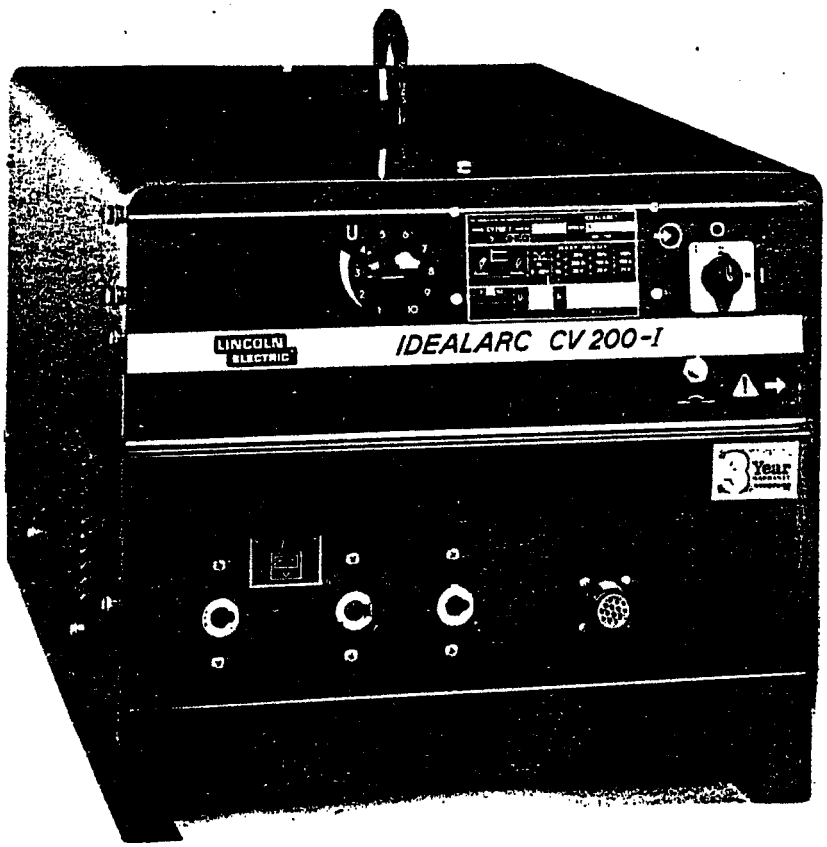
LINCOLN® WELDERS

IM-383
November 1989

Ram

OPERATING MANUAL

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.



IM383
November 1989
Idealarc CV-200-I
9432

DAMAGE CLAIMS

When this equipment is purchased, 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 equipment 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.

LINCOLN® ELECTRIC

THE LINCOLN ELECTRIC COMPANY
World's Largest Manufacturer of Arc Welding Products • Manufacturer of Industrial Motors
Sales and Service Worldwide
Cleveland, Ohio 44117-1199 U.S.A.

ARC WELDING SAFETY PRECAUTIONS

WARNING: PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.

ELECTRIC SHOCK can kill.

1. 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.

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

   c. Insulate yourself from work and ground using dry insulation. When welding in damp locations, on metal framework such as floors, gratings or scaffolds, and when in positions such as sitting or lying, make certain the insulation is large enough to cover your full area of physical contact with work and ground.

   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.

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

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

   g. Never dip the electrode in water for cooling.

   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.

   i. When working above floor level, protect yourself from a fall should you get a shock.

   j. Also see Items 4c and 6.

ARC RAYS can burn.

2. 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.

   b. Use suitable clothing made from durable flame-resistant material 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.

FUMES AND GASES can be dangerous.

3. 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. 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.

   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.

   e. Also see item 7b.

WELDING SPARKS can cause fire or explosion.

4. 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. Have a fire extinguisher readily available.

   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.

   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.

   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 F4.1-80 from the American Welding Society (see address below).

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

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.

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.

h. Also see item 7c.

CYLINDER may explode if damaged.

5. 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.

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

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.

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

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

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

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.

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

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

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

FOR ENGINE powered equipment.

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

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

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.

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.

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.

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.

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.

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

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR WORK performed by qualified people.

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, P.O. Box 351040, Miami, Florida 33135.

PART A

Page

PART B

PART A

1. GENERAL DESCRIPTION

1.1 General Description - CV 200-I

The CV 200-I is a constant voltage DC power source designed for the GMAW process with limited FCAW capability as well. It features an international rating of 200 amps, 28 volts, at 30% duty cycle. It also has the capacity to run at 150 amps, 26 volts, 60% duty cycle. It complies with ISO 700 for power sources. The CV 200-I features an all graphic nameplate.

It is available from the factory in two models, one with meters, the other without, both with variable input voltage.

2. RECOMMENDED PROCESSES AND EQUIPMENT

The CV 200-I is capable of solid wire welding within the rated output capacity of the machine. It is also designed for welding with the following flux-cored wires: NR-152, NR-211, and Outershield® 70 and 71.

The CV 200-I is designed for use with the LN-7 and LN-25 wire feed units.

3. SPECIFICATION SUMMARY

Model	CV 200-I
Type	K1359
Input Frequency	50 Hz
Output Ratings (DC)	ISO 700
Rated Output	200A/28V/30%
Additional Output Capacity	100A/24V/100% 150A/26V/60%
Current/Voltage Range	30A/6V - 200A/28V
Maximum OCV:	40
Normal OCV:	6-40
Input Power	
Standard Voltage	220/380/440/3/50
Nameplate Amps at Rated Output	24.1/15.6/12.2
Idle Current	5.2/3.0/2.6
Idle Power	1100 W
Power Factor at Rated Load	.88
Auxiliary Power	115 volts AC and 42 volts AC, 5 amp maximum combined load, circuit breaker protected.
Dimensions	445 H x 470 W x 610 D (mm) (Lift Hook, add 80 mm)
Net Weight	70 kg
Wiring Diagram	L7983

PART B

1. CV 200-I INSTALLATION

1.1 Safety Precautions

> **WARNING:** ELECTRIC SHOCK CAN KILL.
> TURN THE INPUT POWER OFF AT THE DISCONNECT SWITCH BEFORE ATTEMPTING TO CONNECT TO THE POWER LINES.

- Connect the CV 200-I grounding terminal located near the reconnect panel (marked ⏚) to a good electrical earth ground.

- Turn the Power switch on the CV 200-I "OFF" before connecting or disconnecting output cables, wire feeder or remote connections, or other equipment.
- Only qualified personnel should perform this installation.

1.2 Machine Installation

1.2.1 Location

Place the welder where clean cooling air can freely circulate in through the side and bottom louvers and out through the rear louvers. Dirt, dust or any foreign material that can be drawn into the welder should be kept at a minimum. Failure to observe the precautions can result in excessive operating temperatures and nuisance thermostat trips.

1.2.2 Input Connections

> **WARNING:** ELECTRIC SHOCK CAN KILL.
> TURN THE INPUT POWER OFF AT THE DISCONNECT SWITCH BEFORE ATTEMPTING TO CONNECT TO THE POWER LINES.

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

Gain access to the input reconnect panel by removing the access door on the side nearest to the Power switch.

Have a qualified electrician connect the input leads to L1, L2, and L3 of the terminal block in accordance with all local and national electrical codes, and the connection diagram located on the inside of the access door. Use a three phase line.

The frame of the welder must be grounded. A ground terminal marked with the symbol ⏚ located near the reconnect panel is provided for this purpose. See all local and national electrical codes 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" (1) 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 LEAD AND FUSE SIZES

100% Duty Cycle

Input Volt/Freq.	Input Ampere Rating on Nameplate	Type 75°C Wire in Conduit AWG Copper Cond.	Grounding Wire AWG Copper Cond.	Fuse Size (Super Lag)
220/50	24.1	10	10	25
380/50	15.6	10	10	20
440/50	12.2	10	10	15

(1) Also called "inverse time" or "thermal/magnetic" circuit breakers; circuit breakers which have a delay in tripping action that decreases as the magnitude of the current increases.

1.3 Installation of Field Installed Options

For installation of compatible field installed options, refer to the instructions included with those options.

1.4 Installation of Required Equipment-Control Cable Connections

Follow the instructions below which are appropriate for the wire feeder that will be used.

1.4.1 LN-7 to CV 200-I

> **WARNING:** ELECTRIC SHOCK CAN KILL.
>
> - Turn the Power switch on the CV 200-I "OFF" before making the following connections.

a) Turn the CV 200-I Power switch to the "OFF" position.

b) Connect the LN-7 control cable to the wire feeder receptacle on the CV 200-I.

c) See Section 1.5 for connection of work and electrode cables.

1.4.2 Connection LN-25 to CV 200-I

> **WARNING:** ELECTRIC SHOCK CAN KILL.
>
> - Turn the Power switch on the CV 200-I "OFF" before making terminal strip connections.

a) Turn the CV 200-I Power switch to the "OFF" position.

b) Plug a K484 jumper plug into the CV 200-I wire feeder receptacle.

c) See Section 1.5 for connection of work and electrode cables.

NOTE: The output terminals are energized at all times when the K484 is plugged in.

1.4.3 Connection of Remote Control (K857)

> **WARNING:** ELECTRIC SHOCK CAN KILL.
>
> - Turn the Power switch on the CV 200-I "OFF" before making the following connections.

NOTE: The K856 Power Source Remote Kit must be installed before the K857 can be used. See the instructions provided with the K856.

Plug the Remote Control cable into the Remote receptacle. If possible, tape the Remote cable to the heavy output leads, so they can protect the smaller Remote cable from damage and abuse.

1.5 Output Connections

> **WARNING:** ELECTRIC SHOCK CAN KILL.
>
> - Turn the Power switch on the CV 200-I "OFF" before connecting or disconnecting output cables.

Output cables must have Magnum Twist-Mate™ plugs for connection to the CV 200-I. Order K852-70 plugs (2 required) for connecting (50-70 mm^2) cables. Order K852-95 for connecting (70-95 mm^2) cables. Refer to S18737 for instructions on installing these plugs.

Connect the positive output lead to the terminal marked "+". The negative output lead can be hooked to either the low inductance terminal (marked "  ") or the high inductance terminal (marked "  ").

Cable Sizes for Combined Lengths of Copper Electrode and Work Cable

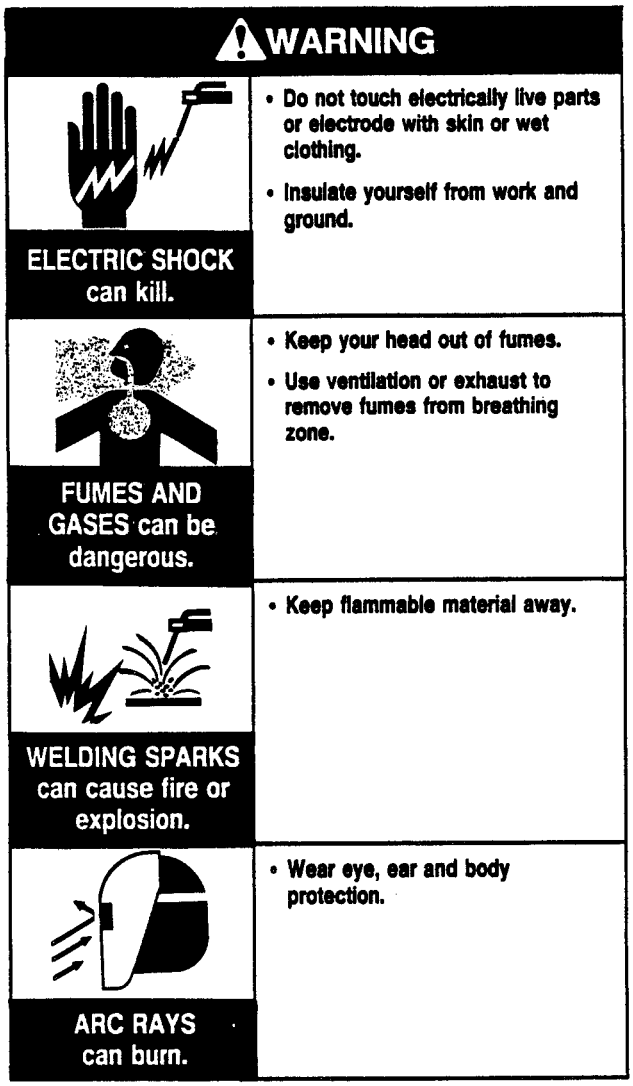
Machine Size	Lengths up to 45 m	45 m to 60 m
200/30%	1/0 (50 mm^2)	2/0 (70 mm^2)

1.6 Paralleling

The CV 200-I is not designed to be paralleled with any other power source.

2. OPERATION

2.1 Safety Precautions



CAUTION:
When using a CV 200-I power source with wire feeders which do not have an electrical trigger interlock (or with wire feeders with the electrical trigger interlock in the OFF position), there will be a small spark if the electrode contacts the work or ground within several seconds after releasing the trigger.

When used with some wire feeders with the electrical trigger interlock in the ON position, the arc can restart if the electrode touches the work or ground during these several seconds.

2.2 Power Source Operation

Be sure the CV 200-I is properly installed, and that all accessories are properly hooked up before attempting operation.

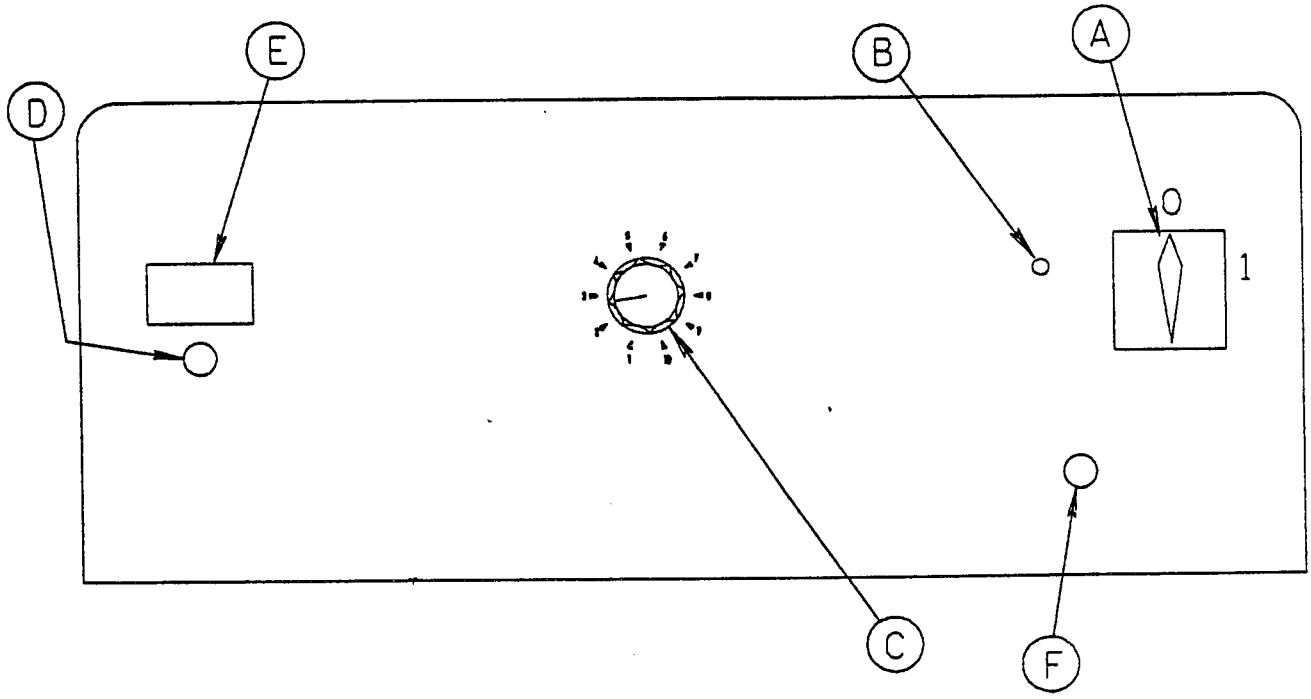
2.2.1 Duty Cycle

The CV 200-I is rated at the following duty cycles:

Amps	Volts	Duty Cycle (10 minute period)
200	28V	30%
150	26V	60%
100	24V	100%

2.2.2 Control Panel

CONTROL PANEL
FIGURE 1



A. Power Switch

A two-position rotary switch.

Controls the input power to the CV 200-I.

B. Pilot Light

Indicates when the CV 200-I is energized (input power is "ON"). The pilot light will flash when certain trouble conditions exist. See the Troubleshooting Section of this manual.

C. Voltage Adjust

Controls the CV 200-I output voltage.

D. Optional Volts/Amps Switch

Selects either output current or arc voltage to be displayed on the digital meter.

E. Optional Digital Voltmeter/Ammeter

Displays the CV 200-I output current, or the arc voltage.

NOTE: Due to voltage drops in the welding cables and at cable connection points, the actual arc voltage may be lower than that displayed on the voltmeter. Use welding cables of the proper capacity and make sure all connections are tight to minimize this effect.

F. Circuit Breaker

Protects the 115 volt 31-32 circuit and the 42 volt 41-42 circuit in the wire feeder receptacle from overloads and shorts. If this circuit breaker opens, any equipment powered by the 31-32 circuit or the 41-42 circuit will not work.

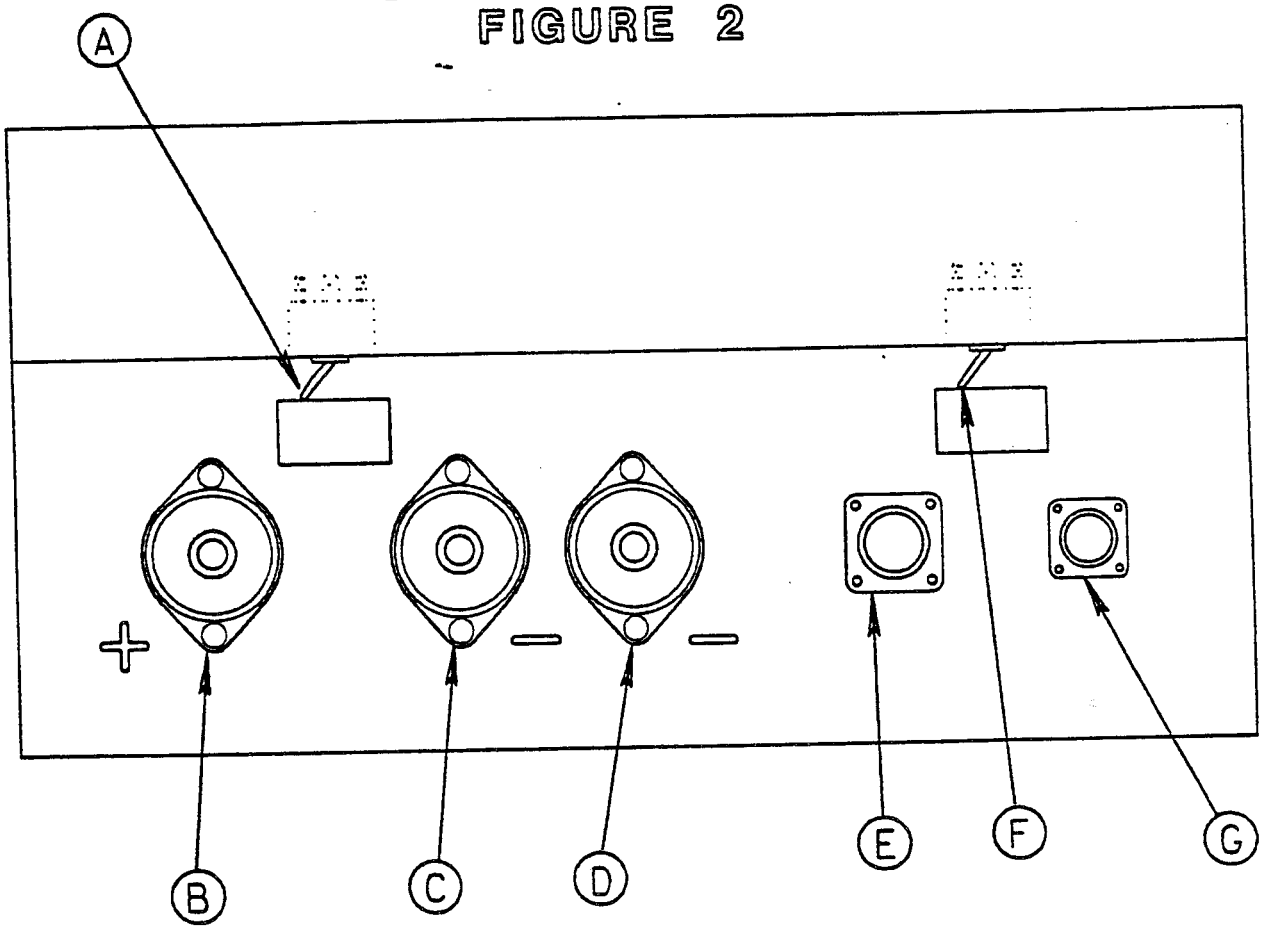
G. Warning Decal

Safety information pertaining to the operation and service of the CV 200-I.

NOTE: This decal appears on the right case side of the CV 200-I.

2.2.3 Output Panel Connections

OUTPUT PANEL
FIGURE 2



A. Wire Feeder Voltmeter Switch

This switch selects the polarity of the wire feeder voltmeter, if so equipped. When welding electrode positive (MIG, Outershield® and most Innershield® electrode processes) set the switch to "+".

When welding electrode negative (some Innershield electrodes) set the switch to "-".

This switch has no effect on the welding polarity. In fact, if the wire feeder being used does not have a voltmeter, the setting of this switch has no effect.

B., C., D. Output Connectors

Each connector is a Magnum Twist-Mate™, receptacle. Insert a mating Twist-Mate™ plug, and twist clockwise to secure.

For GMAW processes, and most FCAW processes, the positive output connection goes to the wire feeder. One of the negative output connections goes directly to the work.

B. Positive output connection.

C. Low inductance negative connection.

The low inductance connection is typically used for short arc welding of mild steel, particularly on thin materials or when using CO_2 shielding gas.

D. High inductance negative output connection.

The high inductance connection is more suitable for short arc welding heavier weldments or when using 75% Argon/25% CO_2 shielding gas. This connection produces a softer arc and a flatter bead with more wash-in than the low inductance connection. A spray type transfer is possible with either connection.

E. Wire Feeder Receptacle

14-pin MS style receptacle for wire feeder. Provides connections for auxiliary power (115 VAC and 42 VAC), contactor closure, wire feeder voltmeter sense lead, and ground.

F. Local/Remote Switch (Part of the optional K856 Power Source Remote Kit)

Determines whether the welding voltage is controlled at the CV 200-I, or controlled remotely by a K857 Remote Control.

G. Remote Control Receptacle (Part of the optional K856 Power Source Remote Kit)

6-pin MS style receptacle for connection of a K857 Remote Control.

2.2.4 Starting the Machine

The power switch at the extreme right side of the control panel energizes the CV 200-I.

The red light to the left of the power switch indicates when the CV 200-I is energized.

2.2.5 Adjusting the Output Voltage

Adjustment without the optional K856 Power Source Remote Kit: Change the Voltage Adjust control setting to give the proper arc voltage for the welding procedure being used. The knob can be adjusted anywhere from 1 to 10 on the dial. This control may be adjusted while welding to change the CV 200-I output.

Adjustment with the K856 and K857 Remote Control: Place the Local/Remote switch in the REMOTE position. Change the Remote Control setting to give the proper arc voltage for the procedure being used. The Remote Control knob can be adjusted from 1 to 10 on the dial. This control may be adjusted while welding to change the CV 200-I output.

2.3 Auxiliary Power

The CV 200-I supplies both 115 volt and 42 volt AC power needed for some wire feeding equipment. The auxiliary power is available from the wire feeder receptacle. A 5 amp circuit breaker on the machine control panel protects the auxiliary power from excessive overloads.

NOTE: Do not use terminals 2 or 4 for control of auxiliary loads. (The 2-4 circuit is isolated from the 31-32 and 41-42 circuits.)

3. MAINTENANCE

3.1 Safety Precautions

> **WARNING:** ELECTRIC SHOCK CAN KILL.
> HAVE QUALIFIED PERSONNEL DO ALL INSTALLATION, MAINTENANCE AND TROUBLESHOOTING WORK. TURN THE INPUT POWER OFF AT THE FUSE BOX BEFORE WORKING ON THE MACHINE.

3.2 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 with low pressure air at regular intervals to eliminate excessive dirt and dust build-up on internal parts.

Machine and Circuit Protection

The CV 200-I Control PC Board has built-in diagnostic routines to alert the operator when trouble exists. When a trouble condition occurs, the CV 200-I meter will display an error code, in the form "EXX", where "XX" refers to a specific error. See Section 3.3.1 for an explanation of the error codes.

The power source is thermostatically protected with a proximity thermostat against overload or insufficient cooling. If the machine is overloaded, the thermostat will open, the pilot light will flash, and the output will be zero. The fan will continue to run. The thermostat will remain open until the machine cools, at which time it will close and the output will again be available.

The CV 200-I is electronically protected against overloads and accidental short circuits. If the circuitry senses a short circuit, it will disable the CV 200-I output until the power switch is turned off, then on again. Remove the short before turning the machine back on. If an overload is detected, the output will be disabled until the operator releases the 2 and 4 switch. Remove the overload before closing the switch again.

3.3 TROUBLESHOOTING THE CV 200-I

> **WARNING:** ELECTRIC SHOCK CAN KILL.
> HAVE QUALIFIED PERSONNEL 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.

3.3.1 Built-In Diagnostic Routines and Error Codes

Machines equipped with a meter PC board will display error codes during certain fault conditions. The letter "E" will be displayed, followed by a two-digit code that indicates the type of fault encountered. The machine will be disabled until the condition is corrected.

ERROR CODE	CAUSE	WHAT TO DO
E00	Output short circuited	Turn power off. Remove short circuit.
E10	Thermostat circuit has opened	Allow machine to cool. Be sure to provide adequate ventilation for machine.
E20	Memory error	See PC Board Troubleshooting Procedures.
E30	1. Voltage Adjust potentiometer not connected	1. Check wiring between Voltage Adjust and the Control PC Board.
	2. K856 Remote Option Kit or K857 Remote Control not functioning properly	2. See 3.3.3 Options Troubleshooting Guide.
E40	Line voltage too low	Turn power off. Make sure line voltage is within 10% of nominal before turning power back on.
E50	Line voltage too high	Turn power off. Make sure line voltage is within 10% of nominal before turning power back on.
E60	Overcurrent	Release 2 and 4 switch to reset the machine.

If after attempting the remedies listed above the error condition still exists, the problem may be with the wiring in the following areas: the shunt (leads 218 and 219), or voltage feedback (leads 21, 22, and 23).

3.3.2 Machine Troubleshooting Guide

Not all trouble conditions can be recognized by the PC board and displayed as error codes. The following guide covers most other trouble conditions.

TROUBLE	CAUSE	WHAT TO DO
Machine has no output.	1. Secondary contactor circuit (2 and 4 wire feeder receptacle) not working.	1. Check 2 and 4 circuit wiring.
	2. Electrode or work lead loose or broken.	2. Repair connection.
	3. Defective PC board.	3. See PC Board Troubleshooting Procedures.
	4. Protective circuits operating due to output short circuit.	4. Turn power off. Remove output short circuit.
	5. If using an LN-25, K484 jumper plug kit not making connection between 2 & 4 in wire feeder receptacle.	5. Check for continuity between pins C & D in the K484.
Machine has minimum output and no control.	1. Voltage Control misconnected.	1. Voltage Control wiring.
Machine has low output and no control.	1. Open in feedback circuitry.	1. Check wiring and control and PC board wiring harness plugs.
	2. Faulty PC board.	2. See PC Board Troubleshooting Procedures.
	3. Voltage Adjust potentiometer circuit open (lead 75).	3. Check and replace potentiometer if faulty. Check wiring of lead #75.
Pilot light is flashing.	1. Machine has internal fault.	1. For meter equipped machines, consult error codes and troubleshoot.
		2. For nonmeter equipped machines, consult error code troubleshooting guide and check for those causes in sequential order.

TROUBLE	CAUSE	WHAT TO DO
Machine does not have maximum output.	1. Faulty Control PC board.	1. See PC Board Troubleshooting Procedures.
	2. Voltage Adjust potentiometer defective.	2. Check and replace if faulty.
	3. Voltage Adjust potentiometer leads open.	3. Check and repair broken leads.
Machine will not shut off.	1. Defective power switch.	1. Replace.
Variable or sluggish welding arc.	1. Poor work or electrode connection.	1. Check and clean all connections.
	2. Welding leads too small.	2. Check table in operating manual.
	3. Welding current or voltage too low.	3. Check procedures for recommended settings.
	4. Defective SCR bridge.	4. Check and replace if defective.
Digital meters do not light - or - Digital meter display is incorrect.	1. Faulty Meter PC board.	1. See PC Board Troubleshooting Procedures.
	2. Faulty Control PC board.	2. See PC Board Troubleshooting Procedures.
Output Control not functioning on the machine.	1. Faulty Voltage Adjust potentiometer.	1. Check and replace if found faulty.
	2. Leads or connections open in control circuit.	2. Check lead continuity and connections for an open and repair if necessary.
	3. Faulty Control PC board.	3. See PC Board Troubleshooting Procedures.
	4. Malfunctioning Power Source Remote Kit.	4. See "Options Troubleshooting".
Poor arc striking with semiautomatic wire feeders.	1. Poor work connection.	1. Work connection must be adequate for application.
	2. Improper procedures.	2. Adjust procedures for improved starting.
	3. Defective PC board.	3. See PC Board Troubleshooting Procedures.
Poor arc characteristics.	1. Control PC Board defective.	1. See PC Board Troubleshooting Procedures.

3.3.3 Options Troubleshooting Guide

K856 Power Source Remote Kit & K857 Remote Control

TROUBLE	CAUSE	WHAT TO DO
Output Control not functioning on Remote Control.	1. Local/Remote switch in wrong position.	1. Place switch in "Remote".
	2. Faulty Local/Remote switch.	2. Check and replace if found faulty.
	3. Faulty Remote Control potentiometer.	3. Check and replace if found faulty.
	4. Leads or connections open in control circuit.	4. Check all leads and connections, internal or remote, for continuity; repair if necessary.
	5. Faulty Control PC board.	5. See PC Board Troubleshooting Procedures.
Voltage Adjust not functioning on the machine.	1. Local/Remote switch in the wrong position.	1. Place switch in "Local" position.
	2. Faulty Local/Remote switch.	2. Check and replace if found faulty.
	3. Faulty Voltage Adjust potentiometer.	3. Check and replace if found faulty.

WARNING: ELECTRIC SHOCK CAN KILL.

- TURN THE INPUT POWER OFF AT THE DISCONNECT SWITCH BEFORE WORKING INSIDE THE MACHINE CASE.

3.3.4 PC Board Troubleshooting Procedures

3.3.4.1 Control PC Board

The Control PC Board controls all machine functions including the pilot light and the Meter PC Board. Most problems, if not caused by faulty wiring or machine misuse, will stem from a faulty Control PC Board.

Perform the following checks before replacing the Control PC Board.

A. With the Power "ON", LED 1 on the Control PC Board must be glowing. If not, check the following.

1. Check for loose connections in the PC board plugs, particularly J3.

2. Check for the following voltages, accessible at PC board plug J3:

Wire #	50 Hz
200-201	11-13 VAC
202-203	11-13 VAC

These voltages are to be taken with the machine hooked up to rated input voltage. If the input line is high or low, these voltages will vary accordingly.

If these voltages are not present, check the wiring back to the main transformer.

If these voltages are correct, refer to "Procedure for Replacing PC Boards."

3.3.4.2 Meter PC Board

When the Meter PC Board malfunctions, first determine if the rest of the machine functions correctly. If so, then the problem is in either the harness between the meter and control boards, or in the meter board itself. Refer to "Procedure for Replacing PC Boards." As a last resort, the Control PC Board may have to be replaced.

3.3.4.3 Procedure for Replacing PC Boards

When a PC board is to be replaced, the following procedure must be followed:

A. Visually inspect PC board in question.

1. Are any of the components damaged?
2. Is a conductor on the back side of the board damaged?
3. If there is no damage to the PC board, insert a new PC board and see if this remedies the problem. If the problem is remedied, reinstall the old PC board and see if the problem still exists with the old PC board.

   a. If the problem does not exist with the old board, check the PC board lead harness plugs.

   b. Check leads in the harness for loose connections.

4. If there is damage to the PC board, return it to the local Lincoln Electric Field Service Shop.

B. Output Voltage

The open circuit voltage of the machine should be 6 to 40 volts. If any other condition exists, refer to the Troubleshooting Guide.

C. Fault Protection Operation

The overload protection circuit on the PC board will cause the CV 200-I to display either "E00" or "E60". The CV 200-I power switch must be turned "off" and then "on" to return the machine to normal output.

D. Optional K857 Remote Control Check

Disconnect the remote output control and connect an ohmmeter between pins C and B and rotate the rheostat in the remote control. The resistance reading should go from zero to 10K ohms. Repeat with ohmmeter across A and B with the same results. Connect ohmmeter across A and C. 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 rheostat.

3.4 Temporary Parts List for CV 200-I Code 9432

Part Description	CV 200-I Part Number
Sheet Metal	
Wraparound	G1947
Case Front Assembly	L7837
Case Back	L7813
Fan Baffle	L7666
Fan Motor Bracket	M14064
Base	G1948
Case Front Components	
Nameplate	L7987
Nameplate w/Optional Meters	L7863
Power Switch	M15470-5
Amps/Volts Switch (Optional)	T10800-30
Voltage Adjust Potentiometer	S18250-68
Circuit Breaker (10 amp)	T12287-20
Control PC Board	L7844-1
Meter PC Board (Optional)	M15893-1
Red Meter Lens (Optional)	T14807-3
Wire Feeder Voltmeter Switch	T10800-35
Wire Feeder Voltmeter Decal	T13086-84
Twist-Mate Output Terminal	M13896-3
Wire Feeder Receptacle & Harness Assembly	S13100-113
Control to Meter Board Harness (Optional)	S18250-65
Internal Components	
SCR Bridge Assembly	L7945
Capacitor Bank Assembly	S18837
Choke Assembly	M15770
Main Transformer Assembly	G1990
Fan	M8678-2
Fan Motor	M8895-5
Reconnect Panel	M15654-1
Reconnect Instructions	M15903
Wiring Diagram	L7983
Tube Resistor (R1) (7.5 ohms 165W)	S10404-109
Miscellaneous	
Roof Cover Seal	S12934

3.5 Temporary Parts List for K856 Power Source Remote Kit

Part Description	Part Number
6-Pin Remote Connector	S12021-32
Local Remote Switch	T10800
Decal	S19107
Connector/Switch/Lead Assembly	M15818
Wiring Diagram	S19072
Installation Instruction	S19106-1, -2

3.6 Temporary Parts List for K857 Remote Control

Part Description	Part Number
Control Potentiometer	T10812-40
Control Box Assembly	L4829-1
Cable & Plug Assembly	S19095
Installation Instructions	S19103

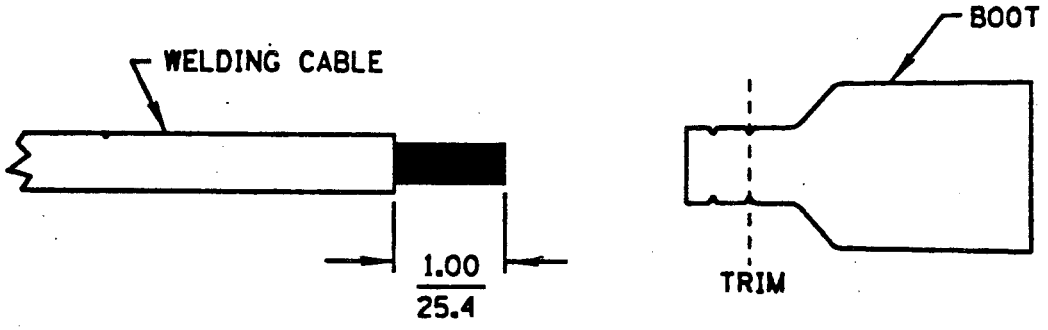
QUICK DISCONNECT PLUG INSTALLATION INSTRUCTIONS

⚠ WARNING:	ELECTRIC SHOCK CAN KILL
	TURN THE POWER SWITCH OF THE WELDING POWER SOURCE "OFF" BEFORE INSTALLING PLUGS ON CABLES OR WHEN CONNECTING OR DISCONNECTING PLUGS TO WELDING POWER SOURCE.

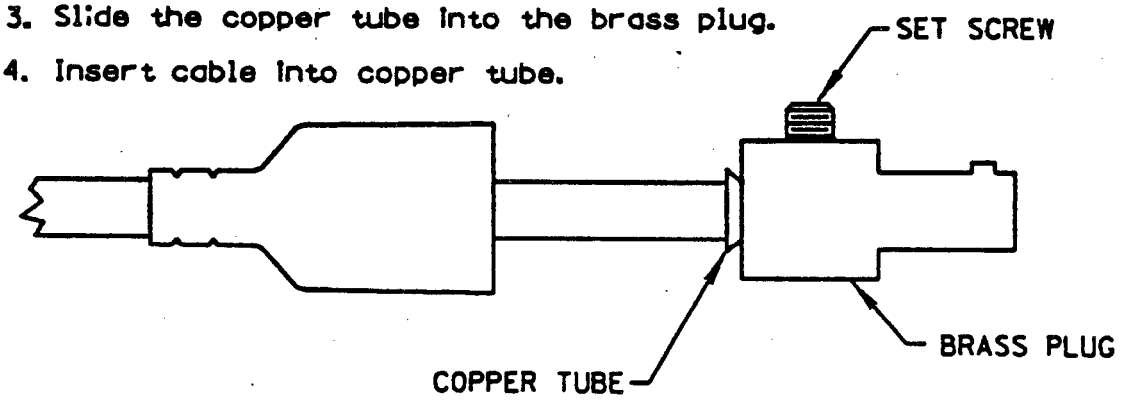
1. CHECK THAT THE CONNECTOR BOOT IS MARKED FOR THE APPROPRIATE CABLE SIZE PER TABLE BELOW; AND SKIN CABLE JACKET TO LENGTH SPECIFIED:

BOOT MARKING	AMERICAN (EUROPEAN) RANGE CABLE SIZE	CABLE SKIN LENGTH
50-70	1/0-2/0 (50-70 mm^2)	1 INCH (25.4mm)
70-95	2/0-3/0 (70-95 mm^2)	1 INCH (25.4mm)

2. Slide rubber boot onto cable end. The boot end may be trimmed to match the cable diameter. Soap or other lubricant will help to slide the boot over the cable.



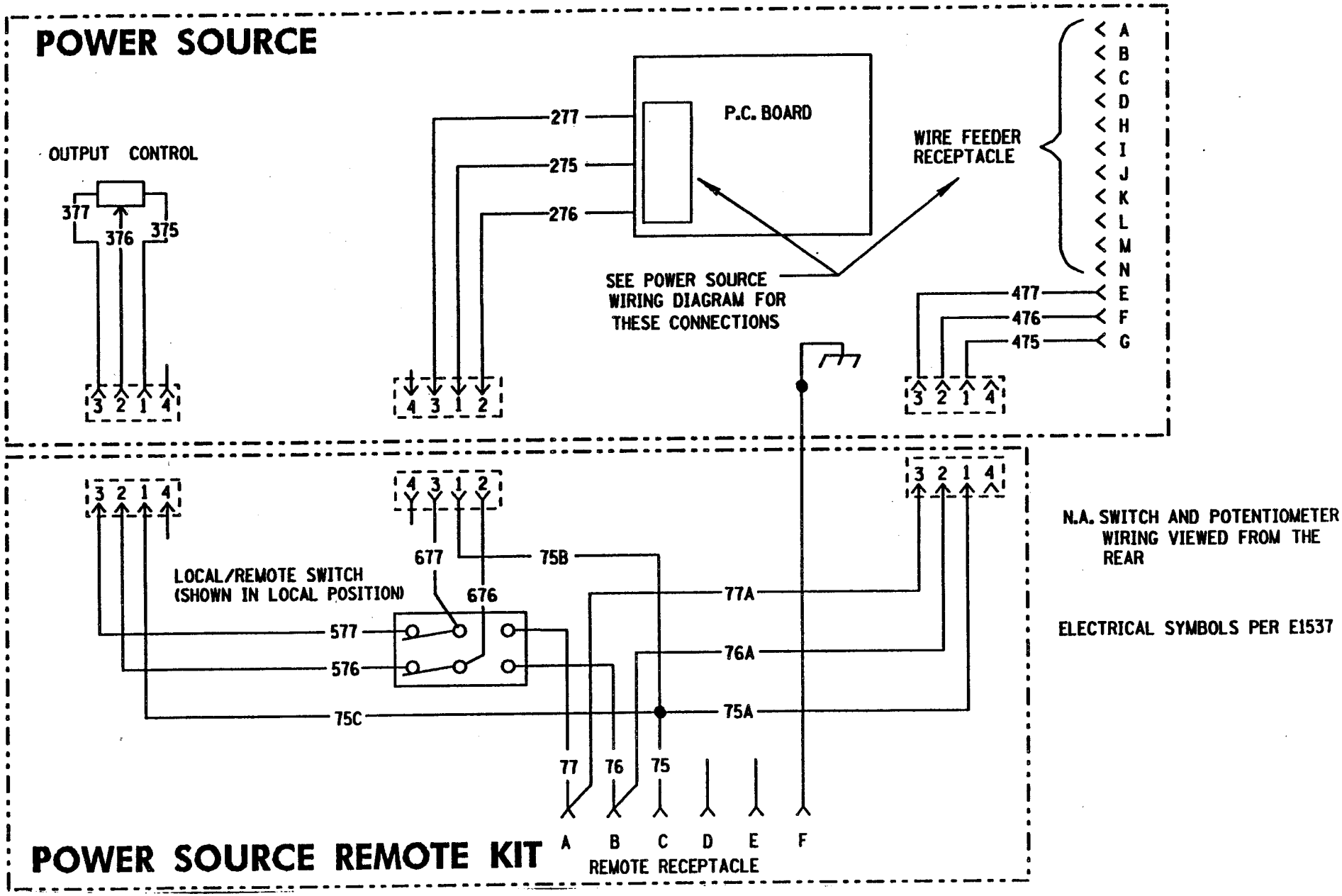
3. Slide the copper tube into the brass plug.
4. Insert cable into copper tube.



5. Tighten set screw to collapse copper tube. Screw must apply pressure against welding cable. The top of the set screw will be well below the surface of the brass plug after tightening.

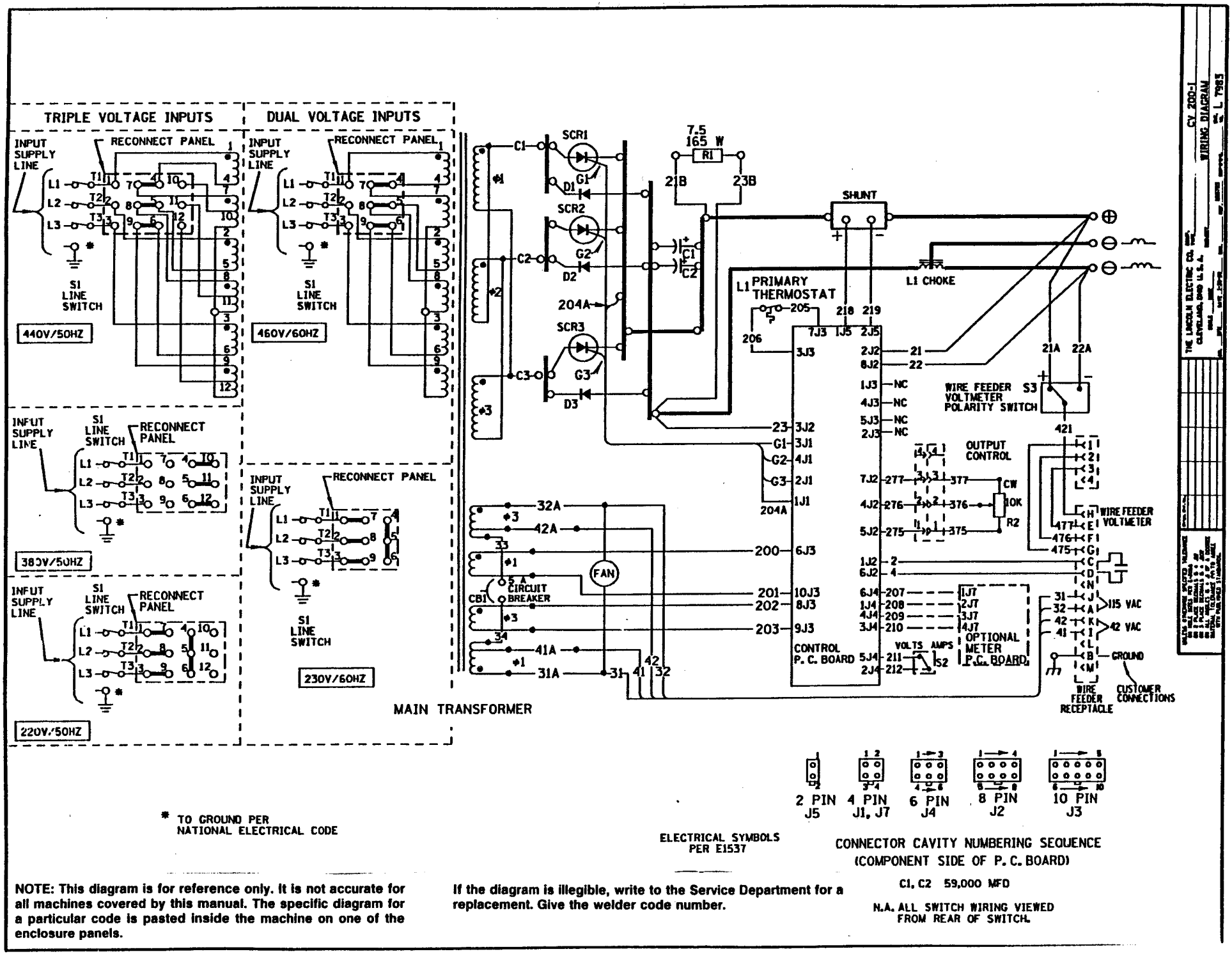
6. Slide rubber boot over brass plug. The rubber boot must be positioned to completely cover all electrical surfaces after the plug is locked into the receptacle.

S18737
1-20-89



Wiring Diagram for K856 Power Source Remote Kit

S19072
11-89



* TO GROUND PER NATIONAL ELECTRICAL CODE

ELECTRICAL SYMBOLS PER E1537

CONNECTOR CAVITY NUMBERING SEQUENCE (COMPONENT SIDE OF P. C. BOARD)

C1, C2 59,000 MFD

N.A. ALL SWITCH WIRING VIEWED FROM REAR OF SWITCH.

NOTE: This diagram is for reference only. It is not 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 welder code number.

CV 200-I
WIRING DIAGRAM
THE LINCOLN ELECTRIC CO.
CLEVELAND, OHIO U.S.A.

LIMITED WARRANTY

STATEMENT OF WARRANTY:

The Lincoln Electric Company (Lincoln) warrants to the original purchaser (end-user) of new equipment that it will be free of defects in workmanship and material.

This warranty is void if Lincoln finds that the equipment has been subjected to improper care or abnormal operation.

WARRANTY PERIOD:

All warranty periods date from the date of shipment to the original purchaser and are as follows:

Three Years:
Transformer Welders
Motor-generator Welders
Semiautomatic Wire feeders
Plasma-cutting power source
Engine Driven Welders (except engine and engine accessories) with operating speed under 2,000 RPM

Two Years:
Engine Driven Welders (except engine and engine accessories) with operating speed over 2,000 RPM

All engine and engine accessories are warranted by the engine or engine accessory manufacturer and are not covered by this warranty.

Equipment not listed above such as guns and cable assemblies, automatic wire feeders and field-installed optional equipment is warranted for one year.

TO OBTAIN WARRANTY COVERAGE:

You are required to notify Lincoln Electric, your Lincoln Distributor, Lincoln Service Center or Field Service Shop of any defect within the warranty period. Written notification is recommended.

WARRANTY REPAIR:

If Lincoln's inspection of the equipment confirms the existence of a defect covered by this warranty, the defect will be corrected by repair or replacement at Lincoln's option.

WARRANTY COSTS:

You must bear the cost of shipping the equipment to a Lincoln Service Center or Field Service Shop as well as return shipment to you from that location.

IMPORTANT WARRANTY LIMITATIONS:

- Lincoln will not accept responsibility for repairs made without its authorization.
- Lincoln shall not be liable for consequential damages (such as loss of business, etc.) caused by the defect or reasonable delay in correcting the defect.
- Lincoln's liability under this warranty shall not exceed the cost of correcting the defect.
- This written warranty is the **only** express warranty provided by Lincoln with respect to its products. Warranties implied by law such as the Warranty of Merchantability are limited to the duration of this limited warranty for the equipment involved.

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