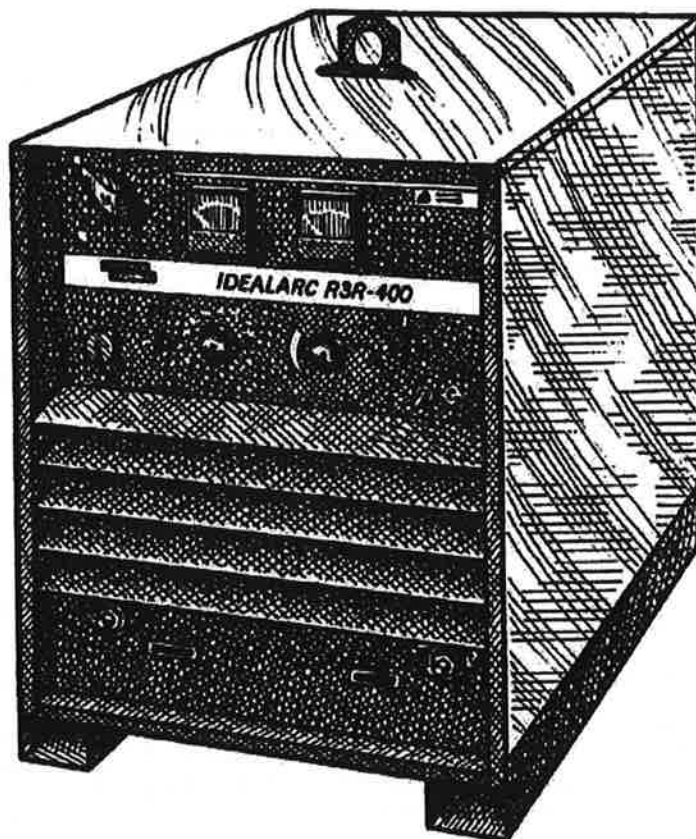


**IDEALARC® R3R-300, -400 AND -500**

For use with machine Code Numbers: **9500 thru 10500,**  
**10857, 10858, 10881, 10882,**  
**11043, 11044, 11045, 11046**  
**11342, 11347**

**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.




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**OPERATOR'S MANUAL**


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**LINCOLN®**  
**ELECTRIC**

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- Sales and Service through Subsidiaries and Distributors Worldwide •

Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: [www.lincolnelectric.com](http://www.lincolnelectric.com)

# SAFETY

## ⚠ WARNING

### ⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

#### The Above For Diesel Engines

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

#### The Above For Gasoline Engines

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

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

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



### FOR ENGINE powered equipment.

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



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



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



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

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

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

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



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



### ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

Mar '95



## ELECTRIC SHOCK can kill.

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



## ARC RAYS can burn.

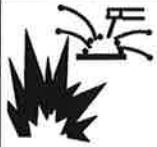
- 4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.
- 4.b. Use suitable clothing made from durable flame-resistant material to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



## FUMES AND GASES can be dangerous.

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

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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-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



### FOR ELECTRICALLY powered equipment.

- 8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.
- 8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
- 8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

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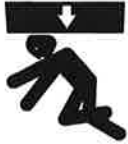
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## LOCATION AND STACKING

### ⚠ WARNING



**FALLING EQUIPMENT** can cause injury.

- Do not lift this machine using lift ball if it is equipped with a heavy accessory such as trailer or gas cylinder.
- Lift only with equipment of adequate lifting capacity.
- Be sure machine is stable when lifting.

Install the welder in a dry location where there is a free circulation of air in through the front louvers and out the 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, causing overheating and nuisance shut-down of the machine.

The Idealarc® R3R welders can be stacked three high when the following precautions are observed:

1. Be sure the bottom machine is on a firm, level surface suitable for the total weight (up to 1350 pounds (608 Kg)) of the stacked machines.
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.
3. No unit heavier than the bottom unit should be stacked on top of it. For example, an R3R-500 shall not be stacked on top of an R3R-400, but an R3R-400 may be stacked on top of an R3R-500.

## INPUT WIRING

### ⚠ 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.

Dual or triple voltage (eg: 230/460, 220/380/440, 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 the U. S. 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  $\equiv$  located on the floor of the input box is provided for this purpose. See the U.S. National Electrical Code for details on proper grounding methods.

**Recommended Input Wire,  
Ground Wire and Fuse Sizes  
Based on U.S. 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	56.0	8	8	80
	460	28.0	10	10	40
400	230	82.0	6	6	125
	460	41.0	10	10	60
500	230	100.0	4	6	150
	460	50.0	8	8	70

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 of every 10 minute period without overheating. An amber high temperature warning light provides a visual indication of an over temperature condition.

### ⚠ CAUTION

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

When powering welder from a generator be sure to turn off welder first, before generator is shut down, in order to prevent damage to welder!

IDEALARC R3R, -300, -400, -500

## OUTPUT CONNECTIONS

### OUTPUT STUDS

With the machine off, run electrode and work cables of the appropriate sizes (see the following table) up through the rectangular holes in the machine base located below the output studs. Connect the cable lugs to the output terminals marked (+) and (-) or, if the welder comes equipped with the polarity switch option "electrode" and "to work". Tighten the holding nuts with a wrench.

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

Machine Size	Up to 100 ft. (30 m)	100 to 150 ft. (30 – 46 m)	150 to 200 ft. (46 – 61 m)	200 to 250 ft. (61 – 76 m)
300	1/0 (54 mm <sup>2</sup> )	1/0 (54 mm <sup>2</sup> )	2/0 (68 mm <sup>2</sup> )	3/0 (86 mm <sup>2</sup> )
400	2/0 (68 mm <sup>2</sup> )	2/0 (68 mm <sup>2</sup> )	3/0 (86 mm <sup>2</sup> )	4/0 (108 mm <sup>2</sup> )
500	2/0 (68 mm <sup>2</sup> )	3/0 (86 mm <sup>2</sup> )	3/0 (86 mm <sup>2</sup> )	4/0 (108 mm <sup>2</sup> )

### CONNECTION OF OPTIONAL REMOTE CONTROL – K857

Turn the machine off. The K857 consists of a control box with 28 feet (8.5m) of four conductor cable and a 6 pin connector for easy connection to the power source. This control will give the same control as the current control on the machine depending on the position of the current dial selector switch. (There is no current dial selector switch on the R3R-300.)

### 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 28 ft. (8.5m) 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 water-proof. Don't let the lugs touch against the case.

### OPTIONAL K963 HAND AMPPTROL AND K870 FOOT AMPPTROL


These ampptrols connect directly to the 6 pin connector on the front of the power source.

## TIG WELDING

The R3R is shipped with proper R.F. By-pass circuitry installed to protect the control circuit when TIG welding with a Hi-Freq™ unit. **To provide protection, the welder frame grounding stud must be connected to ground.**

IDEALARC R3R, -300, -400, -500



 **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 containers that have held combustibles.

**ARC RAYS can burn.**

- Wear eye, ear and body protection.

**NOTE:** The P.C. Board is protected by a moisture resistant coating. When the welder is operated, this coating will “bake off” of certain power resistors that normally operate at high temperatures, emitting some smoke and odor for a short time. These resistors and the P.C. Board beneath them may become blackened. This is a normal occurrence and does not damage the component or affect the machine performance.

1. To Start the Welder, move the “Power” switch to “On”. This starts the welder and lights the white pilot light on the machine control panel. This light indicates that the line contactor is energized).
2. Setting Welding Current
  - a. The “Current Control” dial on the front of the machine indicates the output current at the NEMA arc voltage.

On R3R-300, one dial covers the complete range. On the R3R-400 and -500, two dials are used, The “A” range controls the current over about 1/2 of the range of the “B” range. A toggle switch on the control panel allows selection of the desired range. The output control can be adjusted while welding.

- b. Provisions for remote control are standard on each power source. A current control switch on the machine control panel labeled “Current Control at R3R” or “Current Control Remote” is provided for selecting the desired mode of operation, either at the machine or remote. Be certain the machine remote switch is in the machine position, unless a remote control is connected, or the R3R is equipped with optional pocket amptrol.

- c. The “Arc Force Control”, located on the right side of the front control panel, is calibrated from one to ten. Lower settings will provide less short circuit current and a softer arc. A setting that is too low may cause the electrode to stick in the puddle. Higher settings will provide a higher short circuit current, a more forceful arc, and possibly more spatter. For most welding, the dial should be set at approximately mid range (5 – 6). Adjustment up or down can then be made depending on the electrode, procedures, and operator preference. For most TIG welding applications adjust this control to minimum for best operating characteristics.

### 3. Pocket Amptrol (Optional)

The pocket amptrol option provides a remote current control for the R3R welders. This “wireless” control requires no control cable connection to the welder.

- a. On the R3R-400 and -500 the welder “Current Control” switch must be in the “Remote” position and the “Current Dial Selector” switch in the “B” range. The R3R-300 has only one dial and no selection switch. The R3R-300 does not have a “Current Dial Selector” switch. 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 NEMA minimum to NEMA maximum output of the welder.
- b. Turn the welder power switch on.
- c. Insert one end of the probe into the electrode holder and hold the other end on the work for approximately five seconds.
- d. To change current, change the probe dial setting and repeat the five second procedure of placing the probe between electrode and work.

**IDEALARC R3R, -300, -400, -500**



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.

**115VAC DUPLEX RECEPTACLE AND CIRCUIT BREAKER** (60 Hertz Models for Code Numbers 10857, 10858, 10881, 10882, 11043, 11044, 11045, 11046 only )

- This receptacle provides up to 15 Amps of 115VAC auxiliary power.
- 15 Amp circuit breaker protects the 115VAC receptacle.
- The receptacle and the circuit breaker are located in the output panel between the output studs.

**OPTIONAL EQUIPMENT**

1. Remote Current Control – See “Operation”.
2. Amptrol – See “Operation”.
3. Polarity Switch (Factory Installed Only). Permits changing polarity at the machine output terminals. (See also “Output Connections”.)
4. Meters – Ammeter and Voltmeter (Factory Installed Only)
5. Pocket Amptrol – (Factory Installed Only) See “Operation”.
6. Undercarriage – (K817, K817R) includes a spring loaded handle for hand towing and a choice of wheels.

**RATINGS**

Transformer insulation class 155(F)  
IP21 enclosure protection

IDEALARC R3R, -300, -400, -500



**⚠ 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.

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**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.

**POWER RECTIFIER REPLACEMENT**

Refer to the troubleshooting section "Power Rectifier Bridge Assembly Checking Procedure" if a rectifier failure is suspected.

**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.

## 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.

### ⚠ WARNING



**ELECTRIC SHOCK can kill.**

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

### ⚠ 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.

IDEALARC R3R, -300, -400, -500



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
Input contactor chatters.	1. Faulty input contactor. 2. Low line voltage.	If all recommended possible areas of misadjustment have been checked and the problem persists, <b>Contact your local Lincoln Authorized Field Service Facility.</b>
Machine input contactor does not operate.	1. Supply line fuse blown. 2. Power circuit dead. 3. Broken or loose power lead. 4. Wrong voltage. 5. Thermostats tripped. (High Temperature Warning Light should be lit.) (Welder overheated.) 6. Input contactor coil open. 7. Open winding on 115V pilot transformer. 8. Power ON-OFF switch not closing. 9. Lead broken or loose connection in 115V starter circuit. 10. Thermostats defective. (High Temperature Warning Light should be lit.)	

**⚠ 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.

IDEALARC R3R, -300, -400, -500



Observe all Safety Guidelines detailed throughout this manual

<b>PROBLEMS (SYMPTOMS)</b>	<b>POSSIBLE CAUSE</b>	<b>RECOMMENDED COURSE OF ACTION</b>
<b>FUNCTION PROBLEMS</b>		
<p>Machine input contactor closes but has no or low output. Open circuit voltage should be 67 to 71 volts.</p>	<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. Supply line fuse blown.</li> <li>4. Input line grounded causing single phase input.</li> <li>5. Input leads not connected to contactor.</li> <li>6. Latching resistor, R3, open.</li> <li>7. Control circuit problems.</li> </ol>	<p>If all recommended possible areas of misadjustment have been checked and the problem persists, <b>Contact your local Lincoln Authorized Field Service Facility.</b></p>
<p>Machine has maximum output but no control.</p>	<ol style="list-style-type: none"> <li>1. Possible defective power SCR.</li> <li>2. Possible defective control board.</li> </ol>	

 **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.

**IDEALARC R3R, -300, -400, -500**



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
Machine does not have maximum output (67 to 71 volts).	<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> </ol>	<p>If all recommended possible areas of misadjustment have been checked and the problem persists, <b>Contact your local Lincoln Authorized Field Service Facility.</b></p>
Machine comes on but soon trips off while under load and High Temperature Warning Light glows. (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>	
Machine comes on but reduces to low output under load and remains there until the load is broken and arc re-started. See Fault Protection Operation Section.	<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>	

**⚠ 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.

**IDEALARC R3R, -300, -400, -500**



Observe all Safety Guidelines detailed throughout this manual

<b>PROBLEMS (SYMPTOMS)</b>	<b>POSSIBLE CAUSE</b>	<b>RECOMMENDED COURSE OF ACTION</b>
<b>FUNCTION PROBLEMS</b>		
Machine trips off when under no load or makes excessive noise like it is loaded.	<ol style="list-style-type: none"> <li>1. Power bridge rectifier may have a shorted diode or SCR.</li> <li>2. Short in the transformer.</li> <li>3. Fan hitting vertical baffle.</li> </ol>	<p>If all recommended possible areas of misadjustment have been checked and the problem persists, <b>Contact your local Lincoln Authorized Field Service Facility.</b></p>
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. Control circuit problems.</li> </ol>	
Welder will not shut off.	<ol style="list-style-type: none"> <li>1. Input contactor contacts frozen.</li> </ol>	
115VAC Receptacle not working.	<ol style="list-style-type: none"> <li>1. Circuit Breaker Tripped.</li> <li>2. Defective Circuit Breaker.</li> <li>3. Broken connection in wiring.</li> </ol>	

 **CAUTION**

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**IDEALARC R3R, -300, -400, -500**



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>FUNCTION PROBLEMS</b>		
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 control or circuit boards.</li> </ol>	
Optional remote current control not functioning. See Troubleshooting Procedures before connecting.	<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 models with terminal strip.</li> <li>3. Remove 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 PC board plug disconnected or loose.</li> <li>7. Control circuit problems.</li> </ol>	<p>If all recommended possible areas of misadjustment have been checked and the problem persists, <b>Contact your local Lincoln Authorized Field Service Facility.</b></p>

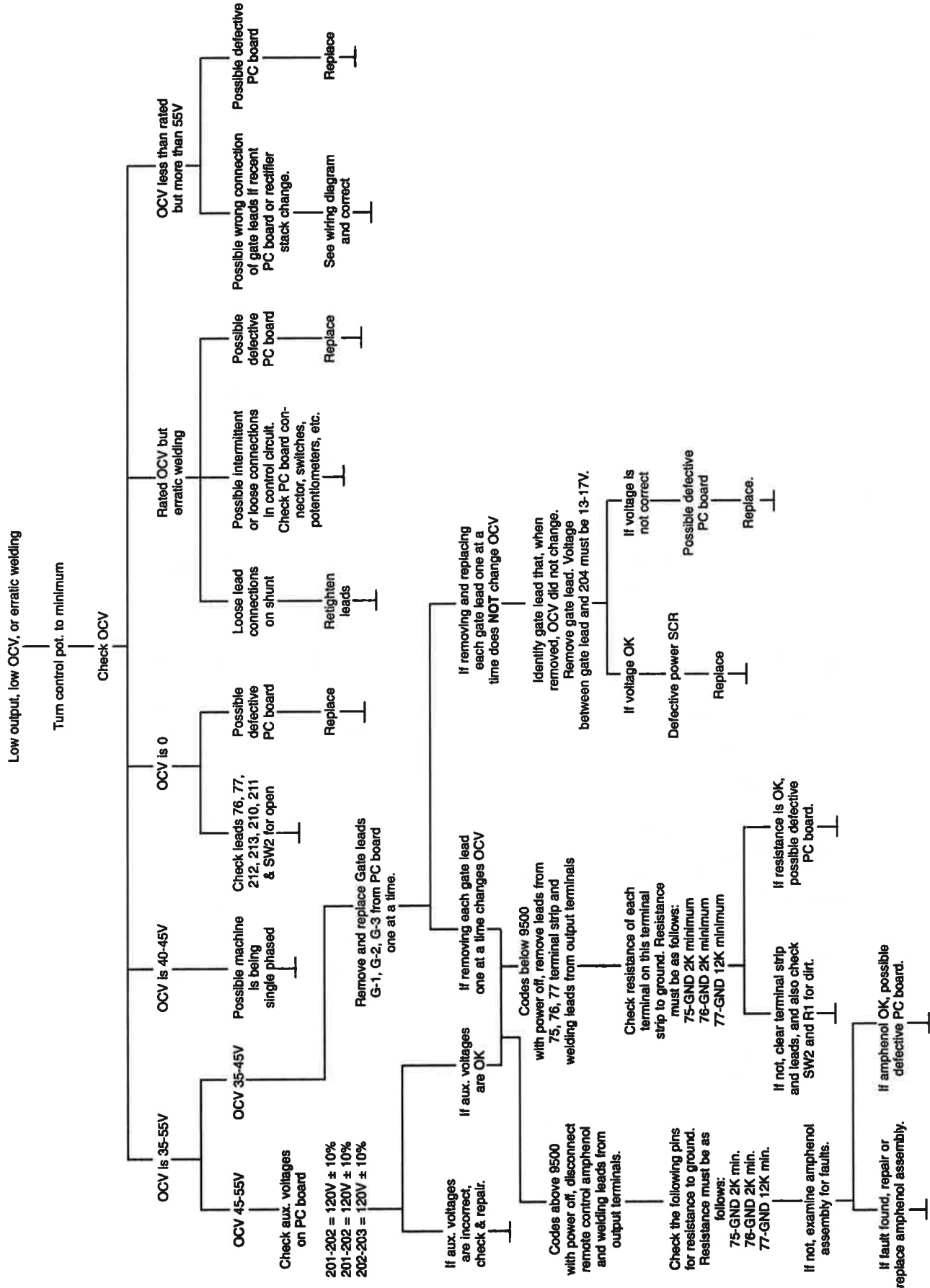
 **CAUTION**

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.

**IDEALARC R3R, -300, -400, -500**







IDEALARC R3R, -300, -400, -500



## TROUBLESHOOTING PROCEDURES

### PROCEDURE FOR REPLACING P.C. BOARD

(The P.C. Board is located behind the front control panel. Remove the nameplate screws to loosen the control panel.)

When the P.C. Board is to be replaced, follow this procedure:

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 Troubleshooting Guide.

### OUTPUT VOLTAGE

The open circuit voltage of the machine should be 67 to 71 volts and should not vary when the rheostat is varied. If any other condition exists, refer to the Troubleshooting Guide.

### OVERLOAD PROTECTION

All IDEALARC R3R, -300, -400, -500s 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 of 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.

### CHECKING SNUBBER CIRCUIT

In case of an SCR malfunction or failure, the snubber assembly should be checked. Turn the machine off and disconnect one lead of the snubber assembly. (Either 221, 222, or 223 depending on the SCR in question. See wiring diagram.) The sides of the machine have to be removed to do this. (See parts list for the exact location.)

1. Visually inspect the snubber assembly for overheated components.
2. Using a V.O.M meter on the X10 scale connect the positive lead to the lead removed. Touch the negative lead to the shunt. The indicating needle on the meter will move quickly to the right (low resistance value) and then slowly return to the left (high resistance value). This indicates that the capacitor in the snubber circuit is taking a charge.
3. If the needle stays to the right, the capacitor is shorted and the assembly is defective.
4. If the needle does not move, the capacitor or resistor on the snubber assembly is open and the assembly is defective.

### CHECKING CURRENT CONTROL RHEOSTAT ON MACHINE

Turn the machine off.

Remove the control panel screws and open the front cover.

Turn the current control switch to remote.

Disconnect the harness plug from the control board.

Put current range switch to "B" range.

With an ohmmeter on X1K, connect it to lead 210 and 211 on SW #2.

Rotate the current control rheostat. The resistance reading should be from around zero to 10K ohms. Check the resistance reading between 75 on the terminal strip and 211 on SW #2. The reading must be 10K ohms.

IDEALARC R3R, -300, -400, -500



No reading will indicate an open rheostat and a low reading will indicate a shorted or partially shorted rheostat; in either case, replace.

### TOGGLE SWITCH CHECK

1. Turn off the machine power input. SW #1 has 115 volts across it when the input power is connected.
2. Isolate the switch to be tested by removing all connecting leads.
3. Check to make sure the switch is making connections with a V.O.M. meter. The meter should read zero resistance.
4. Put the ohmmeter on X1K scale and measure the resistance between the terminal and the case of the machine (touch a self tapping screw). Reading should be infinite.
5. If either step (3) or step (4) fails, replace the switch.

### REMOTE CONTROL CHECK

Disconnect the remote field control and connect an ohmmeter across 75 and 76 and rotate the rheostat in the remote control. The resistance reading should go from zero to 10K ohms. Repeat with ohmmeter across 77 and 76 with same results. Connect ohmmeter across 75 and 77. The reading should be 10K ohms. A lower reading will indicate a shorted or partially shorted rheostat. A very high reading will indicate an open rheostat. In either of the last two cases, replace the rheostat. Check for any physical damage.

### CHECKING POWER RECTIFIER BRIDGE ASSEMBLY

Precise evaluation of diodes or SCRs require

#### CAUTION

laboratory equipment. If a bridge problem still exists after test, please call a Lincoln Field Service Shop.

Equipment Needed:-----

1. V.O.M. or ohmmeter for diodes
2. Circuit Diagram 1 for SCRs

**DEVICE ISOLATION** (See the instruction manual parts list for the exact location.)

Disconnect the following leads from the bridge, shown in Diagram 2:

1. Wiring harness gate leads (G1, G2, G3) from gate lead connector J4 on control P.C. Board
2. AC leads X1, X2, and X3 from the anodes of the SCRs and cathodes of the diodes.
3. The 200, 221, 222, and 223 leads from the Snubber P.C. Board.
4. Lead 220 that connects to the latching resistor (R3).
5. The cathode of each diode (4 total).

### POWER DIODE TEST

1. Establish the polarity of the ohmmeter leads and set to the X10 scale.
2. Connect the ohmmeter positive lead to anode and negative lead to the cathode.
3. Reverse the leads of the ohmmeter from Step 2.
4. A shorted diode will indicate zero or an equally low resistance in both directions. An open diode will have an infinite or high resistance in both directions; and a good diode will have a low resistance in Step 2 and a much higher resistance in Step 3.

### POWER SILICON CONTROLLED RECTIFIER TEST

The SCR must be mounted in the heat sink when making this test.

1. Connect the ohmmeter (set to the X10 scale) leads to the anode and cathode.
2. Reverse the leads of the ohmmeter from Step 1.
3. A shorted SCR will indicate zero or an equally low resistance in one or both directions.
4. Establish the polarity of the ohmmeter. Connect the positive lead to the gate and the negative lead to the cathode.
5. An open gate circuit will have an infinite or high resistance. A good gate circuit will read a low resistance, but not zero ohms.

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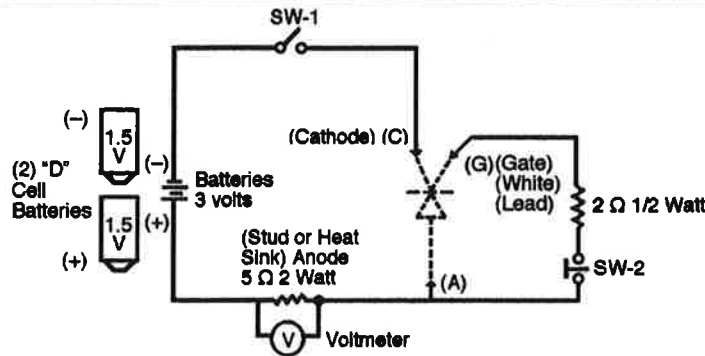


DIAGRAM 1

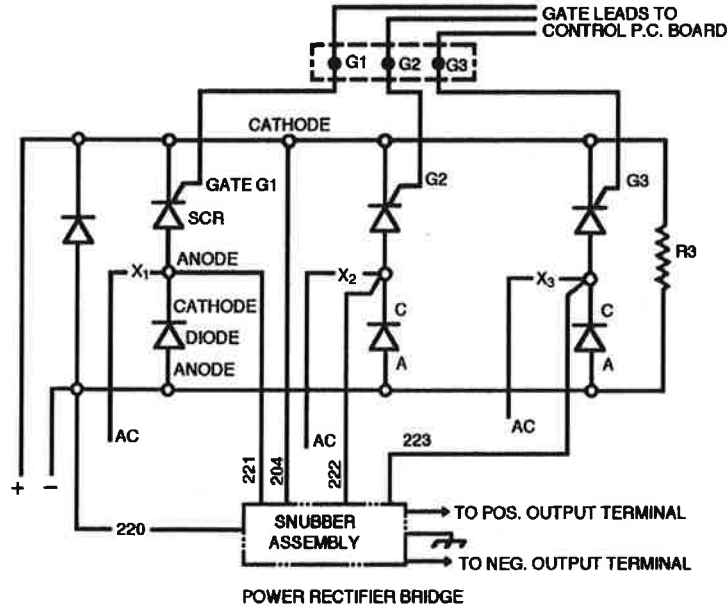


DIAGRAM 2

## BATTERY TEST

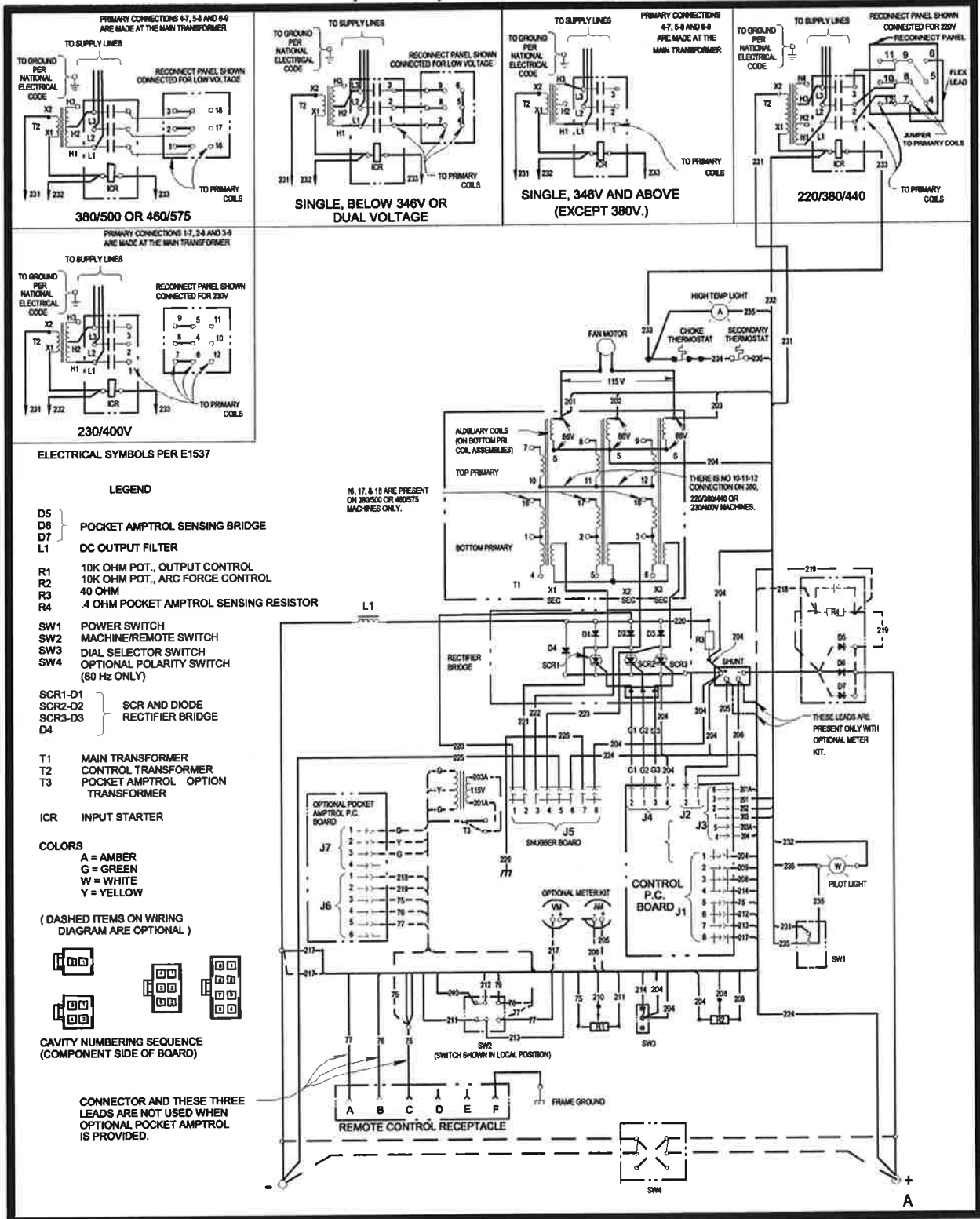
Check the batteries by shorting leads (A) and (C), then close switch SW-1. Replace batteries if voltage is less than 3 volts.

## SCR TEST

1. Isolate SCR to be tested by disconnecting gate leads from the terminals on the P. C. Board. (Do not remove SCR from the heat sink.)
2. Connect SCR into the test circuit as shown (A) lead to anode (C) lead to cathode and (G) lead to the gate.
3. Close switch SW #1 (switch SW#2 should be open); voltmeter should read zero. If the voltmeter reads higher than zero, the SCR is shorted.
4. With switch SW #1 closed, close switch SW #2 for two seconds and release. The voltmeter should read 2 to 2.5 volts before and after switch SW #2 is released. If the voltmeter does not read, or reads only while SW #2 is depressed, the SCR is open or batteries are defective (repeat Battery Test Procedure).
5. Open switch SW #1, disconnect the gate lead (G) and reverse the (A) and (C) leads on the SCR. Close switch SW #1. The voltmeter should read zero. If the voltage is higher than zero, the SCR is shorted.

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## IDEALARC R3R-400, 500-I, 500 & 600-I WIRING DIAGRAM



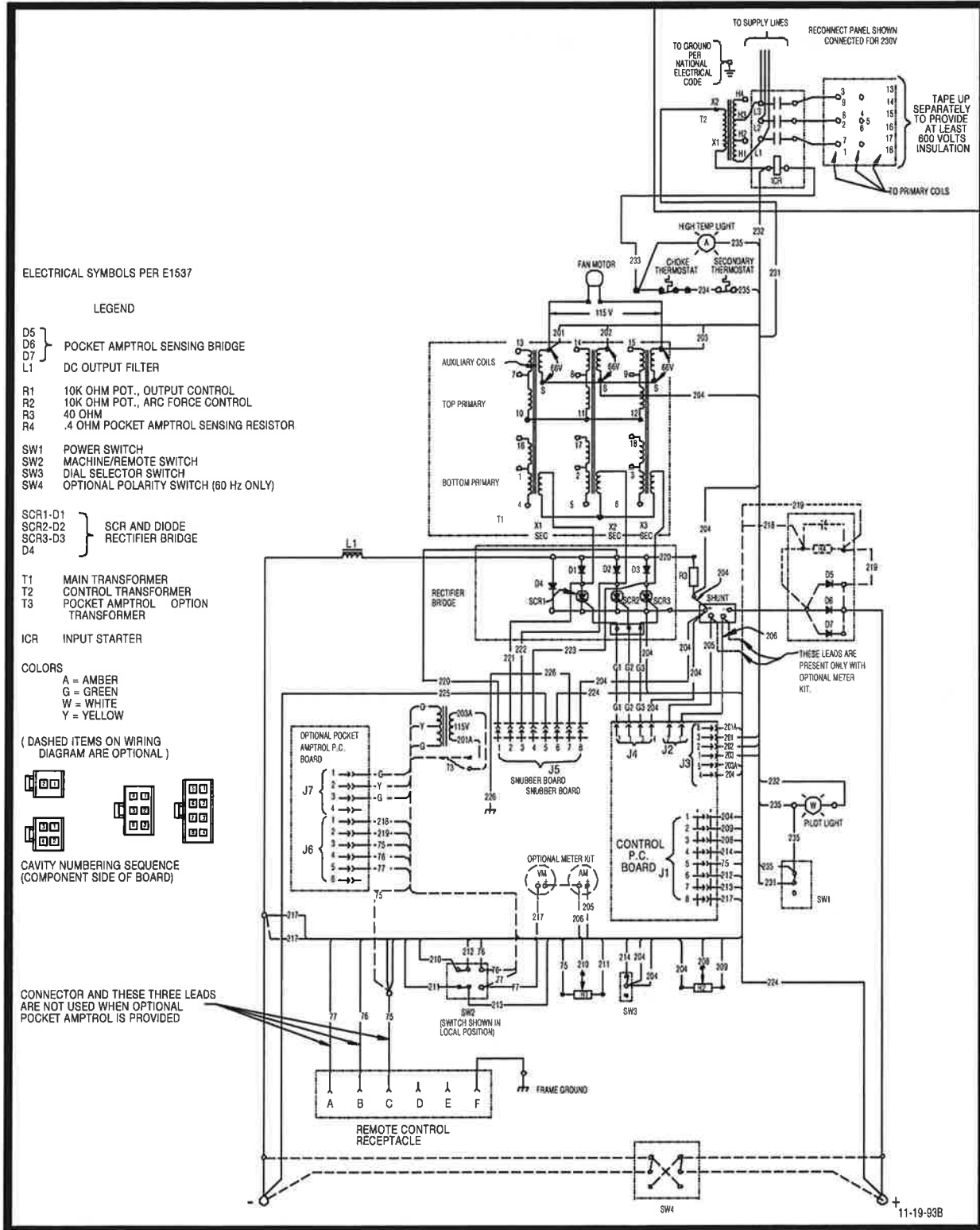
L9376

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.

IDEALARC R3R, -300, -400, -500



IDEALARC R3R WIRING DIAGRAM (230/460/575 V) (FOR CANADA ONLY)



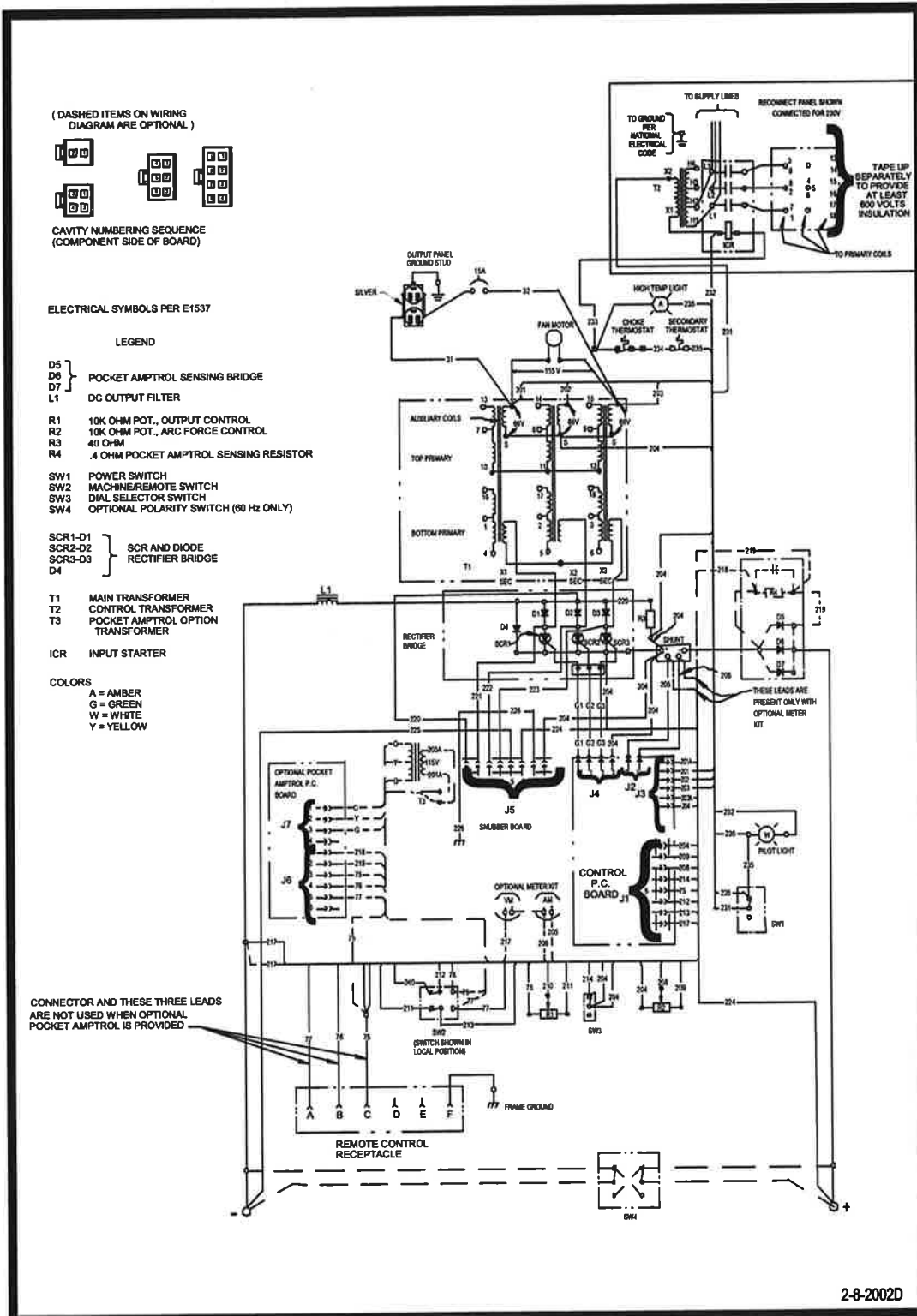
L8184

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.

IDEALARC R3R, -300, -400, -500



IDEALARC R3R WIRING DIAGRAM (230/460/575V) (FOR CANADA ONLY CODES 10857, 10858, 10881, 10882)

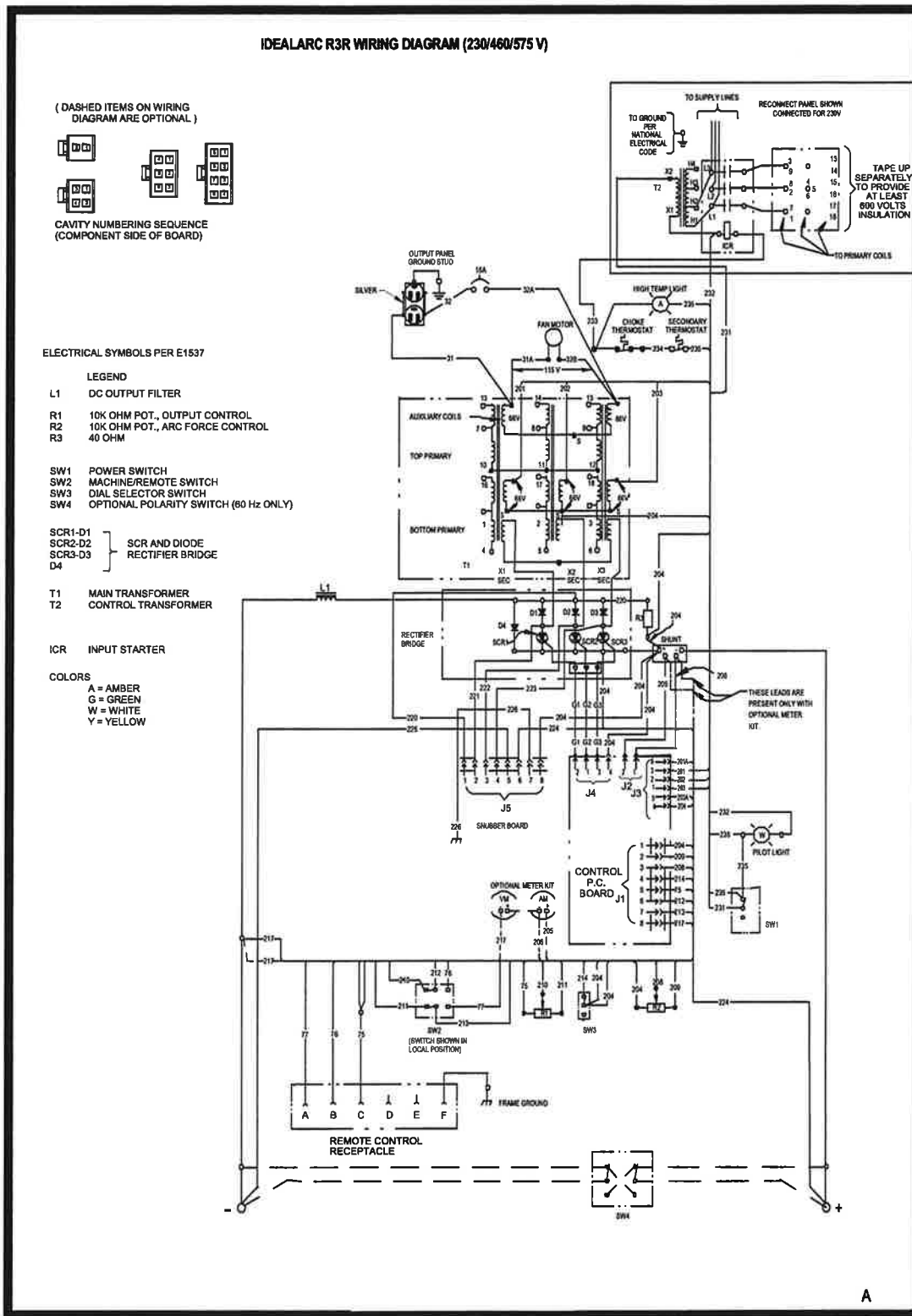


L11869

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.



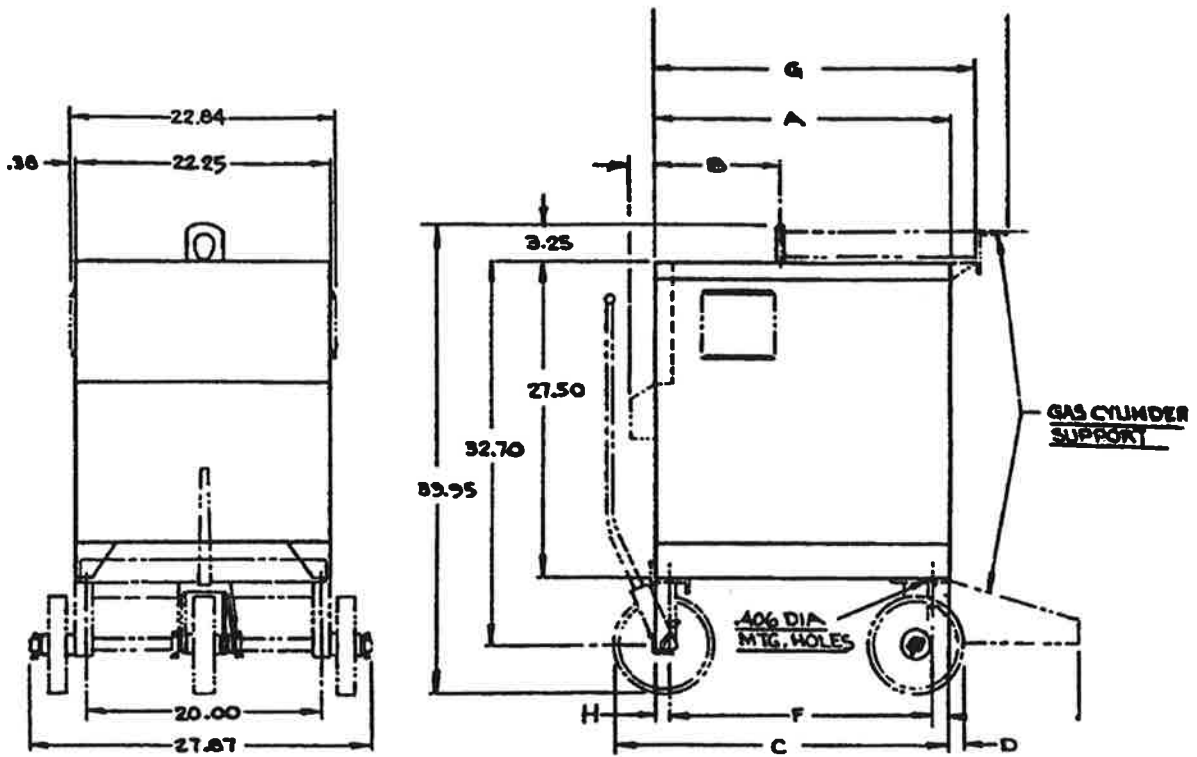
## IDEALARC R3R WIRING DIAGRAM (230/460/575V) (FOR CODES 11043, 11044, 11045, 11046)



L11869-1

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.





N.A-OPTIONAL UNDERCARRIAGE AVAILABLE

Part No.	Type	A	B	C	D	F	G	H
M12244-7	R3R	32.00	15.39	3092	1.44	30.02±.11	33.07±.06	.94

M12244-7  
7-7-78

IDEALARC R3R, -300, -400, -500





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