

# OPERATING MANUAL

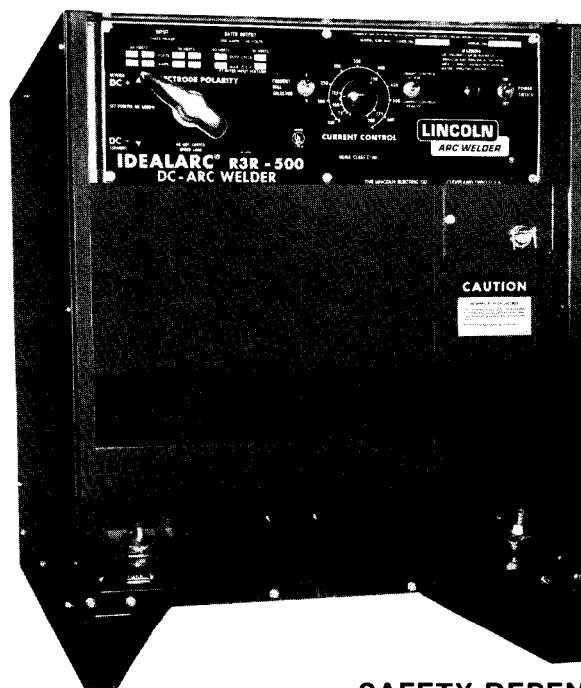
## **IDEALARC®** **R3R-300, R3R-400 and R3R-500** **3 Phase Rectifier Type** **VARIABLE VOLTAGE DC ARC WELDING POWER SOURCE** **FOR MANUAL ELECTRODE WELDING** **Codes 7819 to 8586**

IM290

March, 1981

Idealarc R3R-300, R3R-400, R3R-500

7819; 7820; 7821; 7829; 7830; 7831; 7850;  
7851; 7852; 7853; 7854; 7855; 7898; 7899;  
7900; 7907; 7908; 7911; 7919; 7924; 7932;  
7942; 7944; 7950; 7954; 7955; 7956; 7957;  
7973; 7982; 8007; 8067; 8068; 8069; 8070;  
8071; 8072; 8073; 8074; 8087; 8114; 8131;  
8141; 8148; 8157; 8158; 8159; 8165; 8170;  
8171; 8172; 8187; 8188; 8196; 8197; 8198;  
8210; 8216; 8232; 8248; 8311; 8312; 8381;  
8408; 8414; 8453; 8478; 8494; 8496; 8503;  
8504; 8505; 8506; 8507; 8513; 8518; 8536;  
8542; 8548; 8552; 8554; 8558; 8585



This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

### **DAMAGE CLAIMS**

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.

### **SAFETY DEPENDS ON YOU**

Lincoln welders are 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 OPERATING MANUAL AND THE ARC WELDING SAFETY PRECAUTIONS ON THE INSIDE FRONT COVER.** And, most importantly, think before you act and be careful.

# ARC WELDING SAFETY PRECAUTIONS

**PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. READ AND UNDERSTAND BOTH THE SPECIFIC INFORMATION GIVEN IN THE OPERATING MANUAL FOR THE WELDER AND/OR OTHER EQUIPMENT TO BE USED AS WELL AS THE FOLLOWING GENERAL INFORMATION.**

1. Have all installation, maintenance and repair work performed only by qualified people.

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

Protect yourself from possible dangerous electrical shock:

- a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Never permit contact between "hot" parts of the circuits and bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- b. Always insulate yourself from the work and ground using dry insulation when welding in damp locations, on metal floors, gratings or scaffolds, and particularly when in positions (such as sitting or lying) where large areas of your body can be in contact with a conductive surface.
- c. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition.
- d. Never dip the electrode holder in water for cooling.
- e. 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.
- f. If using the welder as a power source for mechanized welding, the above precautions also apply for the automatic electrode, electrode reel, welding head, nozzle or semiautomatic welding gun.
- g. When working above floor level, protect yourself from a fall should you get a shock. Never wrap the electrode cable around any part of your body.
- h. Also see Item 7.

## 3. **FUMES AND GASES can be dangerous to your health.**

- 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 on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes, even greater care must be taken.
- 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.
- c. Also see Item 8b.

## 4. **ARC RAYS can injure eyes and burn skin.**

Arcburn may be more severe than sunburn. Therefore:

- 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. Filter lens should conform to ANSI Z87.1 standards.
- b. Use suitable clothing to protect your skin and that of your helpers from the arc rays.
- 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.

## 5. **FIRE OR EXPLOSION can cause death or property damage.**

- a. Remove fire hazards well away from the 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.
- b. 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.

- c. 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 "Safe Practices for Welding and Cutting Containers That Have Held Combustibles", A6.0-65 from the American Welding Society, Miami, Florida 33125.
- d. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- e. Also see Items 6c and 8c.

## Additional Safety Precautions

### 6. **For Welding in General.**

- a. Droplets of molten slag and metal are thrown or fall from the welding arc. Protect yourself with 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 when in a welding area. Use glasses with side shields when near slag chipping operations.
- b. Keep all equipment safety guards, covers and devices in position and 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.
- c. Be sure the work cable is connected to the work as close to the welding area as practical. Work cables connected to the building framework or other locations some distance 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.

### 7. **For Electrically Powered Equipment.**

The high voltage and rotating parts associated with such units require observance of these additional precautions:

- a. Disconnect and lock out all power sources before doing any work on the equipment.
- b. Make the electrical installation in accordance with the National Electrical Code and all local codes.
- c. Properly ground the equipment in accordance with the National Electrical Code and the manufacturer's recommendations. The work or metal to be welded must also be connected to a good electrical ground.

### 8. **For Engine Powered Equipment.**

The required fuel and rotating parts associated with such units require observance of these additional precautions:

- a. Whenever possible, turn the engine off before troubleshooting and maintenance work.
- b. Operate internal combustion engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.
- c. Do not add the fuel near an open flame or when the engine is running. Stop the engine and, if possible, allow it to cool to prevent spilled fuel from igniting on contact with hot engine parts or electrical sparks. Do not spill fuel when filling tank.
- d. 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.
- e. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

**For more detailed information it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting — ANSI Standard Z49.1" from the American Welding Society, Miami, Florida 33125.**

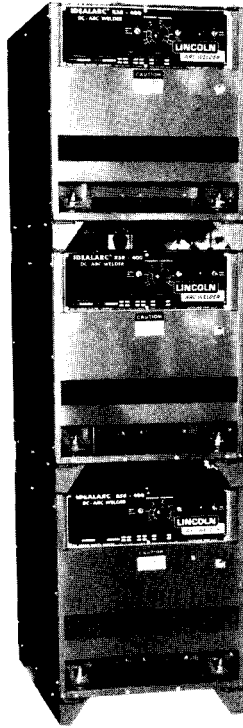
# INSTALLATION

## LOCATION AND STACKING

Install the welder in a dry location where there is a free circulation of air through the louvers in the front and back of the case. A location which minimizes the amount of smoke and dirt drawn into the front louvers reduces the chance of dirt accumulation that can block air passages and cause overheating.

The new Idealarc R3R welders can be stacked three high when the following precautions are observed: (Do not stack with R3R machines below Code 7819 or R3S welders.)

1. Be sure the bottom machine is on a firm, level surface suitable for the total weight (up to 1300 pounds) of the stacked machine.
2. Stack the machines with the fronts flush. Be certain the pins on the top front corners of the lower machines fit through the holes in the base rails of the upper machines.



## INPUT WIRING

Two or three voltage (eg: 230/460, 220/440/380, etc.) models are shipped connected for highest voltage. To change the connection, see the wiring or connection diagram pasted to the inside of the access panel in the case back.

Be sure the voltage, phase and frequency of the input power is as specified on the welder nameplate.

Have a qualified electrician remove the access panel in the case back and connect the three phase AC power to terminals L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub> of the input contactor in accordance with

**Recommended Input Wire, Ground Wire and Fuse Sizes  
Based on National Electrical Code.  
For 60 Hertz, 3 phase Welders at 60% Duty Cycle**

Welder	Input Volts	Amps Input	Copper Wire Size Type 75° C in Conduit		Super Lag Fuse Size in Amps
			3 Input Wires	1 Ground Wire	
300	230	60.0	6	8	80
	460	30.0	10	10	40
400	230	77.0	6	6	125
	460	38.5	8	10	60
500	230	98.0	4	6	150
	460	49.0	8	8	70

the National Electrical Code, all local codes, and the wiring diagram located inside the machine.

The welder frame must be grounded. A stud marked with the symbol  $\perp$  located inside the machine near the input contactor is provided for this purpose. See the National Electrical Code for details on proper grounding methods.

## DUTY CYCLE

This welder is rated for 60% duty cycle. Duty cycle is based on a ten minute period. Therefore, the welder can be operated at nameplate rated output for 6 minutes out of every 10 minute period without overheating.

## OUTPUT CONNECTIONS

### A. Output Studs

With the machine off, run electrode and work cables of the appropriate sizes (see the following table) up through the strain relief loops located below the output studs in the lower corners of the machine front. Connect the cable lugs to the studs and tighten the holding nuts with a wrench. The strain relief loops prevent loosening the connections or damaging the studs if the cables are pulled excessively.

**Cable Sizes for Combined Length of Electrode and Work Cable  
(Copper) at 60% Duty Cycle**

Machine Size	Up to 100 ft.	100 to 150 ft.	150 to 200 ft.	200 to 250 ft.
300	1/0	1/0	2/0	3/0
400	2/0	2/0	3/0	4/0
500	2/0	3/0	3/0	4/0

Cables in the accessory kits recommended below are terminated as required to comply with applicable U.L. standards for safety.

Machine Size	Combined Cable Lengths up to 100 ft.	Lincoln Accessory Kit Numbers
300	1/0	K-703 (35' electrode, 30' work cable, headshield with lens & cover glass, electrode holder & work clamp)
400	2/0	K-704 (similar to above)
500	4/0	K-796 (electrode & work cables)*

\*Specify length of each.

### B. Connection of Optional Remote Control

Turn the machine off. The K-775 consists of a control box with 25 feet of four conductor cable. This connects to terminals 75, 76, 77 on the terminal strip and the case ground screw so marked with the symbol  $\perp$  on the machine. These terminals are made available by opening the terminal access cover on the right side of

the case front. This control will give the same two dial control as the current control on the machine depending on the position of the current dial selector switch.

If the K-775 Remote Control option, or the K-798 Amptrol Adapter Kit, is used on a welder equipped with the Pocket Amptrol, it is recommended that leads 75, 76 and 77 to the Pocket Amptrol P.C. board be disconnected from the terminal strip and taped individually. This is desirable to provide a reasonably linear control with the K-775.

**CAUTION:** Extreme care must be observed when installing or extending the wiring of a remote control. The Remote Control cord can be lengthened to any length by splicing four wires to the standard 25' cord before connecting to the R3R terminal strip. Only the green lead can and should be grounded to the machine case. When extending the standard remote control make sure the leads are the same and the splice is waterproof. Don't let the lugs touch against the case.

There is a fuse on the control board to protect against damage caused by improper connection of the remote control.

#### C. Optional Amptrol Adapter Cable — K-798

A 3-wire cable, 12" long, is available to connect a standard K-771 (Hand) or K-772 (Foot) Amptrol in place of the K-775 Remote Current Control. In this application the Amptrol arc start switch is non-functional. Install per instructions (T-14234) shipped with the K-798.

#### D. TIG Welding

The R3R is shipped with an R.F. by-pass condenser installed to protect the control circuit when TIG welding with a Hi-Freq™ unit (recommended for R3R-300 only). To provide protection, the welder frame grounding stud must be connected to ground (see page 2).

## OPERATING INSTRUCTIONS

### 1. To Set Polarity

With the power source off connect the electrode cable to the positive (“+”) or negative (–) stud, depending upon the electrode polarity desired. Connect the work cable to the other stud.

### 2. To Start the Welder

Move the ‘Power Switch’ to ‘On’. This starts the welder and lights the red pilot light next to the switch.

### 3. To Set Welding Current

There are two continuous ‘Current Control’ dials. When welding with currents in the lower third of the machine output range, dial ‘A’ is recommended for easier and more precise control of the current.

- Set the ‘Current Dial Selector’ switch to ‘A’ if using currents in the lower third of the output range. Set the switch to ‘B’ for higher currents.
- If using the optional ‘Remote Control’, set the toggle switch to ‘Current Control Remote’. If current is to be adjusted by the operator at the machine, set the switch to ‘Current Control at R3R’.
- Set the desired current by adjusting the ‘Remote Control’ or machine ‘Current Control’ as appropriate.

### 4. Optional ‘Pocket Amptrol’

The Pocket Amptrol option provides a remote current control for our R3R series welders. This “wireless” control requires no control cable connection to the welder.

The Pocket Amptrol option (factory-installed only) may be ordered along with any of the other present fac-

tory installed options on the R3R-300, 400 and 500 amp welders.

- The welder ‘Current Control’ switch must be in the “Remote” position and the ‘Current Dial Selector’ switch in the “B” range. With the ‘Current Control’ switch in the “Remote” position, the current control potentiometer on the welder is removed from the circuit and its setting has no effect on the output. With the ‘Current Dial Selector’ switch in the “B” range position, the Pocket Amptrol provides total control from min. to max. output of the welder. If used on the “A” range, the change in output with rotation of the control potentiometer will be very non-linear. (Virtually no change in welding current from 1 to 5 on the dial.) The probe is calibrated from 1 to 10 and can be set by moving either the dial for “Coarse” control or the knob for a “Fine” control selection of current. The control is a multi-turn potentiometer.
- Turn the welder power switch on.
- Insert one end of the probe into the electrode holder and hold the other end on the work for approximately five seconds.
- To change current, change the probe dial setting and repeat the five-second procedure of placing the probe between electrode and work.

The solid-state circuitry within the welder senses this change in probe setting and automatically resets the welding current to the new level. Each time the welder is turned off, the output goes to minimum and must be reset when the welder is turned on again.

# MAINTENANCE

**WARNING: Have a qualified electrician do the maintenance and trouble shooting work. Turn the input power off using the disconnect switch at the fuse box before working inside the machine.**

## General Maintenance

1. The fan motor has sealed bearings which require no service.
2. In extremely dusty locations, dirt may clog the air channels causing the welder to run hot. Blow out the welder at regular intervals. The side panels can be removed even when the machines are stacked.

## 'Pocket Amptrol' Maintenance

Routine cleaning should be the only maintenance required. The probe tip should be kept in condition to provide sharp edges at the ends to assure penetration of heavy oxide coatings on the work piece. A blunted tip could result in giving different welding currents for a given dial setting.

## Overload Protection

All Idealarc R3R's have built-in protective thermostats. If the rectifier or transformer reaches the maximum safe operating temperature because of frequent overload or high room temperature plus overload, the line contactor

drops out stopping the welder. The thermostats automatically reset and the line contactor pulls in when the temperature reaches a safe operating level.

The power rectifier bridge is also protected against short term, high current overloads generally caused by poor operating techniques. For example, if an arc gouging carbon or the electrode is allowed to touch or almost touch the work for a couple seconds or more, the overload protection P.C. board automatically reduces the output to minimum and keeps it there until the overload is removed or the machine is turned off.

## Rectifier Failures

**NOTE:** Since proper material and correct assembly procedures are critical, field disassembly of the power rectifier bridge sections can do more harm than good. Return a defective rectifier bridge section (or the entire bridge) to the factory for repairs.

When a rectifier fails by shorting, the welder is immediately overloaded and the thermostat cuts it off the line. However, if the welder stops while welding, it can also indicate other troubles. See the "Trouble Shooting" table before testing the rectifier bridge for a short.

## PROCEDURE FOR REPLACING P.C. BOARDS

**(The P.C. boards are located behind the front control panel. Remove the nameplate screws to loosen the control panel.)**

When a P.C. board is to be replaced, the following procedure must be followed:

- A. Visually inspect P.C. board in question. Are any of the components damaged? Is a conductor on the back side of the board damaged?
  1. If there is no damage to the P.C. board, insert a new one and see if this remedies the problem. **If the problem is remedied, re-insert the old P.C. board**

**and see if the problem still exists with the old P.C. board.**

- a. **If the problem does not exist with the old board, check the harness plug and P.C. board plug for corrosion, contamination, or oversize.**
  - b. Check leads in the harness for loose connections.
2. If there is damage to the P.C. board, refer to the Trouble Shooting Guide.

## PROCEDURE FOR CHECKING DIODES

- A. Isolate the diode in question. (Electrically disconnect from other circuits.)
- B. Use an ohmmeter X10 scale. Connect the meter across the diode and note the resistance value. Reverse the ohmmeter leads and note the resistance value.

*Shorted diode* — Low resistance readings in both directions.

*Open diode* — High or infinite resistance in both directions.

*Good diode* — One reading will be high or infinite and the other reading will be low.

# TROUBLE SHOOTING

**WARNING: Have a qualified electrician do the maintenance and trouble shooting work. Turn the input power off using the disconnect switch at the fuse box before working inside the machine.**

TROUBLE	CAUSES	WHAT TO DO
Starter chatters.	<ol style="list-style-type: none"> <li>1. Faulty starter.</li> <li>2. Low line voltage.</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair or replace.</li> <li>2. Check with Power Company.</li> </ol>
Machine starter does not operate.	<ol style="list-style-type: none"> <li>1. Supply line fuse blown.</li> <li>2. Power circuit dead.</li> <li>3. Broken or loose power lead.</li> <li>4. Wrong voltage.</li> <li>5. Thermostats tripped (Welder overheated).</li> <li>6. Starter coil open.</li> <li>7. Open winding on 115V, Pilot Transformer.</li> <li>8. Power ON-OFF Switch not closing.</li> <li>9. Lead broken or loose connection in 115V starter circuit.</li> <li>10. Thermostats defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace (Look for reason for blown fuse first).</li> <li>2. Check voltage.</li> <li>3. Repair.</li> <li>4. Check voltage against instructions on input connection diagram.</li> <li>5. <ol style="list-style-type: none"> <li>a. Make sure the fan is operating that there are no obstructions to free flow of air.</li> <li>b. Operate at rated current and duty cycle.</li> </ol> </li> <li>6. Replace.</li> <li>7. Replace.</li> <li>8. Replace.</li> <li>9. Replace.</li> <li>10. Turn input power off (115V circuit is hot when input power is connected). Check thermostats with continuity meter -- should read short circuit when machine is cool. Replace if defective. There are two thermostats; one on the bridge diode plate (or on choke lead) and one on the nose of the primary of the transformer.</li> </ol>
Machine starter closes but has no or low output. Open circuit voltage should be 67 to 71 volts.	<ol style="list-style-type: none"> <li>1. Electrode or work lead loose or broken.</li> <li>2. Open transformer, primary or secondary circuit.</li> <li>3. One supply line fuse blown.</li> <li>4. Input line grounded, causing single phase input.</li> <li>5. Gate lead on SCR bridge open or not connected.</li> <li>6. Firing circuit P.C. board not connected.</li> <li>7. Voltage supply to firing circuit open.</li> <li>8. Firing circuit defective.</li> <li>9. Latching resistor R<sub>2</sub> open.</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair connections.</li> <li>2. Repair.</li> <li>3. Replace blown fuse - check fuse size.</li> <li>4. Repair input to machine.</li> <li>5. Repair or reconnect.</li> <li>6. Connect P.C. board plug.</li> <li>7. Disconnect P.C. board connector and measure AC voltage between leads 201, 202 and 203. Voltage must be 110 to 125 volts.</li> <li>8. Replace.*</li> <li>9. <ol style="list-style-type: none"> <li>a. Replace.</li> <li>b. Check leads to the resistor and repair.</li> </ol> </li> </ol>
Machine has maximum output but no control.	<ol style="list-style-type: none"> <li>1. Current control switch in the wrong position.</li> <li>2. Control P.C. board not connected.</li> <li>3. Current control potentiometer open.</li> <li>4. Open lead in control circuit.</li> <li>5. Remote control leads not connected.</li> <li>6. Remote control cable damaged.</li> <li>7. Current transformer open.</li> <li>8. Control circuit P.C. board faulty.</li> <li>9. Fuse on control board open.</li> </ol>	<ol style="list-style-type: none"> <li>1. Set the switch in "Current Control at R3R" position for control at the machine and "Current Control Remote" position if using a remote control.</li> <li>2. Connect P.C. board plug.</li> <li>3. Replace.</li> <li>4. Repair broken leads.</li> <li>5. Connect leads exactly as numbered. Make sure no lead on the machine or in the remote control pod is touching ground.</li> <li>6. Repair or replace.</li> <li>7. Check continuity between leads 209, 210 and 211 in the control circuit connector which is disconnected from the P.C. board. Replace.</li> <li>8. Replace.*</li> <li>9. Replace fuse. Leads and or SW2 going to case ground. Remove ground and/or replace switch.</li> </ol>
Machine does not have maximum output. (Check Open Circuit Voltage.)	<ol style="list-style-type: none"> <li>1. Input fuse blown. Machine is single phased.</li> <li>2. One phase of main transformer windings open.</li> <li>3. Defective power bridge.</li> <li>4. Defective current control rheostat.</li> <li>5. Defective current limiting assembly.</li> <li>6. Defective remote control.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace fuse or repair input line. Check reason for fault.</li> <li>2. Repair.</li> <li>3. Contact Field Service Shop.</li> <li>4. Replace.</li> <li>5. Disconnect lead 238 from SW 4 and lead 235 from R4. Check diodes D1 and D2. Check R5; should be 270 ohms.</li> <li>6. Switch to machine control and check for maximum output. Check the remote field control. Check leads to the switch. Check SW 2.</li> </ol>

\*See procedure for replacing P.C. boards on page 5.

TROUBLE	CAUSES	WHAT TO DO
Machine comes on but soon trips off while under load. (Thermostat tripped).	<ol style="list-style-type: none"> <li>1. Improper ventilation.</li> <li>2. Loaded beyond rating.</li> <li>3. Fan inoperative.</li> <li>4. Shorted diode or SCR in power rectifier bridge.</li> </ol>	<ol style="list-style-type: none"> <li>1. Make sure all case openings are free for proper circulation of air.</li> <li>2. Operate at rated current and duty cycle.</li> <li>3. Check leads and motor bearings. Fan can be tested on 115 volt line, 201 and 203 on terminal strip in control box.</li> <li>4. Check rectifier assembly for shorted SCR's or diodes. Contact Field Service Shop.</li> </ol>
Machine comes on but reduces to low output under load and remains there until the load is broken and arc re-started.	<ol style="list-style-type: none"> <li>1. Excessive load causing the overload protection on control board to operate.</li> <li>2. Machine output shorted causing overload protection on control board to operate.</li> <li>3. Control circuit defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduces load.</li> <li>2. Turn machine off and remove short.</li> <li>3. Replace.*</li> </ol>
Machine trips off when under no load or makes excessive noise like it is loaded.	<ol style="list-style-type: none"> <li>1. Power rectifier may have a shorted diode or SCR.</li> <li>2. Short in the transformer.</li> <li>3. Fan hitting vertical baffle.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact Field Service Shop.</li> <li>2. Repair.</li> <li>3. Clear the fan.</li> </ol>
Variable or sluggish welding arc.	<ol style="list-style-type: none"> <li>1. Poor work or electrode cable connection.</li> <li>2. Current too low.</li> <li>3. Welding leads too small.</li> <li>4. Open SCR or diode in power rectifier bridge.</li> <li>5. Firing circuit defective.</li> <li>6. Control circuit defective.</li> <li>7. Snubber circuit defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and clean cable connections.</li> <li>2. Check recommended currents for rod type and size.</li> <li>3. See Table on page 2.</li> <li>4. Contact Field Service Shop.</li> <li>5. Replace.*</li> <li>6. Replace.*</li> <li>7. Check and replace if defective.</li> </ol>
Welder won't shut off.	<ol style="list-style-type: none"> <li>1. Starter contacts frozen.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace starter.</li> </ol>
Welding harsh — too much spatter and difficult to start arc with small diameter rod and low currents — popouts.	<ol style="list-style-type: none"> <li>1. Feedback filter choke L2 reversed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take off right side and check choke connections 207 and 208 per the appropriate wiring diagram.</li> </ol>
Current control on machine not functioning.	<ol style="list-style-type: none"> <li>1. Current control switch in wrong position.</li> <li>2. Current control switch defective.</li> <li>3. Current control potentiometer defective.</li> <li>4. Lead or connection in control circuit open.</li> <li>5. Defective current transformers.</li> <li>6. Defective control or firing circuit boards.</li> </ol>	<ol style="list-style-type: none"> <li>1. Place switch in "Current Control at R3R" position.</li> <li>2. Replace.</li> <li>3. Replace.</li> <li>4. Repair or connect.</li> <li>5. Refer to "Machine has Maximum Output but No Control".</li> <li>6. Replace.*</li> </ol>
Optional remote current control not functioning.	<ol style="list-style-type: none"> <li>1. Current control switch in the wrong position.</li> <li>2. Leads 75, 76 and 77 not connected to correct numbers on terminal strip.</li> <li>3. Remote control leads broken.</li> <li>4. Remote control potentiometer open.</li> <li>5. Lead or connection in current control circuit open.</li> <li>6. Control or firing circuit P.C. board plug disconnected.</li> <li>7. Components on control or firing circuit P.C. board defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Place switch in Current Control Remote position.</li> <li>2. Correct connection.</li> <li>3. Repair broken leads.</li> <li>4. Replace.</li> <li>5. Connect or repair.</li> <li>6. Connect plug.</li> <li>7. Replace.*</li> </ol>
Welding okay, then momentary loss of control.	<ol style="list-style-type: none"> <li>1. One Input line intermittently going to ground.</li> <li>2. Input line voltage varying more than <math>\pm 15\%</math>.</li> <li>3. Firing circuit defective.</li> <li>4. Current transformer intermittent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fix input lines.</li> <li>2. Correct voltage condition.</li> <li>3. Replace.*</li> <li>4. Check soldered leads.</li> </ol>
Welder has minimum output with no control.	<ol style="list-style-type: none"> <li>1. Resistor R1 or R4 (A Range) open.</li> <li>2. Current control rheostat defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace.</li> <li>2. Replace.</li> </ol>
Welder has current excessively higher than dial indicates.	<ol style="list-style-type: none"> <li>1. 77 on terminal strip ground to case.</li> <li>2. 77 in remote control grounded to case.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove ground.</li> <li>2. Remove ground.</li> </ol>

\*See procedure for replacing P.C. boards on page 3.

# 'POCKET AMPCTRL' TROUBLE SHOOTING

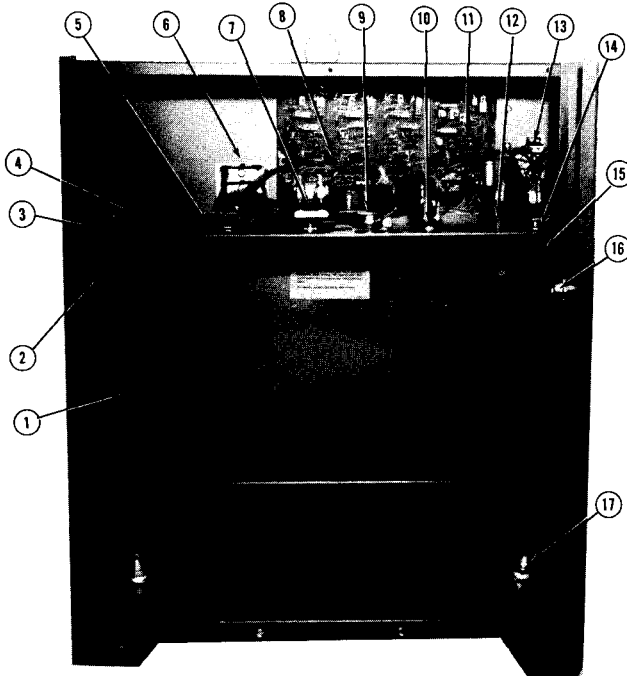
Before trouble shooting the Pocket Ampctrl establish that the machine operates satisfactorily with the 'Current Control' switch in the "Machine" position and the 'Current Dial Selector' on "B".

TROUBLE	CAUSES	WHAT TO DO
Pocket Ampctrl not functioning.	1. Current Control Switch in wrong position.	1. Place switch in remote position.
	2. Current Dial Selector Switch in wrong position.	2. Place switch in "B" position.
	3. Pocket Ampctrl probe tips not making electrical contact.	3. Sharpen edges of probe tips.
	4. Pocket Ampctrl probe defective.	4. Check DC resistance between probe tips. Resistance should vary from approximately 10,000 ohms to 35,000 ohms as the setting is varied from 10 to 1. Replace if defective.
	5. Load on machine.	5. Check for resistance load such as meters connected to output terminals. Remove.
	6. Sensing resistor circuit defective.	6. Remove Pocket Ampctrl P.C. board plug. Check value of sensing resistor, R110, by connecting ohmmeter across leads 1 and 2 in plug. (Positive ohmmeter lead must be connected to lead 2.) Resistance should be 20 ohms.
	7. Pocket Ampctrl transformer defective.	7. Remove Pocket Ampctrl P.C. board plug. Voltage between yellow and red leads should be approximately 12 volts.
	8. Defective Pocket Ampctrl P.C. board.	8. Replace.

**WHEN ORDERING GIVE:**  
Item No., Part Name, Parts List No. and Welder Code.

Parts List P-123-C.1

## FRONT PANEL WITH CONTROLS



ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Front Panel Assembly	1
2	Nameplate (Specify Voltage)	1
3	Control Box	1
4	Voltmeter (Optional)	1
5	Ammeter	1
6	Current Limiting Assembly	1
7	Current Selector Switch (SW-3)	1
8	Firing Circuit Printed Circuit Board	1
9	Potentiometer	1
	Potentiometer Insulation	1
	Knob	1
10	Current Control Switch (SW-2)	1
11	Control Printed Circuit Board	1
12	Pilot Light	1
13	Terminal Strip	1
	Number Plate	1
14	Power Switch (SW-1)	1
15	Terminal Strip	1
	Number Plate	1
16	Box Connector	1
17	Output Stud Assembly (Old Design), Includes:	2
	Output Stud	1
	Stud Insulation	1
	Insulating Tube	1
	Insulating Washer	1
	Lockwasher	1
	Hex Jam Nut	2
	Connection Strap	1
	Flanged Nut	1
	Plain Washer	2
	Round Head Screw	1
	Hex Nut	1
	Lockwasher	1
17	Output Stud Assembly (New Molded Design), Includes	2
	Output Terminal	1
	Flanged Nut	1
	Hex Head Screw	1
	Self Tapping Screw	2
	<b>Parts Not Illustrated:</b>	
	Pocket Ampctrl Option, Includes:	
	Printed Circuit Board	1
	Transformer	1
	Voltage Sensing Resistor Assembly	1
	Control Transformer	1
	Diode-Heat Sink Assembly	1
	Remote Amp Control Assembly	1
	Polarity Switch	1
	Handle	1
	Ampctrl Adapter Kit	1
	Foot Ampctrl	1
	Hand Ampctrl	1



## HOW TO ORDER REPLACEMENT PARTS

Order parts only from Lincoln offices or from the Authorized Field Service Shops listed in the "Service Directory". Give the following information:

- (a) From the nameplate — machine model, code and serial numbers.
- (b) From this manual — part name, item number, quantity

required and the number of the list used to get this information.

Any items indented in the "Parts Name" column are included in the assembly under which they are listed. The indented items may be ordered separately. If the entire assembly is needed, do **not** order the indented parts.

## GUARANTEE

The Lincoln Electric Company, the Seller, warrants all new equipment except engines and accessories thereof against defects in workmanship and material for a period of one year from date of shipment, provided the equipment has been properly cared for, and operated under normal conditions. Engines and engine accessories are warranted free from defects for a period of ninety days from the date of shipment.

If the Buyer gives the Seller written notice of any defects in equipment or electrode or flux within any period of warranty and the Seller's inspection confirms the existence of such defects, then the Seller shall correct the defect or defects at its option, either by repair or replacement F.O.B. its own factory or other place as designated by the Seller. The remedy provided Buyer herein for breach of Seller's warranty shall be exclusive.

No expense, liability or responsibility will be assumed by the Seller for repairs made outside of the Seller's factory without

written authority from the Seller.

The Seller shall not be liable for any consequential damages in case of any failure to meet the conditions of any warranty. The liability of the Seller arising out of the supplying of said equipment or electrode or flux by the Buyer, whether on warranty or otherwise, shall in any case exceed the cost of correcting defects in the equipment or replacing defective electrode in accordance with the above guarantee. Upon the expiration of any period of warranty, all such liability shall terminate.

The foregoing guarantees and remedies are exclusive and except as above set forth. There are no guarantees or warranties with respect to engines, accessories, equipment, electrodes, or flux, either express or arising by operation of law or trade usage or otherwise implied, including without limitation, the warranty of merchantability, all such warranties being waived by the Buyer.

## SPECIAL GUARANTEE ON RECTIFIER STACKS

The Lincoln Electric Company guarantees the main power rectifiers on transformer-rectifier type welders against defects in material or workmanship for a period of five years from date of welder shipment. When an individual diode or diode assembly is replaced, the original diode or diode assembly must be returned to Cleveland for examination and

credit if judged defective. If a replacement diode or diode assembly is installed by an Authorized Field Service Shop within twelve months of the date of shipment of the original part, the labor expense will be paid by The Lincoln Electric Company. After 12 months any labor expense will be the owner's responsibility.



# THE LINCOLN ELECTRIC COMPANY

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*Ram*