

# LN-23P

## Portable Innershield Semiautomatic Wire Feeder

For use with machines having Code Numbers:

- 9085
- 10242
- 10314
- 10892
- 10917
- 10918
- 11359
- 11360
- 11361
- 11362

### Safety Depends on You

Lincoln arc welding and cutting 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

**LINCOLN**<sup>®</sup>  
**ELECTRIC**

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## ⚠ WARNING

### ⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

**ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.**

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

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



### FOR ENGINE powered equipment.

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



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



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

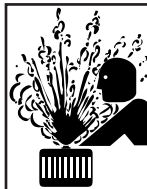
1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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



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

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



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



### ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

Mar '95



### 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.

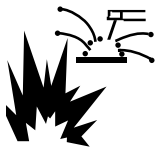
- 4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. 1 standards.
- 4.b. Use suitable clothing made from durable flame-resistant material 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. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.
- 5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.
- 5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer’s safety practices. MSDS forms are available from your welding distributor or from the manufacturer.
- 5.f. Also see item 1.b.

AUG '06



### 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.

Mar '95

## 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.
  - f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s'appliquent aussi au pistolet de soudage.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas où on reçoit 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 soleil, 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 aux 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 le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les 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 pistologie. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgène (gas fortement toxique) ou autres produits irritants.
11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le châssis 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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## TECHNICAL SPECIFICATIONS – LN-23P

### OPERATING ARC VOLTAGE

Constant Voltage (CV)

14-50VDC (90VDC Maximum OCV)

### RATED CURRENT

250-350 Amps 60% Duty Cycle

(Depending on Gun Used)

### WIRE SPEED RANGE

30-170 Inches Per Minute (IPM)

(1.18-6.70 mm)

### RECOMMENDED ELECTRODE WIRE SIZES

.068"

INNERSHIELD

.072"

INNERSHIELD

5/64"

INNERSHIELD

### PHYSICAL DIMENSIONS

#### HEIGHT

20.5 Inches  
(520.7 mm)

#### WIDTH

9.0 Inches  
(228.6 mm)

#### DEPTH

19.0 Inches  
(482.6mm)

#### WEIGHT

27 lbs  
(12.3 kg)

### TEMPERATURE RANGE

OPERATION: - 30° C\* to +40° C (- 22° F to +104° F)

STORAGE: - 40° C to +40° C (- 40° F to +104° F)

### ENVIRONMENTAL RATING

\*At temperatures below 0°C, the gun cable may require a warm up operating time to improve flexibility.

LN-23P





## SAFETY PRECAUTIONS

**⚠ WARNING**

**ELECTRIC SHOCK can kill.**



• Only qualified personnel should perform this installation, maintenance and troubleshooting work.

• Turn off the input power at the fuse box before working on other equipment connected to the welding system at the disconnect switch or fuse box before working on this equipment.

• Do not touch electrically hot parts.

**INPUT CABLE:**

For K316L-1 (6 pin connector)

The standard 25 foot input cable between the LN-23P and the power source (with a K350 Adapter Kit) consists of a six-conductor control cable and a 1/0 electrode cable. The control cable has lugged leads on the power source end and a polarized plug on the wire feeder end.

**With the power source turned off,** install the input cable per the following instructions:

- Connect the end of the control cable with the lugged leads to the K350 or K350-1 Adapter Kit. Connect the electrode cable to the negative output stud on the power source.

**NOTE:** If two LN-23P's are connected to an Adapter Kit, connect the feeder that will be used at the lowest voltage setting to Feeder "A" terminal strip in the K350. If only one LN-23P is used, connect it to Feeder "A" terminal strip.

- Connect the input control cable polarized plug into the mating 6 pin receptacle on the rear of the control section of the LN-23P. Tighten the threaded locking collar until the connector is completely seated.
- Unclip the rubber retaining strap that holds the wire enclosure cover in place and remove the cover. Push the wire drive section door latch towards the rear of the LN-23P and open the door. Route the electrode cable through the large rubber grommet in the rear of the wire feed section and connect the lug to the brass conductor block at the front of motor-gearbox assembly using the bolt provided. Attach the control cable strain relief hook to the bracket on the frame of the LN-23P.

For K316L-2 or higher (8 pin connector)

**With the power source turned off,** install the input cable per the following instructions:

- The K316L-2 LN-23P can be connected directly to any Lincoln power source that has CV output. and Twist-Mate weld terminals (V350, V350-PIPE, CV-305, etc.), using the control cable provided with the machine.
- Connect the 14-pin connector and Twist-Mate plug of the input cable assembly to the front of the welder.
- Unclip the rubber retaining strap that holds the wire enclosure cover in place, and remove the cover. Push the wire drive section door latch towards the rear of the LN-23P and open the door. Route the electrode cable through the large rubber grommet in the rear of the wire feed section and connect the lug to the brass conductor block at the front of the motor gear box assembly using the bolt provided. Attach the control cable strain relief hook to the bracket on the frame of the LN-23P.
- Connect the 8-pin receptacle to the LN-23P located on the back underside of the control box.

**WORK CABLE AND REMOTE VOLTAGE SENSING WORK LEAD**

- Connect a work cable of sufficient size and length, per the following table, between the proper output stud on the power source and the work. Be sure the connection to the work makes tight metal to metal contact.

Electrode Cable Length	Work Cable Length	Copper Electrode Cable Size	Copper Work Cable Size
0-25 ft.	0-75 ft.	1/0	1/0
0-25	76-125	1/0	2/0
26-75	26-75	2/0	2/0
26-75	76-125	2/0	4/0
76-100	76-125	3/0	4/0

Above cable sizes are based on a maximum voltage drop of 4.3 volts in the combined lengths of electrode and work cable at 350 amps.

- Connect a 12 AWG or larger rubber covered flexible lead physically suitable for the installation to the voltage sensing work lead (#21) coming from the Adapter Kit. For convenience, wrap this voltage sensing lead around the work lead and tape in place. Connect it directly to the work or to the work cable connection. This lead supplies voltage to the voltmeter as well as power to the LN-23P control circuitry and drive motor.

LN-23P

## WIRE DRIVE ROLLS AND GUIDE TUBES

The LN-23P is shipped with the proper drive rolls and guide tubes factory installed. Do not adjust the idle roll tension adjusting screw. If the idle roll tension must be relieved temporarily, see "A" and "B" of Maintenance Section.

## OPTIONAL FEATURES INSTALLATION

### INNERSHIELD GUN AND CABLE

- Unclip the rubber retaining strap that holds the wire enclosure cover in place and remove the cover.
- Push the wire drive section door latch towards the rear of LN-23P and open door.
- Loosen the gun locking set screw in the conductor block on the front of the gear box with a 3/16 hex Allen wrench.
- Lay the cable out straight. Insert the connector on the conductor cable thru the large grommet in the front of the wire drive section and into the brass block on the front of the gear box. Make sure it is all the way in and tighten the locking set screw with a 3/16 hex Allen wrench. Keep this connection clean and bright.
- Connect the 3 pin gun trigger connector to the lower receptacle.
- If the gun cable being used has a reduced speed switch, connect the 4 pin reduced speed switch connector to the upper receptacle. If the reduced speed switch is not used, install the protective cap on the upper receptacle.

**K-350 ADAPTER KIT**– Turn off power source and all power to the power source.

- SAM-400 Engine Welders: Attach the shock mounted mounting plate to the front of the SAM electrical component panel to left of the relay case with 4 of the #10 self-tapping screws provided. Older models require the drilling of 4 5/32 dia. holes into the panel. Connect the adapter control cable to the SAM terminal strips per the proper connection diagram.

- DC-600 (below code 10500): Attach the triangular mounting plate to the shock mounted plate of the Adapter with three of the #10 self-tapping screws provided. Attach the triangular plate to the side of the DC-600 adjacent to the control terminal strips using two roof screws and one front panel screw. Connect the Adapter control cable to the DC-600 terminal strips power the proper connection diagram.
- Other Power Sources: Mount the Adapter Kit to the side of the power source or some convenient location so its control cable can be connected to the power source terminal strip. Use the shock mounted mounting plate as a template to locate the four 5/32" diameter holes that must be drilled in the case side. (Use caution not to drill into or get chips into any internal components.) Mount the Adapter Kit with four of the #10 self-tapping screws provided. Connect the Adapter control cable to power source terminal strips per the proper connection diagram.

**K350-1 ADAPTER KIT** - Turn off power source and all power to the power source.

Used to connect an LN-23P (K316L-1) to a Lincoln power source that has a 14 pin control connector.

- Mount the Adapter Kit to the side of the power source or some convenient location so its control cable can be connected to the power source terminal strip. See the mounting instructions form the K350
- Connect the Adapter control cable to 14 pin connector on the power source per the proper connection diagram.
- Connect a 12 AWG or larger rubber covered flexible lead physically suitable for the installation to the voltage sensing work lead (#21) coming from the LN23P control cable connector. For convenience, wrap this voltage sensing lead around the work lead and tape in place. Connect it directly to the work or to the work cable connection

**K-276 ENCLOSED 50lb.WIRE REEL SUPPORT**  
Installation and loading instructions (M-13153) are supplied with the kit.

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LN-23P



## POWER SOURCE

One or two LN-23P's can be connected to a DC power source (constant voltage) with a K-350 or K350-1 Adapter Kit. If two LN-23P's are connected, they can be set for different procedures but only one can be used at a time.

### LN-23P/ Power Source Combinations

1. Classic II, Classic III, Classic IIID, or SA-250 with K350-1 Adapter Kit and K623-1 Wire Feed Module.
2. Commander 300, Commander 400 or Commander 500 with K350-1 Adapter Kit.
3. Ranger 250 , Ranger 275, or Ranger 305G with K350-1 Adapter Kit.
4. CV-300, CV305, CV-400, DC-400, DC-600, DC655 or V300, V350 Pro, V450 Pro with K350-1 Adapter Kit.  
**NOTE:** The K350 must be used on power sources with terminal strip connections only.  
 K316L-2 may not require a K350-1 adapter if the power source has a Lincoln 14 pin connector.
5. SAE-400 or SAE-400 Weld 'N Air with K316L-2, K385-1, 2 CV Adapter & K350, K2379-1 Adapter Kit.  
**NOTE:** Only allows for one LN-23P feeder.  
 Gun will always be HOT when SAE-400 is running.
6. SAE-400 with a K385-1 and a K350 Adapter.  
**NOTE:** K350 will have to be powered from 120VAC receptacle (customer responsibility).  
 No remote control of weld voltage from LN-23P  
 Gun will always be HOT when SAE -400 is running
7. LN-23P (K316L-2) used with V350-Pipe does not require a K350-1 Adapter.

Power source connection diagrams:

M17323  
 M14272  
 S25869  
 S25149

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## SAFETY PRECAUTIONS

### ⚠ WARNING



**ELECTRIC SHOCK can kill.**

- Do not touch electrically live parts such as output terminals or internal wiring.

- When inching with gun trigger, electrode and drive mechanism are “hot” to work and ground and could remain energized several seconds after the gun trigger is released.
- Turn OFF input power at welding power source before installation or changing drive roll and/or guide tubes.
- Welding power source must be connected to system ground per the National Electrical Code or any applicable local codes.
- Only qualified personnel should perform this installation.

## PRODUCT DESCRIPTION

The K316L-[ ] / LN-23P is an arc voltage powered, lightweight, portable wire feed unit which includes calibrated wire speed control, voltage control, wire drive with enclosed 14 lb. wire reel, analog voltmeter and various input control and electrode cable lengths.

The LN-23P was designed specifically for Innershield pipe welding, but, with the proper electrode, can be utilized for general purpose welding.

The feeder is designed for welding with 14 pound coils of .068 and 5/64 Innershield self-shielding electrodes using a constant voltage type DC power Source. When shipped, it is internally connected for welding with electrode negative polarity (DC-). Depending upon which gun and cable is used, its rating is either 350 amps or 250 amps at 60% duty cycle.

The wire speed control has a calibrated dial plate with a range of 30 to 170 inches per minute which allows quick and easy setting of the procedure wire feed speed. The wire speed is not affected by changes in the arc voltage setting even though the wire feed circuit is powered by arc voltage. A two-position switch, mounted on the gun provides a reduced speed circuit. This allows selection of either the preset wire speed or 83% of the preset speed.

A low voltage gun trigger circuit turns both the power source output and wire feed on and off. The gun trigger

circuit is interlocked by a weld current sensing reed switch so that while welding, the gun trigger switch does not have to be held closed. The welding process is stopped by pulling the gun away from the work. The electrode remains cold until the gun trigger is operated again.

The LN-23P voltage control is used to adjust the power source output. Also included is an analog voltmeter which allows easy setting of the arc voltage at the LN-23P once the arc is established.

## LOADING THE WIRE REEL

- Lay the LN-23P flat with the wire reel cover up, unclip the rubber retaining strap, and remove the cover.
- Remove the center clamping nut and the cover plate from the wire reel.
- Unpack the 14-pound coil of wire. Be sure not to bend the side tangs of the coil liner and straighten any tangs that may have been bent.
- Place the coil on the wire reel so the coil will unwind when it rotates in a clockwise direction.
- Remove the start end of the coil from its holding slot in the coil liner, cut off the bent end, straighten the first few inches and thread it through the wire feed conduit connected to the wire enclosure until several inches of electrode are exposed. Be careful not to release the electrode until it is through the wire feed conduit; otherwise, it will unwind and tangle.
- Be sure all the lower tangs of the coil liner are flush against the back half of the wire reel and that none of the upper tangs are bent in against the coil.
- Replace the reel cover plate and the center clamping nut.
- Replace the cover of the wire reel enclosure and clip the retaining strap in place.
- Pull about 2 feet of the exposed end of the electrode through the wire feed conduit. Slide the insulator all the way up on the wire feed conduit. Make a single, free loop in the electrode and feed the end into the section of wire feed conduit connected to the gearbox. Press the gun trigger and push the electrode into the drive rolls. Release the electrode as soon as it is picked up by the drive rolls. Continue feeding electrode until the excess length is fed through the drive rolls. Watch the single loop and guide it if necessary to make certain it untwists without kinking. Do not feed electrode through the gun cable at this time. Slide the insulator down on wire feed conduit until it slips over section of conduit connected to gearbox.
- Set the unit upright on floor, straighten the gun cable, press the gun trigger, and feed electrode through the gun and cable assembly.

LN-23P

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## DRIVE ROLL PRESSURE

The drive roll pressure is pre-set at the factory for proper feeding. If the idle roll tension must be relieved temporarily, see the Maintenance Section for proper adjustment procedure.

## ADJUSTING WIRE FEED SPEED AND VOLTAGE

Set the wire feed as specified in the procedures using the calibrated dial on the back of the LN-23P control box. When the reduced wire speed switch (mounted on the gun handle) is in Position No. 1, the wire feed speed will be that which is indicated on the dial. In Position No. 2, the wire feed speed will be 83% of the figure indicated on the dial.

Set the voltage by adjusting the voltage control while welding until the voltage specified in the procedures is indicated on the meter. The meter reading with the power source on but not welding is the open circuit voltage. With some power sources, this voltage may be significantly higher than welding voltage.

When establishing initial procedures, start with the voltage control set near minimum. Strike an arc on scrap steel. If the electrode gets hot but the arc fails to start, increase the voltage settings until the arc can be established.

NEVER set the power source open circuit voltage higher than 50<sup>(1)</sup> volts. The LN-23P will not feed wire when the voltage is higher than 50<sup>(1)</sup> volts.

When using the CV Converter or the DC-600 and inching wire (not welding) at open circuit voltages below 20 volts or above 25 volts, feeding may be unsteady or the wire speed may vary from that set on the dial. This condition does not exist while welding. Minimum usable arc voltage is 14 volts.

**NOTE:** For improved readability of the voltmeter in some applications, the voltmeter guard may be installed rotated end for end. This will result in the protective bars crossing the meter face in a different location.

## MAKING THE WELD

Be sure the proper contact tip for either .068" or 5/64" wire, as appropriate, is in the gun. The thread protector should cover the external threads on the nozzle.

Loosen the insulated socket head screw on the side of the gun, rotate the gun nozzle to the position most

convenient for the particular application, and retighten the screw.

When welding, set the wire feeder on the floor or hang it near the work area as convenient. Place the LN-23P to minimize the amount of spatter falling onto it. **Always avoid sharp bends and keep the gun cable as straight as practical.**

Be sure the electrode cable, work cable, and control lead are connected and the power source is on.

Press the gun trigger to feed the electrode out of the gun. Use a visible stickout equal to the electrical stickout specified in the procedures for the wire being used.

Position the gun with the wire just off or **lightly** touching the work. Press the gun trigger to start the arc. Once the arc is established, the gun trigger can be released while welding. The gun trigger interlock circuit automatically keeps the welding process on. At the end of the weld, pull the gun away from the work.

When not welding, always store the gun in the insulated tube on the front of wire feeder.

While welding with one feeder of a two-feeder installation the electrode of the second feeder is "HOT". Only one feeder at a time can be used for welding. Do not press the gun trigger of the idle feeder while the other feeder is being used since this can shut down the feeder being used for welding.

<sup>(1)</sup> 45 volts on DC-600.

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## OPTIONAL EQUIPMENT

### GUN AND CABLE ASSEMBLIES

Type	K-355-10*	K-345-10*	K-264-8	K-361-10	K-406*
Length:	10 feet	10 feet	8 feet	10 feet	Linconditioner Gun 10 ft. (15 ft. Exhaust Hose)
Rated Welding Current:	250 Amps	350 Amps	250 Amps	350 Amps	350 Amps
Duty Cycle	60%	60%	60%	60%	60%
Electrode Sizes	.068, .072, 5/64	.068, .072, 5/64	068, .072, 5/64	068, .072, 5/64	068, .072, 5/64
Reduced Speed Switch	Std.	Std.	None	None	Std.
Sizes	5/64	5/64	5/64	5/64	5/64
Nozzle Angle	90E	90E	62E	62E	68E
Weight	7.0 lbs.	89.3 lbs.	5.2 lbs.	7.5 lbs.	16.0 lbs.

\* Recommended for pipe welding applications.

All guns include one each .068/.072 tip, 5/64 tip, and a thread protector\*\*. The K-264-8 also includes an insulated guide for 3/4" to 1-1/2" stickout. The K-361-10 also includes an insulated guide for 2" stickout.\*\* The K-406 includes an insulated guide for 2" to 1" stickout, but no thread protector.

### K350 ADAPTER KIT

Required when using the LN-23P on any constant voltage power source. Either one or two LN-23P's can be connected to the Adapter. If two LN-23P's are connected, they can be set for different procedures. The Adapter circuit is interlocked so only one LN-23P can be used at a time.

#### K350-1 Adapter Kit

The K350-1 is similar to the K350 but has a 14 pin connector on the end of the control cable that will interface with any Lincoln power source that utilizes a 14 pin connector for control.

**Note:** A **K350 Adapter Kit** is not required when connecting a LN-23P / K316I-2 (8pin connector) to a V350-Pipe, V350PRO or V450PRO.

### K-276 ENCLOSED WIRE REEL SUPPORT

Bolts to the LN-23P frame for feeding wire from standard 50 lb. Innershield coils. Includes enclosure and door to keep the dirt out; also includes wire reel brake assembly.

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## SAFETY PRECAUTIONS

### ⚠ WARNING

Have qualified personnel do the maintenance work. Turn the engine off before working inside the machine. 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.



#### ELECTRIC SHOCK can kill.

- Do not touch electrically live parts or electrode with skin or wet clothing.
- Insulate yourself from work and ground
- Always wear dry insulating gloves.

See additional warning information throughout this operator's manual and the Engine manual as well.

### REPLACING OR REVERSING DRIVE ROLLS (See Figure D.1)

Loosen idle roll tension screw (Item 1) to release pressure between idle roll and drive rolls.

Remove hex head screw (Item 2) with a 1/2" wrench and remove the drive roll clamping collar (Item 3).

Remove drive rolls from shaft.

Wipe the drive roll surfaces clean. Then install new drive rolls. If reversing drive rolls, turn drive rolls over so unworn teeth face each other.

Replace clamping collar and hex head screw.

Tighten the idle roll tension screw until it bottoms and then back it out two complete turns. If feeding problems persist, do not increase the tension. check for other issues such as the wire spool binding or a dirty or damaged gun cable

### REMOVING IDLE ROLL ASSEMBLY

Remove the idle roll tension screw (Item 1), tension spring retainer (Item 4), and tension spring (Item 5).

Pivot the idle roll assembly away from the gearbox and lift it off the pivot pin (Item 6).

To re-assemble, replace idle roll assembly, tension spring, retainer, and tension screw. Adjust the tension screw as described above.

### GUN AND CABLE MAINTENANCE

Remove spatter from tip after each ten minutes of arc time or as required.

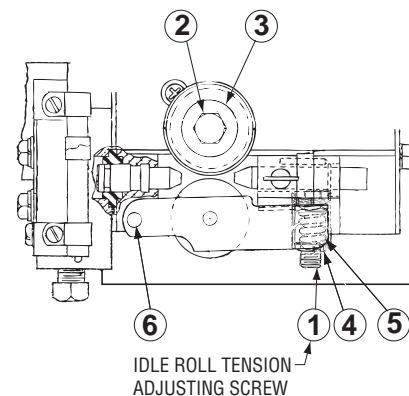
Replace worn contact tips and thread protectors as required.

Replace worn spring liners in nozzles. The life of the spring can be doubled by rotating it 180°.

Clean cables after using approximately 300 pounds of electrode. Remove the cable from the wire feeder and lay it out straight on the floor. Remove the contact nozzle tip from the gun. Using an air hose and only partial pressure, gently blow out the cable from the gun end. (Too much pressure at the start will cause the dirt to form a plug.) Flex the cable over its entire length and again blow out the cable. Repeat this procedure until no further dirt comes out.

Before any gun is disassembled, remove unit from the wire feeder or shut off the power source.

FIGURE D.1



### WIRE DRIVE ASSEMBLY MAINTENANCE

Every 500 pounds of electrode, the drive roll section should be inspected and cleaned out if necessary. Do not use a solvent for cleaning the idle roll as it may wash lubricant out of the bearing.

Replace drive rolls as required. Drive rolls should be worn on both sides before replacing. See "A" of this section.

Check the motor brushes every six months. Replace if they are less than 1/4" long.

Every year examine the gear box and paint the gear teeth with moly-disulfide filled grease.

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**CIRCUIT PROTECTION**

**Circuit Breaker** – The 3.5 amp circuit breaker located on the rear of the unit normally trips only when an overload occurs because of excessive loading in the wire feed cable or a defective motor or control components. After allowing a few minutes for cooling, push the reset button and weld. If it trips again, be sure the gun cable is not being excessively bent, is clean, and is the proper size for the wire diameter being fed. If it still trips, look for a defective electrical component.

**NAMEPLATES**

Whenever routine maintenance is performed on this machine — or at least yearly — inspect all nameplates and labels for legibility. Replace those which are no longer clear. Refer to the parts list for the replacement item number.

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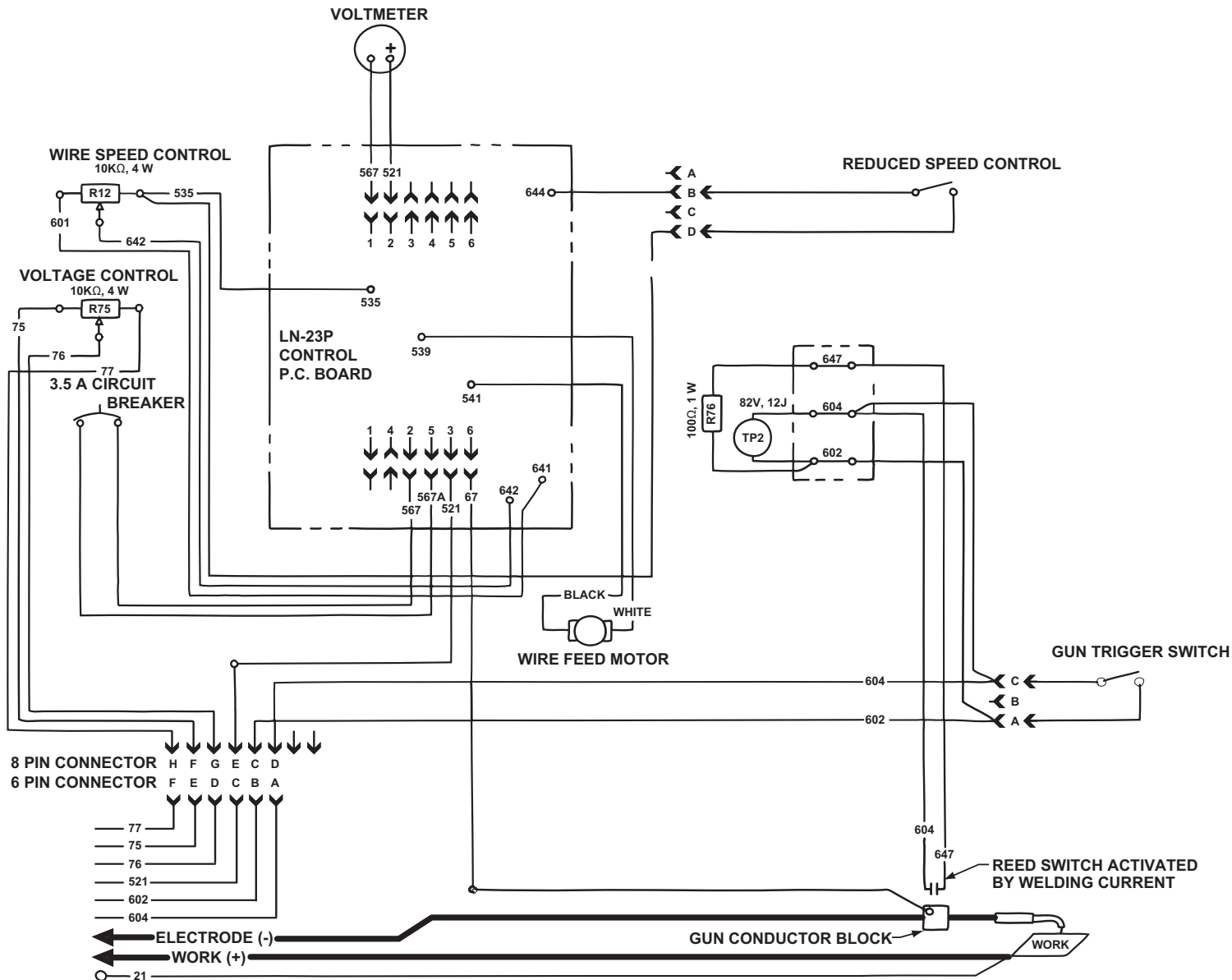
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**FIGURE E.1 GENERAL DIAGRAM**



LN-23P



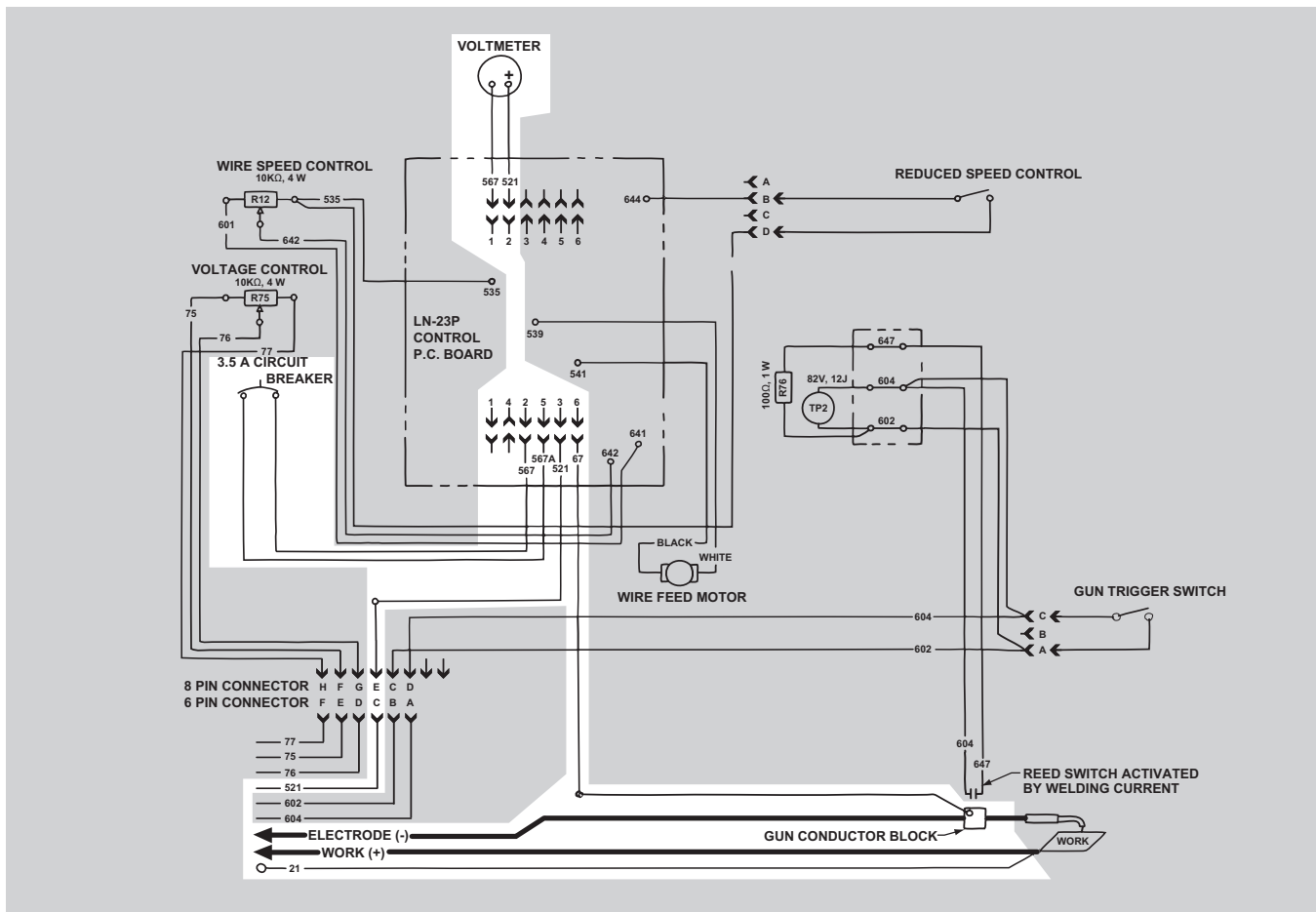
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FIGURE E.2 – INPUT POWER CIRCUIT.



## GENERAL DESCRIPTION

The LN-23P is an Arc Voltage powered, lightweight, portable wire feed unit which includes calibrated wire speed control, voltage control, and wire drive with an enclosed 14 lb. wire reel, analog voltmeter and various input control and electrode cables.

The LN-23P was designed specifically for Innershield pipe welding, but, with the proper electrode, can be utilized for general purpose welding. The machine is internally connected for negative polarity (DC-). It will feed .068 or 5/64 Innershield wire using one of several different gun cable assemblies. It is designed to be used with any Lincoln constant voltage (CV) power source that is suited to the operating range of those wires.

Other features include a Wire Speed Reduction Switch and a trigger interlock circuit which will be discussed in more detail.

## INPUT POWER CIRCUIT

The DC arc voltage from the power source is applied to the LN-23P by way of the electrode cable (-) and the Work Sensing Lead (+). Typically the work connection is through the control cable of the K350 Adapter. If no adapter is used the connection is through the power source. The voltage is then coupled to the Control Board at lead 67 and 521.

The electrode circuit (lead #67) is routed out of the board (lead #567) to the 3.5 amp circuit breaker and back to the board (lead 567A). The Circuit Breaker provides protection for the board from motor overload.

Leads 567 and 521 are routed through the Control Board to the Voltmeter. See Figure E.2.

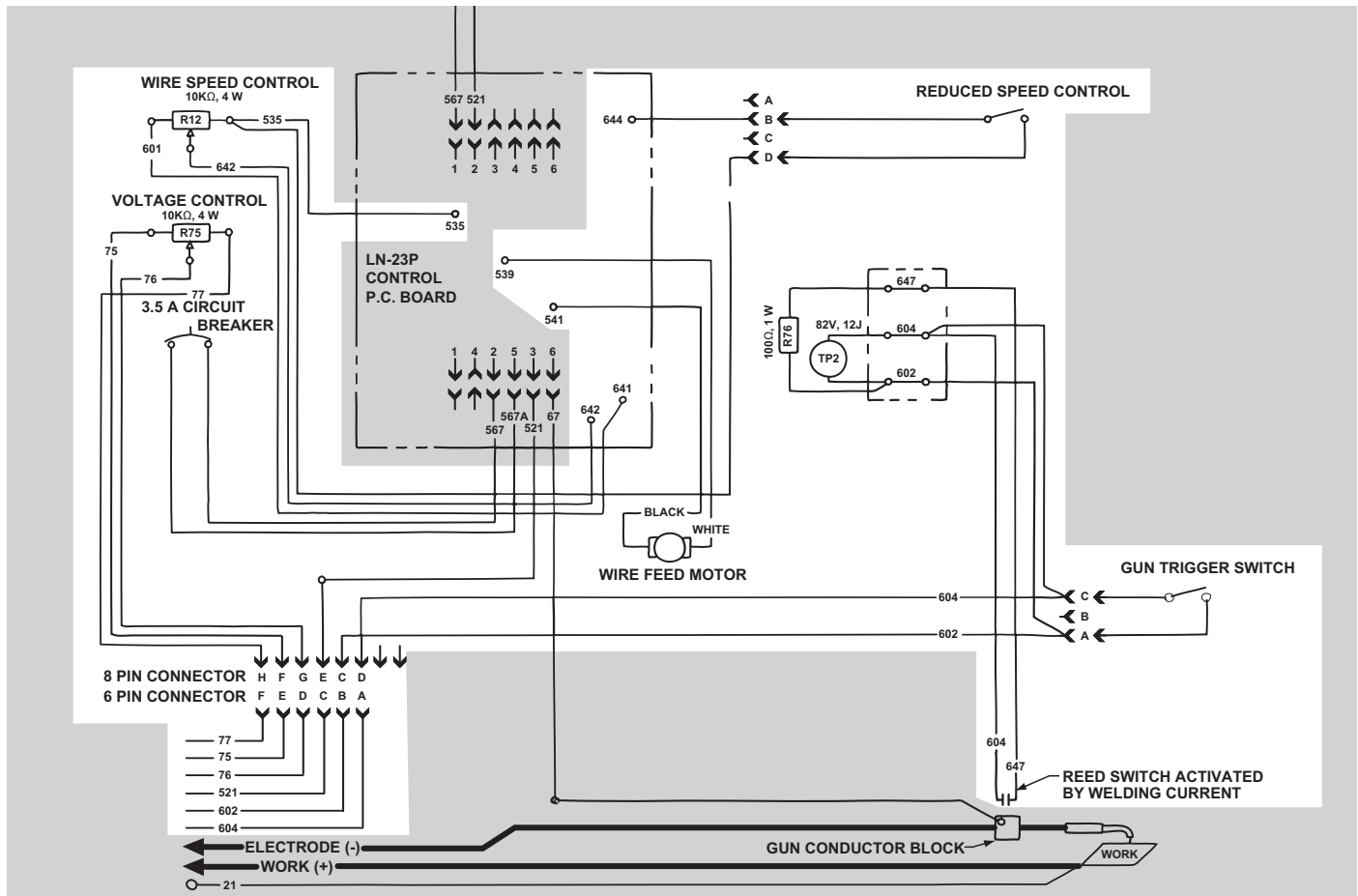
**NOTE:** Unshaded areas of block logic diagrams are the subject of discussion.

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FIGURE E.3 – CONTROL CIRCUITS.



## CONTROL CIRCUIT OPERATION

### VOLTS AND SPEED CONTROL CIRCUITS

The Voltage Control is connected directly to the K350 Adapter or the power source (if no adapter is required) by leads 75, 76 & 77. It can be adjusted while welding to provide the voltage called for by the weld procedure.

The wire feed speed is controlled by signals to the Control Board from the Speed Control and the Reduced Speed Switch. The Wire Speed Control is calibrated and can be preset to the desired value. The speed will remain at the set value regardless of arc voltage as long as the Reduced Speed Switch is in Position 1 (open).

When the Reduced Speed Switch is in Position 2 (closed) the speed will be reduced to 83% of the set speed. This switch is to facilitate welding if the root opening changes or to reduce “sagging” of the weld metal as the operator approaches the bottom of a pipe joint. The switch may be changed to either position while welding as needed without stopping or breaking the arc.

### TRIGGER AND INTERLOCK CIRCUIT

The gun trigger (leads 602 & 604) is connected to the 24VAC circuit from the K350 Adapter, or the low voltage output control circuit (#2 & #4) of the power source if no K350 is required.

Once the trigger is closed the wire starts feeding. When the arc is established, the reed switch closes (leads 647 & 604) and the trigger is bypassed or “interlocked”. This feature allows the operator to release the trigger once the weld has begun to help eliminate fatigue.

The reed switch is a magnetically operated device that is mounted on a bracket above the block where the gun connects to the feeder. It responds to the magnetic field that is present due to the weld current flowing through the gun cable.

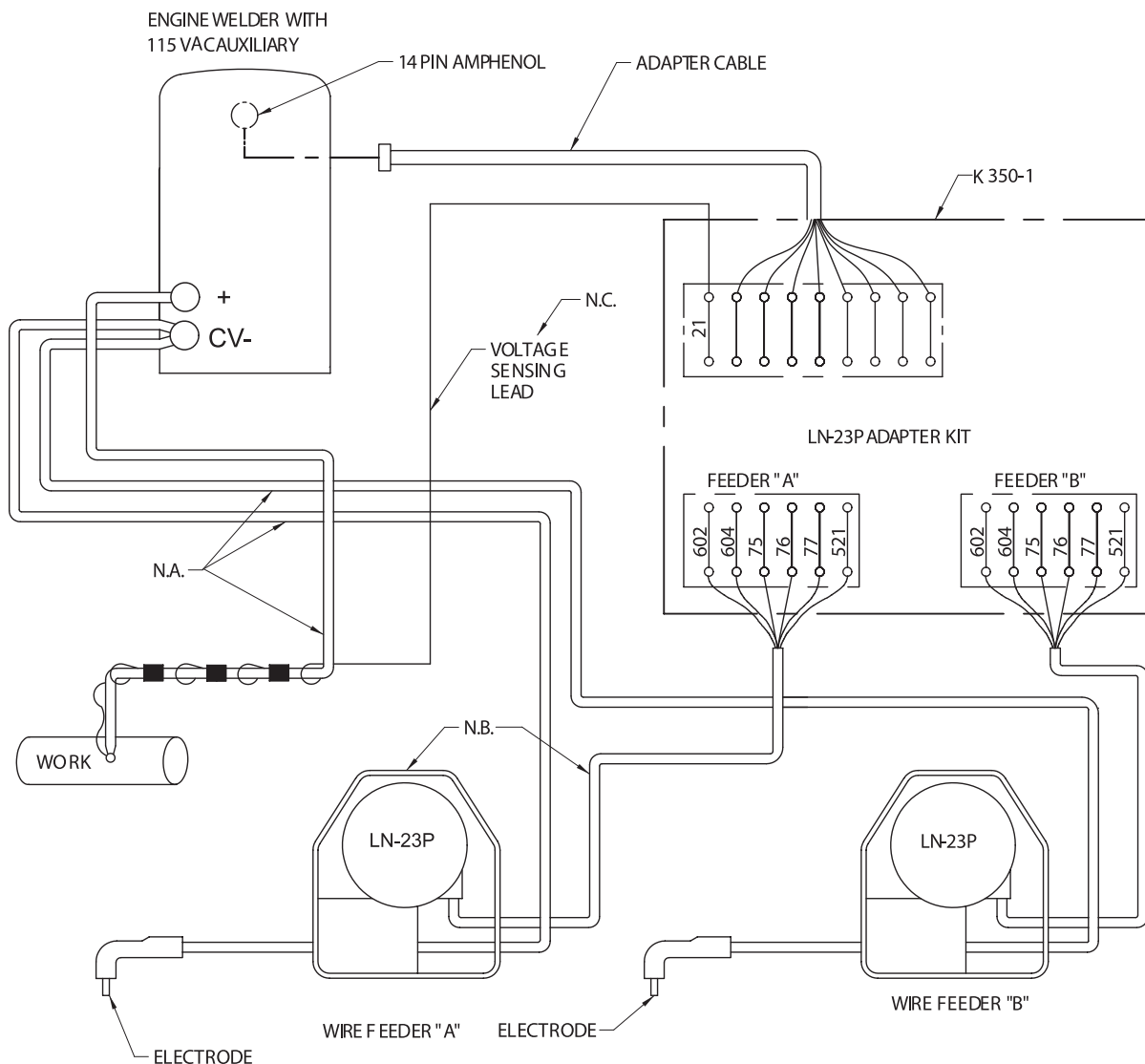
To stop welding, the operator must physically pull the gun away from the weld, thus stopping current flow and releasing the reed switch. See Figure E.3.

**NOTE:** Unshaded areas of block logic diagrams are the subject of discussion.

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FIGURE E.4 – OPTIONAL CIRCUITS.



## OPTIONAL CIRCUITS

### K350 / K350-1 ADAPTER KITS

The K350 Adapter kits are used to interface one or two LN-23P feeders to a Lincoln CV power source. Figure E.4 shows a typical two feeder connection using a K350-1. If only one feeder is used it must be connected to the "Feeder A" terminal strip.

NOTE: Many of the newer power sources allow a single feeder to be connected without using an adapter kit. See the connection diagrams in Section G.

### **⚠ WARNING**

In a two feeder system, both guns will be 'HOT' when either gun is triggered

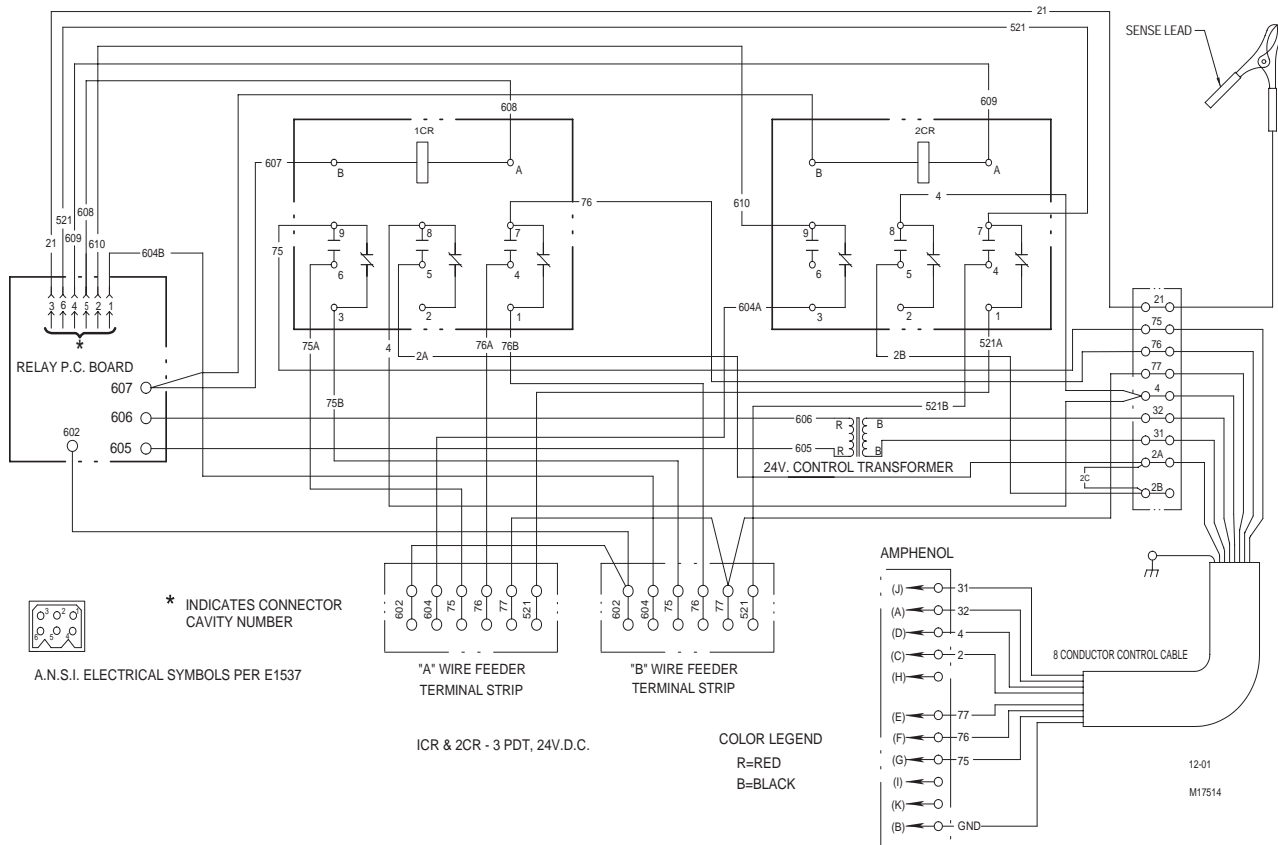
In a two feeder system, triggering the second gun while one is welding may cause the feeder in use to shut down.

**NOTE:** Unshaded areas of block logic diagrams are the subject of discussion.

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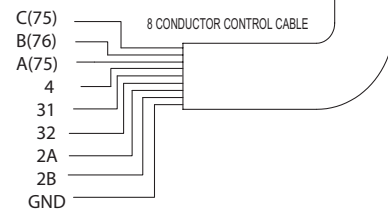
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FIGURE E.5 K350-1 DIAGRAM



K350 Control Cable - for use with power sources that do not have a 14 pin Amphenol connector

FIGURE E.5.a



K350 / K350-1ADAPTER KITS (cont.)

The wiring diagram in Figure E.5 shows the internal connections that allow the voltage control, the welder output (contactor) control and the Work Sense Lead (#21) to be switched from one feeder to the other.

The Relay Board and the two relays (1CR & 2CR) connect the feeder that has been triggered to the power source through the control cables. See the K350 Machine Schematic in Section G for a better understanding of the relay logic.

The 24 volt control transformer provides power for the Relay Board and the relays. It is also the low voltage trigger circuit supply for the LN-23P.

The K350 is basically the same as the K350-1 except the Control Cable to the power source has leads with terminals. (Figure E.5.a). It is designed to be used with power sources that have a terminal strip for the wire feeder connection rather than a 14 pin connector.

NOTE: Unshaded areas of block logic diagrams are the subject of discussion.

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## WARNING



### **ELECTRIC SHOCK can kill.**

- Never work on the inside of the machine without removing the input power. You can receive a life threatening electrical shock if you fail to do this. Only qualified technicians should perform installation, maintenance, and troubleshooting work on the machine.
-

## How To Use Troubleshooting Guide

### WARNING

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

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

**Step 1. LOCATE PROBLEM (SYMPTOM).** Look under the column labeled "PROBLEM" (SYMPTOMS). This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into three main categories: Output Problems, Function Problems and LED Function 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.

### IMPORTANT TROUBLESHOOTING TIPS:

The most common problem in multiple machine installations is proper routing of the Weld cables, control cables and remote sense leads. See the information in Section A of this manual or in the Operator's Manual (IM848).

When trying to troubleshoot an AC/DC 1000 that is in a multi arc, tandem and/or parallel weld cell set up, it would be an advantage to use a known good welder, wire feed head, or PF10A controller to help isolate the problem with the system. If replacing a component eliminates the problem, the weld cell can be re-started and the defective unit can possibly be repaired outside of the working weld cell. This can help to minimize down time.

**Note:** It is good practice to record the dip switch

arrangement before any changes are made. If the machine is to be returned to the same location, the proper re-setting the switches will help facilitate the installation. When working on welders that have been in a multi-arc or parallel set-up, the dip switches on the control board & ethernet board will have to be re-configured to the factory "default" settings for Single arc applications. The dip switch information can be found in Section A of this manual or in the Operator's Manual (IM-848) under the heading "Internal Controls".

Once the welder is set for a single arc application, troubleshooting can be done with a single PF10A controller and , PF10S feed head or with the diagnostic software that is packaged with the Power Wave AC/DC 1000.

### CAUTION

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

# TROUBLESHOOTING & REPAIR

## PC BOARD TROUBLESHOOTING PROCEDURES

### ⚠ WARNING



#### ELECTRIC SHOCK can kill.

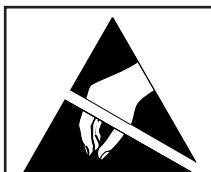
- Have an electrician install and service this equipment. Turn the input power OFF at the fuse box before working on equipment. Do not touch electrically hot parts.

### ⚠ CAUTION

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

# TROUBLESHOOTING AND REPAIR

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FEEDING PROBLEMS</b>		
Major physical or electrical damage is evident when the sheet metal covers are removed.		Contact the Lincoln Electric Service Department at 1-888-935-3877.
Motor does not run. No Voltage on the Voltmeter	<ol style="list-style-type: none"> <li>1. Check for power source output.</li> <li>2. Remote Sensing lead not connected to work or broken.</li> <li>3. Control Cable to Adapter Kit misconnected or defective.</li> <li>4. Defective Adapter Kit</li> </ol>	<ol style="list-style-type: none"> <li>1. If OK, continue to Step 2.</li> <li>2. Check continuity of sense lead circuit. See <b>Wiring Diagram</b>.  If meter reads backwards, polarity is wrong. Reverse polarity of power source. The LN23P must run on Electrode Negative.</li> <li>3 Check continuity of the control cable.</li> <li>4. See the <b>K350 Adapter test</b>.</li> </ol>
Motor does not run. OCV is indicated on the meter.	<ol style="list-style-type: none"> <li>1. OCV must be at least 14 VDC.  NOTE: Code 9085 OCV must be less than 50vdc (45Volts on DC600).</li> <li>2. Circuit Breaker tripped.</li> <li>3. Defective gun trigger or control leads.</li> <li>4. Possible defective Control Board</li> <li>5. Defective Adapter Kit or Control cable</li> <li>6. Defective Motor or gearbox.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust power source output accordingly. If OCV cannot be adjusted below 50 vdc, Code 9085 machines must be upgraded with a new Control Board.</li> <li>2. Reset breaker. If it trips again, check the wire feed system for restrictions. Perform the <b>Gun Test</b>.</li> <li>3. Check the trigger circuit continuity. See the <b>Wiring Diagram</b>.</li> <li>4. Perform the <b>Wire Feeder Test</b></li> <li>5. <b>See the K350 Adapter test</b>.</li> <li>6. See <b>Feed Head test</b>.</li> </ol>

## ⚠ CAUTION

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

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# TROUBLESHOOTING AND REPAIR

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<b>FEEDING PROBLEMS (cont.)</b>		
Drive rolls turn but wire does not feed or feed is erratic.	<ol style="list-style-type: none"> <li>1. Gun cable is excessively bent or is dirty.</li> <li>2. Weld wire tangled or binding in wire reel enclosure.</li> <li>3. Worn drive rolls.</li> <li>4. Improper drive roll tension.</li> </ol>	<ol style="list-style-type: none"> <li>1. Straighten gun and clean if necessary. Perform <b>Gun Test</b>.</li> <li>2. Open Cannister and if necessary cut and reload wire.</li> <li>3. Reverse or replace. Refer to Section D.</li> <li>4. Reset tension . Refer to Section D.</li> </ol>
Improper speed control.	<ol style="list-style-type: none"> <li>1. Defective potentiometer, Control Board or motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform <b>Potentiometer Test</b>, <b>Wire Feeder Test</b> and <b>Feed Head Test</b>.</li> </ol>
Erratic arc action.	<ol style="list-style-type: none"> <li>1. Incorrect speed or voltage setting.</li> <li>2. Worn contact tip.</li> <li>3. Poor connections in weld circuit or weld cables too small.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check procedures.</li> <li>2. Replace.</li> <li>3. Repair or replace weld cables</li> </ol>
<b>OUTPUT PROBLEMS</b>		
Cannot obtain desired voltage.	<ol style="list-style-type: none"> <li>1. Power Source defective or set improperly.</li> <li>2. Defective control cable from LN-23P to Adapter or from Adapter to power source.</li> <li>3. Defective voltage control rheostat.</li> <li>4. Defective K350 Adapter</li> </ol>	<ol style="list-style-type: none"> <li>1. Make sure power source is set for remote control and CV mode. NOTE: SAM 400 &amp; 650 CV controls will always affect the output voltage.</li> <li>2. Check continuity of voltage control circuit, leads 75,76,&amp;77 (A,B,&amp;C) from feeder to power source.</li> <li>3. Perform <b>Potentiometer Test</b>.</li> <li>4. See the <b>K350 Adapter test</b></li> </ol>

## ⚠ CAUTION

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

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# TROUBLESHOOTING AND REPAIR

Observe Safety Guidelines detailed in the beginning of this manual.

## K350 ADAPTER PROBLEMS

Since the K350 (-1) adapter is the communication link between the feeder and the power source, symptoms that seem to indicate a defective feeder may be due to a defective adapter or control cable. If a working feeder and cable is available, connecting it will help to isolate the problem. If this is not convenient, either replace the adapter or follow the troubleshooting steps for the K350.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
<p>Motor won't run. No voltage on the meter. Feeder checks OK and power source has output.</p> <p>NOTE: Symptoms on this page assume that the LN-23P is connected to Feeder "A" terminal strip</p>	<ol style="list-style-type: none"> <li>1. Disconnect the Work Sensing lead from the terminal strip and with power applied to the K350, check for continuity from the #21 terminal to #521 on Feeder "A" Terminal strip.</li> <li>2. Check for 24VAC at terminals 605 &amp; 606 at PC Board.</li> </ol>	<ol style="list-style-type: none"> <li>1. If reading is 0 ohms, check the control cable to the LN-23P.</li> <li>2. If the voltage is 0, <b>check for 120vac at terminals #31 &amp; #32.</b></li> <li>3. Make sure the power source is supplying 120vac to the cable.</li> <li>4. Perform the <b>K350 Adapter test.</b></li> </ol>
<p>Motor won't run when trigger is pulled. OCV shows on voltmeter.</p>	<ol style="list-style-type: none"> <li>1. Temporarily jumper #602 from terminal strip to #610.</li> </ol>	<ol style="list-style-type: none"> <li>1. If motor runs, check connections to relay. Replace 2CR relay.</li> </ol> <p>If motor does not run check leads 602 &amp; 604 from terminal strip to PC Board and to 2CR.</p>
<p>No voltage control or cannot obtain desired voltage.</p>	<ol style="list-style-type: none"> <li>1. Run test with the power source in 'LOCAL' control.</li> <li>2. Check the Voltage Control potentiometer.</li> </ol>	<ol style="list-style-type: none"> <li>1. If desired voltage can be achieved; <ul style="list-style-type: none"> <li>• Check cable from power source to adapter.</li> <li>• Check connections from Feeder "A" terminal strip to 1CR.</li> </ul> </li> <li>2. Perform the <b>Potentiometer test.</b></li> </ol>
<p>Feeder A works OK, Feeder B does not</p>	<ol style="list-style-type: none"> <li>1. Make sure 2CR relay operates when Feeder "B" trigger is pulled.</li> </ol>	<ol style="list-style-type: none"> <li>1. If relay does not operate: <ul style="list-style-type: none"> <li>• Check wiring from Feeder "B" terminal strip.</li> <li>• Perform <b>the K350 Adapter test.</b></li> </ul> </li> </ol>

### ⚠ CAUTION

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

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# TROUBLESHOOTING AND REPAIR

## WIRE FEEDER TEST



### WARNING

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

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

**NOTE:** The procedures and tests described in this manual are written with the understanding that the repair technician fully understands the process of locating and accessing (within the welding machine) the specific board or device involved in each procedure or test.

---

### TEST DESCRIPTION

This test will determine if the wire feeder is functional

### MATERIALS NEEDED

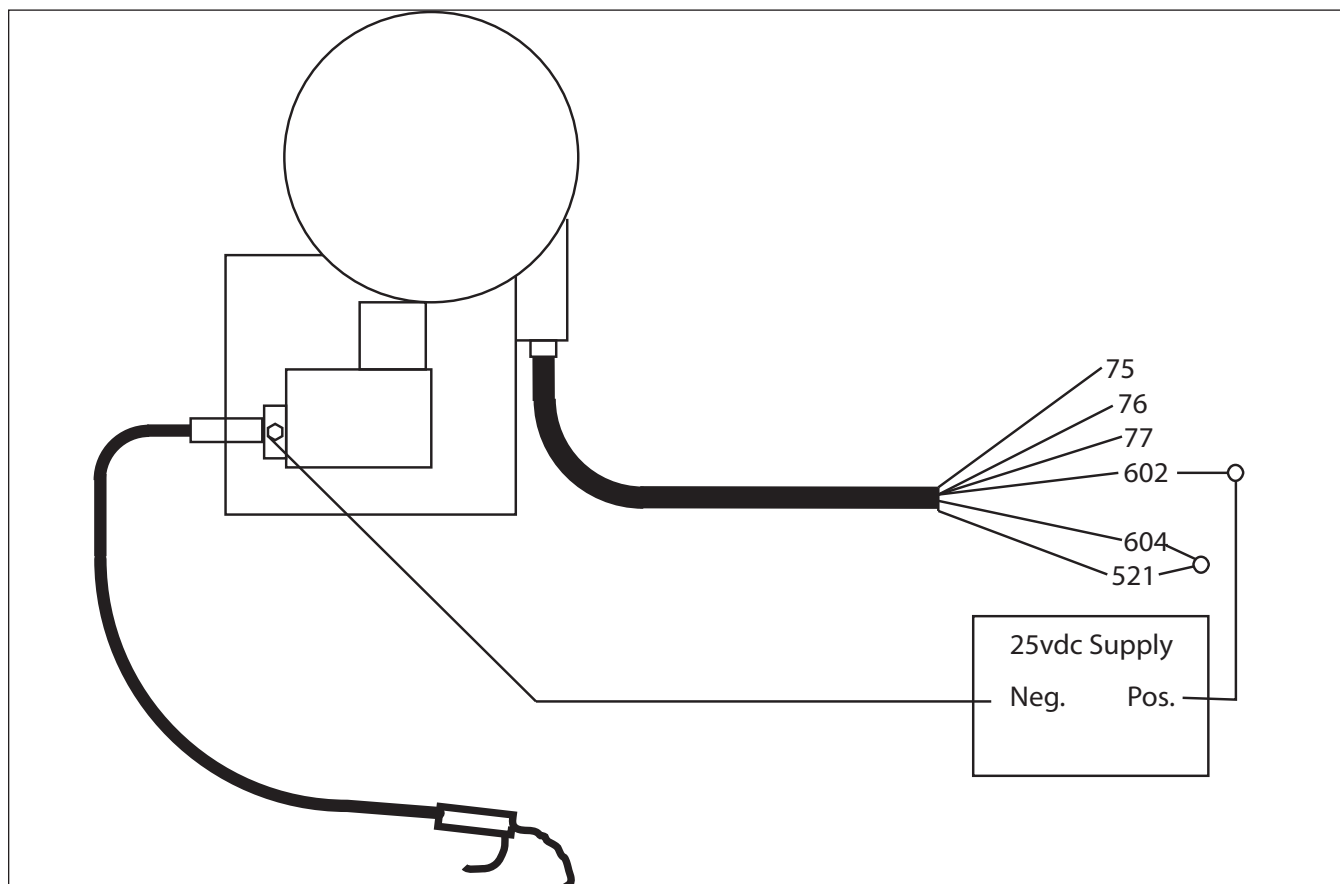
Volt/Ohmmeter  
DC voltage source (24 to 48 Volt / 5amp)  
Misc. Hand Tools

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## WIRE FEEDER TEST (cont.)

FIGURE F.1 FEEDER TEST SET-UP



## TEST PROCEDURE

- Remove the welding wire from the drive rolls. Be careful not to release the loose end to prevent tangling.
- Connect leads 521 and 604 together.
- Connect the DC Power Supply as shown:  
Positive to Lead 602  
Negative to the Electrode Conductor Block.
- Turn on the Power Supply and close the Gun Trigger. The motor should run and the Wire Feed Speed control should vary the speed smoothly from MIN (30 ipm) to MAX (170 ipm).
- Move Reduced Speed Switch to Position 2 and see that motor speed decreases.
- If the motor does not run or runs badly:  
A. Check the trigger circuit. (See **Gun Test**).  
B. Perform the **Feed Head Test**.  
C. Check the wire speed control. (See the **Potentiometer Test**).
- If the gun, the motor and the wire speed control check OK, the Control Board may be defective.
- Perform the **Calibration Check**.
- With an ohmmeter, check the control leads:  
75 to 77 = 10k $\Omega$   
75 to 76 = 0 to 10k $\Omega$  as Volts control is varied.  
77 to 76 = 0 to 10k $\Omega$  as volts control is varied.  
If readings are not correct, check the cable and/or perform the Potentiometer test.

## GUN TEST



### WARNING

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

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

**NOTE:** The procedures and tests described in this manual are written with the understanding that the repair technician fully understands the process of locating and accessing (within the welding machine) the specific board or device involved in each procedure or test.

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### TEST DESCRIPTION

This test will determine if the gun cable assembly is functioning correctly.

### MATERIALS NEEDED

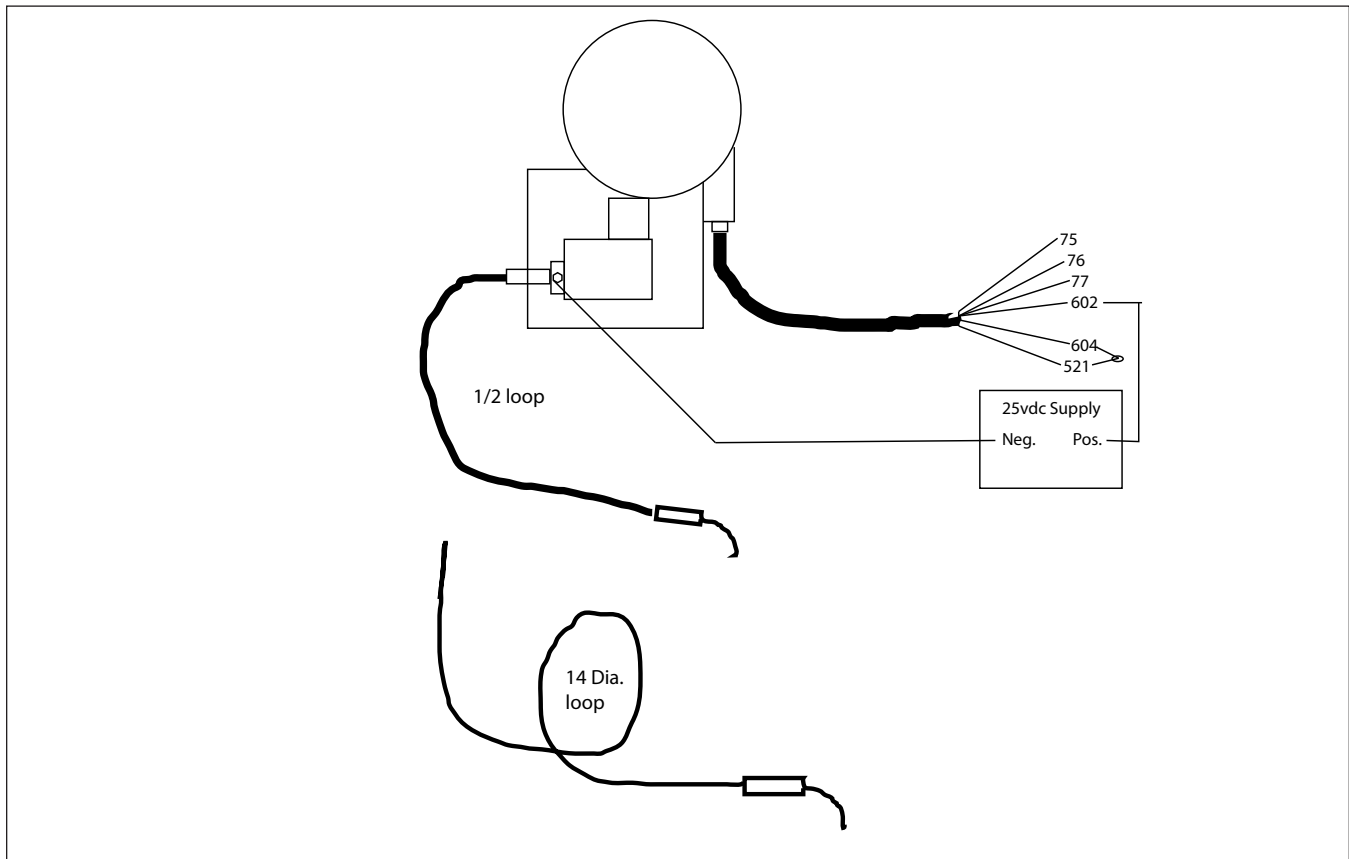
Volt/Ohmmeter with Amp Probe  
Misc. Hand Tools

LN-23P



## GUN TEST (cont.)

FIGURE F.2 GUN CABLE TESTS



## TEST PROCEDURE

## 1. To check the Gun Trigger:

- Disconnect the three pin (lower) Amphenol connector from the feeder.
- Use an ohmmeter to check for continuity between pins A & C of the cable connector.  
Trigger open = Infinity (no continuity).  
Trigger closed = 0 ohms (continuity).

## 2. To check the Reduced Speed Switch:

- Disconnect the four pin (upper) Amphenol connector from the feeder.
- Use an ohmmeter to check for continuity between pins B & D of the cable connector.  
Position 1 = Infinity (no continuity).  
Position 2 = 0 ohms (continuity).

If any of the above readings are incorrect, that switch or cable is defective.

## 3. To check the Wire Feed cable:

- Connect a DC Power Supply to the LN-23P. See **Wire Feeder** Test.
- With the gun connected to the feeder and laying out straight, feed wire through the cable until several inches protrudes from the contact tip.
- Clamp an ammeter probe around one of the motor wires (541 or 539).
- Set the Wire Speed at MAX and feed wire with the cable as shown in Figure F.2, Test A and Test B and monitor the motor current.

Test A - 1/2 loop >1.0 amps.

Test B - 14" loop >2.3 amps.

If current readings are too high, clean cable (see Maintenance Section) and retest. If still too high, replace the gun.

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## FEED HEAD TEST



### WARNING

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

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

**NOTE:** The procedures and tests described in this manual are written with the understanding that the repair technician fully understands the process of locating and accessing (within the welding machine) the specific board or device involved in each procedure or test.

---

### TEST DESCRIPTION

This test will determine if the motor and gearbox are functioning correctly.

### MATERIALS NEEDED

Volt/Ohmmeter with Amp Probe  
DC voltage source (12 to 48 Volt / 5amp)  
Misc. Hand Tools

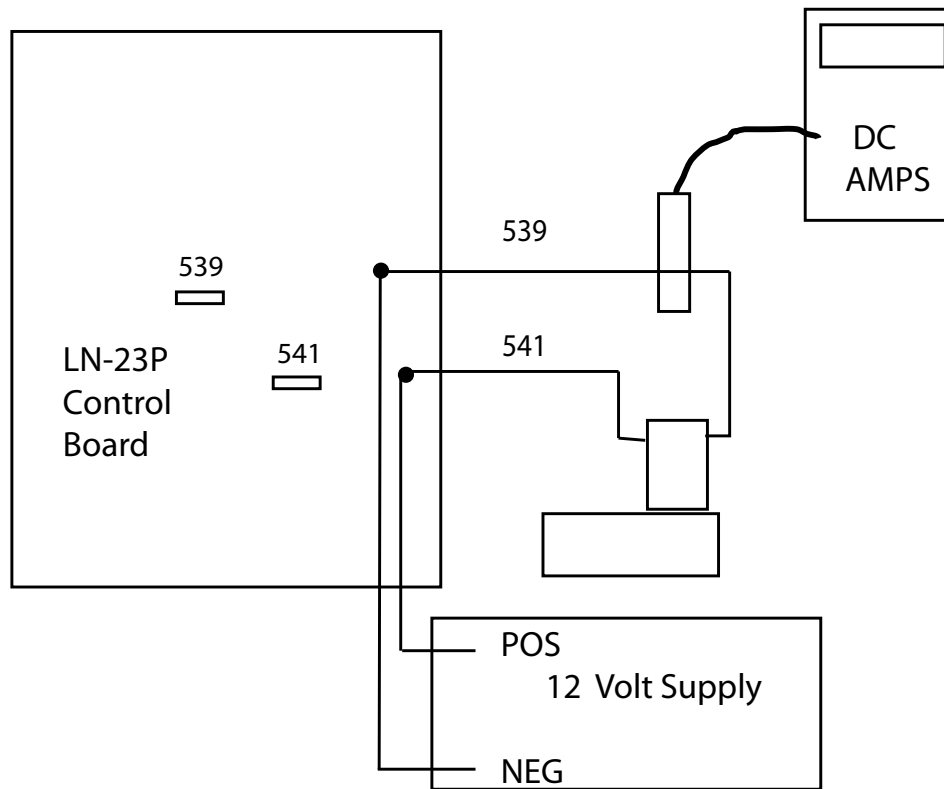
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## FEED HEAD TEST (cont.)

FIGURE F.3



## TEST PROCEDURE

1. Remove the weld wire from the drive rolls.
2. Disconnect the motor leads, 541 and 539, from the Control Board and clamp an amp probe around one of the leads.  
NOTE: A DC ammeter may be connected in series with a motor lead if a current probe is not available.
3. Connect a 12 VDC supply to the motor leads - Positive to lead 541 and Negative to lead 539.

The drive rolls should turn and run smoothly and the motor current should be less than 1 amp. If so the feed head is OK.

If the drive rolls do not turn, and the ammeter shows no current, check the brushes for excessive wear. Insure that they move freely in the brush holders and are contacting the armature.

If drive rolls do not turn but the ammeter indicates current flow, remove the motor from the gearbox and repeat the test.

If the motor still does not run it is defective. If it runs properly there is probably something wrong in the gearbox.

If the drive rolls turn but not smoothly check the motor and brushes as indicated. If OK replace the gearbox.

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## POTENTIOMETER TEST



### WARNING

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

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

**NOTE:** The procedures and tests described in this manual are written with the understanding that the repair technician fully understands the process of locating and accessing (within the welding machine) the specific board or device involved in each procedure or test.

---

### TEST DESCRIPTION

This test will determine if the Speed and Voltage Controls are functioning correctly.

### MATERIALS NEEDED

Volt/Ohmmeter (Analog meter preferred)

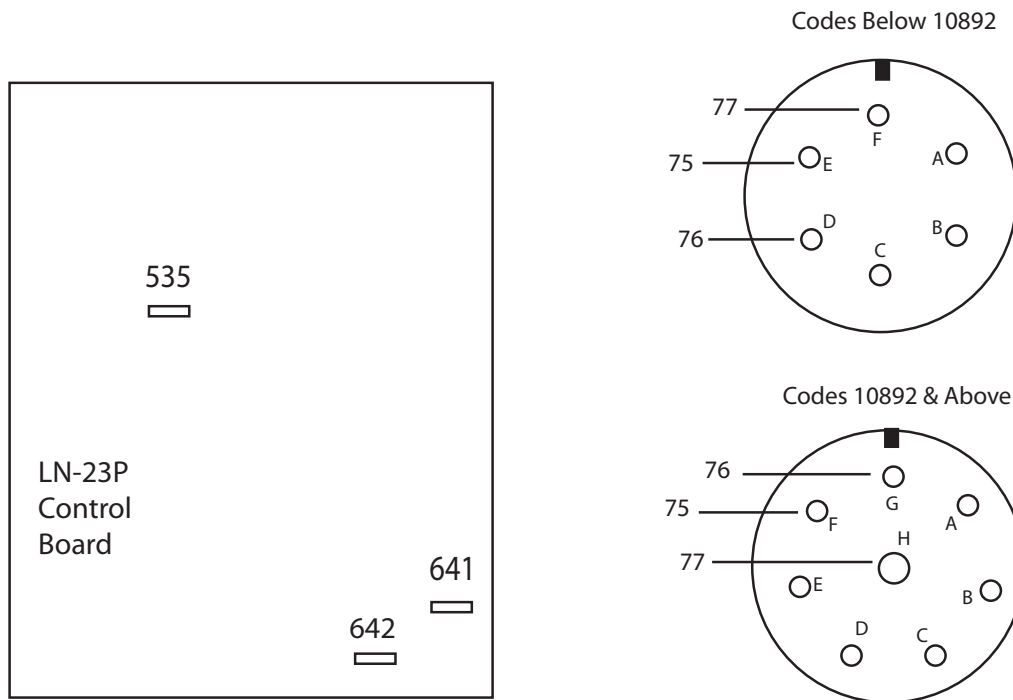
Misc. Hand Tools

LN-23P



## POTENTIOMETER TEST (cont.)

FIGURE F.4



## TEST PROCEDURE

## WIRE SPEED CONTROL POTENTIOMETER

1. Disconnect leads 641, 642 and 535 from the Control Board. (See Figure F.4)
  - a. Check resistance between lead 535 and lead 641 for a reading of  $10k\Omega \pm 10\%$ . A low reading or an 'open' reading indicates a defective potentiometer.
  - b. Connect the ohmmeter to leads 641 and 642, and rotate the control slowly from min to max speed setting. The meter should vary smoothly from  $10k\Omega$  to  $0\Omega$ .
  - c. Repeat test 'b' with meter connected to leads 642 and 535. Any irregularity or 'skipping' in the meter reading indicates a defective potentiometer.
  - d. Check all three leads to the potentiometer case. Reading must be  $>500k\Omega$ .

VOLTAGE CONTROL POTENTIOMETER  
For codes above 10892 (8 pin connector)

1. Disconnect the Control Cable from the back of the feeder.
 

NOTE: See Figure F.4 for Pin locations

  - a. Check resistance from Pin F(75) to Pin H (77) of the box connector for a reading of  $10k\Omega \pm 10\%$ . A low reading or an 'open' reading indicates a defective.
  - b. Connect the meter from Pin F(75) to Pin G(76) and rotate the control slowly from min to max voltage setting. The meter should vary smoothly from  $0\Omega$  to  $10k\Omega$ s.
  - c. Repeat test 'b' with meter connected to Pins G and H. Any irregularity or 'skipping' in the meter reading indicates a defective potentiometer.
  - d. Check all three leads to the potentiometer case. Reading must be  $>500k\Omega$ .

**NOTE: Codes below 10892 have a 6 pin connector. Test points will be pins E(75), D(76) and F(77)**

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## K350(-1) ADAPTER TEST



### WARNING

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

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

**NOTE:** The procedures and tests described in this manual are written with the understanding that the repair technician fully understands the process of locating and accessing (within the welding machine) the specific board or device involved in each procedure or test.

### TEST DESCRIPTION

This test will determine if the K350(-1) is functioning correctly.

### MATERIALS NEEDED

Volt/Ohmmeter

120VAC Supply

Misc. Hand Tools

LN-23P

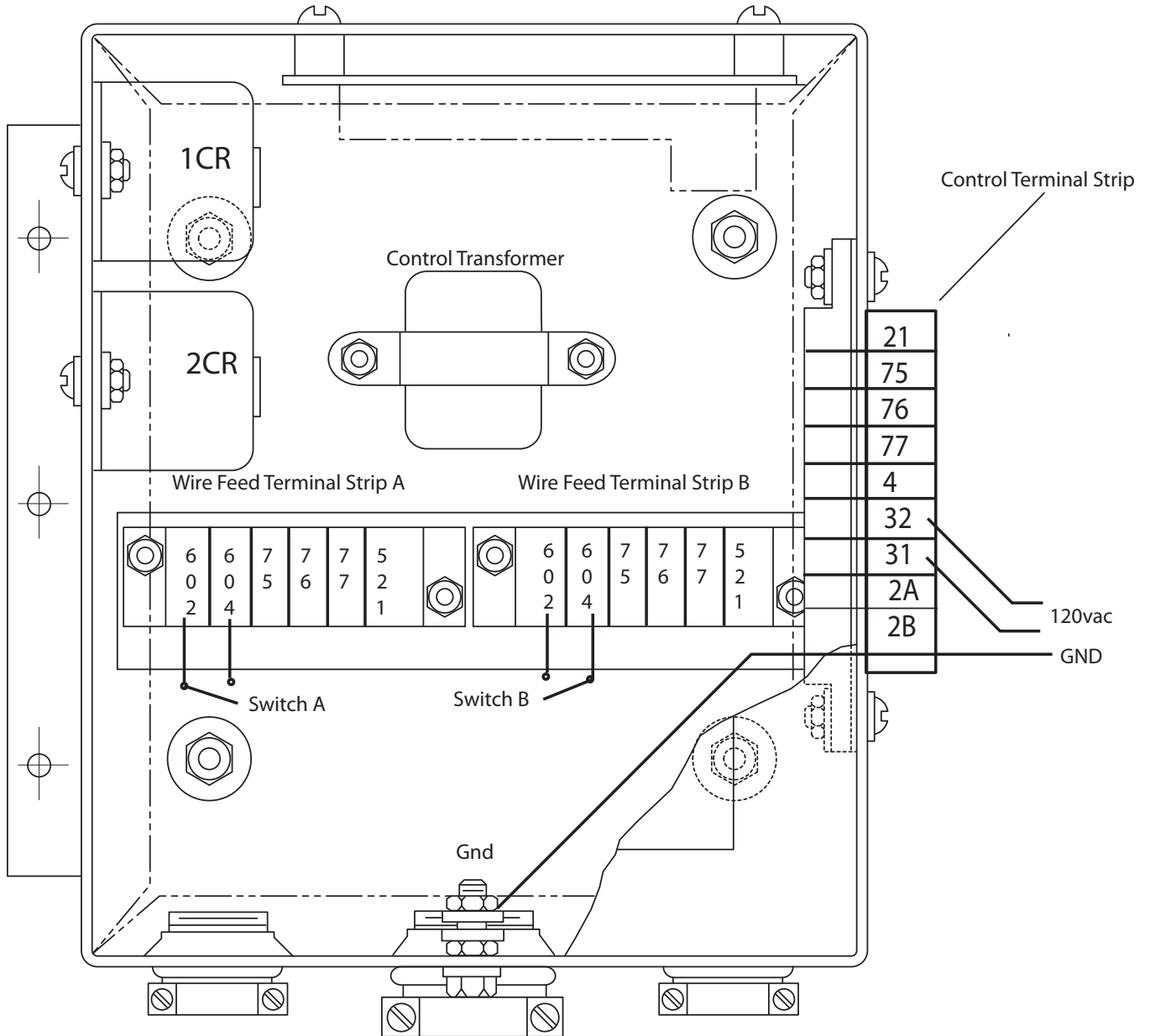


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# TROUBLESHOOTING AND REPAIR

## K350(-1) ADAPTER TEST (cont.)

FIGURE F.5 TEST SET-UP



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# TROUBLESHOOTING AND REPAIR

## K350(-1) ADAPTER TEST (cont.)

### TEST PROCEDURE

1. Connect a switched and grounded 120VAC supply to terminals 31 & 32 of the Control Terminal Strip and the ground stud (GND) as shown in Fig. F.5.
2. Connect two toggle or push button switches to terminals 602 & 604 of the Wire Feed Terminal strips.
3. Close the Power Switch (S1).
4. Check for 24VAC at terminals 605 & 606 on the PC Board.  
If no voltage or incorrect voltage, check the Control Transformer.
5. With an Ohmmeter or continuity tester, check for the values listed in the troubleshooting chart (Fig.F.7), under all three conditions, (Switch A&B open, Switch A closed and Switch B closed).
6. When Switch A is closed, 1CR relay should function. When Switch B is closed, 2CR relay should function.
  - a. If neither relay functions the PC Board may be defective.
  - b. If one of the relays does not work, check for 24vdc at the relay coil. (See Wiring Diagram).  
If voltage is present, replace the relay. If no voltage, check the wiring.
7. If all of the above tests are correct, check the Control Cable for continuity on all leads. (See the Wiring Diagram)

**⚠ WARNING**

**ELECTRIC SHOCK can kill.**

- Only qualified personnel should perform this installation, maintenance and troubleshooting work.
- Turn off the input power at the fuse box before working on other equipment connected to the welding system at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.

**FIGURE F.7 TROUBLESHOOTING CHART**

MEASUREMENT POINTS		EXPECTED READING				
CONTROL TERMINAL STRIP	WIRE FEED TERMINAL STRIP	SWITCH A & B OPEN	SWITCH A CLOSED B OPEN	SWITCH B CLOSED A OPEN	INCORRECT READING INDICATES	CORRECTIVE ACTION
21	521A	OPEN (∞)	SHORT (0Ω)	OPEN (∞)	1CR or PC Bd	Perform tests in Step 6
	521B	OPEN (∞)	OPEN (∞)	SHORT (0Ω)	2CR or PC Bd	
75	75A	OPEN (∞)	SHORT (0Ω)	OPEN (∞)	1CR or PC Bd.	
	75B	SHORT (0Ω)	OPEN (∞)	SHORT (0Ω)	2CR or PC Bd.	
76	76A	OPEN (∞)	SHORT (0Ω)	OPEN (∞)	1CR or PC Bd.	
	76B	SHORT (0Ω)	OPEN (∞)	SHORT (0Ω)	2CR or PC Bd.	
77	77A	SHORT (0Ω)	SHORT (0Ω)	SHORT (0Ω)	Wiring	Check for loose or broken connections
	77B	SHORT (0Ω)	SHORT (0Ω)	SHORT (0Ω)	Wiring	
4 to 2A	----	OPEN (∞)	SHORT (0Ω)	OPEN (∞)	1CR or PC Bd.	Perform tests in Step 6
4 to 2B	----	OPEN (∞)	OPEN (∞)	SHORT (0Ω)	2CR or PC Bd.	

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# TROUBLESHOOTING AND REPAIR

## CALIBRATION CHECK

**If either the Control PC Board or the Wire Feed Motor is replaced,  
the Calibration should be checked**

### TEST PROCEDURE

1. .Connect the feeder to a CV welder or an external 25VDC power supply (See the *Wire Feeder test*).
2. Run the motor at MAX speed for about 2 minutes before doing the Calibration Check.
3. Load the LN -23P with .068 Innershield wire.

**CAUTION: If connected to a welder, the wire will be “hot” whenever the trigger is closed. If connected to an external supply the wire will be at that potential.**

4. Put the ‘Reduced Speed Switch’ in Position 1.
5. Set the Wire Speed Control to exactly 30 ipm.
6. Pull the trigger and measure the wire speed, preferably with a K-283 Wire Speed Meter. The speed should be 30 ipm +/-1.

If a K283 is not available, feed wire for a set time. measure the length and multiply by the appropriate factor.  
(ex. length after 15 seconds x 4 = ipm).  
Do this several times and take the average.

7. If speed is not correct, adjust R14 on the Control Board and re-test. (Clockwise rotation increases speed). Repeat until measured speed is 30 ipm.
8. Set the Wire Speed Control to exactly 170 ipm.
9. Measure the speed as in Step 6. If not correct, adjust R10 and re-test until speed is 170 ipm.

NOTE: Do not adjust R14 after setting R10.

10. Set the Wire Speed Control to 100 ipm and check that the speed is 100 ipm +/-2.
11. Put the Reduced Speed Switch in Position 2.
12. Feed wire and check that the reduced speed is 83 ipm +/-3.

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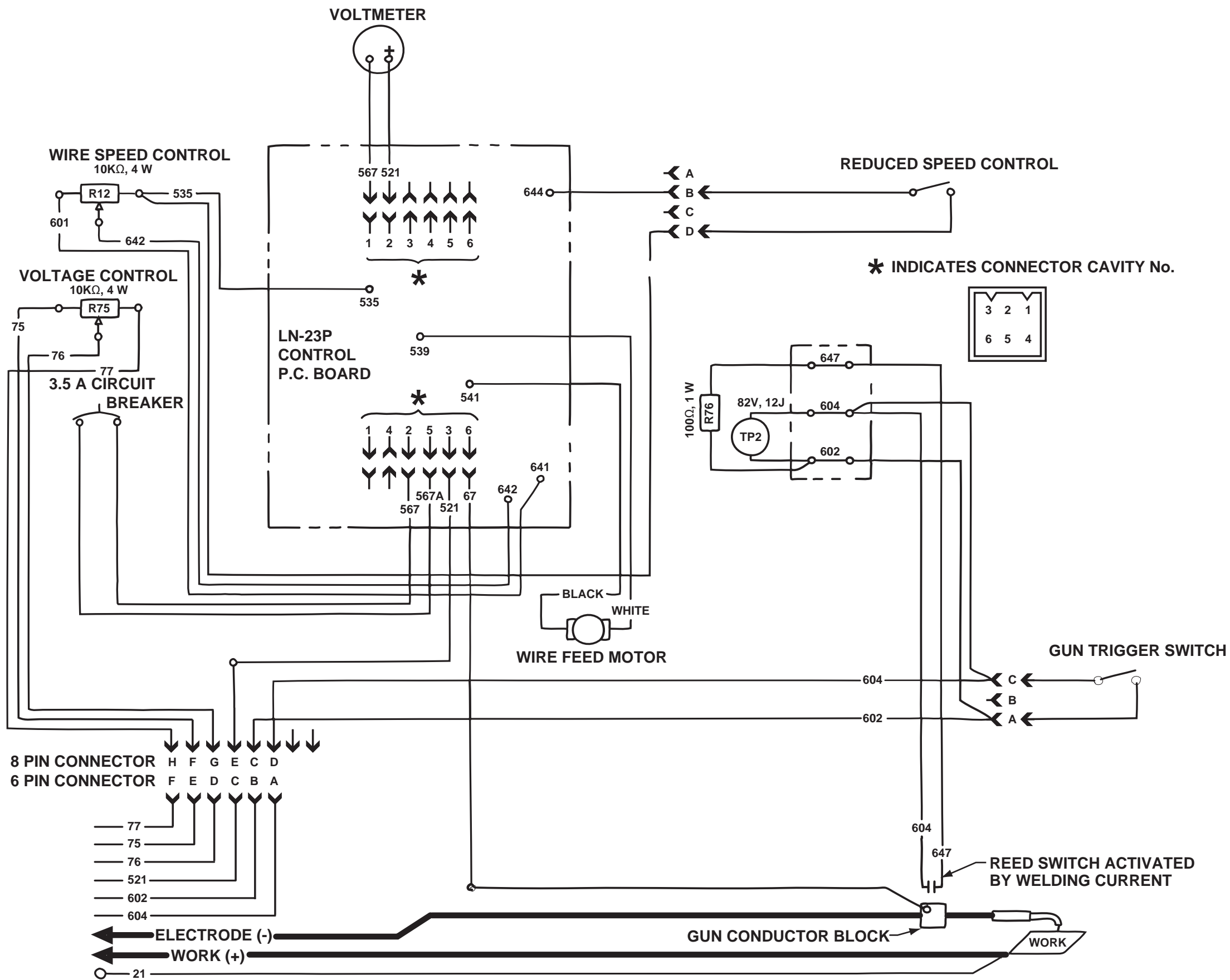
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WIRING DIAGRAM - ENTIRE MACHINE - (M14197)



CRM33074 (8/01)  
M14197

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

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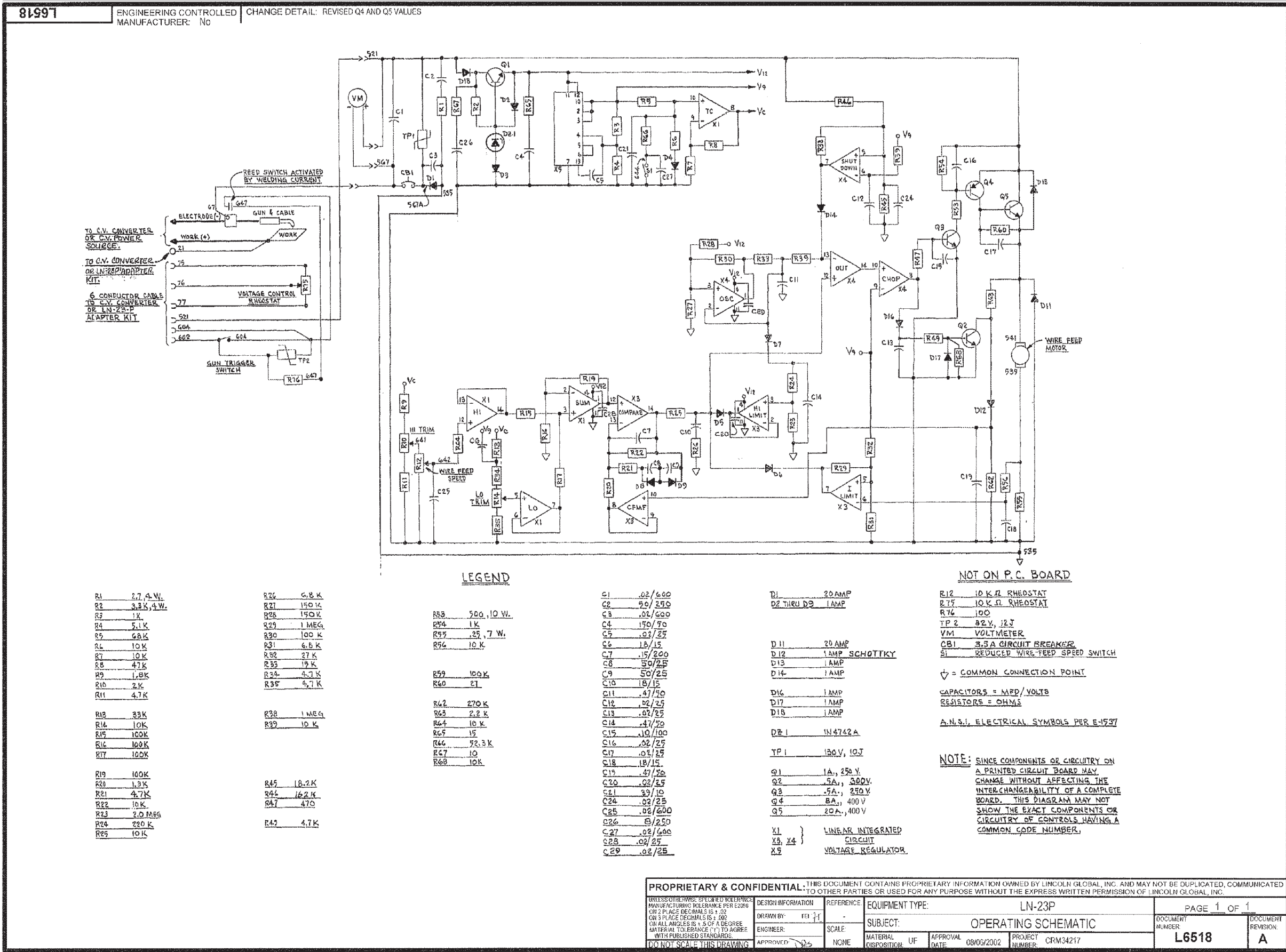
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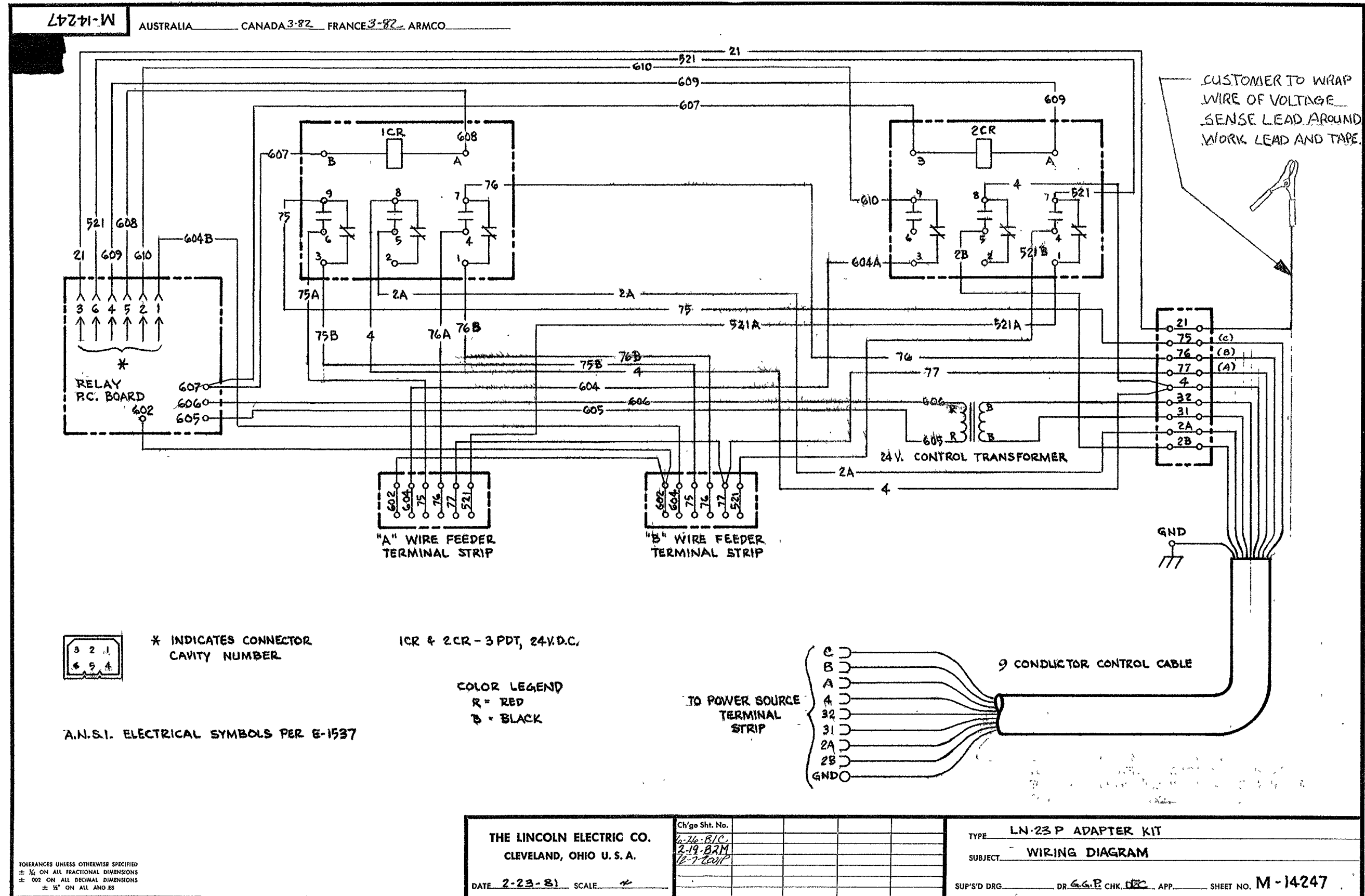
SCHEMATIC - ENTIRE MACHINE (L6518)



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SOLID EDGE

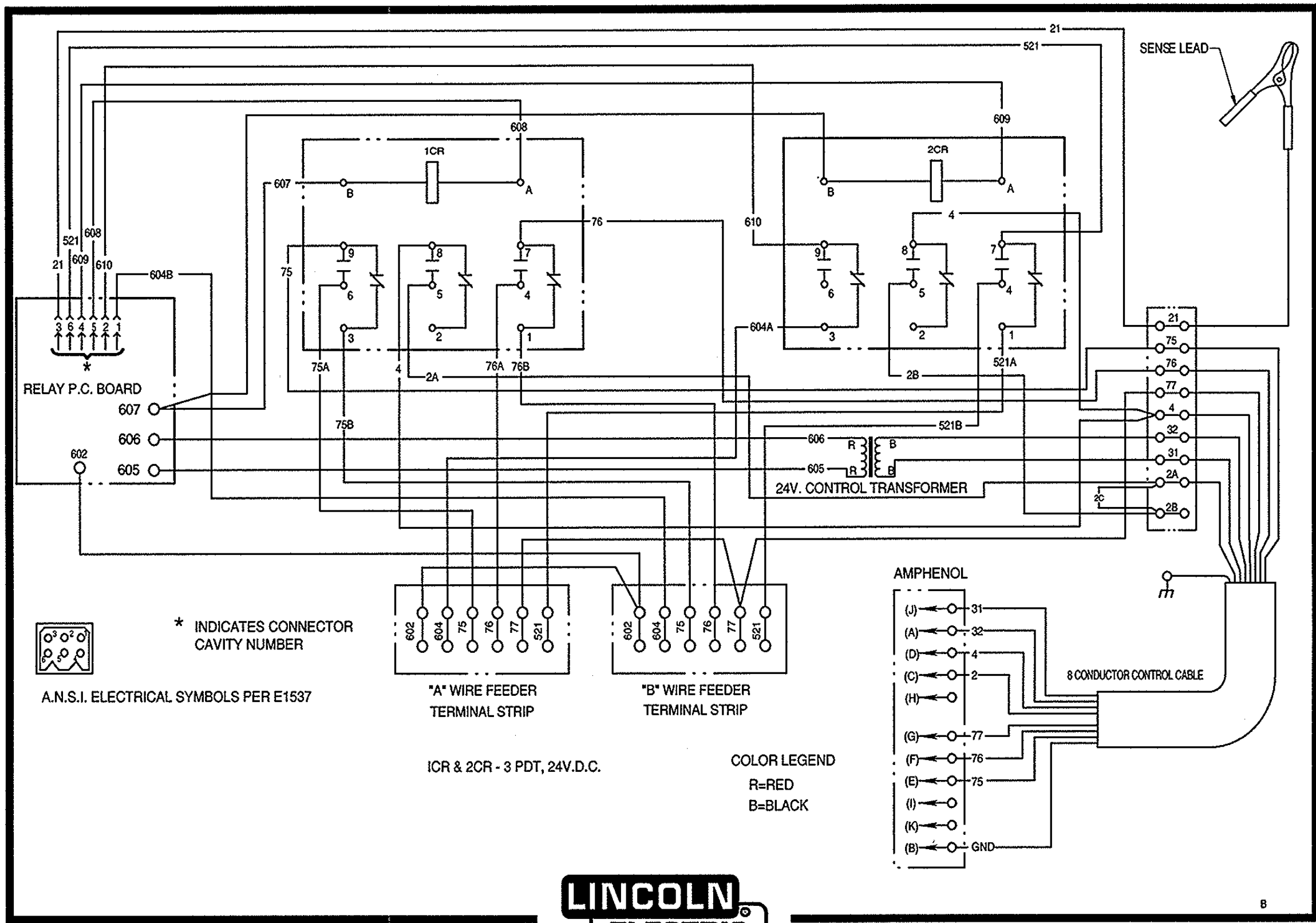
## WIRING DIAGRAM - K350 ADAPTER KIT (M14247)



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

WIRING DIAGRAM K350-1 ADAPTER KIT (M17514)

# LN-23P ADAPTER KIT



A.N.S.I. ELECTRICAL SYMBOLS PER E1537

\* INDICATES CONNECTOR CAVITY NUMBER

"A" WIRE FEEDER TERMINAL STRIP

"B" WIRE FEEDER TERMINAL STRIP

1CR & 2CR - 3 PDT, 24V.D.C.

COLOR LEGEND  
 R=RED  
 B=BLACK

AMPHENOL

- (J) ← 31
- (A) ← 32
- (D) ← 4
- (C) ← 2
- (H) ←
- (G) ← 77
- (F) ← 76
- (E) ← 75
- (I) ←
- (K) ←
- (B) ← GND

8 CONDUCTOR CONTROL CABLE



CLEVELAND, OHIO U.S.A.

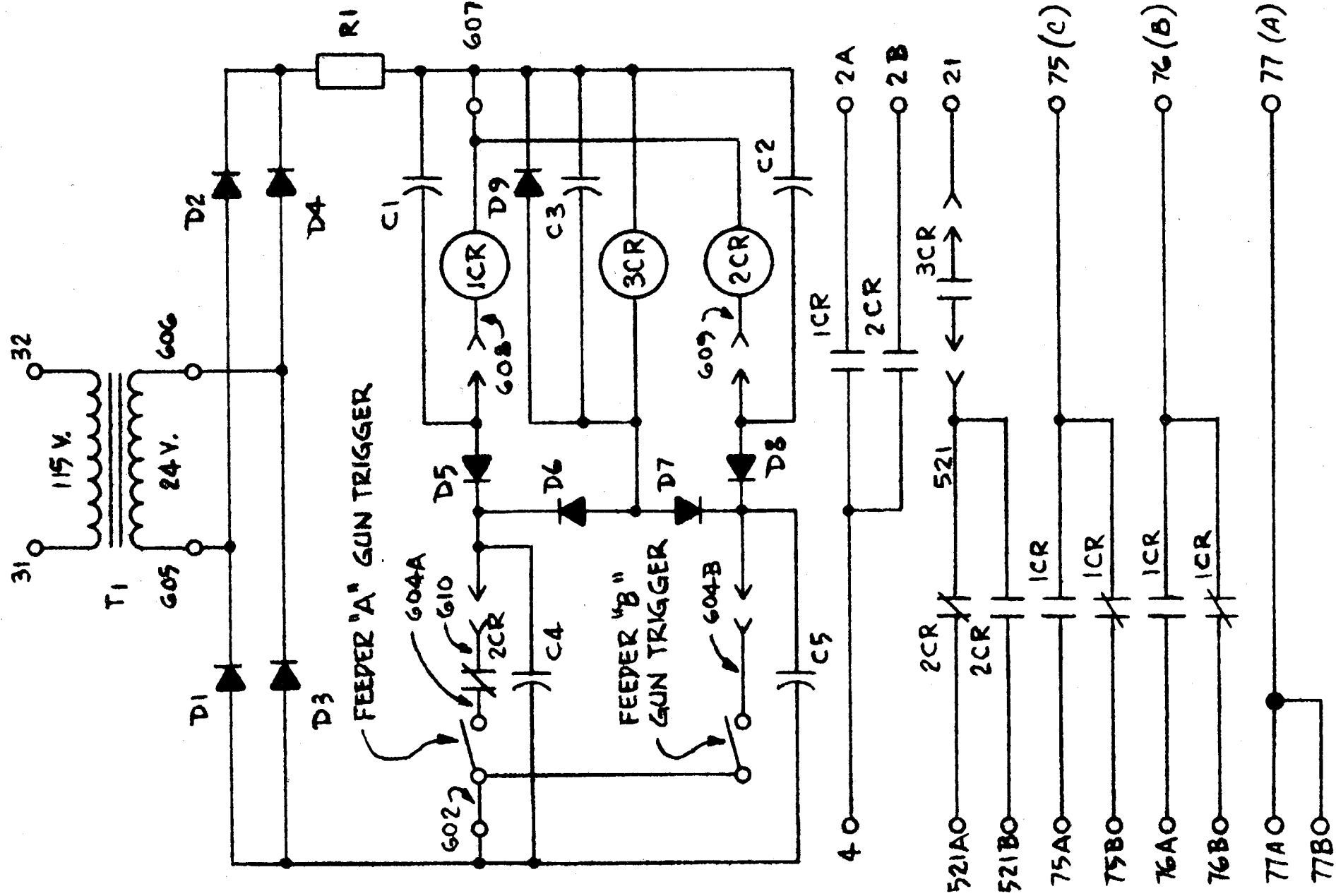
B  
M17514

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

MACHINE SCHEMATIC FOR K350/K350-1 ADAPTER

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

LN-23P WIRING DIAGRAM



LEGEND

- C1, C2 - 150MFD, 50 V.
- C3 - .68MFD, 50 V.
- C4, C5 - .0047MFD, 1400 V.
- D1 THRU D9 - 1A.
- 3CR - SPDT, 24V.D.C.
- R1 - 27Ω, 2W.

COMPONENTS NOT ON P.C. BOARD  
1CR, 2CR - SPDT, 24V.D.C.

S-17124  
2-19-82M

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

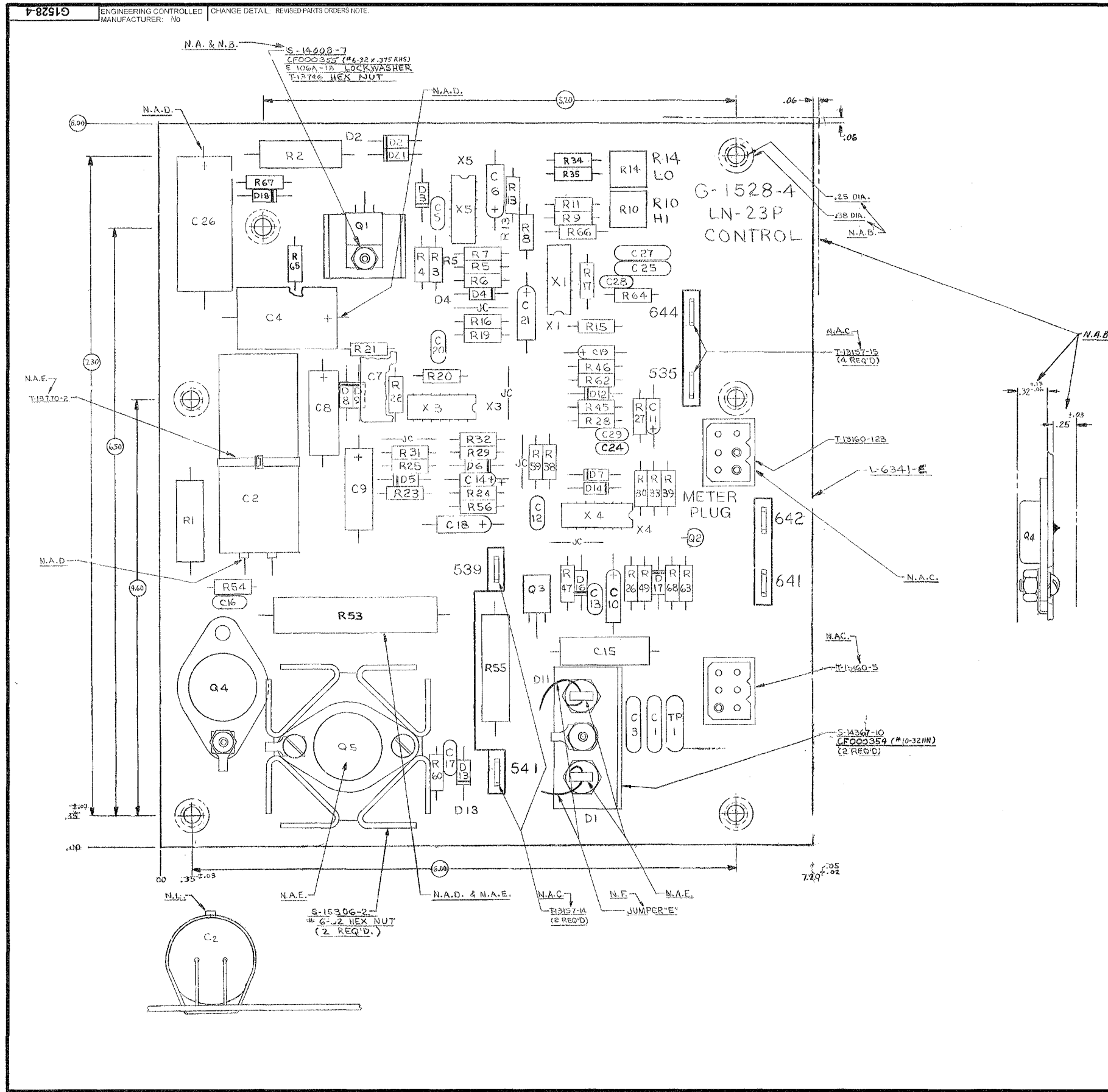
PC BOARD ASSEMBLY FOR CODES BELOW 10892 (G1528-4)

Return to Section TOC  
Return to Master TOC

Return to Section TOC  
Return to Master TOC

Return to Section TOC  
Return to Master TOC

Return to Section TOC  
Return to Master TOC



ITEM	REQ'D	PART NO.	IDENTIFICATION
C1, C3, C25, C27	4	T1157-38	027600
C2	1	S13490-86	50250
C4	1	T1157-7	15050
C5, C12, C13, C16, C17	9	T1157-40	02725
C20, C24, C28, C29	3	S13490-39	18115
C6, C10, C19	3	S13490-63	47750
C8, C9	2	S13490-93	5025
C26	1	S13490-44	8/250
C7	1	S13490-24	15200
C21	1	S13490-30	38710
C15	1	T1157-26	10100
N.E. R1	1	T13195-11	12.7
N.E. R2	1	T13165-5	3.3K
R3, R54	2	T12731-12	1K
R4	1	T12731-44	5.1K
R5	1	T12731-13	68K
R6, R7, R22, R25, R39, R56, R64, R68	3	T12731-8	10K
R8	1	T12731-33	47K
R9	1	T12731-7	1.6K
N.A.C. R10	1	T10812-73	2K
R11, R21, R34, R35, R40	5	T12731-17	4.7K
R13	1	T12731-6	33K
N.A.C. R14	1	T10812-41	10K
R15, R16, R17, R19, R30, R59	6	T12731-32	100K
R46	1	S19400-1623	162K
R20	1	T12731-76	1.3K
R24	1	T12731-79	220K
R23	1	T14444-3	2.0 MEG.
R28, R31	2	T12731-16	6.8K
R27, R28	2	T12731-42	150K
R29, R38	2	T12731-67	1 MEG.
R32	1	T12731-2	27K
R33	1	T12731-25	15K
R45	1	S19400-1822	18.2K
R47	1	T12731-9	470
N.E. R53	1	T14649-2	500
N.E. R55	1	T12300-75	.25
R60	1	T12731-63	27 OHMS
R82	1	T12731-74	270K
R83	1	T12731-11	2.2K
R85	1	T12731-84	15
R66	1	S19400-5232	52.3K
R67	1	T12731-1	10
X1, X3, X4	3	S15128-4	LE CO. PART NO.
X5	1	M13552-1	
TP1	1	T13640-12K	
JUMPER "C"	5	E2387-#20-2, 00	
JUMPER "E"	2	E2387-#16-2, 25	
D2 THRU D9, D13, D14, D16, D17	12	T12199-1	1N4004
D12	1	T12705-23	1A
D18	1	T12199-2	1N4007
D21	1	T12702-48	1N4742A
Q1	1	T12704-40	
Q2	1	T12704-35	
Q3	1	T12704-16	LE CO. PART NO.
Q4	1	S17623-2	

**ASSEMBLY NOTES**  
 N.A. PLACE A HEAVY FILM OF E1888 ON SURFACE OF Q1 AND HEATSINK SURFACE. DO NOT GET ON THREADS.  
 N.B. HOLDING NUT STATIONARY. TIGHTEN SCREW TO A TORQUE OF 6 IN-LBS. DO NOT EXCEED THIS VALUE. NUT MUST NOT TOUCH EPOXY CASE OF COMPONENT AT ANY TIME.  
 N.C. HEAT SINK SIDE NEXT TO BOARD.  
 N.E. SPACE RESISTOR .181" OFF BOARD. (3 PLACES)  
 N.F. MAKE CONNECTIONS FROM DIODES TO P.C. BOARD WITH JUMPER "E". POSITION JUMPERS AWAY FROM HEATSINK. 15 MINIMUM.  
 N.L. TIE LATCH TO BE ON TOP OF CAPACITOR.

**ENCAPSULATION NOTES**  
 N.A.B. ENCAPSULATE WITH E2527 TO DIMENSIONS SHOWN EXCEPT IN AREAS INDICATED WHERE THERE MUST BE NO E2527 ENCAPSULATION ON EITHER SIDE OF BOARD.  
 N.A.C. DO NOT COAT WITH ENCAPSULATION MATERIAL.  
 N.A.D. AFTER ENCAPSULATION WITH E2527, COAT EXPOSED ENDS OF CAPACITORS (3 PLACES) AND TOP OF RESISTOR WITH E2591 SILICONE RUBBER. COVER ALL EXPOSED LEADS.  
 N.A.E. COAT THESE ITEMS WITH E2527 IN PROCESS OF POURING ENCAPSULATION INTO MOLD.

MANUFACTURED AS  
**G1528-4E2**  
 IDENTIFICATION CODE

MAKE PER E1911  
 TEST PER E2528-C

CAPACITORS = MFD/VOLTS  
 RESISTORS = OHMS  
 INDUCTANCE = HENRYS

FOR PARTS ORDERS:  
SEND G4148-2

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DATE OF PREVIOUS EDITION: NONE	MANUFACTURING IN FRANCE PER IECQ	DESIGN INFORMATION: G1528-3	SUBJECT: CONTROL PC BOARD ASSEMBLY	DOCUMENT NUMBER: G1528-4	DOCUMENT REVISION: B
IF 2 PLACES DECIMALS IS 1/10	IF 3 PLACES DECIMALS IS 1/100	ENGINEER: [Signature]	SCALE: NONE	APPROVAL DATE: 10/1/2004	PROJECT NUMBER: CRM36896
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED	MATERIAL TOLERANCE (F1) TO AGREE WITH PUBLISHED DIMENSIONS	APPROVED: [Signature]	DATE: 10/1/2004	PROJECT NUMBER: CRM36896	DATE: 10/1/2004

**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.



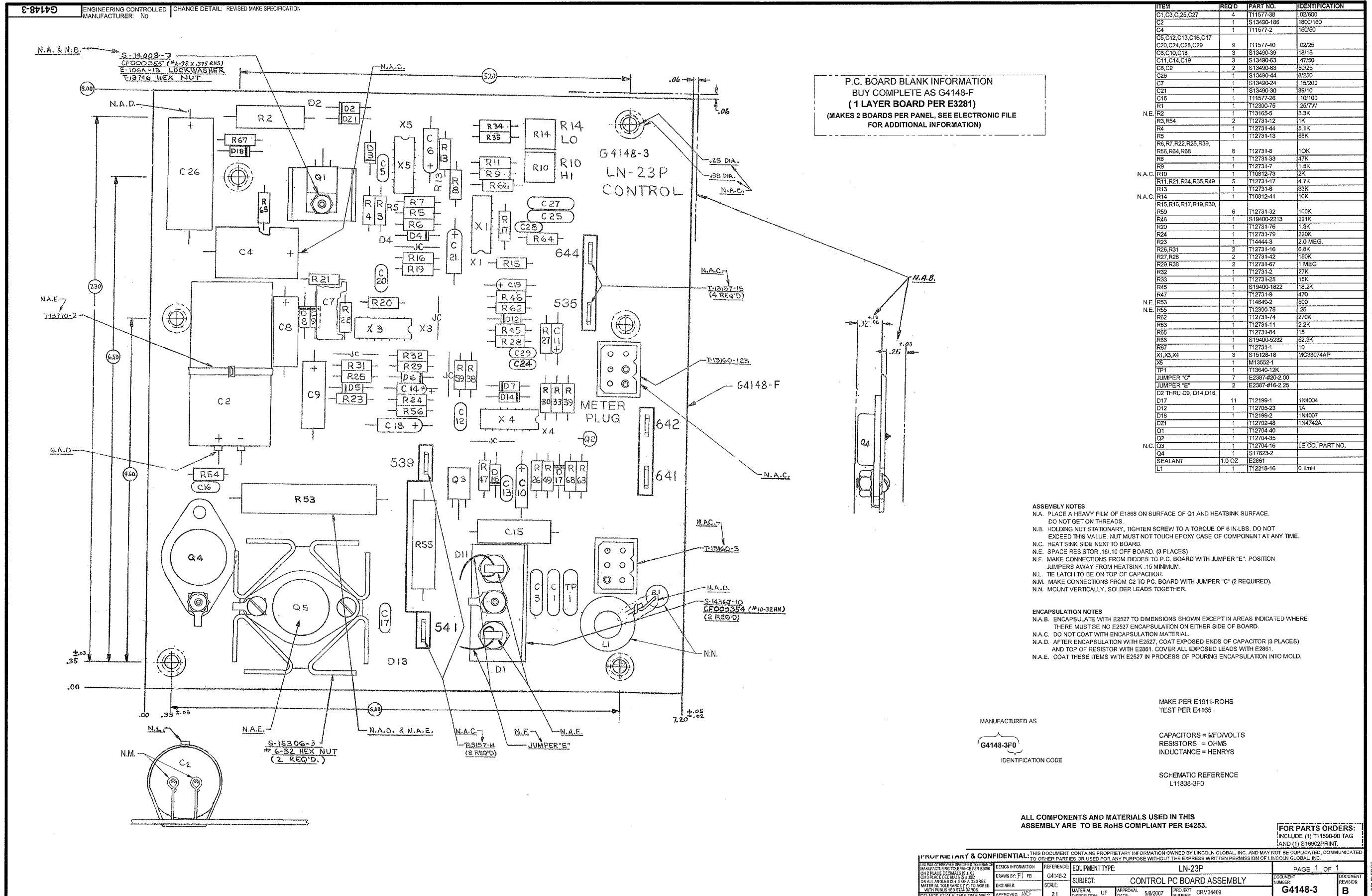
PC BOARD ASSEMBLY FOR CODES 10892 AND HIGHER (G4184-3)

Return to Section TOC  
Return to Master TOC

Return to Section TOC  
Return to Master TOC

Return to Section TOC  
Return to Master TOC

Return to Section TOC  
Return to Master TOC



P.C. BOARD BLANK INFORMATION  
 BUY COMPLETE AS G4148-F  
 (1 LAYER BOARD PER E3281)  
 (MAKES 2 BOARDS PER PANEL, SEE ELECTRONIC FILE  
 FOR ADDITIONAL INFORMATION)

ITEM	REQ'D	PART NO.	IDENTIFICATION
C1, C3, C25, C27	4	T11577-38	102/600
C2	1	S13490-186	1800/160
C4	1	T11577-2	150/50
C5, C12, C13, C16, C17			
C20, C24, C26, C29	9	T11577-40	.02/25
C8, C10, C18	3	S13490-39	18/15
C11, C14, C19	3	S13490-63	.47/50
C8, C9	2	S13490-83	50/25
C26	1	S13490-44	8/250
C7	1	S13490-24	.15/200
C21	1	S13490-30	33/10
C15	1	T11577-26	.10/100
R1	1	T12300-75	.25/7W
R2	1	T13185-5	3.3K
R3, R54	2	T12731-12	1K
R4	1	T12731-44	5.1K
R5	1	T12731-13	68K
R6, R7, R22, R25, R39, R56, R64, R88	8	T12731-8	10K
R8	1	T12731-33	47K
R9	1	T12731-7	1.5K
R10	1	T10812-73	2K
R11, R21, R34, R35, R49	5	T12731-17	4.7K
R13	1	T12731-6	33K
R14	1	T10812-41	10K
R15, R16, R17, R19, R30, R59	6	T12731-32	100K
R46	1	S19400-2213	221K
R20	1	T12731-76	1.3K
R24	1	T12731-79	220K
R23	1	T14444-3	2.0 MEG.
R26, R31	2	T12731-16	6.8K
R27, R28	2	T12731-42	150K
R29, R38	2	T12731-67	1 MEG.
R32	1	T12731-2	27K
R33	1	T12731-25	15K
R45	1	S19400-1822	18.2K
R47	1	T12731-9	470
R53	1	T14645-2	500
R55	1	T12300-75	.25
R62	1	T12731-74	270K
R53	1	T12731-11	2.2K
R56	1	T12731-84	15
R65	1	S19400-5232	52.3K
R67	1	T12731-1	10
X1, X3, X4	3	S15128-16	MC33074AP
X5	1	M13852-1	
TP1	1	T13640-12K	
JUMPER "C"	7	E2387-#20-2.00	
JUMPER "E"	2	E2387-#16-2.25	
D2 THRU D9, D14, D16,	11	T12189-1	1N4004
D17	1	T12705-23	1A
D18	1	T12189-2	1N4007
D21	1	T12702-48	1N4742A
Q1	1	T12704-40	
Q2	1	T12704-35	
Q3	1	T12704-16	LE CO. PART NO.
Q4	1	S17623-2	
SEALANT	1.0 OZ	E2861	
L1	1	T12218-16	0.1mH

ASSEMBLY NOTES  
 N.A. PLACE A HEAVY FILM OF E1888 ON SURFACE OF Q1 AND HEATSINK SURFACE.  
 DO NOT GET ON THREADS.  
 N.B. HOLDING NUT STATIONARY, TIGHTEN SCREW TO A TORQUE OF 6 IN-LBS. DO NOT  
 EXCEED THIS VALUE. NUT MUST NOT TOUCH EPOXY CASE OF COMPONENT AT ANY TIME.  
 N.C. HEAT SINK SIDE NEXT TO BOARD.  
 N.E. SPACE RESISTOR .16/10 OFF BOARD. (3 PLACES)  
 N.F. MAKE CONNECTIONS FROM DIODES TO P.C. BOARD WITH JUMPER "E". POSITION  
 JUMPERS AWAY FROM HEATSINK .15 MINIMUM.  
 N.L. THE LATCH TO BE ON TOP OF CAPACITOR.  
 N.M. MAKE CONNECTIONS FROM C2 TO P.C. BOARD WITH JUMPER "C" (2 REQUIRED).  
 N.N. MOUNT VERTICALLY, SOLDER LEADS TOGETHER.

ENCAPSULATION NOTES  
 N.A.B. ENCAPSULATE WITH E2527 TO DIMENSIONS SHOWN EXCEPT IN AREAS INDICATED WHERE  
 THERE MUST BE NO E2527 ENCAPSULATION ON EITHER SIDE OF BOARD.  
 N.A.C. DO NOT COAT WITH ENCAPSULATION MATERIAL.  
 N.A.D. AFTER ENCAPSULATION WITH E2527, COAT EXPOSED ENDS OF CAPACITOR (3 PLACES)  
 AND TOP OF RESISTOR WITH E2861. COVER ALL EXPOSED LEADS WITH E2861.  
 N.A.E. COAT THESE ITEMS WITH E2527 IN PROCESS OF POURING ENCAPSULATION INTO MOLD.

MAKE PER E1911-ROHS  
TEST PER E4165

MANUFACTURED AS  
 G4148-3F0  
 IDENTIFICATION CODE

CAPACITORS = MFD/VOLTS  
RESISTORS = OHMS  
INDUCTANCE = HENRYS

SCHEMATIC REFERENCE  
L11338-3F0

ALL COMPONENTS AND MATERIALS USED IN THIS  
ASSEMBLY ARE TO BE ROHS COMPLIANT PER E4253.

FOR PARTS ORDERS:  
 INCLUDE (1) T11590-90 TAG  
 AND (1) S16802PRINT.

UNLESS OTHERWISE SPECIFIED TOLERANCES: MANUFACTURING TOLERANCE PER ASME DIMENSIONS DECIMALS ± 0.01 DIMENSIONS INCHES ± 0.005 DIMENSIONS MILLIMETERS ± 0.05 MATERIAL TOLERANCES (T) TO AGREE WITH PUBLISHED STANDARDS. (T) INDICATES THIS DRAWING		DESIGN INFORMATION DRAWN BY: F1 ENGINEER: APPROVED: JCS	REFERENCE G4148-2	EQUIPMENT TYPE: LN-23P SUBJECT: CONTROL PC BOARD ASSEMBLY	SCALE: 2:1	APPROVAL DATE: 5/6/2007	PROJECT NUMBER: CRM34409	PAGE 1 OF 1	DOCUMENT NUMBER: G4148-3	REVISION: B
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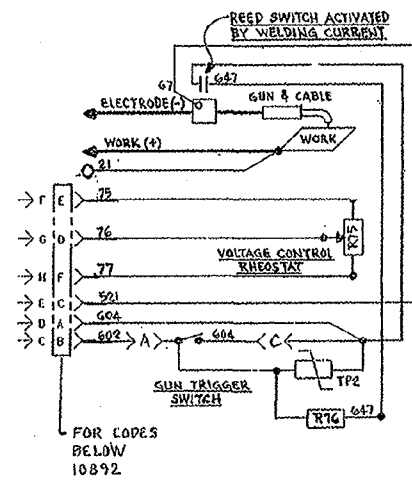
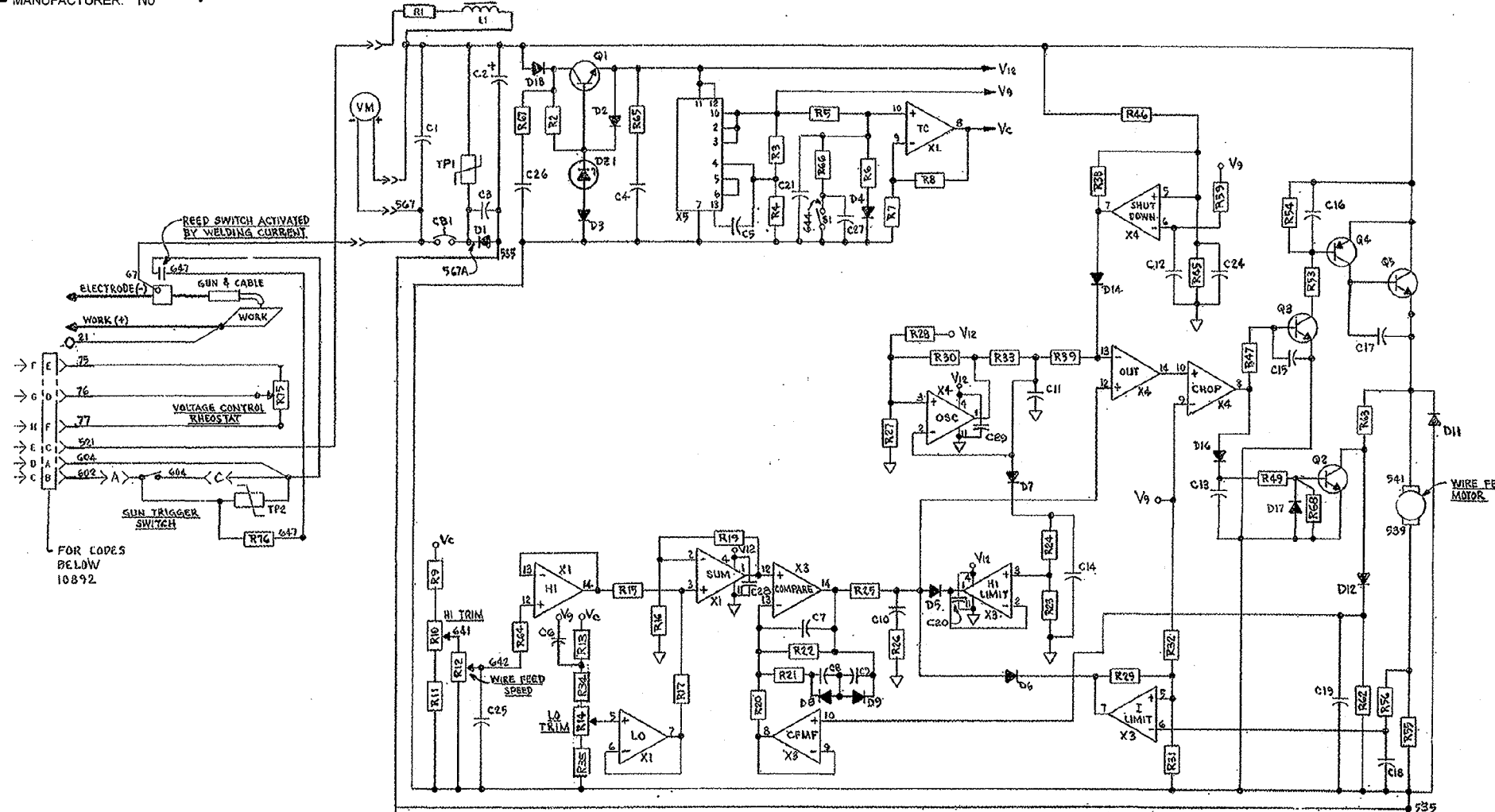
NOTE: Lincoln Electric assumes no responsibility for liabilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. **Individual Printed Circuit Board Components are not available from Lincoln Electric.** This information is provided for reference only. 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.



SCHEMATIC FOR LN-23P CODES 10892 AND HIGHER (L11838-3)

11838-3F0

ENGINEERING CONTROLLED CHANGE DETAIL: NEW MANUFACTURER: No



R1	0.25 / 1 W
R2	3.3K, 4 W
R3	1K
R4	5.1K
R5	.68K
R6	10K
R7	10K
R8	4.7K
R9	1.8K
R10	2.1K
R11	4.7K
R13	33K
R14	10K
R15	100K
R16	100K
R17	100K
R19	100K
R20	1.3K
R21	4.7K
R22	10K
R23	2.0 MEG
R24	220 K
R25	10 K
R26	5.8 K
R27	150 K
R28	150 K
R29	1 MEG
R30	100 K
R31	6.8 K
R32	27 K
R33	12 K
R34	4.7 K
R35	4.7 K
R38	1 MEG
R39	10 K
R45	18.2K
R46	221K
R47	470
R49	4.7K

**LEGEND**

R53	500, 10 W
R74	1K
R97	.25, 7 W
R9C	10 K
R99	100K
R42	270K
R43	2.2 K
R44	10 K
R45	15
R46	22.3K
R47	10
R48	10K
L1	0.1mH/10A

C1	.02/600
C2	1800/160
C3	.02/400
C4	150/20
C5	.02/25
C6	18/15
C7	.15/200
C8	50/25
C9	50/25
C10	18/15
C11	.47/20
C12	.02/25
C13	.02/25
C14	.47/20
C15	.10/100
C16	.02/25
C17	.02/25
C18	18/15
C19	.47/20
C20	.02/25
C21	.39/10
C24	.02/25
C25	.02/200
C26	.5/250
C27	.02/400
C28	.02/25
C29	.02/25

D1	20AMP
D2 THRU D9	1AMP
D11	20AMP
D12	1AMP SCHOTTKY
D14	1AMP
D16	1AMP
D17	1AMP
D18	1AMP
D#1	1N4742A
TP1	130V, 10J
Q1	1A, 250 V
Q2	.5A, 300V
Q3	.5A, 250 V
Q4	.5A, 400 V
Q5	20A, 400 V
X1	LINEAR INTEGRATED CIRCUIT
X3, X4	CIRCUIT
X9	VOLTAGE REGULATOR

**NOT ON P.C. BOARD**

R12	10 K $\Omega$ RHEOSTAT
R75	10 K $\Omega$ RHEOSTAT
R76	100
TP2	8.2V, 12J
VM	VOLTMETER
C#1	3.5A CIRCUIT BREAKER
S1	REDUCED WIRE FEED SPEED SWITCH

∇ = COMMON CONNECTION POINT  
CAPACITORS = MFD/VOLTS  
RESISTORS = OHMS  
A.N.S.I. ELECTRICAL SYMBOLS PER E-1937

**NOTE:** 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.

UNLESS OTHERWISE SPECIFIED TOLERANCE MANUFACTURING TOLERANCE PER 2006 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 DO NOT SCALE THIS DRAWING				DESIGN INFORMATION: DRAWN BY: FEI	REFERENCE: L11838-2E0	EQUIPMENT TYPE: LN-23P	PAGE 1 OF 1
APPROVED: [Signature]				ENGINEER: [Signature]	SCALE: NONE	SUBJECT: OPERATING SCHEMATIC	DOCUMENT NUMBER: L11838-3F0
MATERIAL DISPOSITION: NA				APPROVAL DATE: 8/7/2006	PROJECT NUMBER: CRM38146-B	REVISION: A	SOLID EDGE

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

