



HOW TO USE THIS MANUAL - This manual, identified by an "OM" prefixed number, usually covers just the underlined specification or assembly numbers in the listing below. If none of the numbers are underlined, they are all covered.

EQUIPMENT IDENTIFICATION - The unit's identification number (either a Specification number, or an Assembly number), model, and serial number usually appear on a nameplate attached to its control panel. Equipment which does not have a control panel, such as gun and cable assemblies, are identified only by Spec. (or six-digit assembly) numbers printed on the outside of the shipping container. Record this number for future reference.

A "specification number" starts out with a "series number" (first four-digit number with a possible letter suffix). A "dash number" (-1, -2, etc.) must follow the series number to make a complete "Specification number". For example, 1234A-1, 1234A-2, etc. In the same manner, a "dash number" (-1, -2, etc.) must follow a six-digit assembly number, to identify specific equipment. See below for identifying equipment covered by this manual.

OWNER'S MANUAL NO. OM-223

CT-150-DC-S, Solid-State,  
TIG/STICK Welding Machine

This manual covers units displaying any one of the following specification numbers with exceptions as noted in the first paragraph above.

6426-1	6604-1	6835-1
6426-2	6604-2	6835-2
6426-3	6604-3	6835-3
6426-5	6604-4	
6426-6	6604-5	
6426-7		

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## ARC WELDING SAFETY INSTRUCTIONS AND WARNINGS



### WARNING

ARC WELDING can be hazardous.

**PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR. DO NOT LOSE THESE INSTRUCTIONS. READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.**

Welding products and welding processes can cause serious injury or death, or damage to other equipment or property, if the operator does not strictly observe all safety rules and take precautionary actions.

Safe practices have developed from past experience in the use of welding and cutting. These practices must be learned through study and training before using this equipment. Anyone not having extensive training in welding and cutting practices should not attempt to weld. Certain of the practices apply to equipment connected to power lines; other practices apply to engine driven equipment.

Safe practices are outlined in the American National Standard Z49.1 entitled: SAFETY IN WELDING AND CUTTING. This publication and other guides to what you should learn before operating this equipment are listed at the end of these safety precautions.

**HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.**



#### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment. Lock input power disconnect switch open, or remove line fuses so power cannot be turned on accidentally.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.

6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode while in contact with the work (ground) circuit.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. In confined spaces or damp locations, do not use a welder with AC output unless it is equipped with a voltage reducer. Use equipment with DC output.
14. Wear a safety harness to prevent falling if working above floor level.
15. Keep all panels and covers securely in place.




#### ARC RAYS can burn eyes and skin; NOISE can damage hearing.


Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

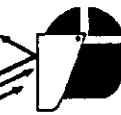
1. Wear a welding helmet fitted with a proper shade of filter (see ANSI Z49.1 listed in Safety Standards) to protect your face and eyes when welding or watching.
2. Wear approved safety glasses. Side shields recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved ear plugs or ear muffs if noise level is high.


Eye protection filter shade selector for welding or cutting (goggles or helmet), from AWS A6.2-73.

Welding or Cutting Operation	Electrode Size Metal Thickness or Welding Current	Filter Shade No.	Welding or Cutting Operation	Electrode Size Metal Thickness or Welding Current	Filter Shade No.
Torch soldering	—	2	Gas metal-arc welding (MIG)	All	11
Torch brazing	—	3 or 4	Non-ferrous base metal	All	12
Oxygen cutting			Ferrous base metal	All	12
Light	Under 1 in., 25 mm	3 or 4	Gas tungsten arc welding (TIG)	All	12
Medium	1 to 6 in., 25-150 mm	4 or 5	Atomic hydrogen welding	All	12
Heavy	Over 6 in., 150 mm	5 or 6	Carbon arc welding	All	12
Gas welding			Plasma arc welding	All	12
Light	Under 1/8 in., 3 mm	4 or 5	Carbon arc air gouging		
Medium	1/8 to 1/2 in., 3-12 mm	5 or 6	Light		12
Heavy	Over 1/2 in., 12 mm	6 or 8	Heavy		14
Shielded metal-arc welding (stick) electrodes	Under 5/32 in., 4 mm	10	Plasma arc cutting		
	5/32 to 1/4 in., 4 to 6.4 mm	12	Light	Under 300 Amp	9
	Over 1/4 in., 6.4 mm	14	Medium	300 to 400 Amp	12
			Heavy	Over 400 Amp	14


	<b>FUMES AND GASES can be hazardous to your health.</b>	<ol style="list-style-type: none"><li>4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.</li><li>5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.</li><li>6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.</li><li>7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.</li></ol>
<p>Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.</p> <ol style="list-style-type: none"><li>1. Keep your head out of the fumes. Do not breath the fumes.</li><li>2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.</li><li>3. If ventilation is poor, use an approved air-supplied respirator.</li></ol>		





	<b>WELDING can cause fire or explosion.</b>	<ol style="list-style-type: none"><li>5. Watch for fire, and keep a fire extinguisher nearby.</li><li>6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.</li><li>7. Do not weld on closed containers such as tanks or drums.</li><li>8. Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.</li><li>9. Do not use welder to thaw frozen pipes.</li><li>10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.</li><li>11. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.</li></ol>
<p>Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot work-piece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.</p> <ol style="list-style-type: none"><li>1. Protect yourself and others from flying sparks and hot metal.</li><li>2. Do not weld where flying sparks can strike flammable material.</li><li>3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.</li><li>4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.</li></ol>		

	<b>FLYING SPARKS AND HOT METAL can cause injury.</b>	<ol style="list-style-type: none"><li>1. Wear approved face shield or safety goggles. Side shields recommended.</li><li>2. Wear proper body protection to protect skin.</li></ol>
<p>Chipping and grinding cause flying metal. As welds cool, they can throw off slag.</p>		

	<b>CYLINDERS can explode if damaged.</b>	<ol style="list-style-type: none"><li>3. Keep cylinders away from any welding or other electrical circuits.</li><li>4. Never allow a welding electrode to touch any cylinder.</li><li>5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.</li><li>6. Turn face away from valve outlet when opening cylinder valve.</li><li>7. Keep protective cap in place over valve except when cylinder is in use or connected for use.</li><li>8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.</li></ol>
<p>Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.</p> <ol style="list-style-type: none"><li>1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.</li><li>2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.</li></ol>		

 <b>WARNING</b>	<b>ENGINES can be hazardous.</b>
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	<b>ENGINE EXHAUST GASES can kill.</b>	<ol style="list-style-type: none"><li>1. Use equipment outside in open, well-ventilated areas.</li><li>2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.</li></ol>
<p>Engines produce harmful exhaust gases.</p>		

	<b>ENGINE FUEL can cause fire or explosion.</b> Engine fuel is highly flammable.	<ol style="list-style-type: none"><li>1. Stop engine before checking or adding fuel.</li><li>2. Do not add fuel while smoking or if unit is near any sparks or open flames.</li><li>3. Allow engine to cool before fueling. If possible, check and add fuel to cold engine before beginning job.</li></ol>
	<b>MOVING PARTS can cause injury.</b> Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.	<ol style="list-style-type: none"><li>3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.</li><li>4. To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.</li><li>5. Keep hands, hair, loose clothing, and tools away from moving parts.</li><li>6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.</li></ol>
	<b>SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.</b> Batteries contain acid and generate explosive gases.	<ol style="list-style-type: none"><li>1. Always wear a face shield when working on a battery.</li><li>2. Stop engine before disconnecting or connecting battery cables.</li><li>3. Do not allow tools to cause sparks when working on a battery.</li><li>4. Do not use welder to charge batteries or jump start vehicles.</li><li>5. Observe correct polarity (+ and -) on batteries.</li></ol>
	<b>STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.</b> The coolant in the radiator can be very hot and under pressure.	<ol style="list-style-type: none"><li>1. Do not remove radiator cap when engine is hot. Allow engine to cool.</li><li>2. Wear gloves and put a rag over cap area when removing cap.</li><li>3. Allow pressure to escape before completely removing cap.</li></ol>

**NOTE: Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields**

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields — Background Paper, OTA-BP-E-63 (Washington, DC: U.S. Government Printing Office, May 1989): "... there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around the body.
4. Keep welding power source and cables as far away from body as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

**About Pacemakers:**

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

**PRINCIPAL SAFETY STANDARDS**

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

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OM-223

CERTIFICATION NOTICE

HIGH FREQUENCY STABILIZER

Serial No. \_\_\_\_\_

Model No. \_\_\_\_\_

This equipment may be reasonably expected to meet radiation limits of ten microvolts per meter at one mile, provided installation, operation, and maintenance is in accordance with the instructions of the manufacturer.

Hobart Brothers Company

Troy, Ohio

USER CERTIFICATE

The above equipment has been installed in accordance with manufacturer's instructions, and is being operated and maintained as outlined in these instructions.

USER: \_\_\_\_\_

Date: \_\_\_\_\_

THIS CERTIFICATION NOTICE MUST BE POSTED NEAR THE WELDING MACHINE



## SOLID STATE ELECTRONIC CONTROL MODULE EXCHANGE SERVICE POLICY

Because of the definite superiority of certain solid-state control components over conventional electro-mechanical relays and regulators, Hobart Brothers Company product lines now incorporate solid-state controls for applications in which they may be used to advantage. To facilitate testing and servicing, these control components and circuits have been assembled as modules on printed circuit boards, mounted in such a manner as to be quickly and easily removed. Electrical connections to other components of the unit are by means of plug-in or "Faston" connectors.

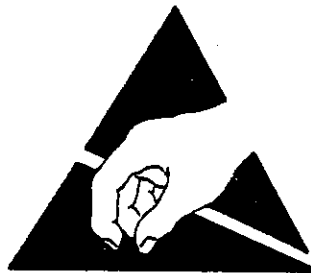
In recognition of the fact that most users of this equipment lack the facilities and specially trained personnel necessary to service and repair solid-state electronic equipment, Hobart Brothers Company has established a control module exchange service plan.

Under the Control Module Exchange Plan, the owner of the equipment may

exchange the entire module in which fault has developed for a replacement. A standard exchange price has been established for each module design which applies, without regard to the amount of repair required to the original turned in, which is applied against the cost of the replacement. Exchange prices for specific modules may be determined by contacting an authorized Hobart distributor or by writing to the factory, giving the SPECIFICATION or ASSEMBLY, MODEL, and SERIAL numbers of the unit in which the module is installed.

This Exchange Plan applies only to specified solid-state control components and circuitry which have failed due to electrical fault or normal deterioration resulting from use and age. The plan does not cover parts which have been physically damaged through accident or abuse, or to which unauthorized repairs have been made or attempted.

HOBART BROTHERS COMPANY  
TROY, OHIO 45373 U.S.A.



CAUTION: Printed circuits and other devices may be affected by static electricity. Handling precautions required.

**A-218**





# Instructions

## RECEIPT OF EQUIPMENT

Check the equipment received against the Hobart Brothers Company invoice to make certain that the shipment is complete and undamaged. If the equipment has been damaged in transit, notify the carrier (railroad, trucking company, etc.) at once and file a claim for damages. If you require assistance with a damage claim, furnish Hobart Brothers Company with full information about the claim. If the shipment is in error, contact: Order Department, Hobart Brothers Company, 600 West Main Street, Troy, Ohio 45373.

Give the MODEL, SPECIFICATION, and SERIAL numbers of the equipment, and a full description of the parts in error. Refer to EQUIPMENT IDENTIFICATION on front page of this manual for an explanation of the specification numbers.

Best results will be obtained with this equipment ONLY if the respon-

sible operating and maintenance personnel have access to this manual, and are familiar with the instructions contained herein. Additional copies may be obtained at a small cost per copy by writing to: Hobart Brothers Company, 600 West Main Street, Troy, Ohio 45373. Be sure and give the SPECIFICATION, SERIAL, and MODEL numbers of your equipment, and the OM number of this manual, or PL number of Parts Lists, and number of copies desired when ordering additional manuals or parts lists.

Generally, it is good practice to move the equipment to the site of installation before uncrating. Use care in uncrating in order to avoid damage to the equipment when bars, hammers, etc., are used. A lifting eye extending through the top of the cabinet has been provided so that the equipment may be handled with a crane or hoist.

## DESCRIPTION

### DESCRIPTION OF EQUIPMENT

The three-phase DC welding machine requires a three-phase AC power input. It has a duty cycle of 100%. The output current of the machine can be either straight or reverse polarity DC. The maximum no-load voltage rating is 85 volts. The input voltage for these units is 230/460, 34/17 amperes, at 60 Hz, or 200/230/460 volts, 39/34/17 amperes or 220/380/415 volts, 36/21/19 amperes, at 50 Hz. See Spec. numbers on front sheet.

The Programmer is a self-contained unit which slides in and out of the welding machine console like a draw-

er, for easy adjustment or service of internal components, or for changing from one type of programmer to another. Any remote controls in use connect to plugs on the front control panel. The programmer controls welding current parameters, plus water and gas flow as described in greater detail in the programmer instruction manual.

The welding current supply, located in the bottom panel on the welding machine console, serves as connection point for the welding leads, plus water and gas hoses, when used. It also contains the polarity reversing

DESCRIPTION OF EQUIPMENT (Continued)  
switch, high frequency ON/OFF Switch and high frequency intensity control. The 115-volt auxiliary output receptacles are also located on this panel. See Figures 1 and 2 for these details.

#### DESCRIPTION OF TIG PROCESS

Gas Tungsten Arc Welding (GTAW) is the descriptive name of the welding process whereby the arc is maintained between a non-consumable metal electrode (usually tungsten) and the work, the arc zone being shielded by an inert gas such as argon or helium. For simplicity and uniformity, any reference to the process in this manual will be made with the term "TIG".

This process can be used for making clean, sound welds on most metals and alloys, irrespective of their composition. In many instances, it provides the only suitable method for joining certain metals. Cleaning is reduced to a minimum and frequently is eliminated, both before and after welding. Flux is unnecessary in this process.

Because of certain inherent characteristics of the TIG welding process, special consideration must be given to the design of a welding machine which will best serve the requirements of the process. This Hobart inert gas welding machine has been designed and built with these requirements in mind. It will give long, satisfactory service producing welds that are correct and sound if it is properly installed, used and maintained.

Welding currents for the TIG process depend upon the size of the tungsten electrode used, the material being welded, welding speed, size and shape of the material, and other factors. Following is a rough guide for usable current ranges for various tungsten electrode sizes:

Electrode Diameter		DC Straight Polarity	DC Reverse Polarity
In.	mm		
.020	0.51	5-35	
.040	1.02	30-100	
1/16	1.59	70-150	10-20
3/32	2.40	150-225	15-30
1/8	3.20	200-275	25-40
5/32	3.95	250-350	40-55
3/16	4.80	300-500	80-125
1/4	6.35	400-650	80-125

Tungsten Electrode Sizes  
Table 1

The inert gas flow should be controlled accurately with a regulator and flowmeter. No specific recommendations for rates of flow can be given, as this depends entirely on the welding conditions and the torch and nozzle used. Correct argon flow is usually between 8 and 35 cubic feet (226 to 990 liters) of gas per hour; and helium flow is between 18 and 85 cubic feet (510 to 2410 liters) per hour.

More specific information concerning the torch configurations available, and the gas flow for each, can be obtained from the manufacturer of the torch equipment.

#### CONTROLS AND CONNECTIONS

This description of controls and connections concerns only the welding machine (referred to as the "console" in many cases). The controls and functions of operation of the programmer which must become a part of this unit for welding operation, are contained in a separate manual, for the specific programmer being used.

METER PANEL - Controls contained here are at the top front panel, above the programmer.

VOLTMETER - This 0-100 volt range voltmeter indicates the welding arc voltage.

## CONTROLS AND CONNECTIONS (Continued)

AMMETER - This meter, scaled 0-200 amperes, indicates welding current.

NOTE: In some instances, the VOLTMETER and AMMETER described above are not mounted on this panel, but are located at another location, if supplied at all. One such case is when the machine is used with *some* DABBER Welding Systems. When so used, consult the CONTROL CABINET ASSEMBLY manual for details on the (Optional) METER PANEL. An (Optional) Hour Meter may be installed in the place of these meters on the panel, in some cases, also.

POWER ON OFF SWITCH - Removes power supply from the pilot transformer, deenergizing internal circuits in the meter panel and the bottom panel.

TIG/STICK SELECTOR SWITCH - This switch allows selection of either the TIG torch mode of welding, or regular covered electrode (stick) welding mode. In the TIG position, it pre-sets the arc force control (described below) to MINIMUM. In the STICK position, it deenergizes the gas and water valves, as well as the high frequency starter circuit.

ARC FORCE AMPERE CONTROL (Only adjustable when the TIG/STICK Switch is in the STICK position) - Varies the short-circuit (welding arc) current and produces an increase of amperage when arc length is shortened, such as in a tight groove. This control provides more arc force and eliminates the tendency of snuffing out the arc when using electrode manipulation. The control is especially suited for use with E-6010, E-7018, and 718 LMP welding electrodes for pipe welding applications.

## FUSES:

10 ampere - Protects the 115 volt auxiliary receptacles from overload.

5 ampere - Protects the internal 115 volt circuitry.

BOTTOM PANEL - The controls and connections on the bottom panel furnish the basic welding mode necessities.

POLARITY SELECTOR SWITCH - Two-position rotary switch that allows selection of STRAIGHT DC or REVERSE DC welding polarity. When set to the STRAIGHT DC position, both the TIG torch terminal and the STICK terminal are negative polarity with respect to the WORK terminal. Therefore, the switch must be set for REVERSE polarity for stick welding.

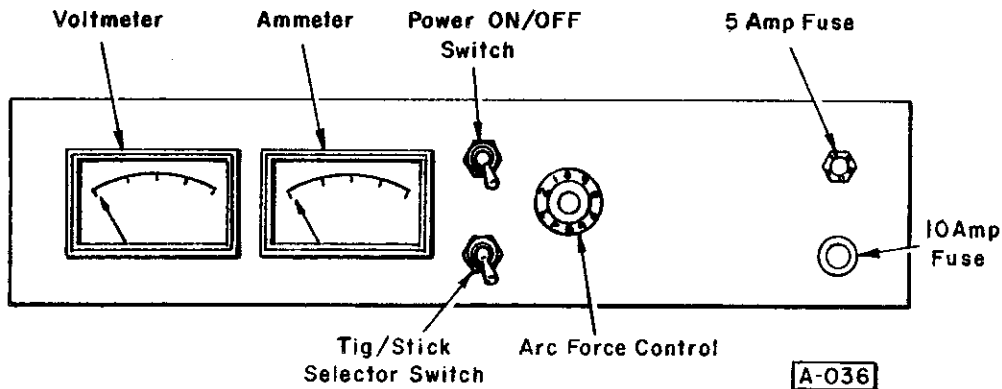
HIGH FREQUENCY SWITCH - In the AUTO position, the high frequency starter circuit is energized when there is open-circuit voltage at the output terminals. Once an arc is established, the high frequency circuit is automatically deenergized. (The TIG/STICK SWITCH must be in the TIG mode.)

REMOTE HIGH FREQUENCY (Optional) - Connection point for remote high frequency control, when receptacle is supplied (115 V AC connection).

HIGH FREQUENCY INTENSITY CONTROL - This single-turn potentiometer controls intensity of the high frequency.

115 VOLT DUPLEX RECEPTACLES - Provides 115 volt AC power for auxiliary equipment (9 amperes maximum).

TIG TORCH TERMINAL - This terminal is for connection of the Tig torch, and is connected through the high frequency coil.



Meter Panel  
Figure 1

#### CONTROLS AND CONNECTIONS (Continued)

#### BOTTOM PANEL (Continued)

**GAS-TO-TORCH CONNECTOR** - Provides connection point for feeding inert gas to the torch.

**GAS-FROM-CYLINDER CONNECTOR** - Provides connection point for inert gas from the supply cylinder to the panel.

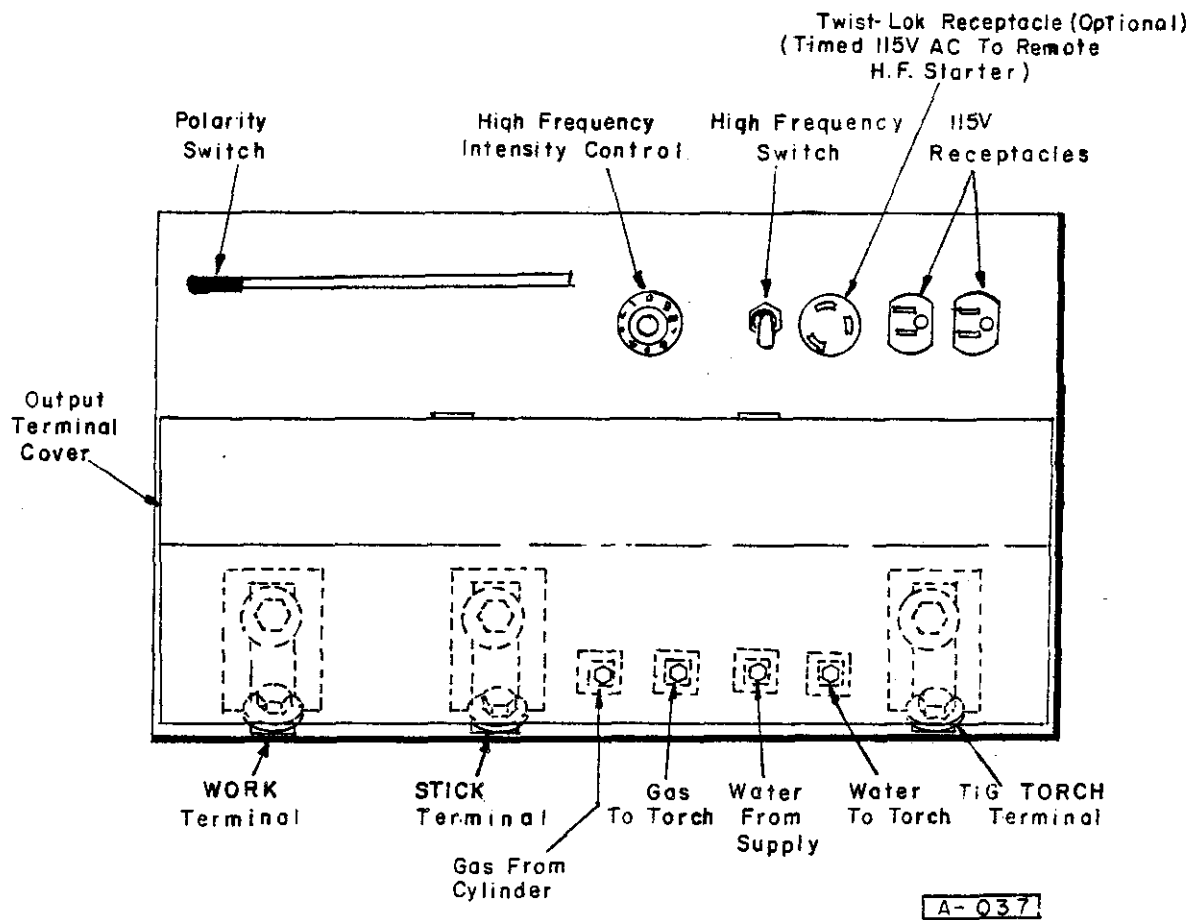
**WATER-TO-TORCH CONNECTOR** - Provides connection point for feeding cooling water to the torch.

**WATER-SUPPLY-CONNECTOR** - Provides connection point for water supply from factory (city) water supply, or from circulating system, such as a Hobart Circoolorator.

**STICK TERMINAL** - Electrode lead connects here for stick (covered electrode welding). When using this terminal, be sure that the TIG/STICK Switch on Meter Panel (see Figure 1) is set on STICK.

**WORK TERMINAL** - Provides "ground" connection to the work, or material being welded, to complete the secondary circuit.





Bottom Front Panel  
Figure 2

## INSTALLATION

## LOCATION

For best operating characteristics and longest unit life, take care in selecting an installation site. When installing the equipment, avoid locations exposed to high humidity, dust, high ambient temperature or corrosive fumes. Moisture condenses on machine parts and electrical controls, causing corrosion which can seriously affect operation and efficiency. Dust and dirt cause extra wear on all moving parts. Therefore, use care to locate the equipment so that excess moisture, dust, or corrosive fumes will not be drawn into the unit.

Adequate air circulation is needed at all times in order to assure proper operation. Provide a minimum of 24 inches (610 mm) of free air space at both front and rear of the unit. Make sure that the ventilator openings are not obstructed. Air enters through the rear panel.

Because high frequency stabilized arc welding machines inherently radiate power at frequencies which may interfere with radio communication, including commercial, police, and aviation broadcasts, their operation is subject to control by the Federal Communications Commission.

Some general information on radio frequency radiation from high frequency stabilized arc welding machines is given below:

## DIRECT RADIATION FROM WELDING MACHINE

The manufacturer controls direct radiation from the welding machine by proper design of the unit. If the user complies with the installation and operation instructions furnished by the manufacturer, direct radiation from the machine will be relatively low.

## DIRECT RADIATION FROM WELDING LEADS

The initial radiation, due almost entirely to the welding leads acting as

an antenna, decreases rapidly with the distance from the leads. This radiation can be kept to a minimum by making the welding leads as short as possible. The frequency spectrum emitted by a particular unit can be altered substantially by changing the length or position of the welding leads and by differences in loading caused by operation with the electrode arcing to the work.

## RADIATION FROM POWER LINES

High frequency voltage which is conducted from the welding machine to the power line may cause radiation from the line itself. This radiation can be kept to a minimum by careful design of the unit and, in some cases, by the use of line filters.

In a welding machine that has been certified by the manufacturer, the radiation from the power line is generally small when compared to the direct radiation from the welding leads.

## WIRING IN THE WELDING AREA

The term "welding area" refers to the area in which the welding machine, the welding leads, and the welding work are located.

## RE-RADIATION

Ungrounded metallic objects in close proximity to the welding area can act as antenna which will pick up, conduct and re-radiate the high frequency generated by the welding machine. Unshielded wires in the immediate vicinity may conduct radiation, and re-radiate it. Therefore, no unshielded conductors shall be located within 50 feet (15,250 mm) of the welding area.

This means that all electrical power or lighting wiring within 50 feet (15,250 mm) of the welding area shall be enclosed in grounded rigid metallic conduit, copper braid, or some

**RE-RADIATION (Continued)**

other material having an equivalent shielding efficiency, or shall consist of lead-covered cable. (Ordinary flexible helically wrapped metallic conduit is generally not suitable.) The shielding or cable covering shall be grounded at 50-foot (15,250 mm) intervals. Good electrical bonding shall be maintained between conduit sections.

Wiring, other than electrical power and lighting wiring within 50 feet (15,250 mm) of the welding area, shall be shielded and the shields shall be grounded. [This includes wiring located within 50 feet (15,250 mm) of the welding machine in a vertical or vertical-diagonal direction.]

The foregoing procedure shall apply even if:

1. The welding area is not a fixed location.
2. There are exposed wires off the premises but within 50 feet (15,250 mm) of the welding area.

**WIRING CHANGES**

All changes in power and lighting wiring shall be made by a qualified electrician. Any shielding or relocation of telephone or signal wires must be done by the service company concerned or with their specific permission.

This type of radiation can be kept to a minimum by installing the welding machine in accordance with the installation procedures outlined in this instruction manual.

**USE IN METAL BUILDINGS**

Where the welding area is enclosed within a metal building, proper precautions must be taken to insure that the building is properly grounded.

This can be accomplished by placing several good electrical grounds around the periphery of the building. Refer to following grounding procedure.

The installation procedures described in this publication shall be observed even if the welding machine is operated within a shielded structure.

**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 applicable rules and regulations. Where no state or local codes exist, it is recommended that the National Electrical Code be followed. Refer to Table 2 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 3, 4 and 5.

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.

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

**GROUNDING (Continued)**

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.

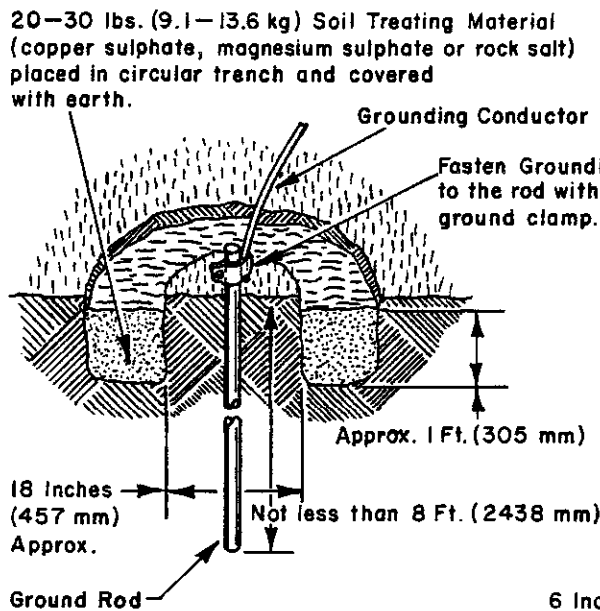
If a system ground is not available, the welding machine must be connected to a driven ground rod (see Figures 3 and 4) or to a water pipe that enters

the ground not more than 10 feet (3,048 mm) from the machine. Refer to the WIRE AND FUSE SIZE CHART, Table 2 for selection of the proper grounding conductor.

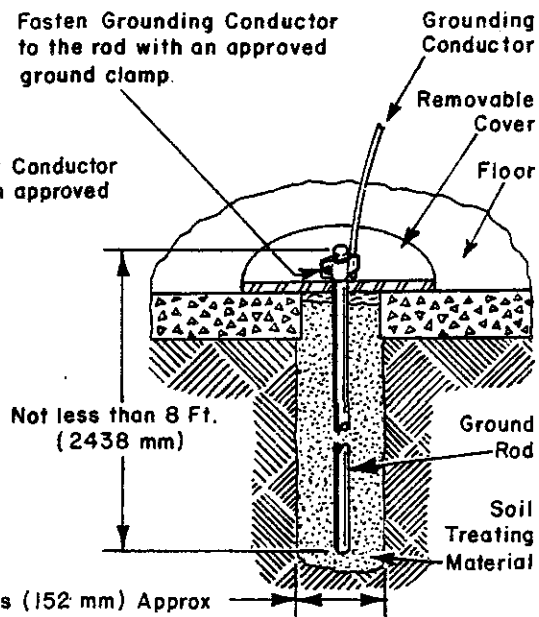
**NOTE:** The grounding conductor must be as short as possible in order to produce the most efficient installation.

**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 3.

**TREATING AN INSIDE GROUND -** Reduce the diameter of the hole to 6 inches (152 mm), pour soil treating material in around the rod. Add enough water to dissolve 8 pounds (3.62 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.



Outside Ground  
Figure 3



Inside Ground  
Figure 4

A-008

CONNECTION TO LINE VOLTAGE

Refer to Table 2 for wire sizes required. The power supply wires serving the welding machine shall be completely enclosed for a distance of at least 50 feet (15,250 mm) (in any direction) from the machine in solid metallic conduit or closely braided copper sheathing. This shielding shall be connected to the ground at the extreme end of the shielding. (See Figure 5.) The shielding shall be solidly connected to the case so as to make good electrical contact and there shall be no gaps in the shielding run. (Ordinary flexible helically wrapped metal conduit is generally not suitable.)

CAUTION: Conductor sizes shall be selected to meet NEC, CE Code, and local codes and shall be modi-

fied 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. See Voltage Change-over Connection Diagram in the back of this manual, or inside the machine. 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 code. If no code exists, use the size of wire and fuses listed in Table 2 following.

Specs	Hz	Line Voltage	Line Current	4 Wires in Conduit		4 Wires in Air		Fuse Size
				Line Wire Size	Grounding Conductor Size	Line Wire Size	Grounding Conductor Size	
6426 or	60	200	39	# 8	#10	#10	#10	60A
	60	230	34	# 8	#10	#10	#10	60A
6835	60	460	17	#10	#10	#10	#10	30A
6604	50	220	36	# 8	#10	# 8	#10	60A
	50	380	21	#10	#10	#10	#10	40A
	50	415	19	#10	#10	#10	#10	30A

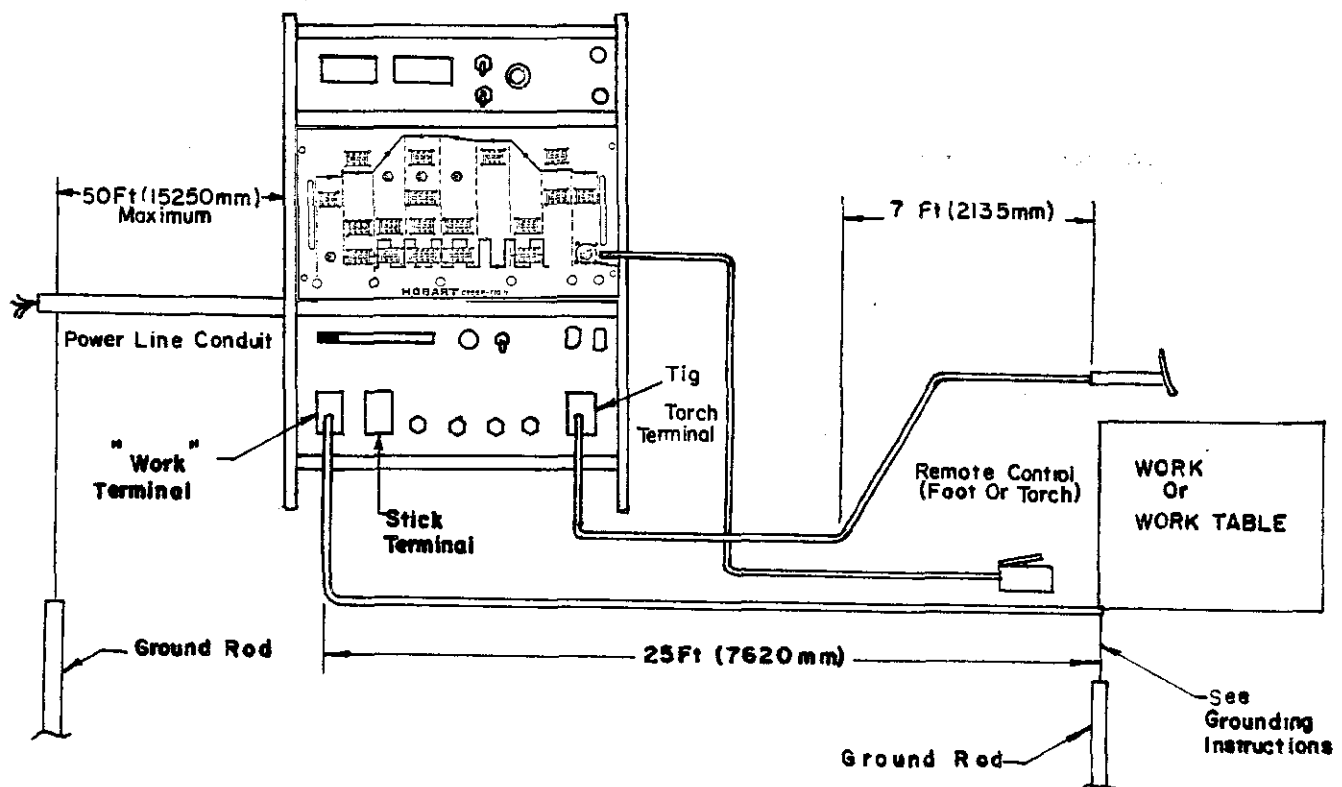
Table 2

CONNECTION TO LINE VOLTAGE (Continued)

**WARNING:** When 4-conductor rubber-covered cable is used, the grounding conductor must be green in color. When flexible armored cable or conduit is required by local codes, install it properly to insure an adequate ground of the equipment. With the machine frame grounded, the operator is always assured full protection, even in the unlikely event of insulation failure, or of accidental ground of the power supply.

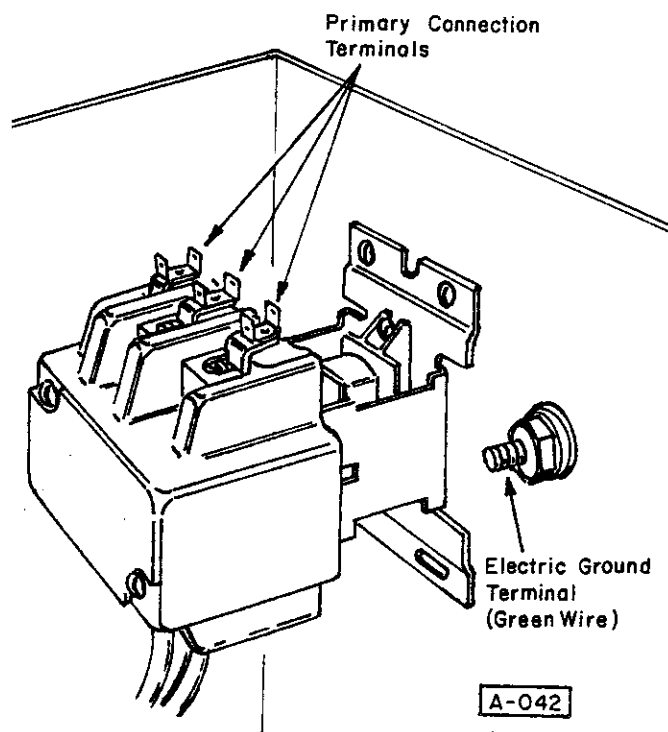
**CAUTION:** The flow of cooling air through the welding machine is carefully directed by baffles. Never operate the machine with any panels removed or open, as serious damage to the components may result.

**CAUTION:** Make certain that the ground lead attached to the work is connected securely at both the work and at the machine and that the lead is in good condition.



Wiring Precautions  
Figure 5

A-041



Three-Phase Input Connections  
Figure 6

**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.

#### CONNECTION TO LINE CONTACTOR

1. Remove the top cover from the welding machine.
2. The line contactor for input power connections is mounted on the back of the inner vertical panel. See Figure 6.
3. The electric ground terminal is located about three inches (76 mm) from the line contactor, on the vertical panel.

4. Run the power cable through the hole at the rear of the machine. Loosen the cable clamp as required to accommodate the cable.

5. Remove about 10 inches (254 mm) of the outer insulation that holds the wires of the cable together.

6. Strip approximately 1/2 inch (12.7 mm) of insulation from the end of each wire.

7. Install the green wire securely to the grounding terminal.

8. Install the other wires to the line contactor as illustrated in Figure 6.

9. Pull the cable back through the hole sufficiently to remove excessive slack, but not enough to permit the cable to be under tension.

10. Secure the cable under the cable clamp. The cable clamp should be sufficiently tight to prevent any movement when it is pulled.

**CAUTION:** Do not tighten the cable clamp enough to damage cable insulation or wires.

11. Refer to instructions under INPUT VOLTAGE CHANGEOVER to assure that the machine is connected internally to match the available line voltage.

12. Replace top cover and securely fasten in place.

#### CONNECTION TO FUSED DISCONNECT SWITCH

1. Connect the black cable wire to the terminal in the fused disconnect switch that leads through the fuse and the switch to the black input power wire.

## CONNECTION TO FUSED DISCONNECT SWITCH (Continued)

2. Connect the white cable wire to the terminal in the fused disconnect switch that leads through fuse and switch to the white input power wire.

3. Connect the red cable wire to the terminal in the fused disconnect switch that leads through fuse and switch to the red input wire.

4. Connect the green cable wire to the fused disconnect switch ground and to an external ground.

## WELDING ADJUSTMENTS

Keep spark gaps set at 0.006 inch (0.152 mm). Set high frequency control to lowest possible setting consistent with good welding.

**CAUTION:** When the machine is in operation, make sure that the top is in place, and all access holes covered in the cabinet. Proper flow of cooling air must be directed through the unit to avoid overheating. Make no changes or adjustments not covered in this manual, as modification might affect radiation and thus void the manufacturer's certification.

## WELDING LEADS

The TORCH lead and the WORK lead must each be 25 feet (7620 mm) or less in length and run together at floor level whenever possible except the last 7 feet (2140 mm) at the torch or "whip" end. (See Figure 5.) Use No. 1 gauge copper cables.

## REMOTE CONTROL CABLES (When used)

The remote control cables for gun trigger or foot control switch must also be 25 feet (7620 mm) in length, or less, and must be brought out close to and parallel to the welding leads.

## CERTIFICATION NOTICE

In order to comply with F.C.C. regulations after the unit has been installed in accordance with the preceding instructions, the user must post the certification notice at the location of the welding machine. A convenient form is enclosed in the front of this book which may be used for this purpose after it has been properly filled out.

## INDIVIDUAL INSTALLATION CERTIFICATION

1. The user may waive any of the requirements outlined in these special installation requirements if he desires to exercise the option of having an installation test survey made. This survey shall be made by a competent engineer in accordance with the test procedure requirements set forth in Part 18 of the Federal Communications' Rules and Regulations.

2. Certification may cover a unit installation or may be included in the certification of a complete plant.

## RESPONSIBILITY FOR INTERFERENCE

In the event this equipment causes interference, it is the user's responsibility to take steps in eliminating the interference.

## INPUT VOLTAGE CHANGEOVER

Refer to the voltage changeover diagram at the back of this manual. Closely follow accompanying instructions.

**WARNING:** Before proceeding, place fused disconnect switch in "OFF" position and remove the fuses.

Remove the top from the cabinet to gain access to the voltage changeover panel. Voltage may be changed by removing the copper links and arranging them according to the instructions on the Voltage Changeover Diagram. When placing links in the 460-volt arrangement, use two links on each position.



#### PROGRAMMER AND REMOTE CONTROL CONNECTIONS

Refer to Figure 5 as a rough guideline, but be sure to use the Programmer instruction manual to determine the exact connection procedure.

#### PREPARATION FOR USE

**COOLING WATER CONNECTIONS** - Refer to Figure 7 when making connections to a "Circoolator". Refer to Figure 8 when making connections to the city (factory) water supply. In both cases, the cooling water exits the torch through the hollow electric cable.

NOTE: All water fittings have left-hand threads.

CAUTION: Do not connect cooling water lines to the welding machine if a pump-type "Circoolator" is used. Connect the torch's water line directly to the pump with a non-metallic hose. The use of Teflon thread sealing tape is recommended on the threaded water fittings, except for the torch cable connection to the welding machine Electrode or Tig Torch terminal. The only thread sealant allowed on this torch cable connection is electrical joint compound. This compound is available from Hobart Brothers Company in 5 oz. (141.8 g) tubes (Hobart part no. 903170).

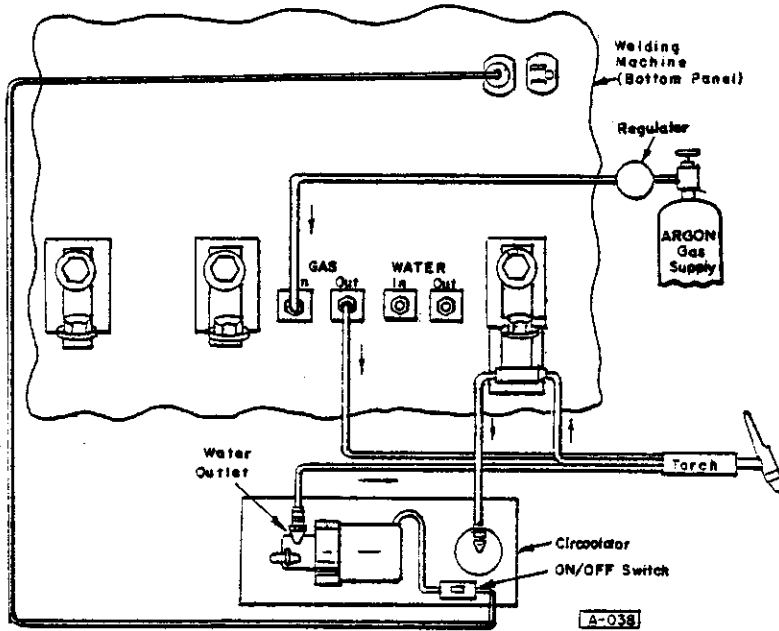
**SHIELDING GAS CONNECTIONS** - Refer to Figure 7 when making connections to a "Circoolator" cooled torch. Refer to Figure 8 when making connections to a city water cooled torch. Refer to Figure 9 when making connections to a gas cooled torch. Only in the case of the gas ("air") cooled torch does the gas flow to the torch through the hollow electric cable.

NOTE: All gas fittings have right-hand threads.

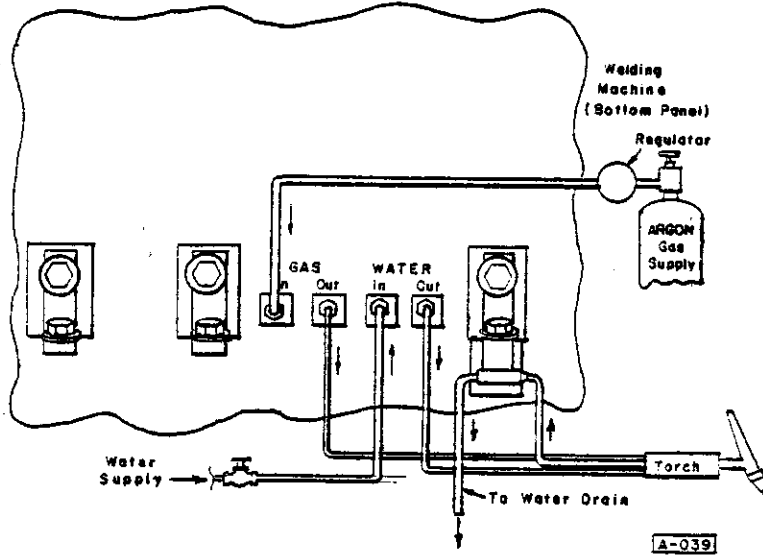
Shielding gas loss due to poor connections results in gas waste and possibly poor welds.

**ELECTRICAL CONNECTIONS TO TORCH AND WORKPIECE** - The "torch" and "work" power leads, plus the remote or torch switch cables, must each be 25 feet (7620 mm) in length or less. Refer to Figure 5. Securely connect the "electrode" (stick) lead to the STICK Terminal (if performing stick-electrode welding only) or to the TIG TORCH Terminal (if performing TIG welding). Securely connect the "work" lead to the WORK Terminal in any case.

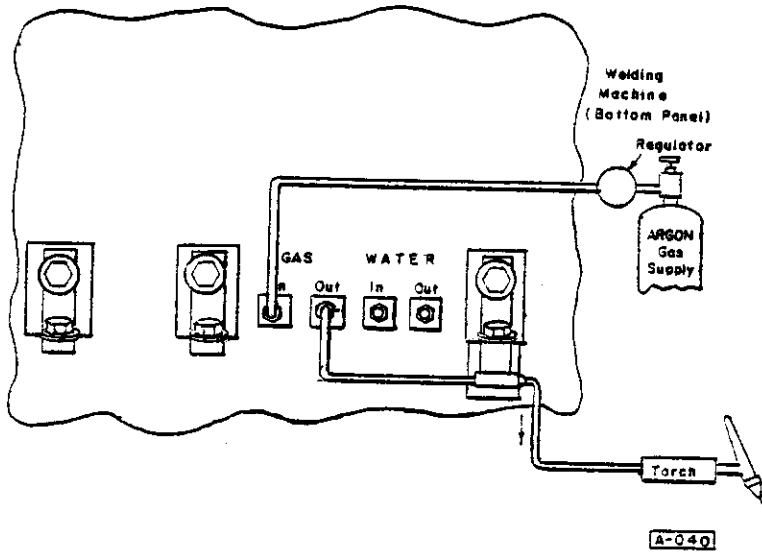
NOTE: Make sure all connections are clean and tight. Thread sealant may be used as specified in the CAUTION note in the section entitled: COOLING WATER CONNECTIONS. When using high frequency, keep both welding leads as short as possible and as far away as practical from other power lines and metallic objects.



Circulator  
Cooled  
Torch  
Figure 7



City (Factory) Water  
Supply Cooled Torch  
Figure 8



Gas (Air) Cooled  
Torch  
Figure 9

## OPERATION

NOTE: For operating instructions, the Programmer Instruction manual will have to be consulted. It will instruct in detail for the particular programmer which is being used in this machine.

PRESETTING CONTROLS FOR TIG WELDING  
Refer to Figure 1, 2 and Programmer Instruction Manual.

HIGH FREQUENCY SWITCH - AUTO position, high frequency mode is initiated, in OFF position, the high frequency circuitry is deenergized.

HIGH FREQUENCY INTENSITY CONTROL - Lowest setting that will consistently initiate the arc.

POLARITY SWITCH - Set in either DCEN (electrode negative) for STRAIGHT polarity; or in DCEP (electrode positive) for REVERSE polarity welding mode.

POWER ON/OFF SWITCH - Place in ON position to supply power to the panel.

TIG/STICK SELECTOR SWITCH - Place in TIG position for TIG welding, or in STICK for covered electrode welding. In STICK position, gas and water and high frequency are deenergized.

ARC FORCE CONTROL - Use only with stick welding. See details under Controls and Connections text in DESCRIPTION section.

## FUNCTIONS OF PRINTED CIRCUIT BOARDS

CONTROL AND FIRING CIRCUIT P.C. BOARD 369096 - The Cyber-Tig II power source uses SCRs to control and rectify the welding current. The conduction of the output rectifier SCRs is activated by this P.C. Board. See Figure 13 and consult callouts and legend for layout of components. Refer to diagram 369096 in back of manual under DIAGRAMS, also.

SCR BACKGROUND CIRCUIT PRINTED CIRCUIT BOARD 368043-1 - Refer to diagrams 368043 and 369284 in back of manual. This circuit provides the open-circuit voltage and the welding current below 5 amperes. The background SCRs are gated ON by the Cyber-Tig II programmer after the preflow timer times out.

Open-circuit voltage appears at the output terminals of the machine until a welding arc is struck. At very low welding currents the conduction angle of the main SCRs is so small that the current is erratic. The background circuit SCRs override the main SCRs and provide a stable weld current down to about 3 amperes.

SOLID-STATE RELAY PRINTED CIRCUIT BOARD 368036 - Refer to diagrams 369284 and 368036 in back of manual under DIAGRAMS. The input voltage (control voltage) is 24 volts DC. The output contacts are for 120 volt AC (7 amperes).

Two solid-state relays are used. One energizes the high frequency starter circuit, and the other one energizes the gas and water valves. The input voltages for these relays are 24 volts DC signals from the programmers.

## MAINTENANCE

## 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 to the frequency of this lubrication if desired.

Type of Duty	Lubrication Interval
Light (up to 6 hrs./day)	Every 12 months
Moderate (7 to 15 hrs./day)	Every 6 months
Heavy (16 to 24 hrs./day)	Every 3 months

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 dry, and well ventilated. Dirt and dust may be blown or wiped from the inside of the welding machine and the programmer drawer.

**WARNING:** Disconnect line voltage from the unit before attempting any servicing inside the machine. Turn the fused disconnect switch to OFF position, and remove its fuses.

Be sure to wipe the fan blades clean. All electrical connections should be checked and tightened at regular intervals to eliminate unnecessary losses and avoid subsequent trouble from overheating or open circuits.

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

## SPARK GAPS

Set to 0.006 inch (0.15 mm) or less. Check gaps frequently, as gap erosion is normal.

## SCRs

See Detailed Troubleshooting Instructions.

## TROUBLESHOOTING

The following chart contains information which can be used to diagnose and correct unsatisfactory operation or failure of 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. In addition to the chart, detailed instructions for checking and adjusting and/or setting components on the Printed Circuit Board and SCRs are given.

TROUBLE	PROBABLE CAUSE	REMEDY
Welding machine will not start.	a. Power switch OFF	a. Place power switch in ON position.
	b. Power lines dead	b. Check voltage.
	c. Broken power lead	c. Repair.
	d. Wrong line voltage	d. Check power supply.
	e. Incorrect input power connections at welding machine	e. Check connections against wiring diagram.
	f. Open circuit to power switch or control transformer	f. Repair. Check for broken wire or loose connections at terminals.
	g. Fuse on pilot transformer blown	g. Remedy cause. Replace fuse.
	h. Broken lead at contactor	h. Repair.
	i. Mechanical obstruction on contactor	i. Remove obstruction.
	j. Defective contactor coil	j. Replace.
Fan will not start.	a. Power switch OFF	a. Place power switch in ON position.
	b. Power lines dead	b. Check voltage.
	c. Broken power lead	c. Repair.
	d. Wrong line voltage	d. Check power supply.
	e. Incorrect input power connections at welding machine	e. Check connections. Refer to Voltage Changeover Diagram in DIAGRAMS Section of this manual.

TROUBLE	PROBABLE CAUSE	REMEDY
Fan will not start. (cont'd)	f. Blown line fuses	f. Check for cause, replace.
	g. Blown fuse on front panel	g. Check for cause, replace.
	h. Fan motor failed	h. Replace.
	i. Control transformer failed	i. Replace.
	j. Loose connections at contactor, control transformer or switch S1	j. Reconnect.
Contactor hums.	k. Loose connections at control transformer	k. Reconnect.
	a. Dirt on pole faces of contactor	a. Clean faces of magnet.
Contactor chatters.	b. Broken shading coil (copper ring) on contactor core	b. Replace contactor.
	a. Line leads too small	a. Use larger leads.
Contactor operates and blows fuse in supply circuit.	b. Low line voltage	b. Check line voltage.
	a. Wrong line voltage	a. Check nameplate of welding machine for line voltage to use, check line voltage.
	b. Links on voltage changeover panel incorrectly connected	b. Check connections. Refer to Voltage Changeover Diagram in DIAGRAMS Section of this manual.
	c. Fuse too small	c. Install proper size fuses. (See wire and fuse size chart in INSTALLATION Section of this manual.)
	d. SCR failed - (output rectifier)	d. Replace SCR. See MAINTENANCE Section of this manual.
	e. Short circuit in primary connections	e. Remove short circuits.
	f. Transformer failed	f. Repair or replace.

TROUBLE	PROBABLE CAUSE	REMEDY
Welding machine delivers welding current but soon shuts down.	<ul style="list-style-type: none"> <li>a. Welding machine overloaded, and duty cycle too high</li> <li>b. Thermostat S7 on output rectifier <i>open</i>, which opens the line contactor (K3)</li> <li>c. Power leads too long or too small in cross section. Voltage drop through leads causes machine overload</li> <li>d. Ambient temperature too high</li> <li>e. Ventilation blocked</li> <li>f. Fan not operating</li> </ul>	<ul style="list-style-type: none"> <li>a. Reduce load - overload can be carried only for a short time.</li> <li>b. Do not operate continually at overload currents.</li> <li>c. Replace with larger diameter leads. See wire and fuse chart in INSTALLATION Section of this manual.</li> <li>d. Operate at reduced loads when temperature exceeds 100°F (38°C).</li> <li>e. Check air intake and exhaust openings for obstruction and remove any found.</li> <li>f. Check bearings, disconnect leads and apply motor nameplate voltage to check.</li> </ul>
Contactor operates but welding machine will not deliver current.	<ul style="list-style-type: none"> <li>a. Electrode lead or holder may be grounded</li> <li>b. Polarity switch not in positive position</li> <li>c. Water pipe connected to TIG torch terminal</li> <li>d. Transformer winding open</li> <li>e. Transformer secondary failed</li> <li>f. SCR failed (output rectifier)</li> </ul> <p style="text-align: center;">See Troubleshooting Section of Programmer Manual also</p>	<ul style="list-style-type: none"> <li>a. Use only lead and holder with sound insulation.</li> <li>b. Set exactly in DCEN or DCEP position.</li> <li>c. Remove. Run lead from torch lug to TIG torch terminal.</li> <li>d. Have transformer repaired.</li> <li>e. Have transformer repaired.</li> <li>f. Replace SCR. See MAINTENANCE Section of this manual.</li> </ul>

TROUBLE	PROBABLE CAUSE	REMEDY
Welding arc is loud and spatters excessively (stick electrode welding)	<ul style="list-style-type: none"> <li>a. Current setting too high</li> <li>b. Polarity wrong</li> <li>c. Filter coil short circuited</li> <li>d. Arc Force set too high</li> </ul>	<ul style="list-style-type: none"> <li>a. Check setting and output with ammeter, or reduce current.</li> <li>b. Check polarity, try reversing polarity.</li> <li>c. Replace filter.</li> <li>d. Lower Arc Force setting.</li> </ul>
Welding arc sluggish	<ul style="list-style-type: none"> <li>a. Current too low</li> <li>b. Poor connections</li> <li>c. Leads too long or too small in diameter</li> <li>d. Low line voltage</li> </ul>	<ul style="list-style-type: none"> <li>a. Check output and current recommended for electrode being used.</li> <li>b. Check all electrode holders, electrode lead and work lead connections.</li> <li>c. Check lead voltage drop, use larger lead. (See Table 2.)</li> <li>d. Check power source. Notify power company if necessary.</li> </ul>
Contactor operates, but welding machine will not deliver welding current, and open circuit voltage is present at the output when gun switch is depressed.	<ul style="list-style-type: none"> <li>a. No ground connections at work</li> <li>b. Welding leads not connected</li> <li>c. Polarity switch</li> </ul>	<ul style="list-style-type: none"> <li>a. Make connections.</li> <li>b. Make connections.</li> <li>c. Check to be sure switch is in position.</li> </ul>
Current control does not control welding current.	See Programmer Manual.	



TROUBLE	PROBABLE CAUSE	REMEDY
Welding machine operates but welding current falls off.	a. Electrode or ground lead connections loose at machine, ground or work  b. Programmer set wrong  Also see "welding machine delivers welding current but soon shuts down".	a. Clean and tighten all connections, check ground return circuit.  b. Recheck Programmer setting.
Low open-circuit voltage	a. Open SCRs in background in output rectifier (SCR P.C. Board 368043-1)	a. Replace SCRs.
Arc difficult to strike	a. Loose connection  b. Wrong type electrode  c. Start level pot set wrong	a. Check connections.  b. Use proper electrode.  c. See Programmer Manual.
Operator gets shock when welding machine case is touched	a. Case of welding machine not grounded	a. Ground welding machine case.
Abnormal current fluctuation, voltage nearly constant	a. Loose cable connections  b. Control board failure	a. Check for overheated connections and tighten.  b. See DETAILED SETTING AND TROUBLESHOOTING OF PC BOARD.
Contactor fails to open	a. Contactor contacts sticking	a. Clean contacts.
Very noticeable, rough, sputtering arc. Loss of control. Minor starting problems.	a. Control circuit board failure	a. Same as "b" above.

TROUBLE	PROBABLE CAUSE	REMEDY
Arc is unstable	<ul style="list-style-type: none"> <li>a. Dirt, grease, or oil on work piece</li> <li>b. Joints too narrow. Arc jumps from side to side.</li> <li>c. Electrode too large; arc moves around on electrode.</li> <li>d. Arc too long</li> </ul> <p style="margin-left: 40px;">Also see "Torch spits tungsten into work".</p>	<ul style="list-style-type: none"> <li>a. Degrease and clean to bare metal by chemical or abrasive means if necessary.</li> <li>b. Increase spacing of work pieces or shorten arc length. Reduce high frequency setting.</li> <li>c. Use smaller electrode or grind point. A polished electrode sometimes helps.</li> <li>d. Shorten arc length.</li> </ul>
Torch "spits" tungsten into work	<ul style="list-style-type: none"> <li>a. Tungsten is balled for reverse polarity</li> <li>b. Arc length too long</li> <li>c. Tungsten too small</li> <li>d. Current too high</li> <li>e. Sharp point ground on tungsten</li> <li>f. Postflow time too short causing air contamination of tungsten</li> <li>g. Tungsten touching work, causing contamination of tungsten and work</li> <li>h. Leaky "O" rings in torch or leaky hoses in gas line</li> <li>i. Hoses previously used to carry oil, acetylene or gases</li> </ul>	<ul style="list-style-type: none"> <li>a. Ball by grinding only.</li> <li>b. Shorten arc.</li> <li>c. Increase size of tungsten.</li> <li>d. Decrease current.</li> <li>e. As rated current of tungsten is approached, reduce sharpness of point.</li> <li>f. Increase postflow time until tungsten stays bright after gas shuts off.</li> <li>g. Break off end of tungsten.</li> <li>h. Replace.</li> <li>i. Use new hoses.</li> </ul>

TROUBLE	PROBABLE CAUSE	REMEDY
Weld is dirty	<ul style="list-style-type: none"> <li>a. Dirty work metal</li> <li>b. Dirty filler rod</li> <li>c. Insufficient gas flow</li> <li>d. Leaky gas hoses</li> <li>e. Hoses previously used to carry oil, acetylene or other gases, causing scum on weld</li> <li>f. Loose connections in gas system</li> </ul>	<ul style="list-style-type: none"> <li>a. Clean work metal with degreasing compound, soap and water compound or wire brush.</li> <li>b. Keep filler rod in location where it will not become dirty.</li> <li>c. Increase gas flow. Check for pinched hoses.</li> <li>d. Replace.</li> <li>e. Use new hoses.</li> <li>f. Tighten.</li> </ul>
On DC-TIG straight polarity welding, high frequency jumps gap between electrode and work, but DC power does not follow to initiate the arc.	<ul style="list-style-type: none"> <li>a. Use of pure tungsten</li> <li>b. Use of helium gas</li> <li>c. Electrode held very near work after high frequency has begun jumping</li> <li>d. Tungsten too large</li> <li>e. Torch fuse blown</li> <li>f. Tungsten used too long a time</li> <li>g. See Programmer Manual</li> </ul>	<ul style="list-style-type: none"> <li>a. Use thoriated tungsten on DC straight polarity welding.</li> <li>b. Use argon gas for best arc-initiating properties.</li> <li>c. After high frequency spark jumps, withdraw torch slightly.</li> <li>d. Use smaller tungsten or grind point.</li> <li>e. Replace, check to see if water is flowing. Reduce current if overloading torch.</li> <li>f. Break off 1/4".</li> </ul>
High frequency and arc extend from side of tungsten.	<ul style="list-style-type: none"> <li>a. Rough tungsten</li> </ul>	<ul style="list-style-type: none"> <li>a. Use ground and polished tungsten.</li> </ul>

TROUBLE	PROBABLE CAUSE	REMEDY
Arc unstable at low current welding on DC straight polarity TIG.	<ul style="list-style-type: none"> <li>a. Arc extends from side of tungsten</li> <li>b. Arc length too long</li> <li>c. Arc wanders</li> <li>d. Background P.C. Board (368043-1) defective</li> </ul>	<ul style="list-style-type: none"> <li>a. Use ground and polished tungsten.</li> <li>b. Use shortest arc length possible.</li> <li>c. See section on "Arc wanders".</li> <li>d. Replace P.C. Board.</li> </ul>
Arc crater at end of weld	<ul style="list-style-type: none"> <li>a. Torch withdrawn before arc is extinguished</li> </ul>	<ul style="list-style-type: none"> <li>a. Snap torch back quickly. An alternate solution is to cut off the current with the remote switch before the torch is withdrawn from the work. Still another solution is to use the remote rheostat control to reduce the current before withdrawing the electrode from the work and filling in the crater in this manner.</li> </ul>
Arc wanders	<ul style="list-style-type: none"> <li>a. Tungsten contaminated by carbon</li> <li>b. Arc blow</li> <li>c. Air drafts</li> <li>d. Electrode too large; arc moves around on electrode</li> <li>e. Joint too narrow; arc jumps from side to side</li> </ul>	<ul style="list-style-type: none"> <li>a. Break off end of tungsten and grind clean. Do not use carbon block for striking arc.</li> <li>b. Change position of ground clamp.</li> <li>c. Shield arc from air drafts.</li> <li>d. Use smaller electrode or grind point. A polished electrode sometimes helps. Grind point on electrode.</li> <li>e. Increase spacing of work pieces or shorten arc length. Reduce high frequency setting.</li> </ul>
Tungsten discolors after weld	<ul style="list-style-type: none"> <li>a. Insufficient gas post-flow</li> </ul>	<ul style="list-style-type: none"> <li>a. Increase setting of post-flow time.</li> </ul>

TROUBLE	PROBABLE CAUSE	REMEDY
Tungsten dis- colors after weld (continued)	<ul style="list-style-type: none"> <li>b. Postflow timer sticks</li> <li>c. Gas valve sticks</li> <li>d. Loose connections in gas system</li> <li>e. Insufficient gas flow</li> <li>f. Leaky hoses</li> <li>g. Solid-state Relay P.C. Board defective</li> </ul>	<ul style="list-style-type: none"> <li>b. Replace or clean contacts.</li> <li>c. Replace.</li> <li>d. Tighten.</li> <li>e. Increase.</li> <li>f. Replace.</li> <li>g. Replace P.C. Board.</li> </ul>
Water to torch flows too slowly or not at all	<ul style="list-style-type: none"> <li>a. Insufficient water pressure</li> <li>b. Water shut off</li> <li>c. Water valve sticks</li> <li>d. Tig/Stick switch set on "STICK"</li> <li>e. Water hose pinched</li> <li>f. Solid-state Relay P.C. Board defective</li> </ul>	<ul style="list-style-type: none"> <li>a. Increase water pressure.</li> <li>b. Turn on water.</li> <li>c. Replace water valve.</li> <li>d. Set switch to TIG position.</li> <li>e. Remove object pinching hose.</li> <li>f. Replace P.C. Board.</li> </ul>
Water or gas will not shut off	<ul style="list-style-type: none"> <li>a. Postflow timer set too high</li> <li>b. Postflow timer malfunction</li> <li>c. Valves stuck open</li> <li>d. Solid-state Relay P.C. Board defective</li> </ul>	<ul style="list-style-type: none"> <li>a. Decrease postflow timer setting.</li> <li>b. See Programmer Manual.</li> <li>c. Replace valves.</li> <li>d. Replace P.C. Board.</li> </ul>
Porous welds	<ul style="list-style-type: none"> <li>a. Postflow too long or cold water flows continuously; causes condensation in inert gas section of torch; will not happen with Circoolorator; water is at room temperature.</li> </ul>	<ul style="list-style-type: none"> <li>a. Shorten postflow or use Circoolorator for cooling water.</li> </ul>

TROUBLE	PROBABLE CAUSE	REMEDY
<p>Porous welds (continued)</p> <p>Weak high frequency and no welding power</p> <p>High frequency will not cut off after arc is struck</p>	<p>b. Leaky "O" rings in torch</p> <p>a. Torch fuse blown</p> <p>a. See Programmer Manual</p> <p>b. Solid-state relay P.C. Board (368036) defective</p>	<p>b. Replace "O" rings.</p> <p>a. Replace; check to see if water is flowing. Reduce current if overloading torch.</p> <p>a. Follow manual instructions.</p> <p>b. Replace P.C. Board.</p>

# Detailed Troubleshooting Instructions

The CT-150-DC-S machines are solid-state welding machines. The method of troubleshooting is different, but 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 power source. Do not overlook bad grounds, shorted control cables, wrong settings, blown fuses, worn contactors, misconnections from auxiliary equipment, misapplications, etc. The only equipment needed to properly detect a problem on this power source is a simple voltohmmeter, although an oscilloscope is the best method to quickly "see" the problem.

**Voltages of Interest** — Refer to Diagrams 369283 and 369284.

1. Across the secondary on all three phases — 115 V AC  $\pm$  10%.
2. From the center bus bar on secondaries to the top or bottom of the secondary — 58 V AC  $\pm$  10%.
3. X4-X5 on center phase of transformer — 115 V AC  $\pm$  10%.
4. X1-X3 on fuse block — 36 V AC  $\pm$  10%.
5. X1-X2 and X2 to X3 from fuse block to output rectifier — 18 V AC  $\pm$  10%.

*NOTE: The  $\pm$  10% value indicates the possibility of having a high or low voltage on the input line.*

## Symptoms

**SCR Firing PC Board Failure** — If a board failure occurs, the following situations will probably happen:

1. Loss of welding arc completely.
2. Rough, sputtering arc, very noticeable.
3. Loss of welding arc control.
4. Difficulty in starting arc.

**Malfunction in SCRs** — The following situations will probably exist:

1. Blown line fuses in the case of a shorted SCR (similar to a shorted diode).
2. One SCR does not turn on [either it is open or gate signal is not being received by the SCR (gate circuit open)] and a very small change will occur at

the welding arc and will be difficult to detect by the average welding operator. Generally when this happens, it will be necessary to adjust the current control on the front of the power source, increasing the current to obtain the same welding current that was being produced before the SCR defect occurred.

3. Two SCRs do not turn on, the welding arc becomes more erratic and unstable.

**Voltage Test** — In the Cyber-Tig II power source the Background SCR P.C. Board (368043-1) provides the open-circuit voltage. The open-circuit voltage will not drop if an output SCR is open. Therefore, use the following procedure to detect a malfunction in one or more of the output rectifier SCRs.

1. Short the WORK terminal to the STICK terminal on the power source.
2. Turn the Current Control to minimum.
3. Turn High Frequency switch to OFF.
4. Turn Arc Force to minimum.
5. Apply rated voltage to machine, and turn Power Switch to ON.
6. Turn Current Control to get 100 amperes output current.
7. Using a conventional VOM meter, measure the AC voltage across anode to cathode of each of the six SCRs. (A digital multimeter is not recommended for this measurement.) The voltage can be measured from the common octagon heat sink to the channel heat sink on each SCR. See diagram 369283.

The voltage should be about  $60 \pm 10$  V AC. If one SCR or more is reading about 15 or 20 volts more than the other SCRs, it should be suspected. Inspect the SCR to make sure it is clamped in the heat sink correctly. Also check to determine that the gate and anode leads are connected, and not pinched in the clamp. If these items appear to be satisfactory, change the faulty SCR, per the following procedures.

## Mounting Procedure for SCRs

1. Thoroughly clean heat sink surface to eliminate any dirt or contamination.

OM-223

2. Apply a thin coat of Alcoa #2 compound to cleaned surface. Alcoa #2 is available from Hobart Brothers Company, 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.

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

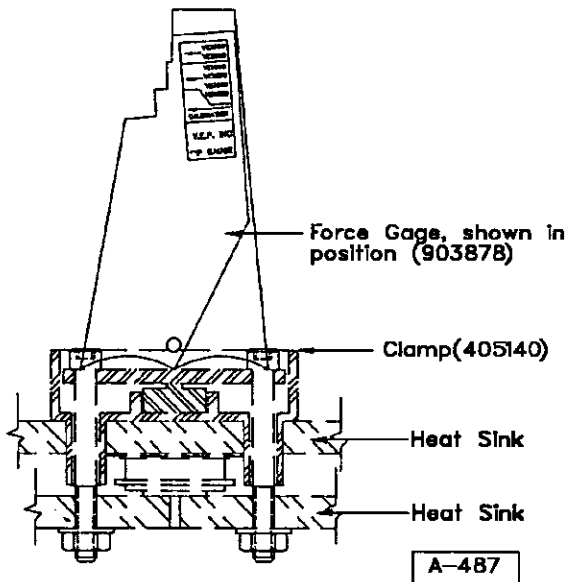
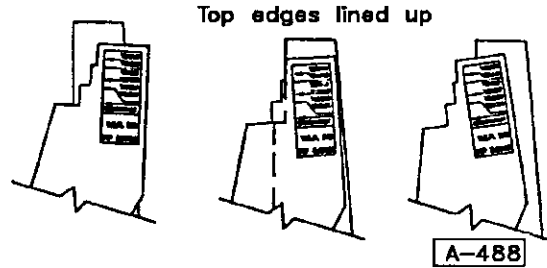


Figure 10

Examples:



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

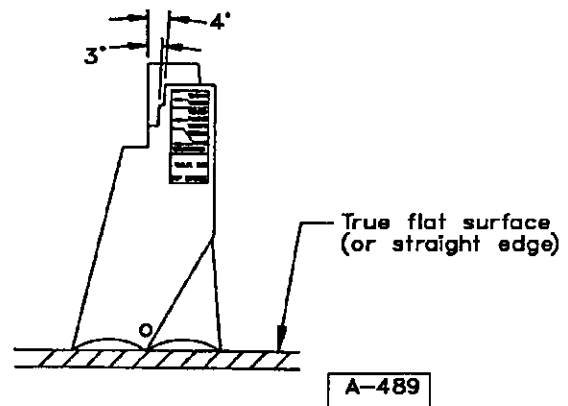
Correct rated force.

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 11

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 12



**Detailed Setting and Troubleshooting of Printed  
Circuit (PC) Board**

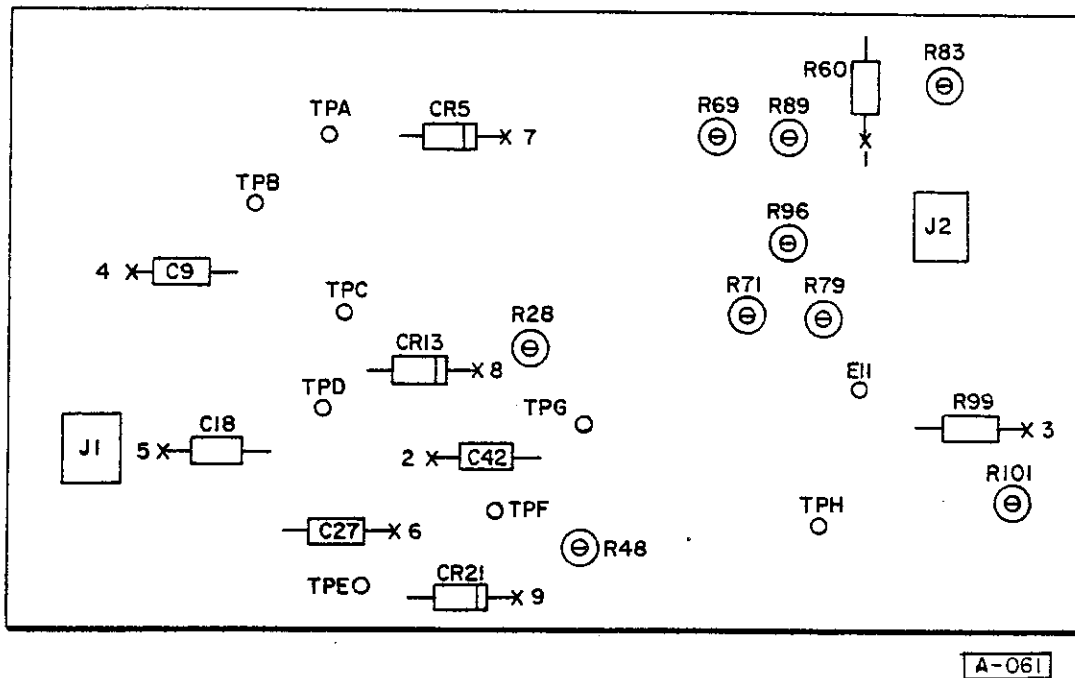
Test Points – There are several test points on the PC Board which will aid in determining if the defect is in the board. First, be certain that all wiring to the board is in good shape, and input (X1-X3) leads are in place. The following voltage checks (Table 3) should be made in sequence.

**CAUTION: Do not connect a machine to a line in which the voltage varies more than  $\pm 10\%$  of nominal line voltage. For example, on a 460-volt line, the operating voltage is 414 to 504 volts.**

Balance Adjustment Check – Balancing conduction angles of SCRs.

Condition – Open circuit

Description – The test points for this adjustment are 7, 8, 9, with 7 as the reference point. The voltage between 7 and 8, 7 and 9, and 8 and 9 should be equal to zero  $\pm .05$  volts DC. If these voltages are not equal to a voltage of less than .05 V DC, adjust potentiometers R28 and R48 until they are equal.



Printed Circuit Board  
Figure 13

TEST	TEST POINTS	VOLTAGE	CONDITIONS	REMARKS
1	E11 to TPG	+15 V DC	Open Circuit	Checks output of regulator
2	TPH to TPG	-15 V DC	Open Circuit	Checks output of regulator
3	1 to TPG	+24 V DC±10%	Open Circuit	Checks solid state contactor control
4	2 to TPG	+9.1 V DC±10%	Open Circuit	Checks reference voltage
5	TPA to TPG	2.9 V DC±10%	Open Circuit	Checks timer operation
	TPC to TPG	2.9 V DC±10%	Open Circuit	
	TPE to TPG	2.9 V DC±10%	Open Circuit	
6	TPB to TPG	17 V DC±10%	Open Circuit	Checks timer operation
	TPD to TPG	17 V DC±10%	Open Circuit	
	TPF to TPG	17 V DC±10%	Open Circuit	
7	4 to TPG	17 V DC±10%	Open Circuit	Checks gate circuit
	5 to TPG	17 V DC±10%	Open Circuit	
	6 to TPG	17 V DC±10%	Open Circuit	

If any of the above tests fail, there is a high probability of a defective PC board.

Table 3

DETAILED SETTING AND TROUBLESHOOTING  
OF PRINTED CIRCUIT (PC) BOARD (Continued)

BALANCE ADJUSTMENT CHECK (Continued)

NOTE: All potentiometer operating values are pre-set at the factory, and normally should not have to be reset in the field. If a need arises that would indicate the need for field adjustments, please contact the factory.

POTENTIOMETER SETTINGS - The following is a brief description of how the potentiometers are adjusted, and the conditions.

1. Pot R69 - Main SCR Adjustment

Conditions - Two 100 ohm, 100 watt resistors connected in parallel across "Work" and "Stick" terminals. Set current control to MAXIMUM setting. Using a "jumper" wire, connect terminal #1 to terminal #6 on the 12-station terminal block at the back of the Programmer.

Description - Adjust for maximum voltage on welding machine voltmeter, then decrease to 2 volts less than maximum.

2. Pot R89 - Arc Force Voltage Setting

Conditions - Unit is loaded to a load value of 18 volts at 50 amps or more. Arc force control set to minimum.

Description - Adjusts the voltage point at which the arc force con-

trol begins, causing the output current to increase. At the above load this adjustment is made such that the output of op amp U9 (Pin 6 to TPG) is zero.

3. Pot R96 - Arc Force Short Circuit Setting

Conditions - Short circuit current, arc force control is set to maximum and current control is set to minimum.

Description - Adjusts the maximum short circuit current obtainable with the arc force control. It is set such that the short circuit current increases 200 amps above the short circuit current obtained when the arc force control is set to minimum.

4. Pot R79 - High Output Current Setting

Conditions - Welding arc current or load bank, arc force control set to minimum. Set current control on Programmer to 200 amperes or 5.0 turns on dial.

Description - Adjusts R79 such that the reading on the DC ammeter on the front of the welding machine reads 200 amperes.

5. Pot R71 - Low Output Current Setting

Conditions - Same as step 4 except current control to be 20 amperes, or 0.5 turns on dial.

Description - Adjust R71 until 20 amperes is indicated on the DC ammeter on the front panel of the welding machine. Repeat steps 4 and 5 until no further adjustment is required.





# Parts List

EQUIPMENT IDENTIFICATION - An identification plate on the unit's control panel shows its model number, serial number, and specification number. Whenever ordering parts or making inquiries, furnish all these numbers.

NOTE: A "specification number", in some cases, must have a "dash number" suffix (-1, -2, -3, etc.) in order to be a complete number.

HOW TO USE THIS PARTS LIST - The part name listings may be indented to show part relationships as indicated in the following example.

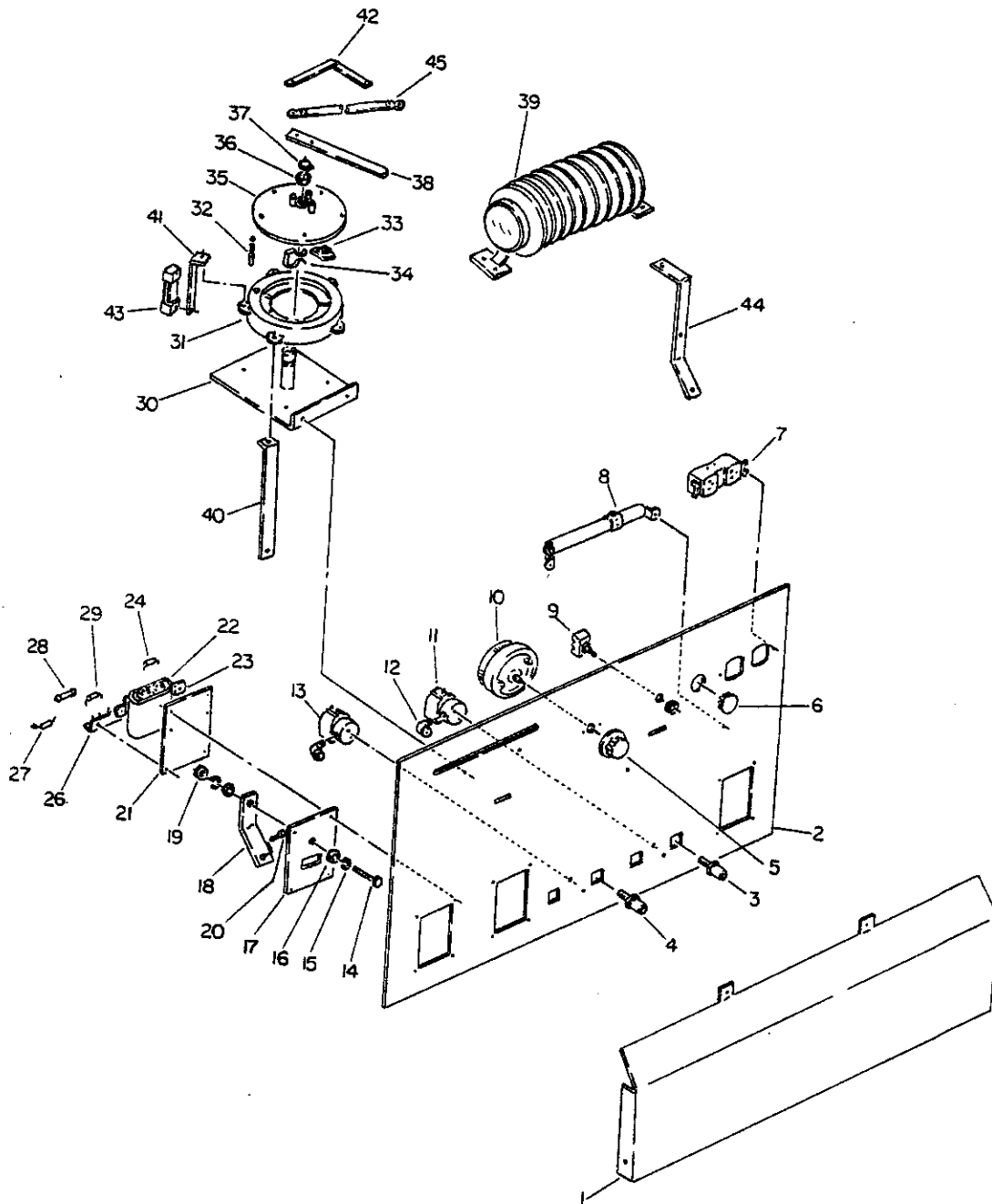
Quantity Recomm. Spares						Quantity per Assembly	Application Code
Class	Fig.	Item No.	Part No.	Description			
1	2	1-	123456	Assembly (Not Shown)	1		
			1	234567 . A detail of assembly	1		
			2	345678 . A sub-assembly	1		
			3	456789 . . A detail of sub-assy (item 2)	1		
			4	567891 . . A sub-assembly of item 2	1		
			5	678910 . . . A detail of sub-assy (item 4)	1		

The parts list contains a breakdown of the equipment into assemblies, subassemblies, and detail parts. All parts of the equipment are listed except standard hardware items, bulk items such as wire, cable, sleeving, tubing, etc., and permanently attached parts which lose their identity by being welded, soldered, riveted, etc.

Locate the specification number below that appears on your unit, and note the "APPLICATION CODE" letter adjacent to it. (If no application code appears below, the parts list is applicable to only the one specification number that appears below.) After locating the desired part in the following figures and parts lists, if the "Application Code" column says "All", proceed to order the part. If there are several part numbers after the same "Item No.", order only the part number corresponding to the "Application Code" letter that you selected above.

SPEC NO.	APPLICATION CODE	SPEC NO.	APPLICATION CODE	SPEC NO.	APPLICATION CODE
6426-1	A	6426-5	D	6835-1	G
6426-2	B	6426-6	E	6835-2	H
6426-3	C	6426-7	F	6835-3	J

HOW TO SELECT RECOMMENDED SPARES - The parts list has a column heading entitled "Recomm. Spares, Class 1 and Class 2". Class 1 recommended spare parts are parts that are consumed or may need replacement in two years or less, depending on operating hours. Class 2 spares are parts that may need replacement under unusual service conditions or because of additional operating hours. The quantities listed are suggested quantities based on expected usage or the minimum quantity package. Class 1 spares are repeated under Class 2 but the quantities may be larger to allow for the additional operating hours. Contact your Hobart equipment dealer for assistance in establishing a spare parts program based on your needs.



Bottom Front Panel  
Figure 1

Quantity  
Recomm.  
Spares

Class		Fig. No.	Item No.	Part No.	Description	Quantity per Assembly	Application Code
1	2						
		1-	1	369475	Cover - Output Terminal	1	All
				369482-1	Panel - Front, Bottom, Assy	1	BCDHJ
				369482-3	Panel - Front, Bottom, Assy	1	AEFG
			2	369469	. Panel - Front, Bottom	1	All
			3	370851	. Adapter - Water, Left Hand	2	All
			4	370447	. Adapter - Gas, Right Hand	2	All
			5	400248	. Knob - Rheostat	1	All
			6	16DA-1997-11	. Button - Hole Plug	1	BCDHJ
		-		100GH-770	. Receptacle - Remote Control, Twist Lock	1	AEFG
		*	7	402670	. Receptacle - Duplex, 3 Wire	1	All
			8	405506-1	. Resistor - Adj., 100 W	1	All
		*	9	402662	. Switch - Toggle	1	All
			10	402219	. Rheostat - 150 Watt, 400 Ohm	1	All
	1		11	402882-1	. Valve - Solenoid, Water	1	All
			12	W-10892-1	. Elbow - Street, 90°, Brass	4	All
	1		13	402882-2	. Valve - Solenoid, Gas	1	All
			14	No Number	. Screw - 1/2-13 x 1-3/4 HHC ST.	1	All
			15	No Number	. Washer - LK. ST. 1/2	4	All
			16	No Number	. Washer - FL. Steel, 1/2	7	All
			17	368875	. Board - Insulator, Output, Terminal	3	All
			18	368874	. Bus - Cable Stud	1	All
			19	No Number	. Nut - 1/2-13, Hex, Jam, ST.	1	All
		-		No Number	. Screw - 1/2-13 x 1-1/4 HHC Steel	2	All
			20	No Number	. Screw - 1/2-13 x 3/4, HHC, Steel	3	All
				368877	. Board - H.F. Return Assy.	1	All
			21	368876	. . Board	1	All
			22	402802	. . Capacitor - Mallory 3 µF	1	All
			23	402879	. . Clamp - Cap.	1	All
			24	362909	. . Resistor - 10,000 Ohm Assy	1	All
			25	368705-2	. Capacitor - .047 µF, 400 V DC Assembly	1	All
				368865	. Bracket - Components, H.F. Assembly	1	All
			26	368866	. Bracket - Mounting	1	All
			27	368705-1	. . Capacitor - W/Leads Assy	1	All
			28	W-9026-10	. . Resistor	1	All
			29	401427-2	. . Capacitor - Radial Lead	1	All
				368633	. Switch - Reversing, Assembly	1	All
			30	368634	. . Plate - Mtg. Rear	1	All
			31	12RT-285	. . Ring - Contact Switch	1	All

\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369423-1.  
- Not Illustrated



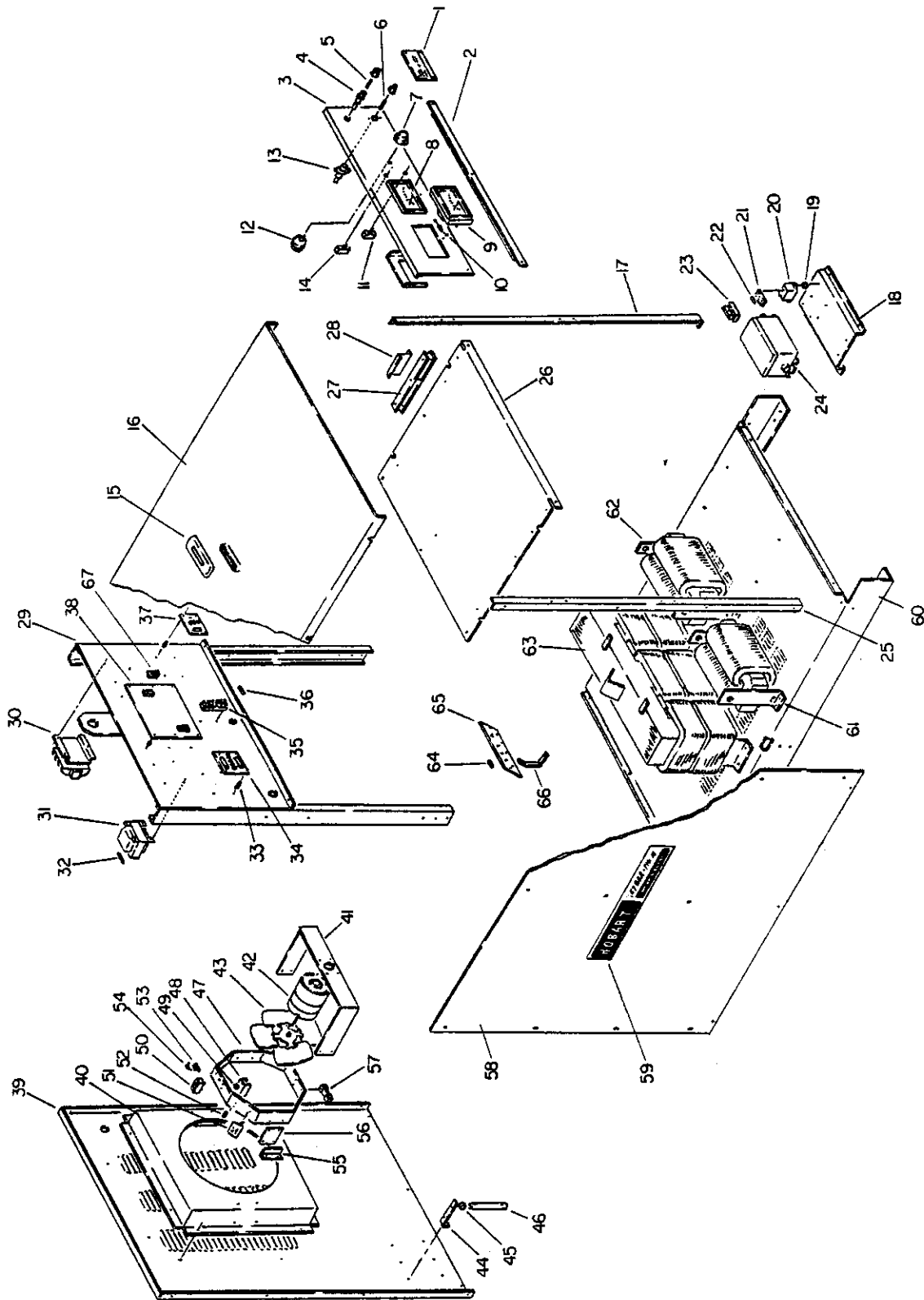


Quantity  
Recomm.  
Spares

Class		Fig. No.	Item No.	Part No.	Description	Quantity per Assembly	Application Code
1	2						
		1-	32	AW-459	. . Catch - Friction Ball	1	All
			33	12RT-238	. . Contactor - Movable	4	All
			34	410541	. . Spring - Pressure	2	All
			35	368726	. . Plate - Front	1	All
			36	SW-167-0	. . Washer - Thrust	1	All
			37	16DA-4249-8	. . Ring - Snap	1	All
			38	365123	. . Handle - Range Switch	1	All
			39	369390	. Transformer	1	All
			40	368718-1	. Bar - Bus, O.T. to Sw.	1	All
			41	369079	. Bar - Bus	1	All
			42	368685	. Bus - Reversing Switch	1	All
			43	AW-894	. Shunt - Meter	1	ABCEGH
				369844	. Shunt - Meter	1	F
				4DW-662	. Shunt - 500 Amp, 50 MV	1	DJ
		-		400078	. Bracket - Resistor	2	All
			44	368696	. Bus - Cable Stud	2	All
			45	W-9234-336	. Cable - Sw. Reversing to High Freq. Coil	1	All
		-		490965-4	. Guard - Edge	3	All
		-		369069-2	Bar - Bus, #106	1	All
		-		369069-1	Bar - Bus, #107	1	All
		-*		405206-1	Plug - Six Pin Male	1	All
		-		405319-16	Label - CT-150-DC-S	1	All
		-		490965-5	Guard - Edge, Trim	1	All
		-*		369419-1	Chart - Wire	1	All

\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369423-1.

- Not Illustrated



Frame Group  
Figure 2

Quantity Recomm. Spares						Quantity	Application
Class	Fig.	Item	Part	Description		per	Code
1	2	No.	No.	No.		Assembly	
		2-	1	404040-1	Nameplate	1	All
			2	369467	Support - Meter Panel	1	All
				369472-1	Panel - Front, Top, Assembly	1	All
			3	369471	. Panel - Front, Top	1	All
			4	402658	. Holder - Fuse	1	All
1			5	401972-2	. Fuse - MDX (Slow Blow) 5 Amp	1	All
1		**	6	W-10502-15	. Fuse - FNM (Slow Blow) 10 Amp	1	All
			7	400248	. Knob - Potentiometer	1	All
			8	405521-12	. Meter - DC, Ammeter	1	ABCDEGH
				406221-1	. Meter - DC, Ammeter	1	F
			9	405520-4	. Meter - DC, Voltmeter	1	ABCDE
				406221-2	. Meter - DC, Voltmeter	1	F
		-		404472-1	. Jack - Insulated, Red	2	GH
		-	10	368705-5	. Capacitor - .047 $\mu$ F, 400 V DC	1	All
		-		404472-2	. Jack - Insulated, Black	1	GH
		**	11	402682	. Switch - Toggle	1	All
		**	12	401428-8	. Potentiometer - 2 Watt	1	All
		**	13	402151	. Holder - Fuse	1	All
		**	14	402662	. Switch - Toggle	1	All
		-		369422-1	. Harness - Upper, Front	1	All
			15	12CW-2170	Grommet - Yoke	1	All
			16	369464	Top	1	All
			17	369461	Angle - Front, Right	1	All
				369055-1	Starter - H.F.	1	All
			18	369054	. Base - Arc Stop	1	All
			19	8RT-654	. Washer - Rubber	2	All
			20	FTW-328-0	. Capacitor - Mica	1	All
			21	368472	. Board - Suppression	1	All
			22	368690	. Choke - R.F. Axial Leads	2	All
			23	FTW-413	. Spark Gap - Assembly	1	All
			24	368706-1	. Transformer - High Voltage Assembly	1	All
			25	369460	Angle - Front, Left	1	All
				369333	Panel - Dustproof, Assembly	1	All
			26	369334	. Panel - Dustproof	1	All
			27	369492	. Slide - Drawer, Programmer	4	All
			28	369491	. Guide - Drawer	2	All
				369430-1	Yoke - Lifting, Assembly	1	All
			29	369446	. Yoke	1	All
			30	405402	. Contactor - Line	1	All
			31	404960-3	. Transformer - Control	1	All
			32	W-10502-25	. Fuse - Slow Blow, 6 Amp	1	All
			33	422241	. Insulator - Tube	14	All
	1		34	368043-1	. Board - P.C. SCR Background Circuit	1	All
		**	These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369422-1.				
		-	Not Illustrated				

Quantity  
Recomm.  
Spares

Quantity  
per Application  
Assembly Code

Class	Fig. No.	Item No.	Part No.	Description	Quantity per Assembly	Application Code
1	2	No.	No.			
		-2-		405770 . Label - Fuse	1	All
		***	35	405129-1 . Holder - Fuse	1	All
		-		367579 . Insulator - Fuse Block	1	All
1		***	36	W-11166-9 . Fuse - Fast Blow, AGC, 1 Amp	6	All
		-		405362-1 . Grommet	2	All
	1		37	368036 . Board - P.C. Assembly (Relay Solid State)	1	All
		-		404472-1 . Jack - Insulated, Red	1	All
		-		404472-2 . Jack - Insulated, Black	1	All
		-		405157 . Label - Fuses	1	All
1			38	369096-1 . Board - P.C., SCR Firing	1	All
			39	369463 Panel - Rear	1	All
			40	367769 Shroud - Fan	1	All
			41	367584 Bracket - Fan Motor	1	All
1			42	12TW-595-1 Motor - Fan	1	All
			43	8RT-609 Blade - Fan	1	All
		**-		405205-1 Receptacle - 6 Pin, Female	1	All
				365827-3 Resistor - Assembly	3	All
			44	AAW-3981 . Mount - Resistor	2	All
			45	16DA-3493 . Insulator - Resistor	4	All
			46	405154-1 . Resistor	2	All
				369279-1 Rectifier - Output, Assembly	1	All
			47	367620 . Heat Sink - Rect.	1	All
			48	367625 . Heat Sink - SCR	6	All
		-		16DA-954-12 . Pin - Spring	6	All
	3		49	405825 . Rectifier - Silicon, Controlled	6	All
			50	405140-1 . Clamp - Mounting	6	All
			51	367634A-1 . Suppressor - Surge, Assembly	2	All
1			52	404044-1 . Thermostat - Overload	1	All
			53	401937-9 . Block - Terminal	2	All
			54	368705-6 . Capacitor - Assembly	6	All
			55	367606 . Brace - Mtg. Rect.	2	All
			56	367605 . Insulator - Mtg. Rect.	2	All
			57	367687 . Shunt - Feedback	1	All
		-		368697 . Bar - Bus	1	All
			58	369462 Panel - Side	2	All
			59	405774 Label - Cyber Tig	2	AB
				407166 Label - CT-150 DC-S	2	CDFGHJ
			60	369455 Base - Assembly	1	All
			61	368454-2 Reactor - Filter	1	All
			62	368526-1 Transformer - Interphase	1	All

- Not Illustrated  
 \*\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369422-1.  
 \*\*\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369421-1.

Quantity Recomm. Spares						Quantity	Application
Class	Fig.	Item	Part	Description		per	Code
1	2	No.	No.	No.		Assembly	
	2-	63	369476		Transformer - Power	1	ABCDEF
			369789		Transformer - Power	1	GHJ
		64	CW-811		Link - Voltage Changeover	6	All
		65	367170-5		Board - Voltage Changeover	1	ABCDEF
			367229-6		Board - Voltage Changeover	1	GHJ
		66	369658		Brace - Voltage Changeover Board	2	All
	***	67	401564-4		Receptacle - J1 and J2, 12 Pin, Female	2	All
	***-		405398-8		Receptacle - J3, 12 Pin, Female	1	All
	***-		405206-3		Plug - J4, 15 Pin, Male	1	All
	-		W-9234-272		Cable - 101	1	All
	***-		405206-1		Plug - 6 Pin, Male	1	All
	-		402037-4		Grommet - Harness	4	All
	-		369277		Kit - Caster (Opt.)	1	All
	***-		369417-1		Chart - Wire	1	All
	-		405651		Receptacle - 4 Pin Amphenol (Mounts on Rear Panel)	1	CDFJ
	-		85640		Cable - 4 Conductor Shielded	5'	CDJ
	-		472761		Panel - Cover, Meter Hole	1	CDJ

\*\*\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369421-1.  
- Not Illustrated





# Parts List

EQUIPMENT IDENTIFICATION - An identification plate on the unit's control panel shows its model number, serial number, and specification number. Whenever ordering parts or making inquiries, furnish all these numbers.

NOTE: A "specification number", in some cases, must have a "dash number" suffix (-1, -2, -3, etc.) in order to be a complete number.

HOW TO USE THIS PARTS LIST - The part name listings may be indented to show part relationships as indicated in the following example.

Quantity

Recomm.

Spares

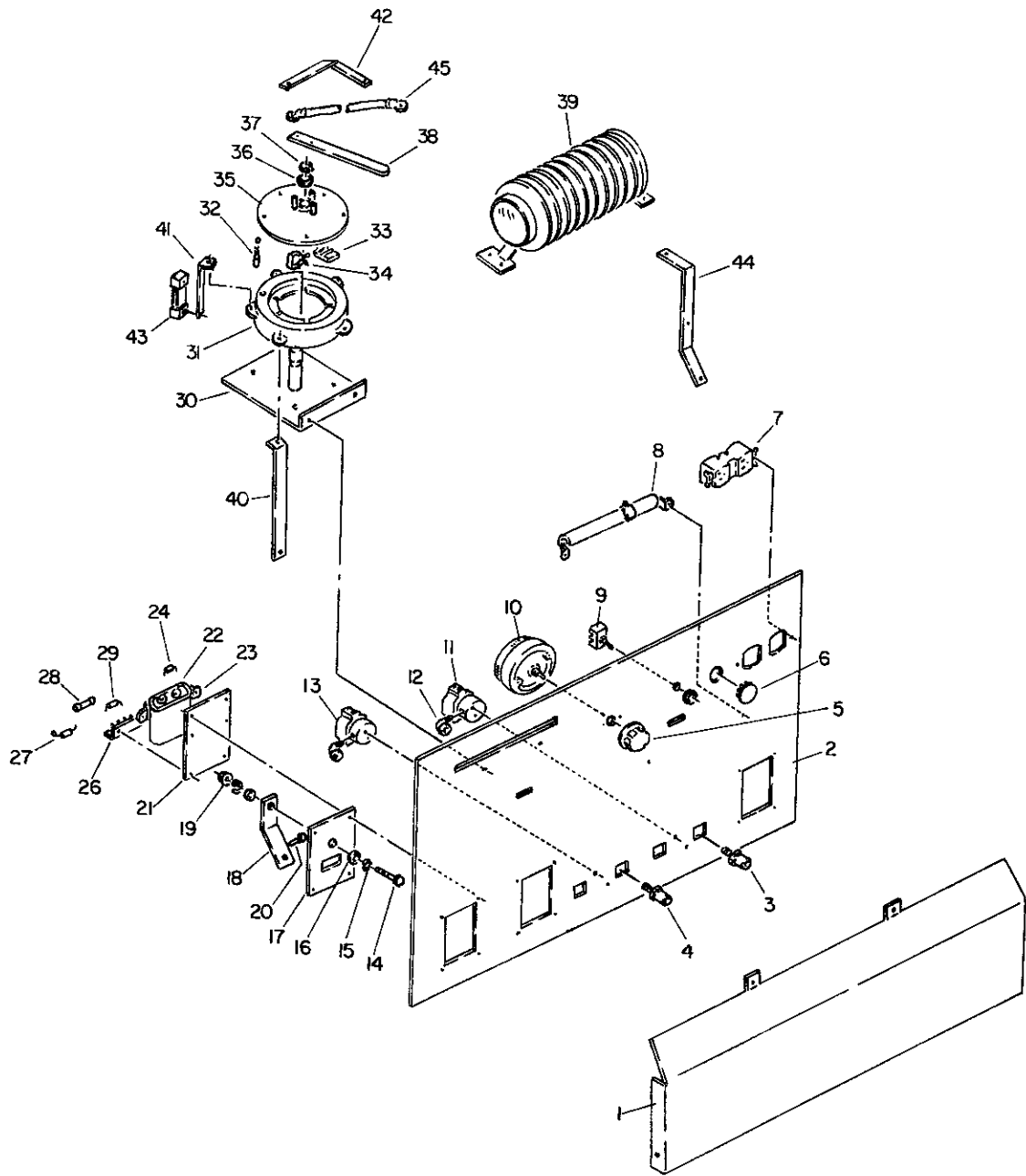
Class	Fig.	Item No.	Part No.	Description	Quantity per Assembly	Application Code
		1-	123456	Assembly (Not Shown)	1	
			1	234567 . A detail of assembly	1	
			2	345678 . A sub-assembly	1	
			3	456789 . . A detail of sub-assy (item 2)	1	
			4	567891 . . A sub-assembly of item 2	1	
			5	678910 . . . A detail of sub-assy (item 4)	1	

The parts list contains a breakdown of the equipment into assemblies, subassemblies, and detail parts. All parts of the equipment are listed except standard hardware items, bulk items such as wire, cable, sleeving, tubing, etc., and permanently attached parts which lose their identity by being welded, soldered, riveted, etc.

Locate the specification number below that appears on your unit, and note the "APPLICATION CODE" letter adjacent to it. (If no application code appears below, the parts list is applicable to only the one specification number that appears below.) After locating the desired part in the following figures and parts lists, if the "Application Code" column says "All", proceed to order the part. If there are several part numbers after the same "Item No.", order only the part number corresponding to the "Application Code" letter that you selected above.

SPECIFICATION NO.	APPLICATION CODE	SPECIFICATION NO.	APPLICATION CODE
6604-1	A	6604-4	D
6604-2	B	6604-5	E
6604-3	C		

HOW TO SELECT RECOMMENDED SPARES - The parts list has a column heading entitled "Recomm. Spares, Class 1 and Class 2". Class 1 recommended spare parts are parts that are consumed or may need replacement in two years or less, depending on operating hours. Class 2 spares are parts that may need replacement under unusual service conditions or because of additional operating hours. The quantities listed are suggested quantities based on expected usage or the minimum quantity package. Class 1 spares are repeated under Class 2 but the quantities may be larger to allow for the additional operating hours. Contact your Hobart equipment dealer for assistance in establishing a spare parts program based on your needs.



Bottom Front Panel  
Figure 1



Quantity Recomm. Spares					Quantity	
Class	Fig.	Item	Part	Description	per	Application
1	2	No.	No.	No.	Assembly	Code
		1-	1	369475	1	All
				369482-1	1	BCDE
				369482-3	1	A
			2	369469	1	All
			3	370851	2	All
			4	370447	2	All
			5	400248	1	All
			6	16DA-1997-11	1	BCDE
		-		100GH-770	1	A
		*	7	402670	1	All
			8	405506-1	1	All
		*	9	402662	1	All
			10	402219	1	All
	1		11	402882-1	1	All
			12	W-10892-1	4	All
	1		13	402882-2	1	All
			14	No Number	1	All
			15	No Number	4	All
			16	No Number	7	All
			17	368875	3	All
			18	368874	1	All
			19	No Number	1	All
		-		No Number	2	All
			20	No Number	3	All
				368877	1	All
			21	368876	1	All
			22	402802	1	All
			23	402879	1	All
			24	362909	1	All
			25	368705-2	1	All
				368865	1	All
			26	368866	1	All
			27	368705-1	1	All
			28	W-9026-10	1	All
			29	401427-2	1	All
				368633	1	All
			30	368634	1	All
			31	12RT-285	1	All

\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369423-1.

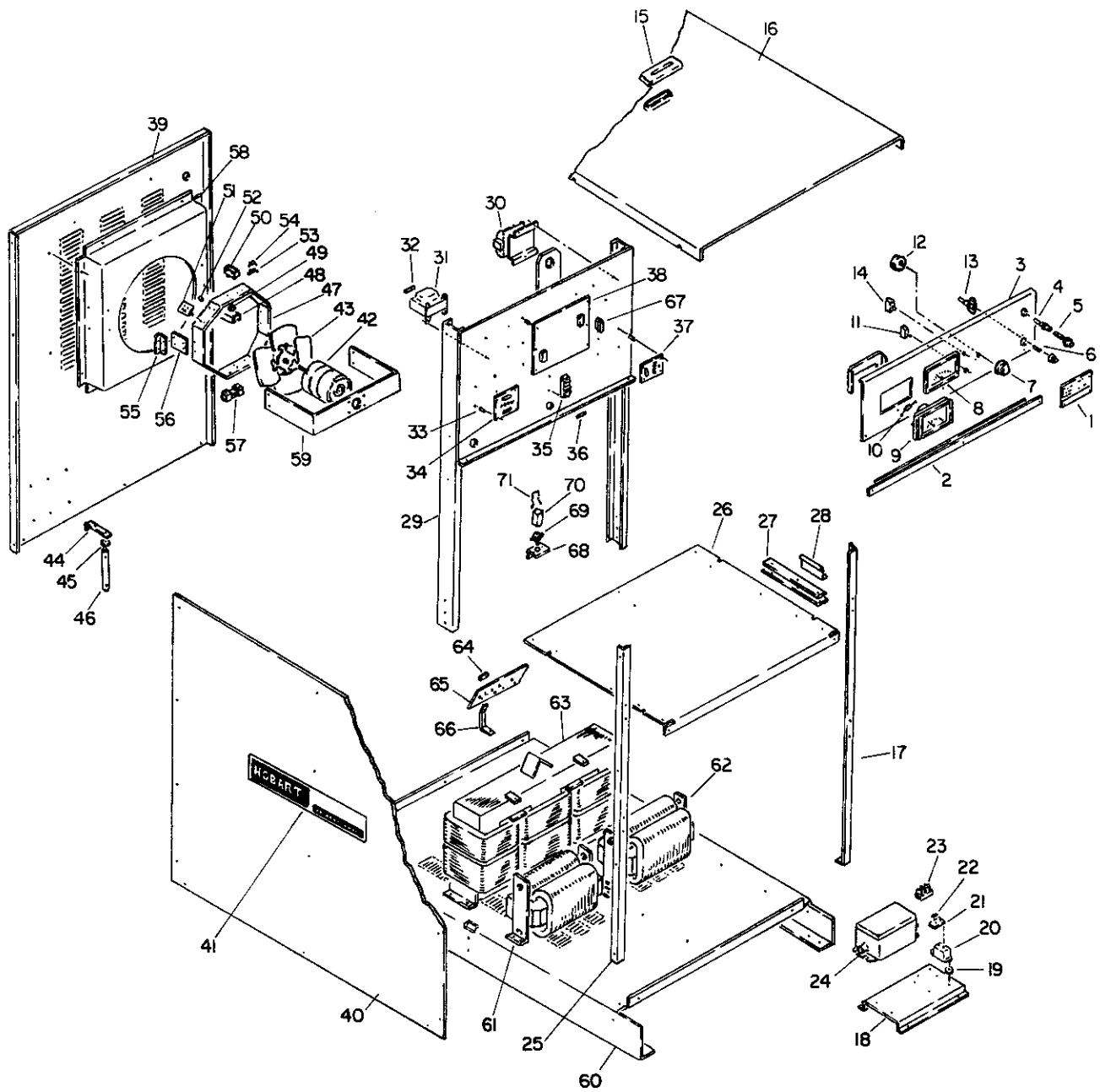
- Not Illustrated



Quantity Recomm. Spares						Quantity	Application
Class	Fig.	Item	Part	Description	per	Code	
1	2	No.	No.	No.	Assembly		
	1-	32	AW-459	. . Catch - Friction Ball	1	All	
		33	12RT-238	. . Contactor - Movable	4	All	
		34	410541	. . Spring - Pressure	2	All	
		35	368726	. . Plate - Front	1	All	
		36	SW-167-0	. . Washer - Thrust	1	All	
		37	16DA-4249-8	. . Ring - Snap	1	All	
		38	365123	. . Handle - Range Switch	1	All	
		39	369390	. Transformer	1	All	
		40	368718-1	. Bar - Bus, O.T. to Sw.	1	All	
		41	369079	. Bar - Bus	1	All	
		42	368685	. Bus - Reversing Switch	1	All	
		43	AW-894	. Shunt - Meter	1	ABCD	
			4DW-662	. Shunt - Meter	1	E	
	-		400078	. Bracket - Resistor	2	All	
		44	368696	. Bus - Cable Stud	2	All	
		45	W-9234-336	. Cable - Sw. Reversing to High Freq. Coil	1	All	
	-		490965-4	. Guard - Edge	3	All	
	-		369069-2	Bar - Bus, #106	1	All	
	-		369069-1	Bar - Bus, #107	1	All	
	-*		405206-1	Plug - Six Pin Male	1	All	
	-		407166	Label - CT-150-DC-S	1	All	
	-		490965-5	Guard - Edge, Trim	1	All	
	-*		369419-1	Chart - Wire	1	All	
	-		405999	Label - Warning	1	All	

\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369423-1.

- Not Illustrated



Frame Group  
Figure 2

Quantity Recomm. Spares						Quantity	Application
Class	Fig.	Item	Part	Description		per	Code
1	2	No.	No.	No.		Assembly	
		2-	1	404040-1	Nameplate	1	All
			2	369467	Support - Meter Panel	1	All
				369472-1	Panel - Front, Top, Assembly	1	All
			3	369471	. Panel - Front, Top	1	All
			4	402658	. Holder - Fuse	1	All
1			5	401972-2	. Fuse - MDX (Slow Blow) 5 Amp	1	All
1		**	6	W-10502-15	. Fuse - FNM (Slow Blow) 10 Amp	1	All
			7	400248	. Knob - Potentiometer	1	All
			8	405521-12	. Meter - DC, Ammeter	1	All
			9	405520-4	. Meter - DC, Voltmeter	1	All
			10	368705-5	. Capacitor - .047 $\mu$ F, 400 V DC	1	All
		**	11	402682	. Switch - Toggle	1	All
		**	12	401428-8	. Potentiometer - 2 Watt	1	All
		**	13	402151	. Holder - Fuse	1	All
		**	14	402662	. Switch - Toggle	1	All
		-		369422-1	. Harness - Upper, Front	1	All
			15	12CW-2170	Grommet - Yoke	1	All
			16	369464	Top	1	All
			17	369460	Angle - Front, Right	1	All
				369055-2	Starter - H.F.	1	All
			18	369054	. Base - Arc Stop	1	All
			19	8RT-654	. Washer - Rubber	2	All
			20	FTW-328-0	. Capacitor - Mica	1	All
			21	368472	. Board - Suppression	1	All
			22	368690	. Choke - R.F. Axial Leads	2	All
			23	FTW-413	. Spark Gap - Assembly	1	All
			24	368706-2	. Transformer - High Voltage Assembly	1	All
			25	369461	Angle - Front, Left	1	All
				369333	Panel - Dustproof, Assembly	1	All
			26	369334	. Panel - Dustproof	1	All
			27	369492	. Slide - Drawer, Programmer	4	All
			28	369491	. Guide - Drawer	2	All
				369430-3	Yoke - Lifting, Assembly	1	All
			29	369446	. Yoke	1	All
			30	405402	. Contactor - Line	1	All
			31	404960-8	. Transformer - Control	1	All
			32	W-10502-25	. Fuse - Slow Blow, 6 Amp	1	All
			33	422241	. Insulator - Tube	14	All
	1		34	368043-1	. Board - P.C. SCR Background Circuit	1	All
		**	These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369422-1.				
		-	Not Illustrated				

Quantity  
 Recomm.  
 Spares

Quantity  
 per Application  
 Assembly Code

Class	Fig. No.	Item No.	Part No.	Description	Quantity per Assembly	Application Code	
1	2						
		-2-	405770	. Label - Fuse	1	All	
		***	35	405129-1	. Holder - Fuse	1	All
		-		367579	. Insulator - Fuse Block	1	All
1		***	36	W-11166-9	. Fuse - Fast Blow, AGC, 1 Amp	6	All
		-		405362-1	. Grommet	2	All
	1		37	368036	. Board - P.C. Assembly (Relay Solid State)	1	All
		-		404472-1	. Jack - Insulated, Red	1	All
		-		404472-2	. Jack - Insulated, Black	1	All
		-		405157	. Label - Fuses	1	All
	1		38	369096-1	. Board - P.C., SCR Firing	1	All
			39	369463	Panel - Rear	1	All
			40	473596	Panel - Side, Left	1	All
		-		369462	Panel - Side, Right	1	All
			41	405774	Label - Cyber Tig	2	All
	1		42	12TW-595-1	Motor - Fan	1	All
			43	8RT-609	Blade - Fan	1	All
		**-		405205-1	Receptacle - 6 Pin, Female	1	All
				365827-3	Resistor - Assembly	3	All
			44	AAW-3981	. Mount - Resistor	2	All
			45	16DA-3493	. Insulator - Resistor	4	All
			46	405154-1	. Resistor	2	All
				369279-1	Rectifier - Output, Assembly	1	All
			47	367620	. Heat Sink - Rect.	1	All
			48	367625	. Heat Sink - SCR	6	All
		-		16DA-954-12	. Pin - Spring	6	All
	3		49	405825	. Rectifier - Silicon, Controlled	6	All
			50	405140-1	. Clamp - Mounting	6	All
			51	367634A-1	. Suppressor - Surge, Assembly	2	All
	1		52	404044-1	. Thermostat - Overload	1	All
			53	401937-9	. Block - Terminal	2	All
			54	368705-6	. Capacitor - Assembly	6	All
			55	367606	. Brace - Mtg. Rect.	2	All
			56	367605	. Insulator - Mtg. Rect.	2	All
			57	367687	. Shunt - Feedback	1	All
		-		368697	. Bar - Bus	1	All
			58	367769	. Shroud - Fan	1	All
			59	367584	. Bracket - Fan Motor	1	All
			60	369455	Base - Assembly	1	All
			61	368454-2	Reactor - Filter	1	All
			62	368526-1	Transformer - Interphase	1	All

- Not Illustrated  
 \*\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369422-1.  
 \*\*\* These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369421-1.

Quantity Recomm. Spares		Fig. No.	Item No.	Part No.	Description	Quantity	Application Code	
Class	per Assembly							
1	2							
		2-	63	369562	Transformer - Power	1	All	
			64	CW-811	Link - Voltage Changeover	6	All	
			65	367229-9	Board - Voltage Changeover	1	All	
			66	369658	Brace - Voltage Changeover Board	2	All	
		***	67	401564-4	Receptacle - J1 and J2, 12 Pin, Female	2	All	
		***-		405398-8	Receptacle - J3, 12 Pin, Female	1	All	
		***-		405206-3	Plug - J4, 15 Pin, Male	1	All	
		-		W-9234-272	Cable - 101	1	All	
		***-		405206-1	Plug - 6 Pin, Male	1	All	
		-		402037-4	Grommet - Harness	4	All	
		-		369277	Kit - Caster (Opt.)	1	All	
		***-		369417-1	Chart - Wire	1	All	
		-		405651	Receptacle - 4 Pin Amphenol (Mounts on Rear Panel)	1	CDE	
		-		85640	Cable - 4 Conductor Shielded	5'	CDE	
		-		472761	Panel - Cover, Meter Hole	1	CDE	
		-		405970	Label - Warning	1	All	
			68	16DA-4029	Bracket - Mtg. Socket, Relay	1	D	
			69	16DA-4052-1	Socket - 8 Pin	1	D	
			70	16DA-4004A-7	Relay - 2 PDT, 24 V DC Coil	1	D	
			71	16DA-4253-1	Retainer - Spring	1	D	
		-		W-9917-4	Meter - Hour Running (Mts. on Item 3)	1	D	
		***	These parts and their quantities are shown in relationship to their location in the machine, but they are all components of Wire Harness Assembly 369421-1.					
		-	Not Illustrated					







# Diagrams

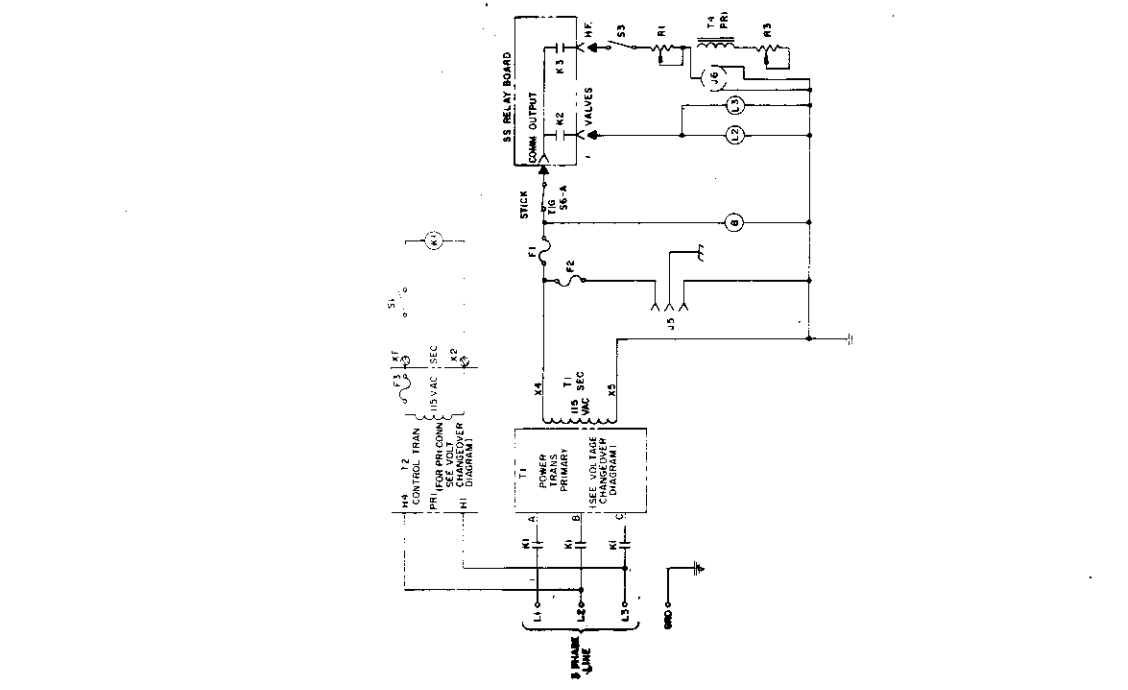
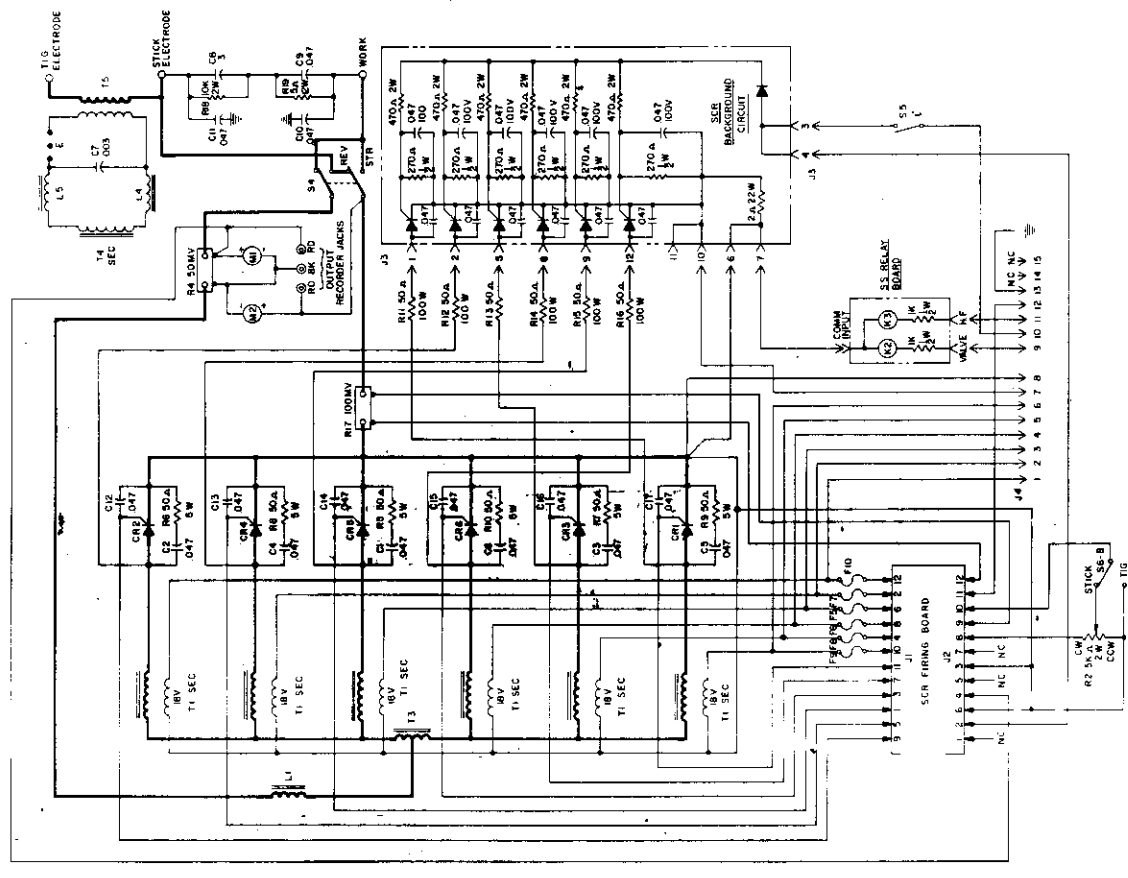
1. Note the specification number shown on the equipment nameplate.
2. Locate these numbers in the specification number columns below.
3. Use only those diagrams and instructions that are applicable.

Model No.	Spec No.	Connection Diagram	Schematic Diagram	Voltage Changeover Diagram	Outline Dimension
CT-150-DC-S	6426-1	200904	200903	369528	369483
	6426-2	369283	369284	369528	369483
	6426-3 6426-5	472760	472759	369528	369483
	6426-6	473642	473643	369528	369483
	6426-7	472760	472759	369528	369483
	6604-1	200904	200903	369374	369483
	6604-2	369283	369284	369374	369483
	6604-3	472760	472759	369374	369483
	6604-4	472779	472780	369374	369483
	6604-5	472760	472759	369528	369483
	6835-1	200904	200903	369371	369483
	6835-2	369283	369284	369371	369483
	6835-3	472760	472759	369371	369483



LEGEND

- C1-C6 CAPACITOR, .047 MFD, 500 VDC, SUPPRESSION
- C7 CAPACITOR, 3 MFD, 250 VDC, H.F. RETURN
- C8 CAPACITOR, .047 MFD, 500 VDC, H.F. RETURN
- C9-C11 CAPACITOR, .002 MFD, 100 VDC
- C12-C17 CAPACITOR, .002 MFD, 100 VDC
- CP1-6 SCR, POWER OUTPUT
- E SPARK GAPS
- F1 FUSE, 10A 5MM SLOW BLOW, 250 VAC
- F2 FUSE, 10A 5MM SLOW BLOW, 250 VAC
- F3 FUSE, 10A 5MM SLOW BLOW, 250 VAC
- F4 FUSE, 1A 5MM SLOW BLOW, PILOT TRANSFORMER
- F5-F10 FUSE, 1A 5MM SLOW BLOW, SCR FIRING BOARD
- J1 RECEPTACLE, SCR FIRING BOARD
- J2 RECEPTACLE, SCR FIRING BOARD
- J3 RECEPTACLE, SCR FIRING BOARD
- J4 RECEPTACLE, SCR FIRING BOARD
- J5 RECEPTACLE, SCR FIRING BOARD
- J6 RECEPTACLE, SCR FIRING BOARD
- K1 RELAY, LINE CONTACTOR
- K2 RELAY, SOLID STATE VALVES
- K3 RELAY, SOLID STATE VALVES
- L1 COIL, WATER VALVE, 115 VAC
- L2 COIL, WATER VALVE, 115 VAC
- L3 COIL, GAS VALVE, 115 VAC
- L4 COIL, GAS VALVE, 115 VAC
- M1 METER, AMPERE
- M2 METER, VOLTMETER
- M3 ROEHMIG METER, 400 OHMS, 150M, H.F. INTENSITY
- M4 ROEHMIG METER, 400 OHMS, 150M, H.F. INTENSITY
- R1-R10 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R11-R16 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R17-R19 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R20-R22 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R23-R25 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R26-R28 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R29-R31 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R32-R34 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R35-R37 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R38-R40 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R41-R43 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R44-R46 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R47-R49 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R50-R52 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R53-R55 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R56-R58 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R59-R61 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R62-R64 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R65-R67 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R68-R70 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R71-R73 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R74-R76 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R77-R79 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R80-R82 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R83-R85 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R86-R88 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R89-R91 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R92-R94 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R95-R97 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- R98-R100 RESISTOR, 100 OHMS, 1/2 WATT, 5% TOLERANCE
- S1 SWITCH, DPST, POWER ON-OFF
- S2 SWITCH, DPST, H.F. ON-OFF
- S3 SWITCH, DPST, H.F. ON-OFF
- S4 SWITCH, DPST, H.F. ON-OFF
- S5 SWITCH, DPST, H.F. ON-OFF
- S6 SWITCH, DPST, H.F. ON-OFF
- S7 SWITCH, DPST, H.F. ON-OFF
- S8 SWITCH, DPST, H.F. ON-OFF
- S9 SWITCH, DPST, H.F. ON-OFF
- S10 SWITCH, DPST, H.F. ON-OFF
- S11 SWITCH, DPST, H.F. ON-OFF
- S12 SWITCH, DPST, H.F. ON-OFF
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- S92 SWITCH, DPST, H.F. ON-OFF
- S93 SWITCH, DPST, H.F. ON-OFF
- S94 SWITCH, DPST, H.F. ON-OFF
- S95 SWITCH, DPST, H.F. ON-OFF
- S96 SWITCH, DPST, H.F. ON-OFF
- S97 SWITCH, DPST, H.F. ON-OFF
- S98 SWITCH, DPST, H.F. ON-OFF
- S99 SWITCH, DPST, H.F. ON-OFF
- S100 SWITCH, DPST, H.F. ON-OFF



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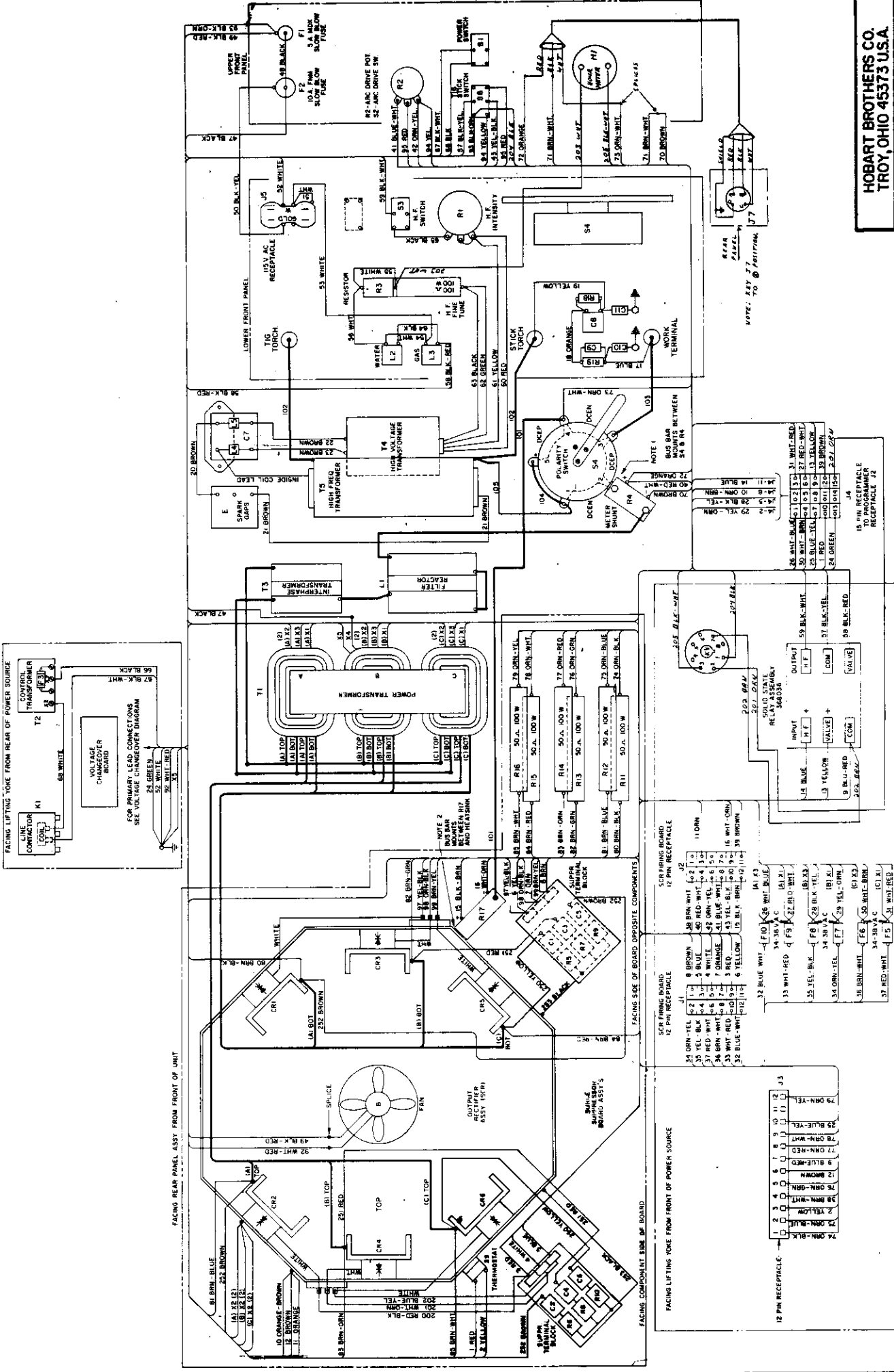
TITLE DIAG. SCHEMATIC

REV. DWG. NO. 200903

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TITLE DIAGRAM, CONN.

REV. DWG. NO. 472779

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12 PIN RECEPTACLE

1	2	3	4	5	6	7	8	9	10	11	12
79 ORN-YEL	78 ORN-WHT	77 ORN-RED	76 ORN-WHT	75 ORN-RED	74 ORN-BLK	73 YEL-ORN	72 YEL-ORN	71 ORN-GRN	70 ORN-GRN	69 ORN-GRN	68 ORN-GRN

SCR FIRING BOARD 12 PIN RECEPTACLE

1	2	3	4	5	6	7	8	9	10	11	12
34 ORN-YEL	33 WHI-RED	32 BLUE-WHT	31 BLUE-WHT	30 BRN-WHT	29 BRN-WHT	28 BRN-WHT	27 BRN-WHT	26 BRN-WHT	25 BRN-WHT	24 BRN-WHT	23 BRN-WHT

18 PIN RECEPTACLE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
48 WHI-BLUE	47 WHI-RED	46 WHI-RED	45 WHI-RED	44 WHI-RED	43 WHI-RED	42 WHI-RED	41 WHI-RED	40 WHI-RED	39 WHI-RED	38 WHI-RED	37 WHI-RED	36 WHI-RED	35 WHI-RED	34 WHI-RED	33 WHI-RED	32 WHI-RED	31 WHI-RED

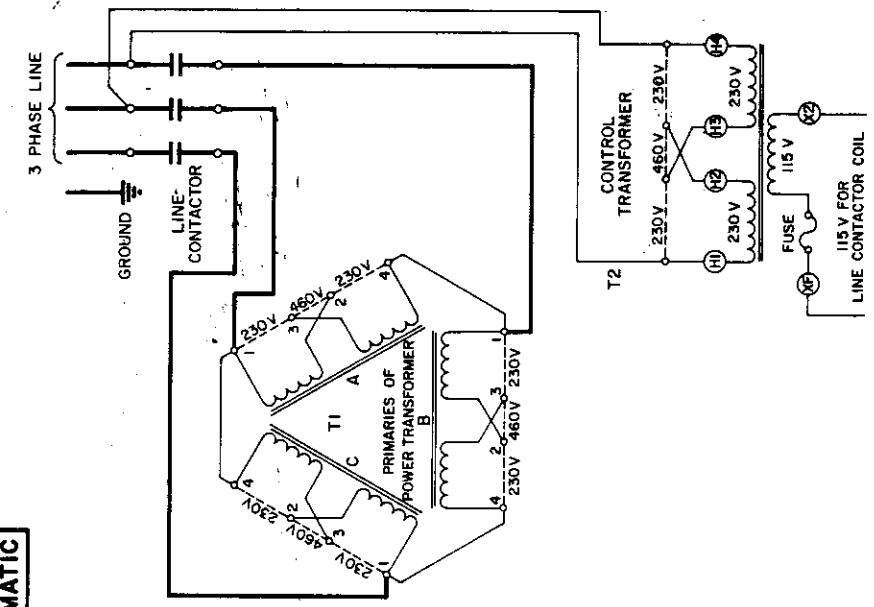
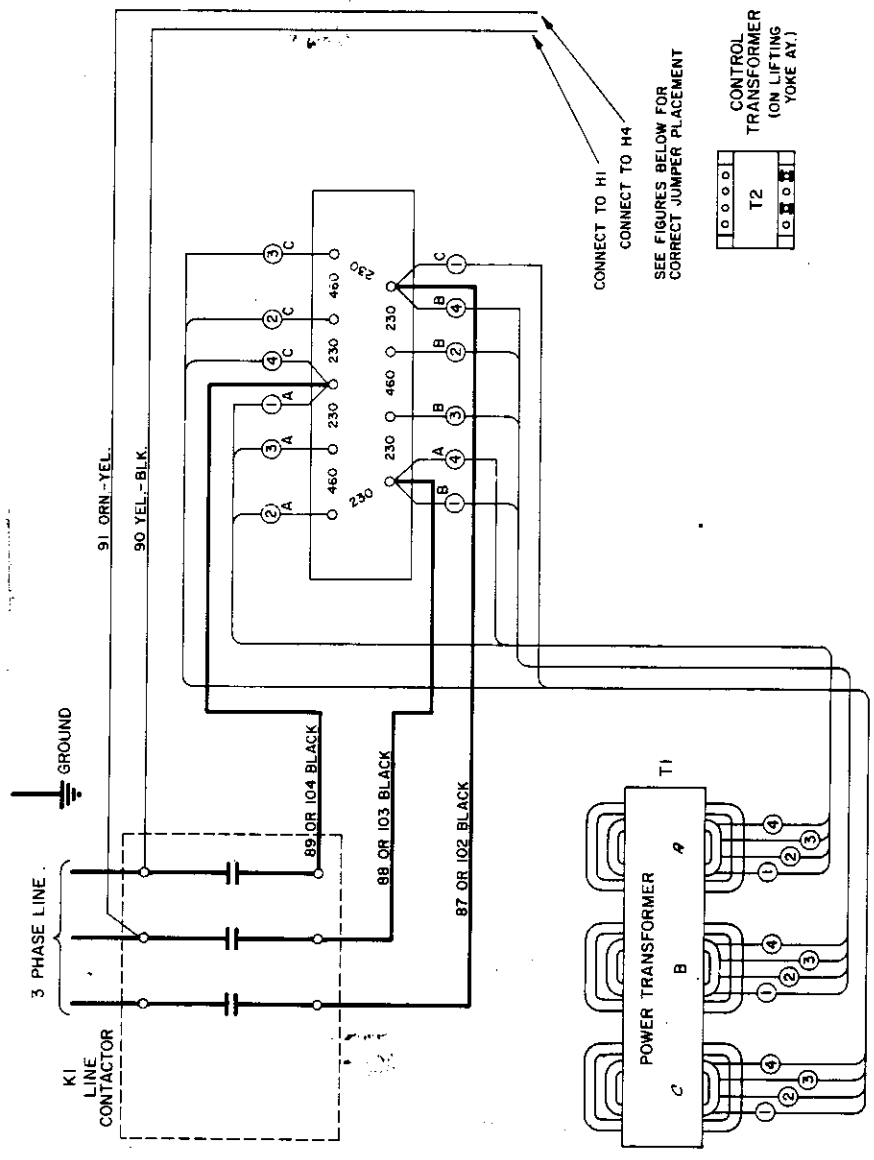
FACING REAR PANEL ASSY FROM FRONT OF UNIT

FACING LIFTING YOKE FROM FRONT OF POWER SOURCE

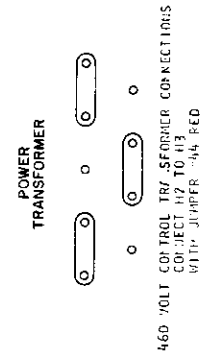
FACING LIFTING YOKE FROM REAR OF POWER SOURCE

FOR PRIMARY LEAD CONNECTIONS SEE VOLTAGE CHANGEOVER DIAGRAM

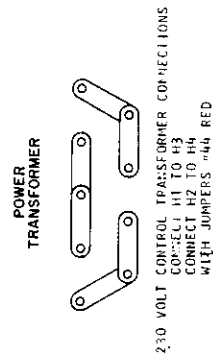
**SCHEMATIC**



**LINKS FOR 460 VOLT LINE**

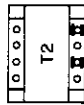


**LINKS FOR 230 VOLT LINE**

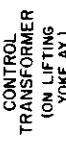


INSTRUCTIONS FOR SETTING VOLTAGE CHANGEDOVER PANEL AND CONNECTING POWER LINE.  
(ALSO SEE INFORMATION IN INSTRUCTION MANUAL)

1. CHECK THE NAMEPLATE OF THE WELDER TO BE CERTAIN IT IS DESIGNED FOR THE LINE VOLTAGE TO WHICH YOU WISH TO CONNECT IT.
2. CHECK THE LOCAL CODES FOR PROPER LINE WIRE SIZE FOR THE WELDER. FOR THE PROPER LINE VOLTAGE.
3. IF NO CODE EXISTS, USE THE CHART IN THE "INSTALLATION" SECTION OF THE "WELDER" MANUAL.
4. CONNECT THE 3 PHASE POWER LINE TO THE TOP OF THE WELDER LINE CONTACTOR AS IN THE DIAGRAM ABOVE. (DANGER - BE CERTAIN INPUT CIRCUIT IS OPEN BEFORE HANDLING LINE.)
5. CONNECT THE POWER SYSTEM GROUND TO THE SCREW ON THE INTERIOR PANEL MARKED "GROUND".



CONNECT TO H1  
CONNECT TO H4  
SEE FIGURES BELOW FOR  
CORRECT JUMPER PLACEMENT

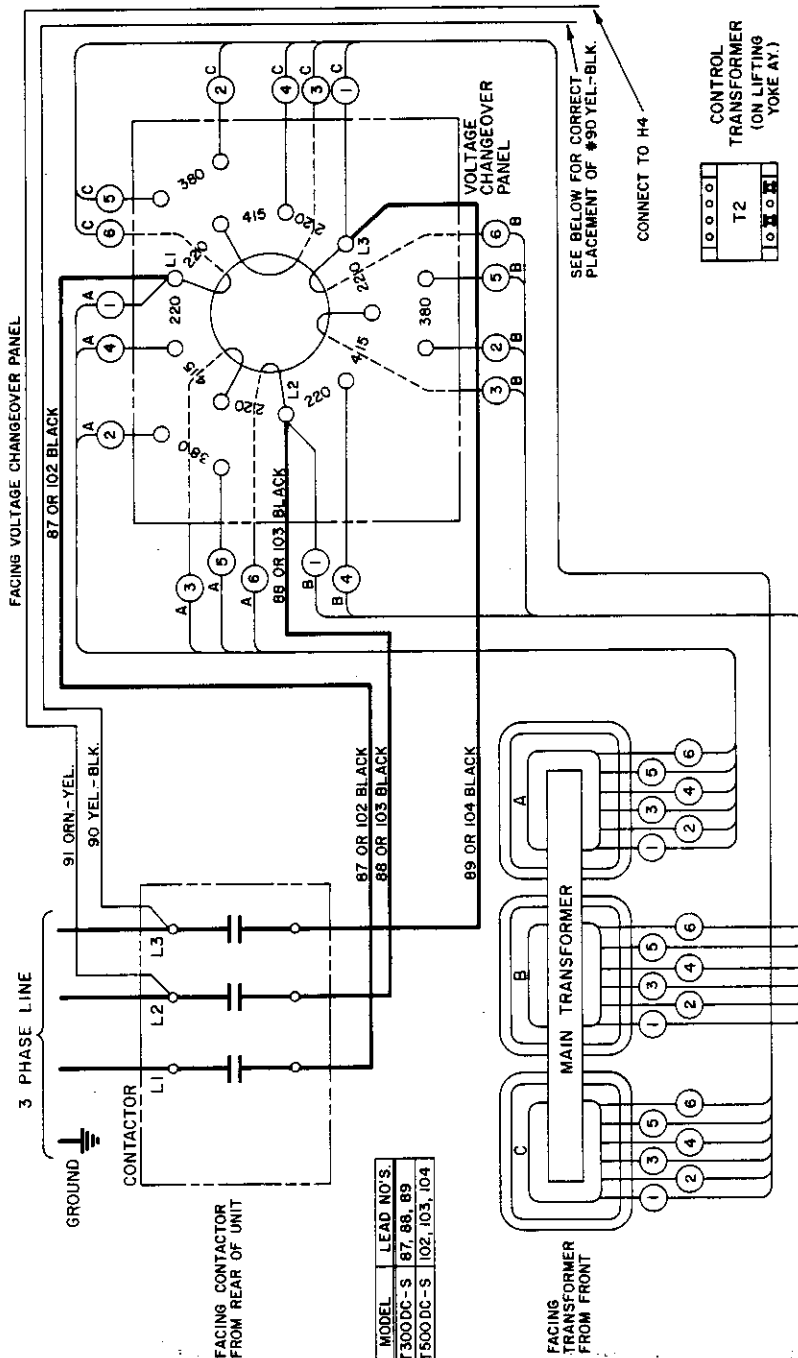
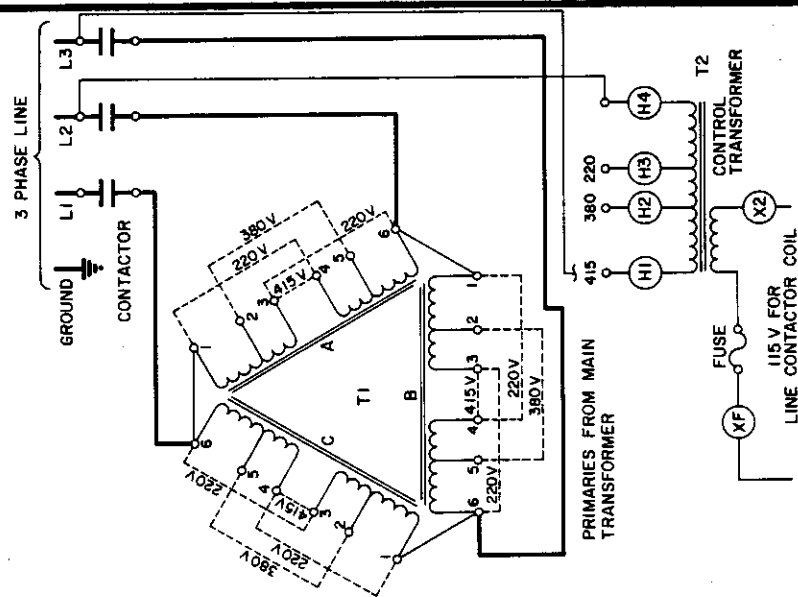


**HOBART BROTHERS CO.**  
**TROY, OHIO 45373 USA.**

**TITLE**  
Diagram, Changeover  
Voltage, Changeover

**REV.** 2  
**DWG. NO.** 369528

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**INSTRUCTIONS FOR SETTING VOLTAGE CHANGEOVER PANEL AND CONNECTING POWER LINE**  
 (ALSO SEE INFORMATION IN INSTRUCTION MANUAL)

1. CHECK NAMEPLATE OF THE WELDER TO BE CERTAIN IT IS DESIGNED FOR THE LINE VOLTAGE TO WHICH YOU WISH TO CONNECT IT.
2. VERIFY THE LINKS AS SHOWN IN FIGS. 1, 2, AND 3 AT LEFT, AS APPLICABLE, FOR THE PROPER LINE VOLTAGE.
3. CHECK YOUR LOCAL CODES FOR THE PROPER LINE WIRE SIZE FOR THE LINE CURRENT SHOWN ON THE NAMEPLATE OF THE WELDER. IF NO CODES EXIST, USE THE CHART IN THE "INSTALLATION" SECTION OF THE MANUAL.
4. CONNECT THE 3 PHASE POWER LINE TO THE TOP OF THE WELDER LINE CONTACTOR AS IN THE DIAGRAM ABOVE. (CAUTION - BE CERTAIN INPUT CIRCUIT IS OPEN BEFORE HANDLING LINE.)
5. CONNECT THE POWER SYSTEM GROUND TO THE SCREW ON THE INTERIOR PANEL MARKED "GROUND".

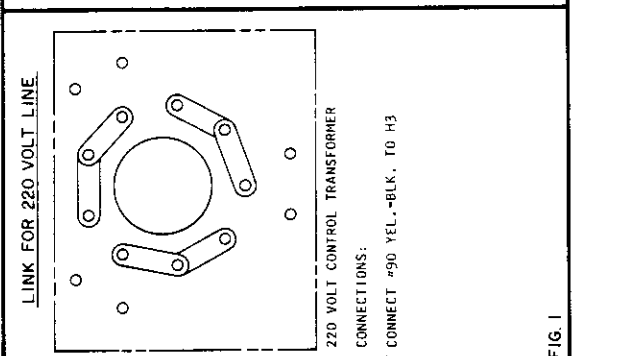
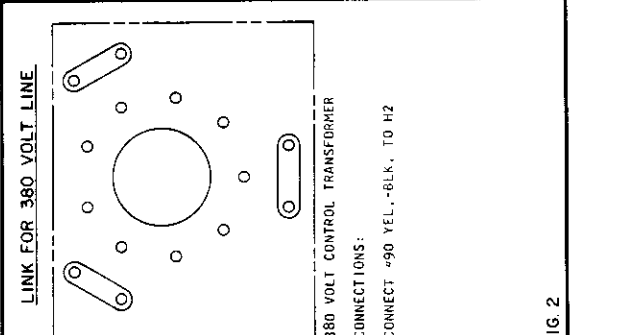
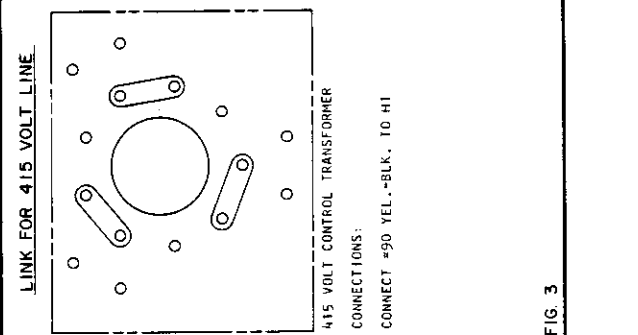
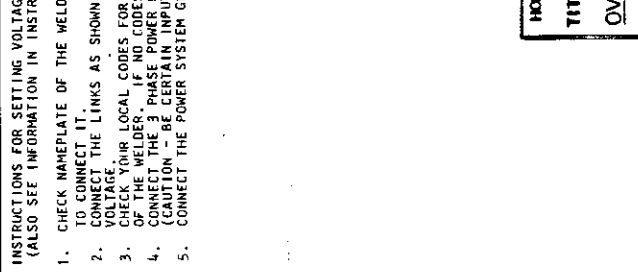
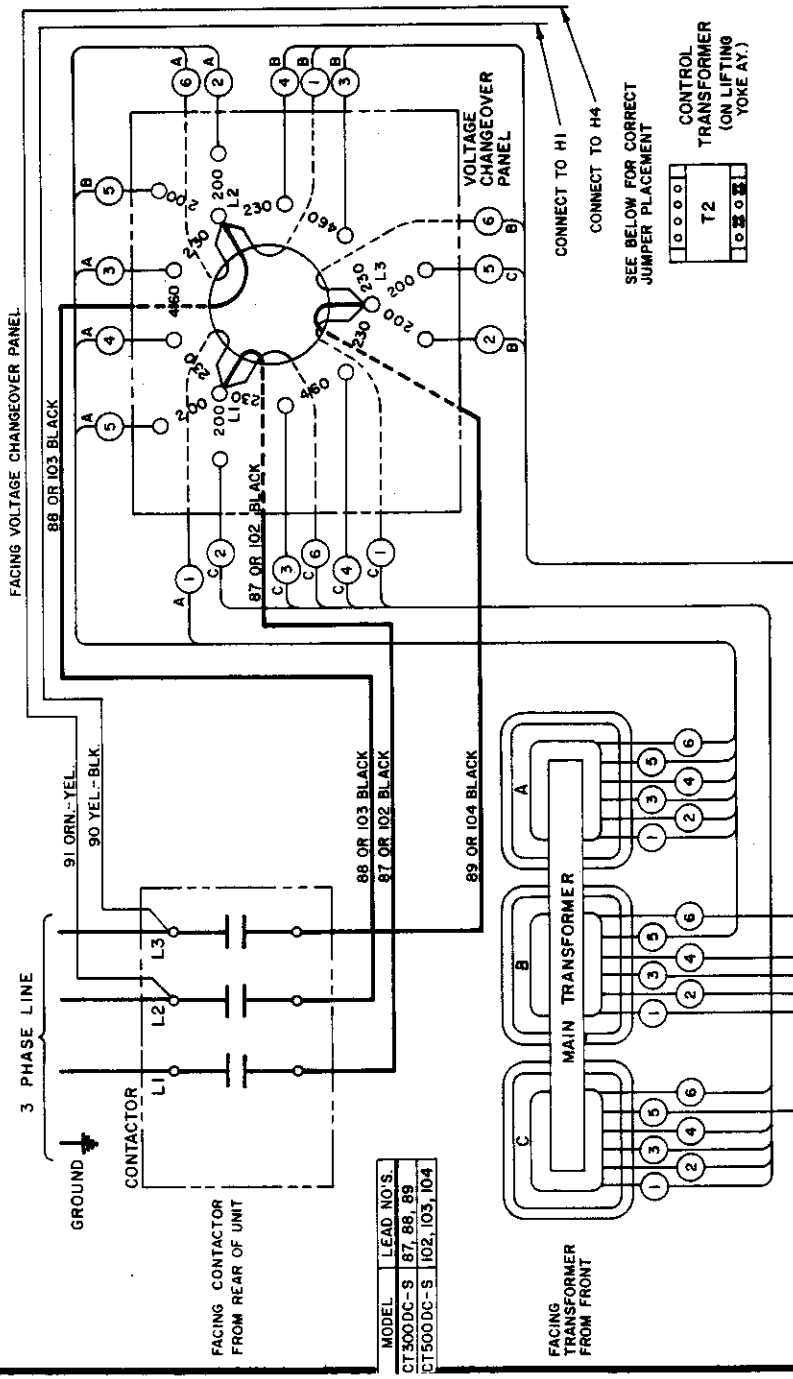
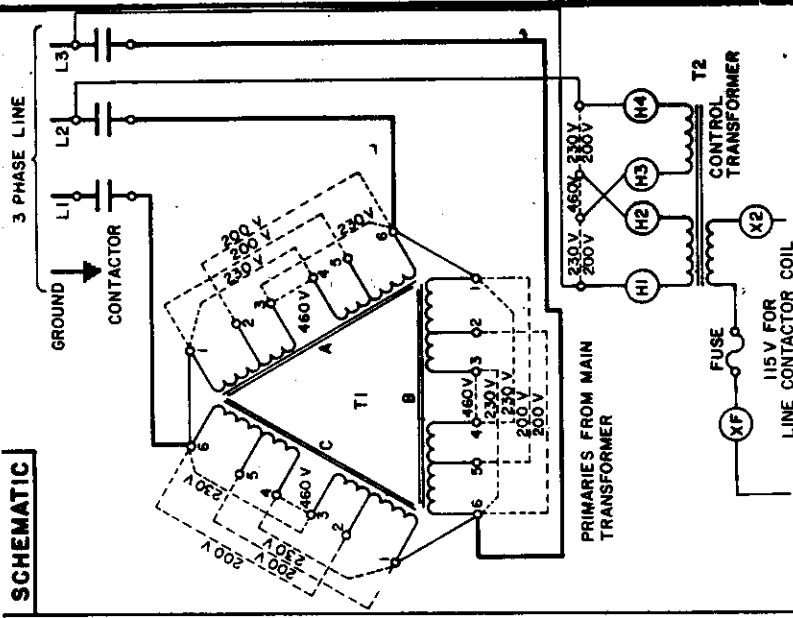


FIG. 1  
 FIG. 2  
 FIG. 3

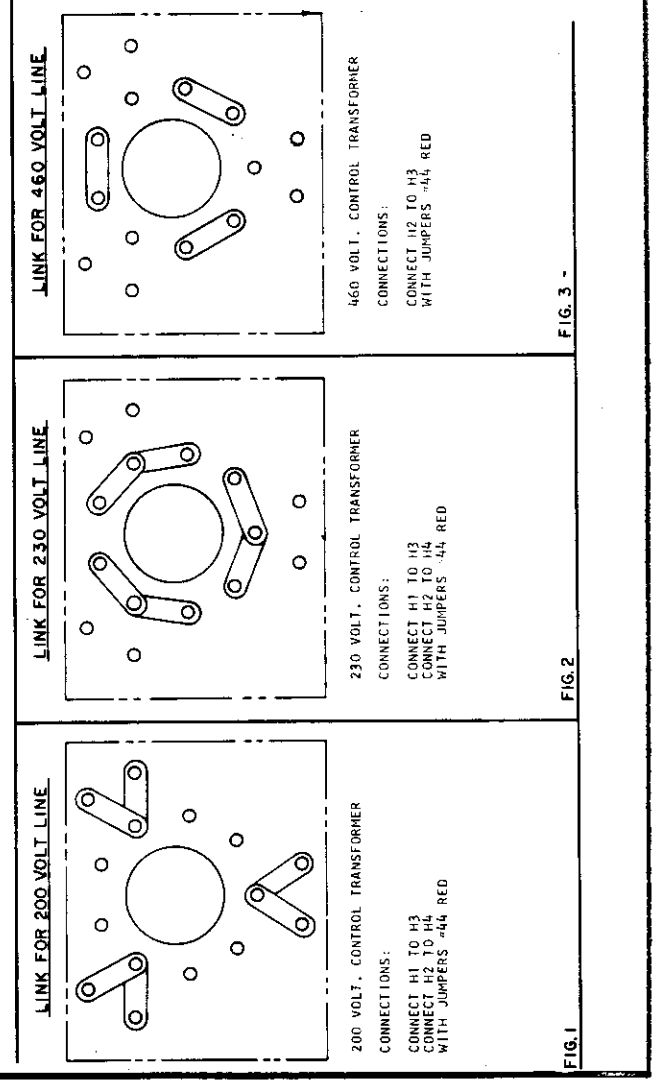


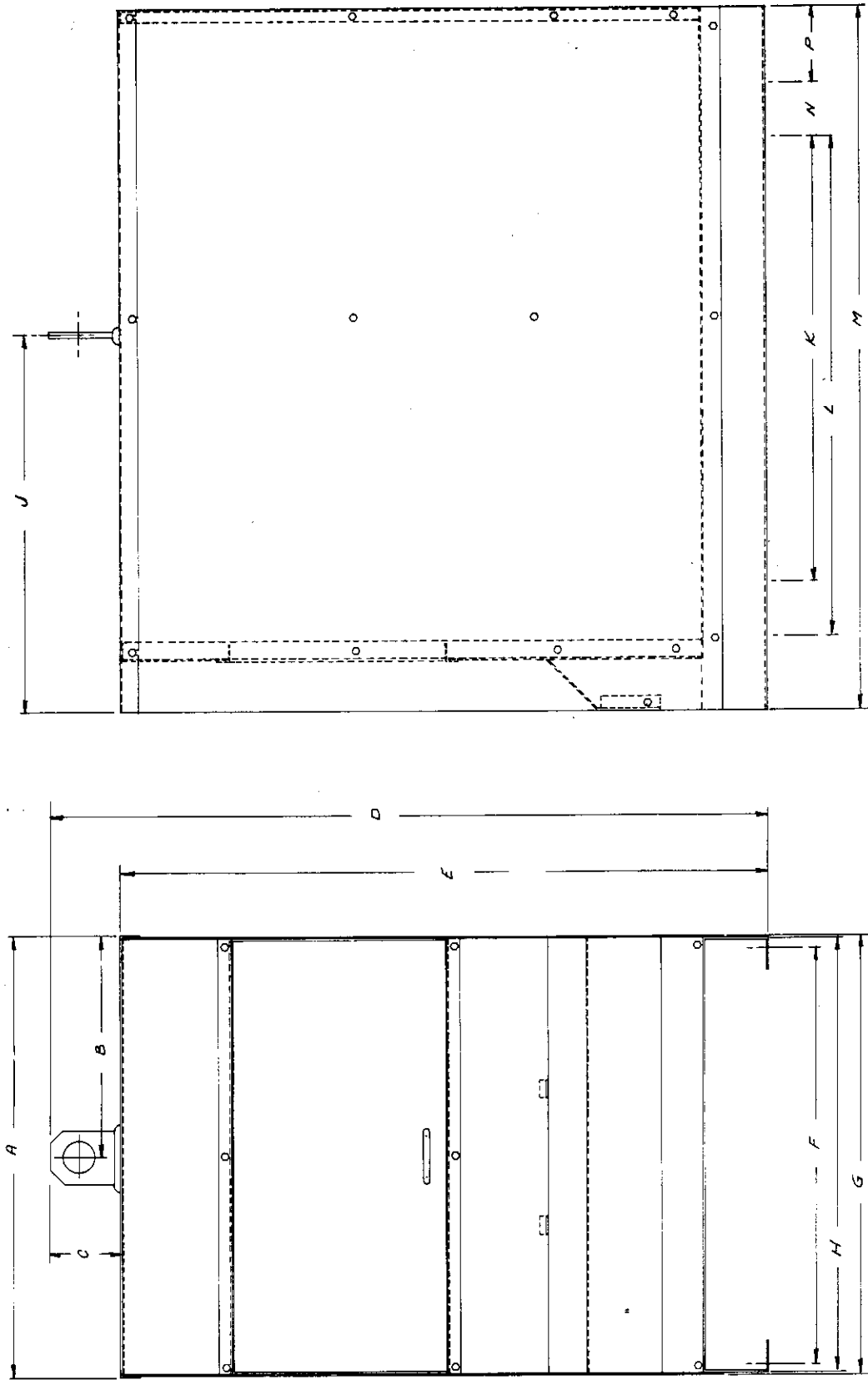
**SCHEMATIC**



**INSTRUCTIONS FOR SETTING VOLTAGE CHANGEOVER PANEL AND CONNECTING POWER LINE (ALSO SEE INFORMATION IN INSTRUCTION MANUAL)**

1. CHECK NAMEPLATE OF THE WELDER TO BE CERTAIN IT IS DESIGNED FOR THE LINE VOLTAGE TO WHICH YOU WISH TO CONNECT IT.
2. CONNECT THE LINKS AS SHOWN IN FIGS. 1, 2, AND 3 AT LEFT, AS APPLICABLE, FOR THE PROPER LINE VOLTAGE.
3. CHECK YOUR LOCAL CODES FOR THE PROPER LINE WIRE SIZE FOR THE LINE CURRENT SHOWN ON THE NAMEPLATE OF THE WELDER. IF NO CODES EXIST, USE THE CHART IN THE "INSTALLATION" SECTION OF THE MANUAL.
4. CONNECT THE 3 PHASE POWER LINE TO THE TOP OF THE WELDER LINE CONTACTOR AS IN THE DIAGRAM ABOVE. (CAUTION - BE CERTAIN INPUT CIRCUIT IS OPEN BEFORE MAKING LINE CONNECTIONS.)
5. CONNECT THE POWER SYSTEM GROUND TO THE SCREW ON THE INTERIOR PANEL MARKED "GROUND".





DIMENSIONS		A	B	C	D	E	F	G	H	J	K	L	M	N	P
ENGLISH IN.		24-3/8	12-3/16	2-15/16	38-1/2	35-9/16	22-1/2	24-1/4	24-1/8	20-7/8	24-9/16	27-9/16	38-3/4	3	4-1/8
METRIC MILLIMETERS		619.1	309.6	74.6	977.9	903.3	561.5	615.9	612.6	530.2	623.9	700.1	984.2	76.2	104.8

HOBART BROOK CO. TROY, OHIO 45773 U.S.A.  
 REV. \_\_\_\_\_  
 DWG. NO. 369483  
 TITLE OUTLINE, DIMENSIONAL



