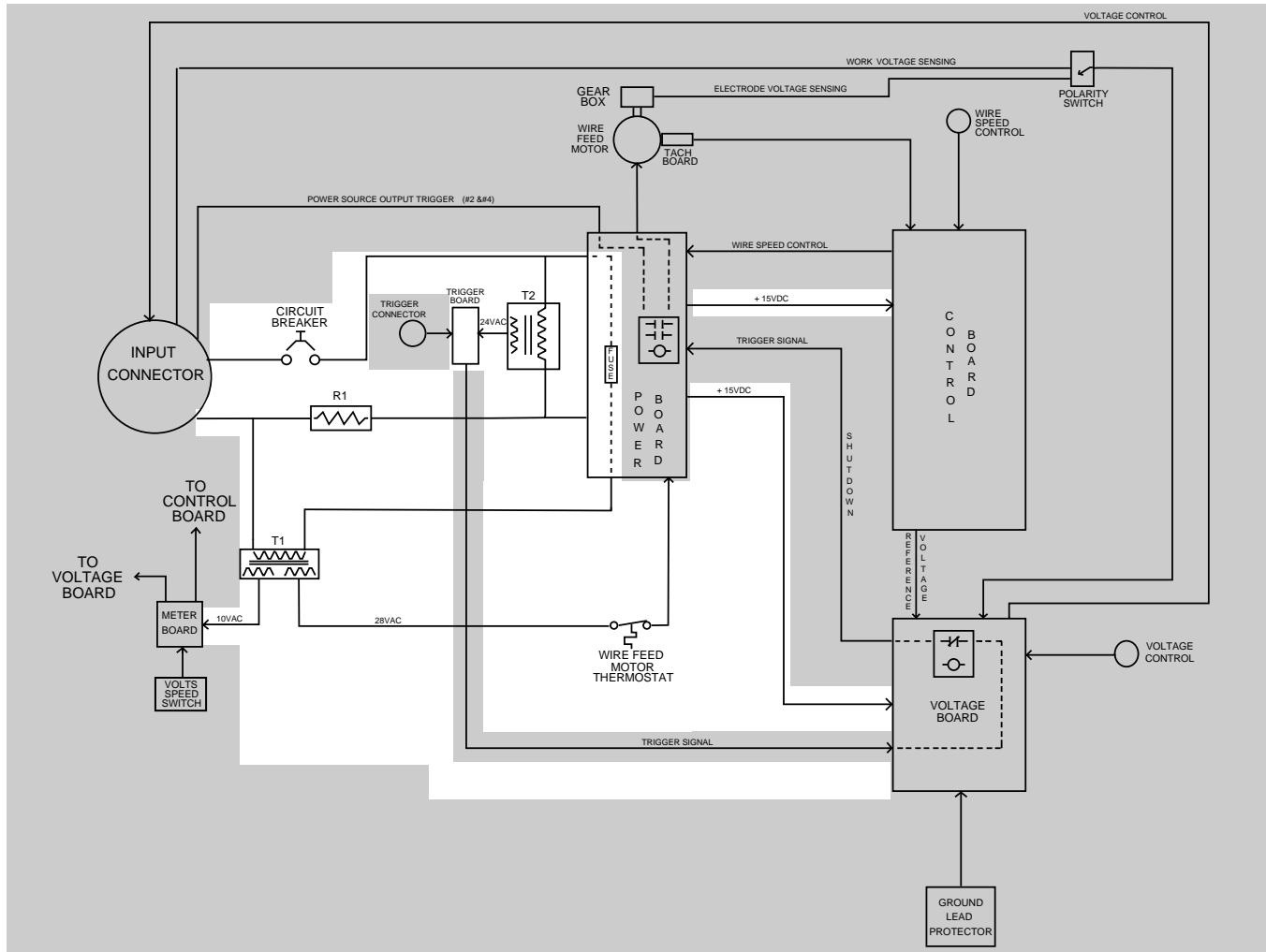
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## GENERAL DESCRIPTION

The LN-9 is a semiautomatic wire feeder that allows the user to preset the arc voltage and wire feed speed. The wire feed speed is internally monitored and regu-

lated to the preset condition. When the LN-9 is coupled to an appropriate Lincoln constant voltage power source, the arc voltage is also regulated to match the preset voltage.

FIGURE E.2 – POWER INPUT CIRCUITS



## POWER INPUT CIRCUITS

The 115VAC is applied (usually from the welding power source) via the input connector and through the circuit breaker and R1 resistor to the power board, the T2 trigger transformer, and the T1 transformer.

The 24VAC developed at the T2 trigger transformer is applied to the trigger board. There it is rectified and regulated to 20VDC and used to operate the wire feeder trigger circuitry.

The 28VAC produced by the T1 transformer secondary is applied to the power board. There it is rectified and regulated to 15VDC. This 15VDC powers the electronics on the power, control, and voltage boards. The 10VAC secondary voltage is rectified, regulated, and utilized by the meter board.

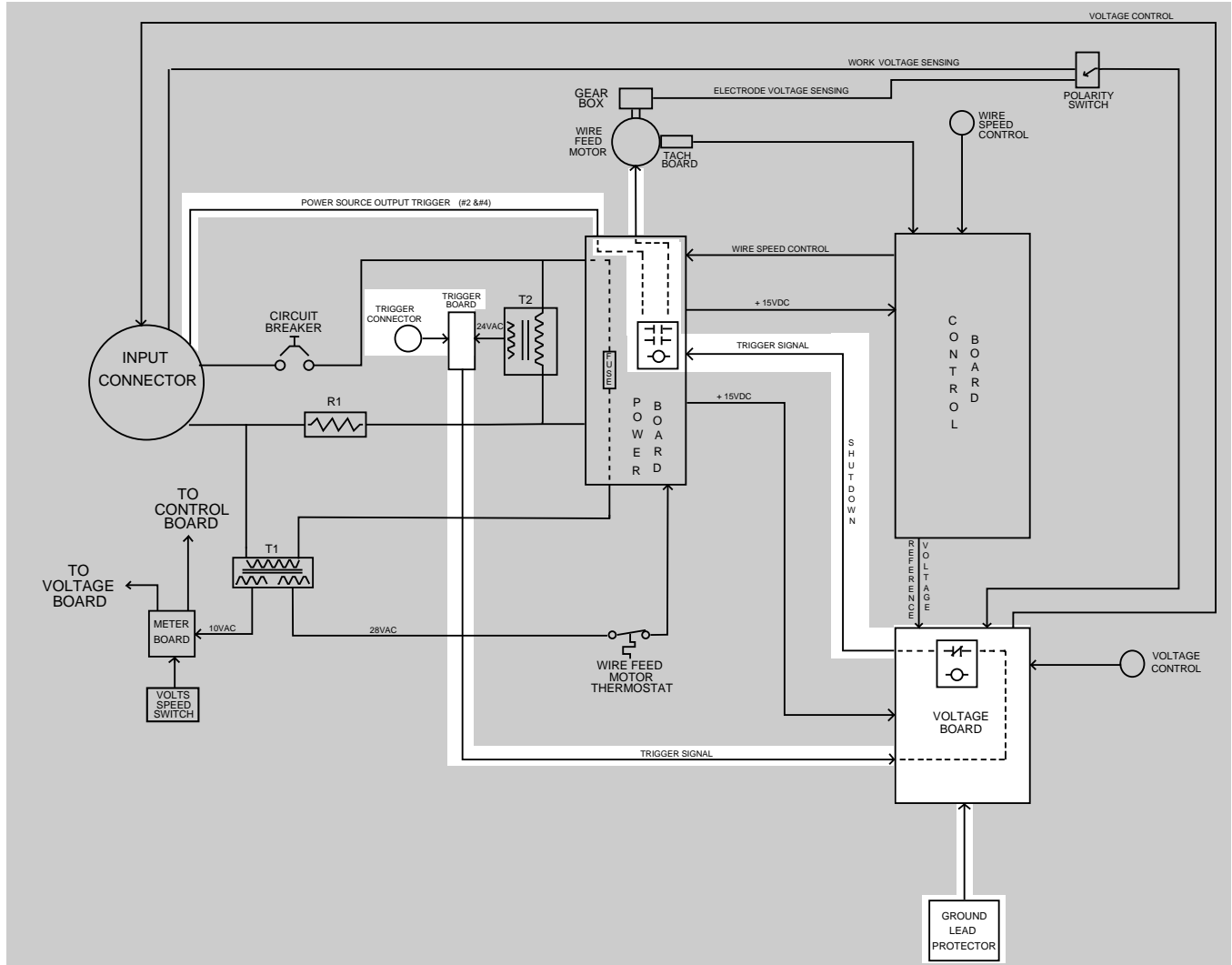
**NOTE:** Unshaded areas of Block Logic Diagram are the subject of discussion.

LN-9 Wire Feeder



# THEORY OF OPERATION

## FIGURE E.3 - TRIGGER AND SHUTDOWN CIRCUIT



## TRIGGER AND SHUTDOWN CIRCUIT

When the gun trigger switch is activated (closed), the trigger board completes the trigger signal path. This energizes the CR1 relay located on the power board. The CR1 relay activates the wire drive motor and the #2 and #4 circuit, which then activates the Lincoln welding power source. The CR1 relay may also be used to energize a gas solenoid.

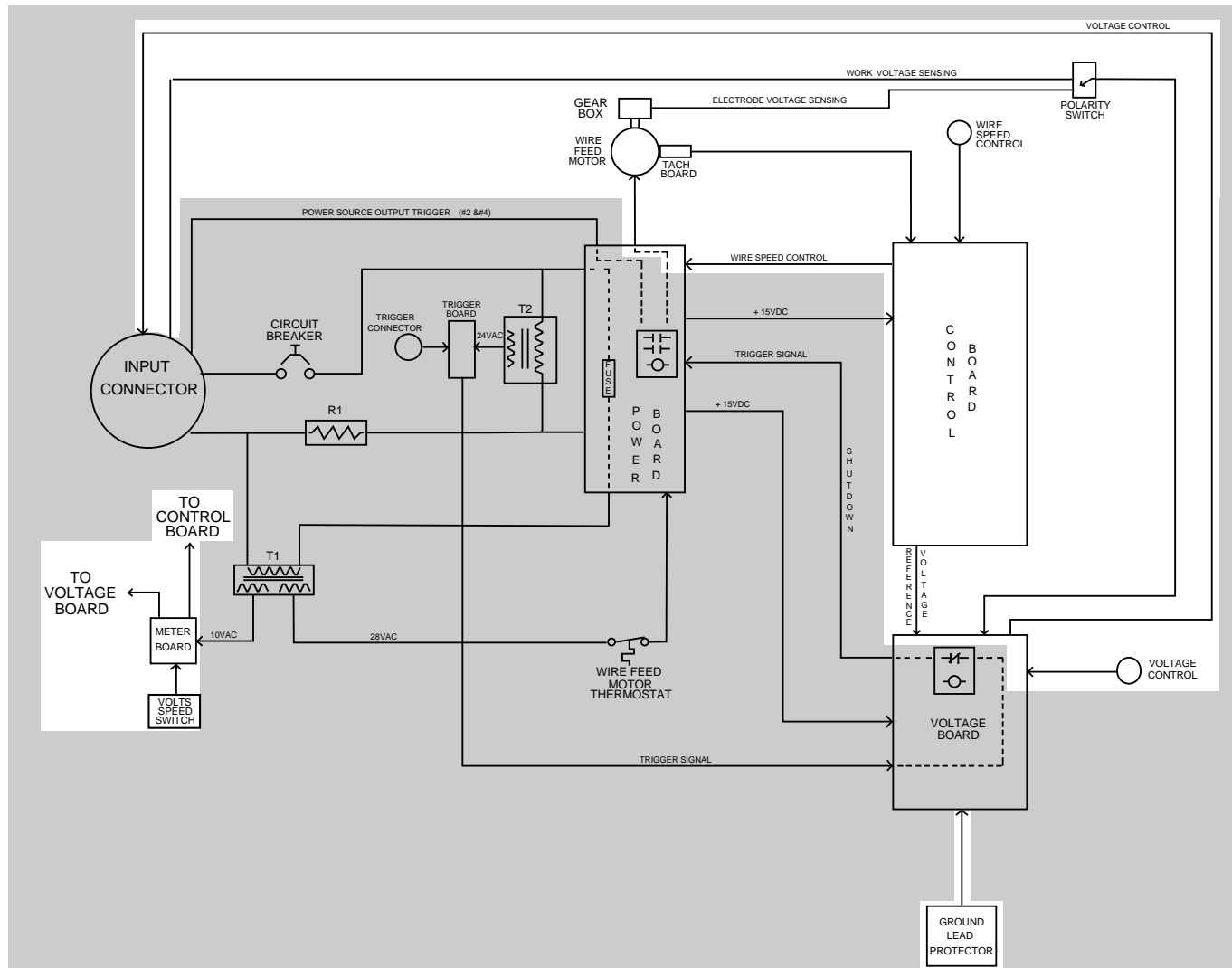
The normally closed relay located on the voltage board is in series with the trigger signal. If an out-of-voltage-range signal or a ground fault condition should occur, the CR501 (on voltage board) relay contacts would "open," and the trigger signal path would be interrupted. This would cause the wire feeder to "shut down" until the gun trigger is released or the ground fault protector is reset.

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

LN-9 Wire Feeder



FIGURE E.4 – ARC VOLTAGE, WIRE SPEED CONTROL AND METERING



## ARC VOLTAGE, WIRE SPEED CONTROL AND METERING

The arc voltage, which is sensed at the work piece and motor gear box, is connected through a polarity switch to the voltage board. This actual arc voltage is compared to the reference preset voltage that is set by the voltage control. The voltage board determines what correction signal needs to be sent to the Lincoln welding power supply. This voltage control signal is coupled to the power supply through the input connector. The Lincoln power supply then adjusts the welding arc voltage to meet the demands of the preset reference voltage.

The tach board sends motor speed information to the control board. This feedback voltage is compared to the reference command preset by the wire speed control. The control board determines what correction is needed and sends the appropriate signal to the power board. The power board then adjusts the motor armature voltage to comply with the command from the control board.

A three-digit meter is provided to read both arc voltage and wire feed speed. Either the preset or the actual welding parameters can be displayed.

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

LN-9 Wire Feeder





# THEORY OF OPERATION

## PRINTED CIRCUIT BOARD FUNCTIONS

### POWER BOARD

The input power (115VAC) is applied to the power board, and from that the power board develops the DC field voltage for the wire drive motor. The SCR circuitry, used to control the motor armature voltage, is also contained on the power board.

The relay used to activate motor armature voltage, field voltage, auxiliary output on terminals 32A-7, and power source output (#2 and #4) is housed on the power board.

The rectified and regulated power supplies, used for the LN-9 control circuitry, are incorporated in the power board.

The shut down, start response and trigger interlock circuitry, in addition to the rectified and regulated power supplies used for the LN-9 control circuitry, is included in the power board design.

### CONTROL BOARD

The control board provides a reference voltage to the wire speed control and voltage control potentiometers, allowing SET signals to be produced.

The control board also powers and processes the feedback signals from the tachometer board. It compares the actual speed information to the SET speed command signal and develops firing pulses that drive the motor armature SCR circuitry, located on the power board.

Initial acceleration rates for wire feed speed are controlled by the control board as well as the SET speed and actual speed signals for the digital meter circuitry.

### VOLTAGE BOARD

The voltage board compares the SET voltage values to the actual voltage values and makes any necessary correction by sending the appropriate signal to the Lincoln CV power source. If for any reason the arc voltage cannot be controlled to the SET voltage, the voltage board interrupts the LN-9 trigger path, and the unit shuts down. The response (Fast or Slow) to changes in arc voltage is also controlled by the voltage board, as well as the SET and actual arc voltage signals for the digital meter circuitry.

### TRIGGER BOARD

The trigger transformer supplies 24VAC to the trigger board where it is rectified and regulated to 20VDC. This DC voltage is used in the gun trigger circuit to initiate the welding operation.

### TACHOMETER BOARD

A square wave frequency signal, proportional to motor speed, is generated by the tachometer board and sent to the control board.

### METER BOARD

The meter board contains signal scaling and power supply circuitry for the digital meter.

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

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# NOTES

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### NOTE

This Troubleshooting section is specific to the LN-9. However, much of this information may apply to the LN-9F model with slight adaptation. Refer to LN-9F Wiring Diagram.

# TROUBLESHOOTING & REPAIR

## 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 main categories: Function Problems, Feeding Problems, Welding Problems, Meter Problems, and Starting Problems.

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

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

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

### ⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353.

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## PC BOARD TROUBLESHOOTING PROCEDURES

### ⚠ WARNING



#### ELECTRIC SHOCK can kill.

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

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

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



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

Reusable  
Container  
Do Not Destroy

#### PC Board can be damaged by static electricity.

- Remove your body's static charge before opening the static-shielding bag. Wear an anti-static wrist strap. For safety, use a 1 Meg ohm resistive cord connected to a grounded part of the equipment frame.
  - If you don't have a wrist strap, touch an unpainted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.
- Tools which come in contact with the 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:** 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.

# TROUBLESHOOTING & REPAIR

Observe Safety Guidelines detailed in the beginning of this manual.

## TROUBLESHOOTING GUIDE

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
No wire feed when gun trigger is activated. The digital meter does NOT light. The drive rolls do not turn.	<ol style="list-style-type: none"> <li>1. Make sure 115VAC is being applied to the LN-9 at the input connector. Pin "C" is lead #31 and pin "D" is lead #32.</li> <li>2. Check the 5 amp circuit breaker. Reset if tripped.</li> <li>3. The F101 1/2 amp fuse, located on the power PC board, may be blown.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for loose or faulty lead connections between the input connector, the T1 transformer, and the power PC board.</li> <li>2. The T1 transformer may be faulty. Perform the <b><i>T1 Transformer Test.</i></b></li> </ol>
No wire feed when gun trigger is activated. The digital meter DOES light but reads zero in both (set and actual) volts and wire speed.	<ol style="list-style-type: none"> <li>1. The wire drive motor may be over heated, and the thermal protector has tripped. Let unit cool.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for loose or faulty connections on leads #527 and #528 between the wire drive motor and the power PC board.</li> <li>2. Perform the <b><i>T1 Transformer Test.</i></b> Replace if faulty.</li> <li>3. The power PC board may be faulty. Replace.</li> </ol>

⚠ 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 216-383-2531 or 1-800-833-9353.

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# TROUBLESHOOTING & REPAIR

## TROUBLESHOOTING GUIDE

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>The wire feed "coasts" when the gun trigger is released. The interlock switch is OFF.</p>	<p>1. Make sure the gun trigger is not "sticking."</p>	<p>1. The relay 1CR may be faulty. Replace.</p>

### ⚠ 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 216-383-2531 or 1-800-833-9353.

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Observe Safety Guidelines detailed in the beginning of this manual.

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>No wire feed when gun trigger is activated. The drive rolls do not turn. The digital meter does light but reads only the SET voltage and wire speed values.</p>	<ol style="list-style-type: none"> <li>1. The Ground Lead Protector may have tripped. Reset and clear possible fault between electrode circuit and feeder frame.</li> <li>2. The gun trigger may be faulty.</li> </ol>	<ol style="list-style-type: none"> <li>1. The 1CR relay on the power PC board may be faulty. Check or replace.</li> <li>2. Check resistor R1. Normal resistance is 2 ohms. See the Wiring Diagram.</li> <li>3. Perform the <i>Trigger Transformer T2 Test</i>.</li> <li>3. Perform the <i>Trigger Board Test</i>.</li> <li>4. Perform the <i>Wire Drive Motor Test</i>.</li> <li>5. If the wire drive motor is OK, then the power PC board or the control PC board may be faulty.</li> </ol>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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## TROUBLESHOOTING GUIDE

Observe Safety Guidelines  
detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>The wire feeds when the gun trigger is activated, but there is no arc voltage.</p>	<ol style="list-style-type: none"> <li>1. Make sure the inch switch is in a "Wire Hot" position.</li> <li>2. Check the welding cables for loose or faulty connections.</li> <li>3. Put a jumper wire from #2 to #4 on the power source terminal strip. (Machines with 14 pin amphenols: pin C to pin D.) If the arc voltage is not present at the output terminals, the power source is faulty. If the arc voltage IS present, the problem is in the wire feeder or control cable.</li> <li>4. Check the continuity of leads #2 and #4 through the control cable. Replace if "open."</li> </ol>	<ol style="list-style-type: none"> <li>1. The 1CR relay, located on the power PC board, may be faulty. Check or replace.</li> <li>2. If a burnback kit is installed, remove and install jumper plug. If the problem is solved, the burnback kit is faulty.</li> <li>3. Check the #2 and #4 leads in the LN-9 wiring harness for loose or faulty connections. See the Wiring Diagram.</li> </ol>

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
<p>The SET speed is adjustable and steady. The actual speed is uncontrollable. The meter displays the actual speed correctly or reads "EEE."</p>	<p>1. Contact your local Lincoln Authorized Field Service Facility.</p>	<p>1. While the motor is running, carefully unplug the 15 pin molex plug from the control board.</p> <p>If the motor continues to run, the power PC board may be faulty. Replace.</p> <p>If the motor stops, the control PC board may be faulty. Replace.</p> <p>2. Perform the <b>Wire Drive Motor Test</b>.</p>
<p>The SET speed is adjustable and steady. The actual speed reading is incorrect, erratic, or zero.</p>	<p>1. Check for loose or faulty connections on leads #510, #525, and #555 between the tach board and the control PC board.</p>	<p>1. Check to make sure the slotted disc in the tach housing is secure and aligned.</p> <p>2. Perform the <b>Tach Board Feedback Test</b>.</p> <p>3. If the <b>Tach Board Feedback Test</b> is OK, the control PC board may be faulty. Replace.</p>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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## TROUBLESHOOTING GUIDE

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>The SET speed is erratic or not adjustable over entire range of control. The actual speed is also erratic like the SET speed.</p>	<p>1. Check for loose or faulty connections on leads #631, #632, and #633 between the speed control potentiometer (R2) and the control PC board.</p>	<p>1. Remove power to the LN-9 and disconnect the plug to the control PC board. Check the resistance of the speed control potentiometer (R2). When measured from the wiper (lead #632) to lead #633, the resistance should vary smoothly from 0 to 10,000 ohms, when the shaft is rotated. See the Wiring Diagram.</p> <p>2. The control PC board may be faulty. Replace.</p>
<p>The wire continues to feed with the gun trigger open, and the wire is electrically "hot." The interlock switch is in the "OFF" position.</p>	<p>1. Disconnect the gun trigger cable. If the problem is resolved, the gun trigger or cable is faulty. Repair or replace.</p>	<p>1. Disconnect lead #530 from the trigger board. See the Wiring Diagram. If the problem is resolved, the trigger board is faulty. Replace.</p> <p>2. Relay 1CR may be stuck closed. Check or replace.</p> <p>3. The power PC board may be faulty. Replace.</p>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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## TROUBLESHOOTING GUIDE

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>TRIGGER INTERLOCK FUNCTION PROBLEMS</b>		
The wire feeds when the interlock switch is in the "ON" position. No welding or gun trigger activation.	1. Check to see if the reed switch 2CR is stuck closed.	1. Check the 2CR reed switch for sticking and associated leads (#529 and #628) for shorts.  2. The power PC board may be faulty. Replace.
With the interlock switch in the "ON" position, the wire feed stops when the gun trigger is released.	1. Check leads #529 and #628 for loose or faulty connections between the 2CR reed switch and the power PC board.	1. The 2CR reed switch may be faulty. Check to see if it closes when welding.  2. Check the continuity (zero ohms) of leads #529 and #628 from the 2CR reed switch to the power PC board. Also check continuity of leads #530 and #522 from the power PC board to the interlock switch. See the Wiring Diagram.  3. Check the interlock switch for proper operation.  4. The power PC board may be faulty. Replace.

⚠ 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 216-383-2531 or 1-800-833-9353.

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## TROUBLESHOOTING GUIDE

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>The SET voltage is erratic or not adjustable over the entire range of control. The actual voltage is also erratic like the SET voltage.</p>	<p>1. Check for loose or faulty connections on leads #634, #635 and #636 between the voltage control potentiometer (R3) and the voltage PC board.</p>	<p>1. Remove power to the LN-9 and disconnect Plug J1 from the voltage PC board. Check the resistance of the voltage control potentiometer (R3). When measured from the wiper (lead #635) to lead #634, the resistance should vary smoothly from 0 to 10,000 ohms when the shaft is rotated.</p> <p>2. The voltage PC board may be faulty. Replace.</p>
<p>The field fuse (F101), located on the power PC board, repeatedly fails.</p>	<p>1. Very rapid and repetitive gun triggering can possibly cause the field fuse to fail.</p>	<p>1. Perform the <i>T1 Transformer Test</i>.</p> <p>2. Perform the <i>Wire Drive Motor Test</i>.</p> <p>3. Disconnect the meter board. If the problem is resolved, the meter board may be faulty.</p> <p>4. The power PC board may be faulty. Replace.</p>

⚠ **CAUTION**

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>Circuit breaker (5 amp) repeatedly trips when the gun trigger is activated.</p>	<ol style="list-style-type: none"> <li>1. Check or replace gun trigger and leads. Make sure the trigger leads are not shorted to the electrode or work cables.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disconnect lead #500 from the trigger board. If the breaker still trips when the gun trigger is activated, the trigger board may be faulty. Replace</li> <li>2. Disconnect any accessory that may be connected to terminals #7 and #32A. See the Wiring Diagram. If the problem is resolved, the accessory may be faulty. Replace.</li> <li>3. Perform the <b>Wire Drive Motor Test</b>.</li> <li>4. The power PC board may be faulty. Replace.</li> </ol>
<p>Circuit breaker (5 amp) trips when power is applied to the LN-9. Gun trigger is NOT activated.</p>	<ol style="list-style-type: none"> <li>1. Disconnect any kits that may be incorporated in the LN-9 (K202, K319, etc.). Be sure to install any necessary jumper plugs. If the problem is resolved, the fault may be in the disconnected kit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disconnect lead #620 from trigger board. See the Wiring Diagram. If the problem is resolved, the trigger board may be faulty. Replace.</li> <li>2. Perform the <b>T2 Transformer Test</b>.</li> <li>3. Check the harness leads #32A, #31, and #531 for shorts or grounds. See the Wiring Diagram.</li> <li>4. The power PC board may be faulty. Replace.</li> </ol>

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## TROUBLESHOOTING GUIDE

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>The 1/8 amp fuse on the voltage PC board repeatedly fails.</p>	<p>1. Check to make sure the PC boards are NOT grounded to the case of the LN-9. This can happen due to metallic wire shavings build-up.</p>	<p>1. Remove input power to the LN-9. Replace the 1/8 amp fuse and switch the LN-9 polarity switch to the "NEG" position.</p> <p>Make a resistance check from the following leads to the LN-9 case grounding screw: Lead # 500, 510, 525, 522, 526, 530, and 628.</p> <p>The resistances should be above 1000 ohms. If any test is below 1000 ohms, that circuit has low resistance to case ground. Isolate the faulty leads or PC board. See the Wiring Diagram and Schematic.</p>

**⚠ 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 216-383-2531 or 1-800-833-9353.

LN-9 Wire Feeder



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# TROUBLESHOOTING & REPAIR

## TROUBLESHOOTING GUIDE

Observe Safety Guidelines  
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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
<p>The LN-9 shuts down while welding. Upon retriggering, the gun the unit will weld again for a period of time.</p>	<ol style="list-style-type: none"> <li>1. Make sure the power source and wire feeder polarity switches are set correctly for the process being used.</li> <li>2. Make certain the voltage control switch on the Lincoln CV power source is set in the "Remote" position.</li> <li>3. Make sure the #21 lead in the control cable has continuity to the work piece.</li> <li>4. Check the 1/8 amp fuse on the LN-9 voltage PC board. Replace if faulty.</li> <li>5. Be sure the welding power source is compatible with the LN-9 and operating properly. Make sure duty cycle of power source is not being exceeded.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform <b><i>Out of Voltage Range Shutdown Test</i></b>.</li> <li>2. The control cable may be faulty. Check or replace.</li> <li>3. The voltage PC board may be faulty. Replace.</li> </ol>

**⚠ 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 216-383-2531 or 1-800-833-9353.

LN-9 Wire Feeder



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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FEEDING PROBLEMS</b>		
When the gun trigger is activated the drive rolls turn, but the wire will not feed or wire feeding is rough.	<ol style="list-style-type: none"> <li>1. Check or replace the gun cable. It may be kinked, clogged, or twisted.</li> <li>2. Make certain the drive rolls and guide tubes are correct for the wire being used.</li> <li>3. Check or replace the gun contact tip.</li> <li>4. The electrode wire may be rusty or dirty. Replace if necessary.</li> </ol>	<ol style="list-style-type: none"> <li>1. If conditions are extremely dirty, install a wiper on the wire before it enters the guide tube. Use a piece of cloth saturated with "Pyroil B."</li> </ol>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>WELDING PROBLEMS</b>		
The welding arc is variable or "hunting."	<ol style="list-style-type: none"> <li>1. Make sure the welding parameters are correct for the welding procedure being used.</li> <li>2. Check the welding cables for loose or faulty connections.</li> <li>3. The gun cable may be faulty. Check or replace.</li> <li>4. Check cable liner for proper size.</li> <li>5. The gun contact tip may be worn. Check or replace.</li> <li>6. The welding power supply may be faulty. Check or replace.</li> </ol>	<ol style="list-style-type: none"> <li>1. Put the power source in "Machine Control" for voltage, and check if welding performance improves. If the problem is resolved, check or replace the control cable. Or, the LN-9 voltage PC board may be faulty.</li> <li>2. Perform the <b>Wire Drive Motor Test</b>.</li> </ol>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>WELDING PROBLEMS</b>		
<p>Poor arc striking with sticking or "blast offs." The weld bead may also be ropey and display weld porosity.</p>	<ol style="list-style-type: none"> <li>1. Make sure the welding parameters and techniques are correct for the welding procedure being used.</li> <li>2. Check the welding cables for loose or faulty connections.</li> <li>3. The gun cable may be faulty. Check or replace.</li> <li>4. The gun contact tip may be worn. Check or replace.</li> <li>5. The welding power source may be faulty. Check or replace.</li> </ol>	<ol style="list-style-type: none"> <li>1. Jumper the "BYPASS" terminals on the voltage PC board.</li> <li>2. Put the power source in "Machine Control" and check if welding performance improves. If the problem is resolved, check or replace the control cable. Or, the LN-9 voltage PC board may be faulty.</li> </ol>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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# TROUBLESHOOTING & REPAIR

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>METER FUNCTION PROBLEMS</b>		
The SET and actual speed meter readings match within a few IPM, but both are in error.	1. Contact your local Lincoln Authorized Field Service Facility.	1. Check to make sure the slotted disc in the tach housing is secure and aligned. 2. Perform the <b><i>Meter Circuit Accuracy Test.</i></b> 3. The control board may be faulty. Replace.
SET speed and actual speed meter readings do NOT match within a few IPM. One or both readings may be erratic.	1. Contact your local Lincoln Authorized Field Service Facility.	1. Check the Volts - Speed meter selector switch and the associated wiring. See the Wiring Diagram. 2. Check the SET - Actual switch and the associated wiring. See the Wiring Diagram. 3. Perform the <b><i>Meter Circuit Accuracy Test.</i></b>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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Observe Safety Guidelines  
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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>METER FUNCTION PROBLEMS</b>		
<p>SET volts and actual volts readings match within a few tenths of a volt while welding. However, both readings are inaccurate.</p>	<ol style="list-style-type: none"> <li>Put the Lincoln power source in the "Machine Control" mode. Check to see if the power source can be set for the arc voltage required for the process. If not, the power source may be faulty.</li> <li>The control cable may be faulty. Check or replace.</li> </ol>	<ol style="list-style-type: none"> <li>Check the voltage sensing leads for continuity (zero ohms). Lead #21 should have continuity to the work piece, and lead #67 should have continuity to the brass conductor block. See the Wiring Diagram.</li> <li>Perform the <b>Meter Circuit Accuracy Test</b>.</li> <li>The voltage board may be faulty. Replace.</li> </ol>
<p>The actual volts reading does NOT match the SET volts reading within a few tenths of a volt while welding. One reading may be erratic. The LN-9 does NOT shut off.</p> <p>NOTE: Pulse Power Filter kit may slow down the shutdown feature.</p>	<ol style="list-style-type: none"> <li>Make sure the shutdown "BYPASS" pins are NOT jumpered together on the LN-9 voltage PC board.</li> <li>Check the voltage sensing leads for continuity (zero ohms). Lead #21 should have continuity to the work piece, and lead #67 should have continuity to the brass conductor block. See the Wiring Diagram.</li> <li>Put the Lincoln power source in the "Machine Control" mode. Check to see if the power source can be set for the arc voltage required for the process. If not, the power source may be faulty.</li> </ol>	<ol style="list-style-type: none"> <li>If the actual reading is the problem, check the actual volts switch and associated leads.</li> <li>If the SET reading is the problem, check the set volts switch and the associated leads.</li> <li>Check the Volts - Speed selector switch and associated leads.</li> <li>The voltage PC board may be faulty. Replace.</li> </ol>

⚠ **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 216-383-2531 or 1-800-833-9353.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>STARTING PROBLEMS</b>		
<p>The output voltage is too low to start the weld.</p>	<ol style="list-style-type: none"> <li>1. Check the welding cables for loose or faulty connections.</li> <li>2. Put the Lincoln power source in the "Machine Control" mode. Jumper the "BYPASS" pins on the LN-9 voltage PC board. Adjust the weld voltage from the power source for the process being used. If the correct voltage cannot be set, the power source may be faulty.</li> <li>3. Check for correct control cable connections to the power source.</li> <li>4. The control cable may be faulty. Check or replace.</li> <li>5. The start trimmer on the LN-9 voltage PC board may be set too low. See <b>Starting Characteristics</b> in the <b>Operation</b> section of this manual.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the voltage control potentiometer (R3) and the associated leads. See the Wiring Diagram.</li> <li>2. The voltage PC board may be faulty. Replace.</li> </ol>

⚠ **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 216-383-2531 or 1-800-833-9353.

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PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>STARTING PROBLEMS</b>		
<p>Voltage seems to be too high or the arc flares at the start of weld. Welding is good.</p>	<ol style="list-style-type: none"> <li>1. Adjust the "start" trimmer on the voltage PC board. It should be only slightly higher than the weld voltage. See <b>Starting Characteristics</b> in the <b>Operation</b> section of this manual.</li> <li>2. Put the Lincoln power source in the "Machine Control" mode. Jumper the "BYPASS" pins on the LN-9 voltage PC board. Adjust the weld voltage from the power source for the process being used. If the correct voltage cannot be set, the power source may be faulty.</li> <li>3. Check for correct control cable connections to the power source.</li> </ol>	<ol style="list-style-type: none"> <li>1. The LN-9 voltage PC board may be faulty. Replace.</li> </ol>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>STARTING PROBLEMS</b>		
<p>The arc voltage appears to rise too slowly or stubs or blasts at the start of a weld. Once started the welding is good.</p> <p>NOTE: Pulse Power 500 operation with a filter kit may exhibit these symptoms.</p>	<ol style="list-style-type: none"> <li>1. Check the welding cables for loose or faulty connections.</li> <li>2. Adjust the "start" trimmer on the voltage PC board. It should be slightly higher than the weld voltage. See <b>Starting Characteristics</b> in the <b>Operation</b> section of this manual.</li> <li>3. Put the Lincoln power source in the "Machine Control" mode. Jumper the "BYPASS" pins on the LN-9 voltage PC board. Adjust the weld voltage from the power source for the process being used. If the symptoms persist, the power source may be faulty.</li> <li>4. Check for correct control cable connections to the power source.</li> </ol>	<ol style="list-style-type: none"> <li>1. If a start board is used in the LN-9, change the jumper to position "A." If the problem is solved, the start board may be faulty. Replace.</li> <li>2. The voltage PC board may be faulty. Replace.</li> </ol>

**⚠ 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 216-383-2531 or 1-800-833-9353.

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# TROUBLESHOOTING & REPAIR

## T1 TRANSFORMER TEST

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

---

### **DESCRIPTION**

This test will aid the technician in determining if the T1 transformer is functioning.

### **MATERIALS NEEDED**

- 115VAC power supply
- Phillips head screw driver
- Volt/ohmmeter (multimeter)

LN-9 Wire Feeder



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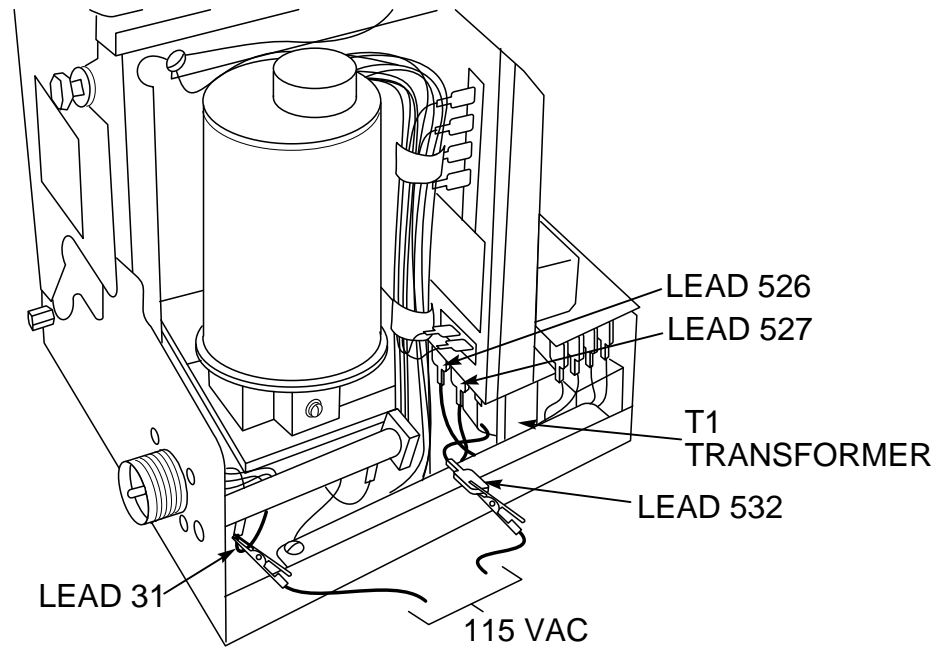
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# TROUBLESHOOTING & REPAIR

## T1 TRANSFORMER TEST (*continued*)

FIGURE F.1 – LEAD #532 AT POWER PC BOARD



### TEST PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Using the phillips head screw driver, remove the screws holding the left side cover assembly.
3. Disconnect lead #532 from the power PC board terminal. See Figure F.1.
4. Apply power (115VAC) to the T1 transformer primary leads #31 and #532. See Figure F.1 and the Wiring Diagram.
5. Using the volt-ohmmeter, check for 28VAC at secondary leads #526 and #527. See Figure F.1. Place the meter probes where the leads attach to the power PC board terminals.

### **⚠ WARNING**

Electric Shock can kill.



- With power applied, there are high voltages inside the wire feeder. Do not reach into the wire feeder or touch any internal part of the wire feeder while power is applied.

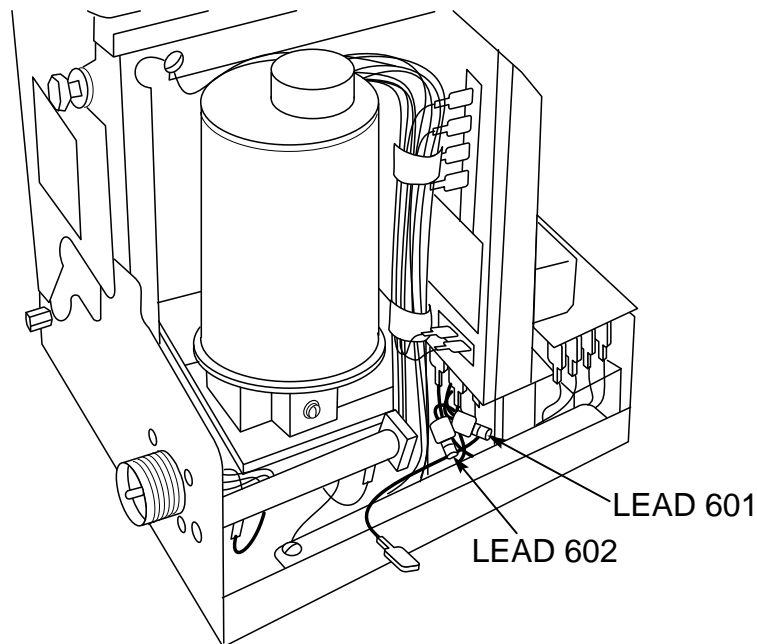
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## T1 TRANSFORMER TEST (*continued*)

FIGURE F.2 – SECONDARY LEADS #601 AND #602 AT LEAD SPLICES



- Using the volt/ohmmeter, check for 10VAC at secondary leads #601 and #602. Typically, these leads are yellow. Place the probes at the lead spllices. See Figure F.2.
- With 115VAC applied to the primary leads #532 and #31, if either or both of the secondary voltages are missing or low the T1 transformer may be faulty. Replace the transformer.
- After the test is completed, disconnect the 115VAC from the T1 transformer primary leads. Reconnect lead #532 to the power PC board terminal. Close the left side cover assembly and re-assemble the screws.

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## T2 TRANSFORMER TEST

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

---

### DESCRIPTION

This test will aid the technician in determining if the T2 transformer is functioning.

### MATERIALS NEEDED

115VAC power supply  
Phillips head screw driver  
Volt/ohmmeter (multimeter)

LN-9 Wire Feeder

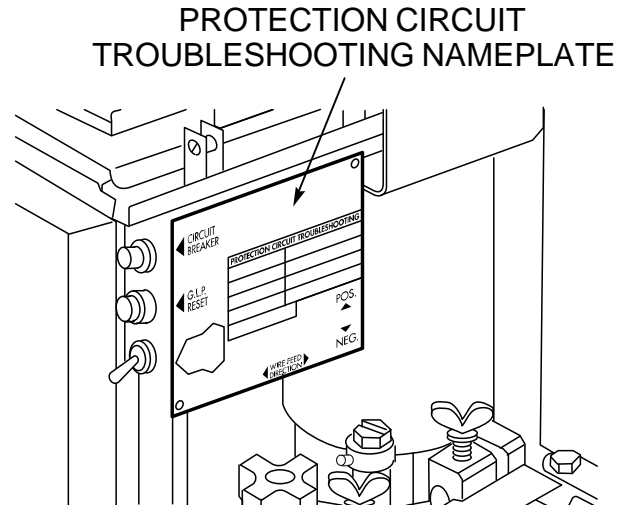


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# TROUBLESHOOTING & REPAIR

## T2 TRANSFORMER TEST *(continued)*

FIGURE F.3 – “PROTECTION CIRCUIT TROUBLESHOOTING” NAMEPLATE



### TEST PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Using the phillips head screw driver, remove the screws holding the left side cover assembly.
3. Lift the right side cover assembly.
4. Using the Phillips head screw driver, remove the two screws from the "protection circuit troubleshooting" name plate. Remove the nameplate as far as the lead length will allow. See Figure F.3.

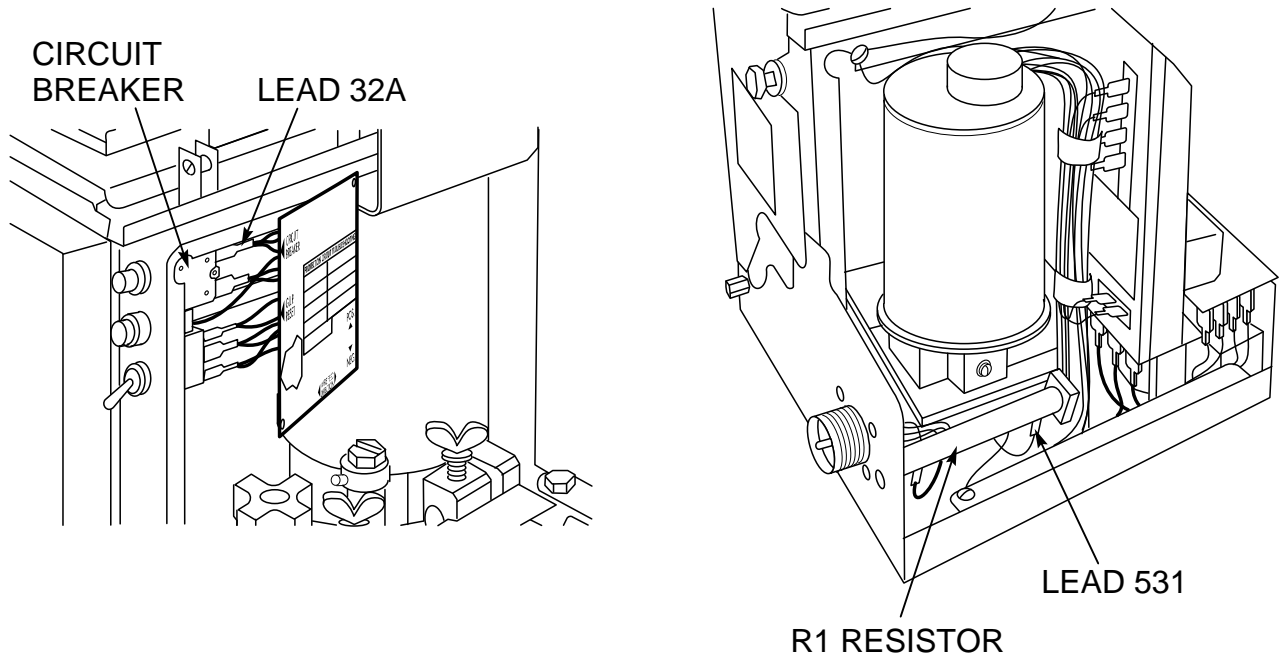
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## T2 TRANSFORMER TEST (continued)

FIGURE F.4 – T2 PRIMARY LEADS #32A AT 5 AMP CIRCUIT BREAKER AND #531 AT R1 RESISTOR

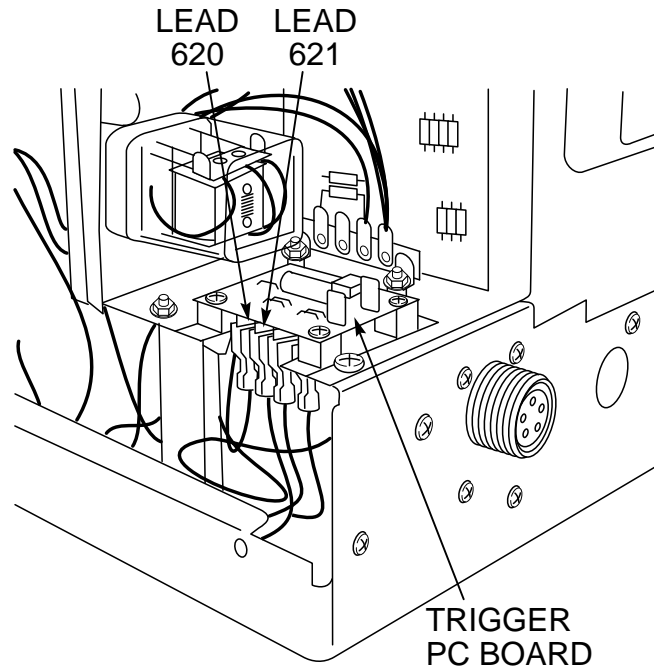


4. Locate the T2 transformer primary lead #32A connected to the 5 amp circuit breaker. Remove lead #32A from the circuit breaker. See Figure F.4 and the Wiring Diagram.
5. Lift the left side cover assembly.
6. Locate T2 transformer primary lead #531 connected to the R1 2-ohm resistor. See the Wiring Diagram. See Figure F.4.

# TROUBLESHOOTING & REPAIR

## T2 TRANSFORMER TEST (*continued*)

FIGURE F.5 – T2 SECONDARY LEADS #621 AND #620 ON TRIGGER PC BOARD



### **⚠ WARNING**

Electric Shock can kill.



- With power applied, there are high voltages inside the wire feeder. Do not reach into the wire feeder or touch any internal part of the wire feeder while power is applied.

7. Insulate the T2 transformer primary leads #531 and #32A and apply 115 VAC power. See the Wiring Diagram and **Figure F.4**.

- Using the volt/ohmmeter, check for approximately 24VAC at the T2 transformer secondary leads #621 and #620. Place the probes where the leads connect on the trigger PC board. See Figure F.5.
- With 115VAC applied to the primary leads #531 and #32A, if the secondary voltage is missing or low the T2 transformer may be faulty. Replace the T2 transformer.
- After the test is completed, disconnect the 115VAC from the T2 transformer primary leads #531 and #32A. Reconnect lead #32 to the circuit breaker. Re-attach the Protection Circuit Troubleshooting nameplate. Close the right and left side cover assemblies and replace all previously removed screws.

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## WIRE DRIVE MOTOR AND TACH FEEDBACK TEST

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

### **DESCRIPTION**

This test will help determine if the drive motor and tach feedback are functioning properly.

### **MATERIALS NEEDED**

Phillips head screw driver  
Analog volt/ohmmeter (multimeter)

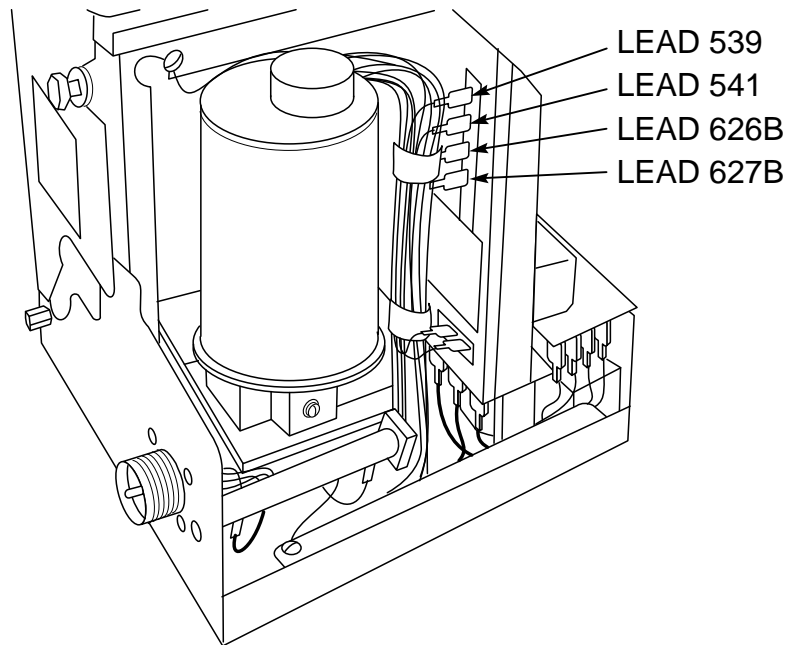
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## WIRE DRIVE MOTOR AND TACH FEEDBACK TEST (*continued*)

FIGURE F.6 – LEAD #539, #541, #626B AND #627B AT POWER PC BOARD TERMINAL STRIP



### TEST PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Remove any electrode wire or disengage the drive rolls.
3. Using the phillips head screw driver, remove the screws from the left side cover assembly.
4. Lift the left side cover assembly.
5. Locate leads #539, #541, #626B and #627B at the power PC board terminal strip. See Figure F.6.

LN-9 Wire Feeder



# INSTALLATION

## WIRE DRIVE MOTOR AND TACH FEEDBACK TEST *(continued)*

6. Apply 115 VAC power.

### **⚠ WARNING**

**ELECTRIC SHOCK can kill.**



- With power applied, there are high voltages inside the wire feeder. Do not reach into the wire feeder or touch any internal part of the wire feeder while power is applied.

7. With the gun trigger activated or the gun terminals jumpered together (see the Wiring Diagram), check the motor armature volts at leads #541(+) and #539(-). Normal is 5 to 95VDC depending on the wire feed speed setting. As the armature voltage is increased the wire feed speed should increase.

8. With the LN-9 at idle (gun trigger NOT activated), check the motor field voltage at leads #626 and #627. Normal is 115VDC. When the gun trigger is activated or the gun terminals are jumpered together (see the Wiring Diagram), the field voltage polarity should reverse from the idle state. Normal is 115VDC, independent of motor speed.

9. If the above voltages are present and the motor does not operate, the motor, motor brushes or gear box may be faulty.

If the armature or field voltages are missing or not correct, the power board or 1CR relay may be faulty.

If the motor is running at high speed and the armature voltage is high and uncontrollable, proceed with the ***Tach Feedback Test***.

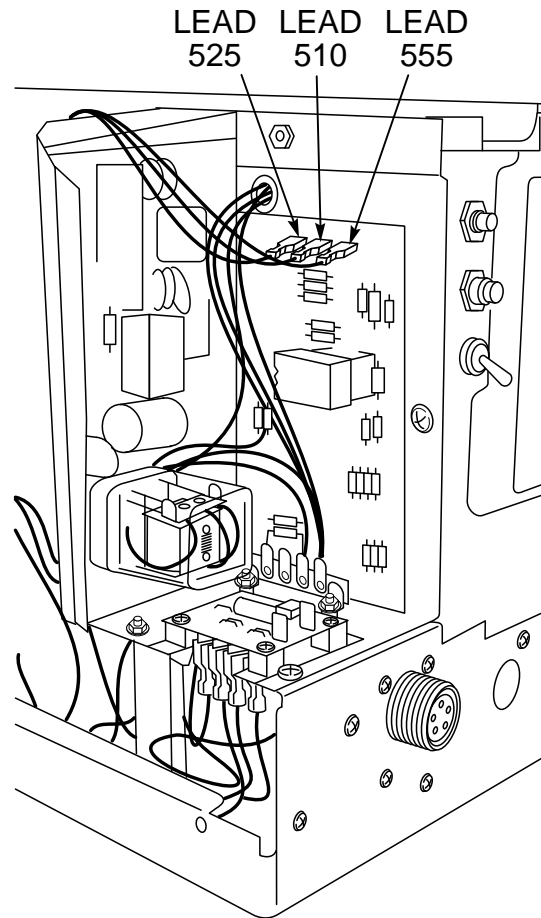
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## WIRE DRIVE MOTOR AND TACH FEEDBACK TEST (*continued*)

FIGURE F.7 – LEADS #525, #510, #555 ON CONTROL PC BOARD



### TACH FEEDBACK TEST PROCEDURE

1. Locate tach PC board leads #510, #525 and #555 on the control PC board. See Figure F.7.
2. Check leads #525(+) to #510(-) for the presence of 15VDC. This is the supply voltage from the control PC board to the tach PC board. If the voltage is present, proceed to the next step. If the voltage is missing, check the wiring and perform the **General Power Supply Test**.
3. With gun trigger activated or the gun terminals jumpered together (see the Wiring Diagram), check leads #555(+) to #510(-) for the presence of between 4.5 - 10.5VDC. (The motor must be running). This is the feedback voltage from the tach PC board to the control PC board. This voltage is dependent upon motor speed.

If the feedback voltage is missing or does not vary with motor speed, the tach PC board may be faulty.

4. After the wire drive motor and tach feedback tests are completed, remove the jumper from the gun terminals (if used) and close the left case side cover assembly and re-attach the screws.

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## VOLTMETER ACCURACY TEST

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### DESCRIPTION

This test will help determine if the LN-9 voltmeter is providing accurate readings.

### MATERIALS NEEDED

- Phillips head screw driver
- Digital volt/ohmmeter (multimeter) with at least 3-1/2 digits and +/-0.5% accuracy

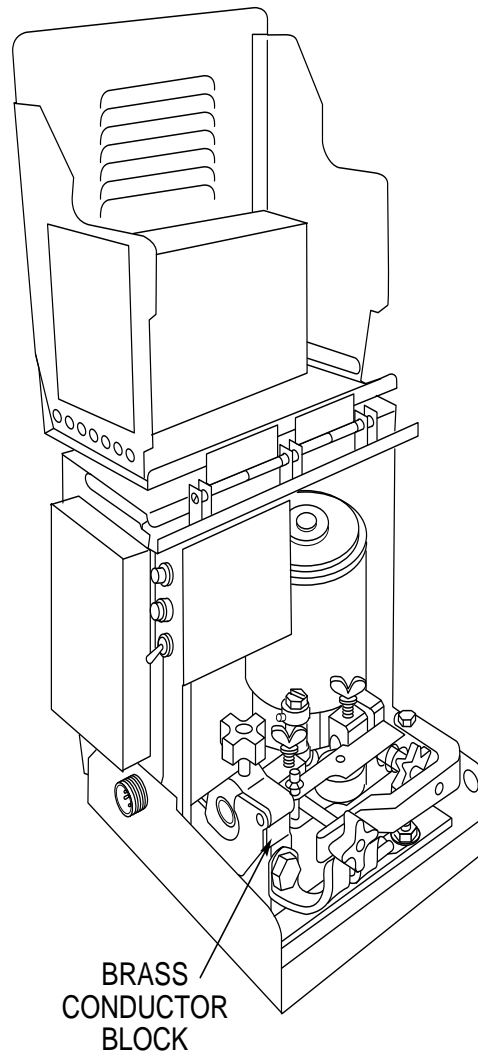
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## VOLTMETER ACCURACY TEST (*continued*)

FIGURE F.8 – VOLTMETER CONNECTION POINT



### TEST PROCEDURE

Perform the following checks with the LN-9 wire feeder connected to a Lincoln CV welding power source according to the proper connection diagram. (See the **Installation** section of this manual.)

See Figure F.8 for this test.

1. Lift the right side cover assembly.
2. Connect the test meter (see Materials Needed) between the brass conductor block on the wire feeder and the work piece.

LN-9 Wire Feeder



VOLTMETER ACCURACY TEST (*continued*)**⚠ WARNING****ELECTRIC SHOCK can kill.**

- With power applied, there are high voltages inside the wire feeder. Do not reach into the wire feeder or touch any internal part of the wire feeder while power is applied.

3. With the LN-9 gun trigger closed or the gun terminals jumpered together (see the Wiring Diagram), the test meter reading should match the LN-9 ACTUAL volts reading within +/- 0.5 volts. If it does not, check the integrity and placement of the voltage sensing leads #21 and #67. Perform the **Meter Circuit Accuracy Test**.
4. Remove the test voltmeter and, while welding, compare the SET volts and ACTUAL volts meter readings. Depending upon the arc voltage characteristics of the welding process being used, the ACTUAL reading may vary somewhat around an average value. The average ACTUAL reading should match the SET reading within +/- 0.5 volts. If not, refer to the **Meter Circuit Accuracy Test**.
5. If no further tests are required, remove the jumper from the gun terminals (if used) and close the left case side cover assembly.

LN-9 Wire Feeder



## METER CIRCUIT ACCURACY TEST

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### DESCRIPTION

This test will help determine if the LN-9 meter circuit is functioning properly.

### MATERIALS NEEDED

- Phillips head screw driver
- Digital volt/ohmmeter (multimeter) with at least 3-1/2 digits and  $\pm 0.5\%$  accuracy
- Slot head screw driver
- 3/8" Nut driver

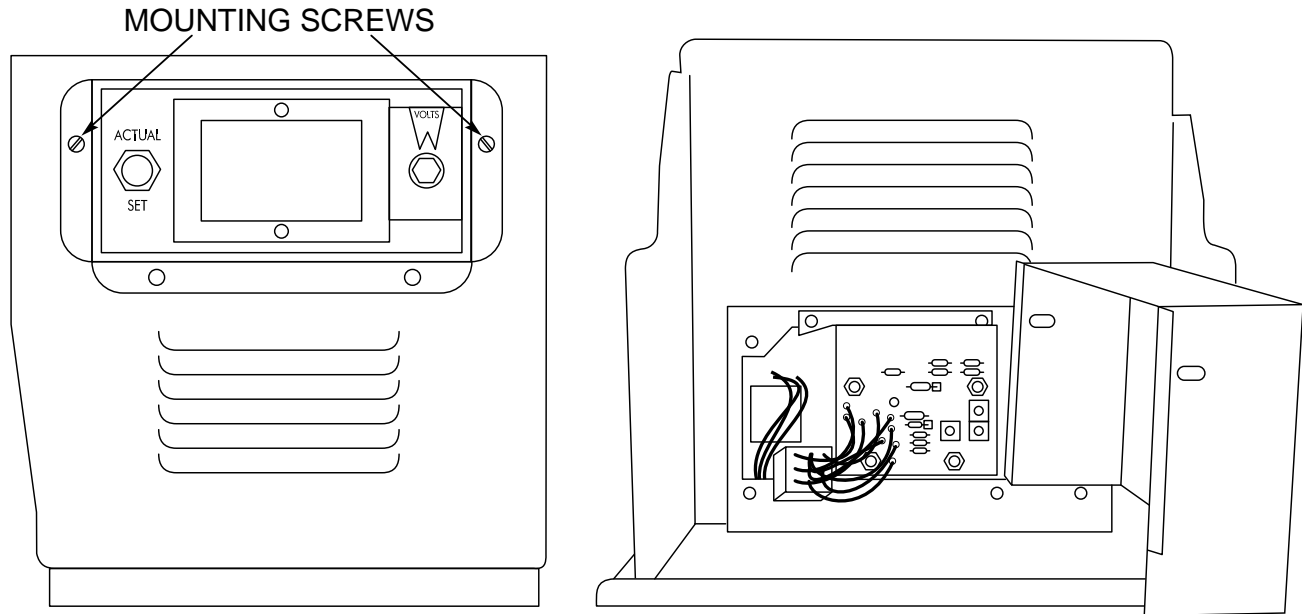
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## METER CIRCUIT ACCURACY TEST *(continued)*

FIGURE F.9 – METER PC BOARD LOCATIONS AND COVER



### TEST PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Lift the right side cover assembly and remove the two screws holding the meter cover to the right side assembly. Carefully remove the meter cover. See Figure F.9.
3. Locate and gain access to the meter PC board. See Figure F.9.
4. Apply input power to the wire feeder.

### **⚠ WARNING**

**ELECTRIC SHOCK can kill.**



- With power applied, there are high voltages inside the wire feeder. Do not reach into the wire feeder or touch any internal part of the wire feeder while power is applied.

LN-9 Wire Feeder

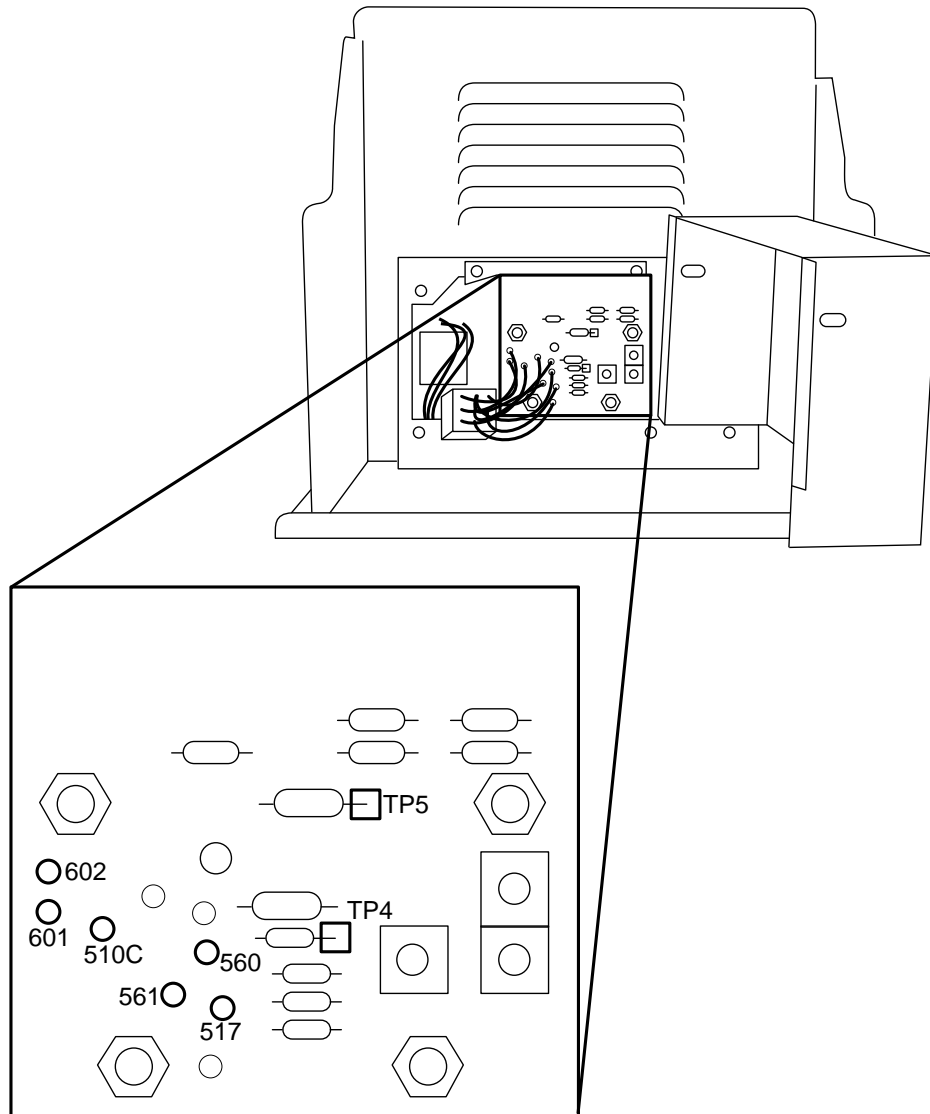




# TROUBLESHOOTING & REPAIR

## METER CIRCUIT ACCURACY TEST (continued)

FIGURE F.10 – METER PC BOARD TEST POINTS



5. Test for AC supply to the meter PC board.  
Check for 8 to 11 VAC from lead #601 to #602. See Figure F.10.  
  
Note: The coating will have to be removed from the test points.
6. Test for DC volts on the meter PC board.  
Check for 4.75 to 5.25 VDC from TP5 to lead #510C. See Figure F.10.  
  
**NOTE:** The coating will have to be removed from the test points.

If the display is NOT lit and the correct DC voltage is present at TP5 to lead #510C, the digital meter may be faulty. Replace the digital meter.

If AC voltage IS present at leads #601 to #602 and the DC voltage is missing, the meter PC board may be faulty.

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## METER CIRCUIT ACCURACY TEST *(continued)*

**Test Digital Meter Accuracy.** (For LN-9 models above code 7980 with separable digital meter and meter boards only).

1. Use a test meter with at least 3-1/2 digits and +/- .5% accuracy.
2. Connect the + probe to TP4 and the - probe to lead #510C.

NOTE: The coating will have to be removed from the test points.

3. With the meter in SET volts, adjust the voltage control until the test meter matches the settings in the table below.

If the LN-9 digital meter does not match the readings, the LN-9 digital meter may be faulty. Replace the digital meter.

LN-9 SET VOLTS READING	TEST VOLTMETER READING
15.0 V	.150 +/- .004 VDC
30.0 V	.300 +/- .004 VDC
60.0 V	.600 +/- .006 VDC

**Test Meter PC Board Accuracy.** (All Models)

1. Use a test meter with at least 3-1/2 digits and +/- .5% accuracy.
2. Connect the + probe to leads #517 and the - probe to lead #510C.

NOTE: The coating will have to be removed from the test points.

3. With the meter in SET volts, adjust the voltage control until the LN-9 meter matches the settings in the table below.

If the test meter does not match the readings, the meter PC board may be faulty. Replace the meter PC board.

LN-9 SET VOLTS READING	TEST VOLTMETER READING
15.0 V	1.50 +/- .05 VDC
30.0 V	3.00 +/- .05 VDC
60.0 V	6.00 +/- .07 VDC

**Test Meter PC Board Accuracy.** (For LN9-H, LN-9FH Models Only)

1. Use a test meter with at least 3-1/2 digits and +/- .5% accuracy.
2. Connect the + probe to lead #519 and the - probe to lead #510C.

NOTE: The coating will have to be removed from the test points.

3. With the meter in SET IN/MIN, adjust the speed control until the LN-9 meter matches the settings in the table below. If the test meter does not match the readings, the meter PC board may be faulty. Replace the meter PC board.

LN-9 SET IN/MIN READING	TEST VOLTMETER READING
082 IPM	0.50 +/- .05 VDC
49 IPM	3.00 +/- .05 VDC
978 IPM	6.00 +/- .07 VDC

# TROUBLESHOOTING & REPAIR

## METER CIRCUIT ACCURACY TEST *(continued)*

**Test Meter PC Board Accuracy.** (Metric Models Only)

1. Use a test meter with at least 3-1/2 digits and +/- .5% accuracy.
2. Connect the + probe to lead called for in the table below and the - probe to lead #510C.

NOTE: The coating will have to be removed from the test points.

3. With the meter in SET M/MIN, adjust the speed control until the LN-9 meter matches the settings in the table below. If the test meter does not match the readings, the meter PC board may be faulty. Replace the meter PC board.

METRIC MODEL	METRIC RANGE	SET M/MIN READING	TEST VOLTMETER READING
LN-9 or LN-9F	LO	8.89	LEAD #560 3.50 +/- .05VDC
	HI	15.2	LEAD #561 6.00 +/- .07VDC
LN-9H or LN-9FH	LO	8.28	LEAD #560 2.00 +/- .05VDC
	HI	24.8	LEAD #561 6.00 +/- .07VDC



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# TROUBLESHOOTING & REPAIR

## WIRE SPEED ACCURACY TEST

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### **DESCRIPTION**

This test will help determine if the LN-9 is providing the proper wire feed inches per revolution of the drive roll.

### **MATERIALS NEEDED**

- Phillips head screw driver
- Ruler or other linear measuring device

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## WIRE SPEED ACCURACY TEST *(continued)*

### TEST PROCEDURE

Perform the following checks with the LN-9 wire feeder connected to a Lincoln CV welding power source according to the proper connection diagram. (See the Installation section of this manual.)

#### A. Check for the proper wire feed inches per revolution of the drive roll.

1. Set the LN-9 wire speed control for between 50 and 120 IPM (1.27 to 3.17 M/MIN).
2. Measure the precise length of wire fed by exactly 10 revolutions of the drive rolls. This measured length should be 53.0 +/- .8 inches (1.35 +/- .02 meters). If not, there may be a problem with the wire or the wire feed path. See the ***Troubleshooting Guide (Feeding Problems)*** in this section of the manual. Also check for correct drive roll tension adjustment.

#### B. Check for the proper drive roll revolutions per minute.

1. Adjust the LN-9 wire speed control for the LN-9 actual speed meter readings given in the table below.
2. Compare the corresponding LN-9 drive roll RPM (counted revolutions in 60 seconds) and LN-9 SET speed meter readings with the table below. The numbers should match. If not, perform the ***Meter Circuit Accuracy Test***.

MODEL	ACTUAL SPEED METER READING		MEASURED DRIVE ROLL SPEED	SET SPEED METER READING	
	IN/MIN	M/MIN		IN/MIN	M/MIN
LN-9 or LN-9F	158 316	4.0 8.0	30 +/- 1/2 60 +/- 1	158 +/- 2 316 +/- 2	04.0 +/- .1 08.0 +/- .1
LN-9H or LN-9FH	161 322	4.1 8.2	30 +/- 1/2 60 +/- 1	161 +/- 3 322 +/- 3	04.1 +/- .1 08.2 +/- .1



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# TROUBLESHOOTING & REPAIR

## OUT OF VOLTAGE RANGE SHUT DOWN TEST

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### **DESCRIPTION**

This test will help determine if the out-of-voltage range shut down circuitry is functioning properly.

### **MATERIALS NEEDED**

- Phillips head screw driver
- Volt/ohmmeter (multimeter)
- Jumper wire

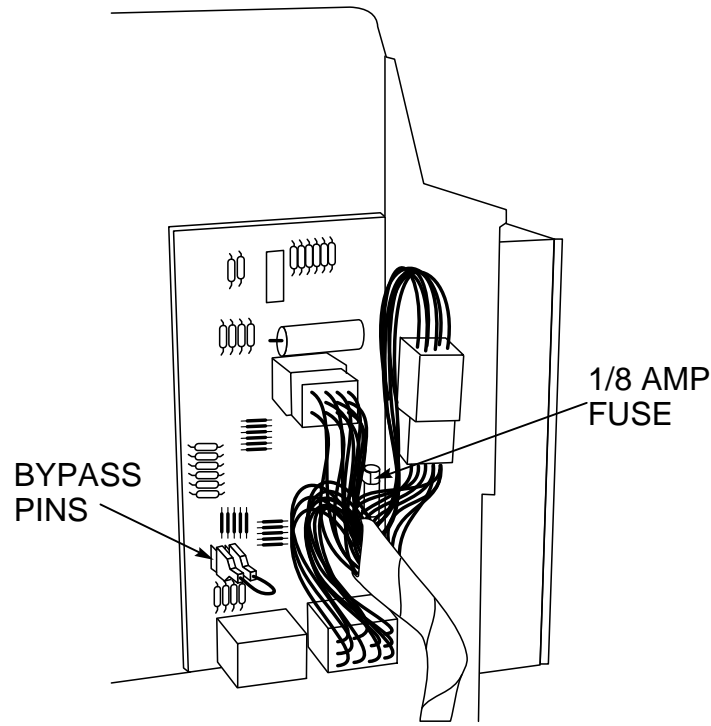
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## OUT OF VOLTAGE RANGE SHUT DOWN TEST (continued)

FIGURE F.11 – VOLTAGE PC BOARD WITH JUMPERS



### TEST PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Using the phillips head screw driver, remove the screws from the left side cover assembly.
3. Lift the left side cover assembly.
4. Locate the voltage PC board. Jumper together the "BYPASS" pins on the LN-9 voltage PC board. See Figure F.11. (On older voltage boards these pins may be labeled "B".) This should disable the shut down circuit.
5. Connect to a Lincoln Electric CV power source per connection diagram. See the **Installation** section of this manual.
6. Start welding and observe the ACTUAL voltage reading on the LN-9 digital meter. The actual voltage must match the SET voltage within +/- 0.5V. If it does NOT, the LN-9 is designed to shut down.
7. If the LN-9 continues to shut down with the "BYPASS" pins jumpered together, the voltage PC board may be faulty.

### **⚠ WARNING**

**ELECTRIC SHOCK can kill.**



- With power applied, there are high voltages inside the wire feeder. Do not reach into the wire feeder or touch any internal part of the wire feeder while power is applied.

LN-9 Wire Feeder



## TROUBLESHOOTING & REPAIR

### OUT OF VOLTAGE RANGE SHUT DOWN TEST *(continued)*

8. If the ACTUAL voltage reading is zero, the sensing leads may be faulty. Check the continuity (zero ohms) of leads #21 and #67. Lead #21 must have continuity to the work-piece, and #67 must have continuity to the electrode. Also check the 1/8 amp fuse on the voltage PC board.
9. Check the polarity switches in the LN-9 and the Lincoln power source and their associated leads. Set the switches to the same polarity as the electrode. See the Wiring Diagram.
10. If the ACTUAL voltage reading is different from the SET voltage reading, the power source may not be capable of producing the required arc voltage, the control cable may be faulty or misconnected, or the LN-9 voltage PC board may be faulty.
11. After all tests are complete, remove input power to the wire feeder and remove the jumper you placed on the "BYPASS" pins on the voltage PC board. Reattach the left case side cover assembly.

LN-9 Wire Feeder



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# TROUBLESHOOTING & REPAIR

## GENERAL POWER SUPPLY TESTS

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### DESCRIPTION

These tests will help determine if the power PC board is supplying the correct voltage to the control PC board and the voltage PC board.

### MATERIALS NEEDED

Phillips head screw driver  
Volt/ohmmeter (multimeter)

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## GENERAL POWER SUPPLY TESTS *(continued)*

### TEST PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Using the phillips head screw driver, remove the screws from the left side cover assembly.
3. Lift the left side cover assembly.
4. Locate the power PC board and the control PC board in the wire feeder main assembly; locate the voltage PC board in the left side cover.

5. Apply power (115VAC) to the wire feeder at the correct pins. See the Wiring Diagram.
6. Perform the power supply checks as described in the table below. If any of the readings are incorrect (out of range) or missing, the power PC board may be faulty.

**NOTE:** Do NOT unplug the Molex connector.

7. Also perform the ***T1 Transformer Test***.

### **⚠ WARNING**

**ELECTRIC SHOCK can kill.**



- With power applied, there are high voltages inside the wire feeder. Do not reach into the wire feeder or touch any internal part of the wire feeder while power is applied.

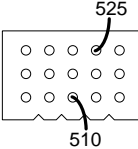
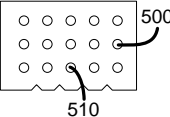
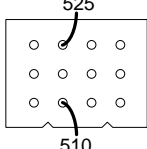
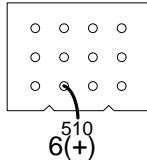
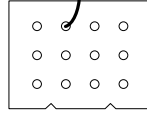
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## GENERAL POWER SUPPLY TESTS *(continued)*

### GENERAL POWER SUPPLY CHECKS

CHECKPOINT LOCATION	TEST DESCRIPTION	CONNECTOR PLUG PIN NO.	LEAD NO.	NORMAL ACCEPTABLE VOLTAGE READING
CONTROL P.C. BOARD CONNECTOR PLUG	CHECK +15VDC SUPPLY FROM POWER BOARD TO CONTROL BOARD	 10(+) 9(-)	525(+) 510(-)	13.5 - 15.5 VDC
CONTROL P.C. BOARD CONNECTOR PLUG	CHECK - 10 VDC SUPPLY FROM POWER BOARD TO CONTROL BOARD	 14(-) 9(+)	500(-) 510(+)	9.2 - 10.8 VDC
VOLTAGE P.C. BOARD UPPER CONNECTOR PLUG NEXT TO "F" AND "S" PINS	CHECK + 15 VDC SUPPLY FROM POWER BOARD TO VOLTAGE BOARD	 4(+) 6(-)	525(+) 510(-)	13.5 - 15.5 VDC
VOLTAGE P.C. BOARD UPPER CONNECTOR PLUG NEXT TO "F" AND "S" PINS  VOLTAGE P.C. BOARD LOWER CONNECTOR PLUG NEXT TO PLASTIC COVERED RELAY	CHECK - 10 VDC SUPPLY FROM POWER BOARD TO VOLTAGE BOARD	 6(+)   4(-)	510(+)  500(-)	9.2 - 10.8 VDC

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# TROUBLESHOOTING & REPAIR

## DIGITAL METER AND METER PC BOARD REMOVAL AND REPLACEMENT

### WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### DESCRIPTION

The following procedure will help the technician remove the digital meter and meter PC board for repair or replacement.

### MATERIALS NEEDED

- Slot head screw driver
- 5/16" nut driver
- Phillips head screw driver

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

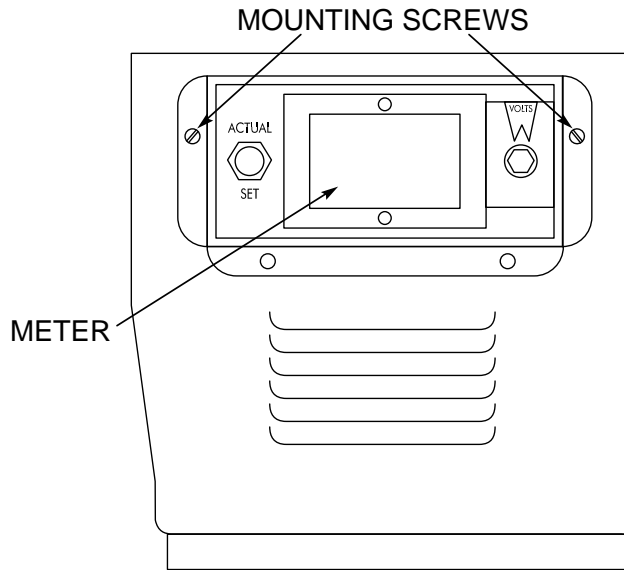
## DIGITAL METER AND METER PC BOARD REMOVAL AND REPLACEMENT *(continued)*

### METER PC BOARD REMOVAL PROCEDURE

1. Remove input power to the LN-9 wire feeder.

2. Locate and remove the two screws on the top left and right side of the meter panel assembly. See Figure F.12.

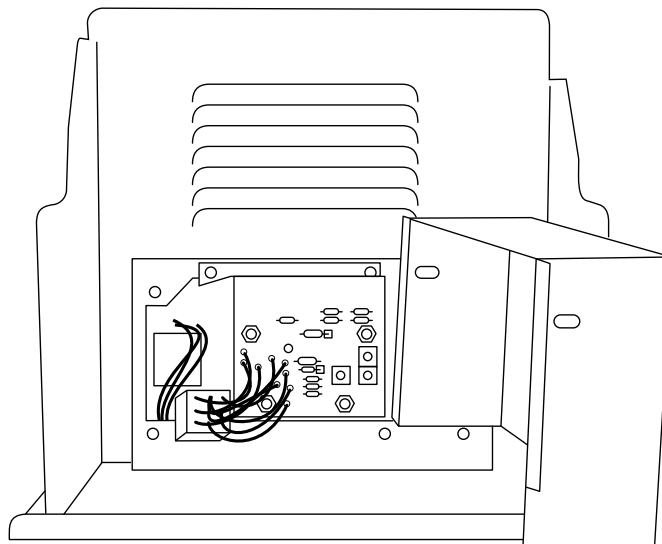
FIGURE F.12 – METER PANEL ASSEMBLY SCREWS



3. Lift the right side cover assembly.

4. Carefully remove the meter enclosure panel. Note the limited lead length. See Figure F.13.

FIGURE F.13 – METER REMOVAL (WITH SHORT LEADS)



LN-9 Wire Feeder



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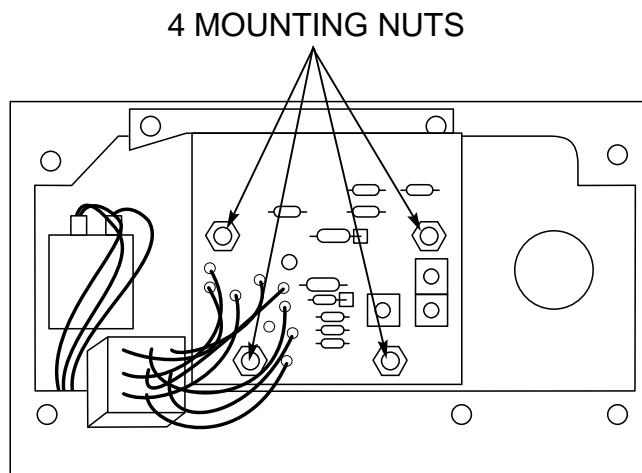
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# TROUBLESHOOTING & REPAIR

## DIGITAL METER AND METER PC BOARD REMOVAL AND REPLACEMENT *(continued)*

FIGURE F.14 – METER PC BOARD REMOVAL



5. Using the 5/16" nut driver, remove the four nuts mounting the meter PC board to the meter assembly. See Figure F.14.
6. Unplug the meter PC board from the wiring harness.
7. Remove the meter PC board. Note insulation placement for reassembly. Also be sure that the plug on the back of the board plugs into the prongs on the meter when you reassemble.

### DIGITAL METER REMOVAL PROCEDURE

1. Using the phillips head screw driver, remove the meter shield frame and bezel assembly.
2. With the 5/16" nut driver, remove the two nuts, screws, and lockwashers holding the digital meter to the cover assembly.
3. Carefully remove the digital meter.

### REPLACEMENT PROCEDURE

1. With the 5/16" nut driver, fasten the digital meter to the cover assembly with two screws, lockwashers and nuts.
2. Using the phillips head screw driver, reattach the meter shield frame and bezel assembly.
3. Position the insulation removed in step 7, above. Plug the digital meter into the meter PC board and into the wiring harness.
4. Mount the meter PC board onto the meter assembly with four nuts.
5. Install the meter enclosure panel using two screws at the top left and right of the meter panel assembly.

# TROUBLESHOOTING & REPAIR

## REED SWITCH (CR2) REMOVAL AND REPLACEMENT

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### DESCRIPTION

The following procedure will help the technician remove the reed switch for repair or replacement.

### MATERIALS NEEDED

3/4" Wrench  
Slot head screw driver  
11/32" wrench

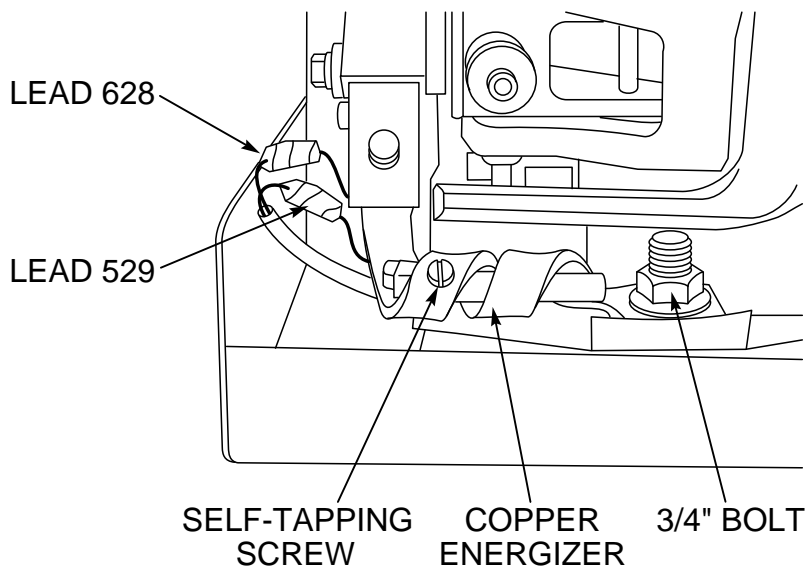
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## REED SWITCH (CR2) REMOVAL AND REPLACEMENT (*continued*)

FIGURE F.15 – CR2 REED SWITCH LOCATION AND COMPONENTS



### PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Lift the right side cover assembly.
3. Locate the CR2 reed switch. See Figure F-15.
4. With the 3/4" wrench, remove the bolt mounting the copper reed switch energizer to the conductor block. This step is optional, but it makes disassembly easier on 4-roll models.
5. Using the slot head screwdriver, remove the self-tapping screw holding the reed switch into the copper energizer.
6. Locate and untape the splices from leads #529 and #628 to the reed switch leads.
7. Using the slot head screw driver and 11/32" wrench, remove the screws and nuts from the lead splices. Note the position of the reed switch in the energizer for reassembly.
8. Carefully slide the reed switch assembly from the copper energizer.

### REPLACEMENT

9. Slide the reed switch into the energizer. Position it according to step 7.
10. With the slot head screw driver and the 11/32" wrench, connect the #529 and #628 lead splices with the screws and nuts. Tape the connections.
11. With the slot head screw driver, tighten the self-tapping screw that holds the reed switch to the copper energizer.
12. With the 3/4" wrench, mount the copper energizer to the conductor block.

LN-9 Wire Feeder





# TROUBLESHOOTING & REPAIR

## T1 TRANSFORMER REMOVAL AND REPLACEMENT

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

### **DESCRIPTION**

The following procedure will help the technician remove the T1 Transformer for repair or replacement.

### **MATERIALS NEEDED**

- Soldering iron
- Phillips head screw driver
- Slot head screw driver
- Needle nose pliers
- 5/16" wrench
- 11/32" wrench

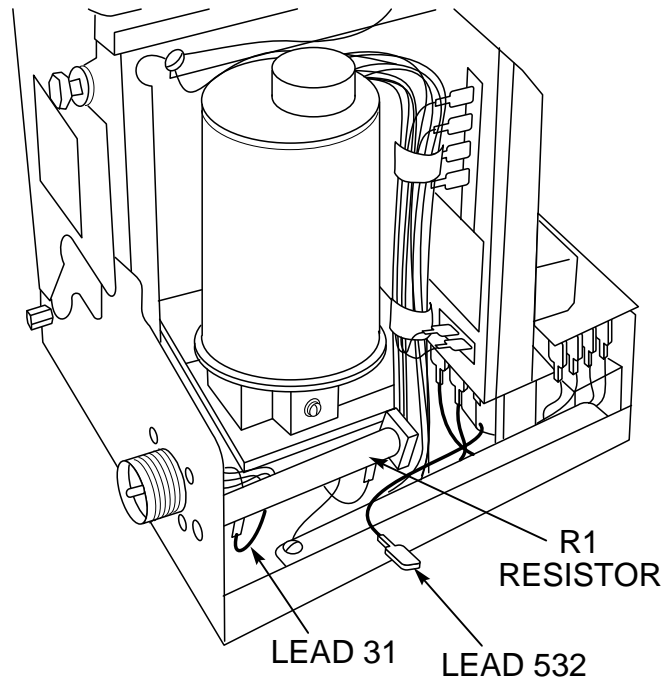
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## T1 TRANSFORMER REMOVAL AND REPLACEMENT *(continued)*

FIGURE F.16 – PRIMARY LEAD #31 AT R1 RESISTOR



### PROCEDURE

1. Remove input power to the LN-9.
2. Using the phillips head screw driver remove the screws holding the left side cover assembly.
3. Lift the cover.
4. Disconnect primary lead #532 from the power PC board terminal.
5. Disconnect the primary lead #31 from the R1 (2 ohm) resistor. See Figure F.16. Upon reassembly this lead will have to be soldered onto the R1 resistor.

LN-9 Wire Feeder

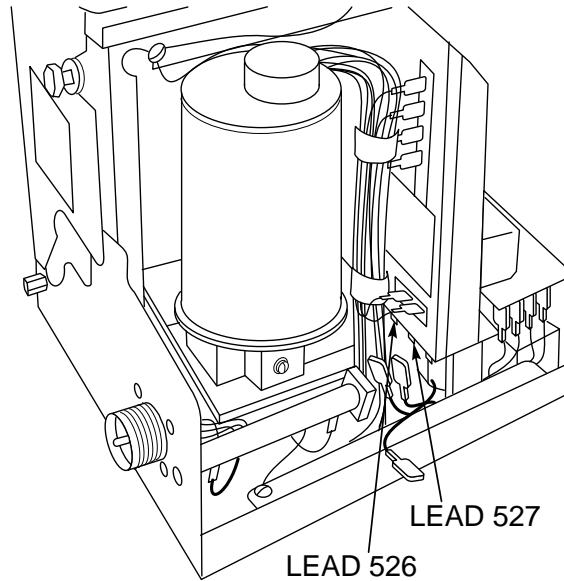


# TROUBLESHOOTING & REPAIR

## T1 TRANSFORMER REMOVAL AND REPLACEMENT (*continued*)

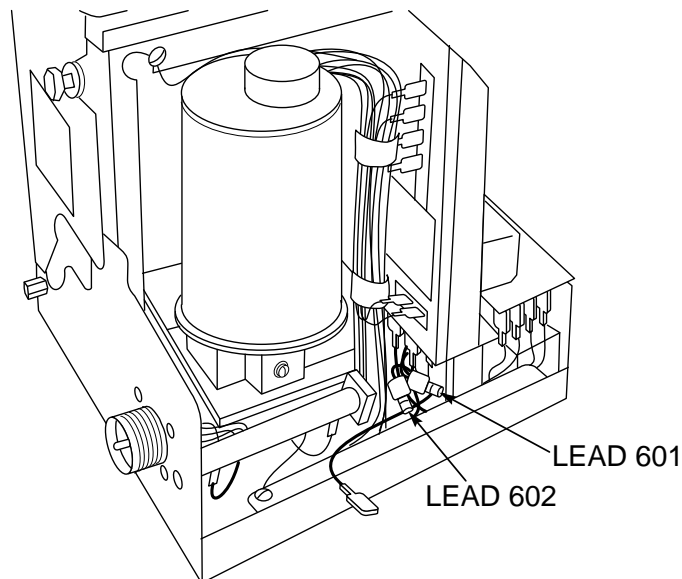
6. Disconnect leads #526 and #527 from the power PC board terminals. See Figure F.17.

**FIGURE F.17 – LEADS #526 AND #527 AT POWER PC BOARD**



7. Disconnect yellow leads #601 and #602 from the lead splices. See Figure F-18.

**FIGURE F.18 – LEADS #601 AND #602 AT LEAD SPLICES**

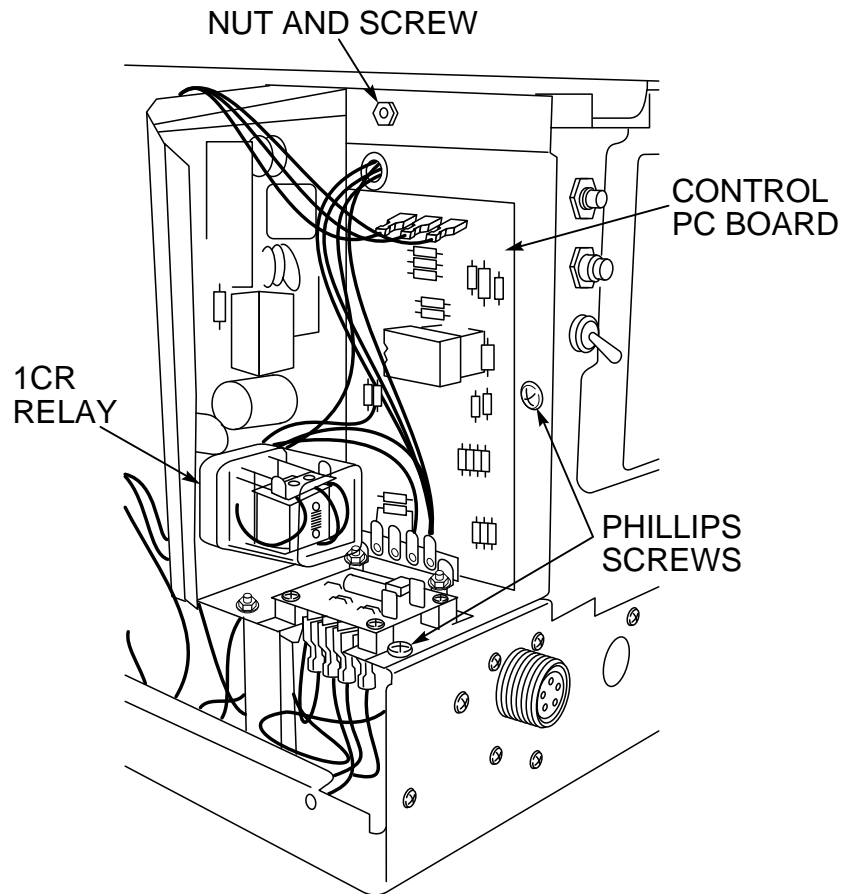


LN-9 Wire Feeder



**T1 TRANSFORMER REMOVAL AND REPLACEMENT (continued)**

8. Remove the two phillips head screws from the control PC board mounting panel.
9. Using the 11/32" wrench, remove the nut and screw from the top of the PC board mounting panel.
10. Remove the clip holding the 1CR relay, then unplug the relay from the power PC board. See Figure F.19.

**FIGURE F.19 – 1CR RELAY REMOVAL**

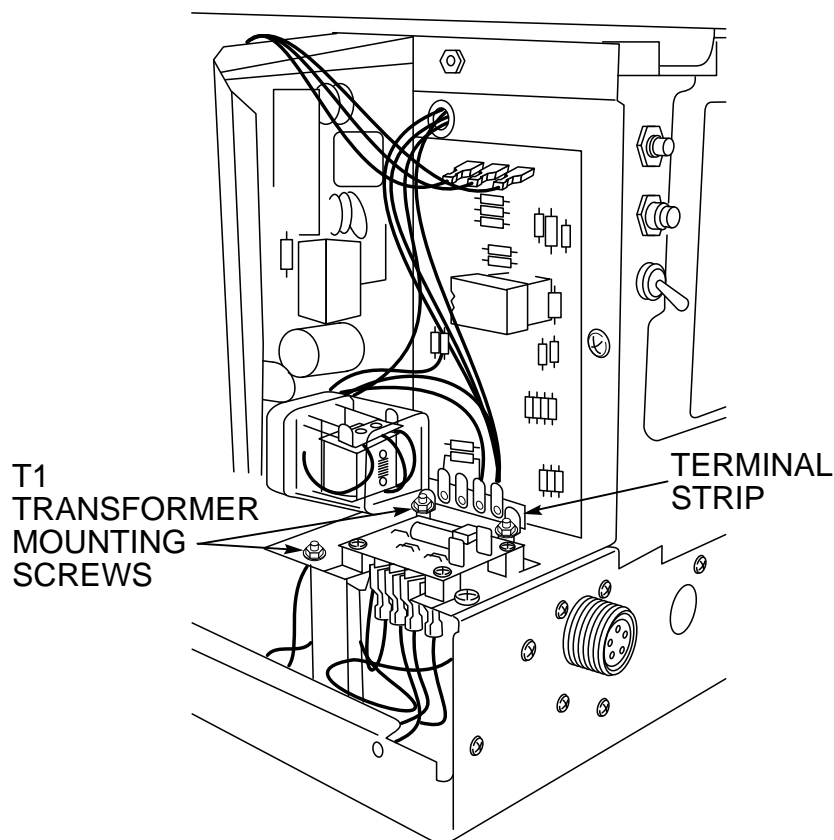
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## T1 TRANSFORMER REMOVAL AND REPLACEMENT (*continued*)

FIGURE F.20 – TERMINAL STRIP MOUNTING



11. Using the 5/16" wrench, remove the nuts and lockwashers mounting the terminal strip to the mounting panel. See Figure F.20.
12. Remove the terminal strip and set it aside.
13. Using the 5/16" wrench, remove the two nuts and washers from the T1 transformer mounting screws.
14. Remove the transformer mounting screws and the T1 transformer. This may require gently prying up the control PC board mounting panel. Be sure to clear all leads.
15. Position the T1 transformer and use the 5/16" wrench to attach it with the two nuts and washers.
16. With the 5/16" wrench, mount the terminal strip.
17. Plug the 1CR relay into the power PC board and attach the clip. See **Figure F.19**.
18. Mount the power PC board mounting panel with the two phillips head screws and 11/32 nut.
19. Connect leads #601 and #602 at the lead splices. See **Figure F.18**.
20. Connect leads #526 AND #527 at their terminals on the power PC board. See **Figure F.17**.
21. Solder lead #31 to the R1 (2 ohm) resistor. See **Figure F.16**.
22. Connect primary lead #532 to its power PC board terminal.
23. Close the left cover and re-attach the screws.

### REPLACEMENT

LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## TACH PC BOARD REMOVAL AND REPLACEMENT

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

### **DESCRIPTION**

The following procedure will help the technician remove the Tach PC Board and related components for repair or replacement.

### **MATERIALS NEEDED**

Slot head screw driver  
Phillips head screw driver  
3/8" open-end wrench

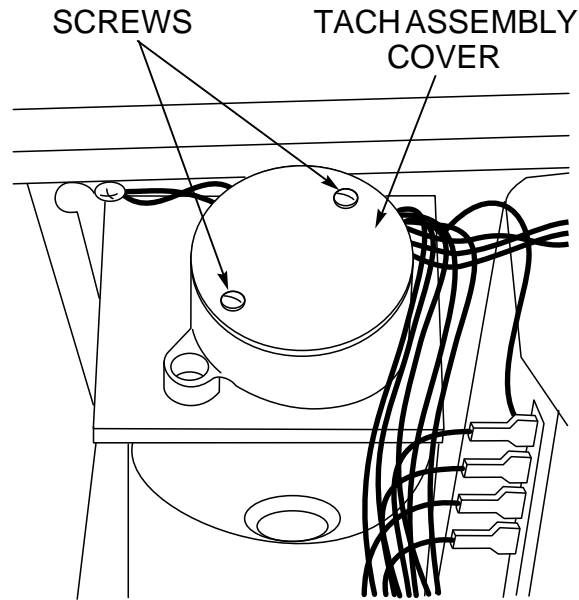
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## TACH PC BOARD REMOVAL AND REPLACEMENT *(continued)*

FIGURE F.21 – TACH ASSEMBLY COVER SCREWS



### PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Using the Phillips head screw driver, remove the screws holding the left side cover assembly.
3. Lift the cover assembly.
4. Using the slot head screwdriver, remove the two screws from the tach assembly cover. See Figure F.21. Remove the cover.

LN-9 Wire Feeder



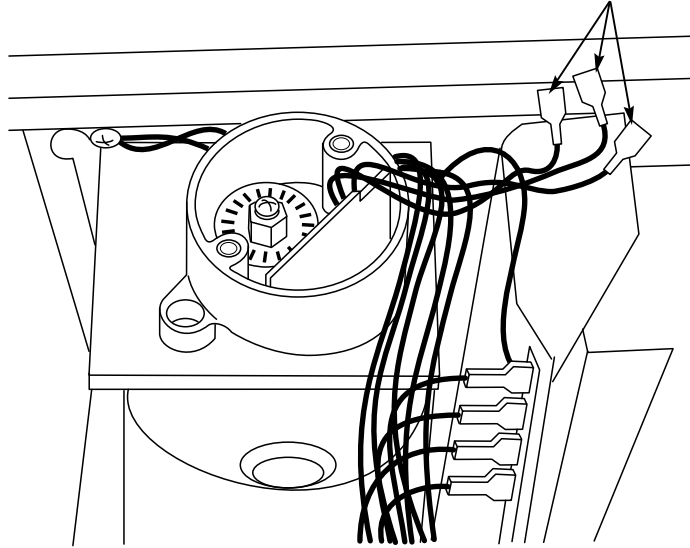
# TROUBLESHOOTING & REPAIR

## TACH PC BOARD REMOVAL AND REPLACEMENT (*continued*)

- Remove control PC board leads #510, #525 and #555. See Figure F.22.

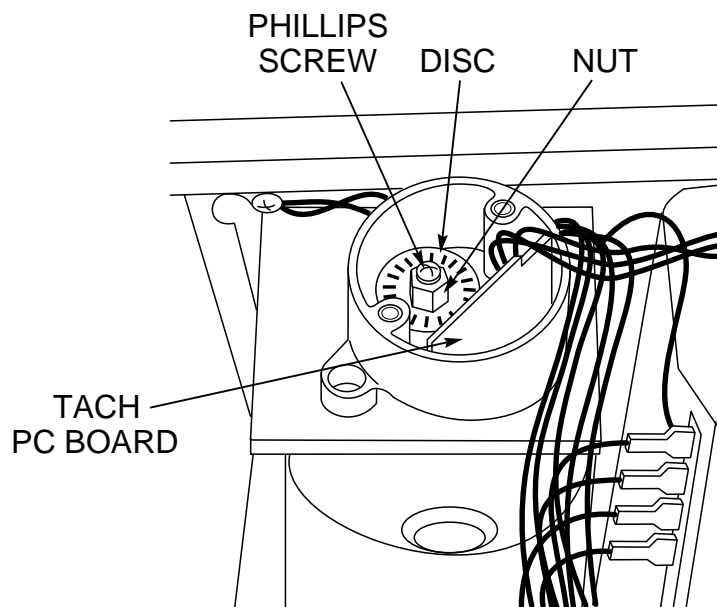
FIGURE F.22 – CONTROL PC BOARD LEADS

LEADS 510, 525, 555



- Hold the nut in place with the 3/8" wrench. With the phillips head screw driver, remove the locking screw from the rotating disc. See Figure F.23.
- Carefully remove the rotating disc and tach PC board together. Note the spacer washers underneath the disc.

FIGURE F.23 – REMOVAL OF ROTATING DISK LOCKING SCREW



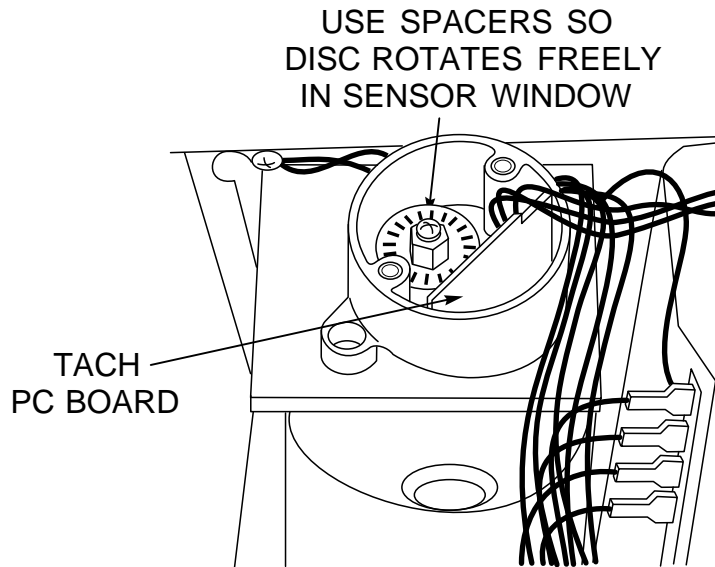
LN-9 Wire Feeder





## TACH PC BOARD REMOVAL AND REPLACEMENT (*continued*)

FIGURE F.24 – TACH COMPONENT ASSEMBLY



### REASSEMBLY

8. Upon reassembly the spacers must be used to assure that the disc rotates freely and smoothly within the sensor "window" on the printed circuit board. See Figure F.24. Note that the tach PC board must be held in place when aligning the rotating disc in the sensor window. Press down on the tach PC board with your finger to simulate the cover.
9. Use the 3/8" wrench to hold the nut in place. Attach the rotating disc with the phillips screw.
10. Attach leads #510, #525, and #555 to the control PC board.
11. Secure the tach assembly cover with two slot head screws.
12. Replace the left side case cover and secure with phillips screws.

# TROUBLESHOOTING & REPAIR

## DRIVE MOTOR REMOVAL AND REPLACEMENT

### **⚠ WARNING**

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353 (WELD).

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### **DESCRIPTION**

The following procedure will help the technician remove the drive motor for repair or replacement.

### **MATERIALS NEEDED**

- Slot head screw driver
- 3/8" Wrench
- Phillips head screw driver

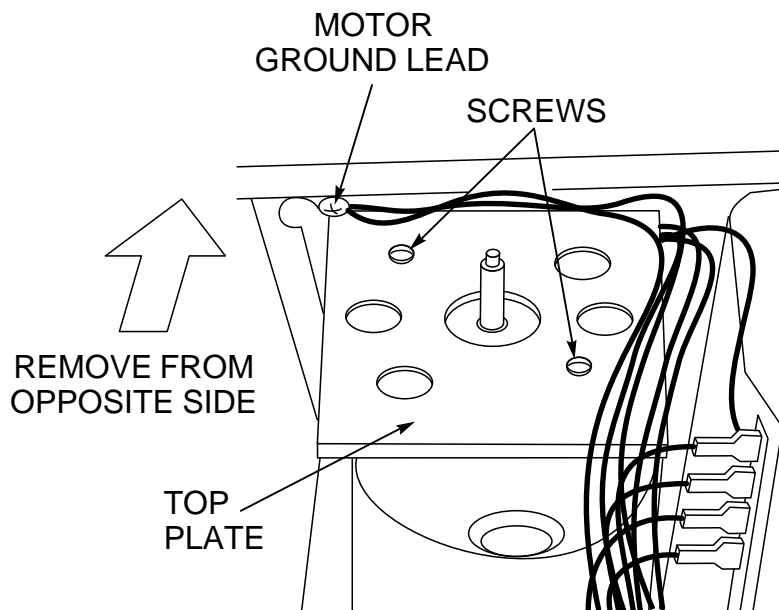
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## DRIVE MOTOR REMOVAL AND REPLACEMENT *(continued)*

FIGURE F.25 – TOP MOTOR PLATE SCREWS



### PROCEDURE

1. Remove input power to the LN-9 wire feeder.
2. Using the phillips head screw driver, remove the screws holding the left side cover assembly.
3. Lift the cover assembly.
4. With the slot head screwdriver and the 3/8" wrench, remove the R1 (2 ohm) resistor. Note the position of the insulators for reassembly.
5. Using the Phillips head screwdriver remove the 9 pin amphenol connector.
6. Set the resistor and the amphenol connector aside as far as the lead lengths will allow. This is necessary to gain access to one of the three screws that mount the glastic base to the floor assembly.
7. Remove the tach PC board and rotating disc. (See the **Tach PC Board Removal and Replacement** procedure).
8. Remove the two screws from the tach PC board housing.
9. Remove the insulator.
10. Remove the two screws from the top motor plate and remove the plate. (Remove it from the other side.) See Figure F.25.

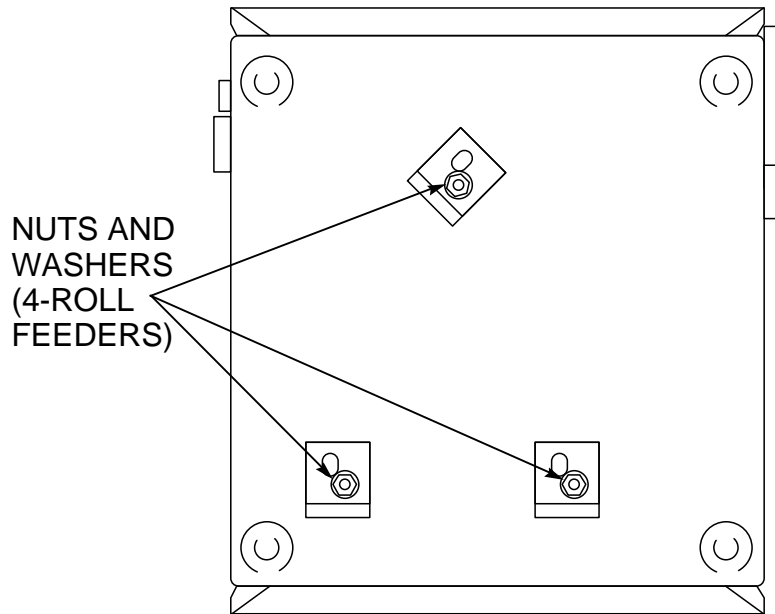
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## DRIVE MOTOR REMOVAL AND REPLACEMENT (*continued*)

FIGURE F.26 – GLASTIC MOUNTING SCREWS



11. Remove the three screws that hold the glastic mounting to the LN-9 floor assembly. See Figure F.26.

**NOTE:** Four- roll drive units have nuts and washers also. Screw heads are located under the Mylar insulator.

12. Remove motor leads #626, #627, #539, #541, #527 and #528 from their terminal locations. Remove the green motor ground lead. See **Figure F.25**. Free the leads from the harness to allow movement of the motor. Cut or untape any necessary harness ties.

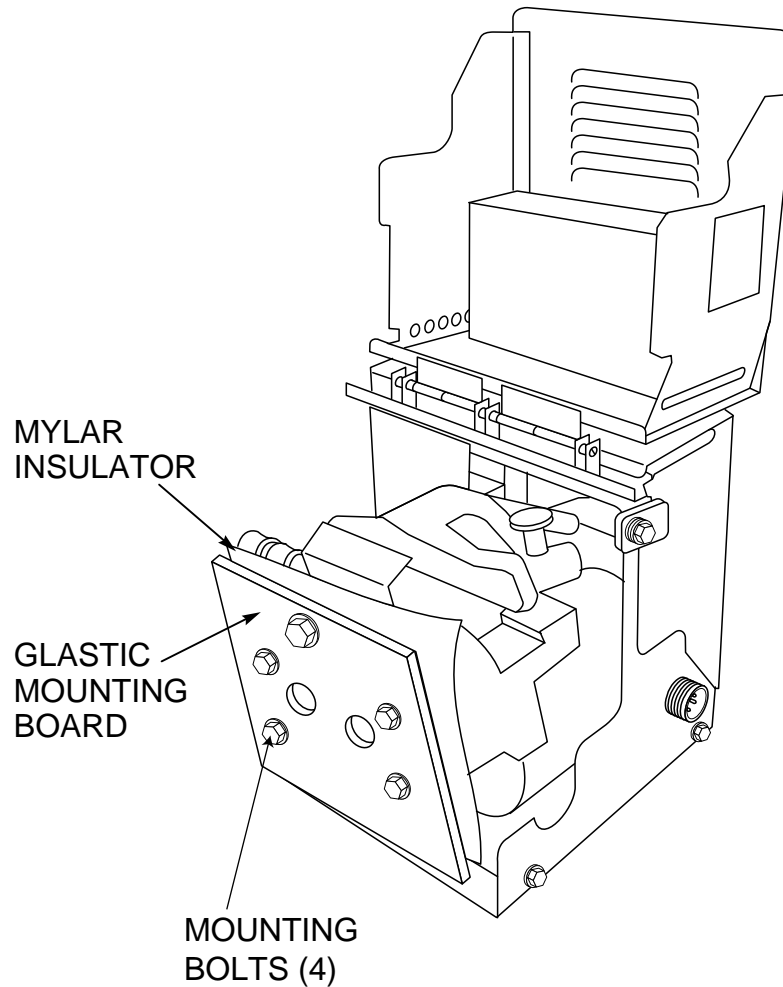
LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## DRIVE MOTOR REMOVAL AND REPLACEMENT (*continued*)

FIGURE F.27 – MOTOR AND WIRE DRIVE REMOVAL



13. Lift the right side cover assembly and carefully lift and slide the motor and wire drive assembly partially out of the LN-9 box assembly. See Figure F.27.

14. Using the 1/2" wrench, remove the four bolts and associated washers holding the glastic mounting board and mylar insulator to the gear box assembly.

**NOTE:** Four-roll drive units will require the removal of a 1/2" bolt mounting the reed switch copper energizer to the glastic plate.

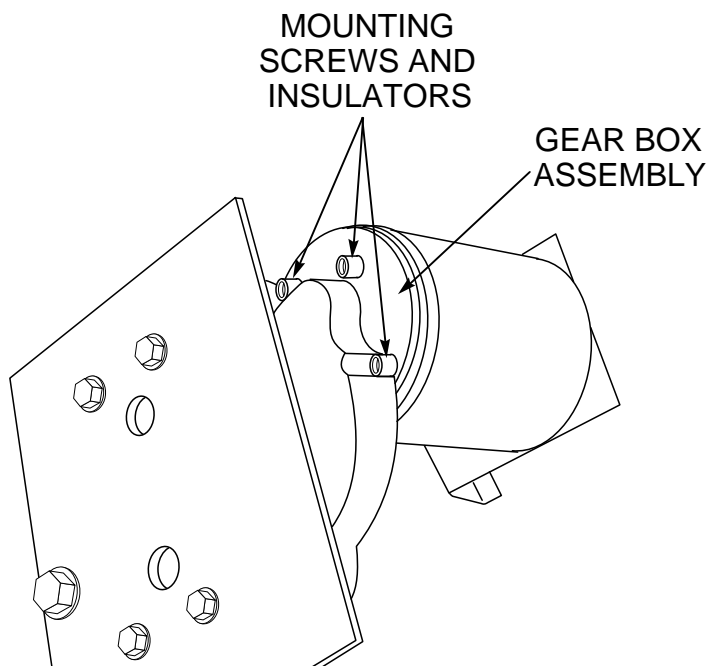
## DRIVE MOTOR REMOVAL AND REPLACEMENT *(continued)*

15. With the slot head screw driver, remove the three screws, lock washers, flatwashers, and insulators holding the drive motor to the gear box assembly. See Figure F.28.
16. Carefully remove the motor and spacer plate.

### REASSEMBLY

17. Attach the drive motor and spacer plate to the gear box assembly. Use the insulators and mounting hardware from step 15, above.
18. Attach the glastic mounting board and mylar insulator to the gear box assembly with the four 1/2" bolts and washers. On four-roll units, install the 1/2" bolt for the reed switch copper energizer.
19. From the right side, slide the motor and gear box assembly into the LN-9. Attach the glastic mounting to the floor with the screws. Four-roll units have nuts and washers.
20. Connect motor leads #626, #627, #539, #541, #527 and #528 to their terminals. Attach the green motor ground lead. Install any cable ties cut earlier or tape the harness as needed.
21. Attach the top motor plate with two screws.
22. Install the insulator and tach PC board housing with two screws. Install the tach PC board and rotating disc and spacers. See the ***Tach PC Board Removal and Replacement*** procedure.
23. Install the 9-pin amphenol and the R1 resistor. Be sure to position the resistor insulators properly.
24. Close and fasten the left cover assembly with screws.

FIGURE F.28 – DRIVE MOTOR REMOVAL FROM GEAR BOX



LN-9 Wire Feeder



# TROUBLESHOOTING & REPAIR

## RETEST AFTER REPAIR

### Retest the LN-9 wire feeder:

If it fails any test and the test requires removing or replacing any mechanical part that could affect the wire feeder's electrical characteristics.

OR

If you repair or replace any electrical component.

The wire feeder must meet the following standards under retest:

- Wire Feed Speed, LN-9.....50 - 600 IPM
- Wire Feed Speed, LN-9H .....80 - 960 IPM
- Voltmeter .....Refer to ***Voltmeter Accuracy Check***
- Wire Speed Meter .....Refer to ***Meter Circuit Accuracy Test***
- Gas Solenoid (If Used) .....Must function when gun trigger is activated
- Voltage control and shutdown .....Refer to ***Out of Voltage Range Shut Down*** Test

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Return to Master TOC



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LN-9 Wire Feeder





# ELECTRICAL DIAGRAMS

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# NOTES

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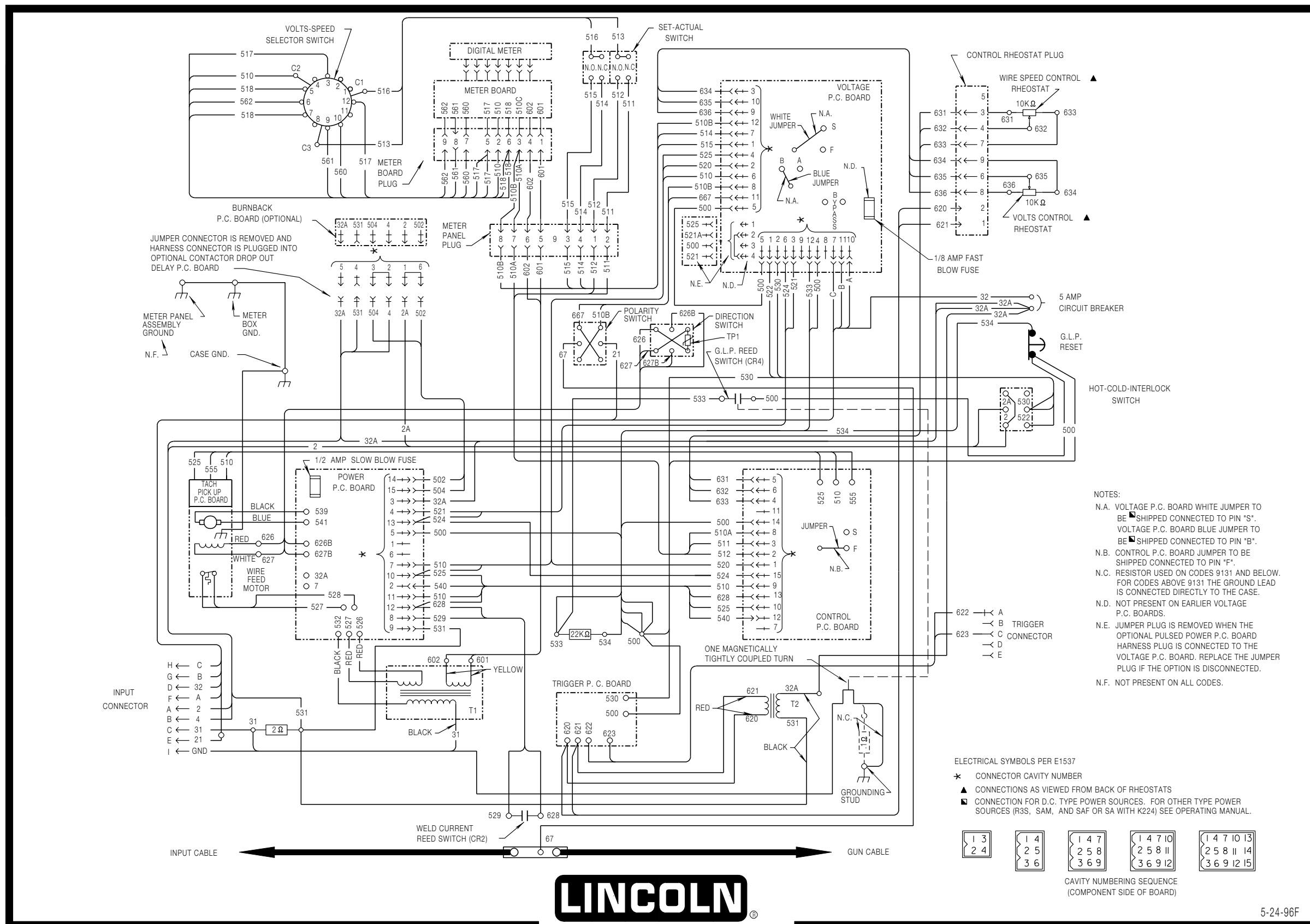
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LN-9 Wire Feeder



Wiring Diagram

LN-9



NOTES:

- N.A. VOLTAGE P.C. BOARD WHITE JUMPER TO BE SHIPPED CONNECTED TO PIN "S". VOLTAGE P.C. BOARD BLUE JUMPER TO BE SHIPPED CONNECTED TO PIN "B".
- N.B. CONTROL P.C. BOARD JUMPER TO BE SHIPPED CONNECTED TO PIN "F".
- N.C. RESISTOR USED ON CODES 9131 AND BELOW. FOR CODES ABOVE 9131 THE GROUND LEAD IS CONNECTED DIRECTLY TO THE CASE.
- N.D. NOT PRESENT ON EARLIER VOLTAGE P.C. BOARDS.
- N.E. JUMPER PLUG IS REMOVED WHEN THE OPTIONAL PULSED POWER P.C. BOARD HARNESS PLUG IS CONNECTED TO THE VOLTAGE P.C. BOARD. REPLACE THE JUMPER PLUG IF THE OPTION IS DISCONNECTED.
- N.F. NOT PRESENT ON ALL CODES.

ELECTRICAL SYMBOLS PER E1537

- \* CONNECTOR CAVITY NUMBER
- ▲ CONNECTIONS AS VIEWED FROM BACK OF RHEOSTATS
- CONNECTION FOR D.C. TYPE POWER SOURCES. FOR OTHER TYPE POWER SOURCES (R3S, SAM, AND SAF OR SA WITH K224) SEE OPERATING MANUAL.

1 3 2 4	1 4 2 5 3 6	1 4 7 2 5 8 3 6 9	1 4 7 10 2 5 8 11 3 6 9 12	1 4 7 10 13 2 5 8 11 14 3 6 9 12 15
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CAVITY NUMBERING SEQUENCE (COMPONENT SIDE OF BOARD)



CLEVELAND, OHIO U.S.A.

5-24-96F

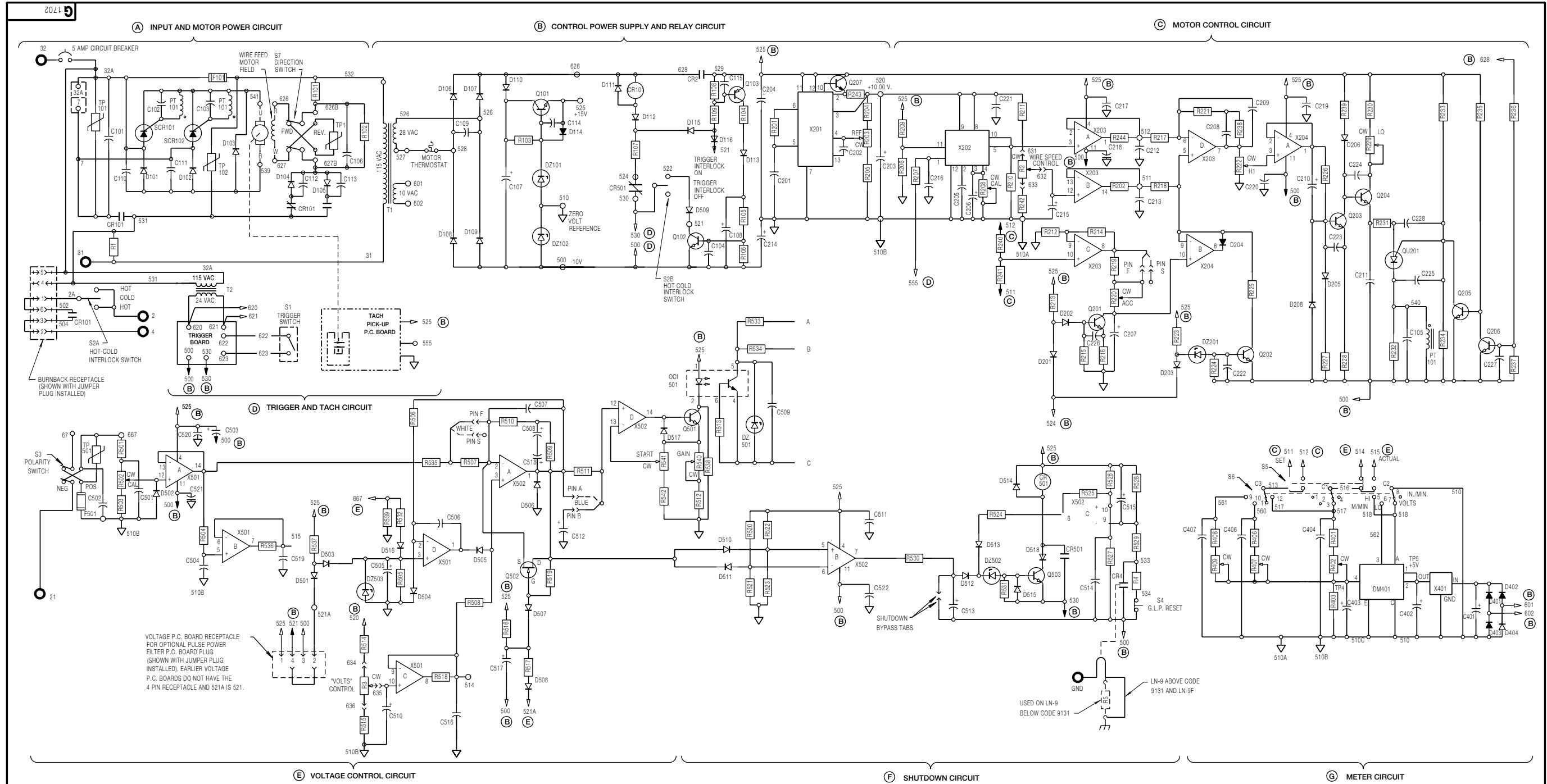
L7197

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.



Return to Section TOC

OPERATING SCHEMATIC

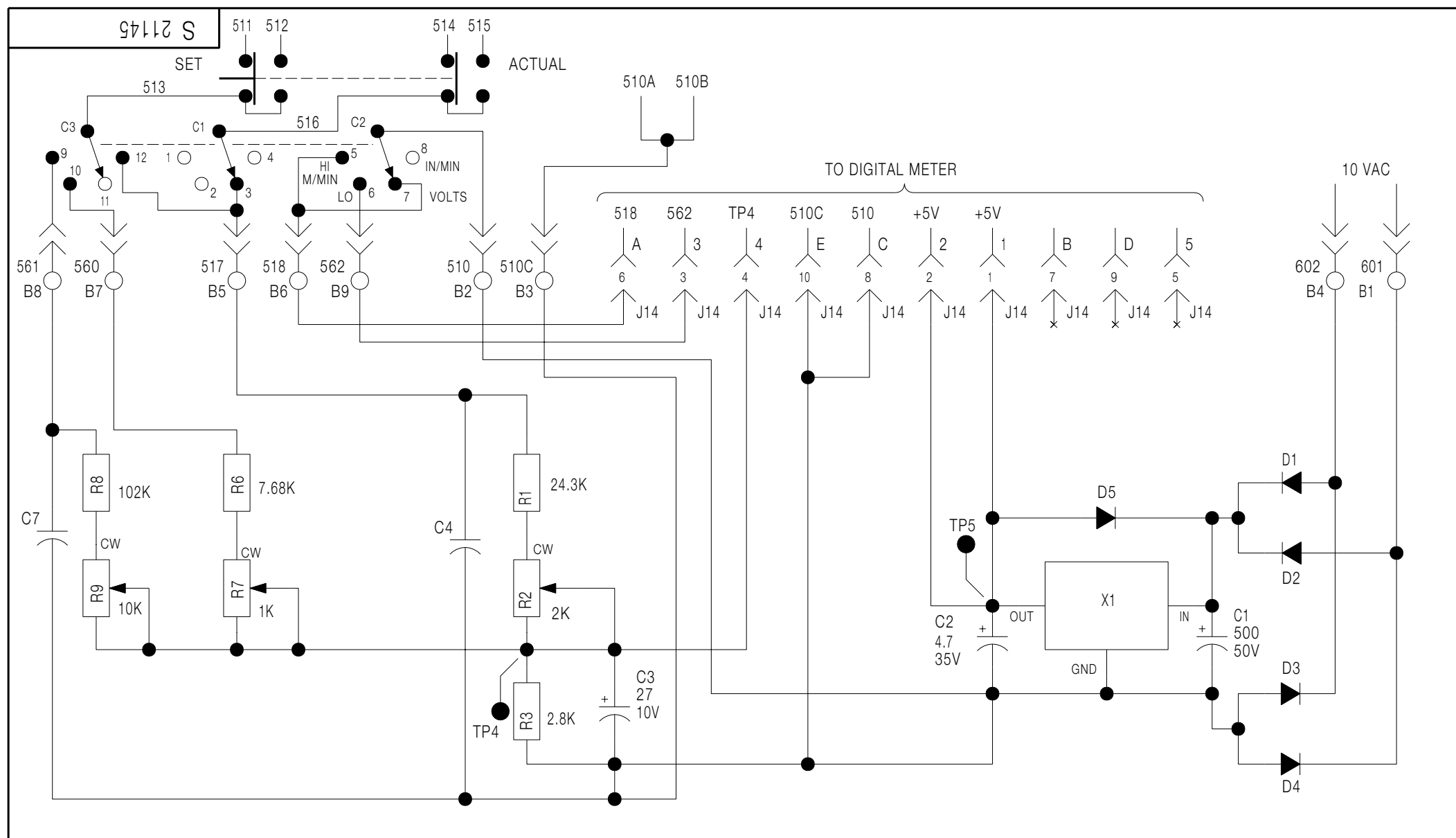


POWER CIRCUIT		CONTROL CIRCUIT		METER CIRCUIT		VOLTAGE CIRCUIT		COMPONENTS NOT ON P.C. BOARD		CIRCUIT	KEY TO SYMBOLS	ELECTRICAL SYMBOLS PER E1537		
C101 .005 MFD C102 .047 MFD C103 .047 MFD C104 .022 MFD C105 .01 MFD C106 50 MFD C107 150 MFD C108 2.7 MFD C109 15 MFD C110 .005 MFD C111 .005 MFD C112 .02 MFD C113 .02 MFD C114 .022 MFD C115 .022 MFD	F101 1/2 A. SLOW BLOW FUSE	C201 .022 MFD C202 .022 MFD C203 18 MFD C204 4.7 MFD C205 .0033 MFD C206 .47 MFD C207 18 MFD C208 4 MFD C209 .047 MFD C210 4.7 MFD C211 .15 MFD C212 .022 MFD C213 .022 MFD C214 4.7 MFD C215 18 MFD C216 100pF C217 .022 MFD C218 .022 MFD C219 1K OHM C220 100pF C221 1A. C222 1A. DZ201 6.8V.	R204 1.00K OHM 1/4W 1% R205 2.94K OHM 1/4W 1% R206 15K OHM R207 10K OHM R208 100K OHM TRIMMER R209 33K OHM R210 10K OHM R211 5.6K OHM R212 15K OHM R213 47K OHM R214 15K OHM R215 100K OHM R216 1K OHM R217 1K OHM R218 1K OHM R219 33K OHM R220 50K OHM TRIMMER R221 15K OHM R222 10K OHM TRIMMER R223 33K OHM R224 100K OHM R225 1K OHM R226 10K OHM R227 6.8K OHM R228 10K OHM R229 20K OHM TRIMMER R230 27K OHM R231 15 OHM	R232 100 OHM R233 6.8K OHM R234 2.7K OHM R235 10K OHM R236 15K OHM R237 10K OHM R238 1M OHM R239 15K OHM R240 5.6K OHM R241 15K OHM R242 500 OHM R243 10 OHM R244 270 OHM	X401 VOLTAGE REGULATOR DM401 DIGITAL METER R401 24.3K OHM 1/4W 1% R402 2K OHM TRIMMER R403 2.80K OHM 1/4W 1% R406 7.68K OHM 1/4W 1% R407 1K OHM TRIMMER R408 102K OHM 1/4W 1% R409 10K OHM TRIMMER	X201 I.C. REGULATOR X202 I.C. TACHOMETER X203 I.C. QUAD OP-AMP X204 I.C. QUAD OP-AMP Q201 2N4123 Q202 2N4125 Q203 2N4123 Q204 2N5816 QU201 2N6027	FOR VOLTAGE P.C. BOARDS L8084-4 OR HIGHER USE L8388 SCHEMATIC FOR COMPONENT VALUES AND CIRCUIT CONNECTIONS. 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.022 MFD C717 .022 MFD C718 .022 MFD C719 .022 MFD C720 .022 MFD C721 .022 MFD C722 .022 MFD C723 .022 MFD C724 .022 MFD C725 .022 MFD C726 .022 MFD C727 .022 MFD C728 .022 MFD C729 .022 MFD C730 .022 MFD C731 .022 MFD C732 .022 MFD C733 .022 MFD C734 .022 MFD C735 .022 MFD C736 .022 MFD C737 .022 MFD C738 .022 MFD C739 .022 MFD C740 .022 MFD C741 .022 MFD C742 .022 MFD C743 .022 MFD C744 .022 MFD C745 .022 MFD C746 .022 MFD C747 .022 MFD C748 .022 MFD C749 .022 MFD C750 .022 MFD C751 .022 MFD C752 .022 MFD C753 .022 MFD C754 .022 MFD C755 .022 MFD C756 .022 MFD C757 .022 MFD C758 .022 MFD C759 .022 MFD C760 .022 MFD C761 .022 MFD C762 .022 MFD C763 .022 MFD C764 .022 MFD C765 .022 MFD C766 .022 MFD C767 .022 MFD C768 .022 MFD C769 .022 MFD C770 .022 MFD C771 .022 MFD C772 .022 MFD C773 .022 MFD C774 .022 MFD C775 .022 MFD C776 .022 MFD C777 .022 MFD C778 .022 MFD C779 .022 MFD C780 .022 MFD C781 .022 MFD C782 .022 MFD C783 .022 MFD C784 .022 MFD C785 .022 MFD C786 .022 MFD C787 .022 MFD C788 .022 MFD C789 .022 MFD C790 .022 MFD C791 .022 MFD C792 .022 MFD C793 .022 MFD C794 .022 MFD C795 .022 MFD C796 .022 MFD C797 .022 MFD C798 .022 MFD C799 .022 MFD C800 .022 MFD C801 .022 MFD C802 .022 MFD C803 .022 MFD C804 .022 MFD C805 .022 MFD C806 .022 MFD C807 .022 MFD C808 .022 MFD C809 .022 MFD C810 .022 MFD C811 .022 MFD C812 .022 MFD C813 .022 MFD C814 .022 MFD C815 .022 MFD C816 .022 MFD C817 .022 MFD C818 .022 MFD C819 .022 MFD C820 .022 MFD C821 .022 MFD C822 .022 MFD C823 .022 MFD C824 .022 MFD C825 .022 MFD C826 .022 MFD C827 .022 MFD C828 .022 MFD C829 .022 MFD C830 .022 MFD C831 .022 MFD C832 .022 MFD C833 .022 MFD C834 .022 MFD C835 .022 MFD C836 .022 MFD C837 .022 MFD C838 .022 MFD C839 .022 MFD C840 .022 MFD C841 .022 MFD C842 .022 MFD C843 .022 MFD C844 .022 MFD C845 .022 MFD C846 .022 MFD C847 .022 MFD C848 .022 MFD C849 .022 MFD C850 .022 MFD C851 .022 MFD C852 .022 MFD C853 .022 MFD C854 .022 MFD C855 .022 MFD C856 .022 MFD C857 .022 MFD C858 .022 MFD C859 .022 MFD C860 .022 MFD C861 .022 MFD C862 .022 MFD C863 .022 MFD C864 .022 MFD C865 .022 MFD C866 .022 MFD C867 .022 MFD C868 .022 MFD C869 .022 MFD C870 .022 MFD C871 .022 MFD C872 .022 MFD C873 .022 MFD C874 .022 MFD C875 .022 MFD C876 .022 MFD C877 .022 MFD C878 .022 MFD C879 .022 MFD C880 .022 MFD C881 .022 MFD C882 .022 MFD C883 .022 MFD C884 .022 MFD C885 .022 MFD C886 .022 MFD C887 .022 MFD C888 .022 MFD C889 .022 MFD C890 .022 MFD C891 .022 MFD C892 .022 MFD C893 .022 MFD C894 .022 MFD C895 .022 MFD C896 .022 MFD C897 .022 MFD C898 .022 MFD C899 .022 MFD C900 .022 MFD C901 .022 MFD C902 .022 MFD C903 .022 MFD C904 .022 MFD C905 .022 MFD C906 .022 MFD C907 .022 MFD C908 .022 MFD C909 .022 MFD C910 .022 MFD C911 .022 MFD C912 .022 MFD C913 .022 MFD C914 .022 MFD C915 .022 MFD C916 .022 MFD C917 .022 MFD C918 .022 MFD C919 .022 MFD C920 .022 MFD C921 .022 MFD C922 .022 MFD C923 .022 MFD C924 .022 MFD C925 .022 MFD C926 .022 MFD C927 .022 MFD C928 .022 MFD C929 .022 MFD C930 .022 MFD C931 .022 MFD C932 .022 MFD C933 .022 MFD C934 .022 MFD C935 .022 MFD C936 .022 MFD C937 .022 MFD C938 .022 MFD C939 .022 MFD C940 .022 MFD C941 .022 MFD C942 .022 MFD C943 .022 MFD C944 .022 MFD C945 .022 MFD C946 .022 MFD C947 .022 MFD C948 .022 MFD C949 .022 MFD C950 .022 MFD C951 .022 MFD C952 .022 MFD C953 .022 MFD C954 .022 MFD C955 .022 MFD C956 .022 MFD C957 .022 MFD C958 .022 MFD C959 .022 MFD C960 .022 MFD C961 .022 MFD C962 .022 MFD C963 .022 MFD C964 .022 MFD C965 .022 MFD C966 .022 MFD C967 .022 MFD C968 .022 MFD C969 .022 MFD C970 .022 MFD C971 .022 MFD C972 .022 MFD C973 .022 MFD C974 .022 MFD C975 .022 MFD C976 .022 MFD C977 .022 MFD C978 .022 MFD C979 .022 MFD C980 .022 MFD C981 .022 MFD C982 .022 MFD C983 .022 MFD C984 .022 MFD C985 .022 MFD C986 .022 MFD C987 .022 MFD C988 .022 MFD C989 .022 MFD C990 .022 MFD C991 .022 MFD C992 .022 MFD C993 .022 MFD C994 .022 MFD C995 .022 MFD C996 .022 MFD C997 .022 MFD C998 .022 MFD C999 .022 MFD C1000 .022 MFD	DZ501 20V, 1W DZ502 15V, 1W DZ503 5.1V	R517 1K OHM R518 270 OHM R519 100K OHM R520 15K OHM R521 56K OHM R522 330K OHM R523 22K OHM R524 4.7K OHM R525 4.7K OHM R526 22K OHM R527 22K OHM R528 22K OHM R529 27K OHM R530 27K OHM R531 100K OHM R532 27K OHM R533 10K OHM R534 10K OHM R535 1K OHM R536 270 OHM R537 33K OHM R538 56K OHM R539 27K OHM R540 5K OHM TRIMMER R541 2K OHM TRIMMER R542 5.6K OHM R543 2.7M OHM R544 5.6K OHM R545 1.8K OHM R546 100K OHM				OC1501 OPTO-ISOLATOR Q501 2N4123 Q502 2N4857 Q503 MPSA42 X501 I.C. QUAD OP-AMP X502 I.C. QUAD OP-AMP TP501 TRANSIENT PROTECTOR R501 44.2K OHM 1/4W 1% R502 500 OHM TRIMMER R503 4.75K OHM 1/4W 1% R504 100K OHM R505 27K OHM R506 15K OHM R507 10K OHM R508 2.2K OHM R509 2.7MEG OHM R510 4.7K OHM R511 100K OHM R512 1K OHM R513 2.7M OHM R514 5.6K OHM R515 1.8K OHM R516 100K OHM	CR2 WELD CURRENT-REED SWITCH CR4 G.L.P. REED SWITCH S1 SPST TRIGGER SWITCH S2 DPDT TRIGGER SWITCH S3 DPDT POLARITY SWITCH S4 SPST G.L.P. RESET SWITCH S5 DPDT SET-ACTUAL SWITCH S6 3 POLE VOLTS-SPEED SELECTOR SWITCH S7 DPDT DIRECTION SWITCH T1 POWER SUPPLY TRANSFORMER T2 TRIGGER SUPPLY TRANSFORMER TP1 150VAC TRANSIENT PROTECTOR

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



METER BOARD (L6687) SCHEMATIC



NOTES :

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

GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537  
 CAPACITORS = MFD (.022/50V UNLESS OTHERWISE SPECIFIED)  
 RESISTORS = Ohms ( 1/4W UNLESS OTHERWISE SPECIFIED)  
 DIODES = 1A, 400V (UNLESS OTHERWISE SPECIFIED)

LABELS

▲ SUPPLY VOLTAGE NET  
 ○ POWER SUPPLY SOURCE POINT  
 ▽ COMMON CONNECTION  
 □ FRAME CONNECTION  
 ⊥ EARTH GROUND CONNECTION

FILE: S21145\_1CA

UNLESS OTHERWISE SPECIFIED TOLERANCE  
 ON HOLES SIZES PER E-2056  
 ON 2 PLACE DECIMALS IS + .02  
 ON 3 PLACE DECIMALS IS + .002  
 ON ALL ANGLES IS + .5 OF A DEGREE  
 MATERIAL TOLERANCE ("±") TO AGREE  
 WITH PUBLISHED STANDARDS

Ch'ge.Sht.No.			
3-25-94			

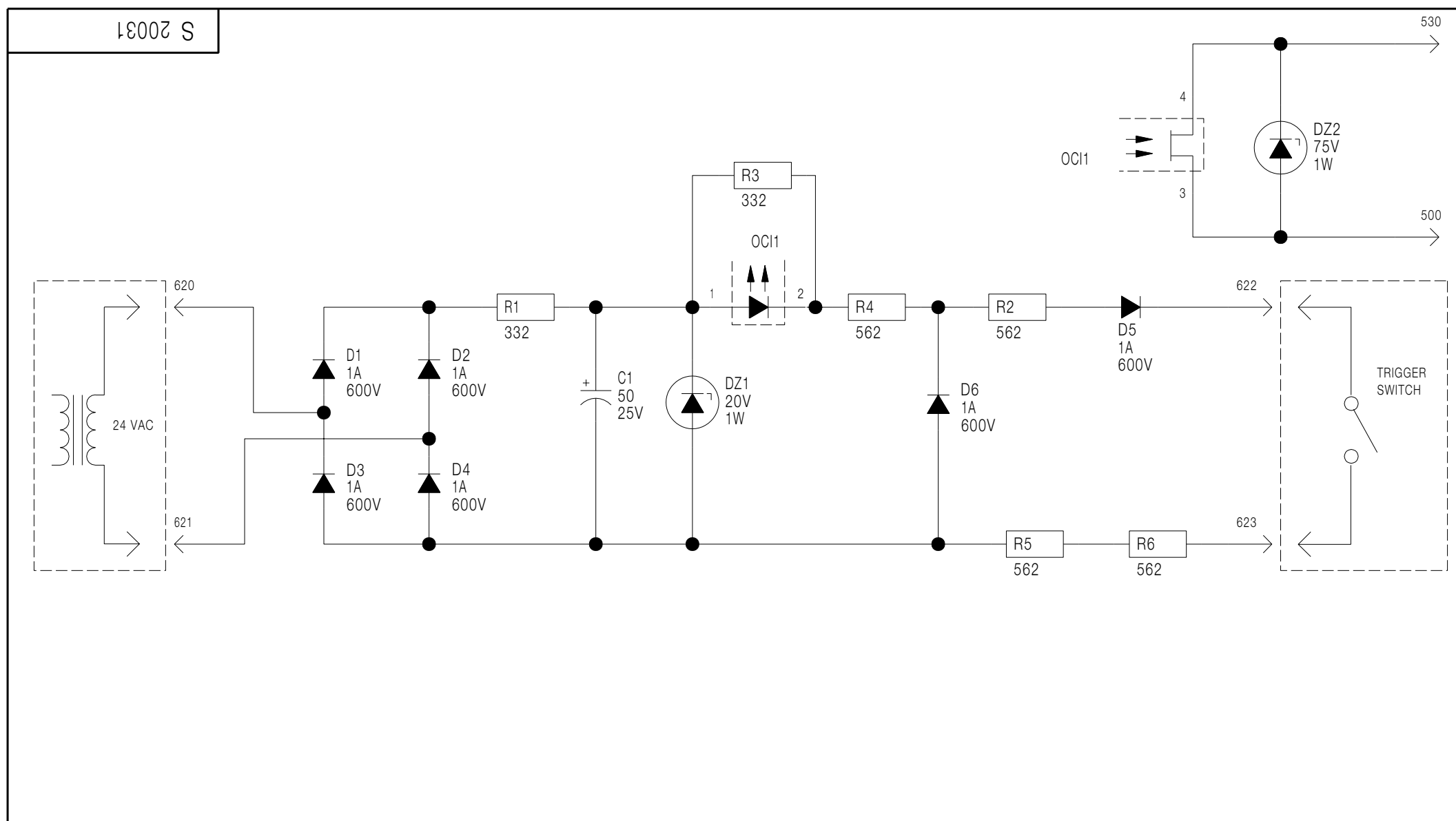
THE LINCOLN ELECTRIC CO.  
 CLEVELAND, OHIO U.S.A.

EQUIP. TYPE LN-9 & LN-9F (METRIC)  
 SUBJECT METER BOARD SCHEMATIC

SCALE NONE  
 DR. FM DATE 9-24-93 CHK. SUP'S'D'G. SHT. NO. S 21145

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

TRIGGER BOARD (M13861) SCHEMATIC



NOTES :

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

GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537  
 CAPACITORS = MFD (.022/50V UNLESS OTHERWISE SPECIFIED)  
 RESISTORS = Ohms ( 1/4W UNLESS OTHERWISE SPECIFIED)  
 DIODES = 1A, 400V (UNLESS OTHERWISE SPECIFIED)

LABELS

▲ SUPPLY VOLTAGE NET  
 ○ POWER SUPPLY SOURCE POINT  
 ▽ COMMON CONNECTION  
 □ FRAME CONNECTION  
 ⊥ EARTH GROUND CONNECTION

FILE: S20031\_3EB

UNLESS OTHERWISE SPECIFIED TOLERANCE  
 ON HOLES SIZES PER E-2056  
 ON 2 PLACE DECIMALS IS + .02 -  
 ON 3 PLACE DECIMALS IS + .002 -  
 ON ALL ANGLES IS + .5 OF A DEGREE -  
 MATERIAL TOLERANCE ("+" TO AGREE  
 WITH PUBLISHED STANDARDS

Ch'ge.Sht.No.			
11-1-91A			
2-25-94C			
5-20-94A			
2-10-95D			

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

EQUIP. TYPE LN-9 TRIGGER P.C. BOARD

SUBJECT SCHEMATIC

SCALE NONE

DR. JRH DATE 12-20-90 CHK. SUP'S'D'G. SHT. NO. S 20031

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

TACHOMETER SCHEMATIC

Return to Section TOC

Return to Section TOC

Return to Section TOC

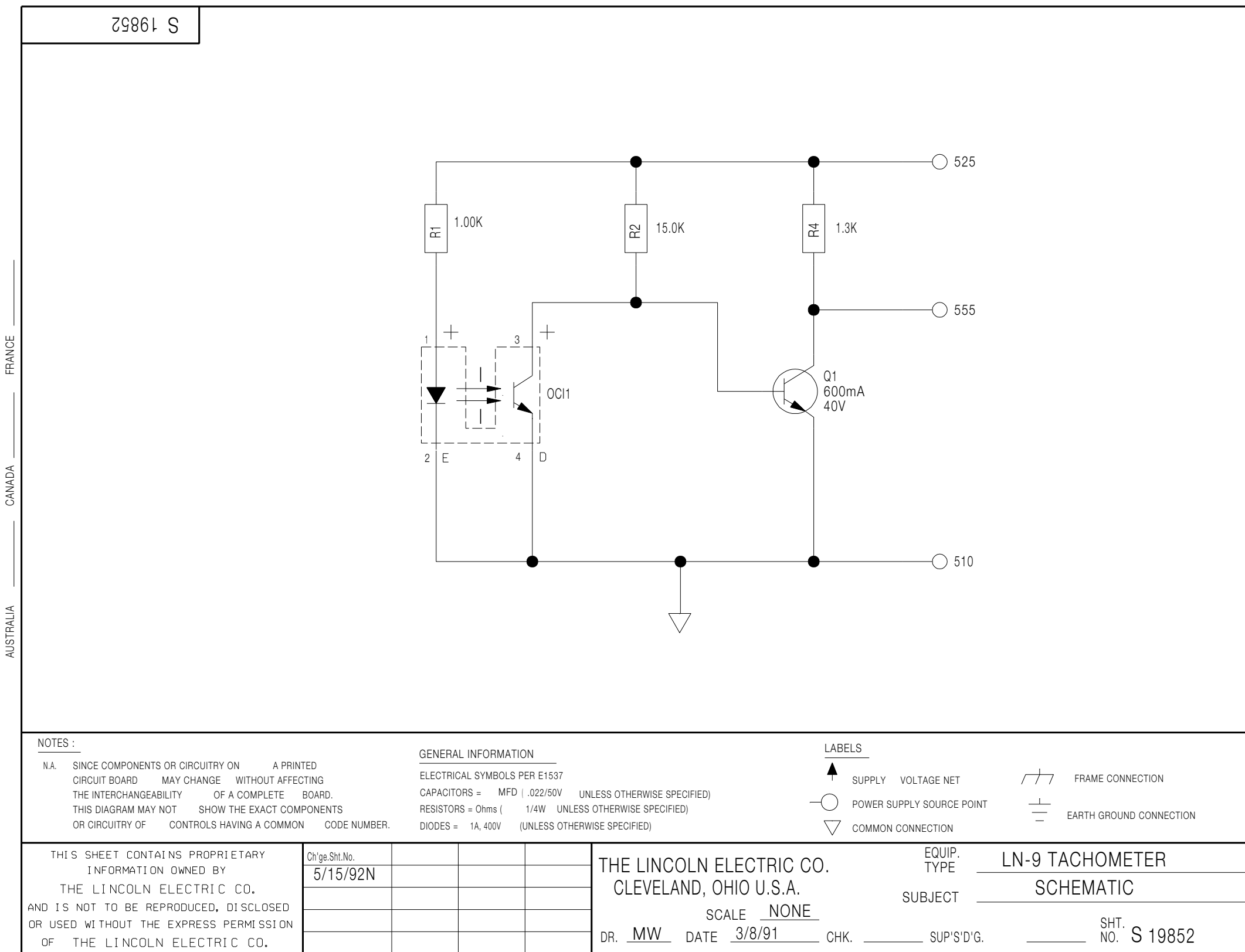
Return to Section TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC

Return to Master TOC



AUSTRALIA CANADA FRANCE

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

