

HOBART

OWNER'S MANUAL OM-305

Revised September 19, 1994

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

Specifications covered by this manual:

HOBART 800 Programmer

- 369520A-1 Current Range 3 to 299 Amperes
- 369520A-2 Current Range 3 to 399 Amperes
- 369520A-3 Current Range 3 to 699 Amperes
- 369520A-4 Current Range 3 to 299 Amperes
- 369520A-5 Current Range 3 to 199 Amperes
Use Addendum O-265
- 369520A-6 Current Range 3 to 299 Amperes
- 473180-1 Use Addendum O-243
- 473153-1 Use Addendum O-254
- 472764 Use Addendum O-262
- 369520A-7
- 369520B-1 Current Range 3 to 299 Amperes
- 369520B-2 Current Range 3 to 399 Amperes
- 369520B-3 Current Range 3 to 699 Amperes
- 369520B-4 Current Range 3 to 299 Amperes
- 369520B-5 Current Range 3 to 199 Amperes
Use Addendum O-265
- 369520B-6 Current Range 3 to 299 Amperes

DO NOT DESTROY

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

Manufacturers of Arc Welding Systems/Aircraft Ground Power Equipment/Industrial Battery Chargers

Addendum
for
Modifications to Programmer
Special For S-6733-1

(Use with OM-305)

Explanation:

This is an addendum to OM-305 (Owner's Manual) for modifications to the standard Series 800 Programmer, to make assembly number 473180. The system covered by the Spec. (6733-1) incorporates this programmer in the CT-300 DC-S Power Source. See front panel as modified, in Figure 1, below.

1. A Keyhole Current Control (item 45) has been added to the Front Panel. This is a three-digit thumbwheel potentiometer that is in parallel with the Final Taper Current Potentiometer (Module) (item 13). The Keyhole Current Control Potentiometer is switched by a relay that has been added to this drawer. This relay is picked up by output number 1 of the TIP 900 controller, and it switches from the Final Taper Current Control to this new Keyhole Current Control.
2. Several new connections have been made to the J1 Connector (item 23) on this drawer. Pin-G is now connected to TB3. Pin-N is now connected to TB11. Pin-J is now connected to TB6. Pin-H is now connected to TB10. Pin-S is connected to the coil of the newly installed relay. Pin-P is connected to the positive (+) side, and Pin-R connected to the minus (-) side of the shunt in the Power Source.
3. A three-pin connector has been added to the rear panel of this drawer, for the connection of the shunt wires from the Power Source to the Programmer.
4. The Weld Taper Delay Time Module (item 40) has been changed from a 0-99.9 second Timer to a 0-999 second Timer. To do this, a small circuit board has been added between the Timer Module and the Main Control P. C. Board (363160-3). The new circuit is wire tied into the wire harness. Its function is to divide the 10 Hz Clock Signal going to the Weld Taper Delay Module (item 40) by 10 to make the clock frequency 1 Hz. The part number on the socket-mounted chip on the new circuit is 405352.

See Revision to PL-305 for additional parts used in this application.

Connection Diagram — 473230

Schematic Diagram — 473231

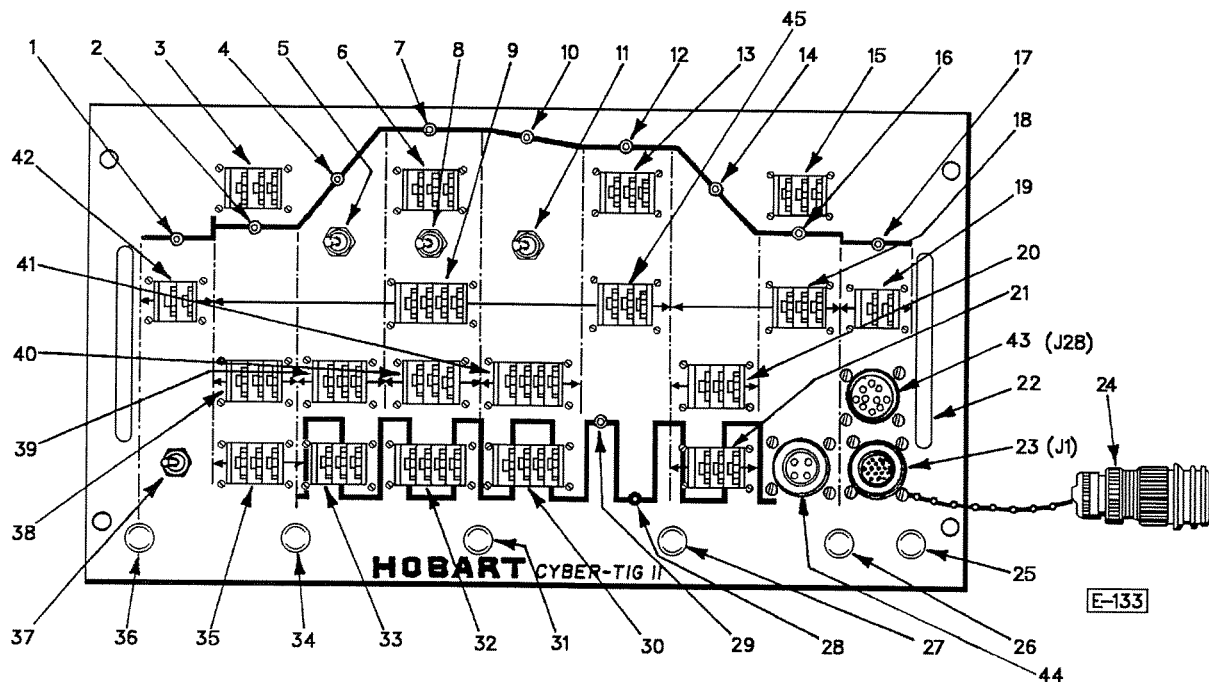


Figure 1

Addendum
for
Modifications to 800S Series Programmer for IAI (S-6818-1)

(Use with OM-305)

EXPLANATION:

This Programmer has been modified for use in the "TIG ETCHING" PROCESS. When the Power Source is in the "ETCH" Mode of Operation, the Programmer sequence will not advance beyond the INITIAL CURRENT step. This is accomplished by activating Relay K1 (Refer to Rework Drawing 473153, sheet 2) with a 24 volt DC signal to pins -2 and -7 of the Relay. Relay contacts between pins -5 and -8 will OPEN. These contacts are in series with switch S3, and effectively puts the UPSLOPE Switch (Fig. 3-1, item 5) in MANUAL position. Relay contacts between pins -1 and -4 also OPEN when K1 is energized. These contacts are in series with Switch S2 and the opening of these contacts disables the Weld Timer.

When these switches are in MANUAL operation, the Weld Sequence will not advance without MANUAL control from the front panel. ETCHING CURRENT is set on the INITIAL CURRENT Thumbpot on the left side of the Programmer front panel. In the ETCH mode, the Programmer will sequence to INITIAL CURRENT, and hold that current until the WELD STOP signal is received.

Under DIAGRAMS in the rear of the Owner's Manual are listed some numbers which do not apply to this particular application. The following Diagram numbers will replace those listed:

REWORK DRAWING 473153, Sheet 2, replaces standard Connection Diagram.
DIAGRAM 368402 replaces standard Schematic Diagram.

Parts used in the modification, not found in the Parts List for the unit, as covered by OM-305, are listed below:

		<u>R</u>
Socket, Relay	405699	1
Relay, Enclosed, Plug-In	16DA-4004A-14	1
Retainer, Spring	16DA-4253-1	1
Housing, Receptacle	401564-1	1
Terminal	401566-1	2



Addendum
for
Series 800 Programmer
in the
U.N.C. Nuclear TIG Welding System

(Use with OM-305)

EXPLANATION:

The Programmer used in this system is the same as described in OM-305. The only difference in this programmer from the standard (Hobart P/N 369520A-2) is the addition of two wires from the remote control receptacle J1 to the 12 station terminal block. The correct diagram drawings for this programmer are 472751 and 472752. The part number for this programmer has been changed to 472764 to document this change from the standard programmer P/N 369520A-2. For the parts list in manual OM-305, use P/N 369520A-2 and application code "B" for proper parts.



Addendum
for
Programmer Connections

(Use with Om-305)
(For 369520A-5, Special for Dabber Systems)

EXPLANATION:

The front panel as shown in OM-305, Figure 1, has been altered to accommodate three cables used in association with the Dabber System. The Dabber System connection diagram shows the connection of these cables. This programmer differs from that described in OM-305 on the following items:

- a) Addition of item 43, 10 pin Amphenol connector 402844.
- b) Addition of item 44, 4 pin Amphenol connector 405651.
- c) Items 30, 31, pulsation time modules are made non-active since pulsation times are determined by sync-pulse probe on weld head assembly.
- d) Addition of the pulsation P.C. board, 472691, mounted inside the programmer drawer.
Addition of the pulsation diagram 472694 at the end of this manual.

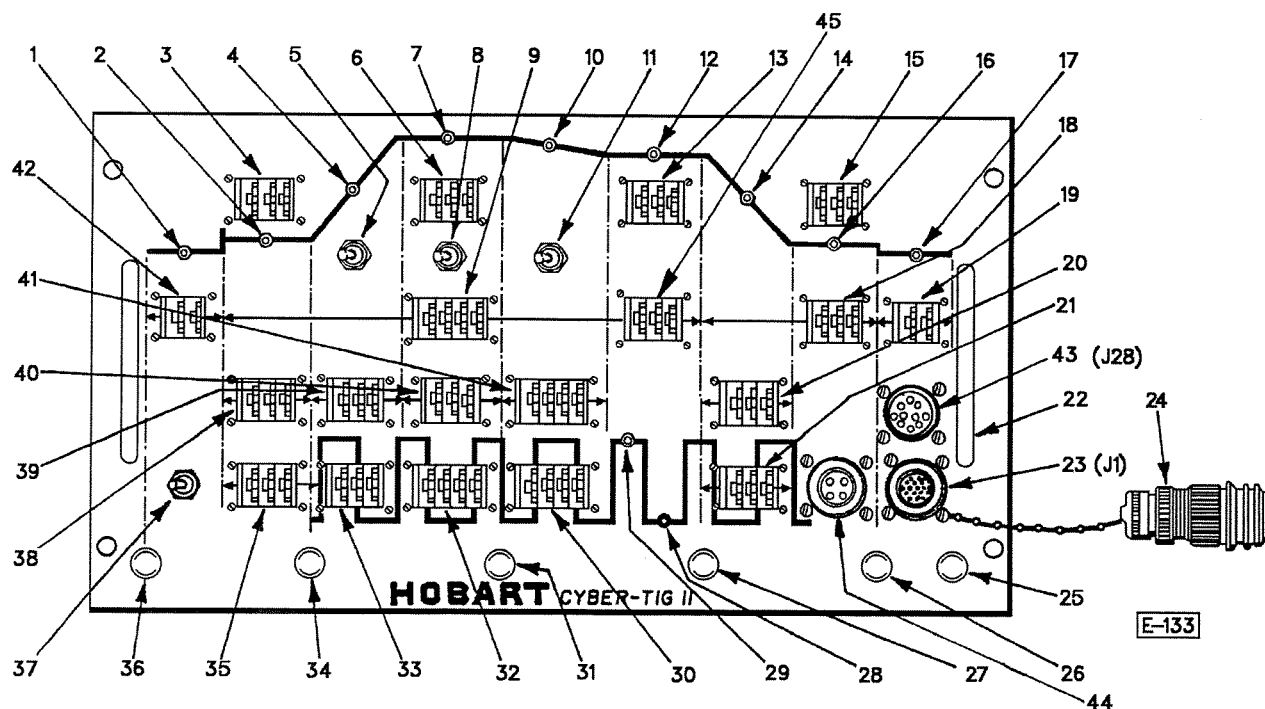


Figure 1

NOTE: All item numbers 1 thru 42 are identical to those in Figure 3-1, OM-305, items 43 and 44 have been added for this special application.

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INTRODUCTION

How To Use This Manual

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

To ensure safe operation, read the entire manual, including the chapter on safety instructions and warnings.

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

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

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

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

Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a nameplate attached to the machine. Equipment which does not have a nameplate attached to the machine is identified only by the specification or part number printed on the shipping container. Record these numbers for future reference.

Receipt Of Equipment

When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to Hobart Brothers Company, Order Department, 600 W. Main Street, Troy, Ohio 45373. Include all equipment identification numbers as described above along with a full description of the parts in error.

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

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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)		
Torch brazing	—	3 or 4	Non-ferrous base metal	All	11
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



FUMES AND GASES can be hazardous to your health.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breath the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.

4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
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.
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.
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.



WELDING can cause fire or explosion.

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.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
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.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.

5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
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.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
11. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.



FLYING SPARKS AND HOT METAL can cause injury.

Chipping and grinding cause flying metal. As welds cool, they can throw off slag.

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.



CYLINDERS can explode if damaged.

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.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
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.

3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

⚠ WARNING





ENGINES can be hazardous.



ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

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

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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DESCRIPTION OF EQUIPMENT

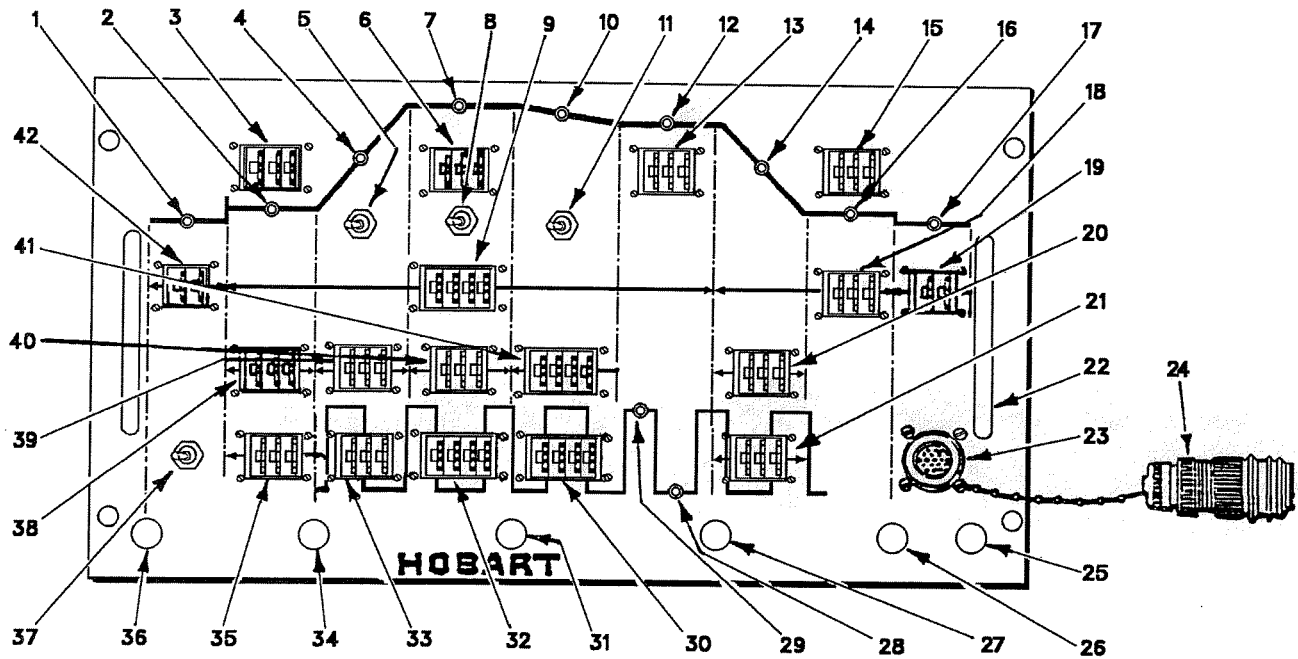
The HOBART 800 Programmer is designed to be used with a 3 phase power supply, but can be used with an AC/DC power source. The programmer will compensate for line voltage fluctuation of $\pm 15\%$, and the welding current will remain $\pm 1\%$ of the digital meter setting. The welding current is substantially constant with changes in welding arc length.

The programmer has built-in precision up and down slope, pulsation with high and low pulse time control, % of weld current, weld taper, postheat, prepurge and postpurge, weld timer controls, and remote control connection.

Hobart Brothers Company provides an exchange program for solid-state components within the programmer if repair ever becomes necessary. Refer to SOLID STATE ELECTRONIC CONTROL MODULE EXCHANGE SERVICE POLICY in back of this manual for details.

Controls And Instruments

1. PREFLOW LIGHT — This light emitting diode (LED) should be lighted only for the duration of preflow time.
2. INITIAL CURRENT LIGHT — This LED should be lighted from the time that arc current starts flowing until the start of the upslope mode.
3. INITIAL CURRENT MODULE — This thumb-wheel control will set the amount of current delivered to the arc from the time that the arc is first established until the beginning of the upslope mode.
4. UPSLOPE LIGHT — This LED should be lighted during upslope mode.
5. UPSLOPE MODE SWITCH — This toggle switch will allow the upslope delay timer to initiate upslope when the switch is set in the AUTO position.
6. WELD CURRENT MODULE — This thumb-wheel control will set the amount of current delivered to the arc from the end of upslope to the start of weld taper, if weld taper is used, or to the start of downslope if weld taper is not used.
7. WELD CURRENT LIGHT — This LED should be lighted from the end of upslope until the start of weld taper, if taper is used, or until the start of downslope if weld taper is not used.
8. WELD MODE SWITCH — With this toggle switch in AUTO position, weld timer will initiate downslope. The arc current will remain at the weld current (6) or final taper current (13) setting if this switch is in the MANUAL (MAN.) position.
9. WELD TIMER — This digital timer module controls the time duration from the start of the arc current to the start of downslope. The weld mode switch (8) must be in the AUTO position for this timer module to function. The digital display can be set between 000.0 and 999.9 seconds. The setting of this timer should always be greater than the sum of the upslope delay time (38), the upslope time (39), the weld taper delay time (40), and the weld taper time (41).
10. WELD TAPER LIGHT — This LED should be lighted during the weld taper mode, if weld taper is being used.
11. WELD TAPER MODE SWITCH — This toggle switch will allow the weld taper delay timer (40) to initiate weld taper when the switch is set in the AUTO position. The arc current will remain at the weld current setting if this switch is in the MANUAL (MAN.) position.
12. FINAL TAPER CURRENT LIGHT — This LED should be lighted from the end of weld taper to the start of downslope.
13. FINAL TAPER CURRENT MODULE — This thumb-wheel control will set the amount of current delivered to the arc from the end of the weld taper to the start of downslope, if weld taper is used.
14. DOWNSLOPE LIGHT — This LED should be lighted during the downslope mode.
15. FINAL CURRENT MODULE — This thumb-wheel control module will set the amount of current delivered to the arc from the end of downslope to the end of the welding cycle.
16. FINAL CURRENT LIGHT — This LED should be lighted from the end of downslope until the postheat timer times out, shutting off the arc current.
17. POSTFLOW LIGHT — This LED should be lighted during the postflow mode. It will also be lighted when power is first turned ON, and remain on for the duration of postflow time.
18. POSTHEAT TIMER — This digital timer module controls the time duration from the start of



- | | | |
|-------------------------------------|---------------------------------------|--|
| 1. Preflow Light (LED) | 16. Final Current Light (LED) | 30. High Pulse Timer Module |
| 2. Initial Current Light (LED) | 17. Postflow Light (LED) | 31. Weld Taper Start Pushbutton |
| 3. Initial Current Module | 18. Postheat Timer Module | 32. Low Pulse Timer Module |
| 4. Upslope Light (LED) | 19. Postflow Timer Module | 33. % Of Weld Current Module |
| 5. Upslope Mode Switch | 20. Downslope Timer Module | 34. Upslope Start Pushbutton |
| 6. Weld Current Module | 21. Pulsation Stop Delay Timer Module | 35. Pulsation Start Delay Timer Module |
| 7. Weld Current Light (LED) | 22. Handle(s) | 36. Weld Start Pushbutton |
| 8. Weld Mode Switch | 23. Remote Control Receptacle | 37. Pulsation Switch |
| 9. Weld Timer Module | 24. "Dummy" Plug | 38. Upslope Delay Timer Module |
| 10. Weld Taper Light (LED) | 25. Purge Pushbutton | 39. Upslope Timer Module |
| 11. Weld Taper Mode Switch | 26. Weld Stop Pushbutton | 40. Weld Taper Delay Timer Module |
| 12. Final Taper Current Light (LED) | 27. Downslope Start Pushbutton | 41. Weld Taper Timer Module |
| 13. Final Taper Current Module | 28. Low Pulse Light (LED) | 42. Preflow Timer Module |
| 14. Downslope Light (LED) | 29. High Pulse Light (LED) | |
| 15. Final Current Module | | |

Figure 3-1 Programmer Control Panel

downslope to the end of final current. The digital display can be set between 00.0 and 99.9 seconds. The setting of this timer should always be greater than the setting of the downslope time, or the arc will extinguish before the final current setting is reached.

19. POSTFLOW TIMER — This digital timer module controls the amount of time that the shielding gas and cooling water will flow after the arc has been extinguished. It can be set between 00 and 99 seconds.

20. DOWNSLOPE TIMER — This digital timer module controls the duration of time that it takes to slope from the final taper current, if weld taper is used, or from the weld current if weld taper is not used, to the final current setting. Downslope starts when the weld timer times out, or when the downslope pushbutton is pressed. The timer can be set for time values from 00.0 to 99.9 seconds. However, when the timer is set at 00.0, the actual downslope time segment will be 00.1 seconds. All other time durations will be determined by the thumb-wheel control settings.

21. PULSATION STOP DELAY TIMER — This digital time module controls the duration of time from the start of downslope until the pulsation is turned off. The pulsation switch must be turned ON for this timer to operate. The timer can be set between 00.0 and 99.9 seconds.

22. Item 22 designates the handles which are provided to assist in sliding the programmer drawer assembly in and out of the welding machine cabinet.

23. and 24. REMOTE CONTROL RECEPTACLE — The receptacle (and its associated "jumper" plug) provides connections between the programmer and remote controls. If a remote control is not used, the jumper plug must be installed in the remote control receptacle to obtain welding voltage. See Remote Control Pin Connections in the Operation chapter of this manual.

25. PURGE PUSHBUTTON — Used to open the gas and water valves to purge these lines before starting to weld.

26. WELD STOP PUSHBUTTON — Press to stop the welding made at any part of the cycle. Postflow will automatically be initiated when this button is depressed.

27. DOWNSLOPE START PUSHBUTTON — Press to start downslope when the weld mode switch is in the MAN (manual) position. This pushbutton can also initiate downslope with the weld mode switch in the AUTO position, if it is pressed before the weld timer completes its timing out cycle.

28. LOW PULSE LIGHT — This LED will be lighted during low pulse mode when pulsation is ON

29. HIGH PULSE LIGHT — This LED will be lighted whenever power is turned ON. It will be OFF only during the low pulse time if the pulsation is ON.

30. HIGH PULSE TIMER — This digital timer module controls the duration of time that welding current is at the high pulse level when pulsation is used. It will operate only AFTER the pulsation *start* delay timer (35) times out, and BEFORE the pulsation *stop* delay timer (21) times out. It can be set between 0.020 and 9.999 seconds.

31. WELD TAPER START PUSHBUTTON — Press to start weld taper when the weld taper mode switch (11) is in the MAN (manual) position. This pushbutton can also initiate weld taper with the weld taper mode switch in the AUTO position, if it is pressed before the weld timer delay timer (40) times out.

32. LOW PULSE TIMER — This digital timer module controls the duration of time that the weld current is at low pulse level, when pulsation is used. It will operate only AFTER the pulsation *start* delay timer (35) times out, and BEFORE the pulsation *stop* delay timer (21) times out. It can be set between 0.020 and 9.999 seconds.

33. % OF WELD CURRENT CONTROL — This thumb-wheel control module will set the percentage value of weld current delivered during the low pulse portion of the pulsation mode.

34. UPSLOPE START PUSHBUTTON — Press to start upslope, when the upslope mode switch (5) is in the MAN (manual) position. This pushbutton can also initiate upslope with the upslope mode switch in the AUTO position, if it is pressed before the upslope delay timer (38) times out.

35. PULSATION START DELAY TIMER — This digital timer module controls the duration of time from the start of arc current until the start of pulsation. The pulsation switch (37) must be in the ON position for this timer to function. The timer can be set for time duration of 00.0 to 99.9 seconds.

36. WELD START PUSHBUTTON — Press to start the welding sequence when a remote control device is not used.

37. PULSATION SWITCH — Move this switch in the direction indicated on panel, to turn pulsation ON and OFF.

38. UPSLOPE DELAY TIMER — This digital timer control module controls the duration of time that the arc current will remain at the initial current setting (as shown on module 3) before sloping to the weld

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current setting (as shown on module 6). The upslope mode switch (5) must be in the AUTO position for this timer to function. The timer can be adjusted for time duration from 00.0 to 99.9 seconds.

39. **UPSLOPE TIMER** — This digital timer module controls the time duration for upslope from the initial current setting (as shown on module 3) to the weld current setting (as shown on module 6). Upslope starts when the upslope delay timer (38) times out, or when the upslope start pushbutton (34) is pressed. The timer can be set for time duration of 00.0 to 99.9 seconds. However, when the timer is set for 00.0, the actual upslope time duration will be 00.1 second. All other time segments will be equal to the control module setting.

40. **WELD TAPER DELAY TIMER** — This digital timer controls the time duration that the arc current will remain at the weld current setting (as shown on module 6) before tapering to the final current setting (as shown on module 15). The weld taper mode

switch (11) must be in the AUTO position for this switch to function. The timer can be set between 00.0 and 99.9 seconds.

41. **WELD TAPER TIMER** — This digital timer module controls the duration of time that it takes to taper from the weld current setting (as shown on module 6) to the final taper current setting (as shown on module 13). Weld taper starts when the weld taper delay timer (40) times out, or when the weld taper start pushbutton (31) is pressed. The weld taper timer can be set from 000.0 to 999.9 seconds. However, when the timer is set at 000.0, the actual weld taper time duration will be 000.1 second. All other time segments will be equal to the control module setting.

42. **PREFLOW TIMER** — This digital timer module controls the duration of time that the shielding gas and cooling water will flow before an arc is established. It can be set for time duration of 0.0 to 9.9 seconds.

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, as these environmental factors can seriously affect operation and efficiency.

Adequate air circulation is needed at all times in order to insure proper operation. Provide a minimum of 12 inches of free air space at both front and rear of welding machine cabinet. Make sure that ventilator openings are not obstructed.

Wiring

The programmer was completely wired at the factory and requires no additional wiring for operation. Connections are made between the programmer and the welding machine console following the installation of the welding machine.

NOTE: The programmer cannot be operated without the welding machine console. Both this instruction manual and the welding machine instruction manual should be read before attempting to install, wire or operate this equipment.

TERMINAL BLOCK CONNECTIONS — The terminal block near the rear of the programmer is available for interlock connections to external accessory equipment. There are twelve connections as shown on Figure 4-1.

Initial Preparation For Use

The welding machine console must be installed, and the input power supply connected, with correct voltage. Refer to welding machine instruction manual for voltage changeover instructions.

1. Loosen the four screws at the corners of the programmer and pull the programmer drawer out of its position within the welding machine on the slide tracks.

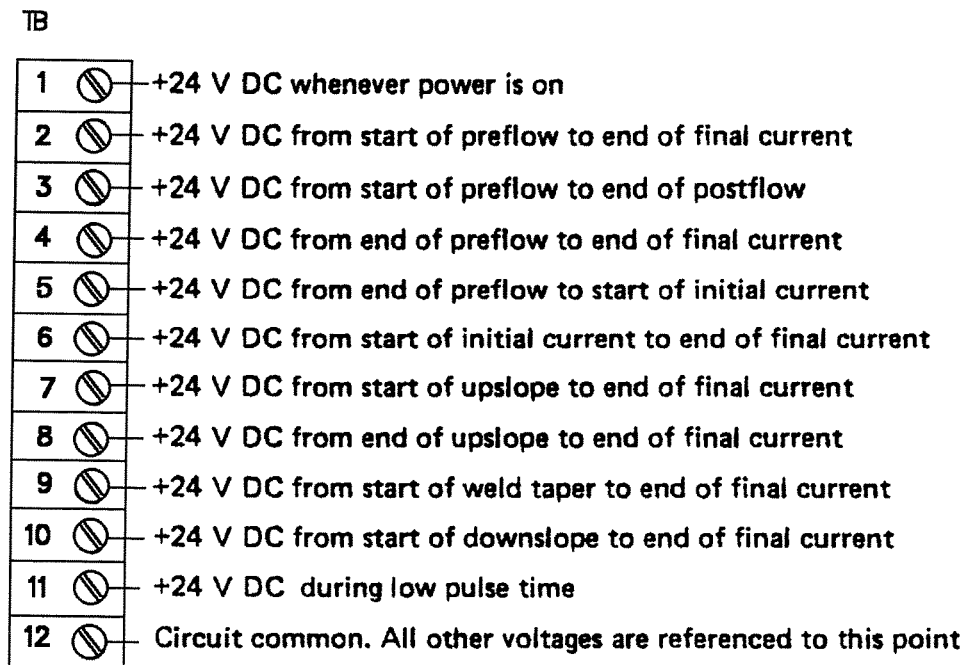


Figure 4-1 Terminal Block Connections

**OM-305
INSTALLATION**

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NOTE: The input power to the programmer is provided by the welding machine, through an internal cable, which will flex to allow the removal of the drawer.

2. Carefully test the slide tracks by moving the programmer back and forth, stopping before pulling it out entirely. The drawer can be removed by pulling forward and up.
3. Inspect for broken wires or connections.
4. Check the interconnecting plugs and PC Boards for being securely in place.
5. Mate the connecting plug from the welding machine with the receptacle on the back of the programmer drawer.
6. Although the programmer is shipped from the factory completely aligned, it may be necessary to readjust maximum and minimum welding current.

This will probably be necessary only in a programmer shipped from the factory and being installed in a welding machine in the field. If calibration of the unit is necessary, refer to CALIBRATION INSTRUCTIONS in the MAINTENANCE chapter.

NOTE: The power supply for operating this programmer comes from the welding machine. When the power supply is turned ON to the welding machine, and the connecting cable is in place between programmer and machine, the programmer has full power supply.

WARNING: Do not attempt any testing or checking components with power ON, except in following specific calibration instructions.

OPERATION

Before attempting to operate the equipment, the welding machine console must be installed, wired, and the voltage changeover (if necessary) made in accordance with the technical manual supplied with the unit. Complete the programmer installation in accordance with the preceding chapter of this manual.

Presetting Controls

Before starting to weld, adjust the controls as follows:

1. Place the main fused disconnect switch in the OPEN or OFF position.
 2. Set the WELDING MACHINE controls:
 - a. POWER ON-OFF SWITCH In OFF position
 - b. HIGH-FREQUENCY SWITCH In OFF position
 - c. STICK-TIG SWITCH As desired
 3. Set the Programmer controls (Ref. Figure 3-1):
 - a. WELD START PUSH-BUTTON SWITCH (36) Do not actuate
 - b. PURGE PUSHBUTTON SWITCH (25) Do not actuate
 - c. WELD STOP PUSHBUTTON SWITCH (26) Do not actuate
 - d. DOWNSLOPE PUSHBUTTON SWITCH (27) Do not actuate
 - e. PULSATION ON-OFF SWITCH (37) For pulsation mode: ON
For non-pulsation mode: OFF
 - f. WELD MODE SWITCH (8) Time controlled weld: AUTO
No time control: MANUAL
 - g. WELD TAPER MODE SWITCH (11) Weld Taper Mode: ON
No Weld Taper: OFF
 - h. REMOTE CONTROL CONNECTOR (23) Remove the plug when using remote control.
 - i. All other controls As desired.
4. The inert gas should be turned OFF at the supply cylinder, and the water should be turned OFF at the water supply.
 5. Three-phase DC machine (machines covered by this manual) DC Polarity Switch (STRAIGHT DC-REVERSE DC): As required for the type of welding and work to be accomplished.
 6. WORK Electrical Connection: Make a good, tight electrical connection at both ends of the WORK lead; to the WORK terminal, and to the work.
 7. ELECTRODE Electrical Connection: Make a good, tight electrical connection at both ends of the TORCH lead; to the ELECTRODE terminal on the welding machine, and to the torch.
 8. For TIG welding, make the following water and gas connections:

CAUTION: Do not connect the water supply through the water valve if a Circoolator is used, as damage to the Circoolator pump may result.

 - a. Connect the water supply to "Water From Supply", or WATER IN (see Figure 2 in the Technical Manual furnished for the welding machine) in accordance with standard water-plumbing procedures.
 - b. Connect the water supply from the welding machine on connector marked "Water To Torch" (see same referenced Figure 2 as above) in accordance with standard water-plumbing procedures.
 - c. Connect the gas supply to "Gas From Cylinder", or GAS IN (see Figure 2 in the Technical Manual furnished for the welding machine) in accordance with standard gas-plumbing procedures.
 - d. Connect the gas from the welding machine to the torch at connector marked "Gas To Torch" (see same referenced Figure 2 as above) in accordance with standard gas-plumbing procedures.

Stick (Covered Electrode) Welding Procedures

NOTE: Do not turn on the water and gas supplies for stick welding.

The following procedural list is the sequence to follow to develop the arc in stick, or "covered electrode" welding, and the turn-off procedure of the system, when welding is completed.

1. Plug the connector from the desired remote control device into the Remote Control Receptacle (item 23, Figure 3-1), or else the Jumper Plug (item 24) if remote control is not being used. See Remote Control Pin Connections on Page 5-4.
2. Place the fused disconnect switch in the ON or CLOSED position.
3. Place the POWER ON/OFF Switch (see Figure 3-1 in Technical Manual supplied for the welding machine) in the ON position. The fan should start and the welding machine is energized for use.
4. Press the WELD START Pushbutton (item 36 on Figure 3-1), the remote (if used) START Pushbutton, or Foot Switch.
5. Touch the electrode to the work and adjust WELD CURRENT Module (item 6) to produce a welding arc of the desired current.
6. Welding can be interrupted, then resumed automatically by removing the electrode from the work, then retouching the electrode to the work.
7. To terminate welding:
 - a. Remove the electrode from the work.
 - b. Press the WELD STOP Pushbutton (item 26), open the foot rheostat, or press the remote STOP pushbutton (if being used).
 - c. Place the POWER ON-OFF Switch on Meter Panel in OFF position.
 - d. Place the fused disconnect switch in the OPEN or OFF position.

TIG Welding Procedures

ESTABLISHING THE ARC — The following procedural list is the sequence to follow to develop the arc in TIG welding, and the turn-off procedure of the system, when welding is completed.

1. Turn ON the water supply.
2. Turn ON the gas supply.

3. Place the HIGH FREQUENCY AUTO-OFF Switch (located on the bottom panel of the welding machine) in the AUTO position.

NOTE: The controls and switches should have been preset as desired. Refer to PRE-SETTING CONTROLS at the beginning of this OPERATION chapter.

4. Plug the connector from the desired remote control device into the Remote Control Receptacle (item 23, Figure 3-1) or else the Jumper Plug (item 24) if remote control is not being used.
5. Place the fused disconnect switch in the ON or CLOSED position.
6. Place the POWER ON/OFF Switch (see Figure 1 in Technical Manual supplied with the welding machine) in the ON position. The fan should start, the HIGH PULSE LIGHT (LED) (item 29, Figure 3-1) should light, and water and gas should begin to flow for the prepurge time.

CAUTION: If the fan, pilot lamp, water and gas are not functioning, do not proceed until the trouble is diagnosed and corrected.

7. The water and gas lines may be purged by pressing the PURGE Pushbutton (item 25, Figure 3-1). Adjust the gas flow rate.
8. Place the welding torch in proximity to the work.
9. Press the WELD START Pushbutton (item 36 on Figure 3-1), the remote (if used) START pushbutton, or Foot Switch.
10. Readjust the controls as deemed necessary.

CAUTION: Once the welding arc is established, power should not be removed from the welding machine/programmer (programmer receives power through the welding machine). The Power ON-OFF Switch should not be turned OFF until after the postpurge mode is completed. The work or the torch may be damaged if water and gas cease to flow too soon.

11. Welding mode can be interrupted by merely removing the torch from proximity of the work. The high frequency will automatically resume and welding current will automatically shift to INITIAL CURRENT control (as determined by setting on the INITIAL CURRENT MODULE, item 3 on Figure 3-1). When the torch returns to proximity of the work, the welding arc will be re-established, the high frequency will cut off, and welding current control will

return to WELD CURRENT MODULE (item 6, Figure 3-1).

PROCEEDING FROM PREPURGE TO DOWNSLOPE — The following sequence will be followed for the welding process:

1. Set the PREFLOW TIMER MODULE (item 42 on Figure 3-1) for desired time duration of water and gas preflow. PREFLOW LIGHT (item 1) will be ON.
2. Turn HIGH FREQUENCY Switch (on bottom front panel) to AUTO position.
3. Set the INITIAL CURRENT MODULE (item 3, Figure 3-1) to desired current to be delivered to the arc from the arc establishment until upslope begins.
4. If the UPSLOPE MODE Switch (item 5) is ON, following UPSLOPE DELAY (set by UPSLOPE DELAY TIMER, item 38), sloping of the weld current from the initial current level to the weld current level occurs. During upslope mode, the UPSLOPE LIGHT (item 4) will be ON.
5. Upslope welding current (time duration established by UPSLOPE TIMER MODULE, item 39) occurs. Arc current upslopes from the initial current to the welding current during this mode.
6. If the PULSATION Switch (item 37) is ON, following PULSATION START DELAY (established by PULSATION START DELAY TIMER MODULE, item 35), pulsation of upslope current and welding current will occur.
7. Upslope ends, welding current levels off in pulsation mode between high pulse, as set by WELD CURRENT MODULE (item 6), and the low pulse as set by % OF WELD CURRENT MODULE (item 33).
8. Time durations of high and low pulses are controlled by HIGH PULSE TIMER MODULE (item 30) and LOW PULSE TIMER MODULE (item 32).
9. If the WELD TAPER MODE Switch (item 11) is ON, following WELD TAPER DELAY (set by WELD TAPER DELAY TIMER MODULE, item 40), taper of the weld current from weld current level to final taper current level occurs. During taper, the WELD TAPER LIGHT (item 10) will be ON.

DOWNSLOPE — Downslope will automatically begin when WELD TIME (set by WELD TIMER MODULE, item 9) elapses. Downslope can also be started by pressing DOWNSLOPE START Pushbutton (item 27), or Remote Control DOWNSLOPE Pushbutton (if being used).

1. Downslope current will be pulsed until the PULSATION STOP DELAY TIMER MODULE (item 21) times out.

2. Downslope will proceed to the FINAL CURRENT level (as set by FINAL CURRENT MODULE, item 15).

3. POSTHEAT TIME (as set by POSTHEAT TIMER MODULE, item 18) includes both Downslope and Final Current.

AFTER POSTHEAT TIME — Postflow starts automatically.

1. When POSTFLOW ends (maximum of 90 seconds), water and gas ceases to flow.

2. At any time, welding can be terminated and POSTFLOW started by pressing the WELD STOP Pushbutton (item 26).

3. Following POSTFLOW (after POSTFLOW LIGHT, item 17, has gone out) turn off the water and gas supplies.

SHUTDOWN — Place POWER ON-OFF Switch on welding machine in the OFF position, and OPEN fused disconnect switch in the primary power source.

Remote Controls

Two optional remote control devices are available for use with this programmer.

1. A foot-operated rheostat.
2. A hand-operated ON-OFF and DOWNSLOPE START Control, with ten-turn direct-reading potentiometer for controlling the weld current, located in a Pendant control box.

Connection For Remote Controls

Each remote control device includes a cable and connecting plug. Electrical connection between the Programmer and remote control device is identical for the two remote controls. To connect a remote control to the Programmer, remove the jumper plug (item 24 on Figure 3-1) from the REMOTE CONTROL RECEPTACLE (item 23), and insert the plug from the remote control cable into the receptacle. To operate the Programmer, either with a remote control or from the Programmer front panel, the POWER ON-OFF Switch in the welding machine must be in the ON position, as the operating power for the Programmer comes from the welding machine console through the connecting plug.

NOTE: See Remote Control Pin Connections on Page 5-4.

Foot-Operated ON-OFF Rheostat

Refer to Figure 5-1.

The foot-operated ON-OFF Rheostat starts and stops the welding process, and controls weld current through the operation of a foot pedal. Depressing the foot pedal starts preflow mode. This is followed by high frequency and the development of a welding arc. As pressure on the foot pedal is increased, welding current is increased. When the pressure on the pedal is lessened, the welding current is decreased. Releasing the foot pedal completely stops the welding process and starts postflow mode.

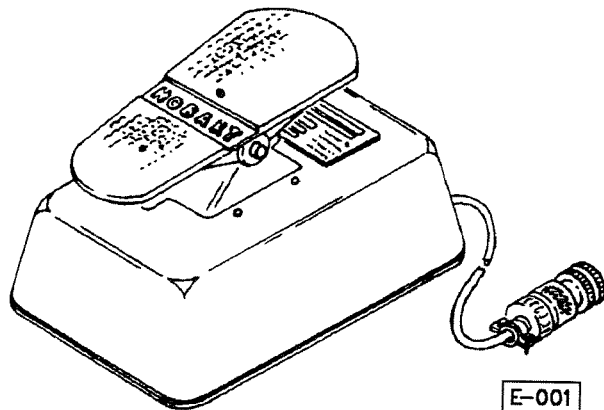


Figure 5-1 Foot-Operated Rheostat

Remote Control Pendant

Refer to Figure 5-2.

This pendant is for remote control functions of START and STOP, DOWNSLOPE, and WELD CURRENT. May be considered an Emergency STOP device.

NOTE: The WELD CURRENT Control operates as a percentage of the current that is set on the main current control (WELD CURRENT MODULE, item 6 on Figure 3-1).

The hand-operated on-off and downslope-start control with a ten-turn direct-reading potentiometer for controlling weld current, starts and stops the welding process, starts the downslope mode, and controls welding current. Depressing the remote START Pushbutton causes preflow of gas to start.

Preflow is followed by the initiation of high frequency mode and the development of the welding arc. Welding begins at the current level set by the ten-turn, direct-reading PERCENT OF WELD CURRENT potentiometer on the remote control pendant, and continues at this level until one of the following occurs:

1. Weld time elapses and causes postheat and downslope to begin.
2. Depressing the DOWNSLOPE Pushbutton on either the Programmer front panel, or on the remote control Pendant causes downslope and postheat modes to be initiated.
3. Depressing either the WELD STOP Pushbutton on the Programmer front panel, or the STOP Pushbutton on the Pendant causes postflow of gas to begin.

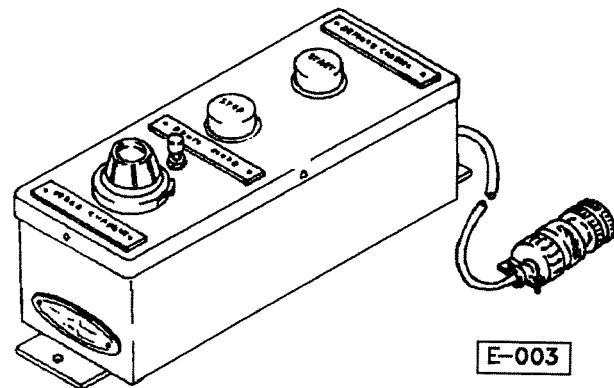


Figure 5-2 Remote Control Pendant

Remote Control Pin Connections

The following connections must be made to the Remote Control Receptacle (19-pin Amphenol) located on the front panel of the Programmer. These are made with the "Dummy" plug, Foot Control, Hand Pendant, or some other type of remote control device.

START/STOP/DOWNSLOPE CIRCUIT

Either:

1. Jumper pins A and C, or —
2. Maintained switch or Foot Switch from pins A to B, or —
3. N.O. Pushbutton Switch (START) from pins A to C, plus a N.C. Pushbutton Switch (STOP) from pins B to C. Also a N.O. Pushbutton Switch (DOWNSLOPE) may be connected from pins C to H.

CURRENT CONTROL

Either:

1. Jumper pins D and E, or —
2. Potentiometer from pins D to F with wiper connected to E. This potentiometer would control weld current from the setting of the MINIMUM CURRENT CONTROL on the Programmer, to 100% of the setting of the WELD CURRENT CONTROL on the Programmer, or —
3. Potentiometer from pins K to F with the wiper connected to E. This potentiometer would control the weld current from the setting of the MINIMUM

CURRENT CONTROL on the Programmer to *Maximum Output Current* of the machine. The WELD CURRENT CONTROL on the Programmer would be disabled.

NOTE 1: The Remote Control Potentiometer would control the current from the end of UPSLOPE to the start of WELD TAPER, if TAPER is used, or until the start of DOWNSLOPE, if Weld Taper is not used.

NOTE 2: The potentiometer should be 5K to 25K ohm value.

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MAINTENANCE

Calibration Instructions

EQUIPMENT REQUIRED:

1. Digital DC voltmeter
2. Frequency counter

PROCEDURE

1. Turn high frequency switch OFF.
2. Turn pulsation switch OFF.
3. Turn resistor (R52) to MAX position in CCW direction. See Figure 6-1 for location of this resistor.
4. Turn all four current controls (initial current, weld current, final taper current, final current) to:
299 on 369520A-1 programmer (299 amps max.)
399 on 369520A-2 programmer (399 amps max.)
699 on 369520A-3 programmer (699 amps max.)
299 on 369520A-4 programmer (299 amps max.)
199 on 369520A-5 programmer (199 amps max.)
299 on 369520A-6 programmer (299 amps max.)
299 on 369520B-1 programmer (299 amps max.)
399 on 369520B-2 programmer (399 amps max.)
699 on 369520B-3 programmer (699 amps max.)
299 on 369520B-4 programmer (299 amps max.)
199 on 369520B-5 programmer (199 amps max.)
299 on 369520B-6 programmer (299 amps max.)
5. Set the timers to the following positions: (See Figure 3-1 for callouts)
Prewflow timer (42) 2.0 seconds
Upslope delay timer (38) 02.0 seconds
Upslope timer (39) 02.0 seconds
Pulsation start delay timer (35) 02.0 seconds
Pulsation stop delay timer (21) 02.0 seconds
Weld taper delay timer (40) 02.0 seconds
Weld taper timer (41) 002.0 seconds
Weld timer (9) 010.0 seconds
Downslope timer (20) 02.0 seconds
Postheat timer (18) 99.9 seconds

- Postflow timer (19) 02 seconds
High pulse timer (30) 1.000 seconds
Low pulse timer (32) 9.999 seconds
6. Set the % of weld current control to 90%.
 7. Place the upslope mode, weld mode, and weld taper mode switches in the MAN (manual) position.

Alignment Procedure

Refer to Figure 6-1.

1. Check power supply voltage, ± 15 V DC
 - a. Test from test point W (TPW) (with [-] minus lead) to test point Y (TPY) (with [+] plus lead). Voltage should be $15 \text{ V} \pm 0.5 \text{ V DC}$.
 - b. Test from test point X (TPX) (with [+] plus lead) to test point Y (TPY) (with [-] minus lead). Voltage should be $15 \text{ V} \pm 0.5 \text{ V DC}$.
 - c. If either of the above tests show any incorrect reading (other than 15 volts), replace the power supply board.
2. 1000 Hz Clock Calibrate
 - a. Connect the plus (+) lead of the frequency counter to test point A (TPA).
 - b. Connect the minus (-) lead of the frequency counter to test point Y (TPY).
 - c. Adjust resistor (R1) until 1000 ± 1 Hz is displayed on frequency counter.
 - d. This adjustment will have calibrated the following timers:
Prewflow timer
Upslope delay timer
Pulsation start delay timer
Pulsation stop delay timer
Weld taper delay timer
Weld timer
Postheat timer
Postflow timer
Low pulse timer
High pulse timer
3. 25,500 Hz Clock Calibrate
 - a. Connect the plus (+) lead of the frequency counter to test point B (TPB).

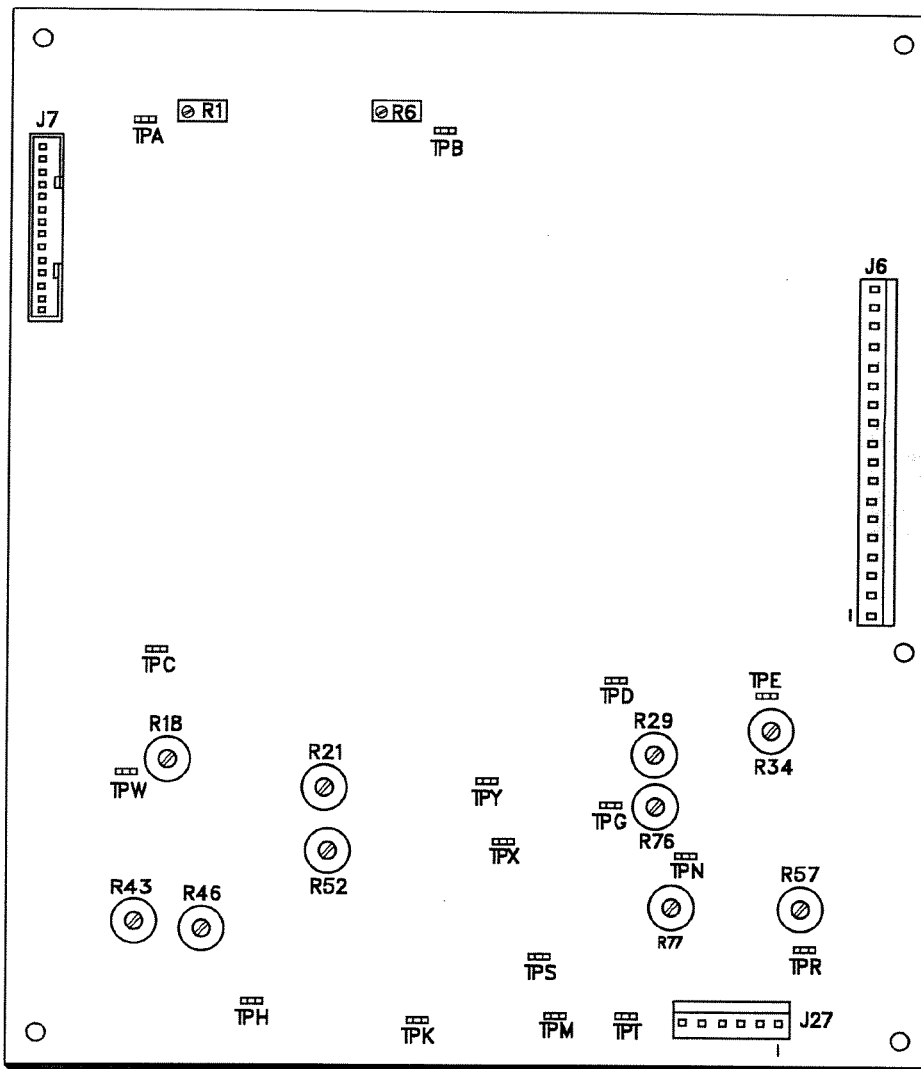


Figure 6-1 Main Control Printed Circuit Board
Adjustment and Test Points

- b. Connect the minus (-) lead of the frequency counter to test point Y (TPY).
- c. Adjust resistor (R6) until $25,500 \pm 10$ Hz is displayed on the frequency counter.
- d. This adjustment will have calibrated the following timers:
 - Upslope timer
 - Weld taper timer
 - Downslope timer
- 4. Reference Voltage Calibration
 - a. Connect a heavy welding lead from the WORK terminal to the ELECTRODE terminal of the welding machine.

- b. Press the WELD START Pushbutton. The PREFLOW LIGHT (item 1 on Figure 3-1) should come ON for two seconds, and then the INITIAL CURRENT LIGHT (item 2) should come ON and stay on.
- c. Connect the minus (-) lead of the voltmeter to test point S (TPS).
- d. Connect the plus (+) lead of the voltmeter to test point Y (TPY).
- e. Adjust resistor (R76) until 10.0 volts is indicated on the meter.
- f. Connect the minus (-) lead of the voltmeter to test point D (TPD).

- g. Connect the plus (+) lead of the voltmeter to test point Y (TPY).
 - h. The voltmeter should read $0 \pm .010$ volts DC.
 - i. Press the UPSLOPE START Pushbutton (item 34 on Figure 3-1). The Upslope Light (item 4) should come ON and stay on for two seconds, and then the Weld Current Light (item 7) should come ON and stay on.
 - j. Adjust resistor (R18) until 10.00 volts is indicated on the meter.
 - k. Connect the minus (-) lead of the voltmeter to test point S (TPS).
 - l. Connect the plus (+) lead of the voltmeter to test point Y (TPY).
 - m. Adjust resistor (R29) until a plus voltage is indicated on the voltmeter. Then adjust R29 until this voltage increases by + 0.002 volts DC.
5. Initial Current Control Calibration
- a. Press the WELD STOP Pushbutton (item 26 on Figure 3-1).
 - b. Press the WELD START Pushbutton (item 36 on Figure 3-1). After two seconds the Initial Current Light (item 2) should come ON and stay on.
 - c. Connect the minus (-) lead of the voltmeter to test point K (TPK).
 - d. Connect the plus (+) lead of the voltmeter to test point Y (TPY).
 - e. Adjust resistor (R57) until exactly 9.50 volts is indicated on the meter. (7.10 volts on 299 ampere maximum current range programmer.)
6. Weld Current Control Calibration
- a. Press the UPSLOPE START Pushbutton (item 34 on Figure 3-1). After two seconds the WELD CURRENT LIGHT (item 7) should come ON and stay on.
 - b. Adjust resistor (R34) until exactly 9.50 volts is indicated on the meter. (7.10 volts on 299 ampere maximum current range programmer.)
7. Final Taper Current Control Calibration
- a. Press the WELD TAPER START Pushbutton (item 31 on Figure 3-1). After two seconds the FINAL TAPER CURRENT LIGHT (item 12) should come ON and stay on.
 - b. Adjust resistor (R77) until exactly 9.50 volts is indicated on the meter. (7.10 volts on 299 ampere maximum current range programmer.)
8. Final Current Control Calibration
- a. Press the DOWNSLOPE START Pushbutton (item 27 on Figure 3-1). After two seconds the FINAL CURRENT LIGHT (item 16) should come ON and remain on until the POSTHEAT TIMER MODULE (item 18) times out (99.9 seconds).
 - b. While the FINAL CURRENT LIGHT is ON, adjust resistor (R21) until exactly 9.50 volts is indicated on the meter. (7.10 volts on 299 ampere maximum current range programmer.)
 - c. Press the WELD STOP Pushbutton (item 26 on Figure 3-1).
9. PERCENT (%) OF WELD CURRENT CONTROL CALIBRATION
- a. Set the % OF WELD CURRENT MODULE (item 33 on Figure 3-1 to 99.9).
 - b. Turn the PULSATION Switch (item 37 on Figure 3-1) to ON position.
 - c. Press the WELD START Pushbutton (item 36). Pulsation should start as soon as the PULSATION START DELAY TIMER (item 35) times out.
 - d. Adjust resistor (R52) only when the LOW PULSE LIGHT (item 28) is ON. The meter should read 9.50 volts during high pulse. (7.10 volts on 299 ampere maximum current range programmer.) Adjust R52 until 9.49 volts is indicated on the meter. (7.09 volts on 299 ampere maximum current range programmer.)
 - e. Turn the PULSATION Switch (item 37) to the OFF position.
 - f. Press the WELD STOP Pushbutton (item 26).
10. Current Output Calibration
- a. Connect the minus (-) lead of the meter to test point H (TPH).
 - b. Connect the plus (+) lead of the meter to test point Y (TPY).
 - c. Press the WELD START Pushbutton (item 36). The PREFLOW LIGHT (item 1) should come ON for two seconds and then the INITIAL CURRENT LIGHT (item 2) should come ON and stay on.

- d. Adjust resistor (R46) until 10.00 volts is indicated on the meter. (7.5 volts on 299 ampere maximum current range programmer.)
 - e. Press the WELD STOP Pushbutton (item 26).
11. Start Current Calibration
- a. Remove the leads from the output terminals of the welding machine.
 - b. Connect the minus (-) lead of the meter to test point M (TPM)).
 - c. Press the WELD START Pushbutton (item 36).
 - d. Approximately 80 volts should appear on the voltmeter on the welding machine after the PRE-FLOW TIMER MODULE (item 42) times out.
 - e. Adjust resistor (R43) until 0.28 volts is indicated on the meter connected to test point M (TPM).
 - f. Press the WELD STOP Pushbutton (item 26).
12. Current Dial Calibration
- a. Remove all test equipment from the Programmer.
 - b. Connect TIG Torch, equipped with a large Tungsten rod, to the welding machine.
 - c. Set the INITIAL CURRENT MODULE (item 3) to maximum setting, or to a current value that the TIG Torch can handle.
 - d. Remove the side panel from the welding machine to gain access to the SCR control board.
 - e. Strike an arc, and then adjust resistor (R79) on the SCR control board until the reading on the DC ammeter on the front panel of the welding machine reads the same as the setting on the INITIAL CURRENT MODULE (item 3).
 - f. Set the INITIAL CURRENT MODULE (item 3) to 20 amperes. Adjust resistor (R71) on the SCR

control board until 20 amperes is indicated on the DC ammeter on the front panel of the welding machine.

- g. Reset the INITIAL CURRENT MODULE to the high setting (same as c. above).
- h. Repeat steps e, f, and g until no further adjustment is required.
- i. Resistor (R46) on the main control board (Figure 6-1) in the Programmer can be used as a *fine tuning control* for calibrating the maximum current output, while resistor (R79) on the SCR control board can be used as a *coarse control* for calibrating the maximum current output.
- j. Press the WELD STOP Pushbutton (item 26).

13. Current Control Calibration Check

- a. All four current control modules (INITIAL CURRENT, WELD CURRENT, FINAL TAPER CURRENT and FINAL CURRENT) should be set to 100 amperes.
- b. Turn the UPSLOPE MODE, WELD MODE, and WELD TAPER MODE Switches to the AUTO position.
- c. Set the POSTHEAT TIMER MODULE (item 18) to 040 (4 seconds), and the POSTFLOW TIMER MODULE to 20.
- d. Strike an arc. After two seconds the ammeter should indicate the same value as the current control module settings (100 amperes), as in a., above. The programmer should sequence through and shut the current off.
- e. If the current does not remain the same during the program, then some recalibration may be required.
- f. If the current only fluctuates during the upslope, taper and downslope modes, then resistor (R29) requires recalibration.

TROUBLESHOOTING

The following guide contains information which can be used to diagnose and correct unsatisfactory operation or failure of the various components of the equipment covered by this manual. Each symptom of trouble is followed by a list of possible causes and the remedy to correct them.

Troubleshooting Guide

Programmer will not operate but fan runs

Programmer disconnected from power source

Check mating plug at rear of programmer.

Blown fuse

Check fuses on programmer power supply board. The six lights on the board will be lighted if the fuses are all good.

Jumper plug or remote control plug not plugged into remote receptacle

Plug the jumper or remote cable plug into the remote receptacle.

Shielding gas will not flow

Jumper plug or remote control plug not plugged into remote receptacle

Plug the jumper or remote cable plug into the remote receptacle.

Weld Start pushbutton not depressed

Press Weld Start pushbutton.

Shielding gas will not flow even when Weld Start pushbutton is pressed

No power output from terminal board terminals TB1 and TB12 — should be + 24 volts

Check power supply to programmer.

Problem not in programmer

Check 115 volt power supply to gas valve.

If no power to gas valve

Replace solid state relay.

If power available at gas valve

Check for restriction in gas line, or replace gas valve.

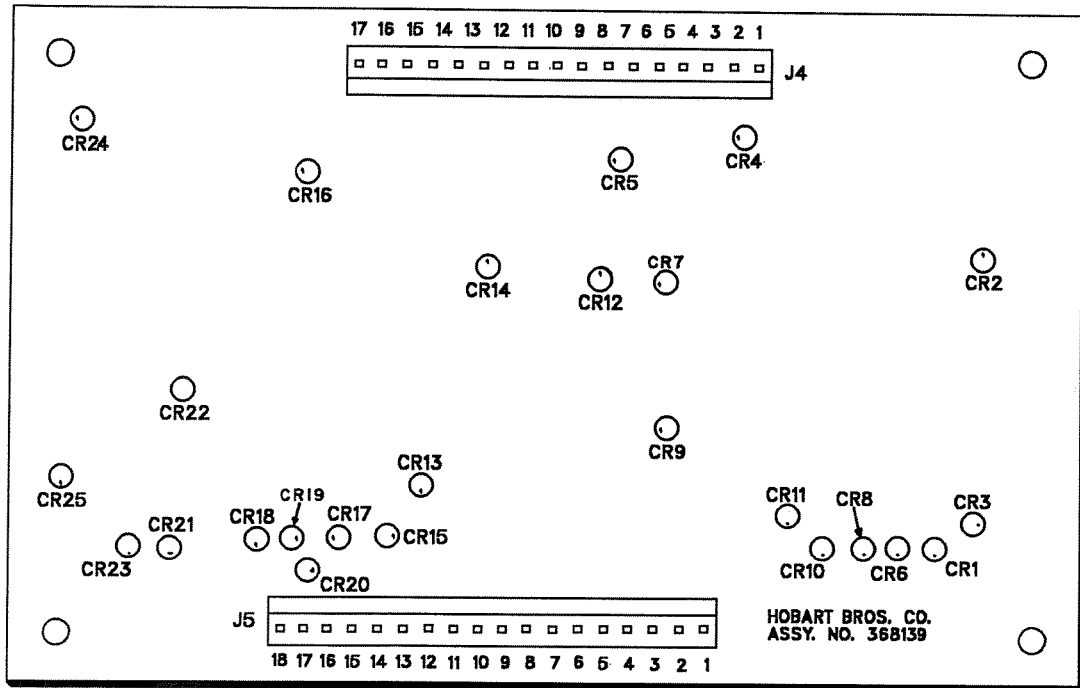
Shielding gas will flow only when Weld Start pushbutton is depressed

Postheat timer or main control board defective. CR1, CR2, CR3, CR4, CR5, CR6 NOT lighted.
(See Figure 7-1 for location of CRs)

Replace postheat timer module or main control board.

Logic board defective CR1, CR2, CR3, CR4, CR5, CR6 all lighted when Weld Start pushbutton is depressed, but go OUT when button is released

Replace logic board. See Figure 7-1.



E-014

Figure 7-1 Logic Printed Circuit Board

Jumper between pins B and C on the remote jumper plug could be open (Lights CR1 and CR4 only ones lighted)

Check remote jumper plug and jump pins B and C. See Figure 7-1.

Logic board defective (Lights CR1 and CR4 only ones lighted)

Replace logic board.

CR1, CR2, CR3, CR4 all lighted; CR5 and CR6 NOT lighted

Replace postflow timer module or main control board.

CR1, CR2, CR3, CR4 all lighted; CR5 and CR6 NOT lighted

Replace logic board.

All six LEDs (CR1, CR2, CR3, CR4, CR5, and CR6) lighted — but no gas flow

Check connection between logic board connector J4-4 and suppressor board, pin 57. See Figure 7-1.

Gas flows all the time when power is ON to the welding machine

Postflow timer not adjusted properly

Adjust postflow timer. Gas should flow for timer set time as soon as power is turned ON.

Q2 on logic board defective

Replace logic board.

Defective postflow timer or main control board

Replace.

Defective Purge pushbutton (CR1 is only light ON)

Replace Purge pushbutton.

DC Voltmeter reads 0 (no open-circuit voltage)

Shorted welding leads

Check or remove leads from output terminals.

Preflow light (item 1 on Figure 3-1) does not come ON

See SHIELDING GAS WILL NOT FLOW at beginning of this guide.

Preflow light (item 1 on Figure 3-1) does come ON — are lights CR7 and CR8 lighted on Logic Board?

If NO

Replace Preflow Timer Module or Main Control Board.

If YES

Check connections from Logic Board connector J4-5 to J2-10. If connection is good, then problem is in the welding machine (power source).

If light CR8 is ON and CR7 is OFF

Q4 on Logic Board is defective — Replace the Board.

Open-circuit voltage ON all the time

Preflow light (item 1 on Figure 3-1) does come ON

If YES

See TROUBLE—“Gas flows all the time when power is ON to the welding machine”.

If NO

Replace Preflow Time Module or Main Control Board.

If light CR8 is OFF and CR7 is ON

Q4 on Logic Board is defective — replace the board.

High frequency does NOT come ON

No open-circuit voltage

See TROUBLE — “DC Voltmeter reads 0 (no open-circuit voltage)”.

High Frequency Switch in OFF position

Place HF Switch in AUTO position.

NOTE: If switch is in AUTO position, and still no HF, check for + 24 V between TB5 and TB12. If + 24 V available, trouble is in welding machine. If NOT available, Logic Board or Main Control Board defective.

High frequency does NOT shut off after arc current starts flowing

Lights CR9 and CR10 on Logic Board remain ON after arc current flows

Check light CR11 on Logic Board. If it is ON, replace Main Control Board.

*If it is not ON, Logic Board is defective.
Replace.*

Lights CR9 and CR10 on Logic Board *not* ON after arc current starts flowing

Problem in welding machine. Check solid state relay.

High frequency available but arc does not follow

Initial current set too low for the size of the tungsten

Increase initial current or use smaller tungsten.

Initial current control not connected to main control board

Check connections.

Main control board not in calibration

See calibration instructions. Recalibrate or replace main control board.

SCR firing board in power source defective

Check SCR firing board. See power source instructions.

Initial current light on programmer front panel remains ON all the time

Upslope Mode switch not in AUTO position

Place Upslope Mode switch in AUTO position (to allow the upslope delay timer to initiate upslope).

If lights CR13 and CR14 on Logic Board come ON when UPSLOPE START pushbutton is depressed, the Logic Board is defective

Replace Logic Board.

If lights CR13 and CR14 on Logic Board *stay* ON when UPSLOPE START button is released, and arc current remains at initial current level, the Main Control Board is defective.

Replace Main Control Board.

If lights CR13, CR14 and CR15 on Logic Board come ON when the UPSLOPE START DELAY timer is supposed to "time out", the Main Control Board is defective

Replace Main Control Board.

If lights CR13, CR14 and CR15 do not come ON when UPSLOPE START DELAY timer "times out", the Upslope Delay timer or Main Control Board is defective

Replace Upslope timer or Main Control board.

Upslope Timer does NOT "time out"

If the Upslope Light on front panel is ON

Upslope timer or Main Control Board defective.

If the Upslope Light on front panel is *NOT* ON

See TROUBLE — "Initial current light on programmer front panel remains ON all the time".

Weld taper delay timer will not initiate weld taper

Weld Taper Mode switch (item 11 on Figure 3-1) not in AUTO position

Place Weld Taper Mode switch in AUTO position.

If the Weld Current Light (item 7 on Figure 3-1) is *NOT* ON

See TROUBLE — "Initial current light on programmer front panel remains ON all the time" and TROUBLE — "Upslope Timer does NOT time out".

If the Weld Current Light is ON, then lights CR18, CR19, and CR20 on the Logic Board should come ON when the Weld Taper times out. If none of the lights come ON, the Weld Taper Delay Timer or the Main Control Board is defective

Replace the Weld Taper Delay Timer or the Main Control Board.

If CR20 comes ON, and CR18 and CR19 remain OFF, the Logic Board is defective

Replace Logic Board.

Weld Taper Timer does not time out

If the Weld Taper Light (item 10 on Figure 3-1) on front panel is ON, the Weld Taper Timer or Main Control Board is defective

Replace Weld Taper Timer Module or Main Control Board.

If the Weld Taper Light is *NOT* ON

See TROUBLE — "Weld taper delay timer will not initiate weld taper".

Weld Timer will not initiate downslope

Weld Mode switch *NOT* in AUTO position

Place switch in AUTO position to allow timer to initiate downslope.

If lights CR21, CR22, and CR23 on the Logic Board do *NOT* come ON when weld timer "times out", the Weld Timer or Main Control Board is defective

Replace Weld Timer Module or Main Control Board.

If light CR23 comes ON but CR21 and CR22 remains OFF, Logic Board is defective

Replace Logic Board.

If lights CR21, CR22, and CR23 come ON, the Main Control Board is defective

Replace Main Control Board.

Arc goes out before downslope time is complete

Postheat time set for shorter duration than Downslope time

Adjust Postheat time for longer time duration than Downslope time.

Final Current Module (item 15 on Figure 3-1) not set high enough (must be set high enough to maintain a stable arc with tungsten being used).

Increase the Final Current setting or use a smaller tungsten.

Pulsation Stop Delay time set for too long a time duration. It must shut off before the low pulse current decreases below a stable level for the size tungsten being used

Decrease pulsation stop delay time or use a smaller tungsten.

Postheat timer, Downslope timer or Main Control Board defective

Replace defective component.

Downslope time is less than set value

Downslope initiated before upslope or final taper is complete. If weld taper is used, downslope should not be initiated until the final taper has been reached. If weld taper is not used, downslope should not be initiated until the weld current level has been reached.

Adjust Downslope timer module.

Downslope timer defective

Replace Downslope timer module.

Postheat timer does not "time out"

Postheat timer or Main Control Board defective

Replace Postheat timer module or Main Control Board.

PARTS LIST

Equipment Identification

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

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

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

How To Select Recommended Spares

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

ASSEMBLY NO.

APPLICATION CODE

369520A-1	A
369520A-2	B
369520A-3	C
369520A-4	D
369520A-5	E
369520A-6	F
473180-1	G
369520A-7	H

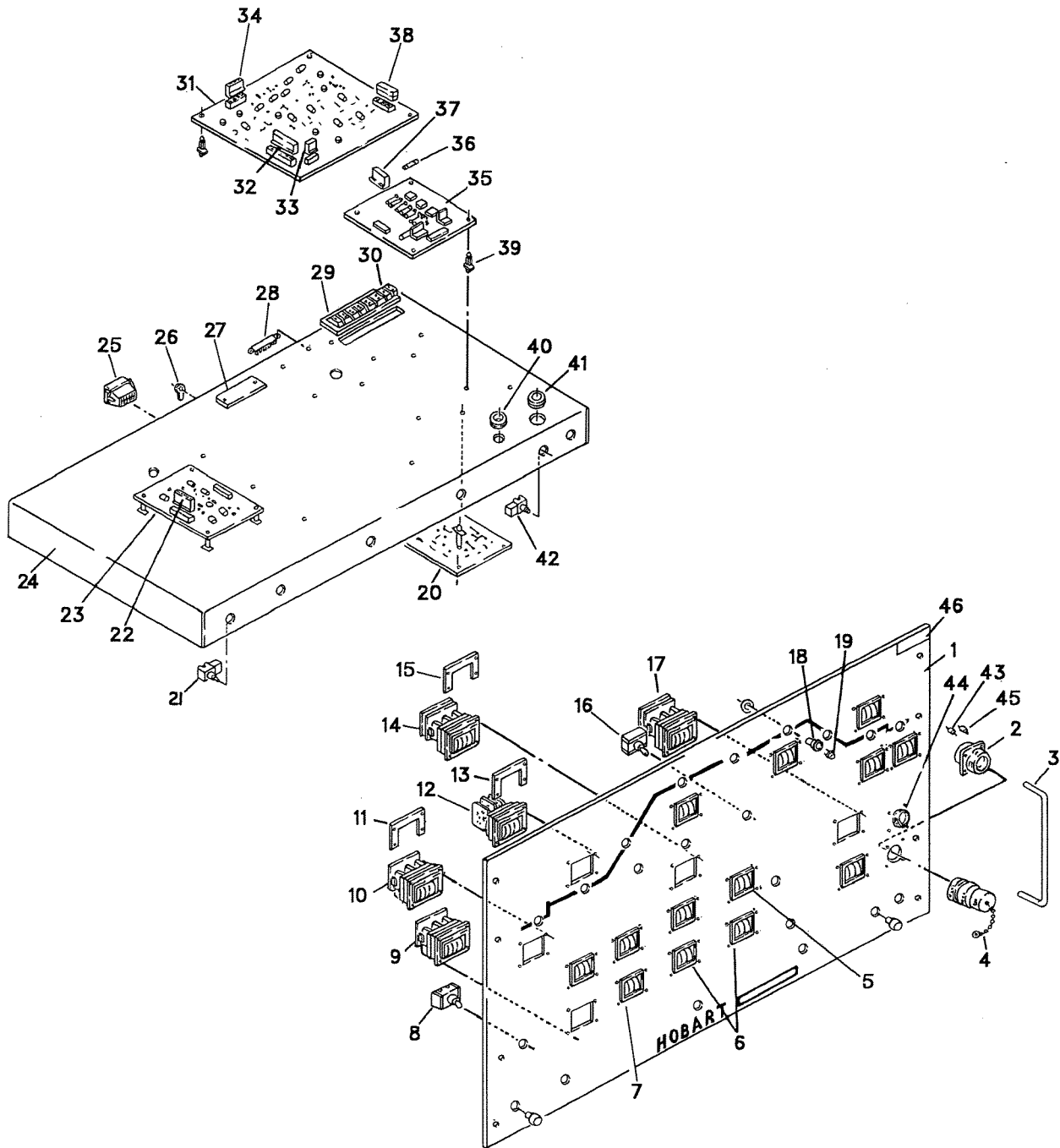


Figure 8-1 Programmer Drawer Group

Parts List for Figure 8-1

Quantity		Item No.	Part Number	Description	Qty per Assy	Application Code
Recomm. Spares Class 1	Class 2					
			369520A-1	Drawer - Programmer, Panel Assembly	1	A
			369520A-2	Drawer - Programmer, Panel Assembly	1	B
			369520A-3	Drawer - Programmer, Panel Assembly	1	C
			369520A-4	Drawer - Programmer, Panel Assembly	1	D
			369520A-5	Drawer - Programmer, Panel Assembly	1	E
			369520A-6	Drawer - Programmer, Panel Assembly	1	F
			473180-1	Drawer - Programmer, Panel Assembly*	1	G
			369520A-7	Drawer - Programmer, Panel Assembly	1	H
		1	369525-1	. Panel - Drawer Front	1	ADFH
			369525-2	. Panel - Drawer Front	1	B
			369525-3	. Panel - Drawer Front	1	C
			369850-1	. Panel - Drawer Front	1	E
			473254-1	. Panel - Drawer Front	1	G
		2	400254	. Receptacle - Amp 19 Pin	1	All
		3	483102	. Handle - Tray	2	All
		4	368983	. Plug - W/Chain Assembly	1	All
1		5	368032	. Module - Freq. Divider Assembly	1	All
1		6	368033	. Module - P.C. Pulsation Timer Assembly	1	All
1		7	368129-1	. Module - Divider, Voltage, 10 K, Assembly	1	All
		8	402856	. Switch - Toggle	1	All
1		9	368056-1	. Module - P.C. Timer, Digital, 3 Digit Assembly	5	All
		10	368058	. Module - P.C. Timer, Digital, 2 Digit Assembly	2	All
		11	368449-1	. Bracket - Mounting Thumb Wheel Switch	2	All
		12	368129-2	. Module - Divider, Voltage, 10 K Assembly	4	AD
			368129-3	. Module - Divider, Voltage, 10 K Assembly	5	BG
			368129-4	. Module - Divider, Voltage, 10 K Assembly	4	C
			368129-5	. Module - Divider, Voltage, 10 K Assembly	4	EFH
		13	368449-2	. Bracket - Mounting Thumb Wheel Switch	13	All
1		14	368051	. Module - Timer, Digital, 4 Digit, Assembly	1	All
		15	368449-3	. Bracket - Mounting Thumb Wheel Switch	4	All
		16	402758	. Switch - Toggle, SPST, Solder Lugs	3	All
1		17	368147	. Module - Freq. Divider Assembly	2	All
		18	405452	. Bushing - Mounting Lead	11	All
1		19	404424	. Diode - Light Emitting	11	All
		20	368065	. Board - P.C. RF Suppressor Assembly	1	All
		—	405322-2	. . Choke - RF 100 uH 2 Amp	1	H
		—	Not Illustrated			

* See data at end of list and Addendum O-243.

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Parts List for Figure 8-1

Quantity		Item No.	Part Number	Description	Qty per Assy	Application Code
Recomm. Spares Class 1	Class 2					
		21	402759-1	. Switch - Pushbutton, SPST, Solder Lugs	5	All
		22	405398-4	. Receptacle - 17 Position	1	All
1		23	368139	. Board - P.C. Logic Assembly	1	All
		24	368434	. Frame - Inner Drawer	1	All
		25	405205-3	. Receptacle - Mate-N-Lock	1	All
		26	400706	. Terminal - Connector	1	All
		27	356795-70	. Tag - Identification	1	A
			356795-71	. Tag - Identification	1	B
			356795-72	. Tag - Identification	1	C
			356795-73	. Tag - Identification	1	DFH
			356795-74	. Tag - Identification	1	E
		28	8TRY-63-2	. Strip - Terminal Solder	1	All
		29	368157	. Marker - Terminal, 12 Station	1	All
		30	402776-12	. Block - Terminal	1	All
1		31	368160-1	. Board - P.C. Main Control, Assembly	1	ADFH
			368160-2	. Board - P.C. Main Control, Assembly	1	BE
			368160-3	. Board - P.C. Main Control, Assembly	1	CG
		32	405398-5	. Receptacle - 18 Position	2	All
		33	405300-1	. Receptacle - 3 Position	1	All
		34	405398-2	. Receptacle - 6 Position	1	All
1		35	368122	. Board - P.C. Power Supply Assembly	1	All
6		36	W-11166-9	. Fuse - Fast Blow, 1 Amp	6	All
		37	405398-3	. Receptacle - 8 Position	2	All
		38	405300-4	. Receptacle - 14 Position	1	All
		39	404460-2	. Support - P.C. Board, Locking	17	All
		40	402037-6	. Grommet - Rubber	3	All
		41	402037-12	. Grommet - Rubber	1	All
		42	402759-2	. Switch - Pushbutton, SPST, Solder Lugs	1	All
3		43	405322-1	. Choke - R.F. Axial Leads	1	ABCE
			405322-1	. Choke - R.F. Axial Leads	2	DFH
		44	402844	. Receptacle - Amphenol, 10 Pin Male	1	E
		45	1CZ-93B	. Diode - Rectifier	1	D
		46	406429-9	. Label - Programmer	1	A
		—	406429-10	. Label - Programmer	1	B
		—	406429-11	. Label - Programmer	1	C
		—	472691	. Board - P.C. Pulsation, Dabber	1	E
		—	Not Illustrated			

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Parts List for Figure 8-1

Quantity		Item No.	Part Number	Description	Qty per Assy	Application Code
Recomm. Spares	Class 1 Class 2					
—		400030-1	. Capacitor - (Mounts on Item 30)	1	H	
—		405651	. Receptacle - Amphenol, 4 Pin	1	E	
—		407251-4	Relay DPDT, 24 V DC, 10 K	1	G	
—		473257	Bracket, Mounting, Receptacle	1	G	
—		405205-1	Receptacle, Mate-N-Lock	1	G	
—		405300-1	Receptacle, Crimp Locking	1	G	
—		473259	Label, Keyhole, Current	1	G	
—		356795-1	Tag, Identification	1	G	

— Not Illustrated

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ASSEMBLY NO.

APPLICATION CODE

369520B-1	A
369520B-2	B
369520B-3	C
369520B-4	D
369520B-5	E
369520B-6	F

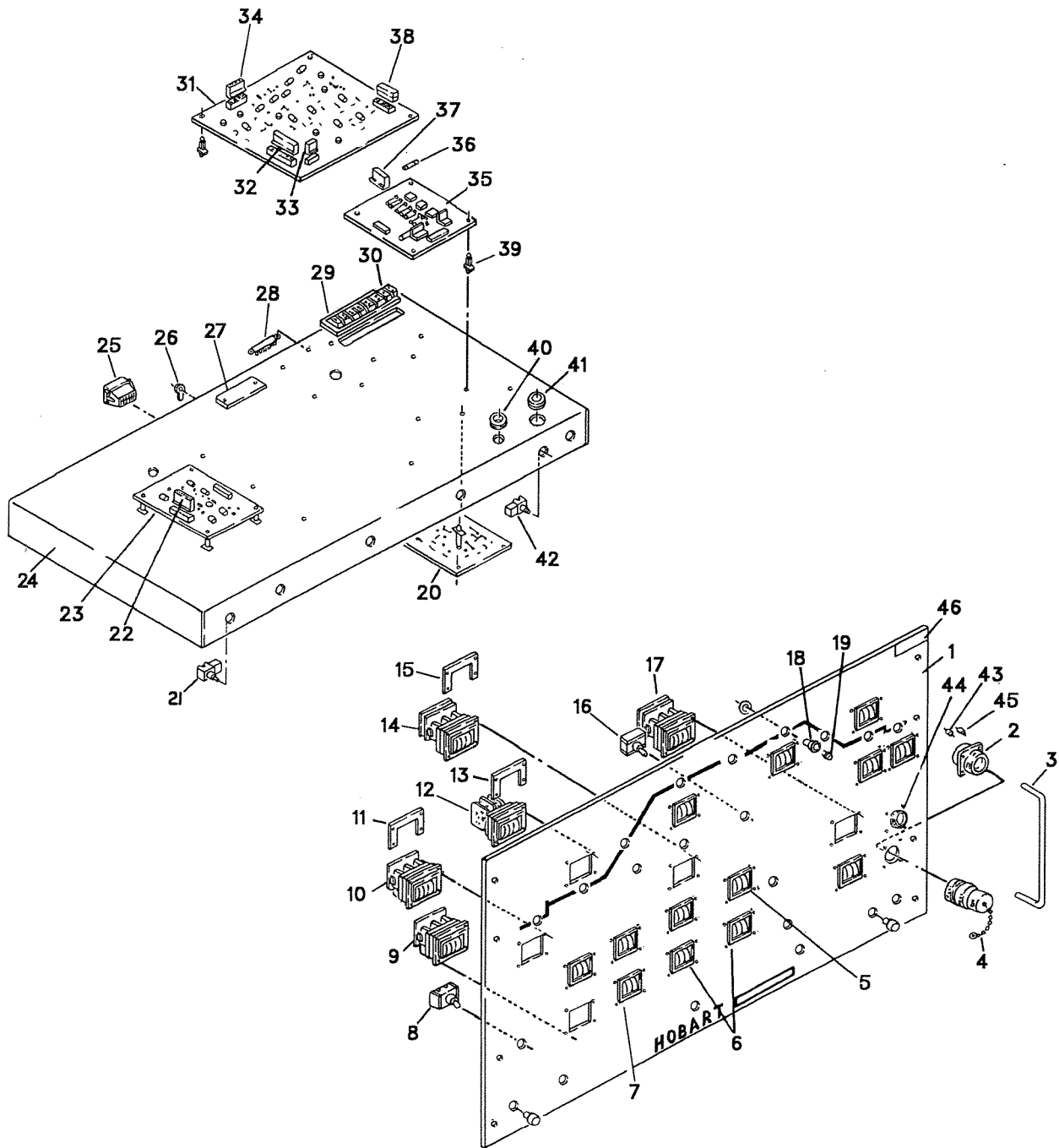


Figure 8-1 Programmer Drawer Group

Parts List for Figure 8-1

Quantity	Recomm.	Item	Part	Description	Qty	Application
Spares	Class 1	Class 2	No.	Number	per	Code
					Assy	
			369520B-1	Drawer - Programmer, Panel Assembly	1	A
			369520B-2	Drawer - Programmer, Panel Assembly	1	B
			369520B-3	Drawer - Programmer, Panel Assembly	1	C
			369520B-4	Drawer - Programmer, Panel Assembly	1	D
			369520B-5	Drawer - Programmer, Panel Assembly	1	E
			369520B-6	Drawer - Programmer, Panel Assembly	1	F
		1	369525-1	. Panel - Drawer Front	1	ADF
			369525-2	. Panel - Drawer Front	1	B
			369525-3	. Panel - Drawer Front	1	C
			369850-1	. Panel - Drawer Front	1	E
		2	400254	. Receptacle - Amp 19 Pin	1	All
		3	483102	. Handle - Tray	2	All
		4	368983	. Plug - W/Chain Assembly	1	All
1		5	202095-1	. Module - Freq. Divider Assembly	1	All
1		6	202120-1	. Module - P.C. Pulsation Timer Assembly	1	All
1		7	202121-1	. Module - Divider, Voltage, 10 K, Assembly	1	All
		8	402856	. Switch - Toggle	1	All
1		9	202106-1	. Module - P.C. Timer, Digital, 3 Digit Assembly	5	All
		10	202104-1	. Module - P.C. Timer, Digital, 2 Digit Assembly	2	All
		11	368449-1	. Bracket - Mounting Thumb Wheel Switch	2	All
		12	202121-2	. Module - Divider, Voltage, 10 K Assembly	4	ADF
			202121-3	. Module - Divider, Voltage, 10 K Assembly	4	B
			202121-4	. Module - Divider, Voltage, 10 K Assembly	4	C
			202121-5	. Module - Divider, Voltage, 10 K Assembly	4	E
		13	368449-2	. Bracket - Mounting Thumb Wheel Switch	12	All
1		14	202105-1	. Module - Timer, Digital, 4 Digit, Assembly	1	All
		15	368449-3	. Bracket - Mounting Thumb Wheel Switch	4	All
		16	402758	. Switch - Toggle, SPST, Solder Lugs	3	All
		17	202123-1	. Module - Freq. Divider Assembly	2	All
		18	405452	. Bushing - Mounting Lead	11	All
1		19	404424	. Diode - Light Emitting	11	All
		20	368065	. Board - P.C. RF Suppressor Assembly	1	All
		21	402759-1	. Switch - Pushbutton, SPST, Solder Lugs	5	All
		22	405398-4	. Receptacle - 17 Position	1	All
1		23	368139	. Board - P.C. Logic Assembly	1	All
		24	368434	. Frame - Inner Drawer	1	All
		25	405205-3	. Receptacle - Mate-N-Lock	1	All
		26	400706	. Terminal - Connector	1	All

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Parts List for Figure 8-1

Quantity		Item No.	Part Number	Description	Qty per Assy	Application Code
Recomm. Spares Class 1	Class 2					
		27	356795-111	. Tag - Identification	1	A
			356795-112	. Tag - Identification	1	B
			356795-113	. Tag - Identification	1	C
			356795-114	. Tag - Identification	1	D
			356795-115	. Tag - Identification	1	E
			356795-116	. Tag - Identification	1	F
		28	8TRY-63-2	. Strip - Terminal Solder	1	All
		29	368157	. Marker - Terminal, 12 Station	1	All
		30	402776-12	. Block - Terminal	1	All
	1	31	202124-1	. Board - P.C. Main Control, Assembly	1	ADF
			202124-2	. Board - P.C. Main Control, Assembly	1	BE
			202124-3	. Board - P.C. Main Control, Assembly	1	C
		32	405398-5	. Receptacle - 18 Position	2	All
		33	408092-1	. Receptacle - 3 Position	1	All
		34	405398-2	. Receptacle - 6 Position	1	All
	1	35	368122	. Board - P.C. Power Supply Assembly	1	All
6		36	W-11166-9	. Fuse - Fast Blow, 1 Amp	6	All
		37	405398-3	. Receptacle - 8 Position	2	All
		38	408092-4	. Receptacle - 14 Position	1	All
		39	404460-2	. Support - P.C. Board, Locking	17	All
		40	402037-6	. Grommet - Rubber	3	All
		41	402037-12	. Grommet - Rubber	1	All
		42	402759-2	. Switch - Pushbutton, SPST, Solder Lugs	1	All
	3	43	405322-1	. Choke - R.F. Axial Leads	1	ABCE
			405322-1	. Choke - R.F. Axial Leads	2	DF
		44	402844	. Receptacle - Amphenol, 10 Pin Male	1	E
		45	1CZ-93B	. Diode - Rectifier	1	D
		46	407187-19	. Label - Programmer	1	A
		—	407187-20	. Label - Programmer	1	B
		—	407187-21	. Label - Programmer	1	C
		—	474161	. Board - P.C. Pulsation, Dabber	1	E
		—	405651	. Receptacle - Amphenol, 4 Pin	1	E
		—	202013	. Network - Suppression	1	All
		—	Not Illustrated			

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SOLID STATE ELECTRONIC CONTROL MODULE EXCHANGE SERVICE POLICY

Because of the definite superiority of certain solid-state control components over conventional electromechanical 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.**



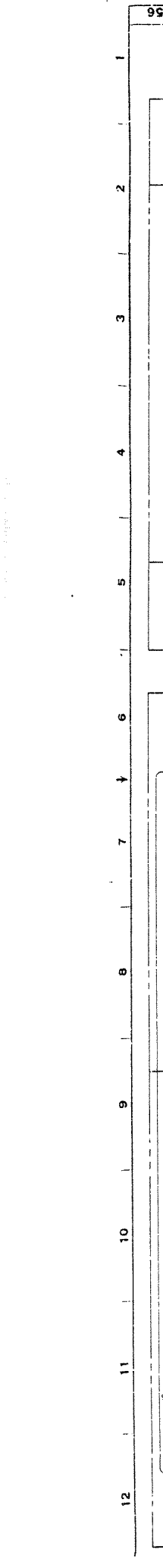
CAUTION: Printed circuits and other devices may be affected by static electricity. Handling precautions required.

A-218

DIAGRAMS

- Note the Model and Assembly numbers shown on the equipment nameplate.
- Locate these numbers in the table below.
- Use only those diagrams and instructions that are applicable.

MODEL NO.	ASSEMBLY NO.	CONNECTION DIAGRAM	SCHEMATIC DIAGRAM	OTHER
800	369520A-1	369000	368402	—
	369520A-2	369000	368402	—
	369520A-3	369000	368402	—
	369520A-4	369917	369918	—
	369520A-5	200023	200024	472694
	369520A-6	201356	201357	—
	473180-1	473230	473231	—
	473153-1	473153	368402	—
	472764	472751	472752	—
	369520A-7	201356	201357	—
	369520B-1	369000	368402	—
	369520B-2	369000	368402	—
	369520B-3	369000	368402	—
	369520B-4	369917	369918	—
	369520B-5	200023	200024	472694
	369520B-6	201356	201357	—



FACING INSIDE OF FRONT PANEL

FACING TOP OF BOTTOM PANEL

FACING SACERMEATH OF BOTTOM PANEL

LOGIC BOARD
368139

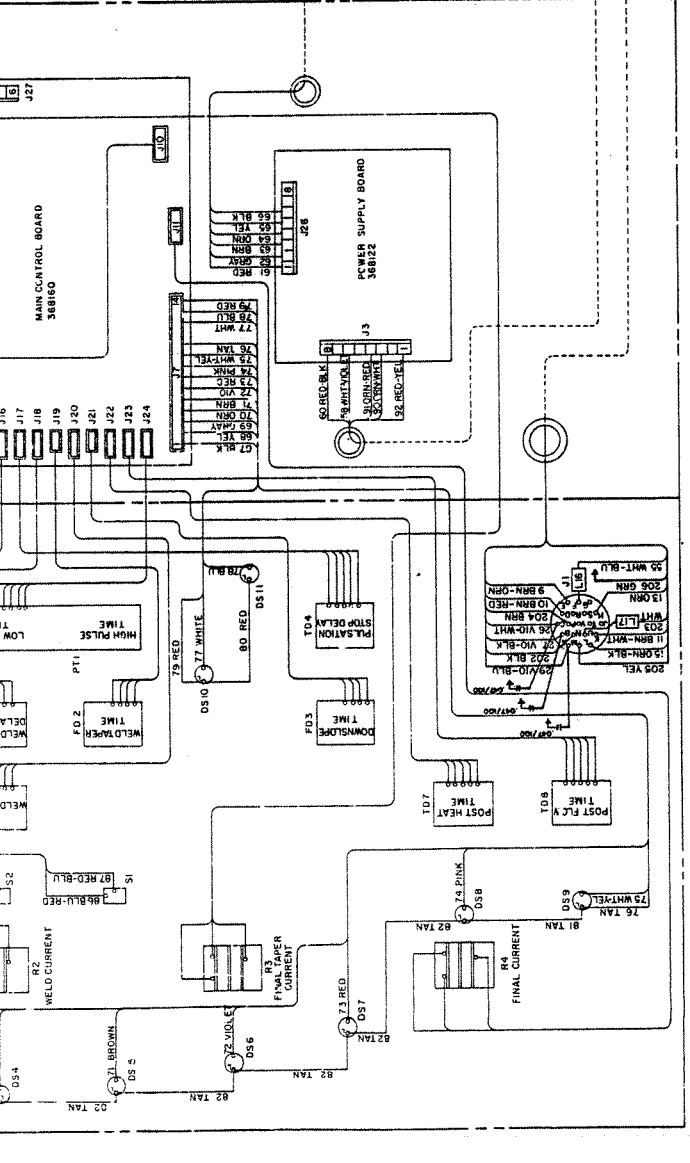
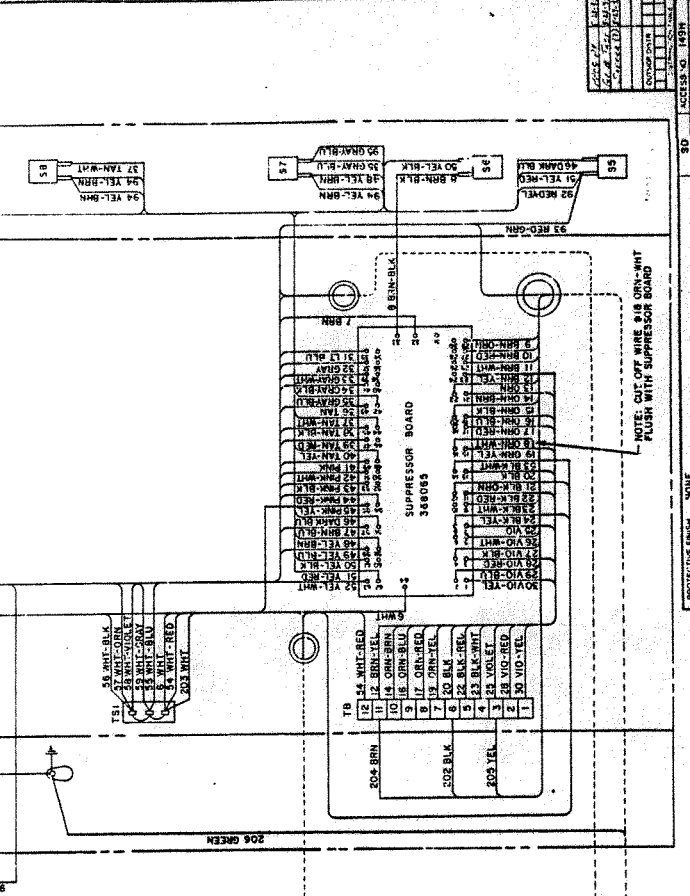
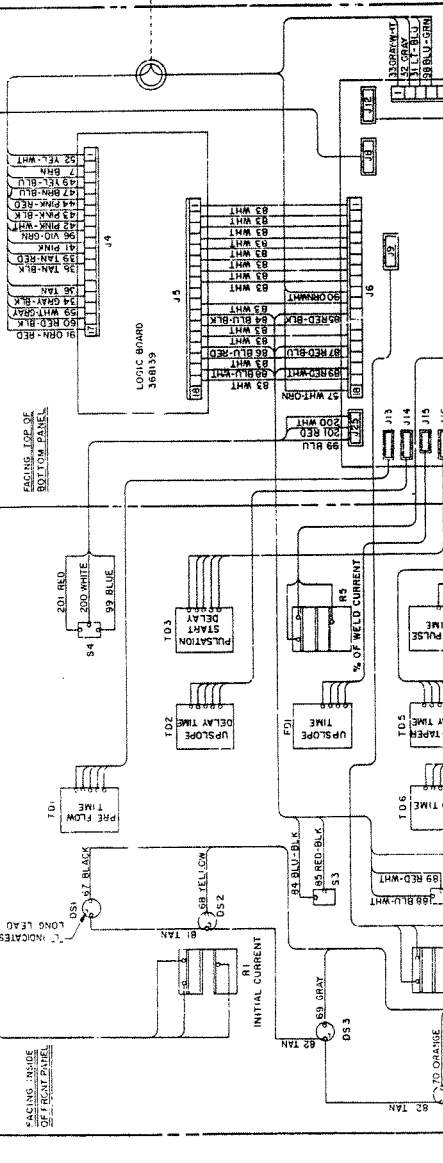
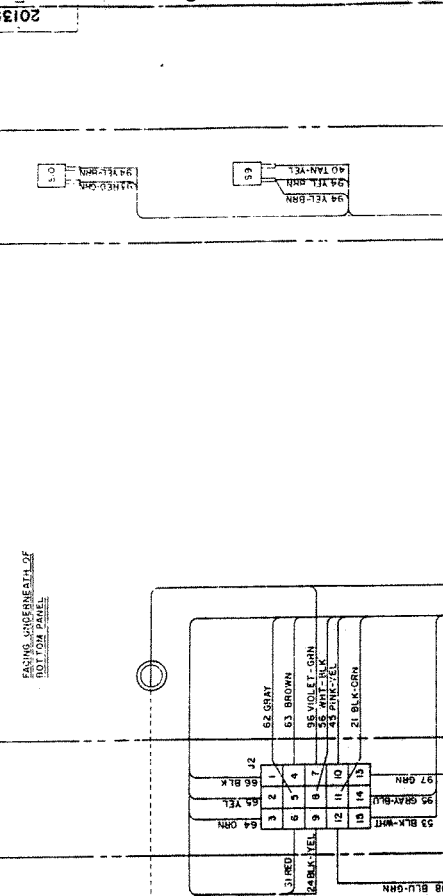
MAIN CONTROL BOARD
368160

POWER SUPPLY BOARD
368122

SUPPRESSOR BOARD
368185

INDEX	DATE	NO.	REVISION	BY	USED
1	8.1.63	1	1	CHANCE	
2	8.1.63	2	1	CHANCE	
3	8.1.63	3	1	CHANCE	
4	8.1.63	4	1	CHANCE	
5	8.1.63	5	1	CHANCE	
6	8.1.63	6	1	CHANCE	
7	8.1.63	7	1	CHANCE	
8	8.1.63	8	1	CHANCE	
9	8.1.63	9	1	CHANCE	
10	8.1.63	10	1	CHANCE	
11	8.1.63	11	1	CHANCE	
12	8.1.63	12	1	CHANCE	

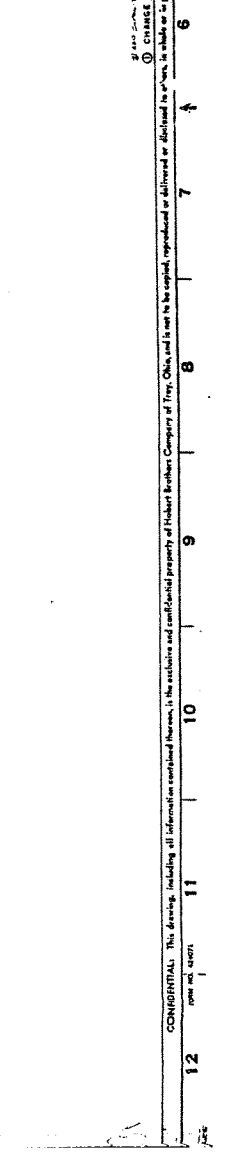
201356



CHANGE RECORD

UNLESS OTHERWISE SPECIFIED
PARTS LISTED HEREIN ARE TO BE USED IN THE
MANUFACTURE OF THIS EQUIPMENT UNLESS
OTHERWISE SPECIFIED BY A NOTE
ON THIS DRAWING

INDEX	DATE	NO.	REVISION	BY	USED
1	8.1.63	1	1	CHANCE	
2	8.1.63	2	1	CHANCE	
3	8.1.63	3	1	CHANCE	
4	8.1.63	4	1	CHANCE	
5	8.1.63	5	1	CHANCE	
6	8.1.63	6	1	CHANCE	
7	8.1.63	7	1	CHANCE	
8	8.1.63	8	1	CHANCE	
9	8.1.63	9	1	CHANCE	
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11	8.1.63	11	1	CHANCE	
12	8.1.63	12	1	CHANCE	



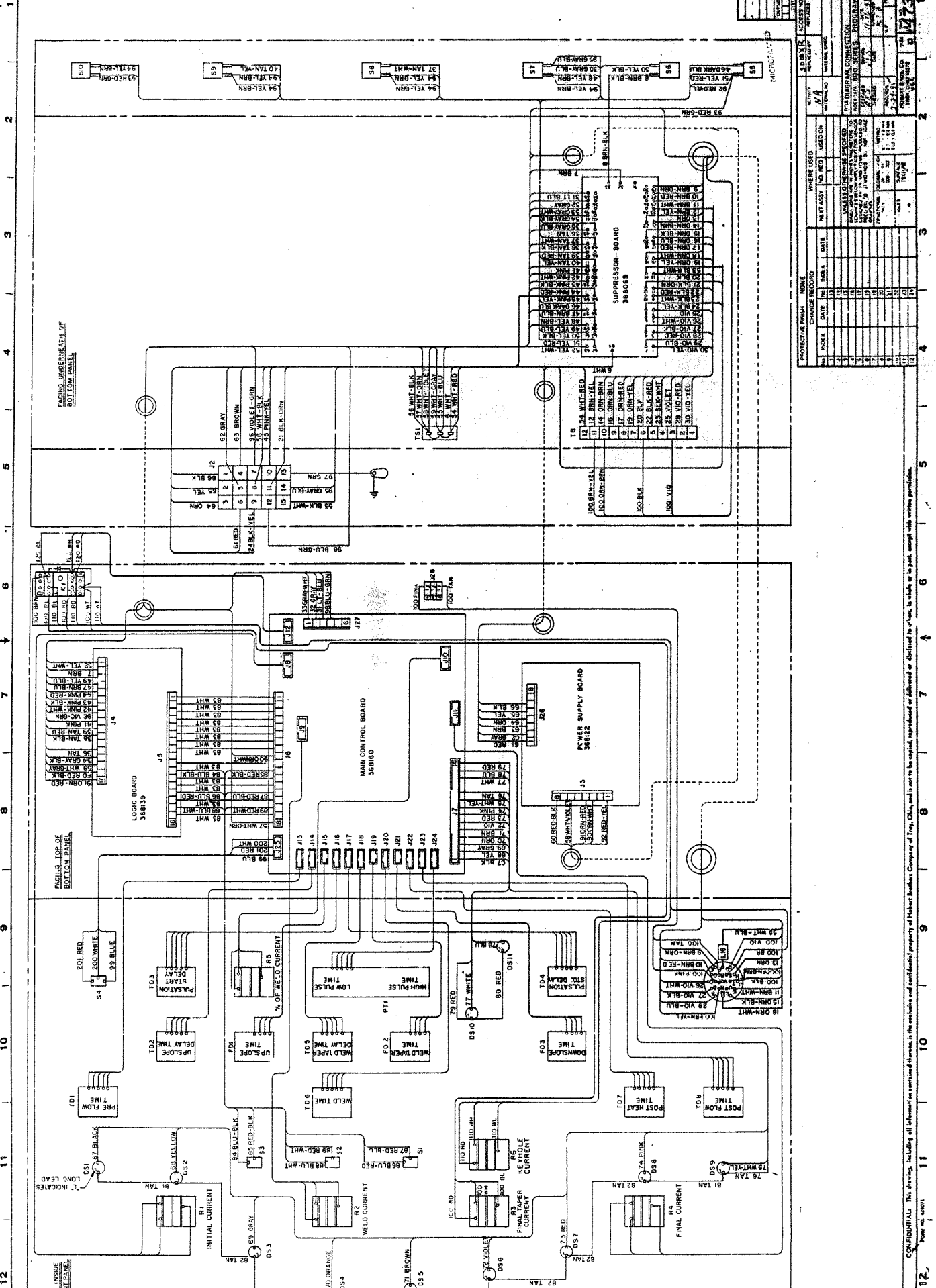
201356

1 2 3 4 5 6 7 8 9 10 11 12

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8.1.63 Change 28. Total 28



PROTECTIVE FINISH	NONE	WHERE USED	DATE	BY	REVISION
1	DATE	BY	REVISION	DATE	BY
2	DATE	BY	REVISION	DATE	BY
3	DATE	BY	REVISION	DATE	BY
4	DATE	BY	REVISION	DATE	BY
5	DATE	BY	REVISION	DATE	BY
6	DATE	BY	REVISION	DATE	BY
7	DATE	BY	REVISION	DATE	BY
8	DATE	BY	REVISION	DATE	BY
9	DATE	BY	REVISION	DATE	BY
10	DATE	BY	REVISION	DATE	BY
11	DATE	BY	REVISION	DATE	BY
12	DATE	BY	REVISION	DATE	BY

NO.	DESCRIPTION	DATE	BY
1	DATE	BY	REVISION
2	DATE	BY	REVISION
3	DATE	BY	REVISION
4	DATE	BY	REVISION
5	DATE	BY	REVISION
6	DATE	BY	REVISION
7	DATE	BY	REVISION
8	DATE	BY	REVISION
9	DATE	BY	REVISION
10	DATE	BY	REVISION
11	DATE	BY	REVISION
12	DATE	BY	REVISION

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6 5 4 3 2 1

TITLE:		DWG. NO. 473153-1	
ITEM	DESCRIPTION	DWG. NO.	R
1	PROGRAMMER, 800 SERIES	369520-1	1
2	SOCKET, RELAY	405699	1
3	RELAY, ENCLOSED, PLUG IN	160A-4004A-14	1
4	RETAINER, SPRING	160A-4253-1	1
5	HOUSING, RECEPTACLE	401564-1	1
6	TERMINAL	401566-1	2

NOTES:
1. APPLY TERMINALS PER DRAWING 360892.

MICROFILMED

PROTECTIVE FINISH				CHANGE RECORD				WHERE USED				ACTIVITY		REPLACED BY		COMM. CLS.		
No.	E.C. No.	DATE	No.	E.C. No.	DATE	NEXT ASSY.	NO. REQ.	USED ON	NO.	DATE	RECORDS	DATE	APPROVED	BASED ON	REPLACES	QUANTITY	REPLACES	
1	22147	6-20-85	13														165	
2			14															
3			15															
4			16															
5			17															
6			18															
7			19															
8			20															
9			21															
10			22															
11			23															
12			24															

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES/MILLIMETERS. TOLERANCES BELOW APPLY EXCEPT FOR VENDOR DESIGNED PARTS AND ITEMS PRODUCED TO RECOGNIZED STANDARDS. DO NOT SCALE DRAWING.

FRACTIONAL INCH: 00 ± .01
INCH: .000 ± .003
ANGLES: ± 30'

METRIC: 0 ± 1.0 mm
0.0 ± 0.4 mm
0.00 ± 0.1 mm

RECORDS: 10-27-83
DATE: 9-23-83
APPROVED: [Signature]
M.F. [Signature]
M.F. [Signature]

TITLE: DRAWER, REWORK, AY
INDEX DATA: 800 PROGRAMMER
DESIGNED: DWYB
CHECKED: DFC
RECORDS: 10-27-83
DATE: 9-23-83
SCALE: BASED ON
MATERIAL SPEC. REWORK, AY

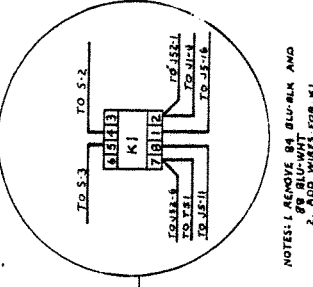
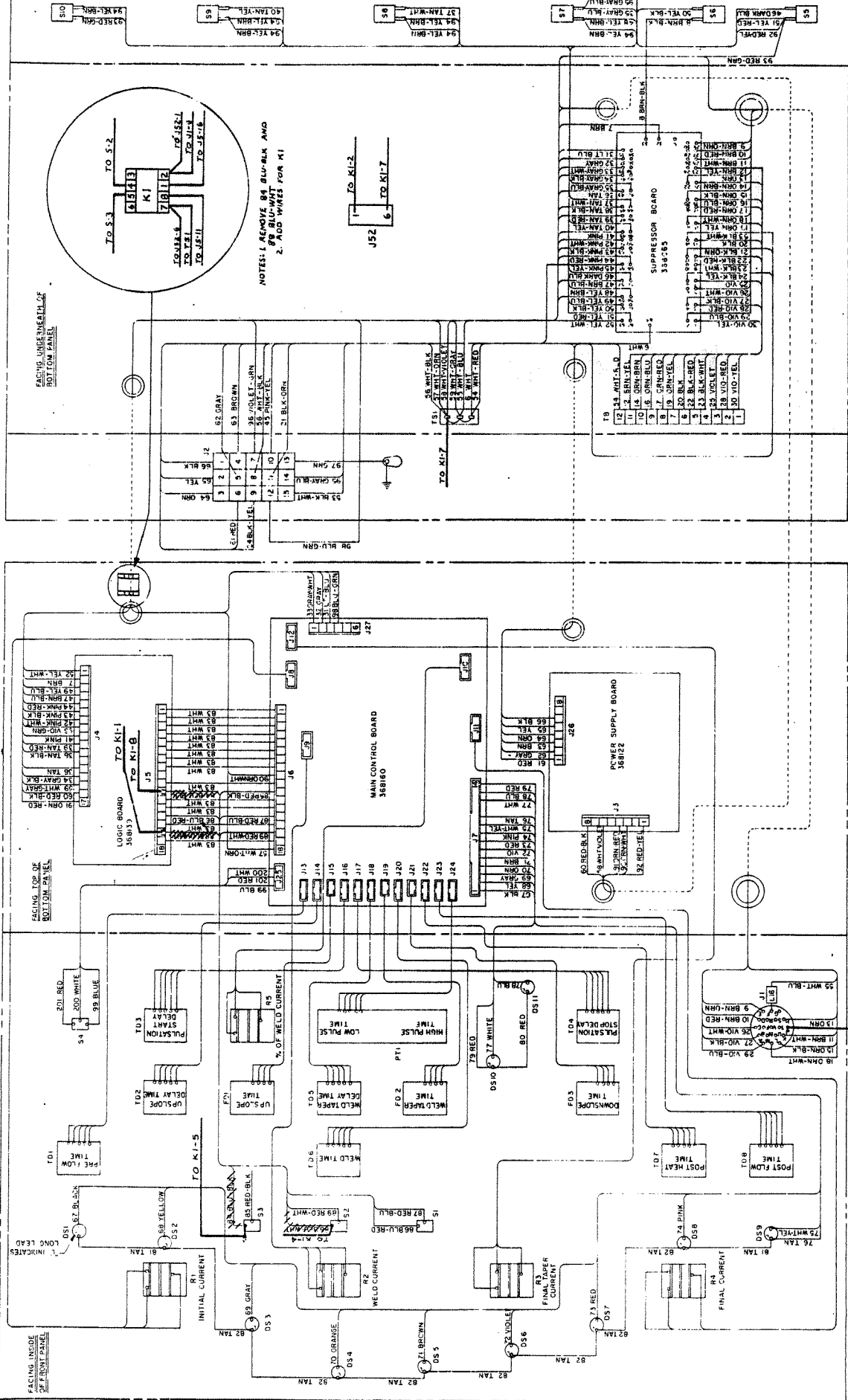
PRODUCT CODE: [Blank]
OUTSIDE DISTR. [Blank]
DISTRIBUTION TABLE: [Blank]

COMM. CLS.: 165

HOBART BROS. CO.
TROY, OHIO 45373
U.S.A.

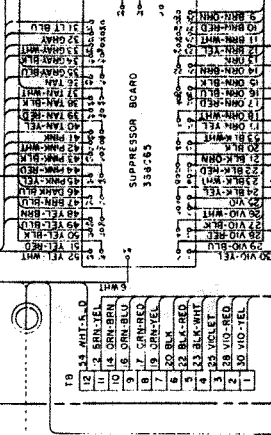
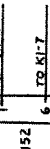
DWG. NO. 5 HT 1 OF 2
B 473153

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FACING UNDERNEATH OF BOTTOM PANEL

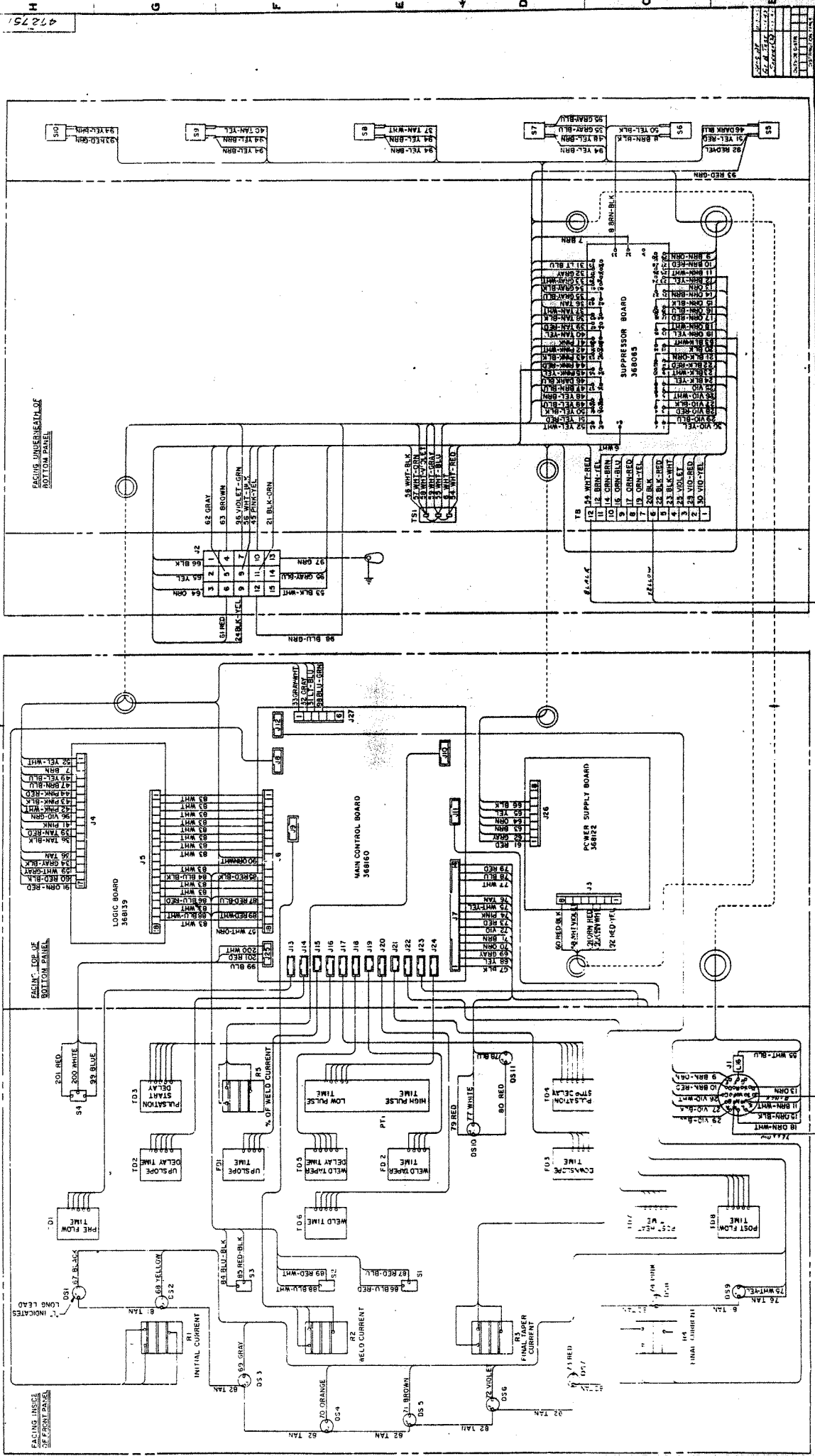
NOTES: 1. REMOVE 84 BLU-BLK AND 85 BLU-WHT 2. ADD WIRES FOR K1



NO.	DATE	NO.	DATE	WHERE USED	NO. USED	USED BY
1						
2						
3						
4						
5						
6						
7						
8						
9						
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12						
13						
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16						
17						
18						
19						

473153

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472751

PROTECTIVE EMER		NONE		WHERE USED		DATE		BY	
NO.	DATE	TIME	REASON	NO.	DATE	TIME	REASON	NO.	DATE
1				1				1	
2				2				2	
3				3				3	
4				4				4	
5				5				5	
6				6				6	
7				7				7	
8				8				8	
9				9				9	
10				10				10	
11				11				11	
12				12				12	

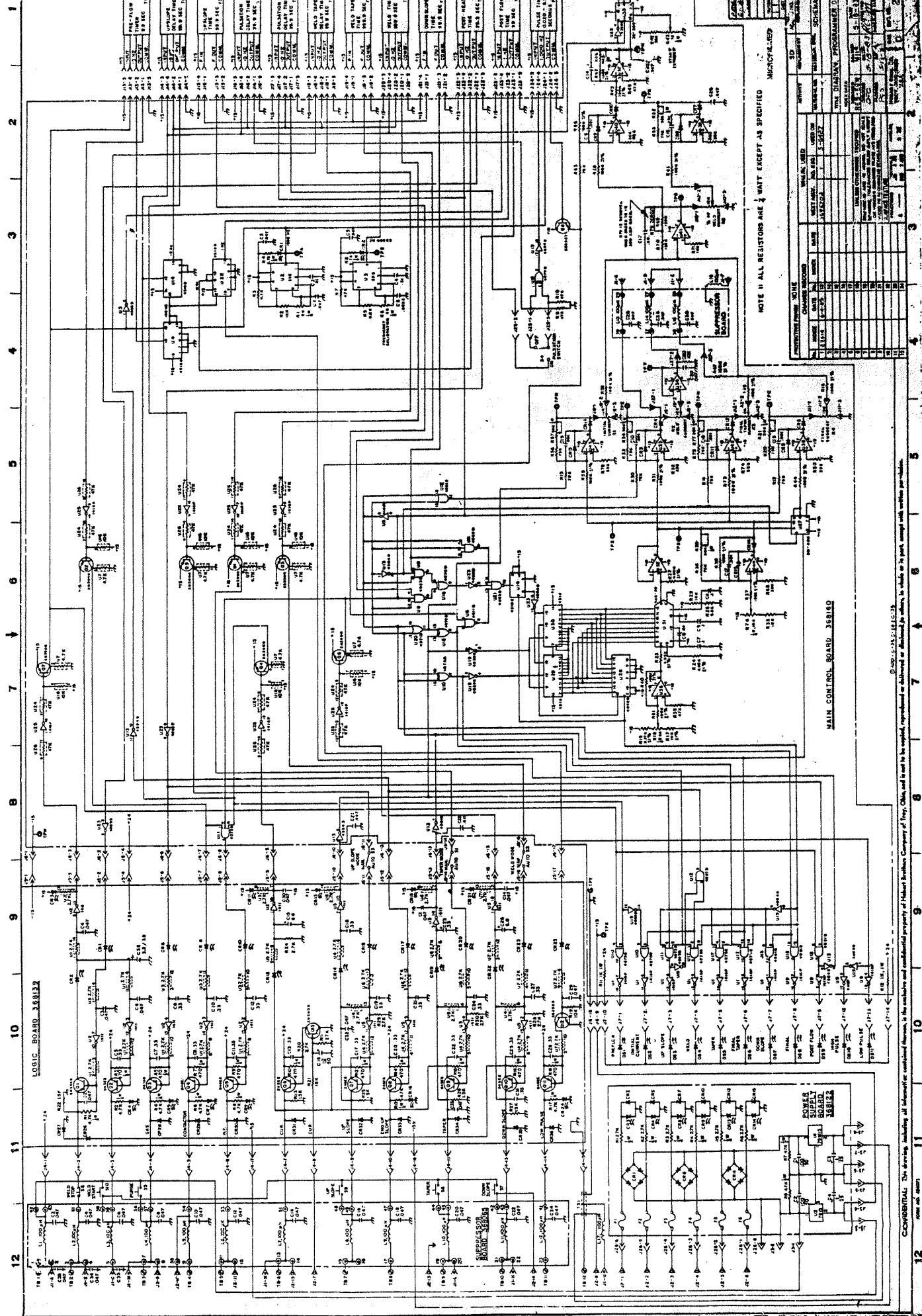
472751

CHANGE RECORD		WHERE USED		DATE		BY	
NO.	DATE	TIME	REASON	NO.	DATE	TIME	REASON
1				1			
2				2			
3				3			
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			
11				11			
12				12			

472751

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12



LOGIC BOARD 35812

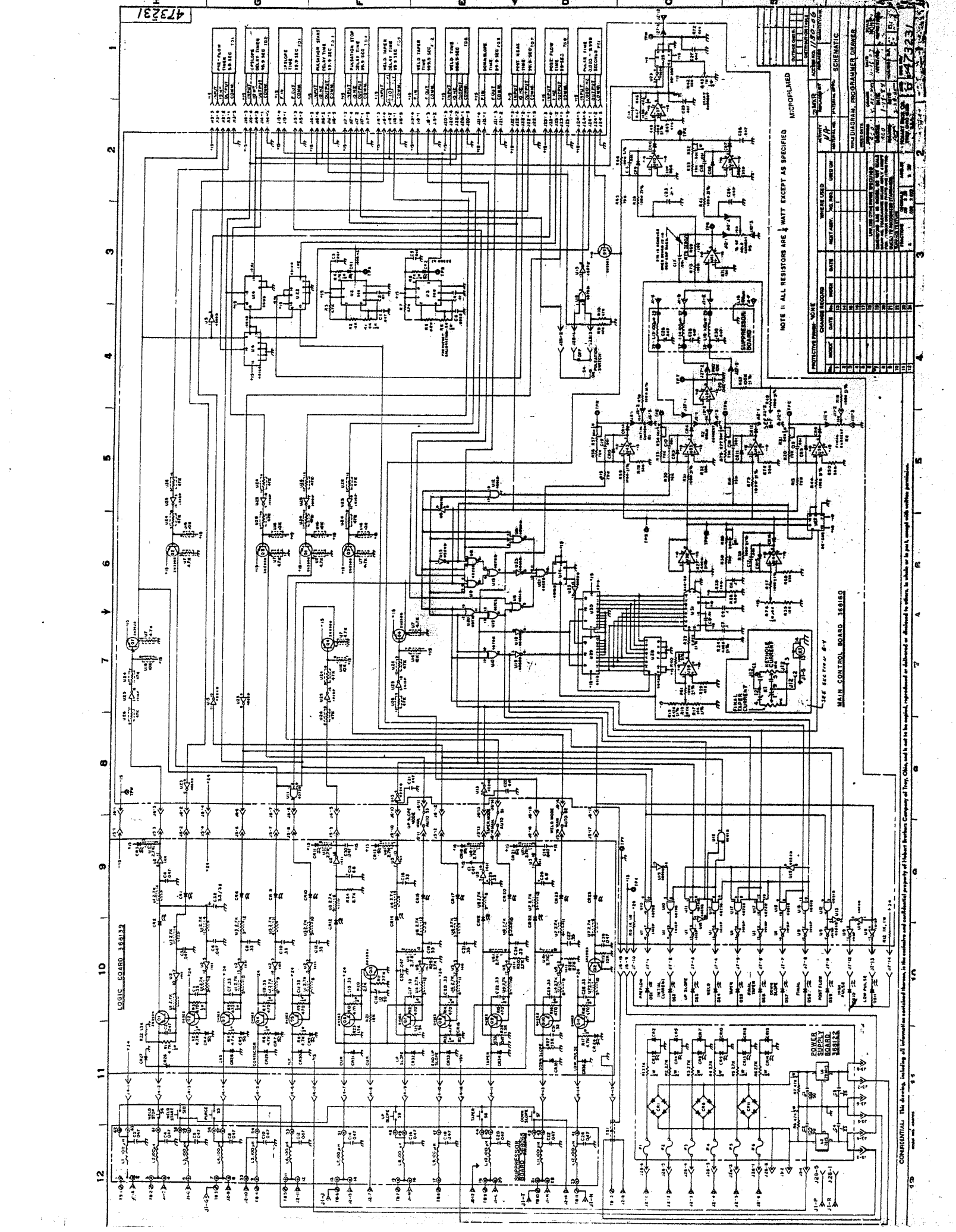
POWER SUPPLY BOARD 35812

MAIN CONTROL BOARD 35810

201387

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© 1964 Honeywell International Company



473231

1 2 3 4 5 6 7 8 9 10 11 12

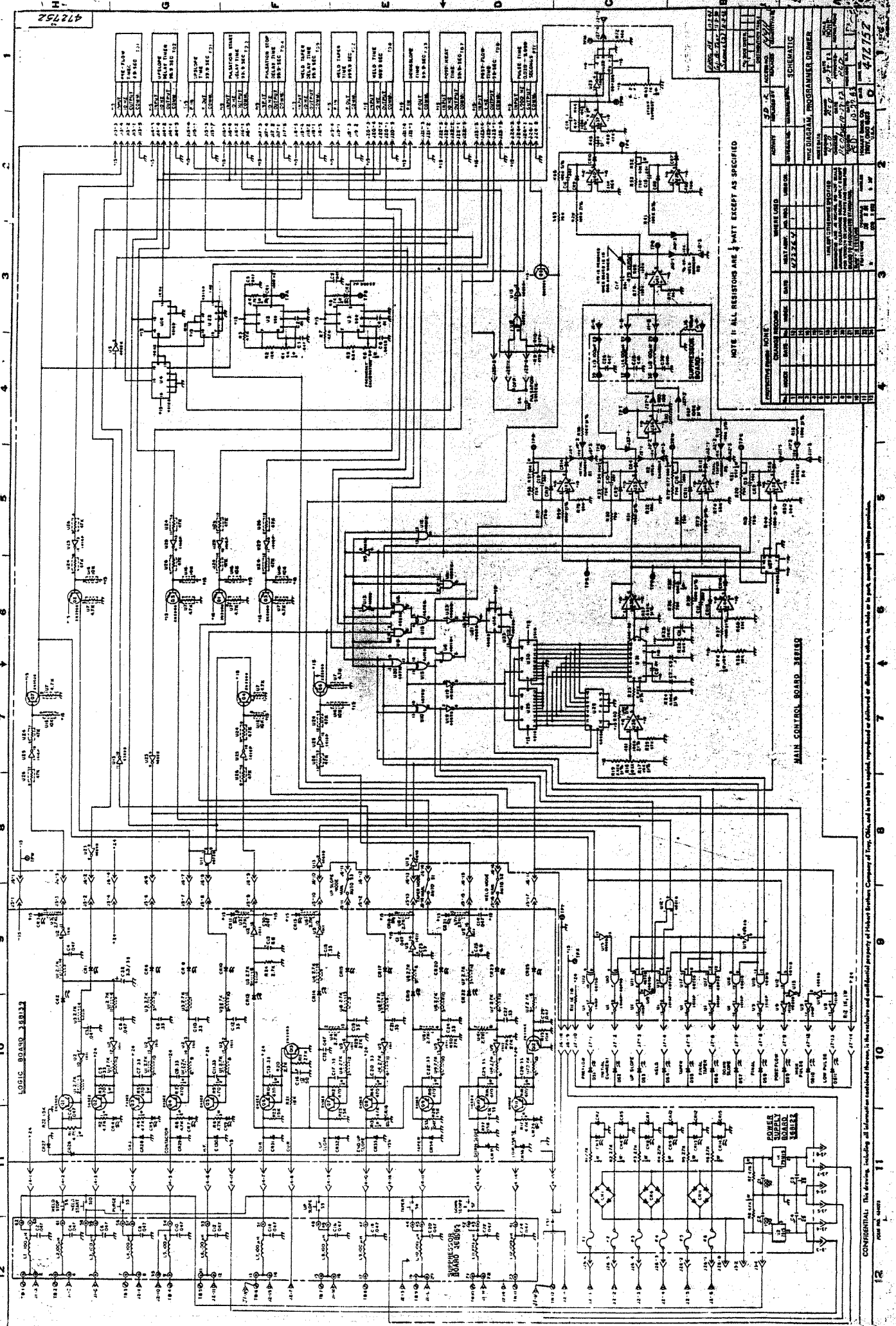
LOGIC BOARD 158R13

MAIN CONTROL BOARD 158R13

NOTE: ALL RESISTORS ARE 1/4 WATT EXCEPT AS SPECIFIED

REVISIONS		DATE		BY		CHECKED		APPROVED	
1	INITIAL								
2	...								
3	...								
4	...								
5	...								
6	...								
7	...								
8	...								
9	...								
10	...								
11	...								
12	...								

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42752

PROJECT DATA				SCHEMATIC			
PROJECT NO.	42752	REV.	1	SHEET NO.	1	TOTAL SHEETS	1
DATE	10/27/56	BY	...	DESIGNED BY	...	CHECKED BY	...
<p>NOTE: ALL RESISTORS ARE 1/4 WATT EXCEPT AS SPECIFIED.</p>							

MAIN CONTROL BOARD SERIES

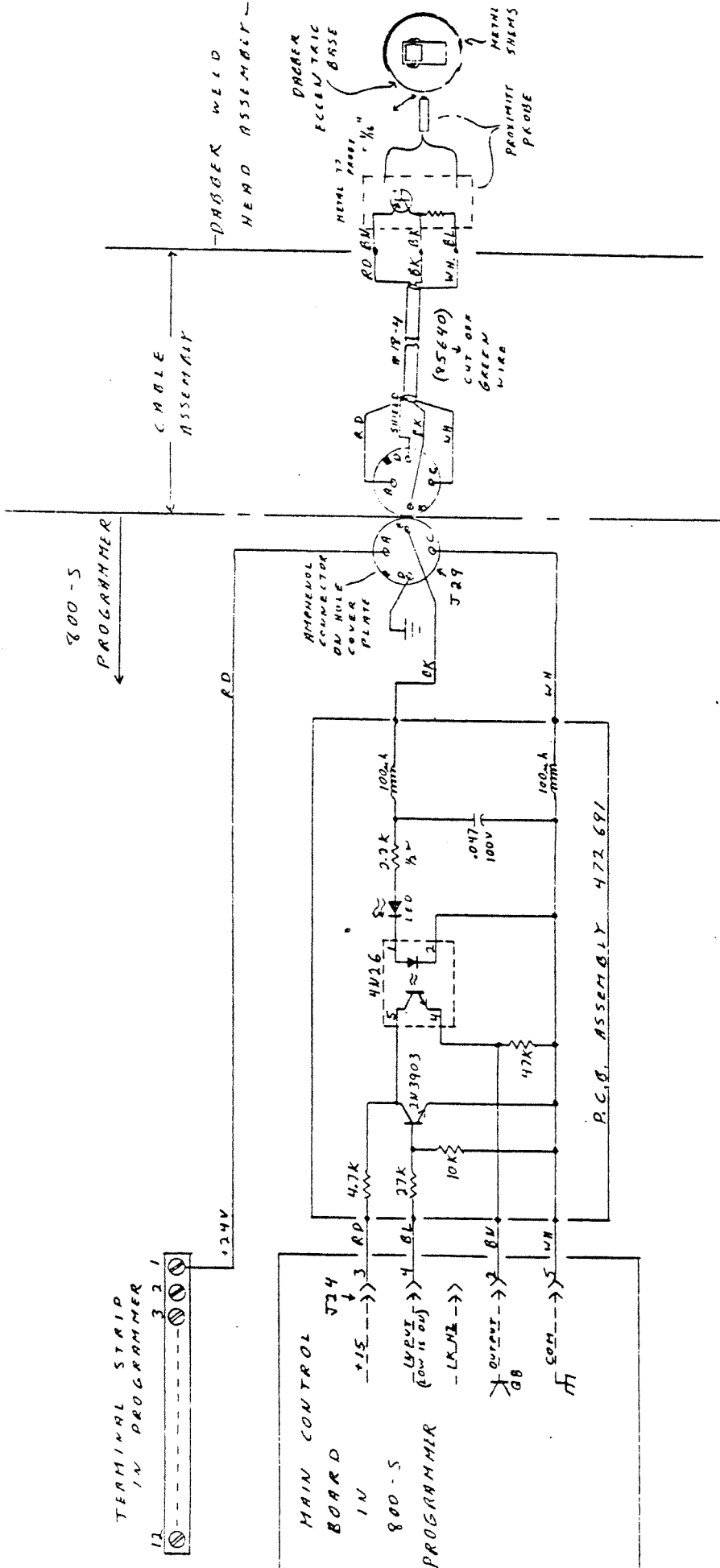
LOGIC BOARD 358132

SUPPLY BOARD

POWER BOARD

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Mason



NOTE: WHEN THE PROXIMITY PROBE SEES METAL = LOW PULSE CURRENT

HOBART BROTHERS CO TROY, OHIO 45373 U.S.A.	
TITLE Diagram, Pulsation Dabber™	
REV.	DWG. NO. 472694

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ATTENTION!!!

**PLEASE FILL OUT AND RETURN THE
WELDER REGISTRATION CARD BELOW.**

Cut Along Dotted Line

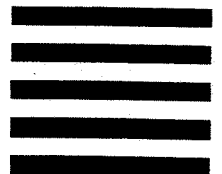


NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 12 TROY, OHIO

POSTAGE WILL BE PAID BY ADDRESSEE

**Hobart Brothers Company
600 West Main Street
Troy, Ohio 45373-9933**



HOBART BROTHERS CO. — WELDER REGISTRATION CARD

Serial No. _____

Owner's Name _____

Address _____

City _____ State _____

Date Received _____ In Satisfactory Order? _____

Obtained From: Factory Dealer or Distributor

IMPORTANT! Fill out at once in ink and return to Hobart Brothers. Immediate return of this card registers warranty date.

THE HOBART "531" CANADA WARRANTY CERTIFICATE

1. **General:** Hobart's products are warranted for one (1) year following date of shipment to the original user, with exception of items listed in paragraphs 2 through 9 below.
2. **Main Power Rectifiers:** Silicon diodes and power SCRs used in the welding output circuits of equipment are warranted for five (5) years following date of shipment to the original user. Hobart will cover parts and labor in year one and parts replacement only in years two through five.
3. **Major Power Components:** Main power transformers, control, stability and filter reactors, armatures, stators, and printed circuit boards with a price in excess of \$200.00, are warranted for three (3) years following date of shipment to the original user. Hobart will cover parts and labor in year one and parts replacement only in years two and three.
4. **Expendable Items:** Primary and secondary switch contacts, cable connectors, carbon brushes, fuses, bulbs, filters, nozzles, contact tips, liners, cutting tips and wire feed rolls are worn or consumed in the normal process of welding or cutting and are therefore warranted only if found to be defective prior to use.
5. **Replacement Parts:** Replacement and exchange parts are warranted for the remainder of the original equipment warranty or for a period of ninety (90) days, whichever is greater.
6. **Semiautomatic Items:** Mig welding guns and cables and plasma cutting torches and cables are warranted for ninety (90) days.
7. **Engines, Tires, and Batteries:** Hobart does not warrant items furnished by Hobart but manufactured by others, including without limitation, gasoline or diesel engines, engine electrical equipment, batteries, and tires. Such items are warranted directly by the manufacturer, and Hobart may periodically inform customers of such warranty coverage; however, Hobart does not guarantee the accuracy or completeness of its information regarding such warranties.
8. **Exclusive Remedies:** In case of Hobart's breach of warranty or any other duty with respect to the quality of any product or service, the sole and exclusive remedies therefore shall be:

As to **PRODUCTS**, (1) repair, (2) replacement, or (3) where authorized by Hobart, payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the product, and as to **SERVICES** (including repair under warranty), the sole and exclusive remedies therefore shall be payment or credit for Hobart's actual charge therefore or, in the absence of any actual charge, the customary or reasonable charge for such services, and if such breach also involves impairment of Hobart products, the remedies available for breach of warranty with respect to the product.

9. **Modification and Misuse:** This warranty does not apply to products which have been modified in any way by any party other than Hobart; nor to products which have not been installed and operated in accordance with applicable industry standards; nor to products which have been used other than under the usual conditions for which designed; nor to products that have not received proper care, lubrication, protection, and maintenance under supervision of competent personnel. **Use of a product after discovery of a defect voids all warranties.**

DISCLAIMER OF WARRANTIES AND CONDITIONS

ALL OTHER GUARANTEES, WARRANTIES, CONDITIONS, REPRESENTATIONS, EITHER EXPRESSED OR IMPLIED, WHETHER ARISING UNDER ANY STATUTE, COMMON LAW, COMMERCIAL USAGE OR OTHERWISE, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED.

WARNING

At all times, safety is an important consideration in the installation, servicing, and operation of the product, and skilled, qualified technical assistance should be utilized at all times. Specific recommendations are included in CAN/CSA-W117.2-M87 Safety in Welding, Cutting, and Allied Processes.

THE HOBART "531" WARRANTY

1. **General:** Hobart's products are warranted for one (1) year following date of shipment to the original user, with exception of items listed in paragraphs 2 through 9 below.
2. **Main Power Rectifiers:** Silicon diodes and power SCRs used in the welding output circuits of equipment are warranted for five (5) years following date of shipment to the original user. Hobart will cover parts and labor in year one and parts replacement only in years two through five.
3. **Major Power Components:** Main power transformers, control, stability and filter reactors, armatures, stators, and printed circuit boards with a price in excess of \$150.00, are warranted for three (3) years following date of shipment to the original user. Hobart will cover parts and labor in year one and parts replacement only in years two and three.
4. **Expendable Items:** Primary and secondary switch contacts, cable connectors, carbon brushes, fuses, bulbs, filters, nozzles, contact tips, liners, cutting tips and wire feed rolls are worn or consumed in the normal process of welding or cutting and are therefore warranted only if found to be defective prior to use.
5. **Replacement Parts:** Replacement and exchange parts are warranted for the remainder of the original equipment warranty or for a period of ninety (90) days, whichever is greater.
6. **Semiautomatic Items:** Mig welding guns and cables and plasma cutting torches and cables are warranted for ninety (90) days.
7. **Engines, Tires, and Batteries:** Hobart does not warrant items furnished by Hobart but manufactured by others, including without limitation, gasoline or diesel engines, engine electrical equipment, batteries, and tires. Such items are warranted directly by the manufacturer, and Hobart may periodically inform customers of such warranty coverage; however, Hobart does not guarantee the accuracy or completeness of its information regarding such warranties.
8. **Exclusive Remedies:** In case of Hobart's breach of warranty or any other duty with respect to the quality of any product or service, the sole and exclusive remedies therefore shall be:

As to **PRODUCTS**, (1) repair, (2) replacement, or (3) where authorized by Hobart, payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the product, and as to **SERVICES** (including repair under warranty), the sole and exclusive remedies therefore shall be payment or credit for Hobart's actual charge therefore or, in the absence of any actual charge, the customary or reasonable charge for such services, and if such breach also involves impairment of Hobart products, the remedies available for breach of warranty with respect to the product.

9. **Modification and Misuse:** This warranty does not apply to products which have been modified in any way by any party other than Hobart; nor to products which have not been installed and operated in accordance with applicable industry standards; nor to products which have been used other than under the usual conditions for which designed; nor to products that have not received proper care, lubrication, protection, and maintenance under supervision of competent personnel. **Use of a product after discovery of a defect voids all warranties.**

DISCLAIMER OF WARRANTIES

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, EXCEPT AS SPECIFICALLY PROVIDED IN THE EXPRESSED WARRANTIES SET FORTH ABOVE, ALL PRODUCTS ARE SOLD "AS IS". HOBART MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

WARNING

At all times, safety is an important consideration in the installation, servicing, and operation of the product, and skilled, qualified technical assistance should be utilized at all times. Specific recommendations are included in "Safety in Welding and Cutting", American National Standard No. Z-49-1.