INSTRUCTIONS for

L12-869-A
April, 1983

LINDE 225 MIGMASTER

Part No. 600507

For a list of changes to this booklet, refer to page 14.

FEATURES/BENEFITS

- A Unique Multi-Application Mig Welder . . . Capable of welding down to 30 Amps for sheet metal applications and up to 225 Amps for general fabrication, the LINDE 225 means welding flexibility.
- Operates on Single Phase Power . . . For easy set-up (200/230 volt) in most shop locations.
- Broad Wire Size Range . . . The LINDE 225, with powerful EH-8 motor, handles a wide range of wire sizes and types including .023, .030, .035 and .045 hard, .045 and .052 flux core as well as 3/64 soft wires.
- A Superior Welding Arc . . . Not only can the LINDE 225 handle a broad range of wire sizes but, its all around .023 through .045 short arc characteristics beat the competition hands down.
- Excellent Portability . . . Compact in size with built-in wire feeder and standard undercarriage and cylinder rack, the LINDE 225 is easily moved between job locations.
- W-I-D-E Range Heat Control . . . The LINDE 225 incorporates 32 overlapping heat (voltage) steps to match any job. Because the LINDE 225 has no awkward heat jack-plug to reposition, set-up is quick and easy.
- Fine Adjustment Capability . . . Once the appropriate heat (voltage) range has been selected for a particular application, the precise welding amperage and arc characteristics can be "Tuned-in" with the wire feeder FINE ADJUSTMENT.
- Optional Spot/Stitch/Anti-Stick Module . . . Designed for easy field installation. Enables the LINDE 225 to perform critical spot welding applications as well as providing excellent control on sheet metal welding with the stitch feature.
- Optional Spool-On-Gun Package . . . Further extends flexibility of the LINDE 225 enabling the use of a spool-on-gun torch (with 30' leads) for aluminum or steel welding applications.
- New LINDE R-27-CF-580 Regulator, provides accurate control and display of cylinder pressure and delivery flow rates in C.F.H.
- MT-200 Torch . . . With "Slide On Nozzles" and light-weight composite cable design provides the performance welders demand with excellent durability.
- One Year Warranty . . . Only Linde offers you all these features and outstanding welding performance under "one easy to order" migmaster part number and a one year warranty on the LINDE 225 power supply.

I. DESCRIPTION

A. SPECIFICATIONS

Rated Output 60% Duty Cycle	225 A. @ 28 V. D.C.	
Output Range for 230 Volt Input	225 A. @ 34 V. to 30 A. @ 11 V.	
Output Range for 200 Volt Input	225 A. @ 28 V. to 30 A. @ 9.5 V.	
Input Voltage	200/230 VAC, 60 Hz., 1-Phase	
Input Current @ Rated Load	52 A. @ 200 VAC 46 A. @ 230 VAC	
Power Factor @ Rated Load	85%	
Dimensions:	Incl. Wheels & Cylinder Rack	Case Only
Width	20-in.	14-1/2-in.
Depth	37-1/2-in.	26-in.
Height	31-3/4-in.	26-in.
Net Weight	236 lbs.	
Wire Feed Speed Range	0-500 ipm	
Wire Size Range	.023 - .045-in. Hard .045 - .052-in. Cored 3/64-in. Soft	

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for electric welding equipment, we urge you to read Linde's free booklet, "Precautions and Safe Practices for Electric Welding and Cutting," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions on page 2 before installing or operating this equipment.

Be sure this information reaches the operator. You can get extra copies through your supplier.

LINDE UNION CARBIDE

L12-869-A

SAFETY PRECAUTIONS

WARNING: These Safety Precautions are for your protection. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below. Failure to observe these Safety Precautions can result in personal injury or death.

1. PERSONAL PROTECTION - - Skin and eye burns from exposure to rays from an electric-arc or hot metal can be more severe than sunburn. Therefore:
   a. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. WARN bystanders not to watch the arc and not expose themselves to the rays of the electric-arc or hot metal.
   b. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
   c. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and pockets eliminated from the front of clothing.
   d. Protect other nearby personnel from arc rays and hot sparks with a suitable non-flammable partition.
   e. Always wear safety glasses or goggles when in a work area. Use safety glasses with side shields or goggles when chipping slag or grinding. Chipped slag may be hot and can travel considerable distances. Bystanders should also wear safety glasses or goggles.
   f. Some gouging and cutting processes produce excessively high noise levels and require ear protection.
2. FIRE PREVENTION - - Hot slag or sparks can cause serious fires when in contact with combustible solids, liquids or gases. Therefore:
   a. Remove all combustible materials well away from the work area or completely cover the materials with a protective non-flammable covering. Such combustible materials include wood, clothing, sawdust, gasoline, kerosene, paints, solvents, natural gas, acetylene, propane, and similar combustible articles.
   b. Hot sparks or hot metal can fall into cracks in floors or wall openings and cause a hidden smoldering fire. Make certain that such openings are protected from hot sparks and metal.
   c. Do not weld, cut or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors.
   d. For fire protection, have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher.
   e. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire.
   f. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", which is available from the National Fire Protection Association, 470 Atlantic Ave., Boston, MA 02210.
3. ELECTRICAL SHOCK - - Contact with live electrical parts can cause severe burns to the body or fatal shock. Severity of electrical shock is determined by the path and amount of current through the body. Therefore:
   a. Never allow live metal parts to touch bare skin or any wet clothing. Be sure gloves are dry.
   b. When standing on metal or operating in a damp area, make certain that you are well insulated. Wear dry gloves and rubber-soled shoes and stand on a dry board or platform.
   c. Always ground the power supply by connecting a ground wire between the power supply and an approved electrical ground.
   d. Do not use worn or damaged cables. Do not overload the cable. Use well maintained equipment.
   e. When not operating, turn off the equipment. Accidental grounding can cause overheating and create a fire hazard. Do not coil or loop cable around parts of the body.
   f. Be sure the proper size ground cable is connected to the workpiece as close to the work area as possible. Grounds connected to building framework or other remote locations from the work area increase the possibility of output current passing through lifting chains, crane cables, or various electrical paths.
   g. Keep everything dry, including clothing, work area, cables, electrode holder, and power supply. Fix water leaks immediately.
   h. Refer to AWS Standard Z49.1 in Item 6 below for specific grounding recommendations. Do not mistake the work lead for a ground cable.
4. VENTILATION - - Fumes, particularly in confined spaces, can cause discomfort and physical harm. Do not breathe fumes. Therefore:
   a. At all times provide adequate ventilation in the work area by natural or mechanical ventilation means. Do not weld, cut, or gouge on materials such as galvanized zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
   b. Do not operate in locations close to chlorinated hydrocarbon vapors coming from degreasing or spraying operations. The heat or arc rays can react with solvent vapors to form phosgene, a highly toxic gas, and other irritant gases.
   c. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
   d. Refer to AWS Standard Z49.1 in Item 6 below for specific ventilation recommendations.
5. EQUIPMENT MAINTENANCE - - Faulty or improperly maintained equipment can result in poor work, but most importantly it can cause physical injury or death through fires or electrical shock. Therefore:
   a. Always have qualified personnel perform the installation, trouble-shooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
   b. Before performing any maintenance work inside a power supply, disconnect the power supply from the electrical power source.
   c. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
   d. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
   e. Keep all safety devices and cabinet covers in position and in good repair.
   f. Use equipment for its intended purpose. Do not modify it in any manner.
6. ADDITIONAL SAFETY INFORMATION - - For more information on safe practices for setting up and operating electric welding and cutting equipment and on good working habits, ask for a free copy of Linde's "Precautions and Safe Practices for Electric Welding and Cutting", Form 52-529. The following publications which are available from the American Welding Society, P. O. Box 351040, Miami, FL 33135, are recommended to you:
   a. "Safety in Welding and Cutting" - AWS Z49.1 (ANSI)
   b. "Recommended Safe Practices for Gas-Shielded Arc Welding" - AWS A6.1
   c. "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances" AWS F4.1
   d. "Recommended Safe Practices for Plasma Arc Cutting" - AWS A6.3
   e. "Recommended Safe Practices for Plasma Arc Welding" - AWS C5.1
   f. "Recommended Safe Practices for Air Carbon Arc Gouging and Cutting" - AWS C5.3.

B. CONTENTS

1. The MIGMASTER LINDE 225 Package P/N 600507 consists of the following:

   LINDE 225 Power Supply/Wire Feeder
   6-ft. Primary Cable with Plug
   Wall Receptacle
   10-ft. Work Cable with Clamp
   10-ft. Ready-To-Weld MT-200 Torch for .035/.045 Wire
   Outlet Guide
   .035 V-groove Feed Roll
   R-27-CF-580 Regulator
   44 lbs., .035 LINDE 82 Hi-Dep Welding Wire
   Mig Welding Handbook
   STARGON Gas Coupon

C. FRONT PANEL CONTROLS

1. **On-Off Switch**, also known as the Ready-Off Switch (ROS). A double pole, single throw switch which energizes the 115-volt control transformer and fan motor, so the unit is ready to weld.
2. **Heat Range Switch (HRS)**. A four position switch by which the operator selects the approximate amount of heat (or voltage, which actually determines the arc length) to be applied to the weld. This switch should **not** be changed under load. It is a **coarse** heat control, and is used in conjunction with the Heat Control Switch (HCS, below). The higher the number, the hotter the weld.
3. **Heat Control Switch (HCS)**. An eight position switch by which the operator selects the exact amount of heat (voltage) to be applied to the weld. This switch **may** be changed under load. It is a **fine** heat control and is used in conjunction with the Heat Range Switch (HRS, above). As with the HRS, the higher the number, the hotter the weld.
4. **Wire Feeder Fine Adjustment**, also known as the Weld Speed Pot (WSP). A potentiometer which is used to set the speed at which the welding wire is fed out from the torch and hence the welding amperage. The wire feed speed of the unit will actually range from about 5 to 500 inches per minute as the control is turned from 0 to 10. (The numbers on the control are used for reference - they do not directly indicate the wire feed speed.)

D. VOLT-AMPERE CHARACTERISTICS

The curves shown in Figures 1 and 2 represent the fixed volt-ampere static characteristics for the power supply. The slant of these curves is referred to as the 'slope' and is generally defined as the 'voltage drop per 100 amperes of current rise.' These curves show the output voltage available at any given output current for the minimum and maximum settings of the voltage control. Values for other settings will fall between the minimum and maximum curves. Because the volt-ampere slope is fixed, it is possible to select optimum welding conditions by approximating the open-circuit voltage required for a particular load current.

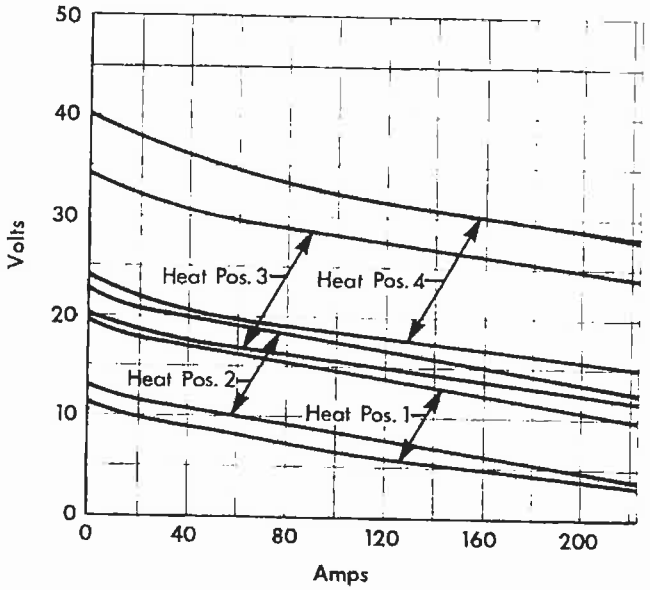


Fig. 1 - LINDE 225 Volt-Ampere Curve - 230 VAC Input

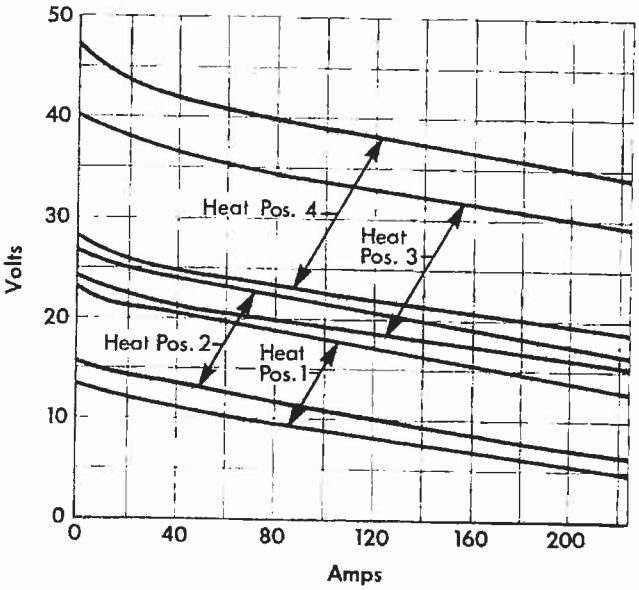


Fig. 2 - LINDE 225 Volt-Ampere Curve - 200 VAC Input

II. OPTIONAL ACCESSORIES

A. SPOT/STITCH/ANTI-STICK MODULE P/N 678424

The addition of this easy-to-install module (wires just plug in) will enable the operator to use the unit for Mig spot welding and for stitch welding. This module includes an adjustable anti-stick circuit to allow adjustment of the wire burnback time, thus preventing the wire from sticking in the weld puddle after completing a weld. For installation and operating instructions, see Sect. IV-E.

If this module is to be used for spotwelding, order the No. 12S Spotweld Nozzle P/N 999625.

B. ST-23 SPOOL-ON-GUN PACKAGE P/N 600502

This package includes a power supply adaptor module and an ST-23 spool-on-gun manual Mig welding torch with

30-ft. service lines, 0.45 - 3/64-in. feed roll and contact tube, torch liner, and No. 10 nozzle. The package is designed for easy field installation with a plug-in cable. (Kit to be available 3rd quarter '83.)

C. WIRE WIPER

Consists of a felt wiper (package of 10, P/N 598537) and a wiper holder (P/N 598764). An extra inlet/outlet guide P/N 05N56 (does not require an insert for this application) must also be ordered. To install the wiper holder, replace the inlet guide (P/N 994403, see Fig. 5) with P/N 05N56. The guide is installed with the point toward the feed roll. The wiper holder screws onto the inlet guide.

The wire wiper effectively cleans and lubricates the welding wire as it is being fed, providing smoother wire feeding and longer conduit life.

D. NOZZLES

A No. 8 Nozzle P/N 998893, to fit the MT-200 Torch, is included in the MIGMASTER LINDE 225 package. This slip-on type nozzle includes a permanently mounted insulator/spatter shield. The following standard duty slip-on nozzles, also equipped with the insulator/spatter shield, are available:

No. 6 Nozzle . . . . . P/N 998895
No. 10 Nozzle. . . . . P/N 998894
No. 12S Spotweld Nozzle . . . . . P/N 999625

Additionally, the following **heavy-duty** slip-on nozzles, also equipped with the insulator/spatter shield, are available:

No. 8 Nozzle . . . . . P/N 999471
No. 10 Nozzle. . . . . P/N 999472
No. 12 Nozzle. . . . . P/N 999473

E. PRIMARY POWER EXTENSION CABLE P/N 678808

A 25-ft. extension cable, assembled with plug and receptacle.

III. INSTALLATION INSTRUCTIONS

A. INSPECTION AND PLACEMENT

1. After removing the unit from the shipping container, inspect it for concealed damage which may not have been apparent upon receipt of the unit. Notify the carrier of any defects or damage at once.
2. Check the container for any loose parts. Check air passages at front base and rear panel of cabinet for any packing materials that may obstruct air flow through the power supply.
3. The machine components are maintained at proper operating temperatures by forced air which is drawn through the cabinet by the fan unit on the rear panel. While operating the power supply, locate it in an open area where air can circulate freely at front and rear openings. Leave at least two feet of clearance between the rear of the power supply and wall or other obstruction. The area around the unit should be relatively free from dust, fumes and excessive heat.

B. ASSEMBLE WHEELS

1. Open the carton containing the wheels and mounting hardware.
2. Remove the rear skid and securely prop the rear of the unit at least 6-in. off the floor.
3. At the rear of the unit are four 1/4–20 x 1-1/2-in. hex head cap screws holding the cylinder base to the unit. Using a 7/16-in. wrench, remove the rearmost screws and 1/4-in. lockwashers (one on each side).
4. Swing the cylinder base down 90^{0}, and re-assemble the two screws and lockwashers (removed in Step 3) to hold the base in operating position. Tighten the other two screws. (See Fig. 3.)
5. Push the axle through the two large holes in the sides of the cylinder base.
6. Assemble two 5/16-in. plain washers, one 6-in. diameter wheel, one more 5/16-in. washer, and secure with the cotter pin. Repeat for second wheel.
7. Remove the front skid, and prop the front of the unit at least 6-in. off the floor.

Table 1 - Optional Wire Feed Accessories for 10-ft. MT-200 Torch

Wire Sizes	Contact Tip		Liner 10′ Long	Outlet Guide	Feed Roll
	1.90" (Long)	1.62" (Short)			
.023 Hard	999742	----	999797 (a)	999745 (b)	999621 (V)
.030	996994		948850	993859 (c)	2075312 (V)
.035	996996	996995 (g)	2075237 (g)	04N19 (d, e, g)	2075313 (V) (g)
.045	996998	996999 (g)	2075237 (g)	04N19 (d, g)	2075311 (V)
.045 Cored	----	999578	2075237 (g)	04N19 (d, g)	999056 (Serr.)
.052	----	948340	2075239	04N19 (d, g)	999056 (Serr.)
3/64 Soft	996998	996999	948863	05N56 (f)	2075310 (U)

a) Also requires inner liner (999743).
b) Includes 12-1/4-in. liner (999746) which must be cut to length.
c) Includes replaceable sleeve (995651).
d) Includes replaceable sleeve (995692).
e) For best feeding of 0.035 wire, use outlet guide 993859.
f) Requires outlet guide insert (05N57).
g) Supplied with Migmaster LINDE 225 Package.

♦ ♦ ♦ ♦ ♦ WARNING ♦ ♦ ♦ ♦ ♦

Be sure the unit's rear wheels are securely braced, and the unit itself securely propped up so it won't fall on the assembler's hands.

8. Using a 7/16-in. wrench, assemble the two casters to the front corners of the unit, with four 1/4—20 x 1/2-in. hex head cap screws and four 1/4-in. lockwashers for each caster.

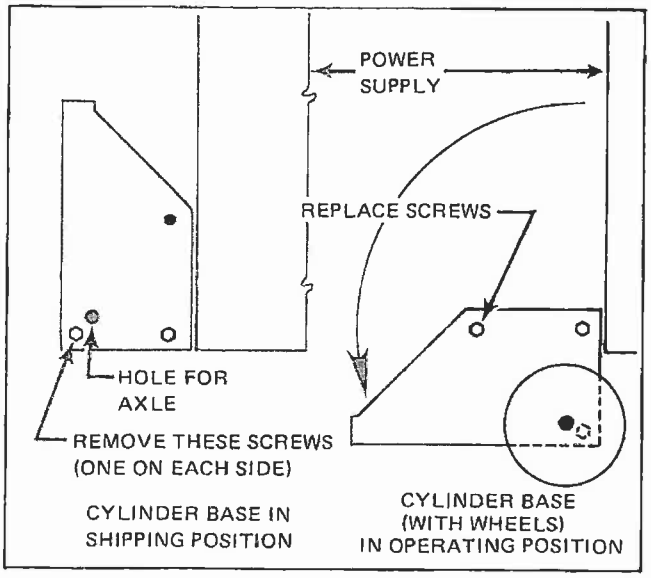


Fig. 3 - Side Views of Cylinder Base

C. ELECTRICAL CONNECTIONS

1. This welding power supply is a single-phase unit and must be connected to a single-phase power line. If possible, the unit should be operated on a separate circuit to assure that the performance of the machine is not impaired by reduced line voltage due to an overloaded circuit.

♦ ♦ ♦ ♦ ♦ WARNING ♦ ♦ ♦ ♦ ♦

Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch when primary electrical connections are made to the power receptacle. To be doubly safe, check your input leads with a voltmeter to make sure that all power if OFF.

2. The LINDE 225 includes a 2 pole, 3 wire power receptacle P/N 674540. Attach this receptacle to a sturdy support. Hook up this receptacle to incoming power and connect the ground terminal to a good electrical ground. Be sure to follow all applicable electrical codes.
3. The LINDE 225 is wired at the factory for 230 volt operation. To change the wiring for 200 volt operation:
   a. Completely remove the hinged cover from the unit.
   b. Referring to Fig. 13, locate the control transformer, CTR.
   c. Remove the red wire (coming from the On-Off Switch in the unit's front panel) from terminal 111 on the control transformer, and attach it to the transformer's H2 terminal. (Refer to the Schematic Diagram in the back part of this booklet.)
   d. Replace the cover.

D. ASSEMBLE THE SHIELDING GAS SYSTEM

1. With the cylinder cap in place, CAREFULLY slide the cylinder of gas onto the cylinder rack.
2. Secure the cylinder to the power supply, using the chain provided.
3. Unscrew the cylinder cap.
4. Open the cylinder valve slightly, just for an instant, to blow away any dirt or dust which may have accumulated in the cylinder valve outlet. Be sure to keep your face away from the valve outlet to protect your eyes.
5. Make sure the regulator flow adjusting screw is released by turning it counterclockwise until it turns freely, (see Fig. 4).
6. Attach the regulator to the cylinder valve, tighten the union nut securely with a 1-1/8-in. open end or an adjustable wrench.
7. Attach the gas hose (P/N 678439) to the regulator outlet connection (see Fig. 4).

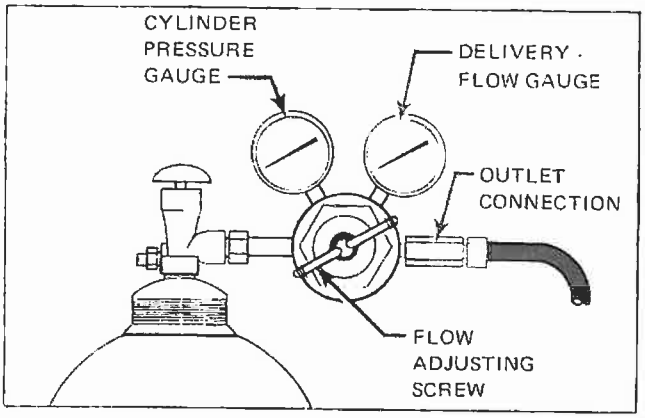


Fig. 4 - R-27-CF-580 Regulator

8. Slowly open the cylinder valve a fraction of a turn. When the regulator pressure gauge pointer stops moving, open the cylinder valve fully.

♦ ♦ ♦ ♦ ♦ WARNING ♦ ♦ ♦ ♦ ♦

Never stand directly in front of or behind the regulator when opening the cylinder valve. Always stand to one side.

9. Test for leakage by turning the regulator flow-adjusting screw clockwise, until an approximate normal working flow (about 35 CFH) is obtained, as indicated on the delivery flow gauge (R.H. gauge).
10. Using a leak test solution, such as P/N 998771 (8 oz. container) or soapy water, test the cylinder valve stem, the regulator inlet connection, and the hose connections at the regulator and at the Migmaster for leakage. Correct any leaks before starting work.
11. If work is to be stopped for a half-hour or more, or the regulator is to be removed from the cylinder, shut down the regulator as follows:
    a. Close the cylinder valve.

b. Release gas from the regulator by opening all valves downstream.
c. Allow flow gauge to read zero, then turn the flow-adjusting screw counterclockwise until it turns freely.

NOTE: If the regulator is to be out of use for more than a day, turn in the flow-adjusting screw enough to move the valve stem off the seat. When the regulator is returned to service, be sure to back out the flow-adjusting screw completely before admitting cylinder pressure to the regulator.

12. Each regulator is equipped with a porous metal inlet filter, P/N 71Z33, pressed into the regulator inlet nipple. **No regulator should be connected to a cylinder or station valve unless it contains this filter.** You can replace the filter if you have reason to do so. To remove a filter, insert a No. 1 'EASY-OUT' or a No. 6 wood screw (about 2-in. long) into the filter and pull it out. Press the new filter into the nipple with a 1/4-in. round metal rod.
13. Regulators in need of repair should be returned to your UNION CARBIDE Welding Products distributor or to a LINDE repair station.

E. INSTALL FEED ROLL

1. Open the hinged left side panel of the LINDE 225.
2. Release the clapper arm on the pressure roll and clamp assembly (refer to Fig. 5, press down, then pull outward on the flat spring, P/N 994139).
3. Remove the Feed Roll Retaining Screw P/N 678111 and the washer P/N 678134 from the output shaft of the Wire Feed Motor, (see Fig. 5).
4. Slip the feed roll onto the outlet shaft with the side of the roll marked "out" facing you.
5. Replace the feed roll retaining screw and the washer; tighten finger tight.

F. INSTALL SPOOL OF WIRE

1. Remove "hairpin" clip from spindle.
2. Orient the spool of wire so the wire will be pulled from the bottom of the spool (and cause the spool to turn counterclockwise).

◆ ◆ ◆ ◆ ◆ WARNING ◆ ◆ ◆ ◆ ◆

As you hold the spool of wire, ready to move it into the unit, there is a very close fit at the left and the bottom of the spool. Be careful to avoid pinching your fingers or hands between the spool and the unit's frame.

3. Slide the spool onto the spindle. Be sure one of the small holes near the center of the spool engages the stud on the spindle (see Fig. 6).
4. Replace the hairpin clip on the spindle.
5. Loosen the brake screw in the center of the spindle hub, (see Fig. 6), then tighten it just enough to prevent coasting of the spool when wire is drawn from it. Too much pressure will load the feed motor unnecessarily. Too little pressure will permit the spool to over-run, causing the wire to kink and tangle.

G. INSTALL MT-200 TORCH

1. Refer to Booklet L12-778, Instructions for Linde MT-200 Mig Welding Torch, packed with the torch.
2. The MT-200 torch comes assembled and ready to hook up and weld using .035-in. wire, the size wire included with the Migmaster package.

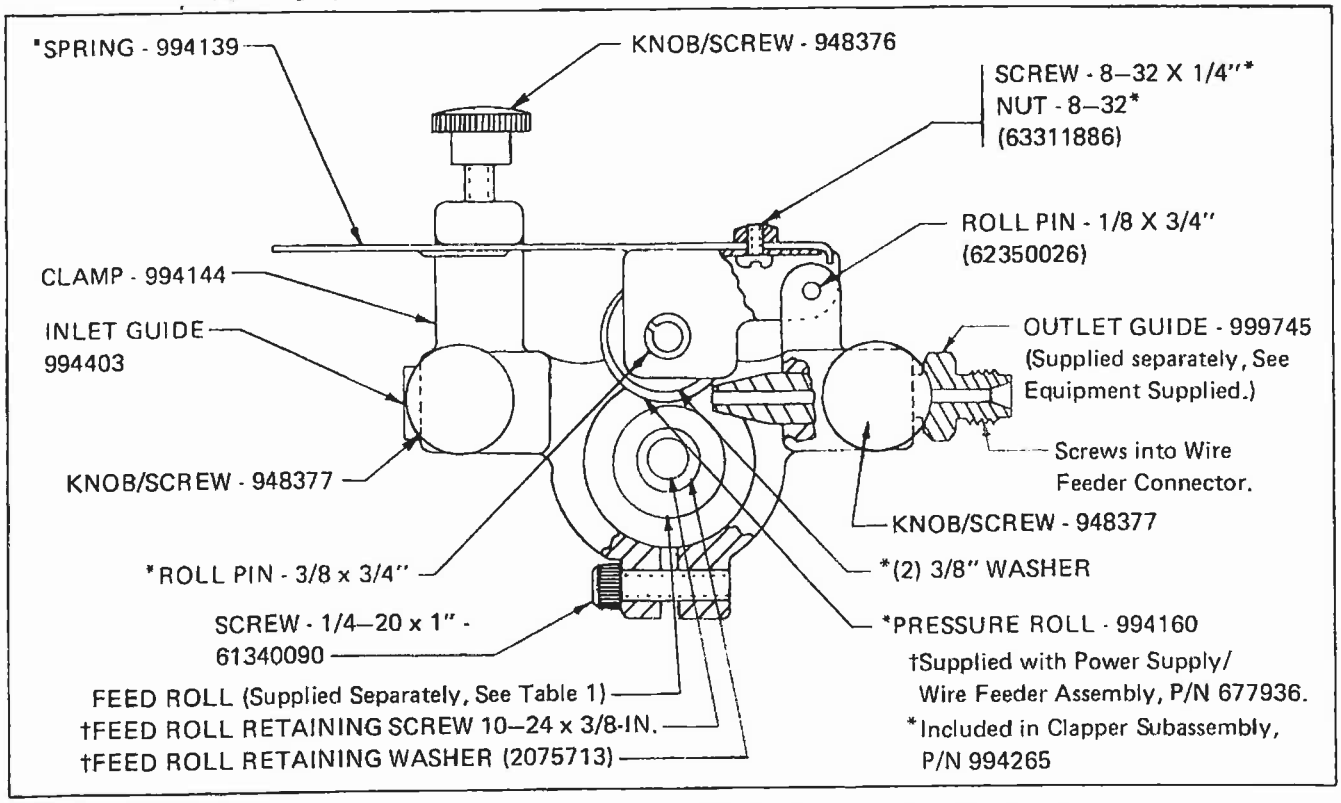


Fig. 5 - Pressure Roll and Clamp Assembly, P/N 994264, with Feed Roll Installed

3. With the left side (hinged) panel open, unscrew the torch locking screw from the wire feeder connector (see Fig. 6).
4. Turn the rear end of the torch so the electrical plug is facing up, pass it through the hole in the front panel, and push it all the way into the wire feeder connector.
5. Replace the torch locking screw in the wire feeder connector, to hold torch in place. (Pull out on the torch to be sure it's secure.)
6. Connect the torch switch lead to the plug on the rear of the torch.

H. THREAD WELDING WIRE

1. Remove any tie wires from the spool; cut off any kinked or twisted welding wire, and round off the free end of the wire with a file.
2. Unscrew the pressure adjusting knob, P/N 948376, until the pressure leaf-spring is free (see Figs. 5 and 6). Raise the clapper by pressing the spring down, pulling it out from under the pressure adjusting knob, and lifting it up.
3. Thread the wire through the inlet guide, through the groove in the feed roll, and into the outlet guide.
4. Check the position of the groove in the feed roll. The wire should lay in the groove and go straight into the outlet guide.
5. If necessary, adjust the feed roll by loosening the setscrew on the collar on the motor output shaft (using an Allen wrench). Move the collar and feed roll in or out as required, then tighten the setscrew (see Fig. 7).
6. Replace the pressure roll clapper, making sure the wire is held in the feed roll groove. To replace the clapper, press down on the leaf spring and move it in under the pressure adjusting knob (P/N 948376, see Fig. 5). The bottom of the screw must engage the indentation in the spring.
7. Straighten out the torch cable and apply power to the unit. On the unit's front panel turn the Fine Adjustment Knob to about 3-6. Adjust the pressure required to feed the wire by alternately pressing and releasing the torch switch while slowly tightening the pressure adjusting knob (see Fig. 6), until the wire begins to feed without slipping. The spring pressure applied should be the minimum required to provide positive, nonslip wire feed. Too little pressure will result in wire slippage while excessive pressure will scar and deform the wire.

CAUTION: The moment the torch trigger is depressed, either to weld or to just inch the wire, the power supply contactor closes and the welding wire is energized. At the same time, a charge is built up by the five large capacitors C-5 through C-9 in the power supply.

When the torch trigger is released, the capacitors will slowly discharge.

Do not touch the welding wire or allow the wire to contact the work soon after releasing the torch switch.

Use insulated cutters when clipping the end of the welding wire.

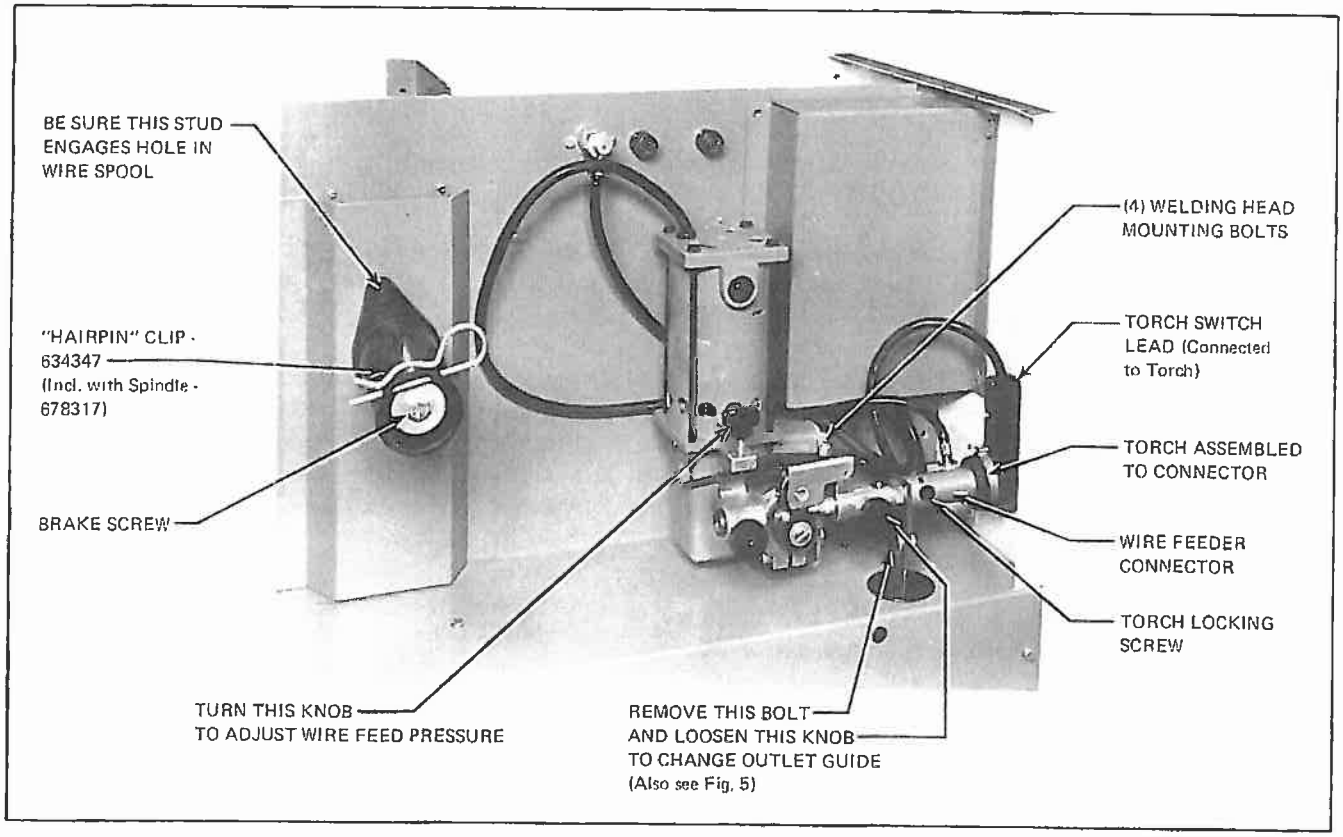


Fig. 6 - Wire Feed Components, LINDE 225

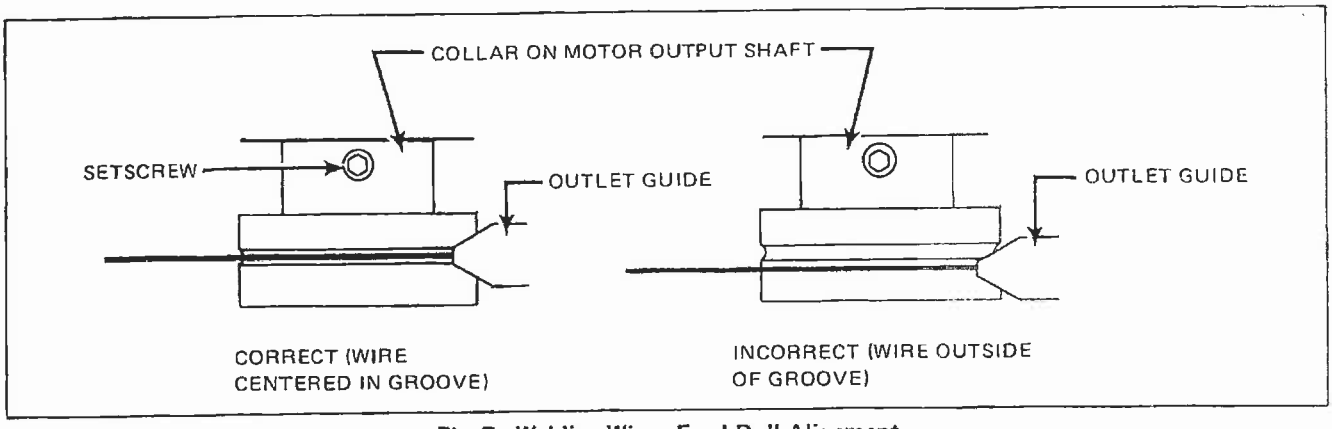


Fig. 7 - Welding Wire - Feed Roll Alignment

8. With the torch cable straightened out, and using the torch switch, inch the wire until it emerges from the front end of the torch. The wire should extend about 1/2-in. beyond the end of the nozzle. Adjust this length by either clipping off the end of the wire, or by using the torch switch.

I. TO CHANGE OUTLET GUIDE

1. Loosen the right-hand knob of the pressure roll and clamp assembly (see Fig. 6).
2. Remove the nut and bold and 2 washers holding the copper bus bars together, just beneath the wire feeder connector (see Fig. 6).

NOTE: Be careful to avoid dropping any hardware down the hole into the power supply compartment where it may short out the unit.

3. Remove the wire feeder connector and screw the outlet guide into the connector.
4. Slide the outlet guide into the pressure roll and clamp assembly.
5. Replace the hardware removed in step 3 above.
6. Adjust the outlet guide so the sleeve or insert just clears the feed roll, then tighten the knob.

NOTE: Install any torch liner or outlet guide insert or sleeve as instructed in the torch booklet (packed with the torch).

IV. OPERATING INSTRUCTION

CAUTION: Never, under any circumstances, operate the power supply with the cover removed. In addition to the safety hazard, improper cooling may cause damage to internal components.

A. DUTY CYCLE

Welding power supplies are rated according to duty cycle. The duty cycle is simply defined as the percentage of arc time in a ten minute period. The LINDE 225 has a 60% duty cycle rating at 225 amps. This 60% rating means that this unit can be operated at its maximum power of 225 amps for six minutes in a ten minute period, and must remain idle for the remaining four minutes. As the output is reduced, the duty cycle rating will increase; the unit may be operated continuously at 175 amps.

B. MATERIAL PREPARATION

1. If the surface to be welded is painted it should be sanded or wire brushed before welding.
2. Before welding on aluminum, be sure to clean the surface thoroughly, using a **stainless steel** brush.
3. Loose surface rust should be removed from steel before welding.

C. EQUIPMENT PREPARATION

1. Make sure you are adequately protected before you start welding. A welding helmet and gloves should always be worn.
2. Make sure the torch contact tip and liner, the outlet guide, and the feed roll are the correct parts for the wire size and type being used (see Table 1 in the Optional Accessories section of this booklet).
3. Make sure the correct shielding gas is being used. Stargon is recommended for welding steel; Linde argon is recommended when welding aluminum.
4. Turn power supply switch to "on".
5. Slowly open the valve on the gas cylinder a fraction of a turn. When the regulator flow gauge pointer stops moving, open the cylinder valve fully.

♦ ♦ ♦ ♦ ♦ **WARNING** ♦ ♦ ♦ ♦ ♦

Never stand directly in front of or behind the regulator when opening the cylinder valve. Always stand to one side.

6. Set the shielding gas flow rate as follows:
   a. Open the hinged door and raise the clapper arm (see Fig. 5) by pressing the spring down, then swinging it out. This will release the pressure roll so the wire will not feed when the torch switch is pressed.
   b. Hold the torch switch "IN" and set the desired gas flow rate by turning the regulator flow adjusting screw until the regulator delivery (right hand) gauge reads 35 CFH.
   c. Hold the torch switch in for at least 15 seconds to ensure adequate purging of the hose and torch.

CAUTION: The power supply contactor becomes energized the moment the torch trigger is pressed, and the welding wire is electrically "HOT".

NOTE: If the hoses and torch are not purged after laying idle for a shift or overnight, the weld may be contaminated. The gas hose and torch should also be purged when the shielding gas is changed.

When welding aluminum or stainless steel, the gas line should be purged on a more frequent basis.

d. Replace the clapper; be sure the welding wire is in the groove of the feed roll and the bottom of the pressure adjusting screw (see Fig. 5) is engaged in the indentation in the leaf spring.
e. Close the cabinet door.

7. Attach the power supply's work cable to the part to be welded. Be sure a good metal to metal contact is made.
8. Before staring a weld, clip off the globule at the end of the welding wire.

CAUTION: Use insulated cutters - the welding wire may be electrically "HOT".

D. OPERATION

CAUTION: Do not change the Heat Range Switch while under load.

1. Set the Heat Range, the Heat Control, and the Wire Feeder Fine Adjustment controls approximately as shown in Table 2, Continuous/Stitch Weld Conditions for:

   a. The type weld being made (see diagrams to the left of each column of figures).
   b. The thickness of the metal being welded.
   c. The gap (if any) between the pieces being welded.
   d. The diameter of the welding wire being used.

   (The Heat Control and Wire Feeder Fine Adjustment may be changed while under load.)

2. Before starting the weld, the welding wire should extend about 1/2-in. beyond the end of the nozzle. Adjust this length by either clipping off the end of the wire with insulated cutters or by using the torch switch.

   CAUTION: Power supply contactor becomes energized the moment the torch trigger is depressed. Arcing can occur if the wire is brought to a ground. Keep the torch away from ground until welding is to begin.

3. To start the weld, hold the torch so the welding wire is approximately 1/4-in. from the work, then press the torch trigger.
4. The welding wire should be pointed into the joint at angles of approximately 45° for fillet welds, and approximately 90° for butt welds, (Fig. 8).
5. The torch angle relative to the length of the weld should be approximately 10° from the vertical (Fig. 9).
6. When welding in the vertical position, travelling either up or down, it is very important to keep the arc on the leading edge of the puddle to ensure complete penetration.
7. Some weldors who are accustomed to welding with stick electrodes may tend to push the torch into the weld. This is neither necessary nor desirable, since the wire electrode is being mechanically fed into the weld.
8. To stop the weld, release the trigger and pull the torch from the work.

E. SPOT/STITCH/ANTI-STICK MODULE

♦ ♦ ♦ ♦ ♦ WARNING ♦ ♦ ♦ ♦ ♦

Before installing this module, all incoming power to the unit must be turned OFF. Switches should be locked out and tagged if possible.

1. Installation:
   a. Remove the top right panel from the front of the power supply. Be sure to save the four screws.
   b. Locate the 15-pin white plastic plug, P3, inside the unit. This plug will have **male pins** inside it and two jumper wires. Remove the two jumper wires.
   c. Connect the plug into the receptacle on the rear of the spot/stitch/anti-stick module. (Note that the plug will fit only one way.)
   d. Install the module in place of the panel removed in Step a., using the same four screws removed in Step a.

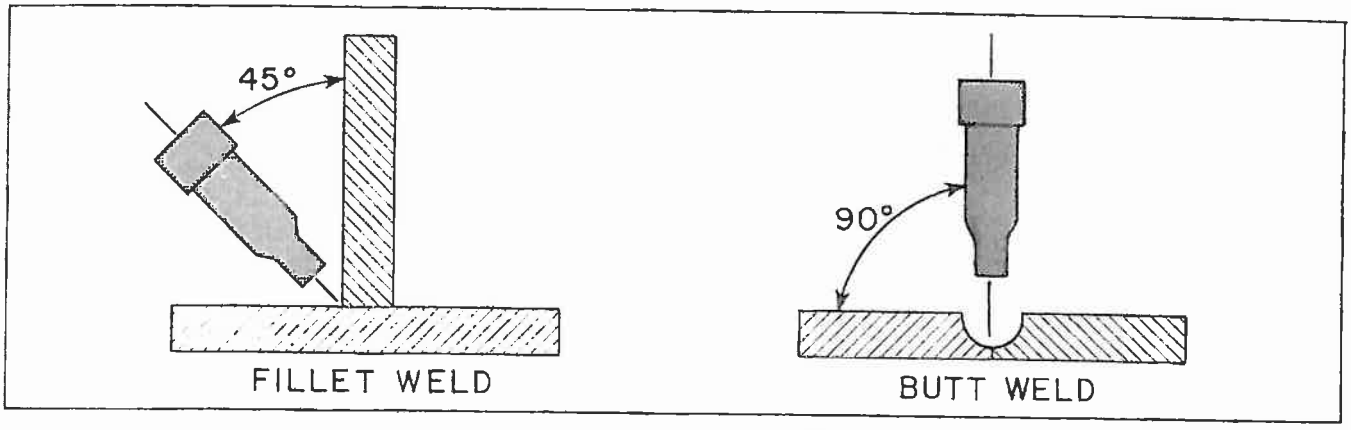


Fig. 8 - Angle of Welding Wire with Joint

Table 2 - LINDE 225 Continuous/Stitch Weld Conditions Using STARGON Shielding Gas

LINDE 225
CONTINUOUS/STITCH WELD CONDITIONS

JOINT TYPE	Material Thickness Inches	Root Opening Inches	Wire Diameter Inches	Heat Range Setting	Heat Control Setting*	Fine Adjustment Setting
STEEL	.024	0	.023	1	3	2
	.028	0	.023	1	3	2
	.034	0	.023	1	3	2
	.044	0 - .040	.023	1	3	2
	.044	0 - .020	.030	1	4	1.8
	.060	0 - .040	.023	1	4	3
	.060	0 - .020	.030	1	5	2.9
	.060	0 - .020	.035	1	4	2
	.093	0 - .060	.023	1	6	4
	.093	0 - .040	.030	2	4	3.2
	.093	0	.035	2	5	3
	.093	0	.045	2	5	2
	.125	.040 - .080	.023	2	5	5.8
	.125	0 - .060	.030	2	5	4.2
	.125	0	.035	2	5	3
	.125	0	.045	2	4	2
STEEL	.187	.093	.030	2	6	4.3
	.187	.060	.035	3	1	4
	.187	.080	.045	3	Low	2.5
	.250	.093	.030	3	Low	5
	.250	.060	.035	4	Low	6
	.250	.060	.045	4	Low	4
STEEL	.028	0	.023	1	3	1.8
	.034	0	.023	1	4	2
	.044	0	.023	1	4	2.2
	.044	0	.030	1	3	1.8
	.060	0	.023	1	5	3
	.060	0	.030	1	5	2.2
	.060	0	.035	2	3	2
	.093	0	.023	1	6	4
	.093	0	.030	1	6	3
	.093	0	.035	2	4	2.5
	.125	0	.030	2	3	2.9
	.125	0	.035	2	8	3.5
	.187	0	.030	2	5	4.2
	.187	0	.035	2	6	4
	.187	0	.045	3	Low	2.5
	.250	0	.030	3	Low	6
	.250	0	.035	3	1	4.8
	.250	0	.045	3	2	3.6

JOINT TYPE	Material Thickness Inches	Wire Diameter Inches	Heat Range Setting	Heat Control Setting*	Fine Adjustment Setting
STEEL	.024	.023	1	3	1.8
	.028	.023	1	3	1.8
	.034	.023	1	4	2.1
	.044	.023	1	5	3.5
	.044	.030	1	4	1.9
	.044	.035	2	2	1.8
	.060	.023	1	6	4.2
	.060	.030	1	5	2.8
	.060	.035	2	3	2.4
	.093	.023	2	5	5.5
	.093	.030	2	5	3
	.093	.035	2	5	3.5
	.093	.045	2	5	2
	.125	.030	2	5	4
	.125	.035	2	6	4
	.125	.045	2	4	2
	.187	.030	2	6	5.5
	.187	.035	2	6	4
	.187	.045	3	Low	2.6
	.250	.030	3	Low	5.5
	.250	.035	3	Low	8
	.250	.046	3	Low	3
STEEL	.028	.023	1	2	1.5
	.034	.023	1	2	1.5
	.044	.023	1	3	2.2
	.044	.030	1	3	1.8
	.044	.035	1	3	1.5
	.060	.023	1	4	2.5
	.060	.030	1	4	2
	.060	.036	1	5	2
	.093	.023	1	5	3.1
	.093	.030	1	5	2.9
	.093	.035	2	4	2.8
	.093	.045	2	4	2.8

JOINT TYPE	Material Thickness Inches	Wire Diameter Inches	Heat Range Setting	Heat Control Setting*	Fine Adjustment Setting
STEEL	.023	.023	1	3	2
	.028	.023	1	4	2.4
	.034	.023	1	5	3.2
	.044	.023	1	5	4
	.044	.030	1	4	2
	.044	.035	1	5	2
	.060	.023	1	6	4.4
	.060	.030	1	6	3
	.080	.035	1	6	2.6
	.093	.023	2	5	6.6
	.093	.030	2	5	4
	.093	.035	2	5	3
	.093	.045	2	5	2
STEEL	.023	.023	1	3	1.9
	.028	.023	1	3	1.9
	.034	.023	1	4	2.5
	.044	.023	1	5	4.1
	.044	.030	1	4	2
	.044	.035	1	5	2.1
	.060	.023	1	6	4.5
	.060	.030	1	6	3
	.060	.035	2	4	2.4
	.093	.023	2	5	6.1
	.093	.030	2	5	4
	.093	.035	3	Low	3.8
	.093	.045	3	Low	3
	.125	.023	3	Low	7.4
	.125	.030	2	6	5.9
	.125	.035	3	1	5
	.125	.045	2	6	2.7
	.187	.030	3	1	6.3
	.187	.035	2	6	3.7
	.187	.045	3	Low	2.5
	.250	.030	3	2	7.2
	.250	.035	3	2	5
	.250	.045	4	Low	3.6
SPRAY ARC STEEL	.250	.030	4	5	8
	.250	.035	4	6	7.5
	.250	.045	4	5	4
ALUMINUM	.250	3/64	3	4	5
	.250	3/64	4	2	5
	.125	3/64	4	Low	5

*Listed Heat Control Settings are based on 230V input. For 200 V. input use next higher setting.

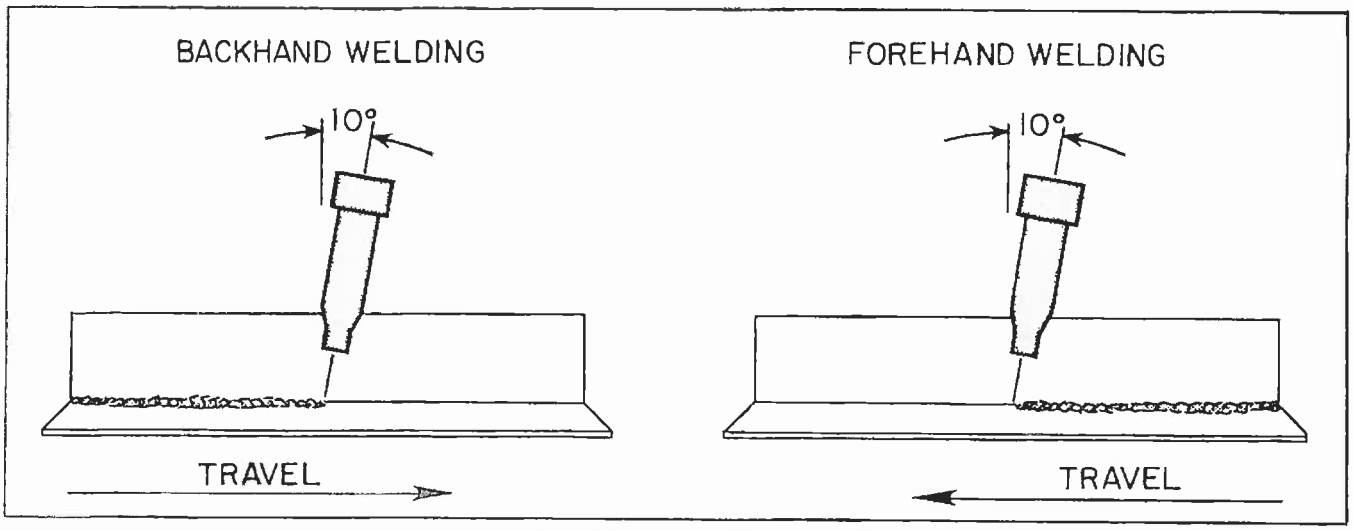


Fig. 9 -Angle of Torch with Direction of Travel

2. Anti-Stick feature provides a time delay at the end of a weld from the time the torch trigger is released until the main contactor is deenergized. This delay allows the welding wire to burn back, away from the work, so it won't "stick" in the weld puddle.

   This delay time, controlled by the "anti-stick" potentiometer, is variable from approximately .05 seconds to .5 seconds. The required delay time generally depends on the Wire Feeder Fine Adjustment setting on the front panel - the higher the setting, the faster the wire will feed into the weld, and the more delay time will be required.

   If, when using the Anti-Stick feature, the welding wire tends to stick in the puddle at the end of a weld, the Anti-stick time should be increased; if, on the other hand, the wire burns back into the torch tip, the anti-stick time should be decreased. Setting the anti-stick time to "Min" effectively cancels the anti-stick feature.

   This Anti-Stick feature is available for all three welding modes - continuous, spot, and stitch.

3. Continuous Weld operation:
   a. Set the Weld Mode switch to "CONTINUOUS" (center position), for regular mig seam welding.
   b. Set the Heat Range, Heat Control, and Wire Feeder Fine Adjustment controls, and perform the welding operation as described in Sect. IV-D.
   c. Set the Anti-Stick time as required.
4. Spot Weld operation:
   a. Set the Weld Mode switch to "SPOT".
   b. Replace the standard nozzle with the No. 12 Spotweld Nozzle P/N 999625.
   c. Trim the welding wire back so the end is slightly inside the nozzle.
   d. Set the Heat Range, Heat Control, Fine Adjustment, and the Spot-Stitch Weld Time as specified in Table 3, Spot Weld Conditions, for the thickness of the metal being welded and the diameter of the welding wire being used.
   e. To spotweld:
      i. Press the torch nozzle squarely on the top plate. Apply enough pressure to hold the two pieces of metal firmly together, so there is no loose play between them.
      ii. Pull the trigger, holding the gun motionless and firmly as in I. The electrode wire and shielding gas will be fed to the work, and the arc will be maintained for the length of time set in step d. above.
      iii. After the preset time has elapsed, the wire will stop feeding, the arc will be broken, and the shielding gas will stop flowing.

      A good spotweld will penetrate through both layers of metal, and will have a small nugget on the reverse side, (Fig. 10).

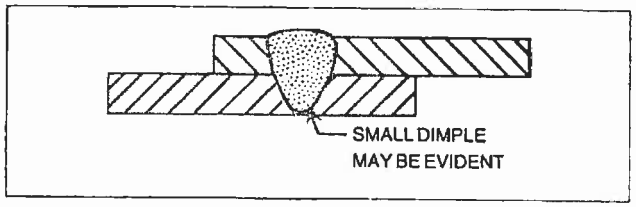


Fig. 10 - Cross Section of Good Spotweld

5. Stitch Weld mode uses a series of pre-timed arc-on/arc-off sequences to allow cooler welding. To stitch weld:
   a. Be sure a standard nozzle (and not a spot weld nozzle) is installed on the torch.
   b. Set the length of time the arc will be ON for each sequence by adjusting the Spot-Stitch Weld Time control on the power supply's front panel. This timer has an approximate range of from 0.4 seconds at the minimum setting to 3.5 seconds at the maximum setting. Set the length of time the arc will be OFF for each sequence by adjusting the Stitch Weld Time control on the front panel. This timer has an approximate range of from 0.4 seconds at the minimum setting to 3.5 seconds at the maximum setting.
   c. Set the Heat Range, Heat Control, and the Fine Adjustment as specified in Table 2 under Continuous Weld Conditions for:

Table 3 - LINDE 225 Spot Weld Conditions

Material Thickness	Wire Type/ Diameter Inches	Heat Range Setting	Heat Control Setting*	Fine Adjustment Setting	Spot-Stitch Weld Time Setting	Anti-Stick Setting
	Easy-Grind					
24 ga.	.023	2	4	4	2	3
22 ga.	.023	2	5	3.5	2.5	3
18 ga.	.023	3	2	7	2.5	3
	Linde 82					
24 ga.	.030	2	5	3	1.5	2
22 ga.	.030	2	5	3	2.5	2
18 ga.	.030	3	4	6.5	1.5	2
16 ga.	.030	3	6	7	1.5	1
14 ga.	.030	4	6	9	4	1
	Linde 82					
24 ga.	.035	1	6	2.5	1	2
22 ga.	.035	1	6	2.5	1.5	1.5
18 ga.	.035	2	6	3	3	2
16 ga.	.035	3	6	5	1.5	1.5
14 ga.	.035	4	Hight	9.5	2	1
	Linde 82					
24 ga.	.045	2	4	1.5	1	2.5
22 ga.	.045	2	5	2	1	3
18 ga.	.045	3	5	4	1	2
16 ga.	.045	3	5	4	1.5	2
16 ga.	.045	4	4	5	1	1
14 ga.	.045	4	6	8.5	1	2

*Listed Heat Control Settings are based on 230V input. For 200V input use next higher setting.
†Spotwelding 14 ga. with .035 wire @ 200V input is not recommended.

i. The type weld being made (see diagrams to the left of each column of figures).
ii. The thickness of the metal being welded.
iii. The gap (if any) between the pieces being welded.
iv. The diameter of the welding wire being used.

d. When using the Stitch weld mode, before starting the weld the welding wire should extend about 1/2-in. beyond the end of the nozzle. Adjust this length by either clipping off the end of the wire with insulated cutters or by using the torch switch.

CAUTION: Power supply contactor becomes energized the moment the torch trigger is depressed. Arcing can occur if the wire is brought to a ground. Keep the torch away from ground until welding is to begin.

e. During the welding, use the same welding techniques as described in Section IV-D, Steps 4-8.

V. MAINTENANCE AND TROUBLESHOOTING

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.

◆ ◆ ◆ ◆ ◆ WARNING ◆ ◆ ◆ ◆ ◆

Deenergize the power supply by placing all incoming primary and control power switches in the OFF position. These switches should be locked out and tagged if possible.

A. GENERAL MAINTENANCE

The mechanical system of the power supply is simple and requires little maintenance. It is recommended, however, that the unit be cleaned and inspected at regular intervals, the interval depending upon the type of service and cleanliness of the installation. For average conditions, an inspection at least twice each year is desirable. The suggested procedure is as follows:

1. Remove side panels.
2. Dust and dirt accumulations are one of the main causes of malfunctions. Therefore, the interior of the power supply, the moving parts such as the feed and pressure rolls, the wire feed motor, etc., and all air passages should be blown out periodically using low pressure air. **Be sure to wear proper face and eye protection.**
3. Check all electrical and mechanical connections for tightness and cleanliness.
4. The fan motor bearings are permanently lubricated and should not require any attention.

B. LUBRICATION OF MOTOR-GEAR UNIT

The EH-8 motor-gear unit is lubricated with gear oil when assembled at the factory. During normal service there

should be no need for further lubrication. However, if you disassemble the unit it should be relubricated with 1-3/4 oz. of SAE-90 gear oil. Use B. F. Houghton and Co. MP Gear Oil (available in a 1-pt. container from Linde under P/N 598123).

C. CHECKING OR REPLACEMENT OF MOTOR BRUSHES (See Fig. 14)

Motor brushes should be checked periodically. If a brush is broken, or worn down to less than 3/8-in. in length, it must be replaced. Brushes can be inspected by unscrewing the brush-holder plug and withdrawing the brush assembly. It will be necessary to remove the welding head to inspect one of the brush assemblies. Never remove a brush without matchmarking it and its holder, so that it can be replaced in the same holder in its original position.

D. REMOVAL OF EH-8 WELDING HEAD

1. Unplug the torch switch lead from the torch, and disconnect the torch from the wire feeder connector (see Fig. 6).
2. Remove the nut and bolt and 2 washers holding the bus bars together, just beneath the wire feeder connector (see Fig. 6).

   NOTE: Be careful to avoid dropping any hardware down the hole into the power supply compartment where it may short out the unit.
3. Remove the 4 bolts holding the welding head to the power supply frame. These bolts are located on the lower right hand side of the welding head, behind the outlet guide (see Fig. 6).
4. At this point, the welding head can be moved so the rear brush assembly is accessible. To completely remove the welding head, disconnect the motor cable from the terminal strip located behind the PC board cover, and disconnect the gas hose either from its connection to the fitting on the power supply frame, or by removing the wire feeder connector from the welding head.
5. The pressure roll and clamp assembly can be removed from the motor-gear unit by loosening the capscrew at the bottom of the assembly.

E. TROUBLESHOOTING DATA

♦ ♦ ♦ ♦ ♦ WARNING ♦ ♦ ♦ ♦ ♦

Disconnect primary power at wall switch, or circuit breaker, before opening side panels or attempting inspection or work inside of the power supply.

If the power supply is operating improperly, the following troubleshooting information may be used to locate the source of the trouble.

Check the problem against the symptoms in the following troubleshooting guide. The remedy for the problem may be quite simple. If the cause cannot be quickly located, open up the unit and perform a simple visual inspection for loose or burned wiring or components, blown fuses, bulged or leaking capacitor, or any other sign of damage or discoloration.

As a general rule, do not replace a printed circuit (PC) board until you have made all the preceding checks. Always put the main power switch in "OFF" position before removing or installing a PC board. Take great care not to grasp or pull on components when removing a PC board. If a printed circuit (PC) board is determined to be the problem, check with your Linde supplier for a trade-in on a new PC board. Supply the distributor with the part number of the PC board as well as the serial number of the wire feeder. Do not attempt to repair the PC board yourself. Warranty on a PC board will be null and void if repaired by customer or an unauthorized repair shop.

1. **SYMPTOM: No output.**
   a. No incoming single-phase power.
   b. Blown line fuse(s).
   c. Ready-off switch in OFF position.
   d. Poor connections at output terminals.
   e. Contactor fails to close (see No. 6, following).
2. **SYMPTOM: Line fuse blows when main line switch is closed.**
   a. Improper line connection.
   b. Shorted primary coils.
   c. Shorted or damaged rectifier diode(s).
   d. Shorted output terminals.
   e. Shorted or damaged filter capacitors.
3. **SYMPTOM: Limited output or low open-circuit voltage.**
   a. Inadequate single-phase input power.
   b. Open connection to the power rectifiers.
   c. Poor terminal connection.
   d. Defective primary contactor.
   e. One diode open.
   f. One or more filter capacitors open.
4. **SYMPTOM: Loss of voltage while welding.**
   a. Blown line or rectifier fuse due to overload.
   b. Rectifier failure.
   c. Transformer failure.
   d. Blown control circuit fuse (no contactor control).
   e. Open in filter capacitor bank circuit.
   f. MTR thermal overload open. (Let transformer cool down.)
5. **SYMPTOM: Loss of current while welding voltage remains normal.**
   a. Wire drive not feeding properly.
6. **SYMPTOM: Contactor not operating.**
   a. Faulty contactor.
   b. Blown control circuit fuse.
   c. External welding control circuit incomplete.
   d. Open lead to contactor coil.
   e. Ready-off switch in OFF position.
   f. MTR thermal overload open. (Let transformer cool down.)
7. **SYMPTOM: F1 fuse blows repeatedly as soon as main line switch is turned "ON".**
   a. Check wiring for short.
   b. If no short can be found, replace "J" Governor board.
8. **SYMPTOM: F1 fuse blows when torch switch is closed.**
   a. Check for jammed or defective wire feed motor/drive unit.

9. SYMPTOM: With torch switch closed, wire feed motor runs, and weld contactor closes, but gas solenoid is not energized.
   a. Check solenoid for defect.
10. SYMPTOM: With torch switch closed, weld contactor closes and gas solenoid is energized, but wire feed motor does not run.
   a. Check for defect in cable to wire feed motor.
   b. Check for excessively-worn motor brushes, or other motor defect.
   c. Replace "J" Governor board.
11. SYMPTOM: No control over motor speed by wire feed speed potentiometer.
   a. Check wire speed potentiometer with ohmmeter. Resistance should range from 0-50 K ohms. Replace potentiometer if defective.
   b. Replace "J" Governor board.
12. SYMPTOM: Erratic or pulsing wire feed rate.
   a. Replace "J" Governor board.
13. SYMPTOM: Motor runs as soon as main line switch is closed.
   a. If contactor and solenoid are also energized, check for defective torch switch or short in switch cable.
   b. If contactor and solenoid are not simultaneously energized, check for welded contacts on TR (torch relay).
14. SYMPTOM: With torch switch closed, wire feed motor runs, but welding contactor and gas solenoid are not activated.
   a. Check for break in wiring.
   b. Check contacts on TR (torch relay).

If none of the above troubles can be located readily, a systematic troubleshooting procedure may be followed by using a voltmeter to measure the 'reference voltage checks' provided on the schematic diagram, Fig. 18. Be sure to exercise care when making these tests. Start at the primary input (line) side of the welding contactor, and check for voltage - either 230- or 200-volts. Then, in order, check the remaining voltages shown on the schematic.

If voltage does not appear at each reference voltage check-point, the trouble is located between the last normal check point and the first abnormal check point. In any case, follow the local electrical maintenance procedure in making your troubleshooting checks.

F. SILICON DIODE CHECK

If a 'trouble' condition has been diagnosed to be a faulty diode(s), the following procedure is suggested for replacement and testing. (The location and replacement parts data for the diodes in the bridge rectifier are shown in Figures 13 and 16.)

1. In order to properly test the diodes, it is necessary to electrically isolate the bridge rectifier. First unbolt one of the bus bar connections between the power filtering capacitor network and the bridge rectifier, and unbolt the bus bar connectors from the main transformer to the bridge. Be sure to reconnect these components when the diode testing is completed.
2. Using an ohmmeter set to low range, place negative test probe against the diode's pigtail lead, and the positive test probe against the stud, and note ohmmeter indication.
3. Reverse test probes and again note ohmmeter indication.
   a. A good silicon diode will indicate a low resistance in one test-probe position and between 20,000 and one megohm in the opposite test-probe position.
   b. An open diode will indicate infinite resistance in both test-probe positions.
   c. A shorted diode will indicate low resistance in both test-probe positions.

IMPORTANT: When replacing diodes make sure that mounting surfaces are clean. Silicon grease, similar to Dow-Corning No. 340 silicon heat sink compound or equivalent, should be used to coat mounting surfaces. Use a torque wrench to tighten the diodes. Recommended torques are 275 inch-pounds/23 foot-pounds minimum and 325 inch-pounds/27 foot-pounds maximum. If a torque wrench is not available, care should be taken that diode nuts are tightened only until firm.

The "A" edition of this booklet covers the following changes:

1. Side panel P/N 678962 was added.
2. Feed roll retaining screw, 10–24 x 3/8-in. replaced P/N 678111.
3. Feed roll retaining washer P/N 2075713 replaced P/N 678134.

VI. REPLACEMENT PARTS DATA

1. All replacement parts are keyed on the illustrations which follow. Order replacement parts by part number and part name, as shown on illustrations. DO NOT ORDER BY PART NUMBER ALONE.
2. Many of the parts on the illustrations, particularly electronic parts, are 'vendor items.' This means that they are standard commercial parts made by and purchased from other manufacturers. If you order from these outside sources, use the manufacturer's part number or designation as shown in the Electrical Parts List.
3. Always state the series or serial number of the machine on which the parts are to be used. The serial number is stamped on the unit nameplate.

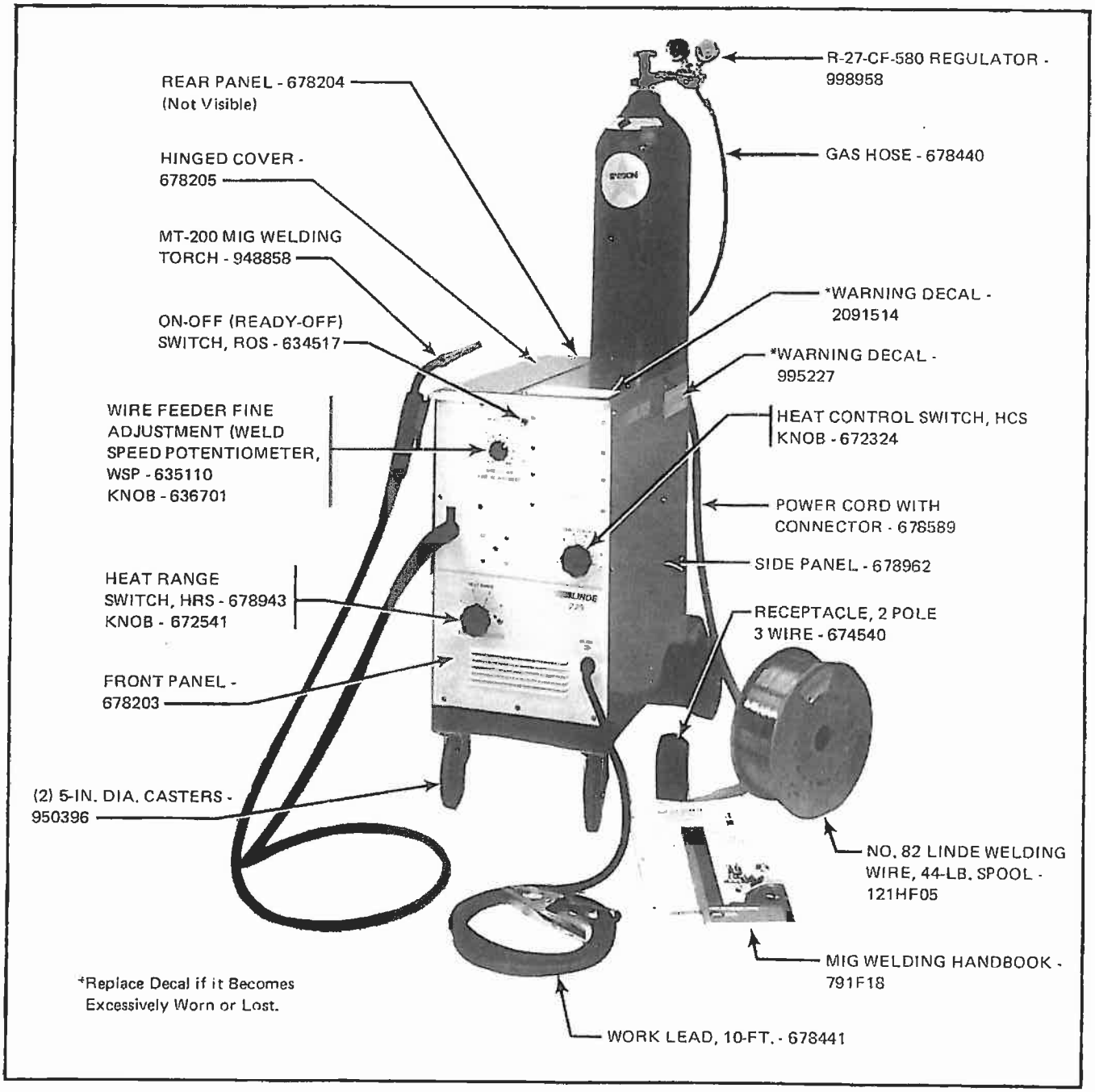


Fig. 11 - Front View, Migmaster LINDE 225, P/N 600507

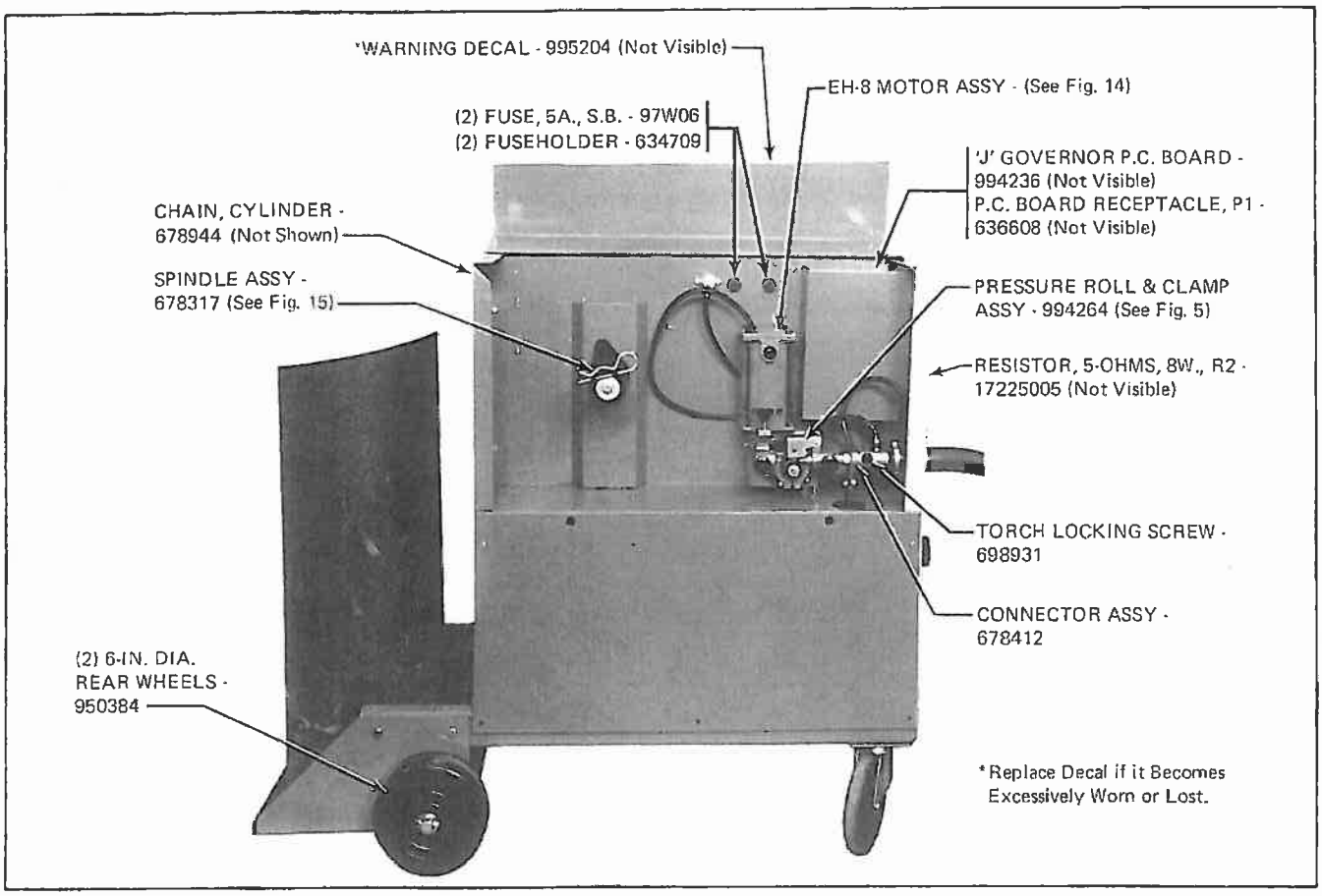


Fig. 12 - Left Side View, Migmaster LINDE 225, P/N 600507

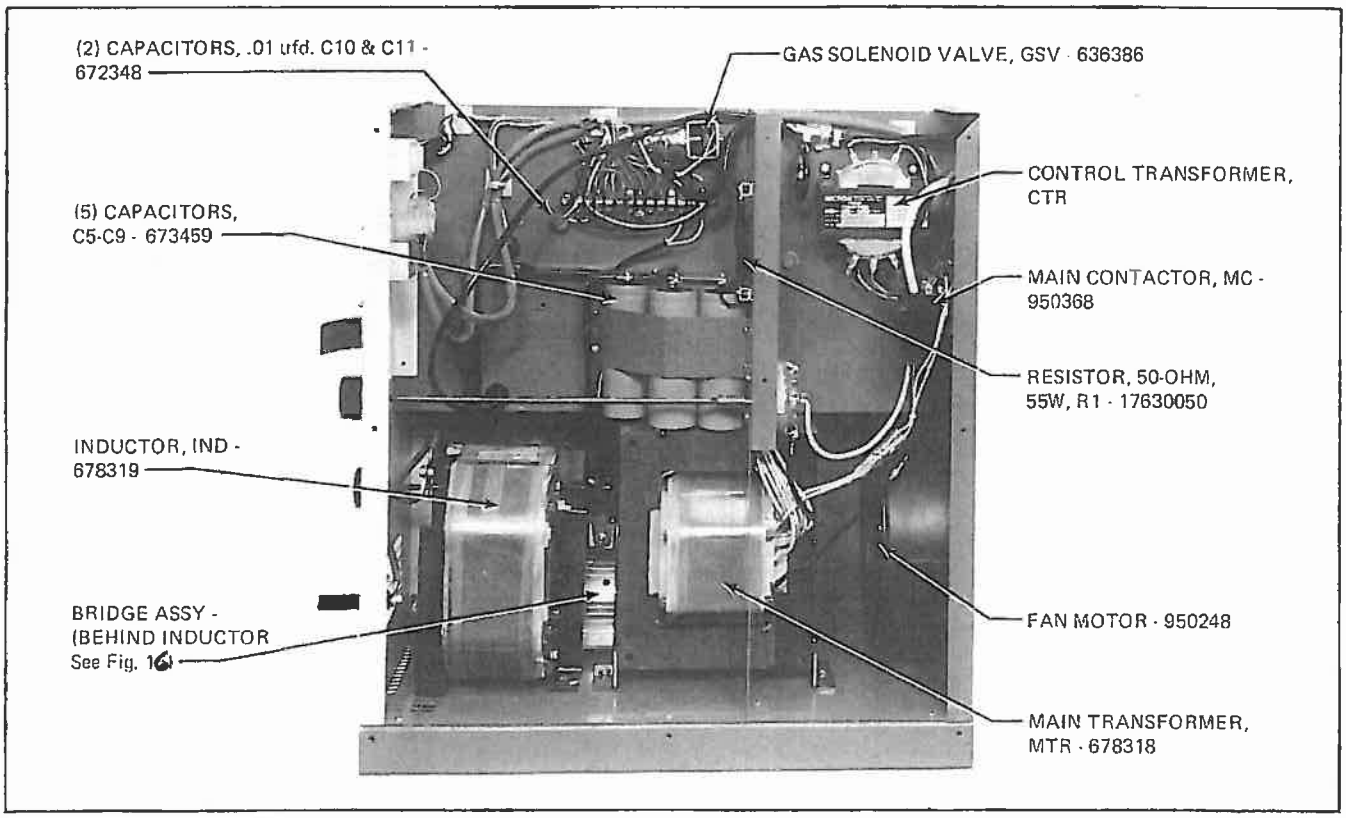
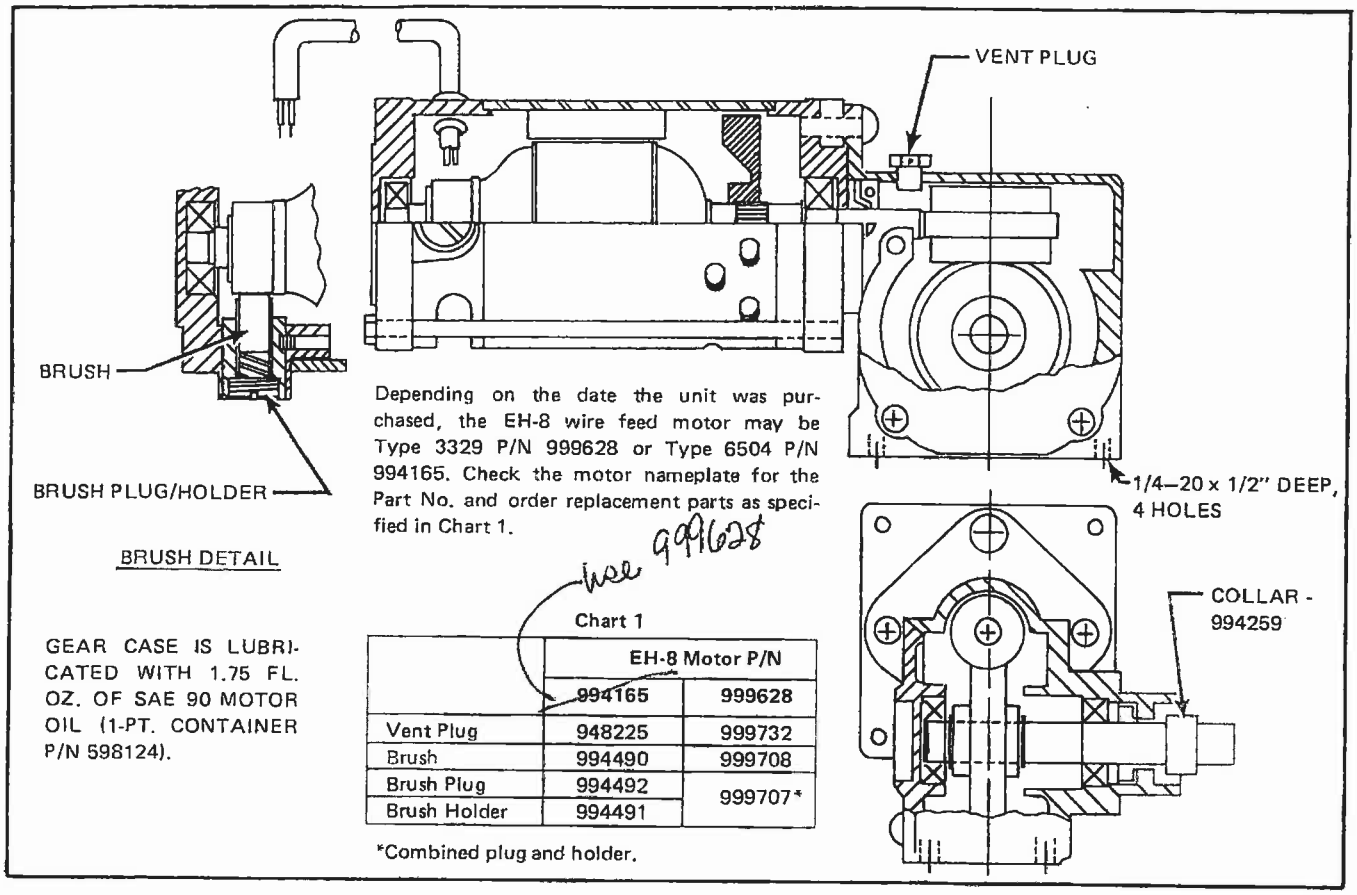


Fig. 13 - Right Side View, Migmaster LINDE 225, P/N 600507



Depending on the date the unit was purchased, the EH-8 wire feed motor may be Type 3329 P/N 999628 or Type 6504 P/N 994165. Check the motor nameplate for the Part No. and order replacement parts as specified in Chart 1.

GEAR CASE IS LUBRICATED WITH 1.75 FL. OZ. OF SAE 90 MOTOR OIL (1-PT. CONTAINER P/N 598124).

Chart 1

	EH-8 Motor P/N	
	~~994165~~ use 999628	999628
Vent Plug	948225	999732
Brush	994490	999708
Brush Plug	994492	999707*
Brush Holder	994491	

*Combined plug and holder.

Fig. 14 - EH-8 Motor-Gear Unit Assembly, P/N 999628

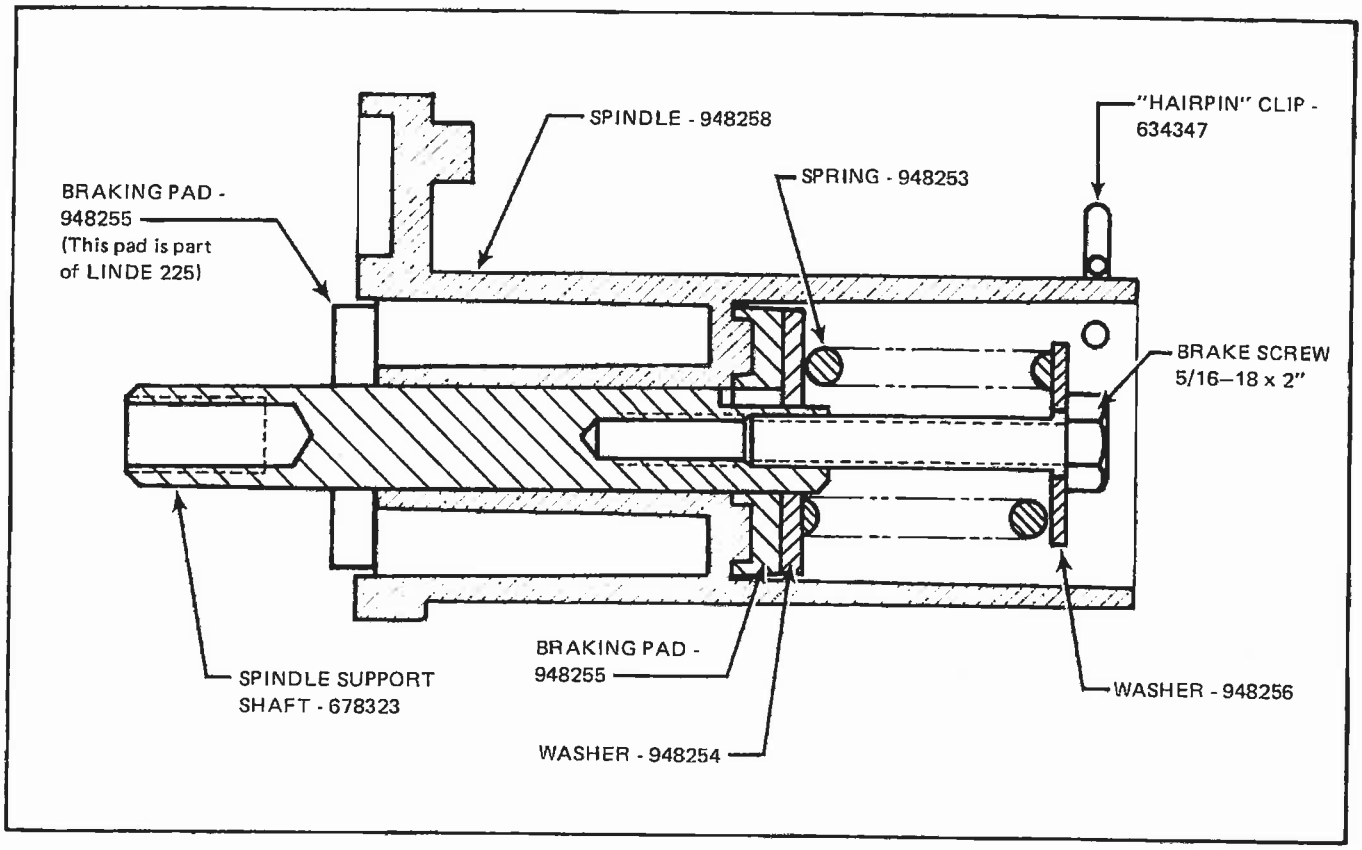
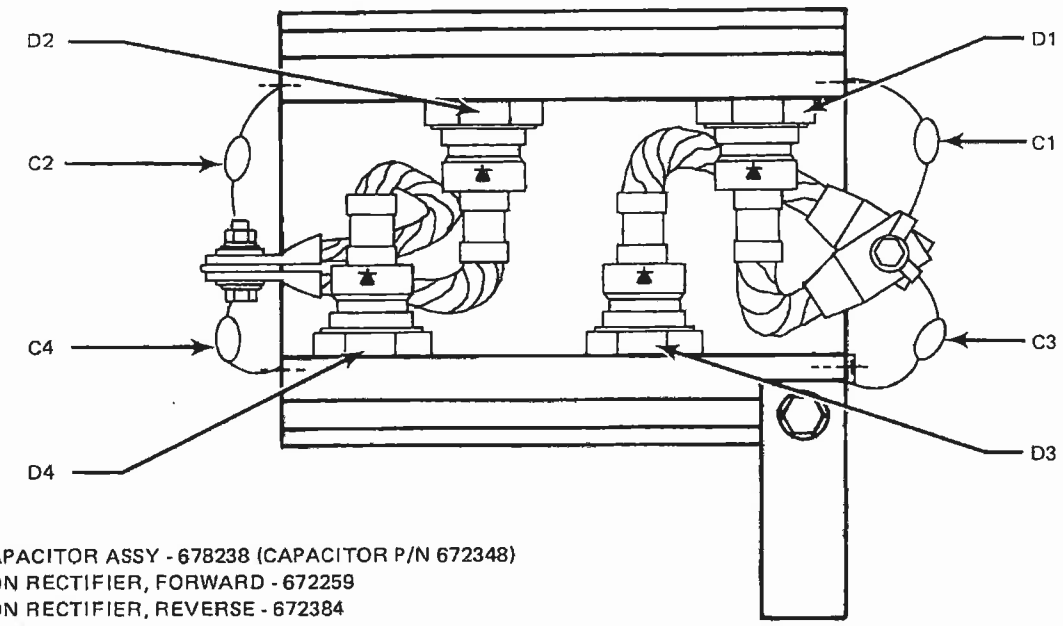


Fig. 15 - Spindle Assembly, P/N 678317



C1 THRU C4 CAPACITOR ASSY - 678238 (CAPACITOR P/N 672348)
D1 & D2 SILICON RECTIFIER, FORWARD - 672259
D3 & D4 SILICON RECTIFIER, REVERSE - 672384

Fig. 16 - Bridge Assembly

ELECTRICAL PARTS LIST

Symbol	Linde P/N	Description and Vendor
C1-C4, C10- C11	672348	Capacitor .01 uf, 1000 WVDC, Sprague P/N 5GA-S10, Murata P/N GPK-103ME.
C5-C9	673459	Capacitor, 9800 uf. 50 WVDC, Mepco Electric P/N 3186EH982U050AMA2, Cornell Dubilier P/N FAH 5527 V
CTR	950370	Transformer, Micron Ind. Corp. P/N EN362CB130057CT-UC.
D1, D2	672259	Rectifier, Silicon, Forward, Forward Current 300 amps, peak rev. voltage 300 PRV, International Rectifier P/N 300 U30A, Westinghouse P/N R6100330XXYA.
D3, D4	672384	Rectifier, Silicon Reverse, Forward Current 300 amps, peak rev. voltage 300 PRV, International Rectifier P/N 300 UR30A, Westinghouse P/N R6110330XXYA.
F1, F2	97W06	Fuse, 5 amp, 125 V, Type: Slo-Blo 3AG, Littlefuse Cat. No. 313005.
FM	950248	Fan, Howard Industries P/N 5-50-7000.
GSV	636386	Solenoid Valve, Automatic Switch Co. P/N US8262D22.
HCS	950369	Switch, Ohmite Mfg. Co. P/N 312-8.
MC	950368	Contactor, 2 Pole, 40 a., 110 VAC, Furnas Elect. Co. P/N 42CE15AF or Sylvania P/N A77-309043A-32.
P1	636608	PC Board Receptacle, 22 Contacts, Elco Corp. P/N 00,-6022-022-940-002.
P2, P3	951504	Plug, Amp Inc. P/N 1-480710-0.
ROS	634517	Switch, DPST, Cutler Hammer Cat. No. 7561K6. Carling Switch Cat. No. 2GK51-73 (For either, specify locknut & lockwashers).
T1	673168	Terminal Block, 13 Terminals, Kulka Electric Corp. P/N 699-13-KT47-KT48, Curtis P/N GBS-13-TB22-TB23.
T2	95W12	Terminal Strip, 8 Terminals, Cinch-Jones Cat. No. 8-140, P/N 353-11-08-001, Curtis P/N 1508 (Closed Back).
TR	~~950371~~ 951037	Relay, DPDT, 24 VAC, ~~Magnacraft P/N W388AX-8.~~
WSP	635110	Potentiometer, 50K, 2 w, Ohmite Cat. No. CMU 5031, Allen Bradley P/N JA1N056S503UA, Clarostat P/N 53C3.

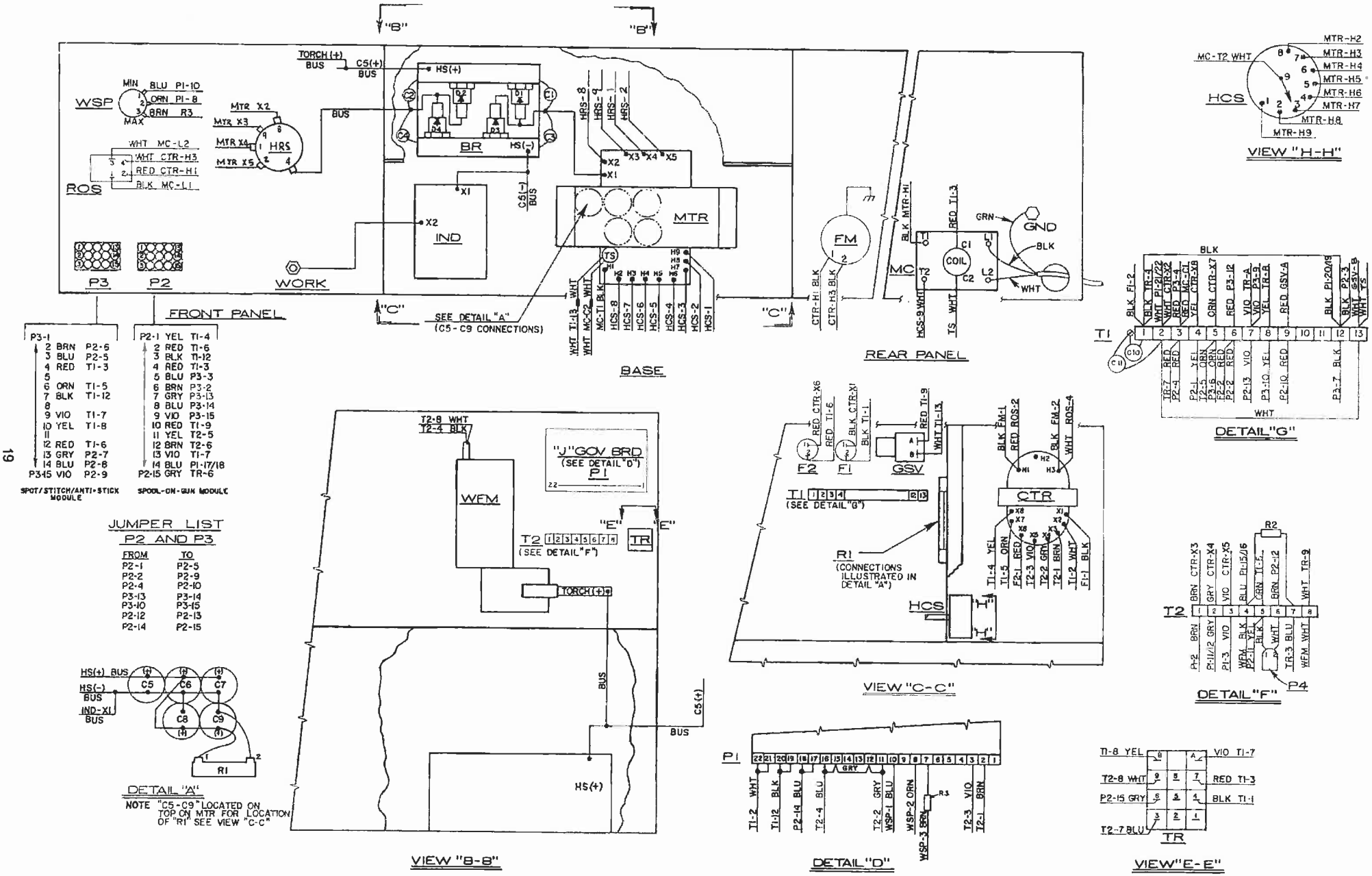


Fig. 17 - Wiring Diagram, LINDE 225

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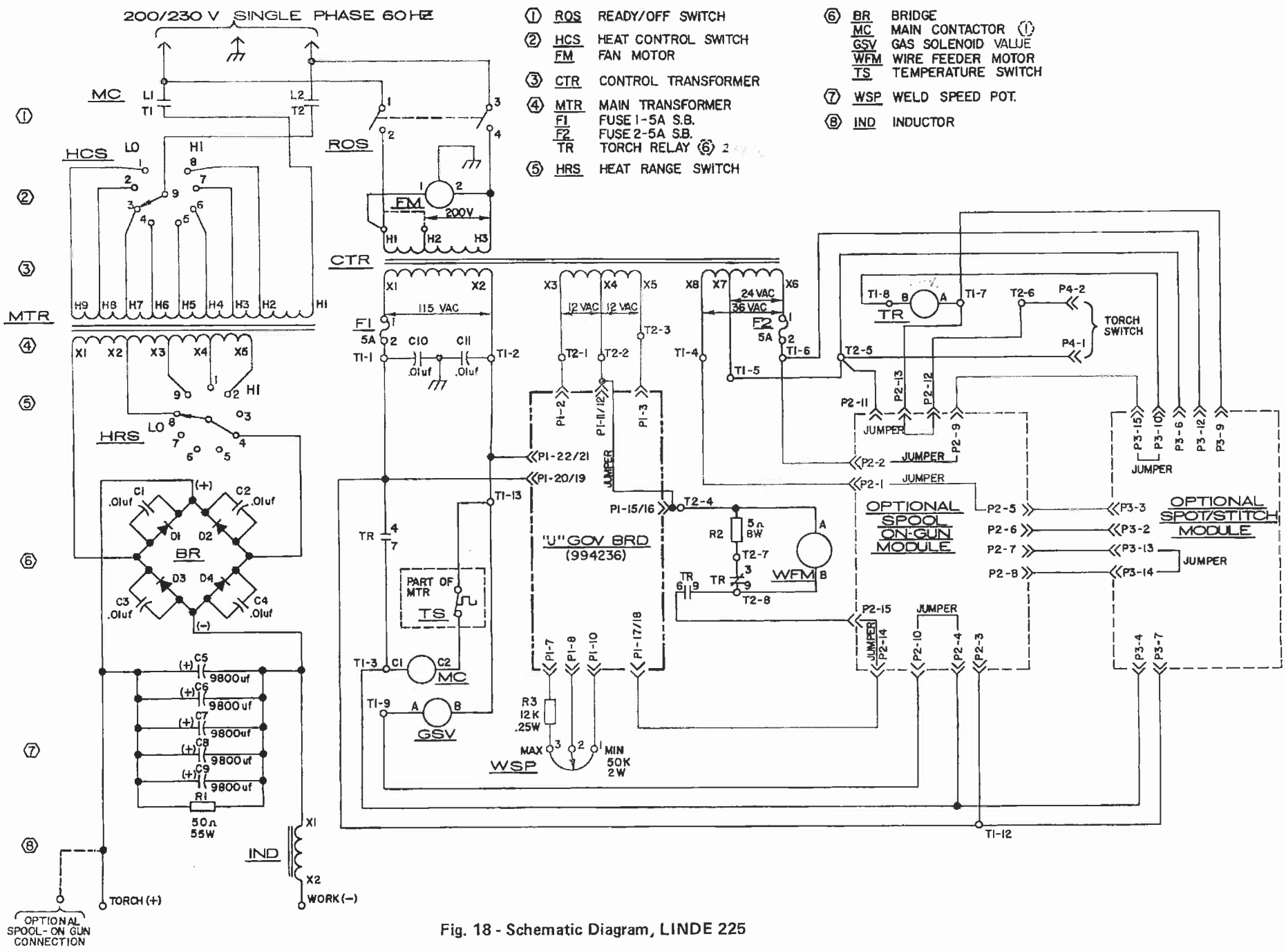

Fig. 18 - Schematic Diagram, LINDE 225

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