

FABSTAR[®] 2620, 4030
Transformer-Rectifier Welding Machine

For the Following Spec:

- 100009-1 FABSTAR[®] 2620 60 Hz
- 100010-1 FABSTAR[®] 4030 60 Hz
- 100009-3 FABSTAR[®] 2620 60 Hz
- 100010-3 FABSTAR[®] 4030 60 Hz



OWNER'S MANUAL Number **430429-404** (Rev - AA)
Revised October 11, 1999

IMPORTANT: Read these instructions before installing, operating, or servicing this system.

THERMAL ARC INC., TROY, OHIO 45373-1085, U.S.A.

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DIAGRAMS

DESCRIPTION OF EQUIPMENT

This unit is a constant voltage, transformer rectifier type DC welding machine that provides volt-ampere characteristic curves that are basically flat.

This unit is recommended to be used with gas metal arc welding (MIG) and flux core arc welding (with or without shielding gas) applications. This unit has to be used with a wire feeder. All Thermal Arc feeder models can be used with this unit. In some cases an adapter cable may be required.

A forceful (mild steel) tap is provided to give a forceful arc and is basically used on mild steel welding. A smooth (stainless) tap is provided to give a smooth arc that is used with stainless steel welding.

Controls and Outlets

1. **Input Power On/Off Switch** — The ON position energizes the power source and puts it in a ready state.

2. **Welding Voltage Control** — Adjusts arc welding output and open circuit voltage.

3. **Voltmeter** — Monitors open circuit voltage and welding voltages anytime secondary circuit is closed.

4. **Ammeter** — Monitors the current flowing through the welding arc.

5. **Positive Terminal (↕) (Forceful, Mild Steel) (For FABSTAR 2620 only)** — Serves as a connection point for the lead to the wire feeder when reverse polarity (DCEP) is desired, and to provide the user with a forceful arc.

5A. **Positive Terminal (↕) (Smooth, Stainless) (For FABSTAR 2620 only)** — Serves as a connection point for the lead to the wire feeder when reverse polarity (DCEP) is desired, and to provide the user with a smooth arc for stainless steel welding.

6. **Feeder Control Receptacle** — Connection point for a remote voltage control type wire feeder control (19-pin).

7. **Local/Remote Switch** — Selects voltage control function for either local or remote operation.

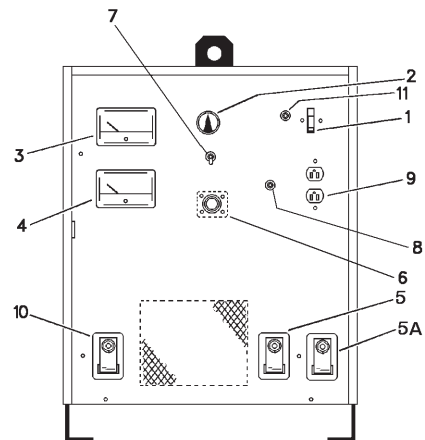
8. **Circuit Breaker (10 amps)** — Protects the 115-V AC control circuitry and the 115-volt receptacles.

9. **115-V AC Receptacles** — Provides auxiliary power for wire feeders, water pumps, etc. — 10 amps max at 100% duty cycle.

10. **Negative Terminal (–)** — Serves as a connection point for the lead from workpiece for reverse polarity (DCEP).

11. **Overload Indicator** — Yellow L.E.D., when lighted, indicates that machine has shut down as a result of amperage overload or rectifier overtemperature (S2).

12. **Stability Control Switch (For FABSTAR 4030 only)** — When the switch is in the mild steel (forceful), provides the user with a forceful arc. When the switch is in the stainless (smooth), provides the user with a smooth arc.



Control Panel for FABSTAR 2620

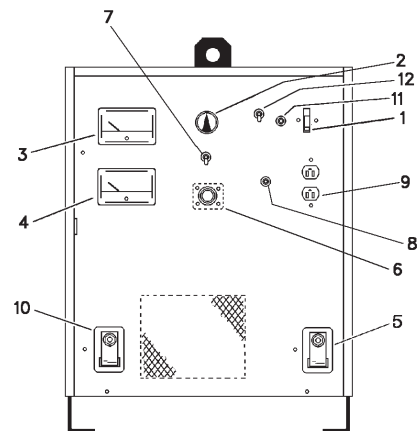


Figure 3-1 Control Panel for FABSTAR 4030

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DESCRIPTION OF EQUIPMENT

13. **Burnback Control** — A non-adjustable burn-back control system is designed into the power source. See Operation chapter for details.

ITEM	FABSTAR® 4030 100010-1 & -3		FABSTAR® 2620 100009-1 & -3	
	Rated Output Amperage	400 A	300 A	260 A
Rated Output Voltage	32 V	32 V	28 V	28 V
Rated Duty Cycle	60%	100%	60%	100%
Maximum Open Circuit Voltage	38 V		35 V	
Auxiliary Power (AC)	1.1 KVA-115 V, 10A		1.1 kVA-115 V, 10A	
Rated Input Voltage	200/230/460/575 V		200/230/460/575 V	
Rated Input Amperage	44/38/19/15 A at 300 amp rating		29/25/12.5/10 A	
Input kW	13.5 kW at 300 amp rating		8.7 kW at 200 amp rating	
Input kW	18 kW at 400 amp rating		10.6 kW at 260 amp rating	
Input Frequency	50/60 Hz		60 Hz	
Input Phase	Three Phase		Three Phase	

Table 3-1 Machine Specifications

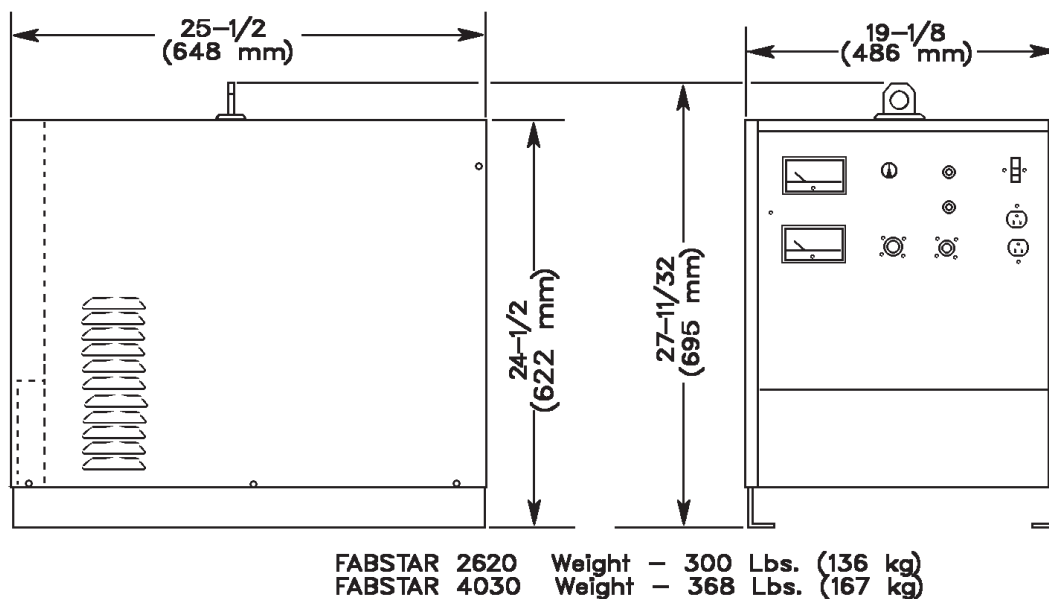


Figure 3-2 Dimensions and Weight Information

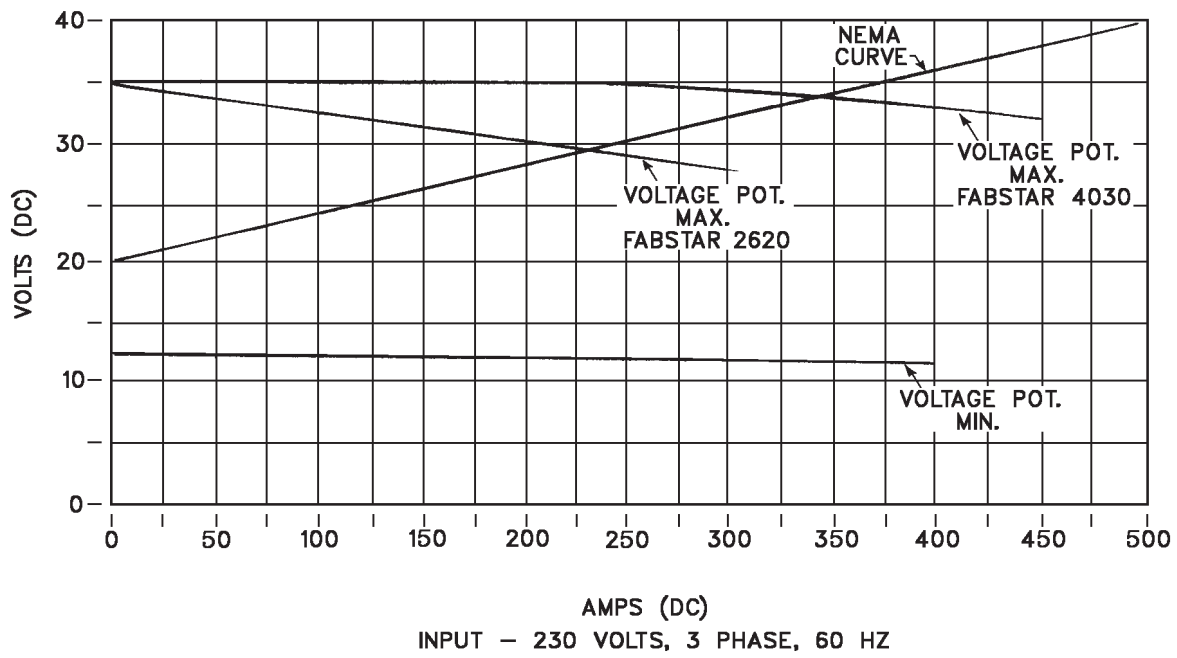


Figure 3-3 Volt Amp Curves

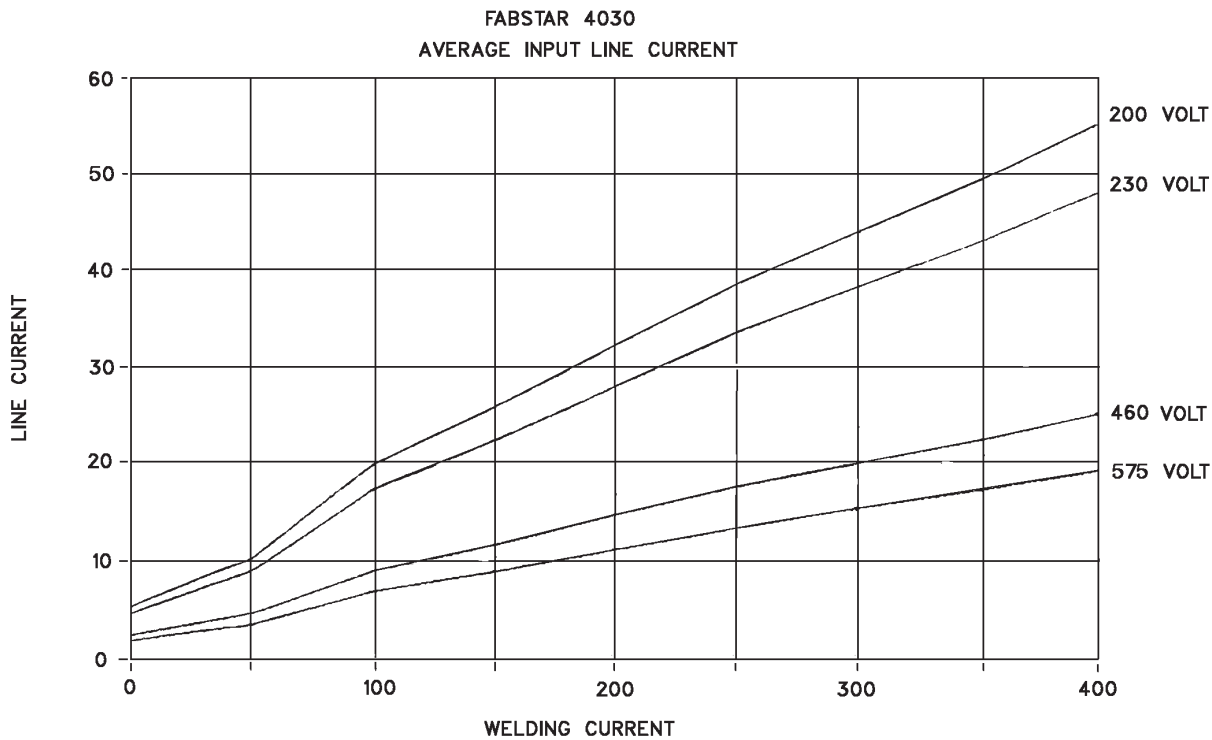
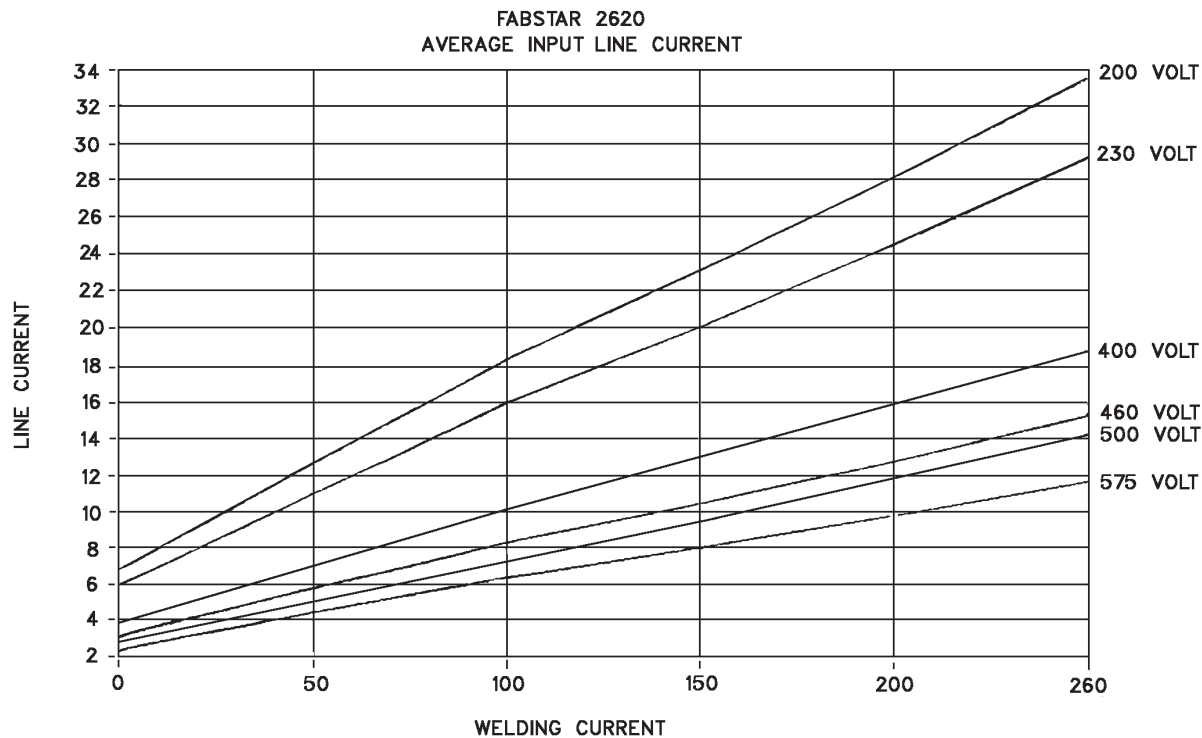


Figure 3-4 Input Line Current Chart

Duty Cycle

(Figure 3-5)

Duty cycle is the percentage of each ten-minute period of time that the welding machine may be operated under rated load conditions. For example, a duty cycle of 60% means that the machine can be

operated at rated load for an average of 6 minutes of each 10 minute period of operation. During the remaining 4 minutes, the machine must idle to permit proper cooling. Figure 3-6 enables the operator to determine the duty cycle at various welding amperages.

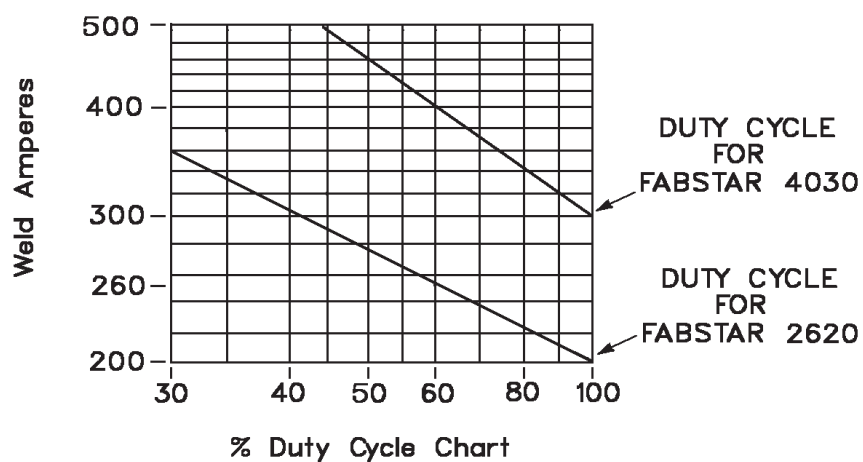
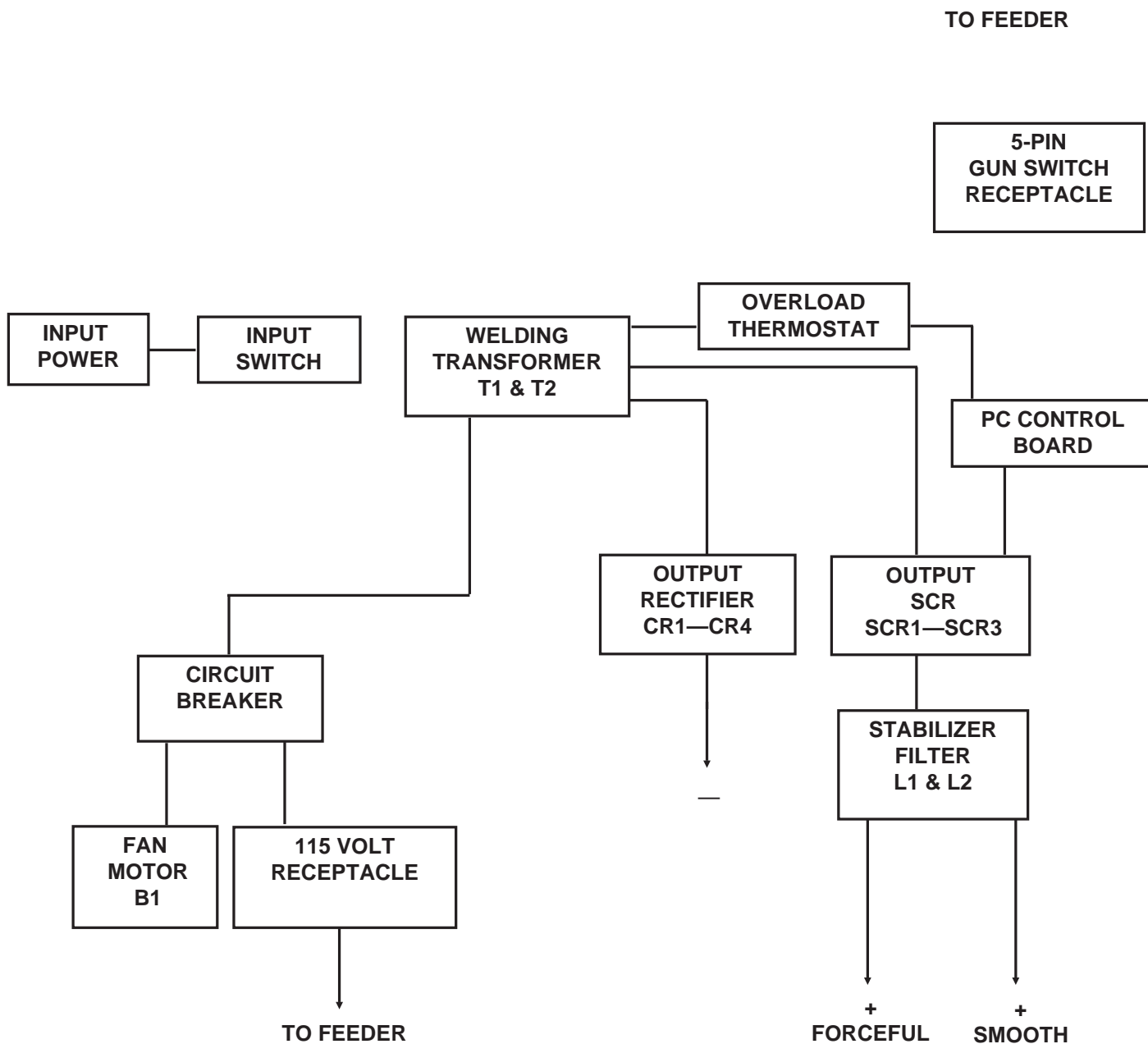
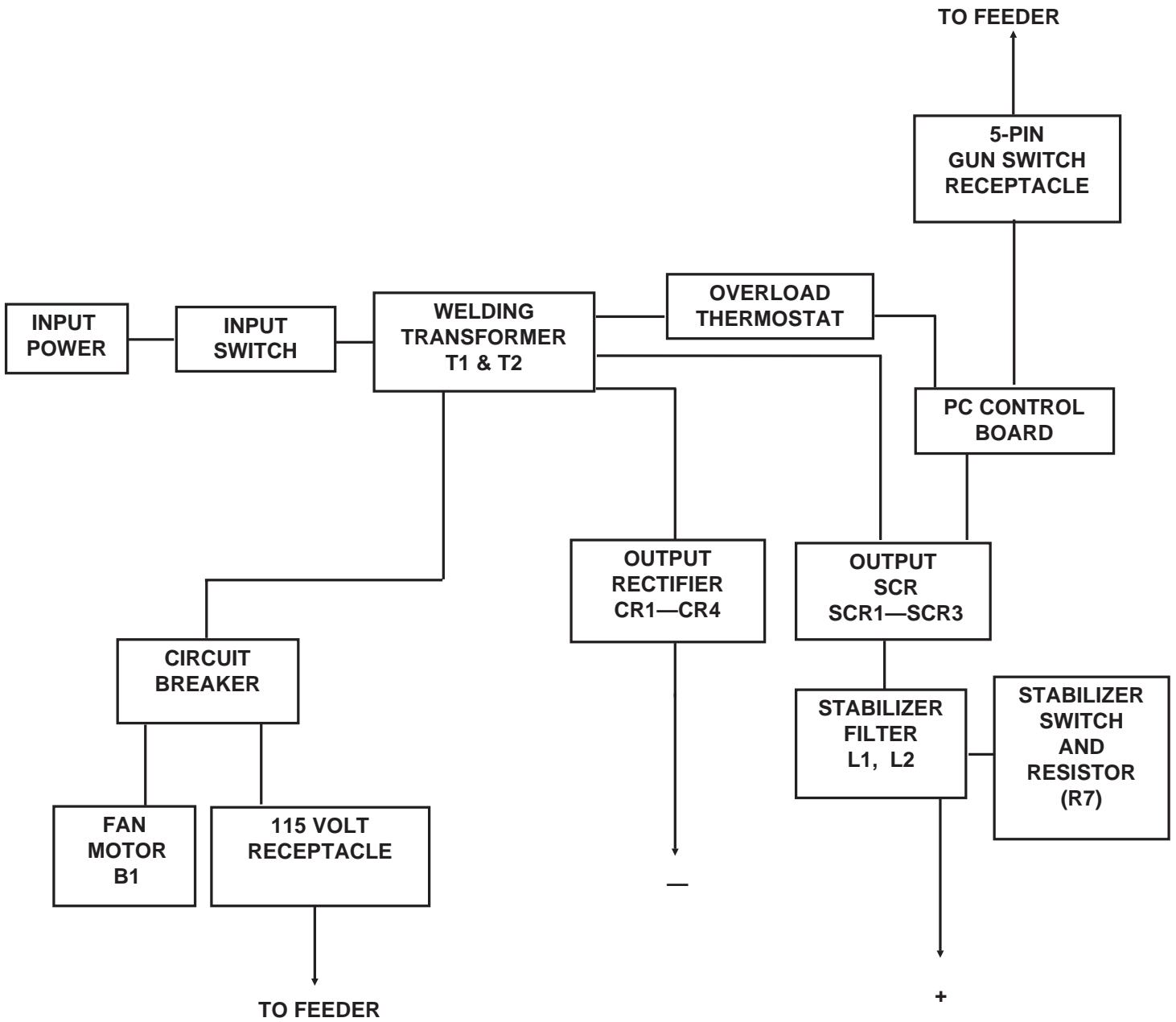


Figure 3-6 Duty Cycle Chart



Functional Block Diagram for FABSTAR 2620



Functional Block Diagram for FABSTAR® 4030

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INTRODUCTION

How To Use This Manual

This Owner's Manual usually applies to just the underlined specification or part numbers listed on the cover. If none are underlined, they are all covered by this manual.

To ensure safe operation, read the entire manual, including the chapter on Safety Instructions and Warnings.

Throughout this manual, the words **WARNING**, **CAUTION**, and **NOTE** may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:

WARNING gives information regarding possible personal injury. Warnings will be enclosed in a box such as this.

CAUTION refers to possible equipment damage. Cautions will be shown in bold type.

NOTE offers helpful information concerning certain operating procedures. Notes will be shown in italics.

Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a nameplate attached to the control panel. In some cases, the nameplate may be attached to the rear panel. Equipment which does not have a control panel such as gun and cable assemblies are identified only by the specification or part number printed on the shipping container. Record these numbers for future reference.

Receipt Of Equipment

When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to Thermal Arc, Order Department, 2200 Corporate

Drive, Troy, Ohio 45373-1085. Include all equipment identification numbers as described above along with a full description of the parts in error.






Move the equipment to the installation site before uncrating the unit. A lifting eye extends through the top of the cabinet on most equipment to facilitate handling with a hoist or crane. Use care to avoid damaging the equipment when using bars, hammers, etc., to uncrate the unit.

WARNING: Falling machine due to lifting eye failure may cause death or serious injury.

- Lifting device may fail when overloaded.
- This lifting device is designed to lift the power source **ONLY**. If the machine is equipped with a trailer or accessories over 100 pounds, **DO NOT LIFT** by lifting eyes.
- Avoid sudden jerks, drops, or swinging.
- Check lifting device components visually for looseness and signs of metal fatigue.
- Before changing any hardware, check grade and size of bolts, and replace with bolts of equal or higher size and grade.

Additional copies of this manual may be purchased by contacting Thermal Arc at the address given above. Include the Owner's Manual number and equipment identification numbers.

Meanings Of Markings And Graphical Symbols:

	Output Control Increase/Decrease
	Circuit Breaker
	Input Voltage Switch
	Wire Feed
115V AC 10 AMPS 	Receptacle Rating For Auxiliary Power

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INSTALLATION

Location

For best operating characteristics and longest unit life, take care in selecting an installation site. Avoid locations exposed to high humidity, dust, high ambient temperature or corrosive fumes. Moisture can condense on electrical components, causing corrosion or shorting of circuits. Dirt on components helps retain this moisture.

Adequate air circulation is needed at all times in order to assure proper operation. Provide a minimum of 12 inches (305 mm) of free air space at both front and rear of the unit. Make sure that the ventilator openings are not obstructed.

Grounding

The frame of this welding machine should be grounded for personnel safety. Where grounding is mandatory under state or local codes, it is the responsibility of the user to comply with all applica-

ble rules and regulations. Where no state or local codes exist, it is recommended that the National Electrical Code be followed. Refer to Table 4-1 for wire sizes.

The work or work table must also be grounded by using a conductor attached to a driven ground or water pipe as described below. See Figures 4-1 and 4-2.

The requirements and recommendations for grounding apply to rubber tire mounted equipment. In addition to the usual function of protecting personnel against the hazard of electrical shock due to fault in the equipment, grounding serves to discharge the static electrical charges which tend to build up on the surfaces of tire mounted equipment. These static charges sometimes cause painful shock to personnel, and in some instances, lead to the erroneous conclusion that an electrical fault exists in the equipment.

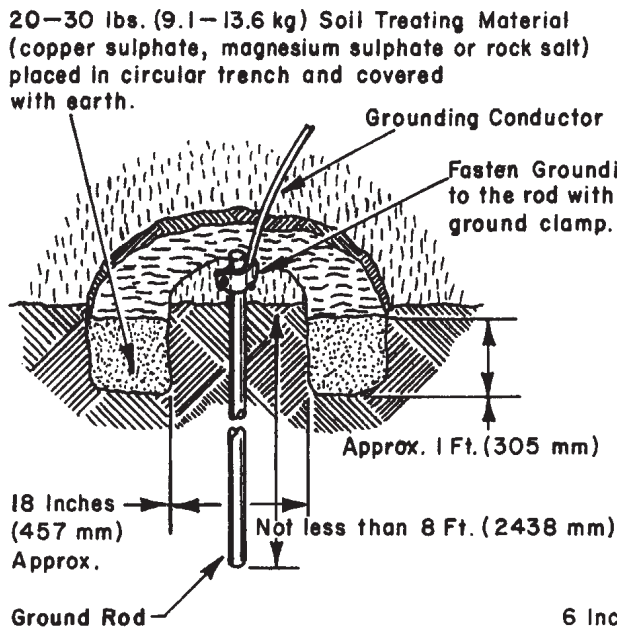
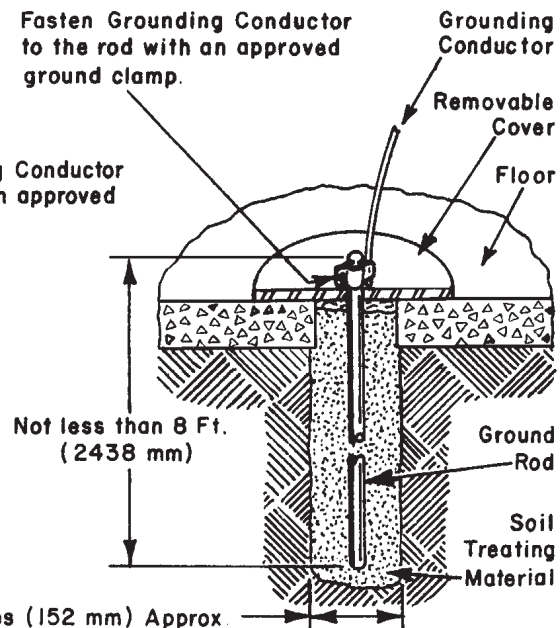


Figure 4-1 Outside Ground



A-008

Figure 4-2 Inside Ground

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Use an input-power cable assembly which includes a grounding conductor to connect this equipment to the input power supply. When included in the cable assembly, the grounding conductor will be green or green with a yellow stripe, or bare. Connect the grounding conductor to the equipment grounding terminal, if provided, and if not, to the equipment frame, taking care to see that good electrical contact is made between conductor and frame. Connect the other end of the grounding conductor to the system ground.

If, for any reason, an input cable which does not include a grounding conductor is used, the equipment may be grounded with a separate conductor if permitted under applicable code, or by special permission of the jurisdictional body responsible for enforcement of the code. Minimum size and color coding requirements must be in accordance with any applicable state or local code, or the National Electrical Code.

If metallic armored cable or conduit is used, the metal sheathing or conduit must be effectively grounded as required by state or local code, or the National Electrical Code.

If a system ground is not available, the welding machine must be connected to a driven ground rod (see Figures 4-1 and 4-2) or to a water pipe that enters the ground not more than 10 feet (3,048 mm) from the machine. Refer to the Wire and Fuse Size Chart, Table 4-1, for selection of the proper grounding conductor.

NOTE: The grounding conductor must be as short as possible in order to produce the most efficient installation.

Treating An Outside Ground — The soil treating materials are placed in a circular trench around the rod, but not in direct contact. The crystals are gradually dissolved by surface waters and the solution is carried into the most useful area of earth surrounding the electrode (rod). Flood the trench several times when making original installation. See Figure 4-1.

Treating An Inside Ground — Reduce the diameter of the hole to 6 inches (152 mm), pour soil treating material in and around the rod. Add enough water to dissolve 8 pounds (4.0 kg) of soil treating material. Flood the hole every 6 months and replace the soil treating material when it is all dissolved. See Figure 4-2.

Connection To Line Voltage

Refer to Table 4-1 for wire sizes required.

CAUTION: Conductor size shall be selected to meet NEC, CE Code, and local codes and shall be modified as required for line voltage drop and ambient temperature.

This welding machine operates on a three-phase, AC input. See nameplate of the machine to determine required input voltage and frequency. Make certain that the welding machine is connected for the power supply voltage available. The input power cables should be connected to the power supply through a fused disconnect switch (furnished by the customer). Refer to the identification nameplate to determine the rating of the machine, then consult the local power company for wire and fuse size

Line Voltage	Input Wire Size (AWG)*		Ground Wire Size (AWG)*	Lag Fuse Rating	
	Fabstar 2620	Fabstar 4030		Fabstar 2620	Fabstar 4030
200	8	8	8	50	50
230	8	8	8	40	60
460	12	12	12	30	30
575	12	12	12	20	30

** Input conductor sizes are based on allowable ampacities of insulated copper conductors, with not more than three conductors in a raceway or cable.*

Table 4-1 Recommended Wire and Fuse Sizes

code. If no code exists, use the size of wire fuses listed in Table 4-1.

Input Connections To Power Source

WARNING: The fused disconnect switch: Open or place in the OFF position and remove the fuses. To avoid an accident, make the electric power connections to the welding machine first, then to the fused disconnect switch. This will prevent an accidental application of power while the machine is being connected.

1. A line (wall) disconnect switch, with fuses or circuit breakers should be provided at the main power panel (see Figure 4-3). The primary power input must have four insulated copper conductors

(three power leads and one ground wire). The wires may be heavy rubber-covered cable or may be run in a solid or flexible conduit. Do not connect the input conductors until step 3.

2. For access to input terminal board, remove the screws which secure the right side panel of the power supply. The input terminal board, Figure 4-3, is clearly marked to show the available primary voltage connections which may be used. Set the voltage links, on this board, to match your actual incoming voltage. Connect the 2 and 3 black wires from input power switch to match the input voltage. As shipped from the factory, the input terminal board voltage links are set up for the highest line voltage.

3. Thread the input conductor cables from the wall disconnect switch through the hole in the rear panel and through the hole in the yoke to the input power switch on the front panel (see Figure 4-3). Connect the conductors to terminals on the input power switch using UL listed pressure wire connectors. Connect the ground wire to the grounding stud provided on the lifting yoke near the changeover board.

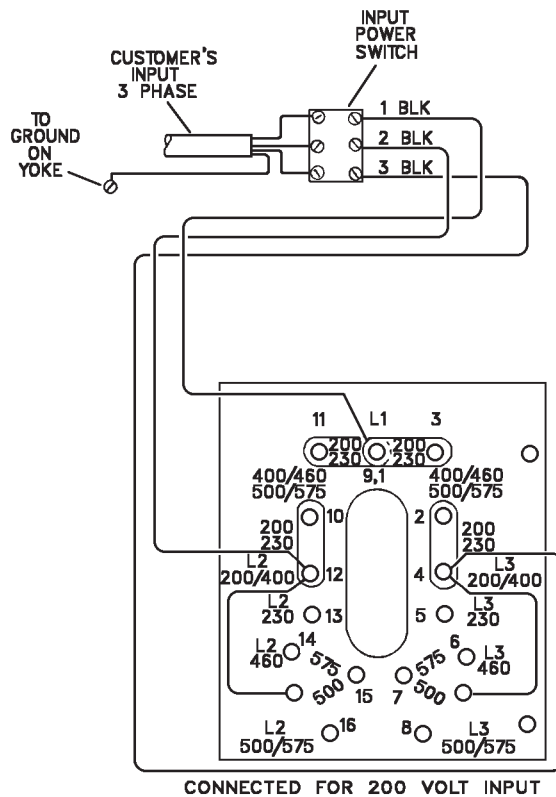


Figure 4-3 Input Voltage Connection and Changeover

WARNING: It is of the utmost importance that the chassis be connected to an approved electrical ground to prevent accidental shocking. Take care not to connect the ground wire to any of the primary leads.

4. Recheck all connections to make sure that they are tight, well insulated, and that the proper connection has been made.

Welding Leads

Use Table 4-2 for selection of the proper size copper welding leads.

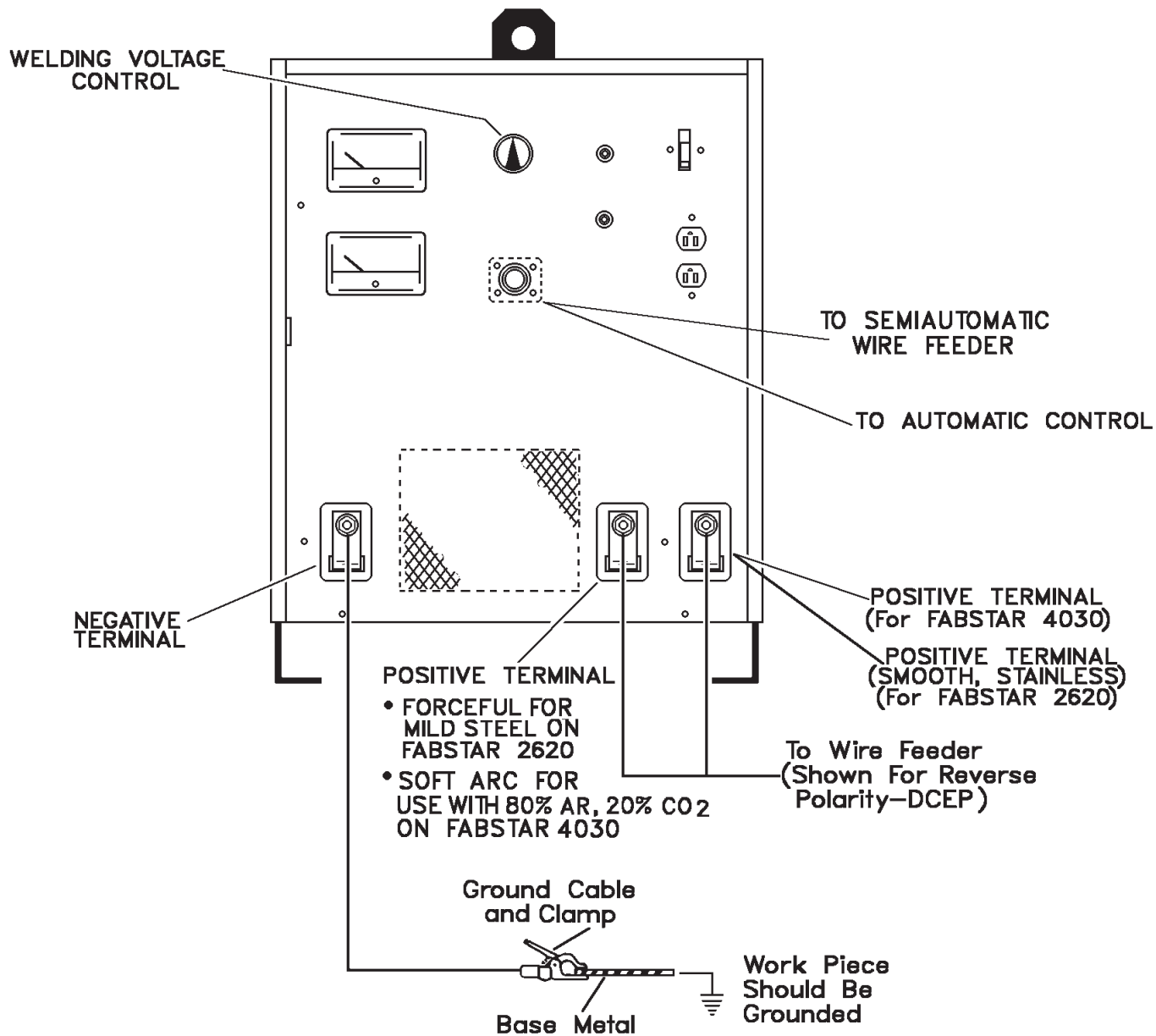
Welding Current Amperes	TOTAL LENGTH OF LEAD CIRCUIT IN FEET (AND METERS) (ELECTRODE LEAD PLUS WORK LEAD)				
	50 Feet (15.2 M)	100 Feet (30.5 M)	150 Feet (45.7 M)	200 Feet (61.0 M)	250 Feet (76.2 M)
100	#4	#4	#2	#1	#1
150	#2	#2	#1	#1/0	#2/0
200	#1	#1	#1/0	#2/0	#3/0
250	#1/0	#1/0	#2/0	#3/0	#4/0
300	#2/0	#2/0	#3/0	#4/0	2 – #2/0
350	#3/0	#3/0	#4/0	2 – #2/0	2 – #3/0
400	#4/0	#4/0	#4/0	2 – #2/0	2 – #3/0

NOTE: Lead size shown is for 90°C (194°F) insulation, 30°C (86°F) ambient, and not over 4.5 volts lead

Table 4-2

OPTIONAL EQUIPMENT	FABSTAR 2620	FABSTAR 4030
1. Model 2400	X	X
2. Model 2410	X	X
3. Model 2200	X	X
4. Model 2210	X	X
5. Model 17	X	X
6. Porta-Feed 17	X	X
7. Dual Feeder (without remote voltage)		X
8. Mega-Con 3		X
9. Remote Mega-Con 3 Control Cable Assembly		X
10. Remote Voltage Control		X
11. Remote Voltage Control Cable Assembly		X

Table 4-3 Wire Feeder Compatibility Table



NOTE: To change polarity, reverse connections on power output terminals on power source.

Figure 4-4 Installation Diagram

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OPERATION

Before operating this unit, be sure that all installation instructions have been accomplished. A thorough knowledge of system cleaning as instructed in Maintenance chapter is required for consistently satisfactory results. Also observe all applicable safety warnings listed in the Safety Instructions and Warnings chapter included in this manual and related instruction manual.

The operating instructions in this manual pertain only to the FABSTAR® welding machine, but reference is made to other items of equipment not included as part of the FABSTAR®. Before operating, consult technical manuals related to specific wire (electrode) feeders and welding guns usually used with this unit.

1. Perform all preset operations on welding gun and wire feeder.
2. Check installation (refer to Installation Diagram, Figure 4-4) to be certain all connections are tight and proper controls, gas, and torches are installed.
3. Set Voltage Control on the unit to the desired welding voltage.
4. Turn on gas supply at gas cylinder.
5. Turn control power switch to ON position. The cooling fan should now start.

NOTE: A thermostatically controlled fan motor is optional (Fan Turn-on Thermostat Kit 200155A), which may be incorporated into the system that stops and starts automatically when a predetermined temperature has been reached.

6. Adjust the gas supply to the desired flow rate.
7. Place the welding gun in proximity of the work.
8. Activate the gun switch. Open circuit voltage will appear, welding gas will flow, and the arc will initiate.
9. Readjust any controls as necessary.

CAUTION: Once a welding arc is established, power should not be removed from the welding machine, and the INPUT POWER ON/OFF SWITCH should not be turned OFF.

10. To terminate welding, proceed in the following manner:

- a. Deactivate the gun switch. Gas will stop flowing.
- b. Keep the gun in the WELD position momentarily (approximately 1/2 second) so the burnback circuit operates.

Burnback Operation — When the gun switch is released, the burnback circuit lowers the voltage to a value which is too low to maintain an arc. The arc will go out. If the wire continues to coast into the weld, there is still enough power at the lower burnback voltage level to “burn off” the end of the wire. This removes the ball on the end of the wire and prepares it for the next start. It also prevents the wire from burning back to the tip or sticking in the weld puddle. The burnback time and burnback voltage is selectable.

Jumpers on the Control Board control these values. JP2 controls the burnback time and JP1 control the burnback voltage. Selection is made by removing the Jumper Block and relocating. Factory settings are shown in Figure 5-1.

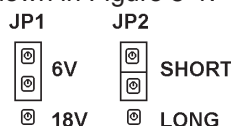


Figure 5-1

The chart below shows some suggested settings for burnback time and voltage.

Wire Type	Size	JP1 Wire Volts	JP2 Time
(FACTORY SETTINGS)		6	SHORT
ER70S-3	.035	6	Short
ER70S-3	.045	18	Short
E71T-1	.045	18	Short
ER308L	.035	6	Short
ER4043	3/64	6	Short

NOTE: These recommendations are based on overall performance. Specific applications may require different settings.

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The gun must remain in the welding position after the gun switch is released to obtain the best results from the burnback circuit. This method of burnback eliminates the need for a time adjustment and prepares the wire for a good restart.

c. Turn off the gas at source.

d. Turn the INPUT POWER Switch to OFF position.

e. Place the fused disconnect switch in the OPEN or OFF position.

This unit is equipped with an overload indicator – yellow L.E.D. When lighted, indicates that the machine has shutdown as a result of amperage overload or overtemperature.

To reset the overload indicator, release the gun trigger switch. If the indicator light goes out, the indication was due to amperage overload. If the light does not go out, the indication was due to an

overtemperature condition. The unit will not weld until the overtemperature condition has dissipated and the light goes out. If the light comes on repeatedly or often, then investigate for the cause of overload or overtemperature and take steps to correct the causes.

Some causes of overload are:

- 1) Gun contact tip shorted to workpiece.
- 2) Diameter of filler wire too large for machine rating can cause overload to trip on weld starts.

Some causes of overtemperature are:

- 1) Exceeding current rating and/or duty cycle rating of machine.
- 2) Blocked or restricted air inlets or outlets to machine.

MAINTENANCE

Replacing SCRs

Replacing an SCR is a critical task but it can be accomplished in the field by following the instructions in the Detailed Troubleshooting Instructions section located in the Troubleshooting chapter of this manual.

Lubrication

The fan motor incorporates sleeve bearings. You can expect the life of this motor to exceed 50,000 hours without relubrication. Periodically cleaning the motor and lubricating the bearings will extend the life of the motor. The following table will furnish a recommended guide as to the frequency of this lubrication if desired.

TYPE OF DUTY	LUBRICATION INTERVAL
Light (up to 6 hrs./day)	Every 12 mo.
Moderate (7 to 15 hrs./day)	Every 6 mo.
Heavy (16 to 24 hrs./day)	Every 3 mo.

NOTE: Apply 1-12 drops of 20W non-detergent oil at each end of bearing.

Inspection and Cleaning

For uninterrupted, satisfactory service from this welding machine, it is necessary to keep the machine clean, dry, and well ventilated. At least every three months, or more often as necessary, wipe and blow out all dirt from the machine's internal components, with air pressure of not over 25 psi (172 kPa). Be sure to wipe the fan blades clean.

Check and tighten all electrical connections as necessary to eliminate unnecessary losses and to avoid subsequent trouble from overheating or open circuits. Check for broken wiring or damaged insulation on wiring.

WARNING: Disconnect line voltage from the unit before attempting any servicing inside unit. Turn off fused disconnect switch that supplies power to welding machine, and remove its fuses.

CAUTION: The flow of air through the welding machine is carefully directed by baffles. Never operate the welding machine with any of the side or top panels removed or open, as serious damage to the rectifiers might result.

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TROUBLESHOOTING

The following chart contains information which can be used to diagnose and correct unsatisfactory operation or failure of the various components of the welding machine. Each symptom of trouble is followed by a list of probable causes and the procedure necessary to correct the problem.

See Wire Feeder or Welding Gun Manual for troubleshooting information on the Wire Feeder or the Welding Gun.

Troubleshooting Guide

Welding machine will not start.

Power switch OFF

Place power switch in ON position.

Overtemperature thermostat has tripped. (Yellow indicator on)

Allow machine to cool to reset thermostat. (Yellow indicator will go out)

Power lines dead

Check voltage.

Broken input power lead

Repair.

Wrong line voltage

Check line voltage.

Incorrect input power connections at welding machine

Check connections against wiring diagram.

Tripped circuit breaker or fuse on input lines

Reset circuit breaker or replace fuses.

Unit delivers welding current but soon shuts down.

Overtemperature thermostat has tripped. (Yellow indicator on)

Allow machine to cool to reset thermostat. (Yellow indicator will go out)

Welding machine overloaded

Reduce load, overload can be carried only for a short time.

Duty cycle too high

Do not operate continually at overload currents.

Power leads too long or too small in cross section

Replace with larger diameter cable.

Ambient temperature too high

Operate at reduced loads when temperature exceeds 104°F (40°C).

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TROUBLESHOOTING

Ventilation blocked

Check air intake and exhaust openings to be unobstructed.

Fan not operating

Check bearings, disconnect leads and apply motor nameplate voltage to test.

Solid-state contactor operates, but welding machine will not deliver welding current, and open circuit voltage is present at the output when gun switch is depressed.

No ground connections at work

Make connections.

Welding cables not connected

Make connections.

Voltage control does not control welding voltage.

Potentiometer burned out

Replace.

Control circuit board failure

Refer to Detailed Troubleshooting Instructions, Printed Circuit Board section.

Fan not operating (also see causes and remedies under “Welding machine will not start”)

Defective fan control thermostat (If equipped)

Replace thermostat.

Motor failed

Replace or repair.

Broken lead or connection to fan motor

Repair wiring.

Tripped circuit breaker on front panel of welding machine

Reset circuit breaker; 115-volt circuit may be overloaded.

Operator gets shock when welding machine case, ground cable, work, or work table is touched.

Case of welding machine not grounded (Poor protective earth connection)

Ground welding machine case, and check for good protective earth connection.

Abnormal current fluctuation, voltage nearly constant.

Irregular wire feed speed

See welding head manual.

Inadequate shielding of arc by flux or gas

Increase shielding by trial and error. See welding head manual.

Wire feed rate too slow

Increase wire feed. See wire burn-off rate charts.

Too much shielding gas

Decrease by trial and error. See welding head manual.

Loose cable connections

Check for overheated connections and tighten.

Welding contact tube (tip) on wire feeder makes poor contact with electrode

Check contact tube hole size and replace with proper tube.

Very noticeable, rough, sputtering arc. Loss of control and burnback. Minor starting problems.

Control circuit board failure

Refer to Detailed Troubleshooting Instructions section of this chapter.

Detailed Troubleshooting Instructions

The FABSTAR® 4030 machine is a solid-state welding machines. The method of troubleshooting is different, but it is not more difficult than troubleshooting a conventional unit. Do not overlook the obvious. As in the case of all electrical equipment, loose connections are the primary cause of malfunction both internal and external to the welding machine. Do not overlook bad grounds, worn contact tubes (tips), dirty cable liners, shorted control cables, wrong settings, blown fuses, worn contactors, misconnections from feeding equipment, misapplication, etc. The only equipment needed to properly detect a problem on this welding machine is a simple voltohmmeter, although an oscilloscope is the best method to quickly "see" the problem.

Control Circuit Board Malfunction — If a board malfunction occurs, the following situations will probably result:

1. Loss of arc completely.
2. Very noticeable, rough, sputtering, arc.
3. Loss of control and burnback.
4. Minor starting problems.

Mounting Procedure for SCRs

1. Thoroughly clean heat sink surface to eliminate any dirt or contamination.
2. Apply a thin coat of Alcoa #2 compound to cleaned surface. Alcoa #2 is available from Thermal Arc, part number 903870.
3. Positively locate the SCR in place in the heat sink. A small spring pin in the extruded heat sink will locate the SCR.
4. Place the clamp in position with the bolts through the holes in the heat sink, and proceed in following manner.
5. Tighten the nuts evenly until finger tight.
6. Tighten each bolt in 1/4 turn increments using correct size hex key.
7. Place the Force Indicator Gauge (903878) firmly against the springs as shown. Be sure both ends and the center are in firm contact with the springs. The gauge notch location will indicate the spring deflection or force. Correct mounting force is indicated as shown below.
8. Spring deflection over 2-1/4 inches of spring is $.037" \pm .002"$ for all clamps.

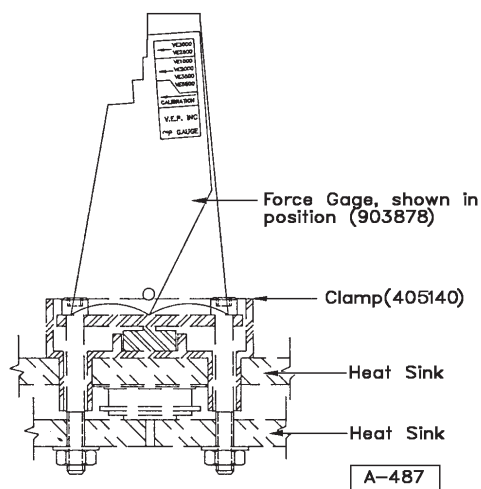
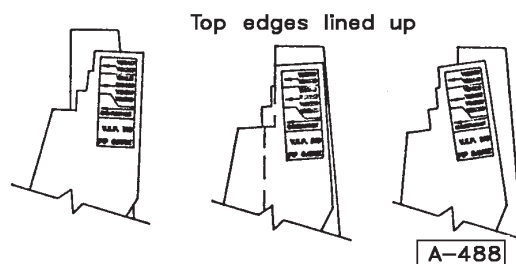


Figure 7-1

Examples:



Less than rated force. Tighten nuts alternately 1/4 turn at a time until points coincide.

Correct rated force.

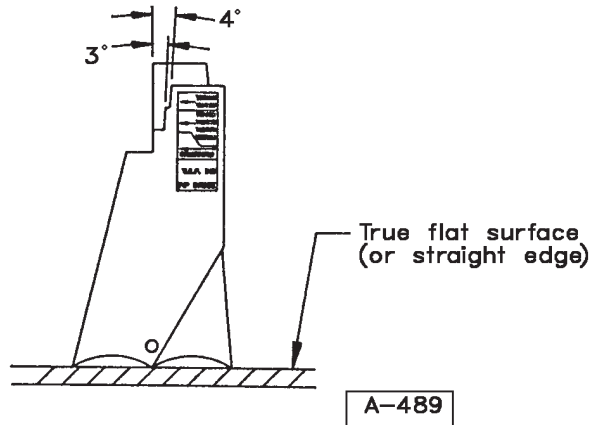
Excessive force. Loosen both nuts and start over. **NEVER** adjust force by backing off the nuts. Friction will produce a false reading. Always start from Step 1.

Figure 7-2

9. All clamps to be set at 4° mark. This corresponds to the VE3000-VE2500 section on the gauge label.

To Calibrate Force Gauge:

If the gauge is suspected of being out of calibration due to wear or damage, check it on a flat surface as shown below.



If the calibration edges do not line up, calibrate the gauge by filing the bottom contact points.

Figure 7-3

Testing Procedures (Printed Circuit Board)

See Figure 7-4.

Test point 3 (3) is the common ground and the negative probe should be connected to this point unless otherwise specified. All test readings are based on the line voltage supply being within specifications, that is, not exceeding $\pm 10\%$ of nominal line voltage. For example, on a 460-volt, 3-phase line, the line voltage must not exceed 506 volts, or be less than 414 volts.

Adjustments (Preset at factory) — The following describes the factory adjustments. It is not intended that the adjustments be made in the field. Refer to Figure 7-4 for reference to P.C. Board (203909B).

1. Balance Adjustment for Conduction Angle of SCRs — The potentiometers R-12, R-13 are used to adjust the balance.

2. Arc Establish — J-2 plug pins 1 and 6. The remote Mega-Con 3 Cable Kit (H.B. P/N 203972), the 19-pin receptacle pin M (J-2 plug pin 1), and Pin L (J-2 plug Pin 6) — Pin 6 is common ground. Pin 1 will have + 15 volts, when the output amps is 50 amps (R68 adjusts this) or more, and pin 1 will drop to "0" volts when with 20 amps or less.

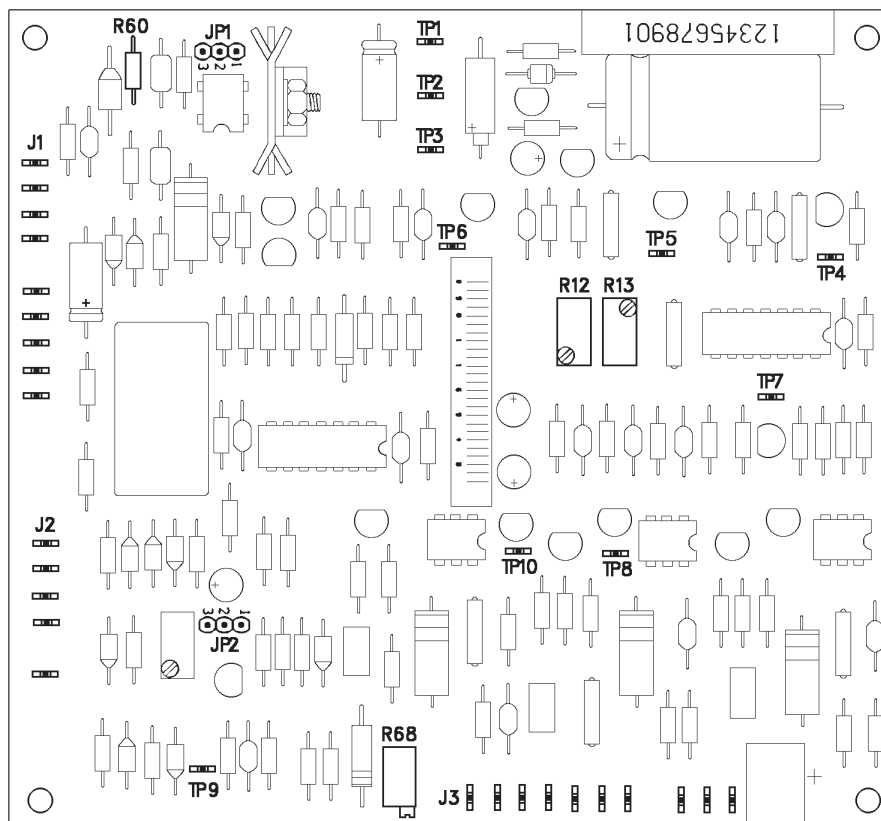


Figure 7-4

TEST	TEST POINTS	ADJUSTING POT	VOLTAGE	REMARKS
1	TP2 (+) TP3		30 \pm 10% DC	Checks positive supply voltage Checks R60 fuse to power supply
2	TP1 (+) TP3		15 V \pm .75 V	Checks voltage regulator
3	TP4 (+) TP3 TP5 (+) TP3 TP6 (+) TP3	R12 R13	Same as TP4	Adjusts phase balance of all three phases
4	TP8 (+) TP3		400 Amps = 5 V \pm 10%	Checks shunt amplifier

Table 7-1

PARTS LIST

Equipment Identification

All identification numbers as described in the Introduction chapter must be furnished when ordering parts or making inquiries. This information is usually found on the nameplate attached to the equipment. Be sure to include any dash numbers following the Specification or Assembly numbers.

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SPECIFICATION NUMBER

100009-1

430429-404-1
PARTS LIST

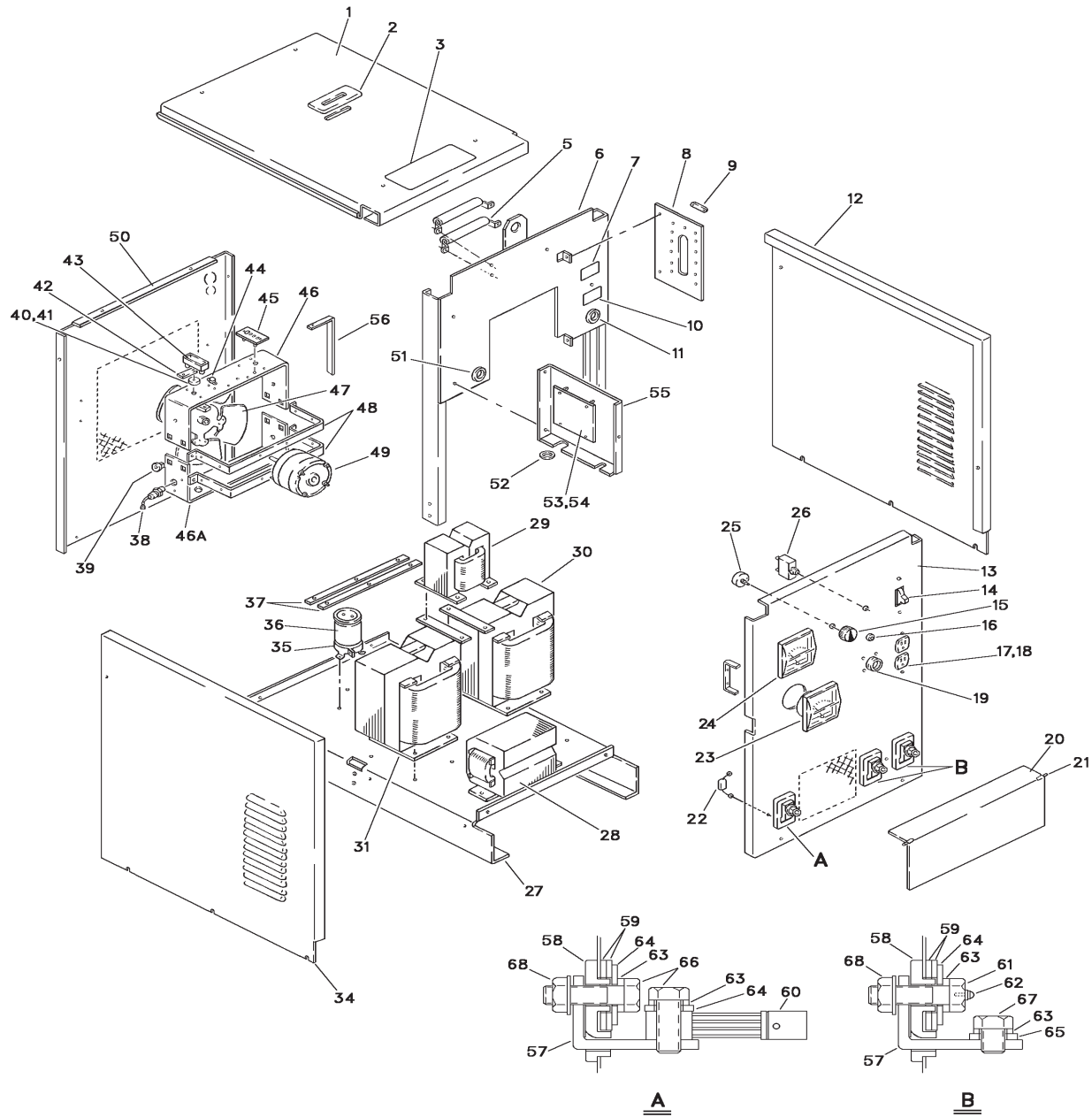


Figure 8-1 Fabstar Welder - Model 2620

Parts List for Figure 8-1

Quantity	Recomm.	Item	Part	Description	Qty
	Spares No.	Number			per
	Class 1	Class 2			Assy
			100009-1	Welder - Fabstar 2620, 60 Hz	1
		1	830150	. Panel - Top	1
		2	12CW-2170	. Boot - Lifting Eye	1
		3	204036	. Label - Precautionary	1
		4		Deleted	
1		5	405154-6	. Resistor - Fixed, 100 W	2
		6	205246	. Yoke - Lifting	1
		7	405548	. Label - Ground	1
		8	203862-1	. Board - Voltage Changeover	1
		9	CW-811	. Link - Voltage Changeover	4
		10	408891	. Label - Ground	1
		11	405362-1	. Bushing - Snap	1
		12	830152	. Panel - Side, Right	1
		13	830259-1	. Panel - Front, Control	1
1		14	409623-1	. Switch - Power, DPST	1
		15	406806-3	. Knob - Control	1
		16	405072-1	. Diode - Light Emitting	1
		—	405734	. Clip - Retainer	1
		17	402670	. Receptacle - Duplex, 3 Wire	1
1		18	366826-1	. Suppressor - Assembly (Mts. on rear of Item 17)	1
		19	400254	. Receptacle - Box, Solid Shell	1
		20	203413-2	. Door	1
		21	203453	. Hinge	2
		22	368705-8	. Capacitor - W/Leads and Terminals	3
1		23	400707-3	. Ammeter - DC	1
1		24	409624-1	. Voltmeter - DC	1
1		25	401428-8	. Potentiometer	1
		26	203627-7	. Circuit Breaker - Pushbutton	1
		27	203753-1	. Base - Mounting	1
		28	203792	. Choke - Filter	1
		29	203865	. Choke - Filter, Input Assembly	1
		30	203863-1	. Transformer - Power Assembly T1	1
		31	203863-2	. Transformer - Power Assembly T2	1
		32		. Delete	
		33		. Delete	
		34	830151	. Panel - Side, Left	1
		35	361052-10	. Clamp - Mtg.	2
		36	405278-13	. Capacitor - Electrolytic	3
		37	203752-1	. Bar - Bus	2
		—		Not Illustrated	

430429-404-1
PARTS LIST

Parts List for Figure 8-1

Quantity		Item Number	Part	Description	Qty per Assy
Recomm. Spares No.	Class 2				
1		38	402833-3	. Diode - Silicon, Neg. Base	4
		39	406319-1	. Grommet - Mtg.	8
1		40	405139	. Rectifier - Silicon Controlled	3
		41	16DA-954-12	. Pin - Spring	3
		42	203776	. Bar - Bus	3
		43	405140-3	. Clamp - Mtg.	3
1		44	404044-7	. Thermostat - Overload	1
1		45	204375	. Suppressor - Surge Assembly	1
		46	830275	. Heat Sink - Top	1
		46A	830258	. Heat Sink - Lower	1
		47	8RT-609	. Fan	1
		48	830121	. Bracket - Mtg. Fan Motor	2
1		49	12TW-595-1	. Motor - Fan	1
		50	203754-1	. Panel - Rear	1
		51	405362-2	. Bushing - Snap	2
		52	402037-9	. Grommet - Rubber	1
		53	203909B-3	. Board - PC, Control Assembly	1
		54	404460-1	. Support - PC Board	4
		55	203756-1	. Bracket - Mtg. PC Board	1
		56	203864-1	. Bar - Bus	2
		—	203864-2	. Bar - Bus, SCR	1
		57	5CW-974	. Bus - Cable Stud	3
		58	369682	. Bushing - Insulator	3
		59	5CW-976A	. Washer - Insulating	6
		60	CW-1142A	. Shunt - 50MV, 400 Amp	1
		61	351505	. Screw - 1/2-13 x 1-3/4 HHC ST. (Drilled for Item 62)	2
		62	No Number	. Screw - #6-32 x 1/2 Rd. Hd. MH. ST.	2
		63	No Number	. Washer - LK Std, 1/2	7
		64	No Number	. Washer - FL, ST. 1/2	4
		65	DW-458	. Washer	3
		66	No Number	. Screw - 1/2-13 x 1-3/4, HHC, ST.	2
		67	No Number	. Screw - 1/2-13 x 1, HHC, ST	2
		68	No Number	. Nut - 1/2-13, Hex Flanged, ST.	3
		—	W-9407-403	. Cable - #2 Assembly (101)	1
		—	Not Illustrated		

PARTS LIST

Equipment Identification

All identification numbers as described in the Introduction chapter must be furnished when ordering parts or making inquiries. This information is usually found on the nameplate attached to the equipment. Be sure to include any dash numbers following the Specification or Assembly numbers.

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SPECIFICATION NUMBER

100009-3

430429-404-2
PARTS LIST

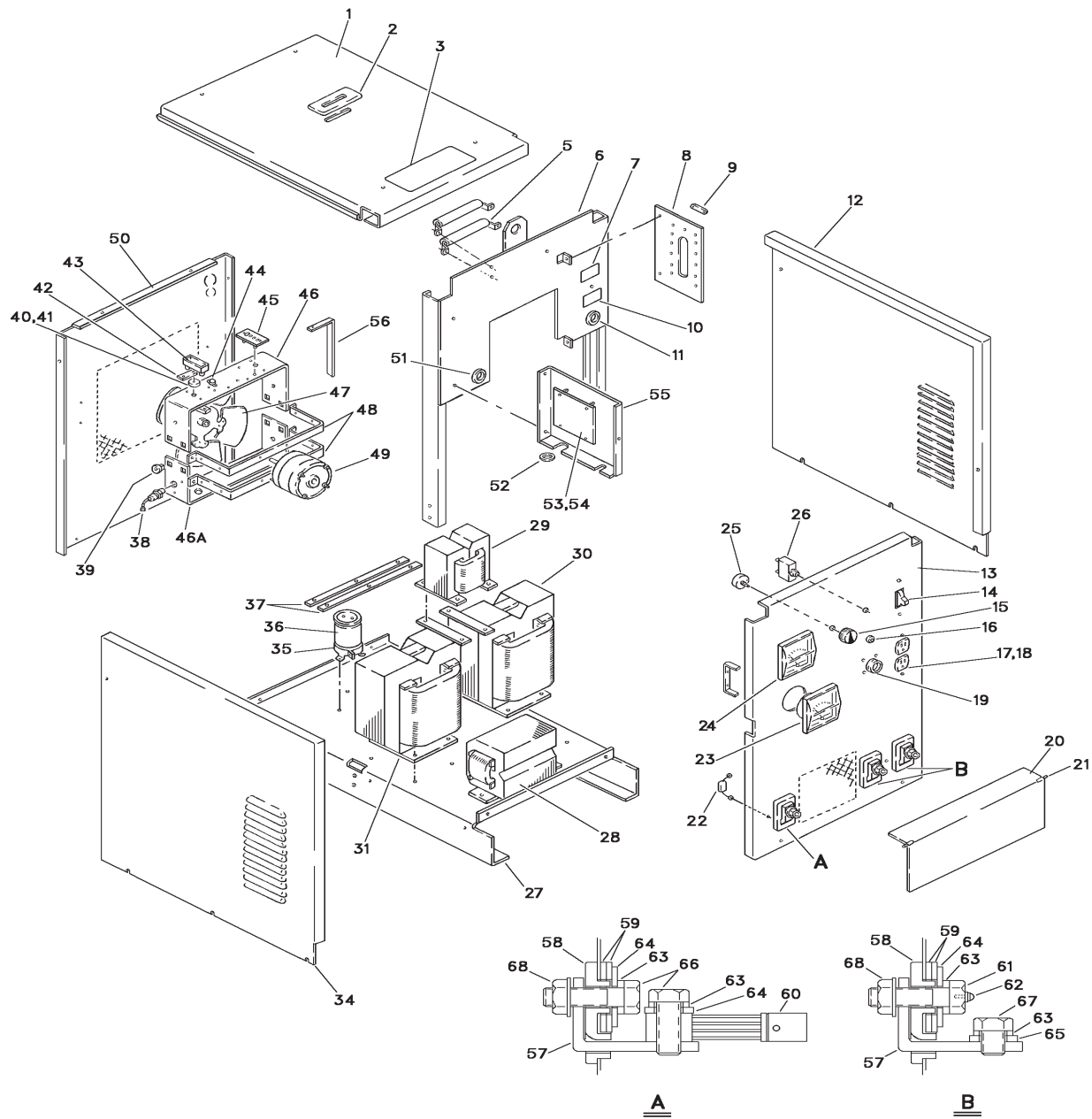


Figure 8-1 Fabstar Welder - Model 2620

Parts List for Figure 8-1

Quantity	Recomm.	Item	Part	Description	Qty
	Spares No.	Number			per
	Class 1	Class 2			Assy
			100009-3	Welder - Fabstar 2620, 60 Hz	1
		1	830150-2	. Panel - Top	1
		2	12CW-2170	. Boot - Lifting Eye	1
		3	204036	. Label - Precautionary	1
		4		Deleted	
1		5	405154-6	. Resistor - Fixed, 100 W	2
		6	205246	. Yoke - Lifting	1
		7	405548	. Label - Ground	1
		8	203862-1	. Board - Voltage Changeover	1
		9	CW-811	. Link - Voltage Changeover	4
		10	408891	. Label - Ground	1
		11	405362-1	. Bushing - Snap	1
		12	830152-2	. Panel - Side, Right	1
		13	830259-1	. Panel - Front, Control	1
1		14	409623-1	. Switch - Power, DPST	1
		15	406806-3	. Knob - Control	1
		16	405072-1	. Diode - Light Emitting	1
		—	405734	. Clip - Retainer	1
		17	402670	. Receptacle - Duplex, 3 Wire	1
1		18	366826-1	. Suppressor - Assembly (Mts. on rear of Item 17)	1
		19	400254	. Receptacle - Box, Solid Shell	1
		20	203413-2	. Door	1
		21	203453	. Hinge	2
		22	368705-8	. Capacitor - W/Leads and Terminals	3
1		23	400707-3	. Ammeter - DC	1
1		24	409624-1	. Voltmeter - DC	1
1		25	401428-8	. Potentiometer	1
		26	203627-7	. Circuit Breaker - Pushbutton	1
		27	203753-1	. Base - Mounting	1
		28	203792	. Choke - Filter	1
		29	203865	. Choke - Filter, Input Assembly	1
		30	203863-1	. Transformer - Power Assembly T1	1
		31	203863-2	. Transformer - Power Assembly T2	1
		32		. Delete	
		33		. Delete	
		34	830151-2	. Panel - Side, Left	1
		35	361052-10	. Clamp - Mtg.	2
		36	405278-13	. Capacitor - Electrolytic	3
		37	203752-1	. Bar - Bus	2
		—		Not Illustrated	

430429-404-2
PARTS LIST

Parts List for Figure 8-1

Quantity		Item Number	Part	Description	Qty per Assy
Recomm. Spares No.	Class 2				
1		38	402833-3	. Diode - Silicon, Neg. Base	4
		39	406319-1	. Grommet - Mtg.	8
1		40	405139	. Rectifier - Silicon Controlled	3
		41	16DA-954-12	. Pin - Spring	3
		42	203776	. Bar - Bus	3
		43	405140-3	. Clamp - Mtg.	3
1		44	404044-7	. Thermostat - Overload	1
1		45	204375	. Suppressor - Surge Assembly	1
		46	830275	. Heat Sink - Top	1
		46A	830258	. Heat Sink - Lower	1
		47	8RT-609	. Fan	1
		48	830121	. Bracket - Mtg. Fan Motor	2
1		49	12TW-595-1	. Motor - Fan	1
		50	203754-1	. Panel - Rear	1
		51	405362-2	. Bushing - Snap	2
		52	402037-9	. Grommet - Rubber	1
		53	203909B-3	. Board - PC, Control Assembly	1
		54	404460-1	. Support - PC Board	4
		55	203756-1	. Bracket - Mtg. PC Board	1
		56	203864-1	. Bar - Bus	2
		—	203864-2	. Bar - Bus, SCR	1
		57	5CW-974	. Bus - Cable Stud	3
		58	369682	. Bushing - Insulator	3
		59	5CW-976A	. Washer - Insulating	6
		60	CW-1142A	. Shunt - 50MV, 400 Amp	1
		61	351505	. Screw - 1/2-13 x 1-3/4 HHC ST. (Drilled for Item 62)	2
		62	No Number	. Screw - #6-32 x 1/2 Rd. Hd. MH. ST.	2
		63	No Number	. Washer - LK Std, 1/2	7
		64	No Number	. Washer - FL, ST. 1/2	4
		65	DW-458	. Washer	3
		66	No Number	. Screw - 1/2-13 x 1-3/4, HHC, ST.	2
		67	No Number	. Screw - 1/2-13 x 1, HHC, ST	2
		68	No Number	. Nut - 1/2-13, Hex Flanged, ST.	3
		—	W-9407-403	. Cable - #2 Assembly (101)	1

— Not Illustrated

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SPECIFICATION NUMBER

100010-1

430429-404-3
PARTS LIST

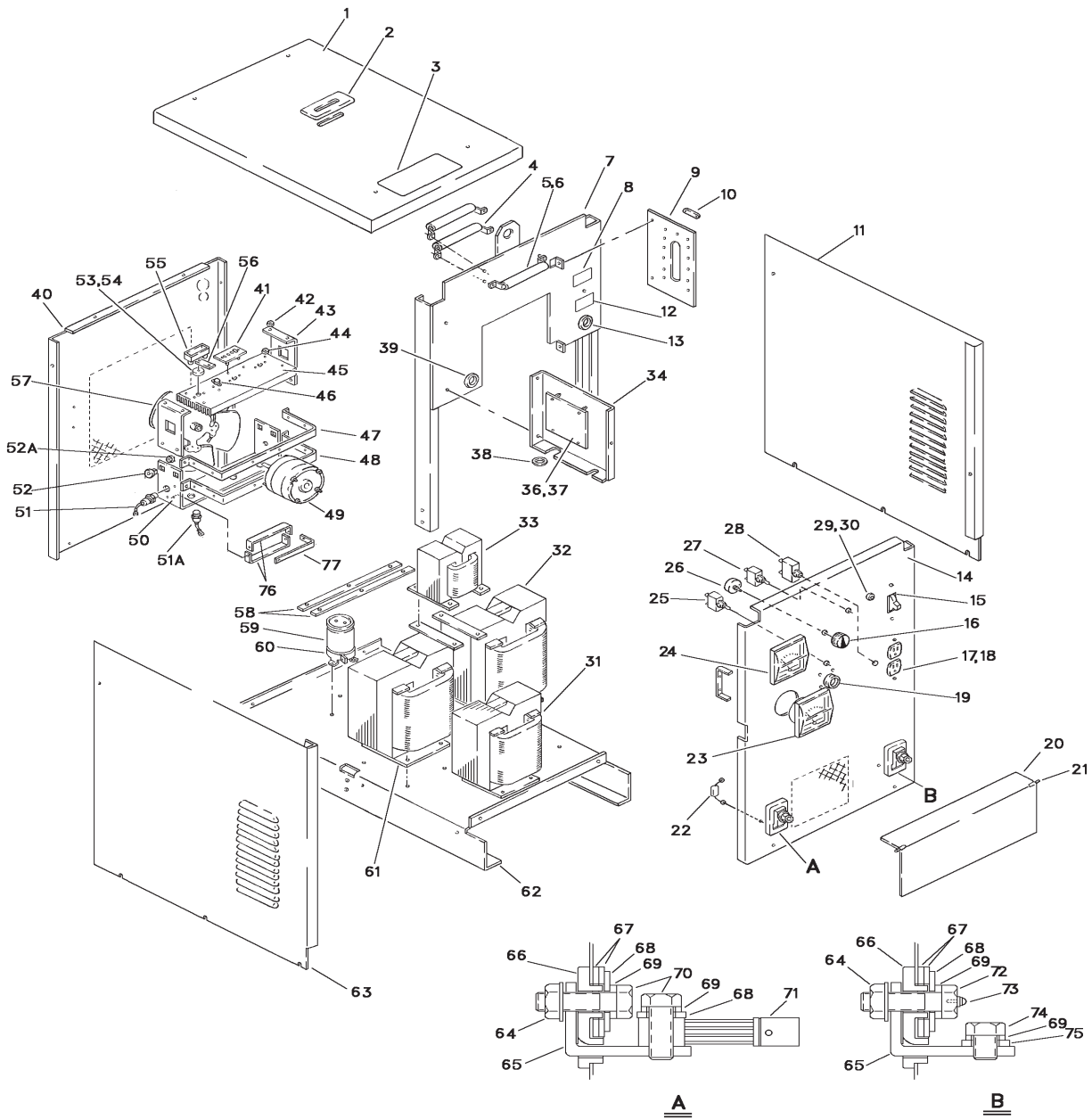


Figure 8-1 Fabstar Welder - Model 4030

Parts List for Figure 8-1

Quantity	Recomm.	Item	Part	Description	Qty
Spares No.	No.	Number			per
Class 1	Class 2				Assy
			100010-1	Welder - Fabstar [®] 4030, 60 Hz	1
		1	830150	. Panel - Top	1
		2	12CW-2170	. Boot - Lifting Eye	1
		3	204036	. Label - Precautionary	1
		4	405154-6	. Resistor - Fixed, 100 W	2
	1	5	W-2974C	. Resistor - 2 Ohm, 100 W	1
		6	400078	. Bracket - Mounting	2
		7	205246	. Yoke - Lifting	1
		8	830116	. Label - Ground	1
		9	203862-1	. Board - Voltage Changeover	1
		10	CW-811	. Link - Voltage Changeover	4
		11	830152	. Panel - Side, Right	1
		12	408891	. Label - Ground	1
		13	405362-1	. Bushing - Snap	1
		14	830148-1	. Panel - Front, Control	1
	1	15	409623-2	. Switch - Power, DPST	1
		16	406806-3	. Knob - Control	1
		17	402670	. Receptacle - Duplex, 3 Wire	1
	1	18	366826-1	. Suppressor - Assembly (Mts. on rear of Item 18)	1
		19	400254	. Receptacle - Box, Solid Shell	1
		20	203413-2	. Door	1
		21	203453	. Hinge	2
		22	368705-8	. Capacitor - W/Leads and Terminals	3
		23	400707-3	. Ammeter - DC	1
	1	24	409624-1	. Voltmeter - DC	1
		25	400400	. Switch - SPST	1
	1	26	401428-8	. Potentiometer	1
		27	405365-1	. Switch - SPST	1
		28	203627-7	. Circuit Breaker - Pushbutton	1
		29	405072-1	. Diode - Light Emitting	1
		30	405734	. Clip - Retainer	1
		31	204077	. Choke - Filter	1
		32	203879-1	. Transformer - Power Assembly T1	1
		33	203885	. Choke - Filter, Input Assembly	1
		34	203756-1	. Bracket - Mtg. P.C. Board	1
		35		Deleted	
		36	203909B-3	. Board - P.C. Control	1
		37	404460-1	. Support - P.C. Board	4
		38	402037-9	. Grommet - Rubber	1
		39	405362-2	. Bushing - Snap	2

430429-404-3
PARTS LIST

Parts List for Figure 8-1

Quantity		Item	Part	Description	Qty per Assy
Recomm. Spares No. Class 1	Class 2				
		40	203754-1	. Panel - Rear	1
		—	W-10080-5	. Strain - Relief	1
1		41	204375	. Suppressor - Surge Assembly	1
		42	409870	. Washer - Insulator	4
		43	203785-1	. Bracket - Mtg.	2
		44	409869	. Bushing - Insulator	4
		45	203779	. Heat Sink - Top	1
1		46	404044-7	. Thermostat - Overload	1
		47	201751-1	. Bracket - Mtg. Fan Motor	1
		48	830121	. Bracket - Mtg. Fan Motor	1
1		49	12TW-595-1	. Motor - Fan	1
		50	830120	. Heat Sink - Lower	1
1		51	402833-3	. Diode - Silicon, Neg. Base	1
		51A	W-10933-3	. Diode - Silicon, Neg. Base	3
		52	409869	. Grommet - Mtg.	4
		52A	409870	. Washer - Insulator	4
		53	405139	. Rectifier - Silicon Controlled	3
		54	16DA-954-12	. Pin - Spring	3
		55	405140-1	. Clamp - Mtg.	3
		56	203776-1	. Bar - Bus	3
		57	8RT-609	. Fan	1
		58	203752-1	. Bar - Bus	2
		59	405278-13	. Capacitor	3
		60	361052-10	. Clamp - Mtg.	2
		61	203879-2	. Transformer - Power Assembly T2	1
		62	203753-1	. Base - Mounting	1
		63	830151	. Panel - Side, Left	1
		64	No Number	. Nut - 1/2-13, Hex Flanged, ST.	2
		65	5CW-974	. Bus - Cable Stud	2
		66	5CW-975	. Bushing - Insulator	2
		67	5CW-976A	. Washer - Insulating	4
		68	No Number	. Washer - FL., ST. 1/2	3
		69	No Number	. Washer - LK. Std. 1/2	4
		70	No Number	. Screw - 1/2-13 x 1-3/4, HHC, ST.,	2
		71	CW-1142A	. Shunt - 50 MV, 400 Amp	1
		72	351505	. Screw - 1/2-13 x 1-3/4, HHC ST. (Drilled for Item 73)	1
		73	No Number	. Screw - #6-32 x 1/2 Rd. Hd. MH. ST.	1
		74	No Number	. Screw - 1/2-13 x 1, HHC, ST.	1
		75	DW-458	. Washer	1
		76	204821	. Resistor	2
		77	204893	. Bar-Bus	1
		—	Not Illustrated		

PARTS LIST

Equipment Identification

All identification numbers as described in the Introduction chapter must be furnished when ordering parts or making inquiries. This information is usually found on the nameplate attached to the equipment. Be sure to include any dash numbers following the Specification or Assembly numbers.

How To Use This Parts List

The Parts List is a combination of an illustration (Figure Number) and a corresponding list of parts which contains a breakdown of the equipment into assemblies, subassemblies, and detail parts. All parts of the equipment are listed except for commercially available hardware, bulk items such as wire, cable, sleeving, tubing, etc., and permanently attached items which are soldered, riveted, or welded to another part. The part descriptions may be indented to show part relationships.

To determine the part number, description, quantity, or application of an item, simply locate the item in question from the illustration and refer to that item number in the corresponding Parts List.

An "Application Code" is used to distinguish parts that are applicable only to certain Specifications and/or Assemblies. This code is found in the rightmost column of the Parts List. If an item in the Parts

List applies to all Specifications or Assemblies, the word "ALL" will be in the Application Code column. Refer to the following list to determine the appropriate Application Codes for the Specifications or Assemblies covered by this manual. If only the assembly or specification number is listed, the use of an Application Code does not apply to this manual.

How To Select Recommended Spares

The first two columns of the Parts List are used to show the recommended quantity of parts which are typically required for spares or replacement purposes. The quantities under Class 1 are for parts that are consumed or that may need replacement in two years or less depending on operating hours. Class 2 quantities are for parts that may need replacement under unusual service conditions or additional operating hours. These are suggested quantities based on expected usage or the minimum package quantity. Class 1 spares are repeated under Class 2 but the quantities may be larger to allow for additional operating hours. Contact your equipment dealer for assistance in establishing the spare parts program best suited for your needs.

SPECIFICATION NUMBER

100010-3

430429-404-4
PARTS LIST

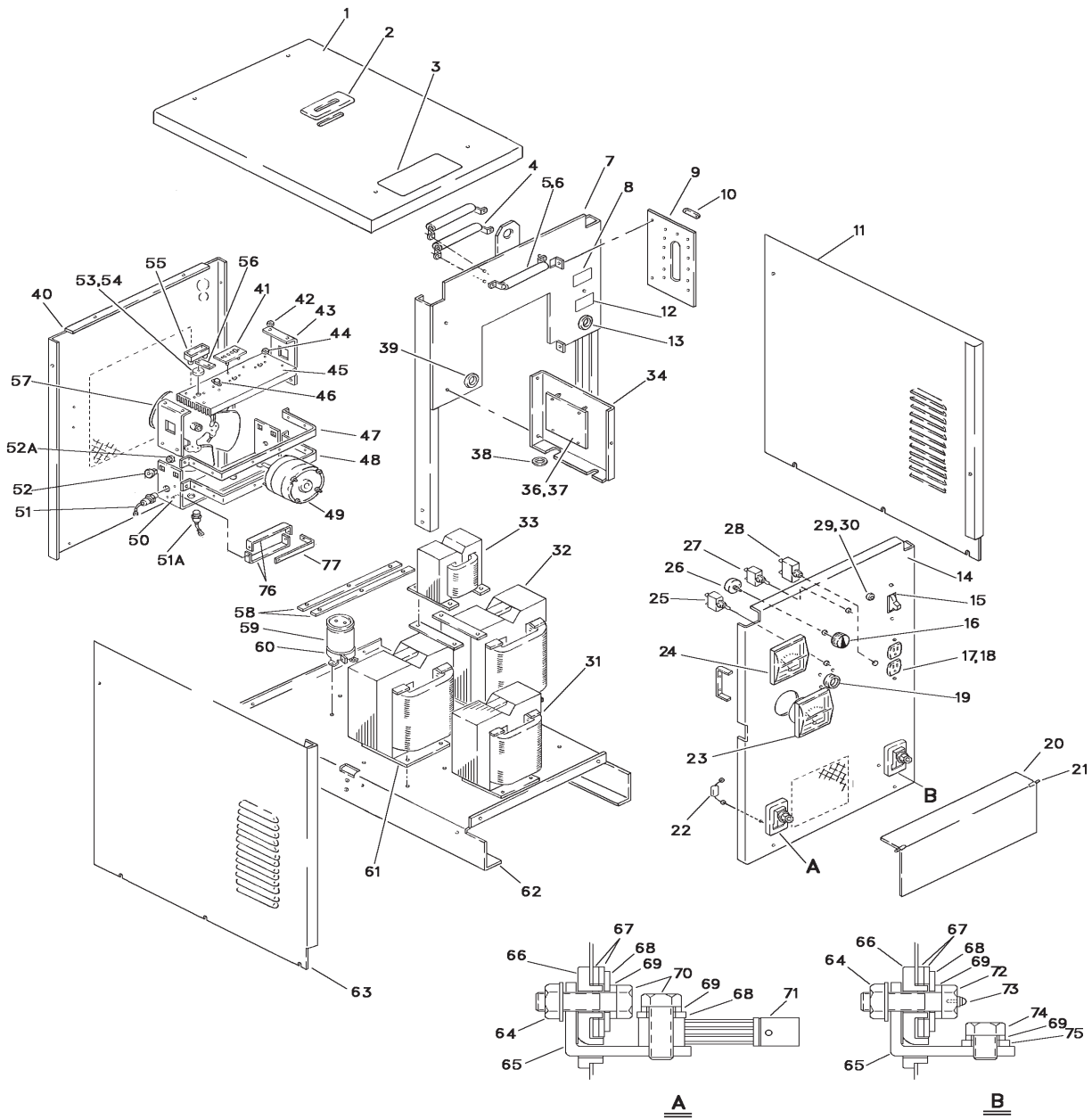


Figure 8-1 Fabstar Welder - Model 4030

Parts List for Figure 8-1

Quantity	Recomm.	Item	Part	Description	Qty
Spares No.	No.	Number			per
Class 1	Class 2				Assy
			100010-3	Welder - Fabstar [®] 4030, 60 Hz	1
		1	830150-2	. Panel - Top	1
		2	12CW-2170	. Boot - Lifting Eye	1
		3	204036	. Label - Precautionary	1
		4	405154-6	. Resistor - Fixed, 100 W	2
	1	5	W-2974C	. Resistor - 2 Ohm, 100 W	1
		6	400078	. Bracket - Mounting	2
		7	205246	. Yoke - Lifting	1
		8	830116	. Label - Ground	1
		9	203862-1	. Board - Voltage Changeover	1
		10	CW-811	. Link - Voltage Changeover	4
		11	830152-2	. Panel - Side, Right	1
		12	408891	. Label - Ground	1
		13	405362-1	. Bushing - Snap	1
		14	830148-1	. Panel - Front, Control	1
	1	15	409623-2	. Switch - Power, DPST	1
		16	406806-3	. Knob - Control	1
		17	402670	. Receptacle - Duplex, 3 Wire	1
	1	18	366826-1	. Suppressor - Assembly (Mts. on rear of Item 18)	1
		19	400254	. Receptacle - Box, Solid Shell	1
		20	203413-2	. Door	1
		21	203453	. Hinge	2
		22	368705-8	. Capacitor - W/Leads and Terminals	3
		23	400707-3	. Ammeter - DC	1
	1	24	409624-1	. Voltmeter - DC	1
		25	400400	. Switch - SPST	1
	1	26	401428-8	. Potentiometer	1
		27	405365-1	. Switch - SPST	1
		28	203627-7	. Circuit Breaker - Pushbutton	1
		29	405072-1	. Diode - Light Emitting	1
		30	405734	. Clip - Retainer	1
		31	204077	. Choke - Filter	1
		32	203879-1	. Transformer - Power Assembly T1	1
		33	203885	. Choke - Filter, Input Assembly	1
		34	203756-1	. Bracket - Mtg. P.C. Board	1
		35		Deleted	
		36	203909B-3	. Board - P.C. Control	1
		37	404460-1	. Support - P.C. Board	4
		38	402037-9	. Grommet - Rubber	1
		39	405362-2	. Bushing - Snap	2

430429-404-4
PARTS LIST

Parts List for Figure 8-1

Quantity		Item	Part	Description	Qty per Assy
Recomm. Spares No. Class 1	Class 2				
		40	203754-1	. Panel - Rear	1
		—	W-10080-5	. Strain - Relief	1
1		41	204375	. Suppressor - Surge Assembly	1
		42	409870	. Washer - Insulator	4
		43	203785-1	. Bracket - Mtg.	2
		44	409869	. Bushing - Insulator	4
		45	203779	. Heat Sink - Top	1
1		46	404044-7	. Thermostat - Overload	1
		47	201751-1	. Bracket - Mtg. Fan Motor	1
		48	830121	. Bracket - Mtg. Fan Motor	1
1		49	12TW-595-1	. Motor - Fan	1
		50	830120	. Heat Sink - Lower	1
1		51	402833-3	. Diode - Silicon, Neg. Base	1
		51A	W-10933-3	. Diode - Silicon, Neg. Base	3
		52	409869	. Grommet - Mtg.	4
		52A	409870	. Washer - Insulator	4
		53	405139	. Rectifier - Silicon Controlled	3
		54	16DA-954-12	. Pin - Spring	3
		55	405140-1	. Clamp - Mtg.	3
		56	203776-1	. Bar - Bus	3
		57	8RT-609	. Fan	1
		58	203752-1	. Bar - Bus	2
		59	405278-13	. Capacitor	3
		60	361052-10	. Clamp - Mtg.	2
		61	203879-2	. Transformer - Power Assembly T2	1
		62	203753-1	. Base - Mounting	1
		63	830151-2	. Panel - Side, Left	1
		64	No Number	. Nut - 1/2-13, Hex Flanged, ST.	2
		65	5CW-974	. Bus - Cable Stud	2
		66	5CW-975	. Bushing - Insulator	2
		67	5CW-976A	. Washer - Insulating	4
		68	No Number	. Washer - FL., ST. 1/2	3
		69	No Number	. Washer - LK. Std. 1/2	4
		70	No Number	. Screw - 1/2-13 x 1-3/4, HHC, ST.,	2
		71	CW-1142A	. Shunt - 50 MV, 400 Amp	1
		72	351505	. Screw - 1/2-13 x 1-3/4, HHC ST. (Drilled for Item 73)	1
		73	No Number	. Screw - #6-32 x 1/2 Rd. Hd. MH. ST.	1
		74	No Number	. Screw - 1/2-13 x 1, HHC, ST.	1
		75	DW-458	. Washer	1
		76	204821	. Resistor	2
		77	204893	. Bar-Bus	1
		—	Not Illustrated		

DIAGRAMS

- Note the model and specification number shown on the equipment nameplate.
- Locate these numbers in the model and specification number columns below.
- Use only those diagrams and instructions that are applicable.

MODEL NUMBER	SPECIFICATION NUMBER	CONNECTION DIAGRAM	VOLTAGE CHANGEOVER DIAGRAM
FABSTAR 2620	100009-1 & -3	830255	204041
FABSTAR 4030	100010-1 & -3	830159	204041