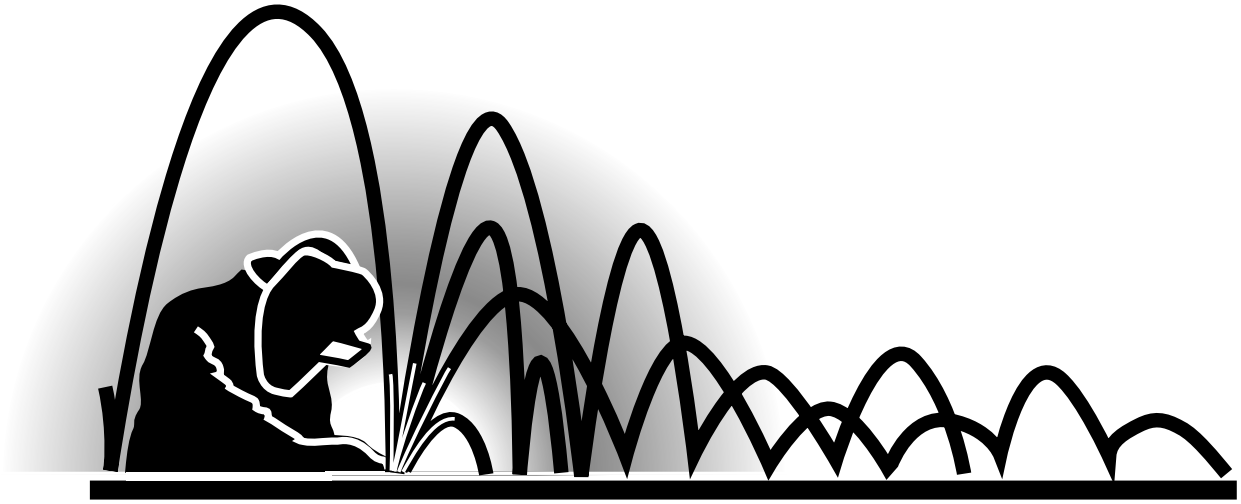
RED-D-ARC E300

IM675

May, 2000

For use with machines having Code Numbers: **10638**



RED-D-ARC Welderentals

OPERATOR'S MANUAL

Red-D-Arc Spec-Built Welding Equipment

This ***RED-D-ARC*** welder is built to ***RED-D-ARC Extreme Duty*** design specifications by Lincoln Electric.

Safety Depends on You

This welder 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.

Date of Purchase:_____
Serial Number:_____
Code Number:_____
Model:_____
Where Purchased:_____

1-800-245-3660

North America's Largest Fleet of Welding Equipment

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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

FOR ENGINE powered equipment.

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

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

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

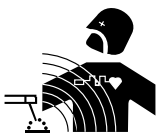
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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

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

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

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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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ELECTRIC SHOCK can kill.

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

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

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

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

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

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

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

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

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

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

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

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

ARC RAYS can burn.

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

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

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

FUMES AND GASES can be dangerous.

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

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

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

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

5.e. Also see item 1.b.

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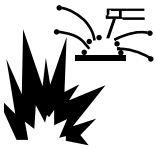


WELDING SPARKS can cause fire or explosion.

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

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

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

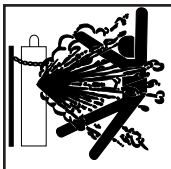
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe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

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

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

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

6.h. Also see item 1.c.



CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

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

FOR ELECTRICALLY powered equipment.

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

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

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

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PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   d.Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.

3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Thank You —— for selecting a **QUALITY** product by Lincoln Electric. We want you to take pride in operating this Lincoln Electric Company product ••• as much pride as we have in bringing this product to you!

Please Examine Carton and Equipment For Damage Immediately

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, Claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Model Name & Number _____

Code & Serial Number _____

Date of Purchase _____

Whenever you request replacement parts for or information on this equipment always supply the information you have recorded above.

Read this Operators Manual completely before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. The level of seriousness to be applied to each is explained below:

⚠ WARNING

This statement appears where the information **must** be followed **exactly** to avoid **serious personal injury** or **loss of life**.

⚠ CAUTION

This statement appears where the information **must** be followed to avoid **minor personal injury** or **damage to this equipment**.

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TECHNICAL SPECIFICATIONS - RED-D-ARC E300 (TYPE K1688-1)

RATED INPUT - WELDER	
AC Input Frequency	60 Hz
Input Power Standard Voltages	230/460/575
Rated Input Current (230V 60Hz)	86 amps
Idle Input Current (230V)	6.2 amps
Power Factor (200 Amp Load)	69.0

RATED OUTPUT - WELDER			
Current Range	**Volts at Rated Amps**	**Duty Cycle**	**Max. OCV**
40-250 amps	DC 250 Amps 30 volts	30%	70 volts

OUTPUT
Auxiliary Power
15 Amps @ 115VAC 100 % Duty Cycle

PHYSICAL DIMENSIONS			
HEIGHT	**WIDTH**	**DEPTH**	**WEIGHT**
27.00 in.* 686 mm*	9.00 in. 483 mm	21.50 in. 546 mm	350 lbs. (159 kg) (159 kg)

*(Lift Hook, add 3.12 in.- 80 mm)

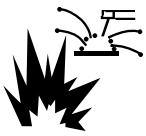
INSTALLATION

Safety Precautions

⚠ WARNING

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

FUMES AND GASES can be dangerous.
- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**



WELDING SPARKS can cause fire or explosion.
- **Keep flammable material away.**
- **Do not weld on closed containers.**

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

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

- Connect the E300 grounding terminal located under the reconnect panel (marked ⏚) to a good electrical ground per the U.S. National Electrical Code and any applicable local codes.
- Turn the power switch on the E300 "OFF" before connecting or disconnecting output cables or other equipment.
- Only qualified personnel should perform this installation.

Location

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

Input Connections

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

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

Remove the input access panel on the rear panel. Route the input power lines through the hole in the rear panel. Lug the input leads with a ring terminal for a 1/4" (6mm) screw. Connect lugged leads to L1 and L2 of the reconnect panel per the diagram pasted to the inside of the input access panel. Input connection must conform to the U.S. National Electrical Code and all local codes.

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

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

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

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

Volts	Hz.	Input Amps	Copper Wire Sizes 75°C in Conduit		Fuse Size (Super Lag)
			Supply Conductor	Grounding Conductor	
230	60	70	#6	#8	90
460	60	35	#10	#10	45
575	60	28	#12	#10	40

STACKING

⚠ WARNING

FALLING EQUIPMENT can cause injury.

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

Installation of Field Installed Options

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

Output Cable Size and Connection

⚠ WARNING

ELECTRIC SHOCK can kill.

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

The output leads are connected to the output terminals marked '+" and "-". They are located at the lower right and lower left corners of the front panel. The E300 provides 1/2" studs for weld cable connections. Minimum cable sizes recommended are listed in the table below.

CABLE SIZES FOR COMBINED LENGTHS OF COPPER ELECTRODE AND WORK CABLES		
	200 Amps 50% Duty Cycle	**250 Amps 30% Duty Cycle**
0-100 Ft.	3 (30mm^2)	3 (30mm^2)
100-150 Ft.	2 (35mm^2)	2 (35mm^2)
150-200 Ft.	1 (45mm^2)	1 (45mm^2)
200-250 Ft.	1/0 (55mm^2)	1/0 (55mm^2)

GENERAL DESCRIPTION

The E300 is a single phase constant current arc welding power source available in a DC output model only. Designed for stick welding, it may also be used for TIG welding when used with the K930-1 Tig Module. A 15 amp 115 volt AC, Auxiliary Power duplex receptacle, with circuit breaker protection is provided.

RECOMMENDED PROCESSES AND EQUIPMENT

DC Constant Current Welding

DC 40-250 Amps	
DUTY CYCLE	**OUTPUT AMPS**
100%	140 Amps
50%	200 Amps
30%	250 Amps
20%	300 Amps

TIG Welding

The K930-1 Tig Module can be used with this machine to provide high frequency stabilization and a gas valve for TIG welding. It operates on 115V 50/60 Hz power. A water valve (for water cooled TIG torches) is available as an option.

DESIGN FEATURES

- Power On/Off switch.
- Continuous current control dials with exact welding current needed for each job. Settings are precise and free from creep.
- Spring loaded knob on the continuous current control crank pulls out for easy adjustment and snaps back out of the way when released.
- Recessed front panel protects controls.
- Large safety margins and protective circuits protect rectifiers from transient voltages and high currents.
- Submersion dipping of assembled transformer and choke in special sealing/insulating material gives extra protection against moisture and corrosive atmosphere.
- Outstanding Arc Stability - Transformer design provides pop-out-resistant welding.
- Reconnect panel is provided to permit changing from one input voltage to another without reconnecting transformer leads.
- Auxiliary Power-15 amps at 115 VAC

Be sure the E300 is properly installed, and that all accessories are properly hooked up before attempting operation.

DUTY CYCLE (WELD)

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

AUXILIARY POWER

• One 15 amp 115 VAC grounding duplex receptacle is standard. Also provided is a receptacle cover and a 15 amp circuit breaker for Auxiliary circuit protection.

CONTROL OPERATION

- Current Control Handle

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

- TIG Welding

The E300 with the optional Tig Module is an inexpensive equipment combination for part-time production or repair TIG welding of aluminum, magnesium, thin stainless steel and many space-age metals. The E300 can be used for normal stick electrode welding with the Tig Module attached.

The Tig Module includes high frequency generator, gas valve and needed controls. It operates on 115V, 60 Hz AC power.

NOTE: Installation instructions are in the kit. (When using the E300 with any other high frequency equipment, an R.F. bypass capacitor must be installed. Order Kit T12246.) To provide protection, the welder grounding stud or frame must be connected to ground (see instructions on grounding in Machine Installation section). Also follow the grounding instructions given in the Tig Module Instruction manual.

OPTIONS / ACCESSORIES AND COMPATIBLE LINCOLN EQUIPMENT

Field Installed Options

- Tig Module (K930-1)
  Converts E300 into a TIG welder.
  Request Bulletin E3.205 for full details.

- Standard Accessory Kit (K710)
  Includes electrode holder, work clamp, electrode, work cables, and headshield with lens and coverplate.

Safety Precautions

⚠ WARNING

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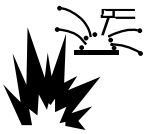

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• Keep flammable material away.
• Do not weld on closed containers.

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

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

General Maintenance

1. The fan motor has sealed ball bearings which requires no service.

2. In dusty locations dirt may clog the air channels causing the welder to run hot. Under these conditions carefully blow out the welder at regular intervals.

3. Keep the electrode and work cable connection tight.

4. Every twelve months or at the first indication of a binding current pointer, turn the input power off and remove the left case side. Wipe the pointer guide bar clean and lubricate with graphite grease.

5. When cleaning the current pointer, clean the reactor quadrant teeth, drive gear and pinion. Lubricate with graphite grease.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.
The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
Rectifier Troubleshooting	1. Turn the input power off. 2. Disconnect all input and output leads from the rectifier bridge. 3. Connect an ohmmeter between the DC positive (red) terminal and one of the Center AC terminals. Note the ohmmeter reading using the 10 to 100 scale. 4. Reverse the ohmmeter leads. Note the readings. 5. The reading taken in steps 3 and 4 should be different. If the readings are the same and near zero, the rectifier has shorted. IF the readings are the same and near full scale, the rectifier has failed open. 6. Repeat steps 3, 4 and 5 between the DC positive (red) terminal and each of the Center AC terminals. 7. Repeat steps 3, 4 and 5 between the DC negative (black) terminal and each of the Center AC terminals. NOTE: Since it is unlikely that all rectifiers of a full wave bridge would fail simultaneously, check the test method and the ohmmeter if the checking indicates that all rectifiers have failed.	If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
Welder will not weld.	1. Line switch not turned “On”. Supply line fuse blown. 2. Power circuit dead. 3. Broken power lead. 4. Wrong voltage. 5. Electrode or work lead loose or broken. 6. Open transformer circuit.	If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
Welder welds, but soon stops welding (DC only).	1. Proper ventilation hindered. 2. Welder loaded beyond rating. 3. Fan motor inoperative. 4. Poor internal connections. 5. Excessive dust accumulation in welder. 6. Bi-metallic thermostat dirty.	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
Variable or sluggish welding.	1. Poor work or electrode terminal connection. 2. Current too low. 3. Low line voltage. 4. Welding leads too small. 5. Old and badly frayed welding cables.	If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility.**
Welder won't shut off.	1. Line switch has failed mechanically.	

⚠ CAUTION

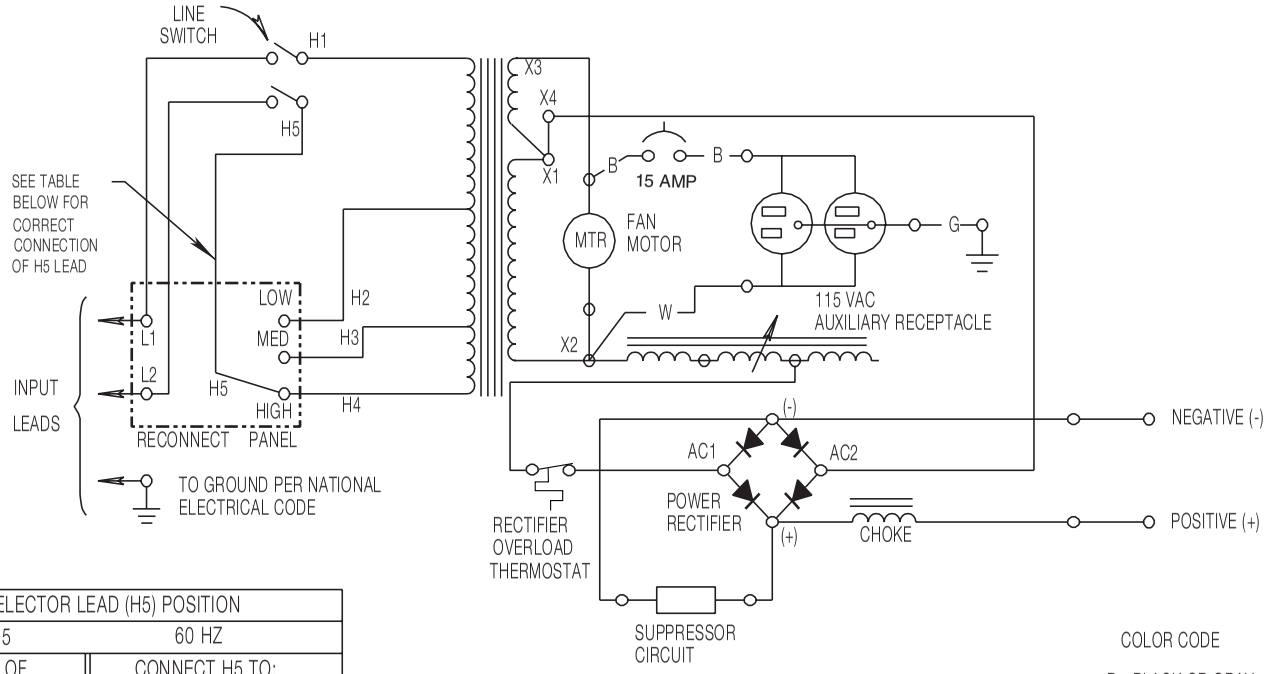
If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

WIIRING DIAGRAM-E300

WARNING

HIGH VOLTAGE can kill

- TURN THE INPUT POWER TO THE WELDER OFF USING THE DISCONNECT SWITCH AT THE FUSE BOX BEFORE INSTALLING OR SERVICING THIS MACHINE.
- DO NOT TOUCH ELECTRICALLY "HOT" PARTS SUCH AS OUTPUT TERMINALS OR INTERNAL WINDINGS.
- GROUNDING SCREW MUST BE CONNECTED TO A GOOD EARTH GROUND THROUGH THE INPUT CABLE PER NATIONAL ELECTRICAL CODE.
- DO NOT OPERATE WITH COVERS REMOVED.
- ONLY QUALIFIED PERSONNEL SHOULD INSTALL OR SERVICE THIS EQUIPMENT.



VOLTAGE SELECTOR LEAD (H5) POSITION	
230/460/575	60 HZ
FOR INPUT VOLTS OF	CONNECT H5 TO:
230	LOW
460	MED
* 575	HIGH

* MACHINES ARE SHIPPED FROM FACTORY CONNECTED FOR HIGHEST INPUT VOLTAGE.

COLOR CODE

B - BLACK OR GRAY
G - GREEN
W - WHITE

CONNECTIONS MUST BE TIGHTENED SECURELY.

ELECTRICAL SYMBOLS PER E1537.

9-9-99

S24750

S24750

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment code number..

NOTES

NOTES

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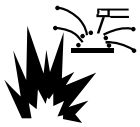
Procedure Handbook "Twelfth Edition"	$15.00	PH		
How to Read Shop Drawings	$4.50	H		
Incentive Management	$5.00	IM		
A New Approach to Industrial Economics	$5.00	NA		
The American Century of John C. Lincoln	$5.00	AC		
Welding Preheat Calculator	$3.00	WC-8		
Pipe Welding Charts	$4.50	ED-89		
			SUB TOTAL	
			Additional Shipping Costs if any	
			TOTAL COST	

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絕緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀捍材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

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IM279-TS

LT-7 TRACTOR TROUBLESHOOTING

JUNE 1995

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.

TROUBLE SHOOTING GUIDE

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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.

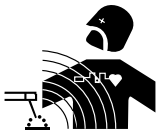
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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. I standards.

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

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

FUMES AND GASES can be dangerous.

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

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

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

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

5.e. Also see item 1.b.

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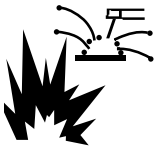


WELDING SPARKS can cause fire or explosion.

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

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

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

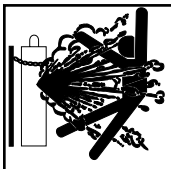
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe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

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

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

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

6.h. Also see item 1.c.



CYLINDER may explode if damaged.

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

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

7.c. Cylinders should be located:

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

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

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

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

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

FOR ELECTRICALLY powered equipment.

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

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

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

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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.

GENERAL DESCRIPTION

The LT-7 tractor is a compact, lightweight, DC, single arc tractor. It is capable of operating with 3/32" through 3/16" electrode with a current carrying capacity of 1000 amps. The LT-7 has a travel range from 6 to 70 inches per minute.

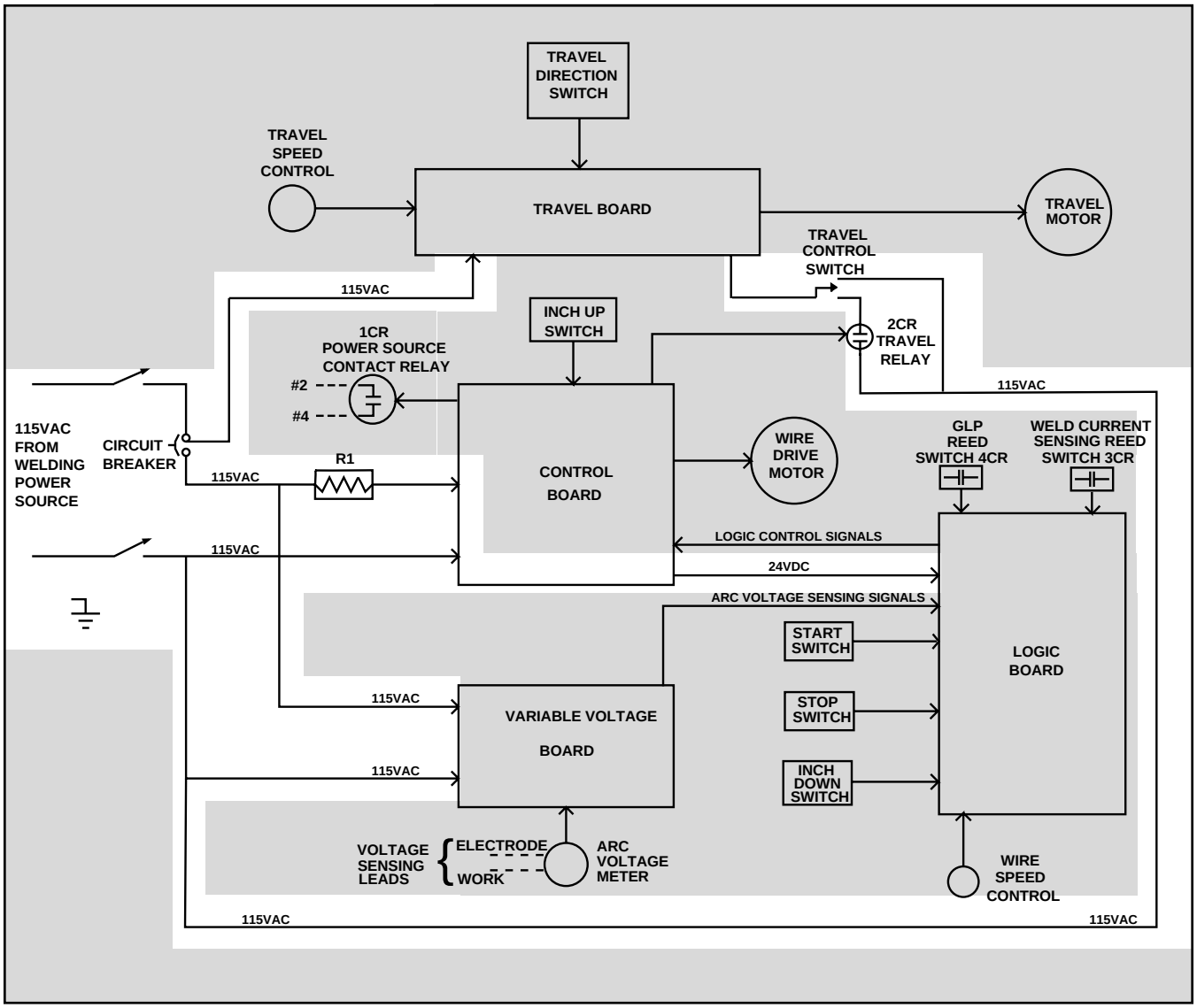

FIGURE E.1 - 115VAC INPUT POWER CIRCUITS

INPUT POWER CIRCUITS

The LT7 is powered by 115VAC which is usually supplied from the welding power source. The 115VAC is applied to the travel board. This voltage is also coupled to the control box circuitry through the on/off power switch and a 3 amp circuit breaker. The input power is then applied to the the variable voltage board and, through resistor R1, to the control board. The 115VAC is rectified and regulated by the control board which supplies 24VDC to the logic board.

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

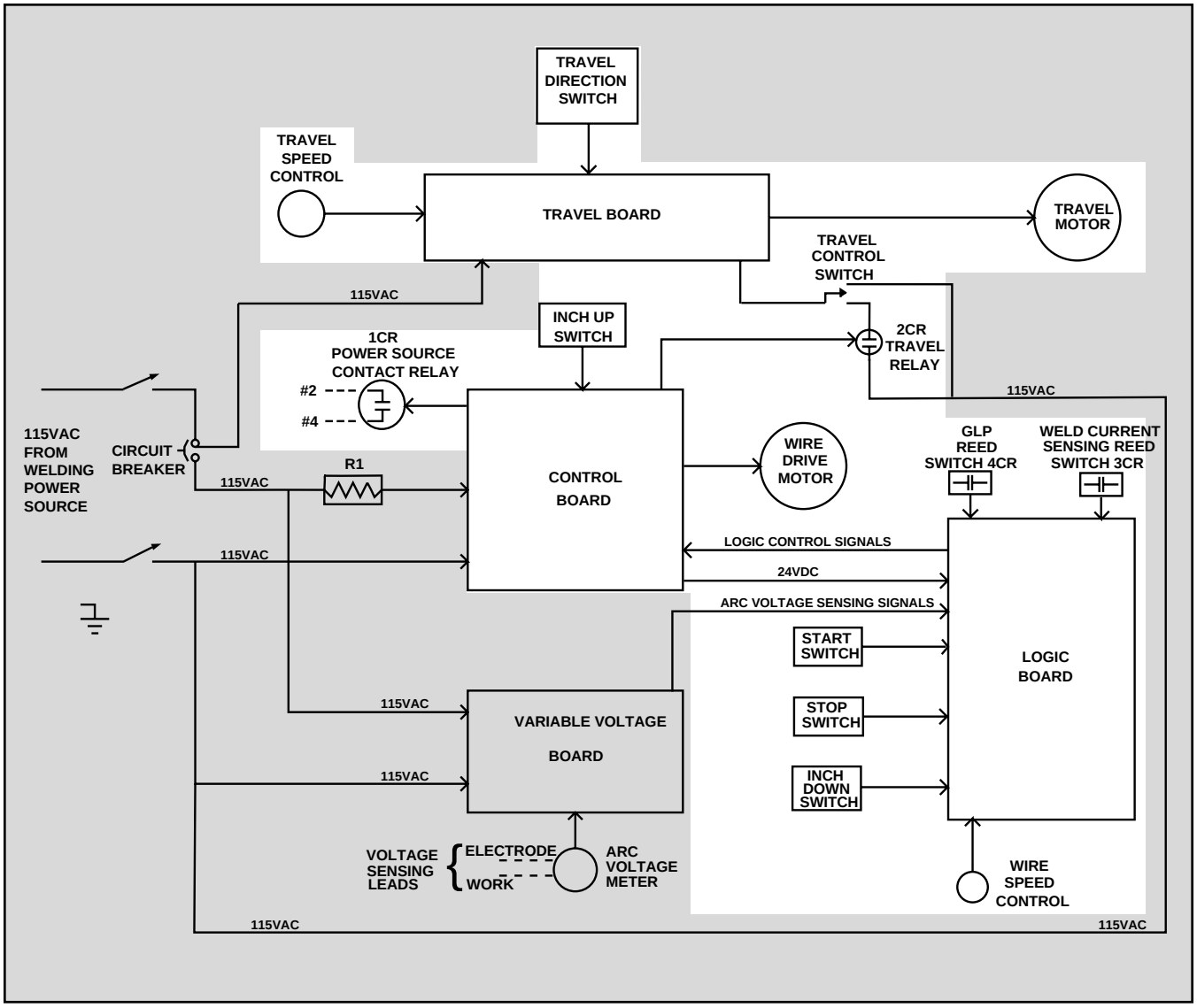

FIGURE E.2 - CONTROL LOGIC AND TRAVEL BOARDS

CONTROL, LOGIC AND TRAVEL BOARDS

Upon receiving commands from the user operated switches or potentiomenters the logic board sends the appropriate signal to the control board which then drives the wire feed motor to the correct speed and direction. When the start signal is received by the control board the power source contact relay(1CR) is energized as well as the travel relay(2CR) and the wire drive motor. When weld current closes reed switch 3CR the logic board directs the control board to change the wire feed speed from the preset inch speed to the welding feed speed set by the wire speed control potentiometer. Reed switch 4CR protects the internal grounding wire circuitry. In the event that abnormally high current was to flow in the grounding lead system the 4CR reed switch would close, signaling the logic board to stop the welding procedure. The inch up switch, which is coupled directly to the control board, dictates that the wire drive motor reverse direction and back the electrode wire away from the work piece.

Travel speed, direction and mode (either manual or auto) are determined by the settings of the three controls connected to the travel board. The travel board then applies the correct voltage and polarity to the travel motor to satisfy the control settings.

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

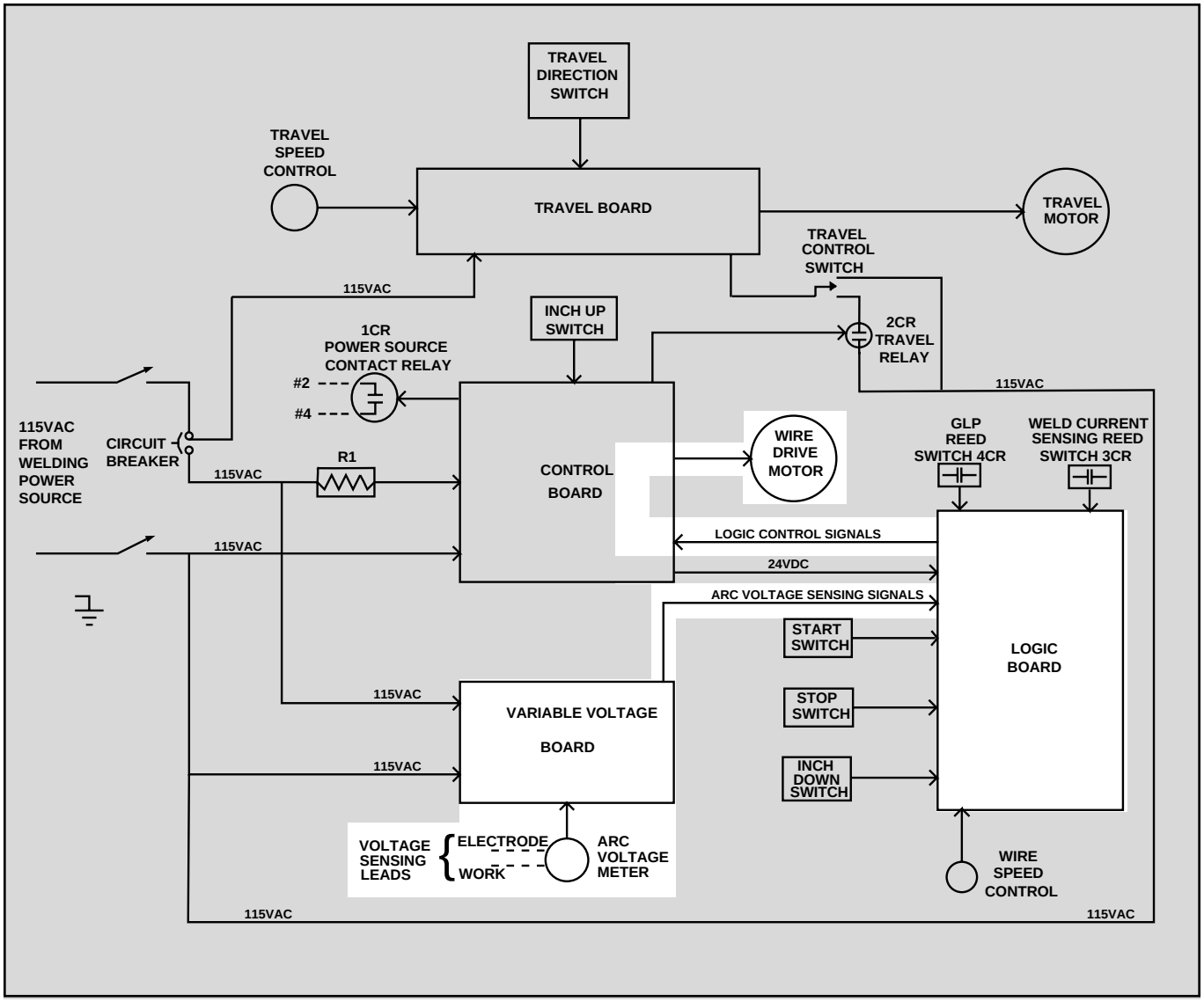

FIGURE E.3 - VARIABLE VOLTAGE BOARD

VARIABLE VOLTAGE BOARD

Arc voltage is monitored by the voltmeter and variable voltage board. When the LT7 tractor is being operated in the constant current mode the variable voltage board is essential in the control of the wire feed speed. As the arc length changes the arc voltage will also change. The variable voltage board recognizes this change and signals the logic board to either increase or decrease the wire feed speed. This function is necessary to maintain a constant electrode arc length and a stable and high quality weld.

The variable voltage board also generates a low voltage which is applied to the electrode during the inch down mode. When the electrode makes contact with the work piece this low voltage is “loaded down” thus signaling the control circuitry to stop the wire feed motor. This feature allows the operator to utilize “work touch sensing”.

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

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 machinery may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped according to: function problems and travel problems.

Step 2. PERFORM EXTERNAL TESTS. The second column labeled "FIELD COURSE OF ACTION" lists the basic possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed.

Step 3. PERFORM COMPONENT TESTS. The last column labeled "RECOMMENDED SHOP 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 bad or good. 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 the necessary test specifications and repair procedures are described in detail following the troubleshooting guide. All electrical test points, terminal strips, junctions, etc., can be found on the electrical wiring diagrams and schematics in the Electrical Diagram Section.

⚠ 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 216-383-2531 or 1-800-833-9353.

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:

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

Reusable Container Do Not Destroy

PC board can be damaged by static electricity.

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

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

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

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

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

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

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

NOTE: 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 Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
Wire feeds whenever “Power Switch” (S1) is turned “ON”.	1. Check the “Start Switch”(S5). Make certain it is not stuck closed. 2. Check the “Inch Down Switch” (S4). Make certain it is not stuck closed. 3. Check the “Inch Up Switch” (S3). Make certain it is not stuck closed.	1. If light 1B on the control board is NOT on, then the control board may be faulty. Replace. 2. If lights 1B and 1A are both “ON” then remove lead #593 from the Inch Up switch(S3). If the problem is resolved the lead or the switch is faulty. If light 1A stays on when lead #593 is removed from the Inch Up switch the control board may be faulty. Replace. 3. If lights 1B, on the control board, and 2B on the logic board, are both “ON” then remove lead #581 from the Start switch(S5). If the problem is resolved the lead or the switch is faulty. If light 2B stays on when lead #581 is removed from the Start Switch the logic board may be faulty. Replace. 4. If lights 1B, on the control board, and 2J on the logic board are both “ON” then remove lead #592 from the Inch Down switch (S4). If the problem is resolved the lead or the switch is faulty. If light 2J stays on when lead #592 is removed from the Inch Down switch the logic board may be faulty. Replace.

⚠ CAUTION

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

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PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
Wire does not feed. No inch up or down. Wire does NOT feed when start switch is activated.	1. Make sure the Power Switch (S1) is on and functioning properly. 2. Check the circuit breaker located on the front cover. If tripped - reset. If circuit breaker repeatedly trips consult appropriate ("PROBLEMS (SYMPTOMS"). 3. Open the front cover and inner panel to check if any of the LEDS on the printed circuit boards are lit. If none of the LEDS are lit, this is an indication that the LT7 is NOT receiving any power. Check the 2/10 amp fuse on the control board. Also make sure that 115VAC is being received on leads #531 and #532. See wiring diagram.	1. Check lights 1C and 1D on the control board. If both lights are lit at the same time replace the control board. 2. Press the inch up switch. Lights 1D and 1E, on the control board should be lit. If they are NOT lit the control board may be faulty. 3. If light 1D and 1E are lit and the wire drive motor does not turn check the continuity of leads #539, #541, #626 and #627 from the control board to the wire drive motor. 4. Perform the ***Wire Drive Motor Test***.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

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PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire will not feed and the circuit breaker trips when the inch or start switches are pressed.	1. Reset the circuit breaker and observe lights 1C and 1D on the control board with the unit at idle. (Not attempting to feed wire). Light 1C should be OFF and light 1D should be ON. If both lights are OFF remove power and check F101 field fuse. (1/2amp). 2. If both lights are ON the control board may be faulty. 3. The following conditions may cause the F101 fuse to fail. •Faulty wire drive motor •Incorrect welding procedure. •A low impedance across the arc voltage sensing leads (#21 and #67). •A defective control board.	1. If when at idle light 1D is ON and light 1C is OFF then perform the ***Wire Drive Motor Test***.

⚠ CAUTION

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

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PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire will not feed when the start switch is pressed. There is not a voltage indicated on the LT7 voltmeter. The wire does inch up and down properly.	1. If light 2M on the logic board is lit the ground lead protector has tripped. Make sure the LT7 head or electrode is NOT contacting the LT7 frame or control box. Note that conductive dirt or shavings can cause the ground lead protector to trip. Remove power to unit and clear fault. 2. While pressing the start switch observe light 2B. It should be lit. If not the start switch (S5) or associated wires may be faulty. See wiring diagram.	1. If light 2B is on when the start switch is pressed and light 2M does NOT light then the logic board may be faulty.

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

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PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire will NOT inch down but does inch up properly. When the start switch is pressed the wire feeds down properly.	1. While pressing the inch down switch observe light 2J. It should be lit. If not the inch down switch (S4) or associated wires may be faulty. See wiring diagram. 2. If the LT7 is in the constant voltage (CV) mode and light 2J does light then the logic board may be faulty.	1. If the LT7 is in the variable voltage (VV) mode, and a variable voltage board is installed, disconnect lead #21 from the terminal strip. Turn on input power and while pressing the inch down switch observe light 3A. If light 3A does NOT light the variable voltage board may be faulty. Replace board and reconnect lead #21. If light 3A does light, with lead #21 disconnected, the resistance across leads #21 and #67 is too low. The resistance must be above 500 ohms. The low resistance could be caused by the following: • A lead or object external to the power source or LT7 causing a low resistance between leads #21 and #67. • A non-Lincoln power source not designed with the required impedance. • A defective power source.

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire will NOT inch down but inches up properly. When the start switch is pressed the wire does not feed.	1. Press the inch down switch and observe light 1B on the control board. If light 1B is lit and the motor does not activate the control board may be faulty.	1. If light 1B does NOT light, when the inch down switch is pressed, measure the DC voltage from lead #586 to lead #539 while pressing the inch down switch. Normal voltage is 12 to 15VDC. •If normal voltage is indicated the control board may be faulty. •If normal voltage is not present the logic board may be faulty.

⚠ CAUTION

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire will not inch down. The wire inches up properly. When the start switch is pressed the wire feeds up instead of down.	1. Check the connections between the power source and LT7 for loose or incorrect connections. 2. Check the leads connected to the variable voltage board for loose or faulty connections. 3. While pressing the inch down switch observe light 3A on the variable voltage board. • If light 3A is NOT lit check leads #21 and #67 for continuity to the voltage board. 4. If while pressing the inch down switch light 3A does light also check light 2E on the logic board. • If light 3A and 2E are both lit the control board may be faulty. • If light 3A is lit but light 2E is NOT lit the logic board may be faulty.	1. Check lead #21 for continuity (zero ohms) to “work”. 2. Check lead #67 for continuity (zero ohms) to electrode.

⚠ CAUTION

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

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PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
When attempting to “cold start” the wire does not stop feeding when it touches the work piece.	1. Make certain a variable voltage board is installed and connected correctly. 2. The jumper on the variable voltage board must be connected to the “H” pin. 3. The logic board may be faulty. 4. The variable voltage board may be faulty.	1. Check lead #21 for continuity (zero ohms) to “work”. 2. Check lead #67 for continuity (zero ohms) to electrode.
The wire will not inch up. The wire inches down properly.	1. With LT7 at idle (not feeding wire) observe light 1D on the control board. The light should be lit. If light is NOT lit the control board may be faulty. 2. While pressing the inch up switch observe light 1A on the control board. If light 1A does NOT light check the inch up switch and associated leads. (#593 and #539) See wiring diagram. 3. If light 1A is lit the control board may be faulty.	1. Perform the ***Wire Drive Motor Test***.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire feeds up with either inch switch.	1. While pressing the inch down switch observe light 2E on the logic board. If light 2E does NOT light the logic board may be faulty. 2. If light 2E does light the control board may be faulty.	1. Check the wiring to the inch down switch. See wiring diagram. 2. Check the wiring between the logic board and the control board. See wiring diagram.
The wire feeds down with either inch switch.	1. With the LT7 at idle (not feeding wire) observe light 2E on the logic board. It should be off. If light 2E is on the logic board may be faulty. 2. If light 2E is off the control board may be faulty.	1. Check the wiring to the inch up switch. See wiring diagram. 2. Check the wiring between the logic board and the control board. See wiring diagram.

⚠ CAUTION

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire feeds at full speed during the inch mode (only).	1. The logic board may be faulty.	1. Check the wiring between the logic board and the control board. See wiring diagram. 2. Perform the ***Wire Drive Motor Test.***
The wire feeds at full speed during the weld mode (only).	1. Remove electrode from drive rolls and place a jumper wire from lead #528 to lead #539 on the reed switch(CR3) in the shunt box. Press the start switch and observe lights 2L and 2D on the logic board. Both lights should be on. If light 2D is lit and light 2L is NOT lit the logic board may be faulty. 2. If light 2D does not light check continuity (zero ohms) of leads #528 and #539 from the reed switch (CR3) to the logic board. See wiring diagram.	1. Check leads #634, #641 and #642 between wire feed speed control (R3) and logic board. 2. Check R3 rheostat for correct resistance (5000 ohms) and proper function.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire feeds at full speed in both inch and weld modes.	1. With the LT7 at idle (not feeding wire) observe light 2F on the logic board. If light 2F is lit the control board may be faulty. 2. If light 2F is not lit the logic board may be faulty.	1. Perform the ***Wire Drive Motor Test***.
The wire has limited or erratic speed control in one or more modes.	1. Make sure the CV-VV switch is in the CV mode. If the problem is solved the variable voltage board may be faulty. 2. The logic board may be faulty. 3. The control board may be faulty.	1. Perform the ***Wire Drive Motor Test***. 2. Check the wire feed speed control (R3) for resistance and smooth operation. Normal resistance is 5000 ohms.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The wire feeds up instead of down when the start switch is pressed. There is no voltage reading on LT7 voltmeter. The wire inches up and down properly.	1. Check for proper connection of electrode leads and control cable leads from power source to LT7. 2. On Lincoln power sources put a jumper from #2 to #4 on the terminal strip. This activates the output from the power source. Test for voltage at the output terminals of the power source. If no voltage is indicated then the power source is faulty. 3. If voltage is present at the power source output terminals it should also be present at the LT7 voltmeter. If not, check leads #21 and #67 for breaks or faulty connections. 4. Remove electrode from drive rolls and press the start switch. Observe light 2K on the logic board. It should be lit. If light 2K does NOT light when the start switch is pressed remove power to unit. Remove lead #682 from CR1. Check the resistance of the coil from the terminal to lead #510. Normal resistance is 10,000 ohms. See wiring diagram. 5. If the relay coil resistance is correct the logic board may be faulty. 6. If light 2K does light make sure the relay (CR1) contacts are making contact.	1. Check lead #21 for continuity (zero ohms) to “work”. 2. Check lead #67 for continuity (zero ohms) to electrode. 3. Check leads #2 and #4 for loose or faulty connections between relay CR1 and the control cable receptacle.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
No control of power source output from LT7 tractor. Power source does have output.	1. Check control cable leads for proper connection to power source. 2. Make sure the Lincoln power source is in the remote control mode.	1. Check the continuity of leads #75, #76 and #77 in the control cable. 2. Check the resistance and operation of the voltage control rheostat (R2). Normal resistance is 10,000 ohms. 3. Check the continuity of leads #75, #76 and #77 from the control rheostat (R2) to the control cable receptacle.
The circuit breaker trips while the LT7 is at idle (not feeding wire).	1. Isolate the problem by unplugging the printed circuit boards one at a time and checking to see if circuit breaker trips.	1. If the problem is not in a printed circuit board then check the wiring harness for “shorts” or grounded leads.

⚠ CAUTION

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
FUNCTIONAL PROBLEMS		
The power source output contactor does NOT “drop out”. The power source output terminals are always electrically hot.	1. With the LT7 at idle (not feeding wire) observe light 2K on the logic board. It should not be on. If light 2K IS on the logic board may be faulty. 2. If light 2K is NOT lit (with the LT7 at idle) locate and remove lead #2 on the 1CR relay. If the power source output contactor drops out the 1CR relay may be faulty. 3. If the power source contactor stays “ON” (output terminals electrically hot) with #2 lead removed from 1CR, the problem is in the control cable or the power source.	
The welding and travel do not stop when the stop switch is pressed.	1. While pressing the stop switch observe light 2C. If light 2C is on the logic board may be faulty. 2. If light 2C is NOT lit (while pressing the stop switch) check the stop switch (S6) and associated leads.	

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Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
TRAVEL PROBLEMS		
The travel motor does not run in either the “manual” or “automatic” position.	1. Make sure the circuit breaker is NOT tripped. 2. Set the travel switch in “manual” mode. Check the voltage at the travel board #531 to #632 at the circuit breaker. Normal is 105 to 130VAC. If the correct voltage is NOT present check the circuit breaker, the R5 resistor, the travel switch and the associated wiring. See wiring diagram. 3. If the correct AC voltage IS present at leads #531 to #632 then check the DC voltage at the travel direction switch (S7). (Leads #561 to #559). Normal is 85VDC. with the travel speed set at maximum. If the correct DC voltage is NOT present at leads #561 to #559 the travel board may be faulty. Also check the travel speed control (R6) and the associated wiring. See wiring diagram	1. Check the DC armature voltage being applied to the travel motor. Leads #595 to #594. Normal is 0 to 85VDC. depending upon the travel speed setting. (Note: In older units the travel motor may be a shunt wound field motor. Normal field voltage is 90 to 110VDC. This may be measured at leads #656 to #657. If field voltage is missing check field fuse F401 on travel board). 2. If the armature voltage is NOT present at leads #595 to #594 check the travel direction switch and associated wiring. See wiring diagram. 3. If the correct armature voltage (and field voltage in older units) IS present perform the ***Travel Motor Test***.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
TRAVEL PROBLEMS		
The travel motor will not run with travel switch set on “automatic”. The motor runs properly with travel switch set to “manual”.	1. Check light 2H on logic board. Light 2H should be lit when automaic travel is required. If light 2H does NOT light check the coil resistance of relay 2CR. Normal resistance is 10,000 ohms. 2. If 2CR coil is good and light 2H does NOT light, when automatic travel is required, the logic board may be faulty. 3. If light 2H does light and relay 2CR activates the contacts in 2CR may be faulty.	1. The travel control switch (S2) or associated wiring may be faulty. See wiring diagram. Check and repair or replace if necessary.
The travel motor runs continuously with travel control switch set on “automatic”.	1. Observe light 2H on logic board. Light 2H should only be lit when automatic travel is required. If light 2H is lit continuously the logic board may be faulty. 2. If light 2H lights only when automatic travel is required and is off all other times the contacts in relay 2CR may be stuck closed. Replace relay.	

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
TRAVEL PROBLEMS		
The travel circuit breaker repeatedly trips.	1. While unit is traveling check the the travel motor armature current. Normal current is 0.5 amps DC. (Note: In older units also check for field voltage of 90 to 110VDC at leads #656 to #657. If field voltage is missing check field fuse F401 on travel board). 2. If the current is too high check for possible excessive external loading of the travel motor such as gummed up gears, excessive cable drag or other obstacles. 3. The travel board may be faulty.	1. If all tests are good the circuit breaker may be faulty. Test or replace.
The travel motor runs at full speed with no control.	1. Remove power to unit and check the resistance of travel speed control rheostat (R6). Normal resistance is 5000 ohms. Also check R6 for smooth operation. 2. Check associated leads between R6 and the travel board. 3. The travel board may be faulty.	1. Perform the ***Travel Motor Test***.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

Troubleshooting Guide – See Wiring Diagrams for location of specified components. See Wiring Diagrams for troubleshooting of specific circuits.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	FIELD COURSE OF ACTION	RECOMMENDED SHOP COURSE OF ACTION
TRAVEL PROBLEMS		
The travel motor runs with limited speed. The control may be erratic.	1. Remove power to unit and check the resistance of travel speed control rheostat (R6). Normal resistance is 5000 ohms. Also check R6 for smooth operation. 2. Check associated leads between R6 and the travel board. 3. The travel board may be faulty.	1. Perform the ***Travel Motor Test***.

⚠ 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 electrical technical troubleshooting assistance before you proceed.Call 216-383-2531 or 1-800-833-9353

PC BOARD STATUS LIGHTS

Table B.1 is a summary of the on/off states of the LED's on the Control Board, Logic Board and Voltage Board for various conditions of the LT-7. Table B.2 lists the functions that these LED's indicate.

Table B.1 P.C. Board Status Lights

INDICATOR LIGHTS		CONDITIONS FOR LIGHT "ON"						
LIGHT NO.	LOCATION	IDLE MODE	INCH UP SWITCH PRESSED	INCH DOWN SWITCH PRESSED	START SWITCH PRESSED	STOP SWITCH PRESSED	BURNBACK MODE	GROUND LEAD PROTECTOR TRIPPED
1A	CONTR. BD.		ON					
1B	CONTR. BD.			ON	ON			
1C	CONTR. BD.			ON	ON			
1D	CONTR. BD.	ON	ON		ON	ON	ON	ON
1E	CONTR. BD.		ON	ON	ON			
2B	LOGIC BD.				ON			
2C	LOGIC BD.					ON	ON	ON
2D	LOGIC BD.	ON*	ON*	ON*	ON	ON		ON*
2E	LOGIC BD.			ON	ON			
2F	LOGIC BD.	ON	ON	ON			ON	ON
2H	LOGIC BD.				ON			
2J	LOGIC BD.			ON				
2K	LOGIC BD.				ON		ON	
2L	LOGIC BD.				ON			
2M	LOGIC BD.							ON
3A	VOLT BD.			ON	ON		ON	
3B	VOLT BD.			ON	ON		ON	

ON* INDICATES LIGHT IS DIM

Table B.2 P.C. Board Status Light Definitions

LIGHT NUMBER	FUNCTIONS INDICATED BY PC BOARD LEDS
1A	INCH UP SWITCH PRESSED
1B	LOGIC SIGNAL FOR MOTOR TO RUN
1C	DOWN FIELD VOLTAGE APPLIED
1D	UP FIELD VOLTAGE APPLIED
1E	ARMATURE VOLTAGE APPLIED
2B	START SWITCH PRESSED
2C	STOP SWITCH PRESSED
2D	WELD CURRENT PRESENT
2E	SIGNAL TO APPLY DOWN FIELD VOLTAGE
2F	INCH SPEED CIRCUIT OPERATIVE
2H	SIGNAL TO ENERGIZE TRAVEL CIRCUIT
2J	INCH DOWN SWITCH PRESSED
2K	SIGNAL TO OPERATE POWER SOURCE CONTACTOR
2L	WELD VOLTAGE CONTROL OPERATIVE
2M	GROUND LEAD PROTECTOR "TRIPPED"
3A	ELECTRODE VOLTAGE (OUTPUT FROM VV BOARD)
3B	ELECTRODE VOLTAGE (INPUT TO VV BOARD)

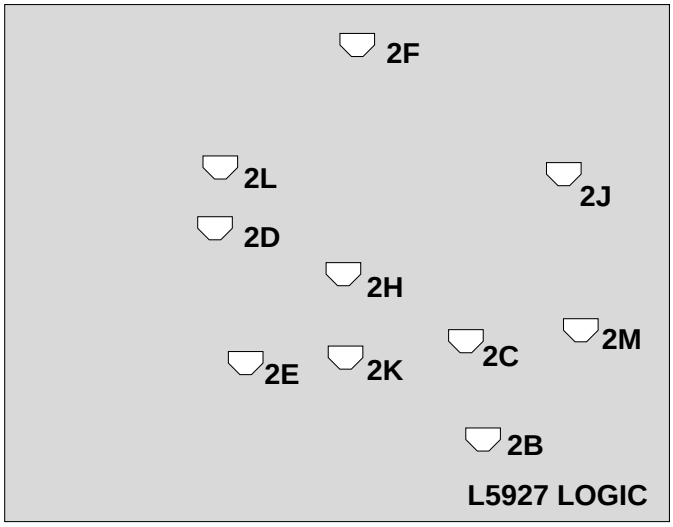


FIGURE B.1 Logic P.C. Board LED Locations

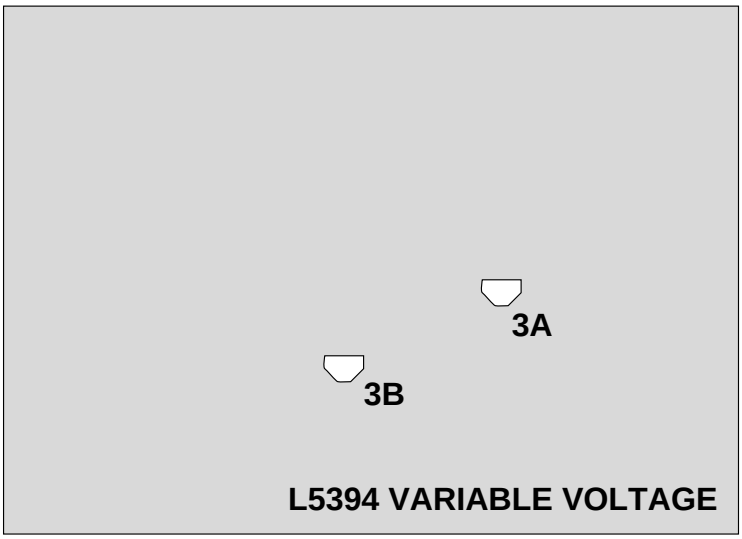


FIGURE B.2 Voltage P.C. Board LED Locations

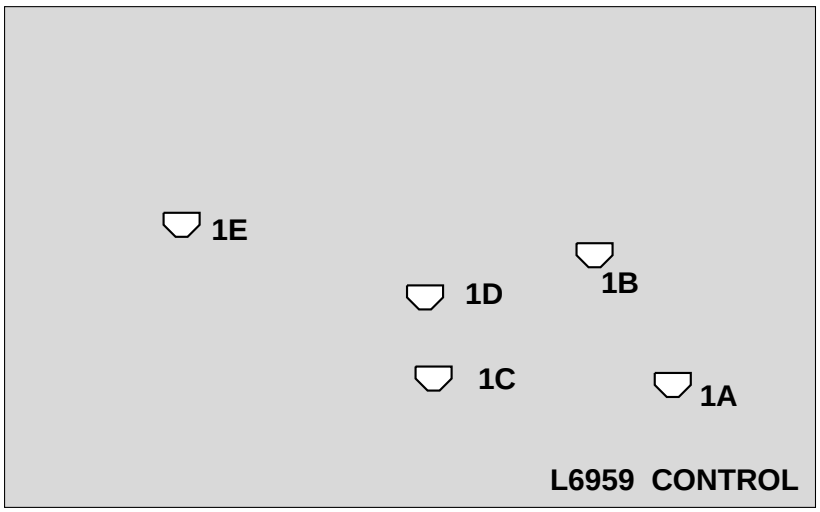


FIGURE B.3 Control P.C. Board LED Locations

NOTES

WIRE DRIVE MOTOR TEST

⚠ 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 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 technical troubleshooting assistance before you proceed. Call 216-383-2531 or 1-800-833-9353(WELD).

TEST DESCRIPTION

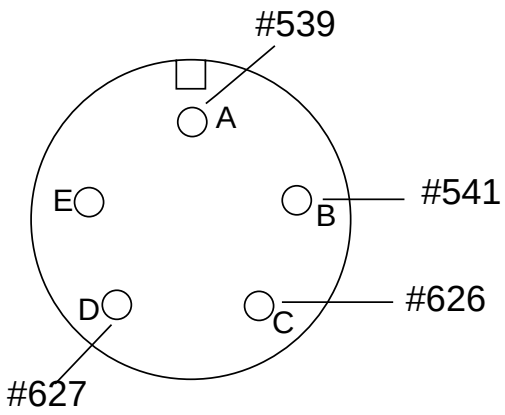
This test will determine if the wire drive motor is able to function when supplied with the correct voltage.

MATERIALS NEEDED

Variable DC voltage supply 0 to 90VDC.
Isolated DC voltage supply 110VDC.
Volt/ohmmeter

WIRE DRIVE MOTOR TEST (*continued*)

FIGURE B.4 - Wire Drive Motor Connector Pins



TEST PROCEDURE

1. Remove the wire feed motor connector from the LT7 control box.

2. Using the ohmmeter measure the motor resistances per Table B.3. Also see Figure B.4

3. If the motor resistance test is good proceed to the Motor Applied Voltage Test.

MOTOR APPLIED VOLTAGE TEST

1. Carefully connect the 110VDC supply (SUPPLY TURNED OFF) to pins C and D on the motor connector.

2. Carefully connect the variable 0 to 90VDC supply (SUPPLY TURNED OFF) to pins A and B on the motor connector.(See Table B.3)

3. Apply field voltage first(pins C and D) to the motor. Then slowly apply the armature voltage on pins A and B.(See Table B.3)

4. The motor should run and the speed should vary with changes to the armature voltage.

5. If the motor does NOT run and change speed correctly the motor or gear box may be faulty.

6. To stop motor REMOVE ARMATURE VOLTAGE FIRST. (Pins A and B)

TABLE B.3

TEST POINTS	RESISTANCE	DC VOLTAGE
Lead #539 to #541 Armature	4 to 5 ohms	0 to 90VDC
Lead #626 to #627 Field Winding	750 to 850 ohms	90 to 120VDC
All leads to motor shell	500,000 ohms min.	NONE

TRAVEL MOTOR TEST

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TEST DESCRIPTION

This test will determine if the travel motor is able to function when supplied with the correct voltage.

MATERIALS NEEDED

Variable DC voltage supply 0 to 90VDC.
Isolated DC voltage supply 110VDC. (Only needed for older units with powered field motor).
Volt/Ohmmeter

TRAVEL MOTOR TEST (*continued*)

TEST PROCEDURE

1. Remove the travel motor connector from the LT7 control box.

2. Using the ohmmeter measure the motor resistances per Table B.4. Also see Figures B.5. and B.6*

3. If the motor resistance test is good proceed to the Motor Applied Voltage Test.

MOTOR APPLIED VOLTAGE TEST

1. *Carefully connect the 110VDC supply (SUPPLY TURNED OFF) to pins C and D on the travel motor connector. See Figure B.6

2. Carefully connect the variable 0 to 90VDC supply (SUPPLY TURNED OFF) to pins A and B on the travel motor connector.

3. *Apply field voltage first (pins C and D) to the motor. See Figure B.6 and Table B.4

4. Slowly apply the armature voltage on pins A and B.(See Table B.4)

5. The motor should run and the speed should vary with changes to the armature voltage.

6. If the travel motor does NOT run and change speed correctly the motor or gear box may be faulty.

7. *To stop motor REMOVE ARMATURE VOLTAGE FIRST. (Pins A and B)

*DENOTES OLDER UNITS WITH FIELD WINDING

TABLE B.4

TEST POINTS	RESISTANCE	DC VOLTAGE
Lead #594 to #595 Armature	25 ohms	0 to 90VDC
Lead #559 to #561 Armature*****	27 ohms*****	0 to 90VDC*****
Lead #546 to #547 Field Winding*	500 to 650 ohms*****	90 TO 110VDC*****
All leads to motor shell	500,000 ohms min.	NONE

*****DENOTES OLDER UNITS WITH FIELD WINDING

TRAVEL MOTOR TEST (*continued*)

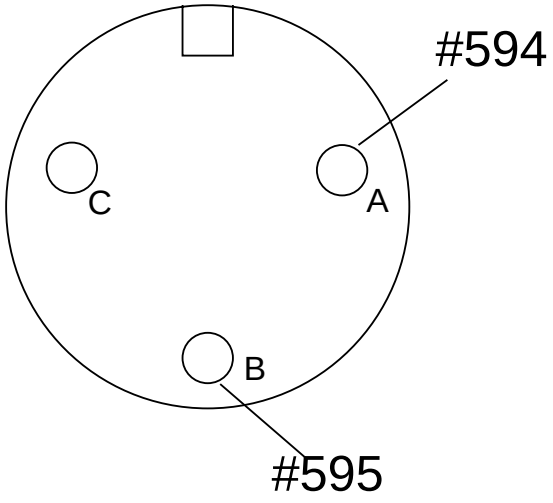

FIGURE B.5 Travel Motor Connector Pins

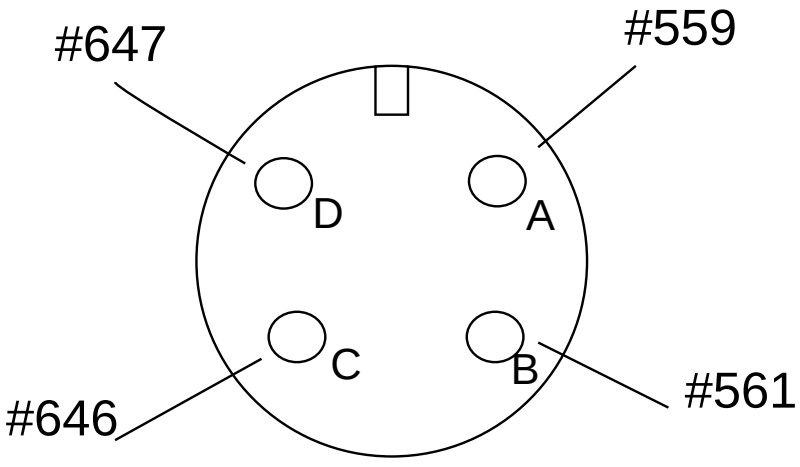

FIGURE B.6 Travel Motor Connector Pins (Older Units with Powered Field.)

NOTES

WIRE DRIVE MOTOR REMOVAL AND REPLACEMENT

⚠ WARNING

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MATERIALS NEEDED

1/2” Wrench
Large slot head screwdriver
Small slot head screwdriver
5/32” Allen type wrench

WIRE DRIVE MOTOR REMOVAL PROCEDURE (*continued*)

MOTOR REMOVAL PROCEDURE:

1. Remove the wire drive motor cable from the LT7 control box.

2. Using the 1/2” wrench remove the bolt holding the flux hopper(if used) to the bumper handle assembly.

3. Use the large slot head screwdriver to remove the two slot head screws holding the bumper handle assembly to the gear box housing.

4. Use the 5/32” Allen type wrench to remove the socket head cap screw from the gear box housing and motor end bracket.

5. Locate and remove the four small slot head screws holding the inspection cover plate to the gear box housing. Note placement of rubber gasket and cable strain clamp.

6. Locate and remove the two socket head cap screws mounting the motor to the gear box housing. Note: The inspection cover plate has to be remove (Step #5) to gain access to the two socket head cap screws.

7. Carefully remove the motor(with pinion gear) from the gear box assembly.

MOTOR REPLACEMENT PROCEDURE:

1. Carefully install the replacement motor (with pinion gear) and mount to the gear box housing using the two socket head caps screws.

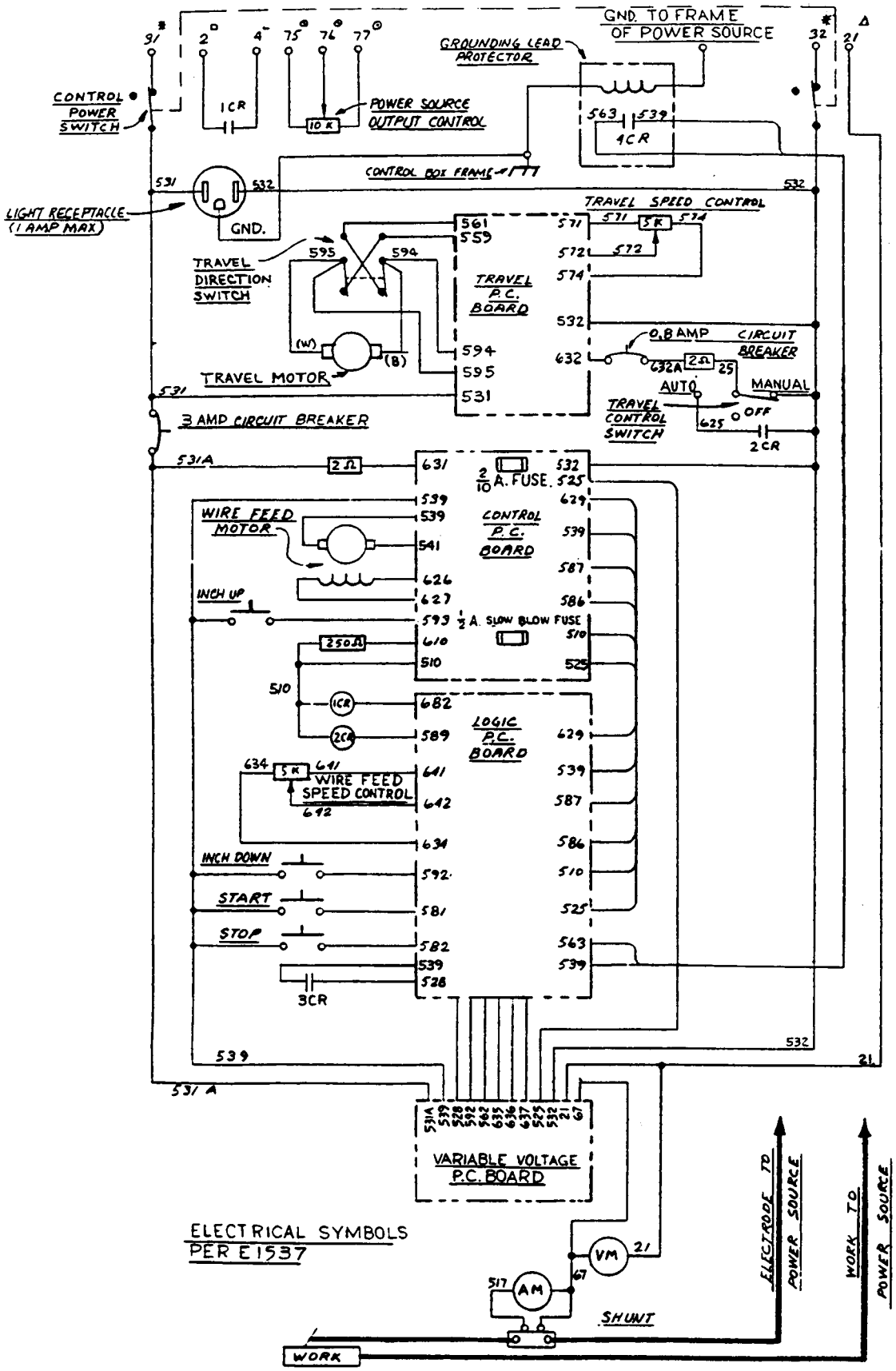
2. Using the four small slot head screws install the inspection cover plate along with the rubber gasket and cable clamp.

3. Install the bumper handle assembly with the socket head cap screw and the two larger slot head screws.

4. Install the flux hopper (if used) to the bumper handle assembly and secure with the hex head bolt.

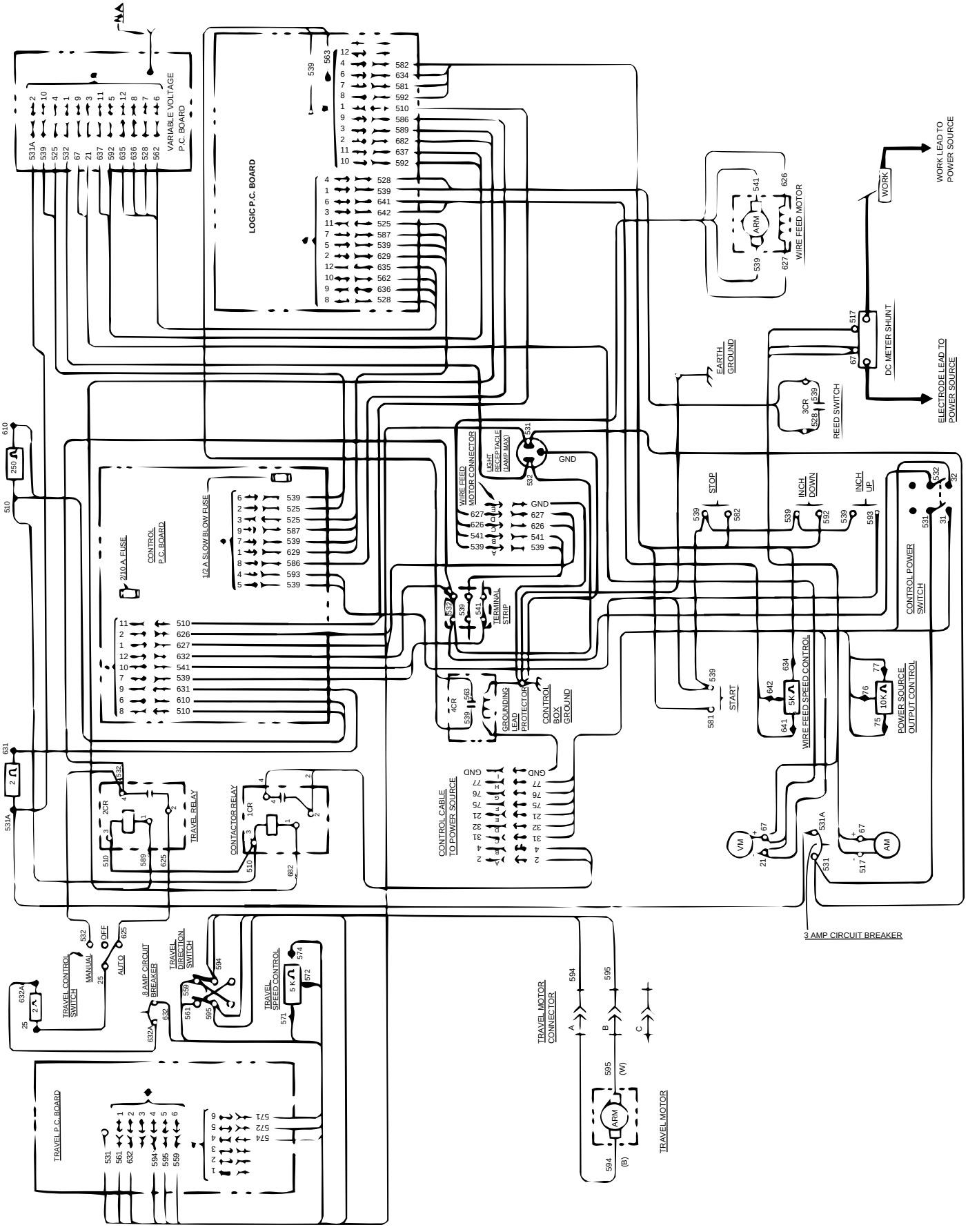
5. Attach the wire drive motor cable to the LT7 control box receptacle.

CONNECTION SCHEMATIC - M15342



LT-7 TRACTOR

CONTROL BOX WIRING DIAGRAM- L7460



This diagram is provided for reference only. It may not be totally applicable to all machine codes.

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NOTES