

# OPERATING MANUAL

Lincolnweld®

**AC-1000**

**Automatic Welding Power Source**

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.



## SAFETY DEPENDS UPON 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. Read and observe all instructions and specific safety precautions included in this manual as well as the common machine operating and welding safety precautions outlined on the back of this manual. And, most importantly, think before you act and be careful.

## GENERAL DESCRIPTION

The AC-1000 is a single phase transformer type welder designed as a power source for AC submerged arc welding. It contains a source of 115 volt AC power and the controls necessary for operation with the LAF-4, LT-4 or AC head of the LT-34.

## DAMAGE CLAIMS

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

## INPUT CONNECTIONS

Place the welder so the air intake areas are free from obstructions. Remove the crate base so the feet set on the floor.

Have a qualified electrician connect the machine to AC power of the voltage and frequency specified on the nameplate. Use a single phase line or one phase of a two or three phase line. Unbalanced line conditions are easily avoided by proper installation of the AC-1000 and other single phase machinery.

Connect the input lines to terminals #1 and #4 of the input panel. This panel and the output control cable terminal strip are accessible by removing the right side panel of the AC-1000. The AC-1000 does not include a line contactor. Therefore, include a starter in the input circuit. Fuse the input circuit with the recommended super lag fuses. Choose an input wire size according to local requirements or use the table below.

The frame of the welder must be grounded. A stud marked with the symbol  $\equiv$  located inside the machine is provided for this purpose. See the National Electrical Code for details on proper grounding methods. Choose the wire size according to local requirements or use the size recommended in the table below.

### RECOMMENDED INPUT WIRE SIZE

60 Hertz — Single Phase  
Based on the National Electrical Code

Welder	Volts Input	Input Amps*	Copper Wire Size Type 75°C In Conduit		Fuse Size Super Lag
			2 Input Wires	1 Ground Wire	
AC-1000	230	312	300 MCM	1	450
	460	156	0	3	225
AC-1000 Scott Conn.	230	312	300 MCM	1	450
	460	156	0	3	225

\* At 1000 ampere output.

Dual input voltage models are shipped connected for the higher input voltage. For the lower input voltage, reconnect the input panel as shown on the wiring diagram.

For connecting machines with the optional Scott connection feature, see page 3.

## DUTY CYCLE

60 hertz machines:

1000 amps, 44 volts, 70% duty cycle

1100 amps, 44 volts, 60% duty cycle

50 hertz machines:

900 amps, 44 volts, 70% duty cycle

1000 amps, 44 volts, 60% duty cycle

## OUTPUT CONNECTIONS

With the input power off, connect the control cable and welding cables between the AC-1000, 35 volt control exciter, automatic welder, and work as specified in the automatic welder instruction manual.

The control cable is connected to the terminal strips located inside the AC-1000 case just above the output studs. The control cable should be brought into the AC-1000 from underneath at the case front panel right offset next to the output studs. Use a cable clamp to secure the control cable to the inside of the AC-1000 case. A screw hole near the bottom on the right side of the case front panel is provided for this purpose.

## PARALLEL CONNECTIONS

Two AC-1000's can be connected in parallel to provide up to 2000 amperes welding current to one automatic welding machine. (Note: The standard automatic welders have meters of 1500 amps capacity.) To connect the two machines in parallel, follow the instructions on the diagram in the automatic welder instruction manual.

Make input connections as specified in the wiring diagram. Be certain the input lines are large enough to carry the load of both machines. Also, additional cable is required for both the electrode cable and the work cable to carry the higher welding currents.

### Setting the Dial Pointers

After the connections are completed, the pointer on the current scale of each machine *must* be set so both pointers are in the *same position* on both machines. To do this, turn the machines on. Operate the current control switch in the automatic welder control box until both pointers are at the end of the dial. Limit switches automatically stop each pointer at the end of the dial. After both pointers stop at the end of the dial, operate the current control switch in the opposite direction to set the pointers for the desired current.

Check the dial pointers periodically. They may not stay identical when a considerable number of current changes are made over a period of time.

**CAUTION:** Improper connection or operation of paralleled power sources can cause serious damage to the machines. Therefore, follow the instructions carefully.

## SCOTT CONNECTIONS (Optional)

The AC-1000 can also be ordered with the taps needed to make Scott connections required for AC-AC tandem welding.

A source of three phase input power is needed to make this connection. The output rating of Scott connected machines is reduced to 86.6% of the single phase AC-1000 rating to prevent overheating the transformers.

For AC-AC tandem arc welding use two or four machines as required. Make the connections at the input panel according to the wiring diagram. This input panel is accessible by removing the right side panel of the AC-1000. The terminals needed for connections which require a phase shift less than or greater than the usual 90° phase shift are included on the input panel. Set the pointers on the paralleled machines to the same position as described under "Parallel Operation."

AC-1000 machines with the optional Scott connection feature can be used with a single submerged arc welding head. A single machine must be connected with a standard connection as shown in the wiring diagram.

## AUXILIARY POWER

2 KVA of 115 volt AC power is available from #31 and #32 of the terminal strip.

## HAND WELDING AND OTHER APPLICATIONS

This machine can be used for hand welding or other applications with the installation of the following switches. Minimum welding current is 125 amps.

- A. *Current Control Switch* — Use a single pole, double throw, center-off, momentary contact toggle switch, rated 10 amps, 125 volts, or higher.
- B. *Output Switch (Optional)* — Use a single pole, single throw switch rated 10 amps, 125 volts AC (or higher).

Mount both switches in a location convenient to the operator. Connect the center terminal of switch A to #32, one end of switch A to #5 and the other end to terminal #29 of the AC-1000 terminal strip. With this connection, throwing switch A in one direction raises the output current and throwing it in the other direction lowers the output.

Connect one terminal of switch B to #B and the other terminal to #32 of the AC-1000 terminal strip. Then with the welder on and this output switch B on, the output studs will be hot. With output switch off, the output studs will be cold. Instead of using an output switch, a lead can be connected between #B and #32. Then the output studs are always hot when the machine is on.

## CAPACITORS

Power factor correction capacitors are included as standard equipment in the AC-1000. When a capacitor fails, it is not always apparent from the appearance of the capacitors. To check, operate the welder at rated input voltage drawing rated output current. The input current should correspond to the nameplate amperes. If the current is 10% or 20% higher, at least one capacitor has failed.

## OVERLOAD PROTECTION

The AC-1000 has a built-in protective thermostat operated by both temperature and current. This device opens the output circuit if the reactor reaches the maximum safe operating temperature because of frequent overload or high room temperature plus overload. The thermostat automatically resets when the temperature reaches a safe operating level.

The 115 volt AC power source is protected by a 20 amp fuse. This fuse is located on the case front above the output studs. If the welder contactors fail to close and the current control fails to operate, check this fuse.

## OPERATION

The current control mechanism is operated from the current control switch in the LAF-4 or LT-4 automatic welding machine control box. For all other operating instructions refer to the appropriate automatic submerged arc welding machine instruction manual.

## WIRING DIAGRAMS

The proper wiring diagram is pasted to the inside of the right side panel when the welder is shipped. The diagrams in this manual are for reference only. If the diagram is illegible, write to the Service Department, Lincoln Electric Co., Cleveland, Ohio for replacement. Give the diagram number or the welder code number.

## MAINTENANCE

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

1. Every three months, blow out the machine with compressed air. In extremely dusty locations, more frequent cleaning may be necessary.
2. Periodically check the current control gear teeth. Lubricate with a good grade of heavy graphited grease when necessary.
3. The fan motor has sealed bearings which require no service.

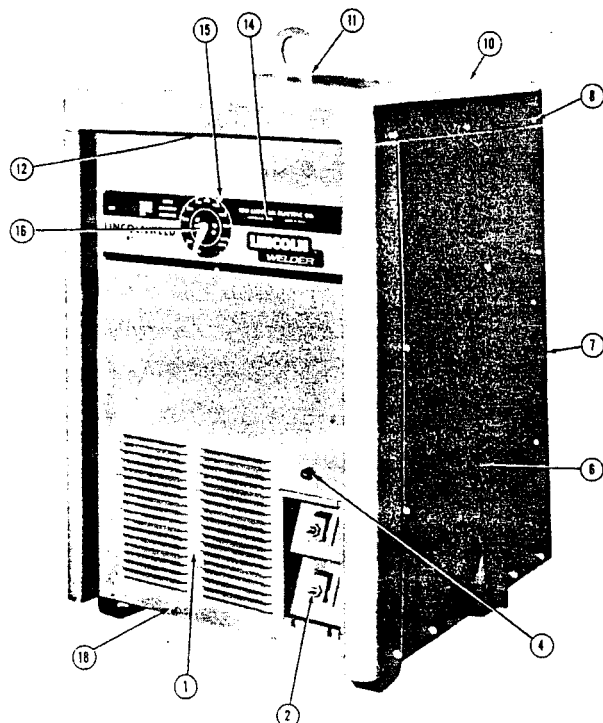
## TROUBLESHOOTING

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

TROUBLE	CAUSE	WHAT TO DO
Welder will not start.	Supply line fuse blown.	Replace (look for cause).
	Power circuit dead.	Check circuit voltages.
	Broken power lead.	Repair.
Machine will not weld.	Electrode or ground lead loose or broken.	Tighten or repair connections.
Control circuit dead.	Control circuit dead.	Check 20 ampere fuse.
	Wrong voltage.	Check connections.
	Thermostat tripped (welder overheated).	Allow machine to cool. Check fan operation and check for ventilation obstructions.
Welder welds, but soon stops welding (thermostat tripped).	Proper ventilation hindered.	Check for obstructions at air intake area.
	Unit loaded beyond current capacity.	Operate at normal current.
	Fan inoperative.	Check leads and motor bearings. Fan can be tested on 115V line.
Variable or sluggish welding arc.	Poor ground or electrode connection.	Clean and check all connections.
	Current too low.	Check recommended currents for electrode size.
	Low line voltage.	Check with power company.

## CASE AND EXTERIOR

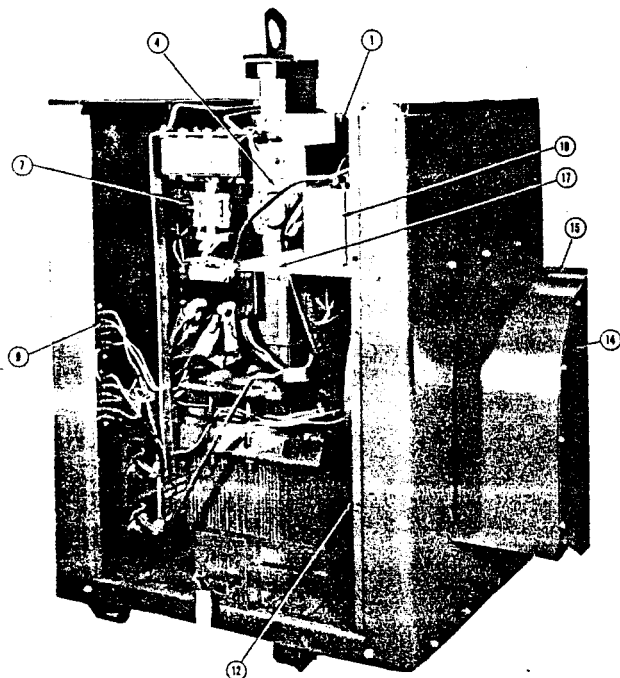
WHEN ORDERING GIVE: Item No., Part Name, Parts List No., and Welder Code.



PARTS LIST P-73-C		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Front Panel	1
2	Stud	2
	Stud Insulation	2
	Insulating Tube	2
	Insulating Washer	2
	Self Tapping Screw	2
	Lockwasher	2
	Hex Jam Nut	4
	Connection Strap	2
	Flanged Brass Nut	2
	Washer	4
	"To Work" Marker	1
	"Electrode" Marker	1
4	Fuse Holder	1
	Fuse	1
6	Right Side Panel, Includes	1
	Speed Nut	1
	Left Side Panel, Includes	1
	Speed Nut	1
7	Rear Panel, Includes	1
	Speed Nut	1
8	Self Tapping Screw	9
10	Top	19
11	Cover Seal	1
12	Spacer, Mount Top to Front Panel	1
14	Nameplate	1
	Self Tapping Screw, Nameplate Mounting	5
15	Thread Cutting Screw	1
16	Dial Pointer	1
18	Thread Cutting Screw	19

## MISC. INTERNAL PARTS

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



PARTS LIST P-73-D		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Pilot Relay	1
	Insulating Bushing, Mount Relay	2
	Insulating Spacer, Mount Relay	2
	Insulating Washer, Mount Relay	2
	Pilot Relay Gasket	1
4	Pilot Relay Cover	1
	Drive Motor	1
	Drive Motor Pinion	1
7	Motor Mounting Bracket	1
	Micro Switch	2
	Switch Actuator	2
	Spacer Tube, Between Switch and Control Shaft	4
9	Support	2
	Terminal Strip	1
	Number Plate (Upper)	1
	Number Plate (Lower)	1
12	Fan Baffle	1
	Self Tapping Screw, Baffle to Case	18
	Fan Motor	1
	Fan Blade	1
14	Fan Bracket	1
	Rain Shield Cover	1
15	Rain Shield Case	1
	Self Tapping Screw, Mount Items 12, 14 and 15	18
17	Condenser Panel and Support	1
18	Condensers	6

## )

3

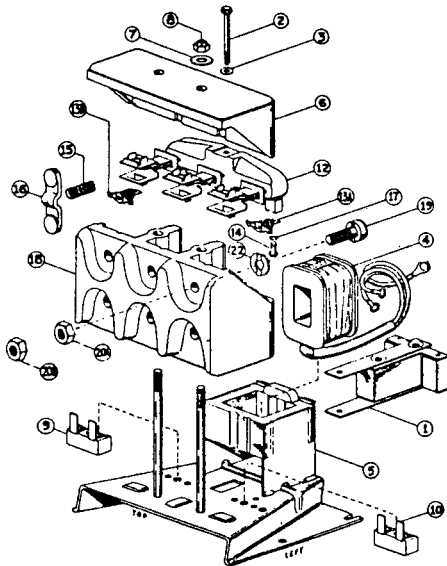


### PARTS LIST P-73-E

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.	ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Base	1	26	Lift Bail Assembly	1
2	Outer Transformer Lamination	1	27	Large Gear	1
3	Square Nut	4	28	Small Washer	1
4	Lockwasher	4	29	Large Washer	1
5	Hex Head Bolt	4	30	Rotor Washer	2
6	Thread Cutting Screw	2	31	Rear Shaft Support Bracket, Includes	1
7	Pointer Drive Gear Bracket	1		Spring	2
8	Right Reactor Coil	1		Hex Head Screw	2
9	Reactor Lamination	1		Huglock Nut	2
10	Input Panel Assembly	1		Brake Lining	2
11	Thread Cutting Screw	8	32	Sems Screw, Front and Rear	8
12	Contactor Mounting Plate	2	33	Transformer and Thermostat Assembly	1
13	Contactor	2	40	Input Panel Support	2
	Contactor Parts	See Below	42	Thermostat Clamp	1
15	Left Reactor Coil	1	43	Clamp Insulation	1
16	Transformer Coil	1	44	Pointer Drive Gear	1
17	Case Front Support	1	45	Inner Transformer Lamination	1
18	Snap Ring	3	46	Pointer Rack	2
19	Counter Shaft	1		Rack Spring	2
20	Small Gear	1	47	Thread Cutting Screw	4
21	Bearing	1		Pointer Mounting Bracket	1
22	Shaft Support	1		Pointer Driven Gear	1
23	Quadrant	1		Self Tapping Screw, Mount Pointer Bracket	4
24	Front Shaft Support Bracket, Includes	1		Rack Extension Arm	1
	Spring	2		Sems Screw, Extension Arm to Racks	2
	Hex Head Screw	2		Square Nut, Extension Arm to Racks	2
	Huglock Nut	2		Thread Cutting Screw, Extension Arm to Racks	2
25	Shaft	1			

## CONTACTOR

Below Code 6740: Used S-45 Type — Parts List P-28-E  
Above Code 6740: Used S-67 Type — Parts List P-28-H



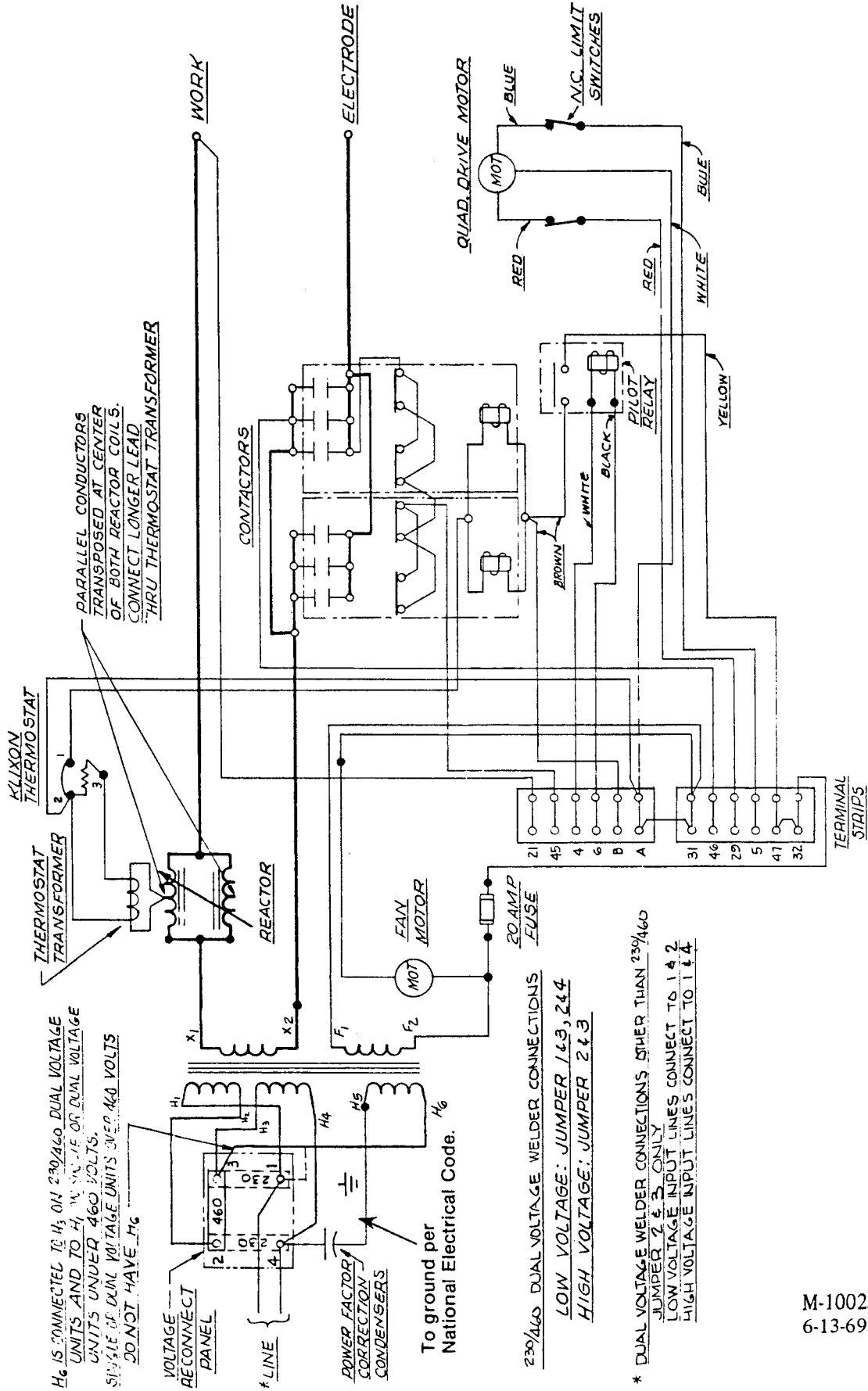
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Complete Assembly Includes: (Less NVR Coil)	1
1	Moving Lamination Assembly	1
2	Screw - Lamination Mounting	1
3	Lockwasher	1
4	*	1
5	Lamination and Panel Assembly (Specify	
	Input Hertz)	1
6	Contact Block Cover	1
7	Plain Washer	2
8	Hugnut	2
9	Stationary Interlock Contact Assembly	1
10	Stationary Interlock Contact Assembly	1
	Screw-Lead Connections	4
11	Screw-Interlock Block Mounting	2
	Contactor Assembly	1
12	Moving Contactor	1
13A	Moving Interlock Contact Assembly	1
13B	Moving Interlock Contact Assembly	1
14	Round Head Screw	1
15	Spring - Main Contact	3
16	Moving Contact	3
17	Lockwasher	1
	Main Contact Block Assembly	1
18	Main Contact Block	1
19	Main Stationary Contact	6
20A	Hex Jam Nut - Brass	As Needed
20B	Hex Jam Nut - Brass	As Needed
22	Spacer Washer	4
	* NVR Coil	

### CONTACTOR MAINTENANCE

Where the S-45 or S-67 output contactor is operated frequently when tacking or making short welds, inspect it every three months:

1. Be sure the mating surfaces of silver contacts are not worn and all make contact at approximately the same time.
2. Make sure the springs and holders are not broken or out of adjustment. Approximate spring compression after making contact as 1/8". Less than 1/16" compression indicates worn contacts that should be replaced.
3. Make sure the moving contact or other moving parts are not binding.
4. Check interlock contacts and springs. Be sure mounting screws are tight.

**AC-1000 (60 Hertz)**



\* DUAL VOLTAGE WELDER CONNECTIONS OTHER THAN 230/460  
JUMPER 2 & 3 ONLY  
LOW VOLTAGE INPUT LINES CONNECT TO 1 & 2  
HIGH VOLTAGE INPUT LINES CONNECT TO 1 & 4

M-10023  
6-13-69B

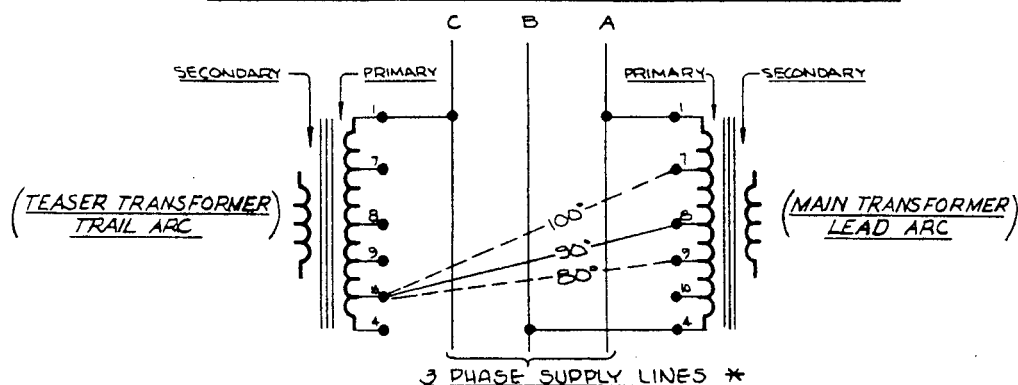


# TANDEM ARC (Scott) CONNECTION

Machines must be ordered with special Scott connection taps.

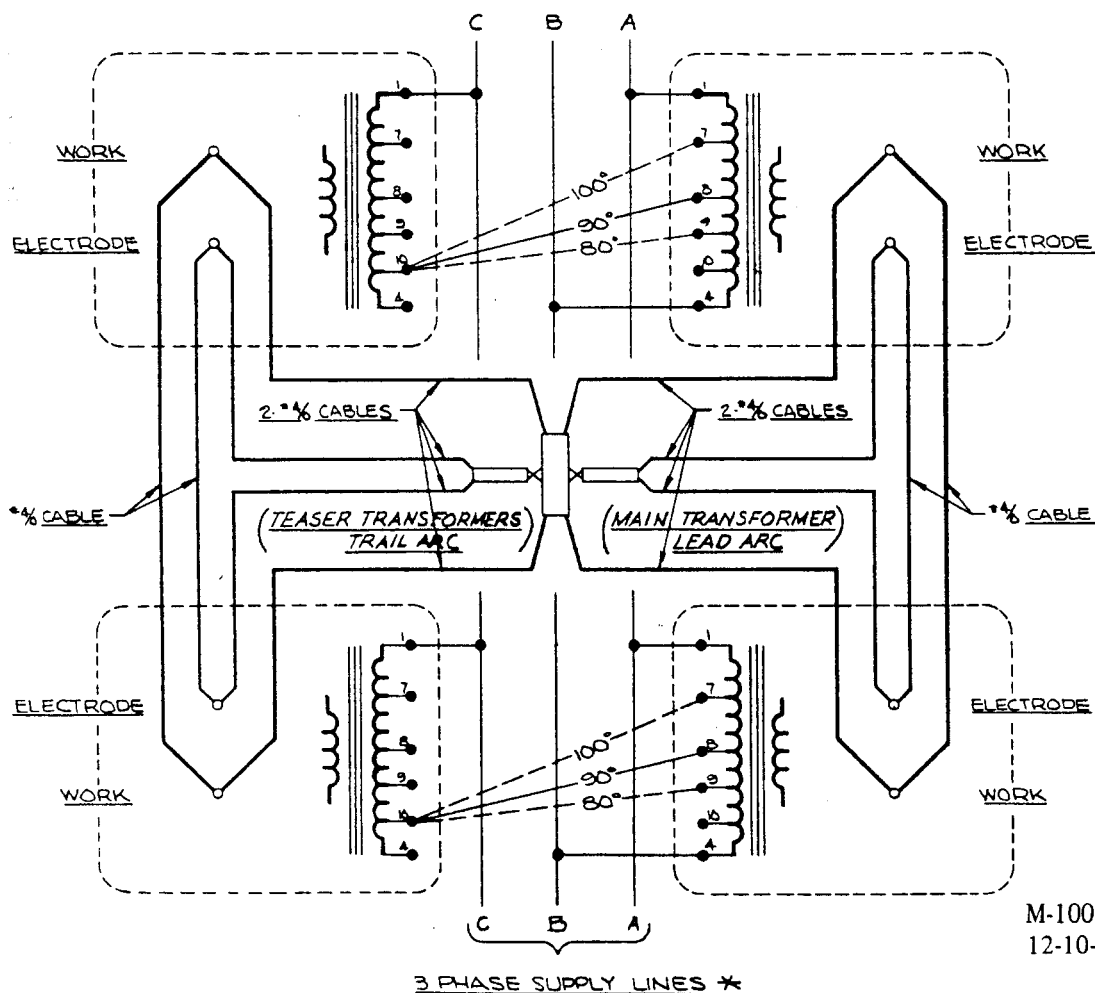
TWO SINGLE MACHINES SCOTT CONNECTED  
MAX. CURRENT EACH ELECTRODE 866 AMPS. (60 hertz machines)

INTERCONNECT MACHINES AS SHOWN FOR DESIRED PHASE ANGLE.



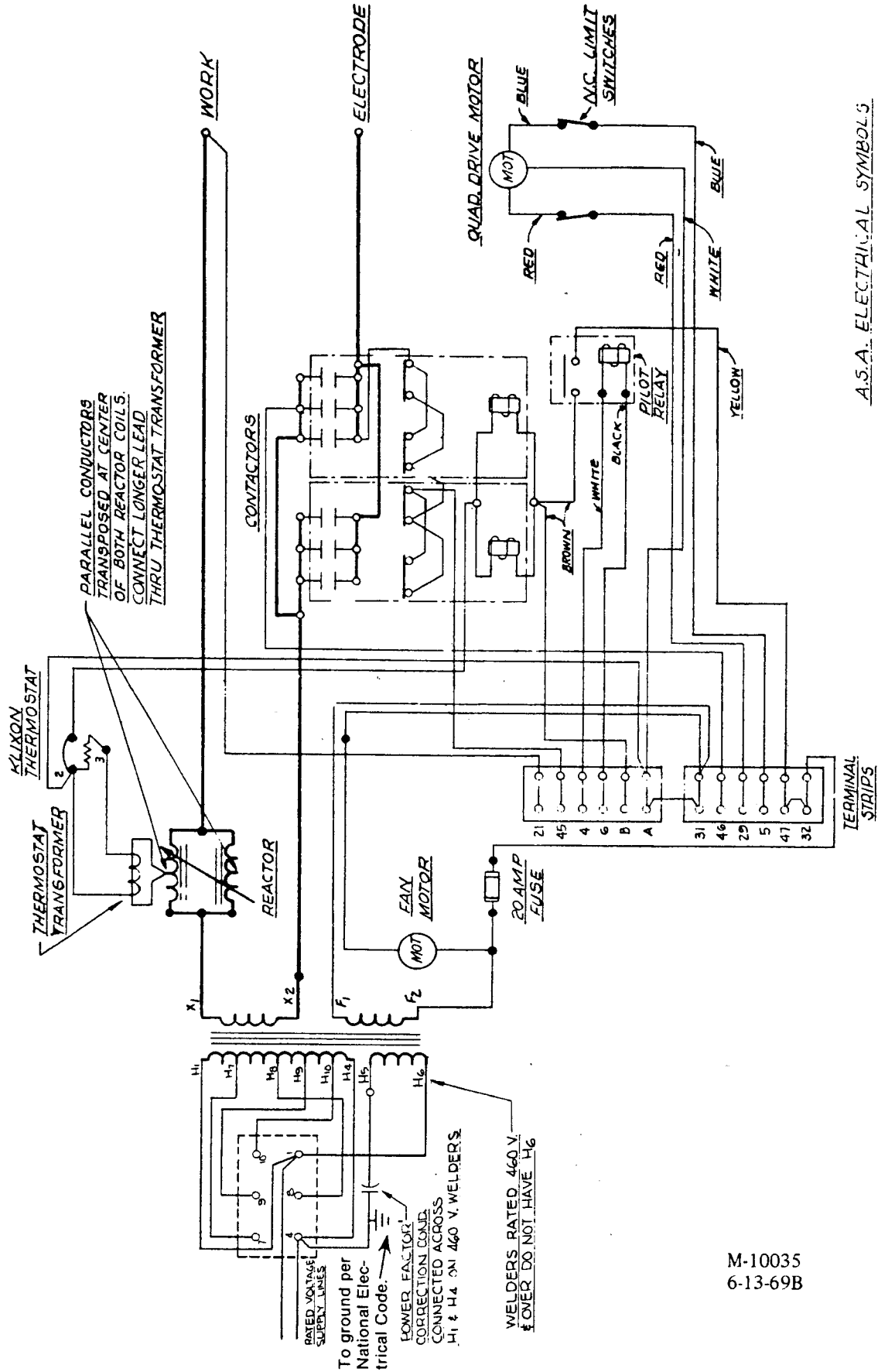
TWO PARALLEL MACHINES SCOTT CONNECTED TO TWO OTHER PARALLEL MACHINES  
MAX. CURRENT EACH ELECTRODE 1732 AMPS. (60 hertz machines)

FOR DESIRED PHASE ANGLE, INTERCONNECT MACHINES (AS SHOWN BELOW). BOTH PHASE ANGLES MUST BE THE SAME.



M-10033  
12-10-71

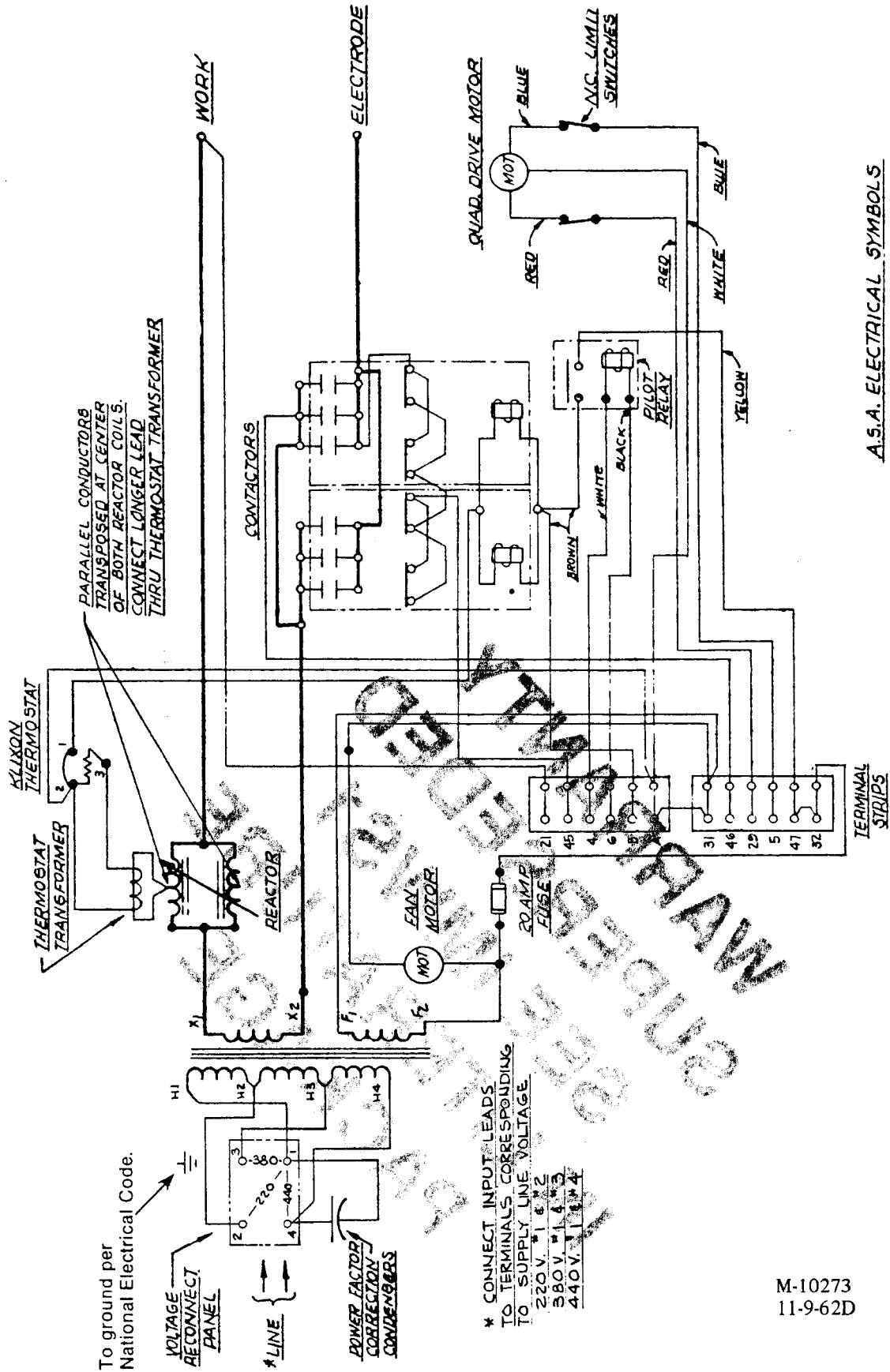
# AC-1000 (with provisions for Scott connection)



A.S.A. ELECTRICAL SYMBOLS

M-10035  
6-13-69B

# AC-1000 (50 Hertz 220/380/440)



A.S.A. ELECTRICAL SYMBOLS

M-10273  
11-9-62D

## SAFETY PRECAUTIONS

In order to protect yourself and others from possible serious injury read and observe all instructions and specific safety precautions included in this manual as well as the following general safety precautions.

1. Protect yourself from possible dangerous electrical shock:
  - a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Never permit contact between "hot" parts of the circuits and bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
  - b. Always insulate yourself from ground using dry insulation when welding in damp locations, on metal floors, gratings or scaffolds, and particularly when in positions (such as sitting or lying) where large areas of your body can be in contact with possible grounds.
  - c. Maintain the electrode holder, ground clamp, welding cable and welding machine in good, safe operating condition.
  - d. Never dip the electrode holder in water for cooling.
  - e. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.
  - f. If using the welder as a power source for mechanized welding, these precautions for the electrode holder also apply for the automatic electrode, electrode reel, welding head, nozzle or semiautomatic welding gun.
2. When working above floor level, protect yourself from a fall should you get a shock. Never wrap the electrode cable around any part of your body.
3. Arcburn may be more severe than sunburn. Therefore:
  - a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Filter lens should conform to ANSI Z87.1 standards.
  - b. Use suitable clothing to protect your skin and that of your helpers from the arc rays.
  - c. Protect other nearby personnel with suitable non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.
4. Droplets of molten slag and metal are thrown or fall from the welding arc. Protect yourself with oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and caps over your hair. Wear ear plugs when welding out of position or in confined places.
5. Always wear safety glasses when in a welding area. Use glasses with side shields when near slag chipping operations.
6. Remove fire hazards well away from the area. If this is not possible cover them to prevent the welding sparks from starting a fire. Remember

- welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
7. When not welding, place the holder where it is insulated from the ground system. Accidental grounding can cause overheating and create a fire hazard.
  8. Be sure the work cable is connected to the work as close to the welding area as practical. Work cables connected to the building framework or other locations some distance from the welding area increase the possibility of the welding current passing through lifting chains, crane cables, or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
  9. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. This is particularly important when welding on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes.
  10. 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.
  11. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedure will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase "Safe Practices for Welding and Cutting containers That Have Held Combustibles," A6.0-65, from the American Welding Society.
  12. Vent hollow castings or containers before heating, cutting or welding. They may explode.
  13. For more detailed safety information it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting — ANSI Standard Z49.1" for \$5.00 from the American Welding Society, Miami, Florida 33125.

### Transformer and Rectifier Welder Safety Precautions

1. Ground the frame of the welder in accordance with the National Electrical Code and the manufacturer's recommendations. The fixture or metal being welded must also be connected to a good electrical ground.
2. Have a qualified electrician do the needed installation, trouble shooting and maintenance work.
3. Turn the welder off using the disconnect switch at the fuse box before doing maintenance work inside the machine.
4. Keep all covers and safety devices in position.

## HOW TO ORDER REPLACEMENT PARTS

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

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

number of the list used to get this information.

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

## WARRANTY

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

If the Buyer gives the Seller written notice of any defects in equipment or electrode or flux within any period of one year, 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. Freight, both ways, for return of equipment 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 will not be liable for consequential damages in case of any failure to meet the conditions of this warranty. The liability of the Seller arising out of the supplying of said equipment or electrode or its use by the Buyer, without the warranties herein provided, 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, any such liability shall terminate.

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



# THE LINCOLN ELECTRIC COMPANY

World's Largest Manufacturer of Arc Welding Products • Manufacturer of Industrial Motors

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Ram