LINCOLN WELDERS®

IM-256-B

OPERATING MANUAL

January, 1970
Idealarc R3S-300, R3S-600, R3S-800
IM256
6331; 6399; 6409; 6415; 6442; 6509; 6512; 6540; 6555; 6618; 6650; 6659; 6673; 6680; 6690; 6691; 6692; 6720; 6721; 6729; 6730; 6731; 6789; 6807; 6809; 6810; 6816; 6817; 6818; 6820; 6821; 6822; 6823; 6840; 6845; 6846; 6858; 6859; 6860; 6861; 6867; 6868; 6869; 6870; 6871; 6872; 6896; 6905

IDEALARC®

R3S-300, R3S-600 and R3S-800

DC POWER SOURCES

Constant Voltage, 3 Phase, Rectifier Type

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

LINCOLN ELECTRIC

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio 44117

World's Largest Manufacturer of Arc Welding Equipment and Electrodes · Manufacturer of Motors Since 1895

INSTALLATION

Damage Claims

When Lincoln 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.

Input Wiring

Have a qualified electrician remove the right side panel of the machine and connect the starter to three phase AC power of the voltage and frequency specified on the nameplate. Fuse the input circuit with the recommended super lag fuses. Choose an input wire size according to local requirements or use the table below. As a safety precaution, ground the welder frame.

230/460 volt models are shipped connected for 460 volts. To change connection, see the wiring diagram pasted to the inside of the right side panel.

NOTE: The R3S-300 and R3S-600 fan does not start until the wire feeder gun trigger is pulled.

RECOMMENDED INPUT WIRE SIZES
60 Cycle, 3 Phase Based on The National Electric Code

Welder	Input Volts	Amps Input	Copper Wire Size – Type 75° in Conduit		Super Lag Fuse Size in Amps
			3 Input Wires	1 Ground Wire	
300	230	42	8	8	70
	460	21	10	12	35
600	230	88	3	6	150
	460	44	8	8	70
800	230	120	1	6	200
	460	60	6	8	100

Output Connections

a. Output Studs

Studs for electrode and ground cable connection are located at the bottom right corner of the front panel. The cables should be run through the strain relief loop below the studs to prevent damage to them if the cables are pulled excessively.

b. Terminal Strip

A terminal strip for connection of wire feeder control leads is located on the front panel above the output studs. The leads should be run from the side through the holes next to the terminal strip and held with the cable clamp provided.

c. Auxiliary Power

This machine supplies the power needed for Lincoln wire feeder controls and wire drive circuits. The power available includes 600 volt-amperes of 115 volt, AC power at #31 and #32 on the terminal strips and 115 watts of 115 volt DC power at #1 and #2 on the terminal strip. Do not overload these circuits.

Knock-outs are provided above the output studs for installation of two 115 volt AC receptacles, if desired.

d. Connection of LN-4, LN-5, LN-6 and NA-2 Wire Feeders

Connect the control leads and the electrode and ground cables exactly as specified on the connection diagram shipped with the wire feeder. Be sure the LN-4, LN-5, or LN-6 is set for constant voltage welding as specified in the wire feeder instruction manual.

e. Connection to Obsolete NA-1 and MN-1 Wire Feeders

Write to the factory for specific connection information.

f. Other Wire Feeders

This power source can be used with most wire feeders manufactured by other companies. The connection must be determined by the customer for the specific equipment being used.

Auxiliary power used for wire feeder operation is described in paragraph C above. To operate the contactor, connect the gun switch to #2 and #4 on the terminal strip.

OPERATING INSTRUCTIONS

a. Output Studs

Connect the electrode cable to the 'Positive' or 'Negative' stud, depending upon the electrode polarity desired. Connect the ground cable to the other stud. Set the 'Control Circuit' toggle switch on the front panel to 'Positive' or 'Negative' to correspond to the electrode cable connection. This switch setting is needed for proper operation of Lincoln wire feeding equipment. The switch has no function when connected to other wire feeders.

b. Voltage Control

Lift the 'Voltage Selector' panel door. Remove the three nuts on the connection triangle and move the triangle so the pointer is set to the desired open circuit voltage. Replace the three nuts and tighten them with a wrench. Close the door. Start the machine by moving the 'Power' toggle switch on the front panel to the 'On' position. A pilot light to the right of the toggle switch indicates when this switch is on.

Press the wire feeder gun trigger to close the machine contactor and energize the main power transformer. It also starts the R3S-300 and R3S-600 cooling fan.

Adjust for the desired arc voltage with the six position 'Fine Voltage Control' on the front of the machine. Vol-

tage is increased in about one volt steps by moving the pointer clockwise. This control can be adjusted while welding. Do NOT attempt to set this switch between any of the six designated points. It has a spring loaded cam to provide rigid setting at each position.

c. 'Arc Control' (R3S-300 and R3S-600)

When welding with short circuiting processes turn the 'Arc Control' rheostat to adjust the pinch effect for the arc characteristics required for each application. Turn the control clockwise for a cold (smaller and less fluid) puddle. Turn counter clockwise when a hotter (more fluid and larger droplets) weld and more weld metal can be handled. Also turn counter clockwise to reduce spatter.

MAINTENANCE

Duty Cycle

Model	Cycles	Amps	Volts	Duty Cycle
R3S-300	60	300	40	100%*
R3S-600	60	600	44	100%*
R3S-800	60	800	44	100%*

*50 cycle machines are rated 80% duty cycle.

Overload Protection

Two fuses protecting the auxiliary transformer from overload are located on the front of the machine. One is an eight amp fuse in the auxiliary AC (#31 and 32) circuit and the other is a four amp fuse in the DC (#1 and 2) circuit. If replacing, use the same type and size fuses.

All Idealarc R3S machines have built-in protective thermostats operated by both temperature and current. These devices stop the machine if the rectifier or transformer reaches the maximum safe operating temperature because of frequent overload, high room temperature plus overload or abnormally high input voltage. The thermostats automatically reset when the temperature reaches a safe operating level.

R3S-300 welders (and R3S-600 and 800 machines built to code 6820 and below plus codes 6840 and 6845) are equipped with a separate circuit to protect the rectifier from excessively high short circuit currents. This circuit stops the machine at once if a high short circuit current is drawn. To re-start the machine move the power toggle switch to the 'Off' position for approximately 10 seconds and then back to the 'On' position. The electrical design of R3S-600 and R3S-800 machines built to later codes (after Dec. 1969) eliminated the need for this separate circuit.

Rectifier Failures

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.

If the welder trips off under no load or if it starts (after setting for sufficient time to allow the thermostat to cool) but again cuts off a few seconds, test for a shorted rectifier as follows:

1. Refer to the wiring diagram and rectifier test instructions pasted to the inside of the welder right side panel. Connect an ohmmeter between the rectifier stack positive (red) output terminal and the right hand rectifier input terminal (AC 1). Note the ohmmeter reading using the 10 or 100 scale.
2. Reverse the ohmmeter leads. Note the reading.
3. The reading taken in Step 1 should be different from the reading taken in Step 2. If, however, the two readings are the same and near zero, the rectifier stack has shorted.
4. Repeat Steps 1 and 2 with the ohmmeter connected between the rectifier stack negative (black) output terminal and the right hand rectifier input terminal (AC 1). Again, if the two readings are the same, the rectifier stack has shorted.

It is possible to have a stack failure caused by an open rectifier. Such a failure will not usually cause the welder to stop. However, it will cause a change in the welder output. Stack failures caused by an open rectifier will not be indicated by the above test.

General Maintenance

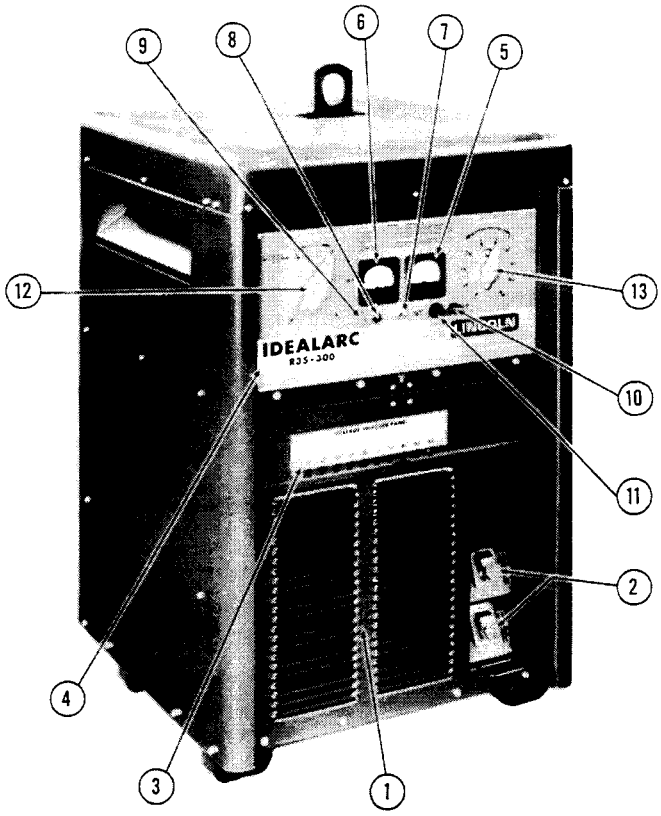
1. The fan motor has sealed bearings which require no service.

2. In extremely dusty locations, dirt may clog the air channels causing the welder to run hot. Blow out the welder at regular intervals.

TROUBLE SHOOTING

Trouble	Cause	What to Do
Starter Chatters	a. Check low line volts	a. Check with Power Company
	b. Faulty starter	b. Repair or replace
Machine will not start (Starter not operating)	a. Reed Switch (4CR) Tripped	a. Turn 'Power' switch 'Off' and then 'On'
	b. Supply line fuse blown	b. Replace (Look for reason for blown fuse first)
	c. Power circuit dead	c. Check voltage
	d. Broken power lead	d. Repair
	e. Wrong voltage	e. Check voltage against instructions
	f. Thermostat tripped (Welder Overheated)	f. Make sure that fan is operating and that there are no obstructions to free flow of air. Operate at normal current and duty cycle.
	g. 8 amp fuse in 115 volt AC blown	g. Replace (Look for reason)
	h. NVR coil open	h. Replace
	i. Switch across 4 and 2 not closing	i. Repair
Machine will not weld (Starter operating)	a. Electrode or ground lead broken	a. Tighten and repair connections
	b. Open transformer circuit	b. Have coils replaced
	c. Switches not centered on arrows	c. Center switch
	d. Voltage selector triangle not on	d. Install triangle
Welder welds but soon stops welding (Thermostat tripped)	a. Proper ventilation hindered	a. Make sure all case openings are free for proper circulation of air
	b. Unit loaded beyond rating	b. Operate at normal current and duty cycle
	c. Fan in-operative	c. Check leads and motor bearings. Fan can be tested on 115V line; with welder on, voltage across fan should be 115 volts
	d. Shorted rectifier	d. Check rectifier for shorted diode
Variable or sluggish welding arc	a. Poor ground or electrode connection	a. Check and clean all connections
	b. Current too low	b. Check recommended currents for wire type and size
	c. Open rectifier	c. Check each diode
	d. Low line voltage	d. Check with Power Company
	e. Welding cables too small or too long	e. Use at least 2/0 with R3S-300, 3/0 cables with R3S-600 and 4/0 cables with R3S-800.
	f. Nuts not tight on triangle connection plate	f. Tighten with wrench
Welder won't shut off	a. Starter contacts frozen	a. Check for approximately 1/8" over travel of contacts. Disconnect from line, etc.
	b. Pilot relay (2CR) contacts stuck closed	b. Replace Relay
R3S-300 shuts off immediately upon striking arc. This circuit also in R3S-600 and R3S-800 built to Code 6820 and below plus codes 6840 and 6845).	a. Loose reed switch (4CR) on steel diverter plate	a. Check reed switch (4CR) mounting. Must be centered and square on steel diverter plate.
	b. Too high starting current causing operation of overload protection (3CR & 4CR).	b. Reduce starting current, by reducing wire feed speed at start.

CASE FRONT & CONTROLS



Parts List P-84-C		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Case Front Panel	1
2	Output Stud Assembly, Includes:	2
	Stud	1
	Stud Insulation	1
	Insulating Tube	1
	Insulating Washer	1
	Self-Tapping Screw	1
	Lockwasher	1
	Hex Jam Nut	2
	Connection Strap (Positive Stud)	1
	Connection Strap Assembly, Includes:	
	(Negative Stud)	1
	Reed Switch (4CR)	1
	Diverter Plate	1
	Diverter Plate	1
	Flanged Nut	1
	Flatwasher	2
	Decal (Positive)	1
	Decal (Negative)	1
3	Selector Panel Door Number Plate	1
	Selector Panel Door Retaining Spring	1
	Selector Stud Panel Assembly See P-84-F	
4	Nameplate (Without Meters)	1
4	Nameplate (With Meters)	1
5	Ammeter (Optional)	1
	Ammeter Shunt	1
6	Voltmeter (Optional)	1
7	Control Circuit Switch	1
8	Pilot Light	1
9	Power 'On-Off' Switch	1
9	Power 'On-Off' Switch	1
10	Fuse Holder (4 Amp)	1
	Fuse (4 Amp)	1
11	Fuse Holder (8 Amp)	1
	Fuse (8 Amp)	1
12	Selector Switch (Fine Voltage Adjustment)	1
	Selector Switch Parts See P-84-E	
	Resistance Strip (Mounts on Switch Terminals)	5
	Selector Switch Handle	1
13	Rheostat (Arc Control)	1
	Rheostat Handle	1

PANELS, COILS & BAFFLES

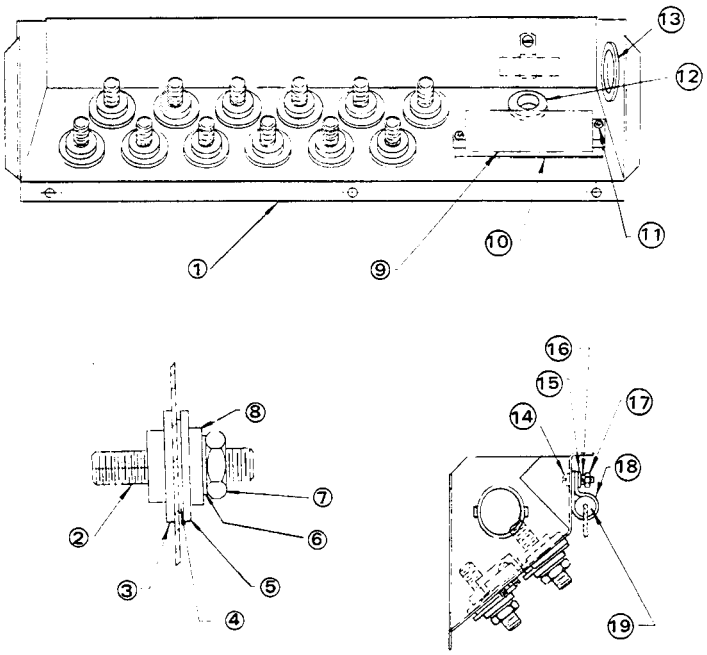
Parts List P-84-D		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Case, Left Side Panel	1
	Case, Right Side Panel	1
	Case, Rear Panel	1
	Case Top	1
	Case Top Cover Seal	1
	Fan Blades and Hub	1
	Fan Motor	1
	Fan Bracket Support	1
	Fan Bracket Stiffener	1
	Fan Baffle Assembly	1
	Fan Baffle Assembly Parts See P-84-G	
	Horizontal Baffle	1
	Grommet Strip (Mounts in Lead Hole on Horizontal Baffle)	1
	Right Side Baffle	1
	Left Side Baffle	1
	Base	1
	Left Base Baffle	1
	Right Base Baffle	1
	Center Base Baffle	1
	Rear Base Baffle	1
	Bottom Rear Baffle	1
	Stud (Used to Clamp Transformer Halves Together)	6
	Primary Coil	5
	Primary Coil with Thermostat Assembly	1
	Secondary Coil	3
	Fan Coil	1
	Starter Mounting Panel	1
	Starter	1
	S-67 Starter (R3S-300 and 600)	1
	S-67 Starter Parts See P-28-F	
	Reconnect Panel	1
	Auxiliary Transformer	1

DC UNIT

Parts List P-84-H		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Choke Assembly, Includes:	1
	Choke Coil	1
	Rectifier Assembly	1
	Rectifier Bracket, Right	1
	Rectifier Bracket Assembly, Left, Includes:	1
	Rectifier Bracket, Left	1
	Suppressor Condenser (C4)	1
	Resistor (R5)	1
	Round Head Screw (Resistor Mounting)	1
	Insulating Washer	2
	Thread Cutting Screw (Brackets to Horizontal Baffle)	6
	Resistor (R3) (Mounts to Horizontal Baffle)	1
	Reed Switch (4CR)	1
	Diverter Plate	1
	Secondary Thermostat	1
	Resistor (R7) (R3S-300 & 600)	1
	Diode Assembly (R3S-300 & 600)	1

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

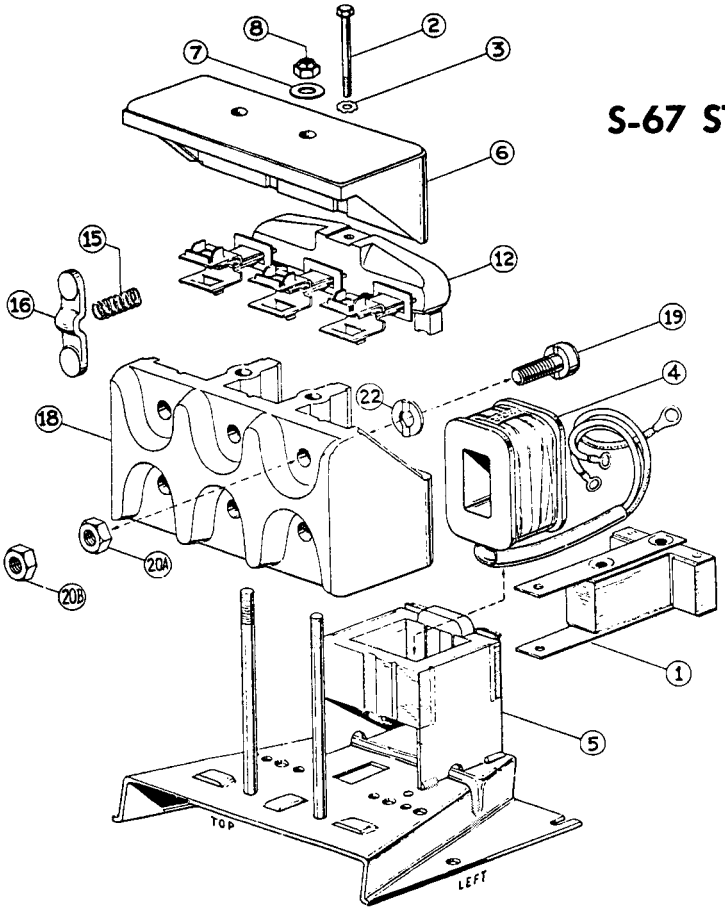
SELECTOR STUD PANEL ASSEMBLY



Parts List P-84-F		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Selector Panel Assembly, Includes:	1
1	Selector Panel	1
2	Selector Stud	12
3	Insulator	12
4	Flatwasher	12
5	Insulating Washer	12
6	Lockwasher	12
7	Brass Nut	12
8	Flatwasher	12
9	Terminal Strip	1
10	Number Plate	1
11	Self-Tapping Screw	2
12	Grommet	1
13	Bushing	1
14	Round Head Screw	1
15	Flatwasher	1
16	Lockwasher	1
17	Hex Nut	1
18	Lead Clamp	1
19	Capacitor (C3)	1
	Voltage Number Plate	1
	Triangular Copper, Connection Plate	1
	Flange Nut (Secures Connection Plate)	3

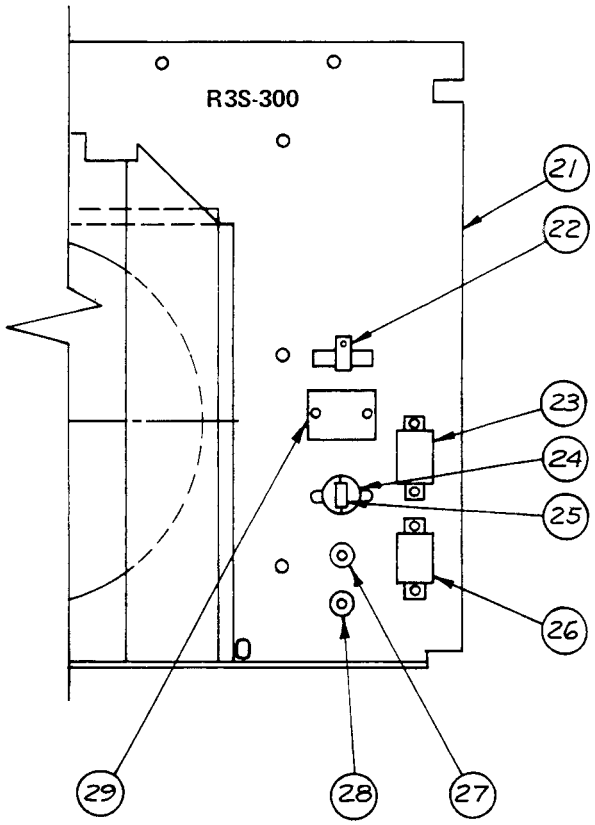
WHEN ORDERING GIVE:
Item No., Part Name,
Parts List No., and Welder Code Number.

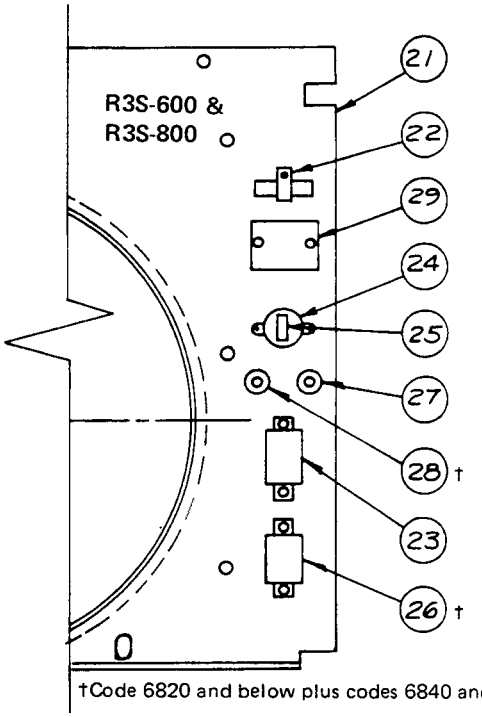
S-67 STARTER (R3S-300 & R3S-600)



Parts List P-28-H		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	S-67 Starter Assembly Includes: (Less NVR Coil)	1
1	Moving Lamination Assembly	1
2	Screw - Lamination Mounting	1
3	Lockwasher	1
4	*	1
5	Lamination and Panel Assembly (Specify Input Cycles)	1
	Plastic Insert	1
6	Contact Block Cover	1
7	Plain Washer	2
8	Hugnut	2
11	Screw - Interlock Block Mounting	2
	Contactor Assembly	1
12	Moving Contactor	1
15	Spring - Main Contact	3
16	Moving Contact	3
	Main Contact Block Assembly	1
18	Main Contact Block	1
19	Main Stationary Contact	6
20	Hex Jam Nut - Brass	As Needed
21	Terminals	3
22	Spacer Washer	4
*	NVR Coil (Specify Input Voltage)	1

FAN BAFFLE ASSEMBLY

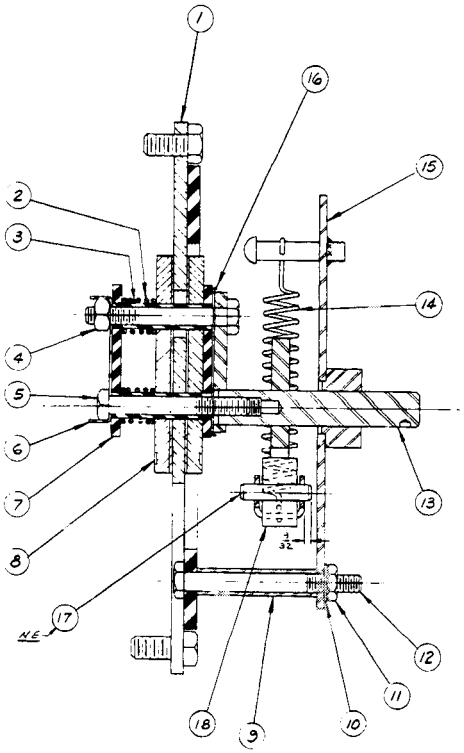




†Code 6820 and below plus codes 6840 and 6845.

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

Parts List P-84-G		
ITEM	**PART NAME AND DESCRIPTION**	**NO. REQ'D.**
	Fan Baffle Assembly, Includes	1
21	Vertical Baffle	1
22	Capacitor (C_2)	1
	Clamp	1
23	Pilot Relay (2CR)	1
	Identification Sticker (2CR)	1
24	Capacitor (C_1)	1
25	Resistor (R4)	1
26	Overload Relay (3CR)	1
	Identification Sticker (3CR)	1
27	Resistor (R1)	1
	Round Head Screw	1
	Insulating Washer	2
28	Resistor (R2)	1
	Round Head Screw	1
	Insulating Washer	2
29	Rectifier (Rect.1)	1



SELECTOR SWITCH ASSEMBLY

Parts List P-84-E		
ITEM	**PART NAME AND DESCRIPTION**	**NO. REQ'D.**
1	Switch Plate Assembly	1
2	Spring	2
3	Insulating Tube	2
4	Hex Nut	1
5	Hex Head Bolt	1
6	Locking Plate	1
7	Rotor Insulation	2
8	Moving Contact	2
9	Spacer	4
10	Lockwasher	4
11	Hex Nut	4
12	Hex Head Bolt	4
13	Rotor Arm Assembly	1
14	Tension Spring	1
15	Mounting Bracket Assembly	1
16	Spring	1
17	Roll Pin	1
18	Roller	1

HOW TO ORDER REPLACEMENT PARTS

All parts should be ordered from Authorized Field Service Shops or branch offices. The "Field Service Directory" listing all Authorized Field Service Shops geographically is supplied with each machine or is available upon request. These shops stock GENUINE replacement parts and have factory trained men to service your machine.

In ordering replacement parts give the following information:

(a) From the machine nameplate - Machine model, code number and serial number.

(b) From the Instruction Manual - Part name, item number, quantity required, and the number of the parts list used to get this information. To obtain this information refer to the pictures of the machine shown in this manual and find the required part and its item number. Get the part name and quantity required from the accompanying parts list.

All items in the parts lists which are indented in the parts name column are integral parts of the assembly which they are listed immediately under. If the entire assembly is required, do not order the indented items. The indented parts may be ordered separately if only parts of the assembly are required.

SAFETY PRECAUTIONS

When using a welder, as with all machinery, the following safety precautions, among others which may be required in special circumstances, should be observed:

1. Use extreme caution when doing maintenance work in the vicinity of rotating parts. If possible shut the unit off.
2. Protect the arms and hands from rayburns and hot slag by wearing good leather gloves whenever welding.
3. Use a good shield fitted with the proper safety lenses to protect your eyes from sparks and arc flash.
4. Use extreme care whenever chipping slag that chips do not fly and hit your eyes or those of your helper. Wear safety glasses.
5. Although with rated electrical input or engine speed, this welder will have a maximum output voltage within the prescribed safety limits, carelessness can result in a serious accident. Be Careful.
   (a) Ground the frame of the welder. Any unpainted screw or bolt used to hold the welder case or enclosure in place is generally acceptable for attaching a ground wire. When required, a longer screw or bolt may be substituted to accommodate the ground wire lug.
   (b) Use a well constructed electrode holder connected to the welder by insulated welding cable.
   (c) Make certain the work is well connected to the ground cable as close to the point of welding as possible. This is particularly important when standing on wet ground or a metal frame work. Under such conditions be sure you are well insulated from the ground by dry gloves and rubber soled shoes.
   (d) Electrode holders must not be cooled by immersion in water.
   (e) The electrode should be used for welding and not for lighting cigarettes.
6. Provide adequate ventilation for weldor.

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, electrode of 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 its use by the Buyer, whether on warranties or otherwise, shall not 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 or electrodes, 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 is replaced, the original diode must be returned to Cleveland for examination and credit if judged defective. If a replacement diode is installed by an authorized Field Service Shop within twelve months of the date of shipment of the original diode, the labor expense will be paid by The Lincoln Electric Company. After 12 months, any labor expense will be the owner's responsibility.

LINCOLN ELECTRIC

THE LINCOLN ELECTRIC COMPANY

World's Largest Manufacturer of Arc Welding Equipment and Electrodes · Manufacturer of Motors Since 1895

Cleveland, Ohio 44117 U.S.A.

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