MAINTENANCE, TROUBLESHOOTING and PARTS INFORMATION for

F-14-448
February, 1989
Price $10.00

HELIARC 306

WELDING POWER SUPPLY

BASIC . . . . . .P/N 680620H●
DELUXE . . . . . .P/N 680630H●

●See note on page # 8 for specific information on electrical diagrams.

This booklet is intended as a supplement to F-14-447 which covers the "Installation and Operating Instructions" for the Heliarc 306 power supplies.

Maintenance and repair work should be performed by an experienced person, and electrical work only by a trained electrician or technician. Do not permit untrained persons to inspect, clean or repair equipment. Use only recommended replacement parts. Be sure to read Safety Precautions on page 2 before repairing this equipment.

I. SPECIFICATIONS

NEMA Rated Output @ 60% Duty Cycle			300 Amps @ 32 Volts AC./DC, Tig/Stick
Open Circuit Voltage			79 VAC/72 VDC
Output Current Range In Amperes	Welding Current		AC/DC
	Low Range		5 ♦ to 50 Amps
	High Range		20 to 380 Amps
Input Voltage			208/230/460 VAC 1 Ph, 60 Hz.
Input Current @ Rated Load in Amperes	Voltage	208 230 460	
	w/o P.F.C.*	123 112 56	
	with P.F.C.*	99 86 43	
Power Factor @ Rated Load	w/o P.F.C.*	Approx. 71%	
	with P.F.C.*	Approx. 88%	
Auxiliary Power Output			115 VAC, 15 Amp, 60 Hz.
Dimensions:	Width	22-3/4-in.	678 mm
	Depth	32-in.	813 mm
	Height	36-in.	914 mm
Weight Approx.		600 lbs.	270 kg

*P.F.C. (power factor correction) is standard on deluxe & optional on basic unit.

♦ 3-amp. minimum with LOW AMP KIT, D.C. only.

II. MAINTENANCE

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction.

WARNING

Be sure that the wall disconnect switch or circuit breaker is open before attempting any inspection or work on the inside of the power supply. Always wear safety goggles with side shields when blowing out the unit with the low pressure air.

A. CLEANING

Since there are no moving parts (other than the fan) in the power supply, maintenance consists mainly of keeping the interior of the cabinet clean. Periodically remove the cover from the cabinet and blow accumulated dust and dirt from the air passages and the interior components, using clean low pressure air. It is imperative that the air passages, to the interior of the unit, be kept free of dirt accumulation to insure adequate circulation of cooling air, especially over the rectifier bridge plates and magnetics. The length of time between cleaning will depend on the location of the unit, and the amount of dust in the atmosphere.

B. LUBRICATION

Fan motors with oil tubes require lubrication after one year of service. Motors without oil tubes are permanently lubricated and do not require any attention.

C. SPARK GAP SERVICING & ADJUSTMENT

The spark gap, which is part of the high frequency generator, is factory set at 0.030-in. (+/– 0.002-in.). After extended operation or if erratic operation is noted, it may be necessary to readjust or replace the electrodes (673578). Use a feeler gauge when readjusting the gap. (See Form 11-831, "Recommended Installation and Test Procedures for High Frequency Stabilized Arc Welding Machines", packed with the unit.) Cleaning or dressing of the spark gap electrodes is not recommended. When replacement is necessary, both electrodes should be replaced.

Remember that high frequency radiation increases as the gap increases and this can cause interference in other electronic equipment.

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

L-TEC
WELDING & CUTTING SYSTEMS

SAFETY PRECAUTIONS

WARNING: These Safety Precautions are for your protection. They **summarize** precautionary information contained in the references in item 7 and as noted herein. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in personal injury or death.

1. **PROTECT YOURSELF AND OTHERS -- Some welding, cutting, and gouging processes are noisy and require ear protection. Skin and eye burns from arc rays can be more severe than sunburn. Hot metal can cause skin burns and heat rays may injure eyes. Training in the proper use of the processes and equipment is essential to prevent accidents. Also:**
   a. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, and goggles are also required.
   b. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. WARN bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
   c. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
   d. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
   e. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
   f. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can travel considerable distances. Bystanders should also wear goggles over safety glasses.

2. **FIRES AND EXPLOSIONS -- Heat from flames and arcs as well as their radiation can act as ignition sources. Hot slag or sparks can also cause fires and explosions. Therefore:**
   a. Remove all combustible materials well away from the work area or completely cover the materials with a protective non-flammable covering. Combustible materials include woods, cloth, sawdust, liquid and gas fuels , solvents, paints and coatings, paper, etc.
   b. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal.
   c. Do not weld, cut or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
   d. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
   e. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
   f. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", which is available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

3. **ELECTRICAL SHOCK -- Contact with live electrical parts can cause severe burns to the body or fatal shock. Severity of electrical shock is determined by the path and amount of current through the body. Therefore:**
   a. Never allow live metal parts to touch bare skin or any wet clothing. Be sure gloves are dry.
   b. When standing on metal or operating in a damp area, make certain that you are well insulated. Wear dry gloves and rubber-soled shoes and stand on a dry board or platform.
   c. Always ground the power supply by connecting a ground wire between the power supply and the ground system of the input power.
   d. Always make sure that the workpiece is connected to a good electrical ground.
   e. It is especially important, particularly with plasma cutting equipment, to be sure the work cable is connected to the workpiece. A poor or missing connection could expose the operator or others in the area to a fatal shock.
   f. Do not use worn or damaged cables. Do not overload the cable. Use well maintained equipment.
   g. When not operating, turn off the equipment. Accidental overloading can cause overheating and create a fire hazard. Do not coil or loop cable around parts of the body.
   h. Be sure the proper size ground cable is connected to the workpiece as close to the work area as possible. Grounds connected to building framework or other remote locations from the work area increase the possibility of output current passing through lifting chains, crane cables, or various electrical parts.
   i. Keep everything dry, including clothing, work area, cables, electrode holder, and power supply. Fix water leaks immediately.
   j. Refer to ANSI/ASC Standard Z49.1 in Item 7 below for specific grounding recommendations. Do not mistake the work lead for a ground cable.

4. **FUMES AND GASES -- Fumes and gases, particularly in confined spaces, can cause discomfort and physical harm. Do not breathe fumes and gases. Shielding gases can cause asphyxiation. Therefore:**
   a. Always provide adequate ventilation in the work area by natural or mechanical ventilation means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes and gases from these materials.
   b. Do not operate in locations close to chlorinated hydrocarbon vapors coming from degreasing and spraying operations. The heat or arc rays can react with solvent vapors to form phosgene, a highly toxic gas, and other irritant gases.
   c. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
   d. Refer to ANSI/ASC Standard Z49.1 in item 7 below for specific ventilation recommendations.

5. **EQUIPMENT MAINTENANCE -- Faulty or improperly maintained equipment can result in poor work, but most importantly it can cause physical injury or death through fires or electrical shock. Therefore:**
   a. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
   b. Before performing any maintenance work inside a power supply, disconnect the power supply from the electrical power source.
   c. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
   d. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
   e. Keep all safety devices and cabinet covers in position and in good repair.
   f. Use equipment for its intended purpose. Do not modify it in any manner.

6. **CYLINDER HANDLING -- Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:**
   a. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
   b. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
   c. When not in use, keep cylinder valves closed. Have valve protection cap in place if not connected for use. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
   d. Locate cylinders away from heat, sparks, or flame of a welding, cutting, or gouging operation. Never strike an arc on a cylinder.
   e. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

7. **ADDITIONAL SAFETY INFORMATION -- For more information on safe practices for setting up and operating electric welding and cutting equipment and on good working habits, ask your L-TEC welding equipment supplier for a copy of "Precautions and Safe Practices for Electric Welding and Cutting", Form 52-529.**

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:
   a. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
   b. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
   c. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
   d. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"
   e. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding
   f. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding"
   g. AWS SP - "Safe Practices" - Reprint, Welding Handbook, Vol. 1, 8th Edition.

1. Loosen retaining screw "A" only enough to free electrode point "C" for adjustment.
2. Place feeler gauge of proper thickness between gap "B".
3. Apply slight pressure against loosened electrode point "C" so the feeler gauge is held firmly in the gap. Tighten retaining screw "A".

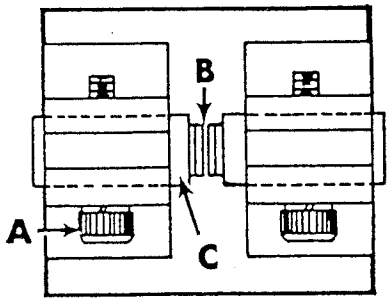


Fig. 1 - Spark Gap Adjustment

D. TESTING AND REPLACING BRIDGE ASSY. COMPONENTS

SCR's and silicon diodes are devices which allow current to flow in only one direction, and block current in the other direction. The SCR's and silicon diodes used in this power supply are designed to provide long troublefree operation; however, should a failure occur, they may require replacement. The testing procedures to determine defective components follow:

1. Silicon Diode Rectifier, D1-D2.
   Disconnect the power lead to the diode, to provide an open- circuit across the component to be tested. Using an ohmmeter set to the Rx1 scale, check the resistance in the forward and reverse direction. A good diode will read high in reverse and low in the forward direction.

   When replacing defective diodes, make sure mounting surfaces are clean. Coat mounting surfaces with Dow-Corning No. 340 silicon heat sink compound, or equivalent. Replaced diode (nuts) should be tightened only until firm, and then torque tight (recommended range is 275 inch lbs. min. to 325 inch lbs. max.).

2. Silicon Controlled Rectifier - SCR.
   Disconnect the SCR wiring (but do not unclamp) to break continuity and provide an open-circuit across the component to be tested. Using an ohmmeter set to the Rx1 scale, check the resistance across the SCR in both directions. A good SCR will read high in both directions. If the reading is low or zero in either direction, the SCR is defective.

   When replacing defective SCR's make sure the mounting surfaces are clean. Coat the mounting surfaces with Alcoa No. 2 electrical joint compound, available from L-TEC in 8 oz. containers under P/N 73585002. Make certain that the polarity on the replacement SCR is the same as on the unit being replaced. Place the top clamp piece over the bolts and tighten each nut **hard finger tight.** The clamp piece should be parallel to the top plate. Then tighten each nut approx. 1/4 turn at a time (alternately), for two complete revolutions until the force indicator on the clamp assembly reads 1.0 kilo pounds (1000 lbs.).

III. TROUBLESHOOTING

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

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

TROUBLE SYMPTOM GUIDE

WARNING

Be sure that all primary power to the machine has been externally disconnected. Open wall disconnect switch or circuit breaker before attempting inspection or work inside of the power supply.

1. **Unit Completely inoperative. Fan does not run.**
   a. Open line fuses -- check the line fuses for continuity and replace if necessary. If the fuses continue to open, the jumper links may not be in proper position. See primary electrical connections in F-14-447.
   b. No power input -- check position of line disconnect switch.
   c. Improper jumper link placement on input terminal board. See primary electrical connections in F-14-447.
   d. Defective ROS and/or wiring -- check continuity of ROS and replace if necessary.
2. **No welding output. Fan operative.**
   a. Improper jumper link placement on input terminal board -- See primary electrical connections in F-14-447.
   b. Power supply magnetics overheating -- thermal switch (TS) tripped due to restricted cooling air flow, or overextended duty cycle. Allow unit to cooldown for at least 5 minutes with fan running to let TS reset.
   c. Tig/Stick switch TSS in the TIG position without a remote contactor control connected to the remote torch receptacle RTR. Place TSS in the STICK position or make remote torch connection at RTR.
   d. Defective TSS and/or wiring. Check continuity and replace if necessary.
   e. Defective SCR p/c board.
   f. Defective Current Range Switch SW1 (located on SCR p/c board). Check continuity of SW1 and ensure that all connections are secure and correct. Replace SW1 if defective.

g. Defective current selector switch CSS and/or wiring. Check continuity of CSS and ensure that all connections are secure and correct. Replace CSS if defective.

h. Defective Current Control Potentiometer R44 (located on SCR p/c board). To check continuity of R44, put Panel-Remote switch (PRS) in REMOTE position. Disconnect TC-1 or FC-4 Remote control. Check resistance between terminals "X" and "W" of Remote Current Control receptacle (RCC) by rotating Current Control potentiometer (R44). Resistance should vary between "O" and 13.3 K to 16.7 K ohms. If pot checks good, replace SCR p/c board.

i. The three (3) amp control fuse may be blown -- check and/or replace.

3. Low or unstable open circuit voltage.

a. Current control pot set too low for welding application. Increase setting of CCP.

b. Defective SCR in main bridge. Check the resistance across the SCR on the Rx1 scale. If the reading is high the SCR is working. If the resistance is low or zero the SCR is defective. To check the gate, connect the gate lead to the anode of the SCR and read the forward resistance across the SCR anode to cathode. If the internal voltage of the meter is high enough, the meter should read a low resistance.

c. Defective diode in main bridge. Place the current selector switch between position so as to provide an open circuit across the diodes. On the Rx1 scale check the resistance in the forward and reverse directions. A good diode will read high in the reverse direction and low in the forward direction. Replace defective parts.

d. Defective CSS and/or wiring. See troubleshooting 2-g.

e. Defective SCR p/c board.

4. Erratic output welding current.

a. Intermittent shunt connections. Check connections to shunt.

b. Defective SCR and/or diode in main bridge. See troubleshooting 3-b and 3-c.

c. Defective SCR p/c board. Replace SCR p/c board.

d. Excessive high frequency. Check spark gaps and adjust if necessary (see Maintenance Section). Check all connections and components in high frequence bypass circuit and replace any defective components.

5. Erratic output at welding currents above 200 amps (approx.).

a. Input voltage falling below 10% of rated voltage while machine is under load. May have to increase input power conductor size or decrease length.

6. Low Welding output in High range.

a. Current Range Switch SW1 (located on SCR p/c board) may not be closing when positioned in HIGH range. Check continuity of SW1 on SCR p/c board -- replace if defective.

7. Minimum welding output in both current ranges.

a. Check for defective Current Control Potentiometer R44 (located on SCR p/c board) using procedure outlined in Step 2-h.

b. Faulty wiring to Panel/Remote switch, or switch itself may be defective.

8. High weld output, current control does not vary the output.

a. Open shunt connection. Check connections to shunt.

b. Defective SCR p/c board. Replace if defective.

9. Absence of High Frequency while selector switch (HFS) is in START mode only.

a. Open circuit voltage low -- check remote contactor switch or Tig/Stick Mode Switch TSS.

b. CCP or remote current control not set high enough.

c. SCR p/c board may be defective.

10. Insufficient or Absence of H.F.

a. High frequency switch in the OFF position. Check HFS and place in START or CONTINUOUS position.

b. Improper spark gap. Clean and adjust spark gaps, if necessary. See spark Gap servicing.

c. Defective wiring to High Frequency Intensity pot, or pot itself may be defective.

d. Defective HFS and/or wiring. Make continuity check and replace if necessary.

e. Defective Logic p/c board.

11. No gas and/or water flow.

a. High Frequency Switch (HFS) in OFF (Stick) position -- place in Start or Continuous Mode(s). Make continuity check, if necessary, and replace if defective.

b. GS and/or WS solenoid defective. Check 24 VAC across solenoid coil. If present and solenoid does not energize, replace it.

12. No remote contactor control.

a. TIG/STICK switch in the STICK position. Place TSS switch in the TIG position.

NOTE

Training and Troubleshooting Courses are available for maintenance and repair of this and other L-TEC equipment. For details, contact: L-TEC Welding & Cutting Systems, P.O. Box F-6000, Florence, SC 29501; Phone 803-669-4411. Attn: Technical Training Coordinator.

IV. REPLACEMENT PARTS DATA

1. All replacement parts are keyed on the illustrations which follow. Order replacement parts by number and part name, as shown on illustrations. DO NOT ORDER BY PART NUMBER ALONE.
2. Always state the series or serial number of the machine on which the parts are to be used. The serial number is stamped on the unit nameplate.
3. Indicate any special shipping instructions.
4. Order replacement parts from the L-TEC office or distributor nearest you.

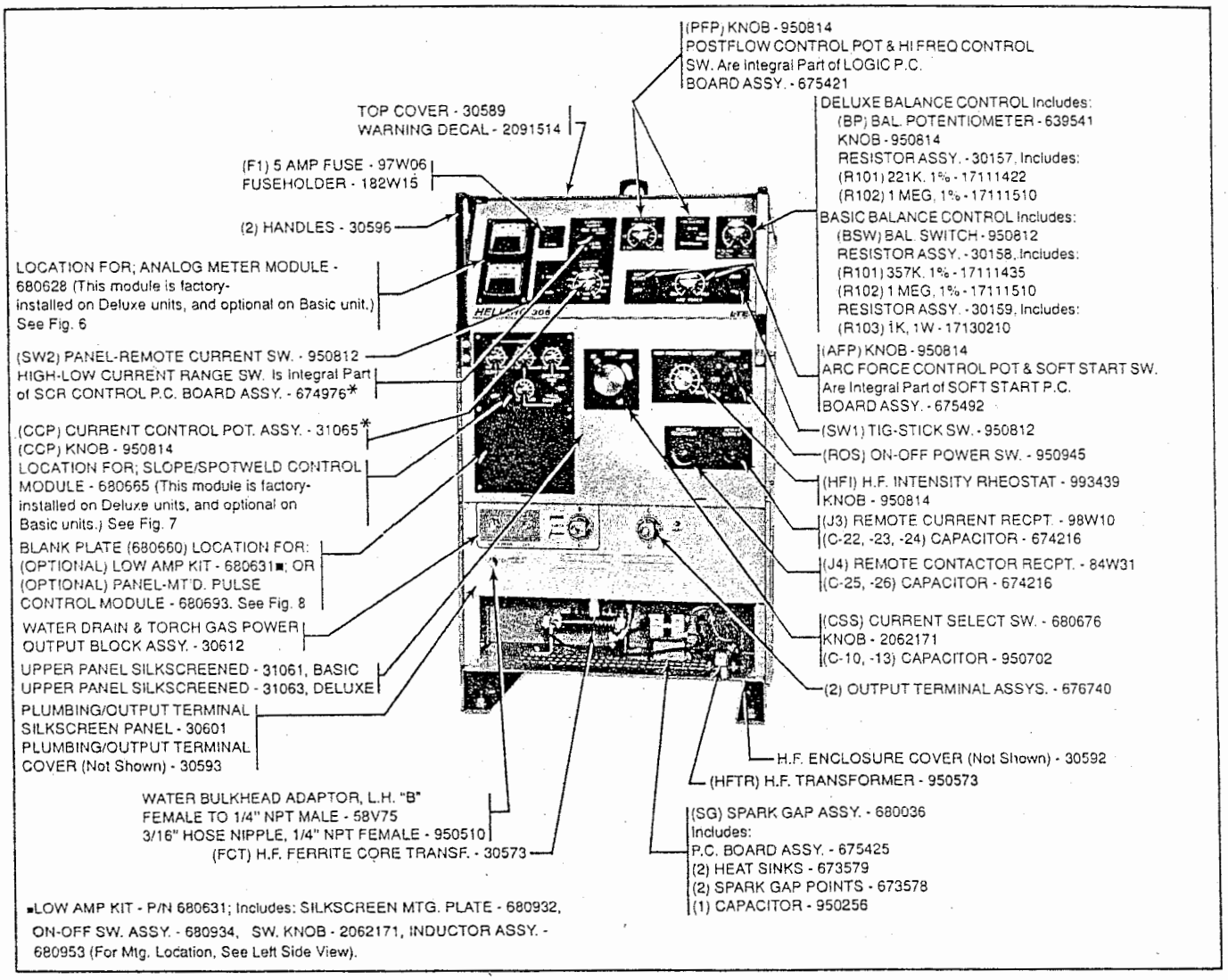


Fig. 2 - Heliarc 306 Front View

* **IMPORTANT:** Earlier versions of the Heliarc 306 (prior to serial # C89"C"_ _ _ _ _) were equipped with an SCR control p.c. board that contained an integral current control pot. (CCP, which was part of the p.c. board) and was identified by P/N 674916. In later versions (serial # C89"C"_ _ _ _ _ and higher), the CCP pot. was separated from the SCR p.c. board, and these are identified as shown above.
If your SCR board and/or CCP pot. become defective and need replacement, please check your unit to determine the vintage of your board/pot to see if it is integrated or separated and order as follows:

1. Older units with "integrated" SCR board and CCP pot. order kit P/N 31024.
2. Later units with "separated" SCR board and CCP pot, order P/N's as shown above.

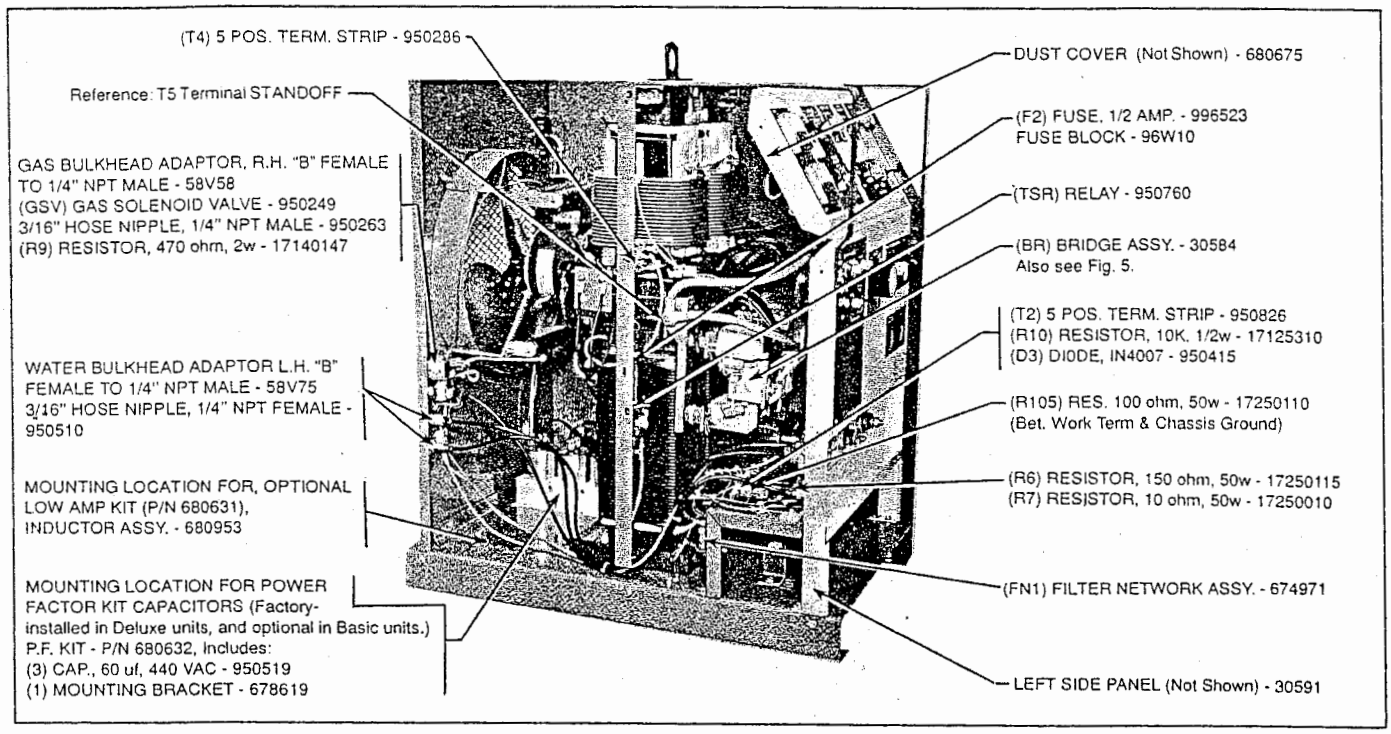


Fig. 3 - Heliarc 306, Left Side View

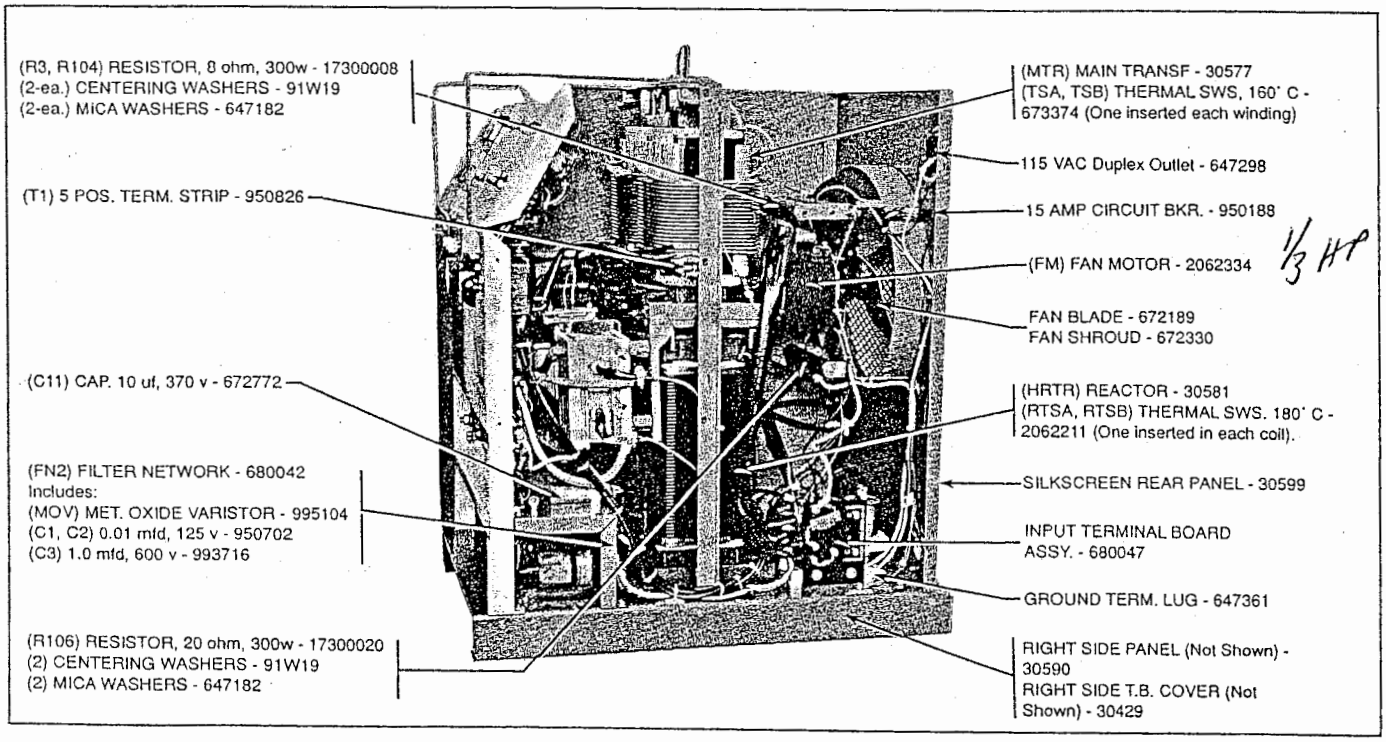


Fig. 4 - Heliarc 306, Right Side View

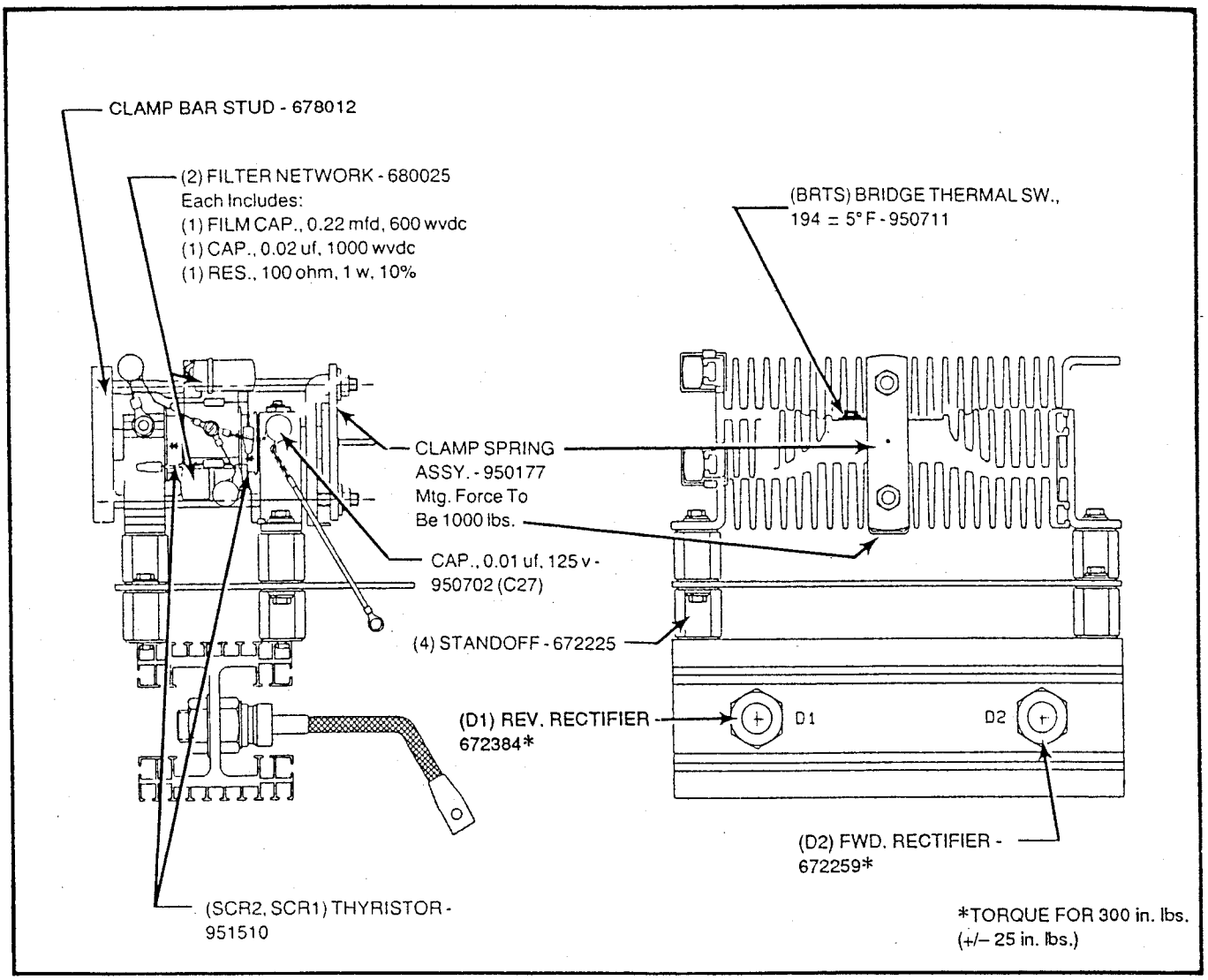


Fig. 5 - Heliarc 306 Bridge Assy. P/N 30584

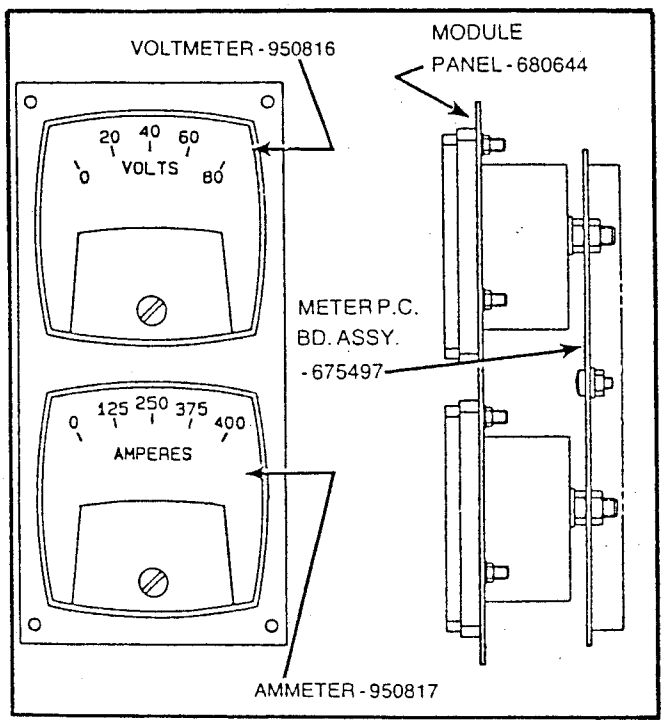


Fig. 6 - Analog Meter Module P/N 680628

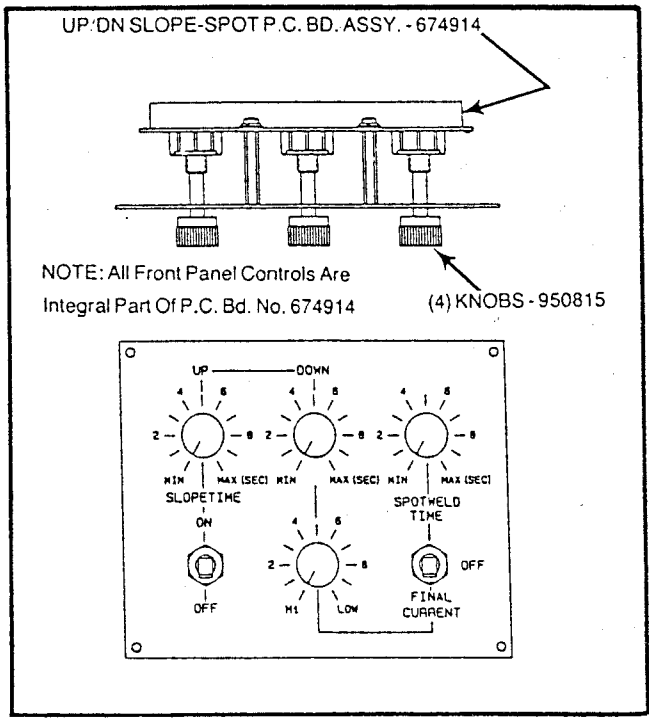


Fig. 7 - Slope/Spotweld Control Module, P/N 680665

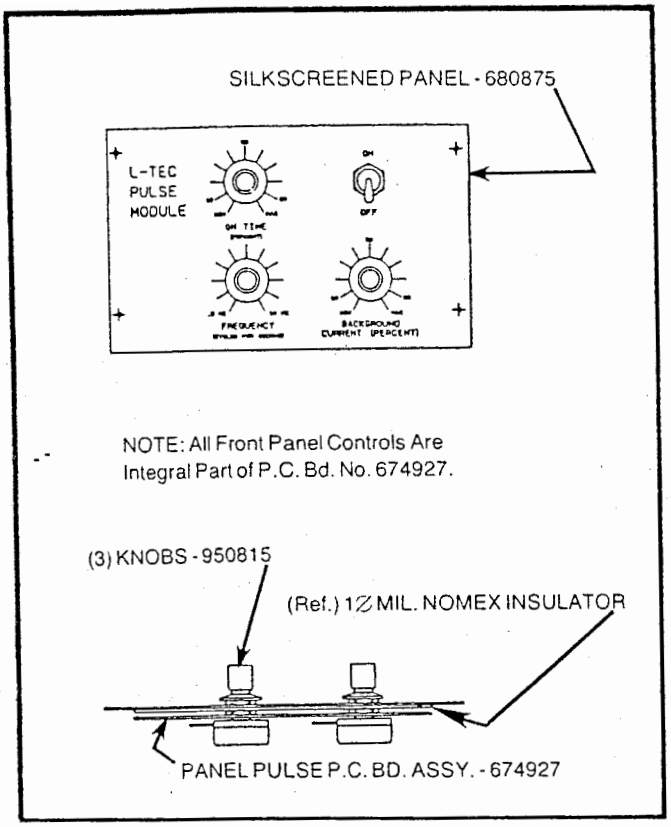


Fig. 8 - Panel Pulse Control Assy. P/N 680693

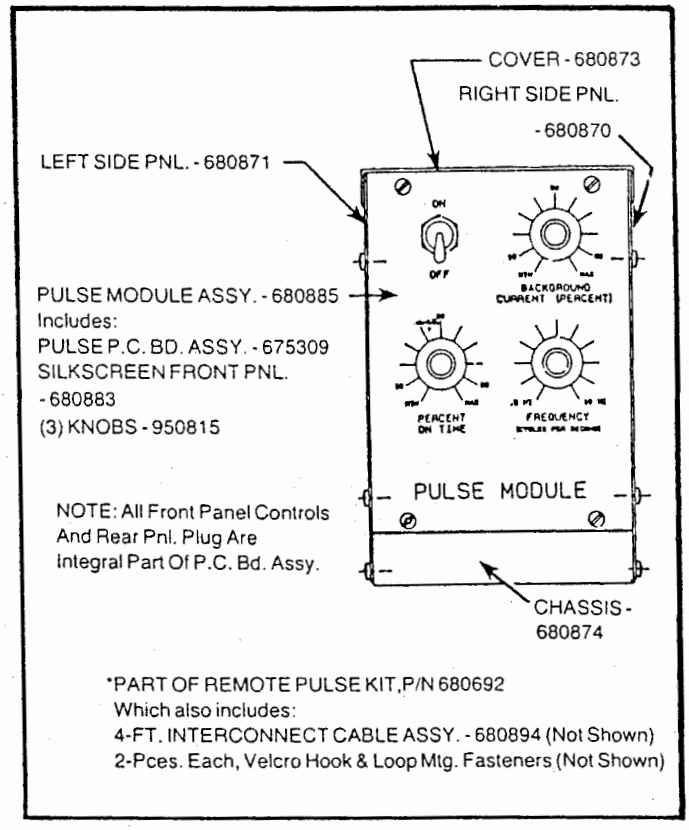
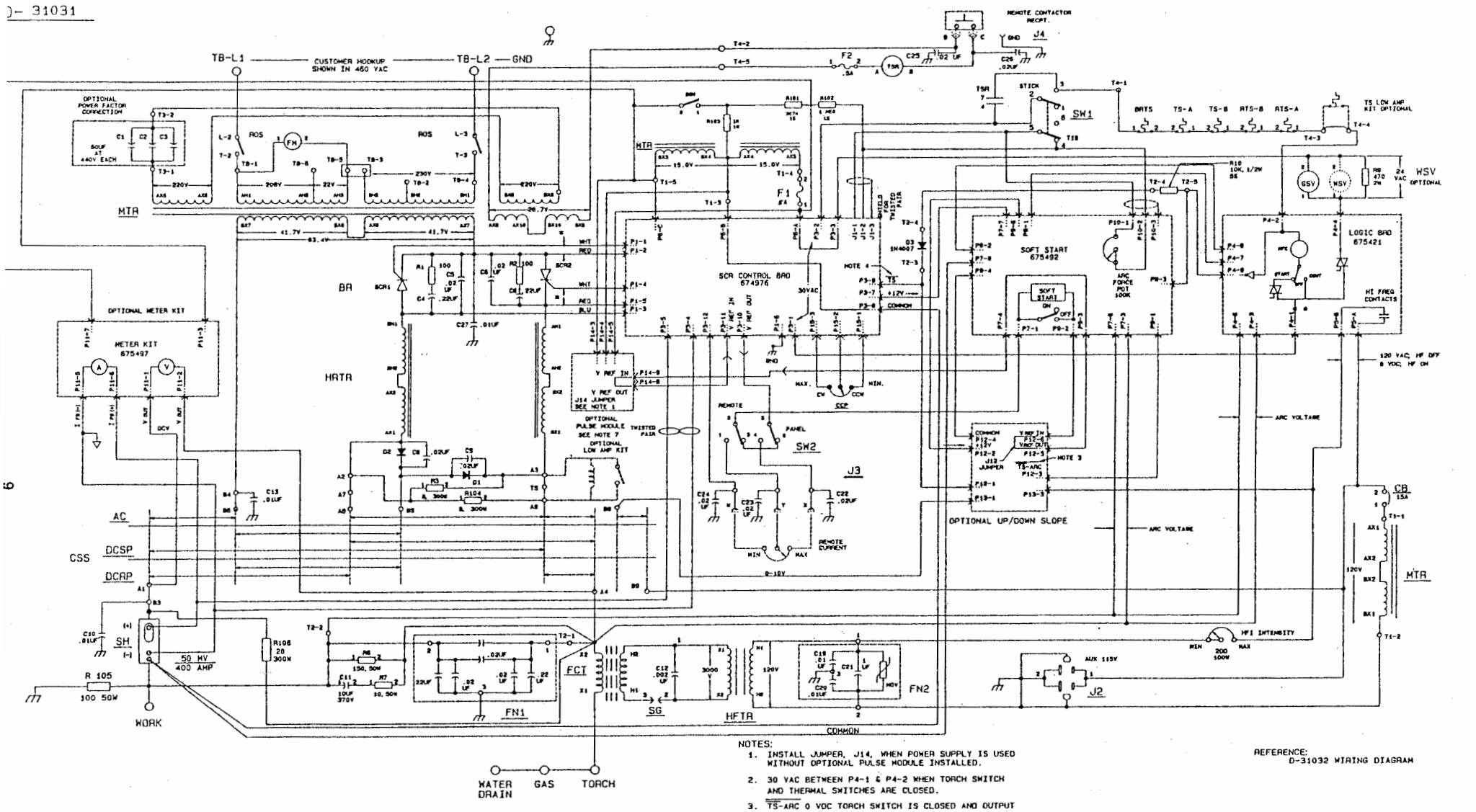


Fig. 9 - Remote Pulse Assembly, P/N 680887*

IMPORTANT NOTE

1. Electrical diagrams shown on pages 9 thru 15 cover all Heliarc 306 units manufactured with serial numbers C89"C"_____ and higher.
2. Electrical diagrams shown on pages 21 through 27 cover all Heliarc 306 units manufactured prior to serial numbers C89"C"_____.
3. Diagrams on pages 16 thru 20 are applicable to all units.



NOTES:

1. INSTALL JUMPER, J14, WHEN POWER SUPPLY IS USED WITHOUT OPTIONAL PULSE MODULE INSTALLED.
2. 30 VAC BETWEEN P4-1 & P4-2 WHEN TORCH SWITCH AND THERMAL SWITCHES ARE CLOSED.
3. $\overline{TS}$-ARC 0 VDC TORCH SWITCH IS CLOSED AND OUTPUT VOLTAGE IS BELOW 35V. 10 VDC OTHERWISE. (REF TO COMMON)
4. $\overline{TS}$ 0 VDC WHEN TORCH SWITCH IS CLOSED 10 VDC OTHERWISE. (REF TO COMMON)
5. SPARK GAP SETTING .030.
6. INSTALL JUMPER, J12, WHEN POWER SUPPLY IS USED WITHOUT OPTIONAL UP/DN SLOPE MODULE INSTALLED.
7. EITHER PULSE MODULE OR LOW AMP KIT MAY BE INSTALLED BUT NOT BOTH.

*- VARIES 0 TO 2 VOLTS

REFERENCE: D-31032 WIRING DIAGRAM

Fig. 10 - Schematic Diagram - Basic (see notes 1 & 3 on page 8)

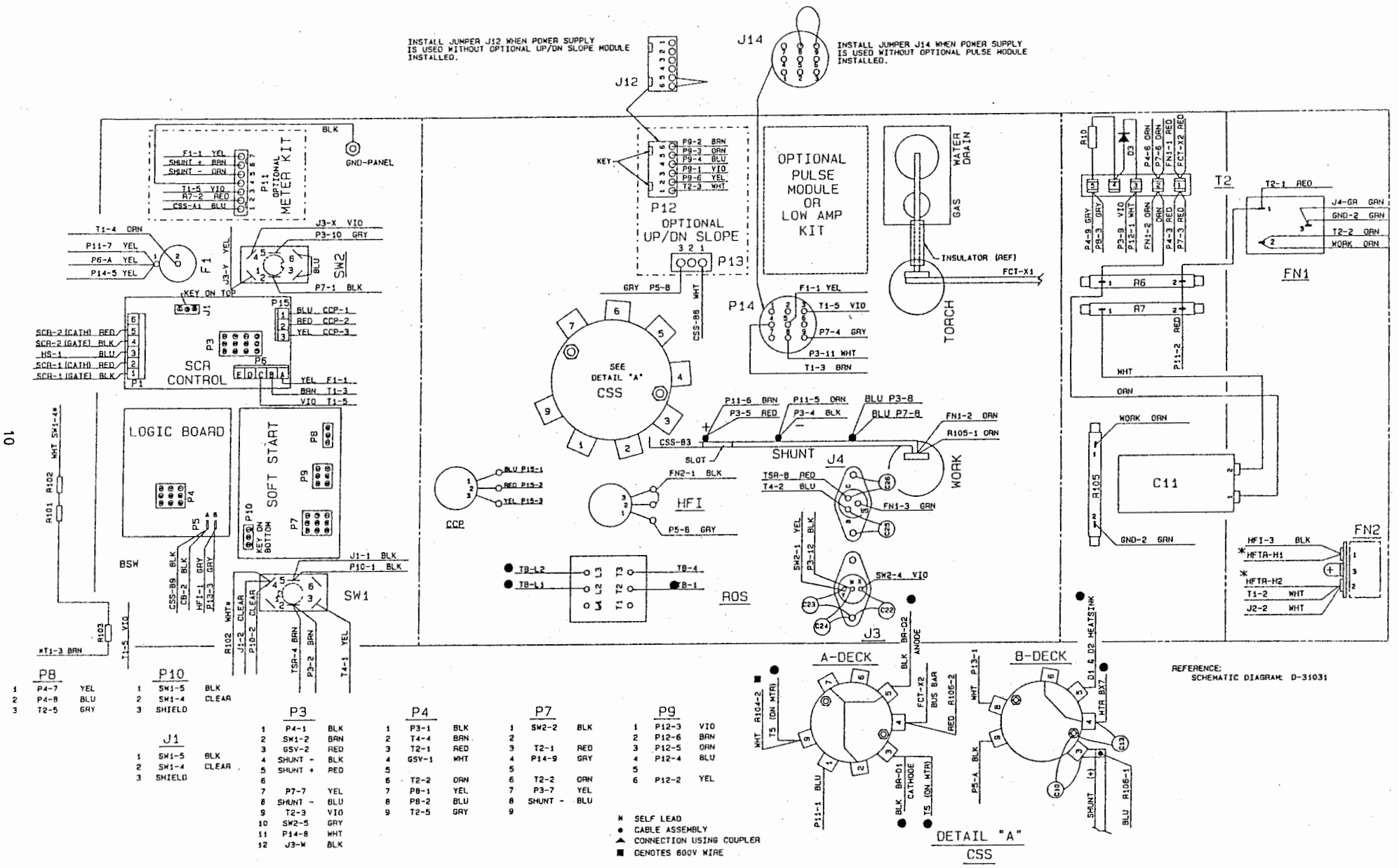


Fig. 10A - Wiring Diagram Sheet No. 1 of 2 - Basic (see notes 1 & 3 on page 8)

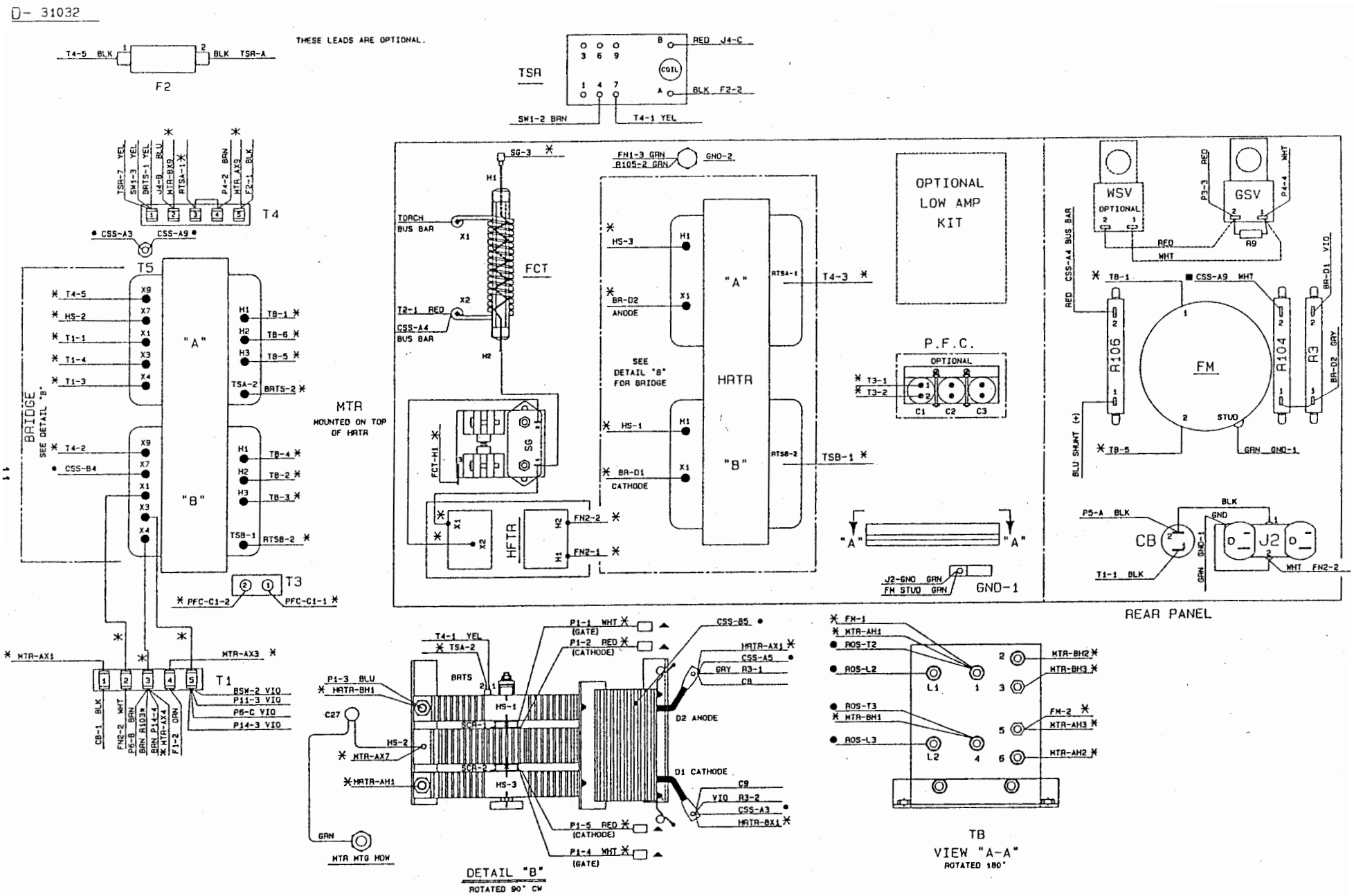


Fig. 10B - Wiring Diagram Sheet No. 2 of 2 - Basic (see notes 1 & 3 on page 8)

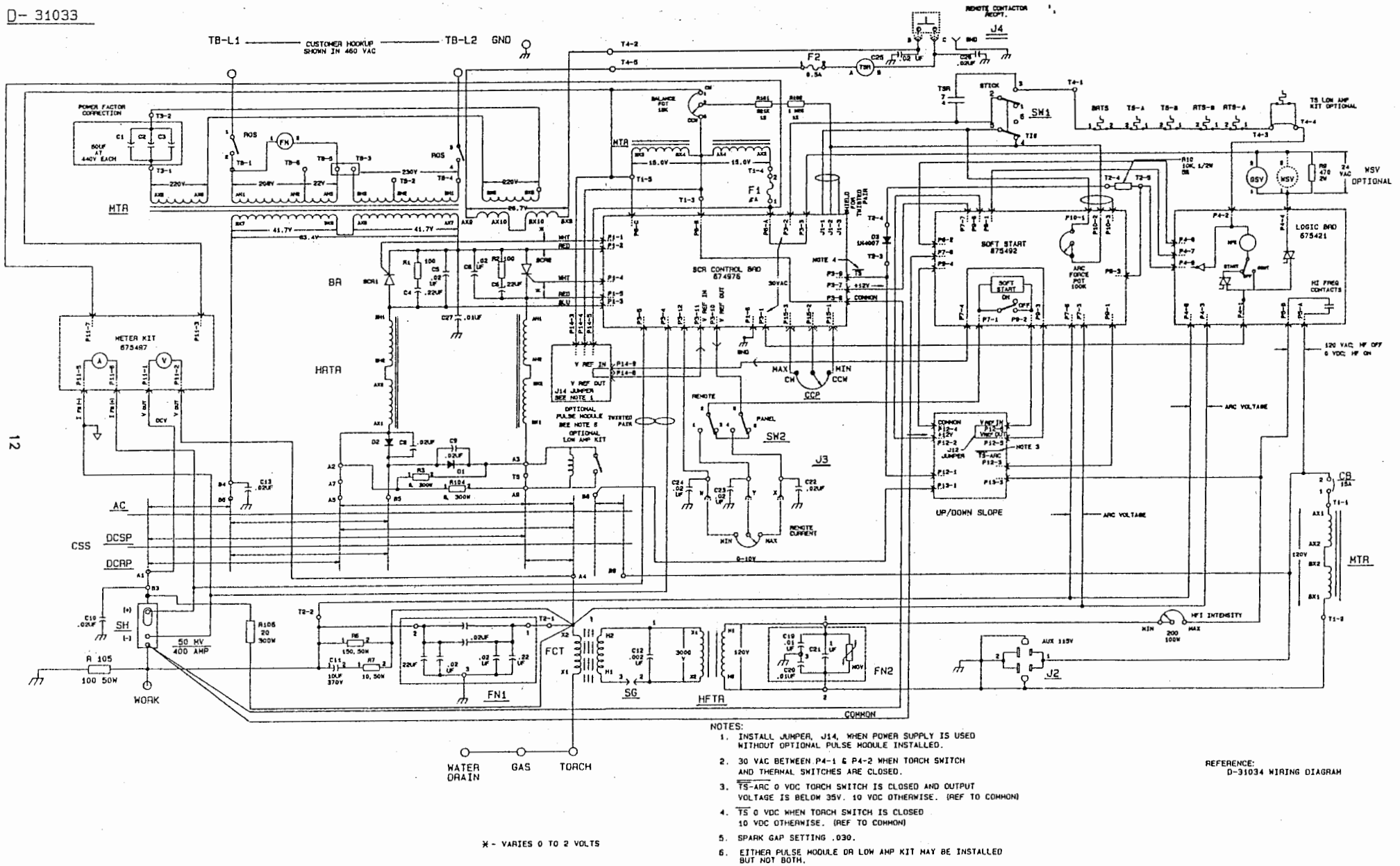
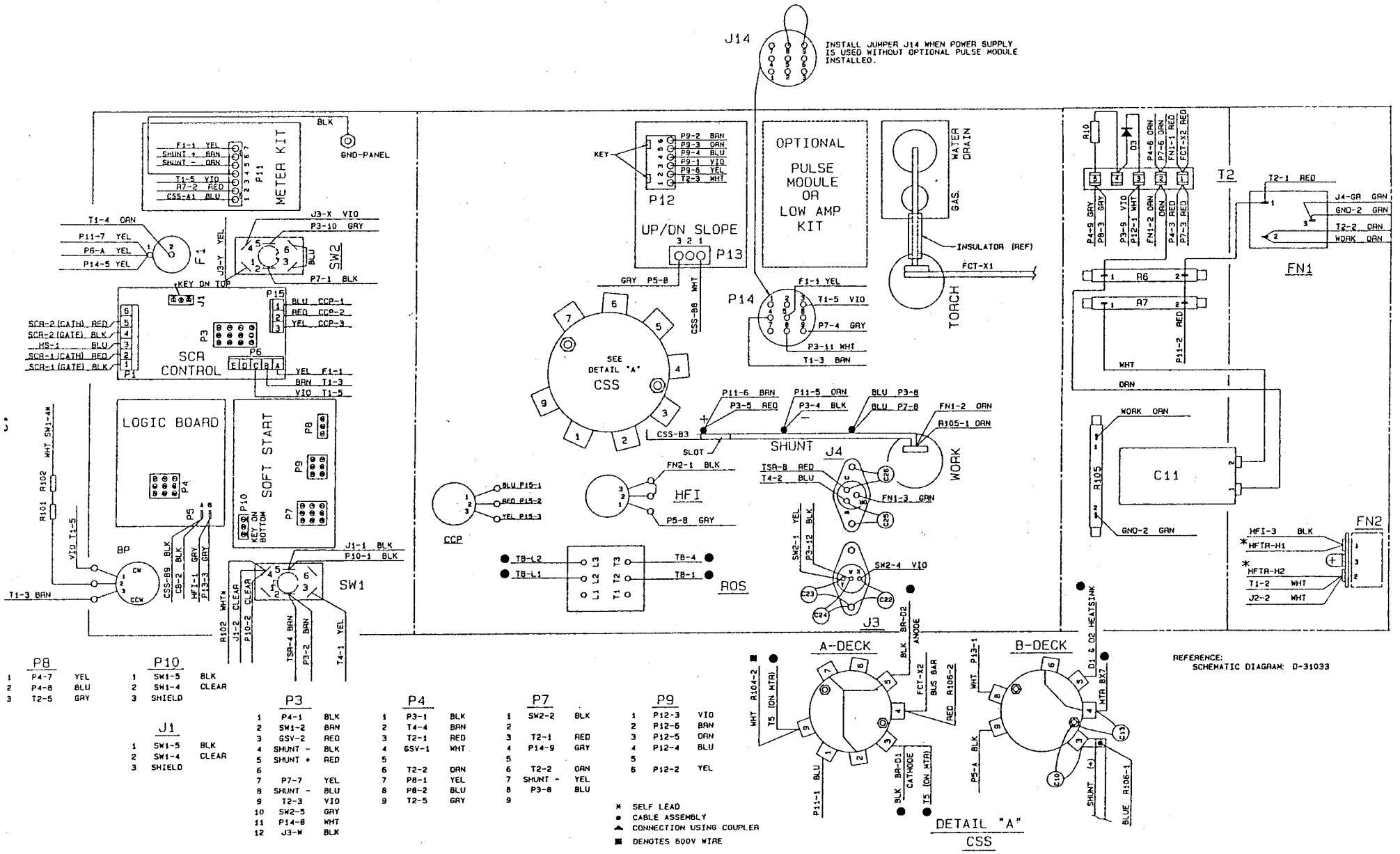


Fig. 11 - Schematic Diagram - Deluxe (see notes 1 & 3 on page 8)



P8		
1	P4-7	YEL
2	P4-8	BLU
3	T2-5	GRY

P10		
1	SW1-5	BLK
2	SW1-4	CLEAR
3	SHIELD	

J1		
1	SW1-5	BLK
2	SW1-4	CLEAR
3	SHIELD	

P3		
1	P4-1	BLK
2	SW1-2	BRN
3	GSV-2	RED
4	SHUNT -	BLK
5	SHUNT +	RED
6		
7	P7-7	YEL
8	SHUNT -	BLU
9	T2-3	VIO
10	SW2-5	GRY
11	P14-8	WHT
12	J3-W	BLK

P4		
1	P3-1	BLK
2	T4-4	BRN
3	T2-1	RED
4	GSV-1	WHT
5		
6	T2-2	ORN
7	P8-1	YEL
8	P8-2	BLU
9	T2-5	GRY

P7		
1	SW2-2	BLK
2		
3	T2-1	RED
4	P14-9	GRY
5		
6	T2-2	ORN
7	SHUNT -	YEL
8	P3-8	BLU
9		

P9		
1	P12-3	VIO
2	P12-6	BRN
3	P12-5	ORN
4	P12-4	BLU
5		
6	P12-2	YEL

* SELF LEAD
● CABLE ASSEMBLY
▲ CONNECTION USING COUPLER
■ DENOTES 600V WIRE

Fig. 11A - Wiring Diagram Sheet No. 1 of 2 - Deluxe (see notes 1 & 3 on page 8)

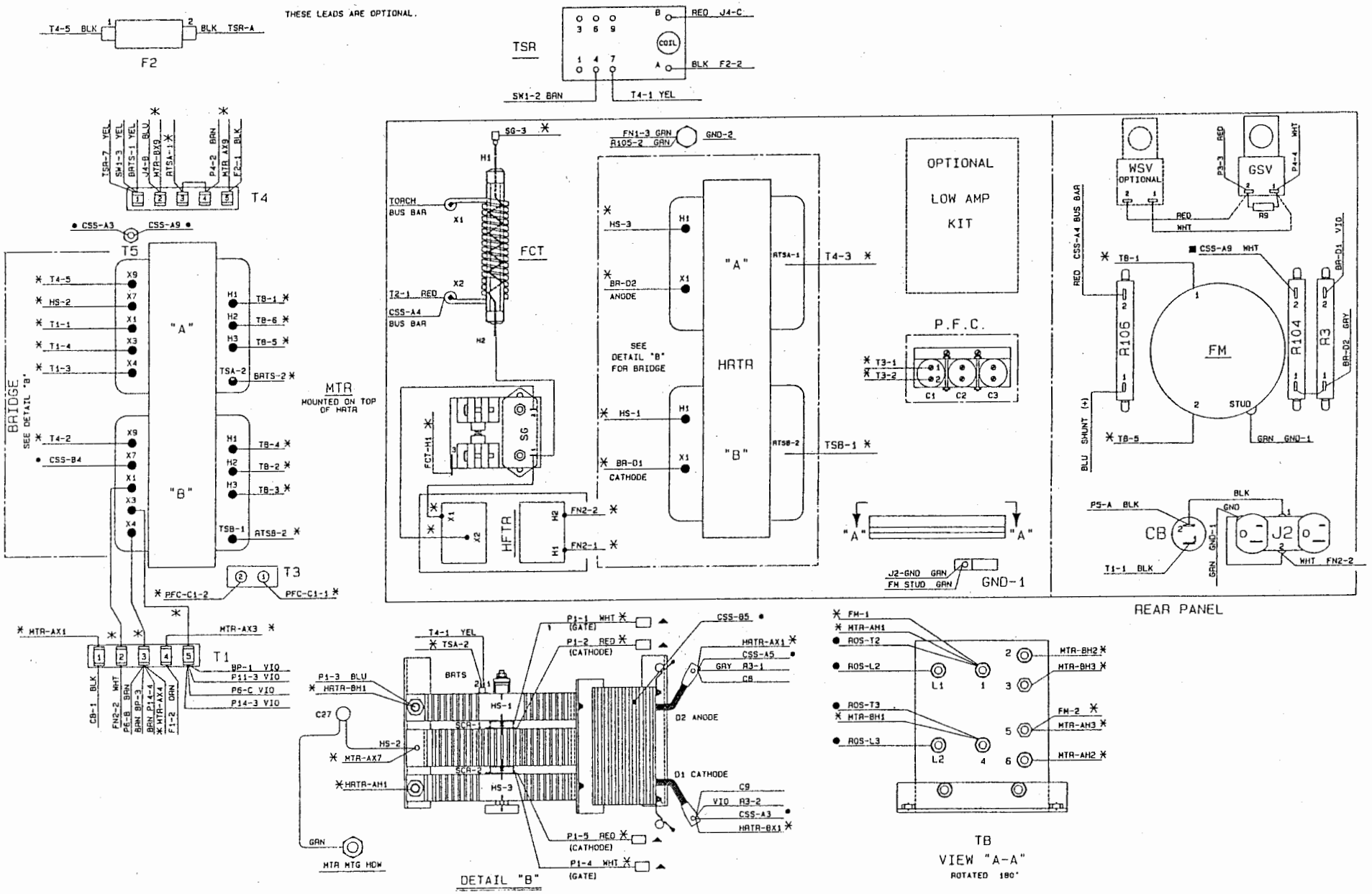
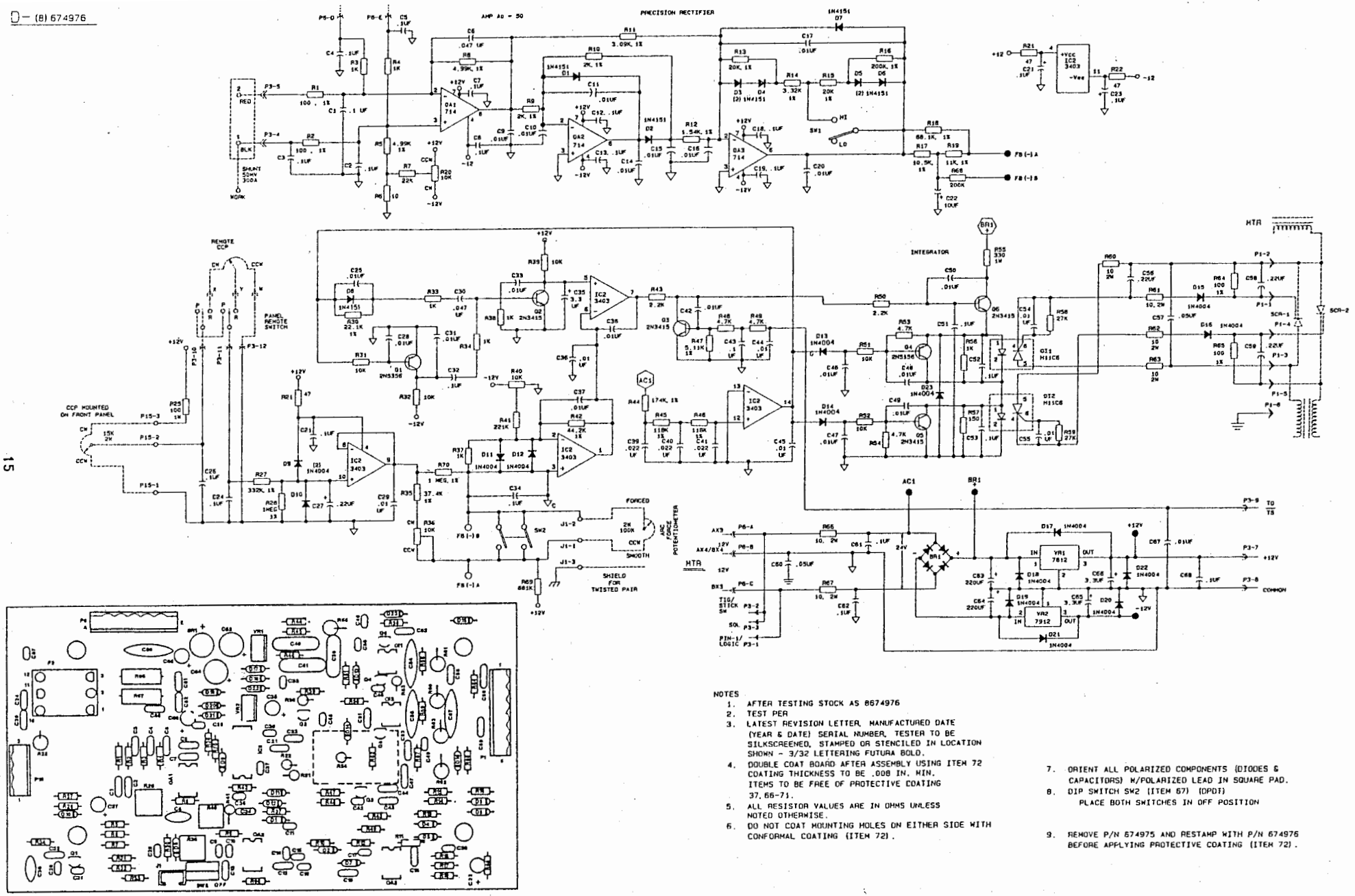


Fig. 11B - Wiring Diagram Sheet No. 2 of 2 - Deluxe (see notes 1 & 3 on page 8)



NOTES

1. AFTER TESTING STOCK AS 8674976
2. TEST PER
3. LATEST REVISION LETTER, MANUFACTURED DATE (YEAR & DATE) SERIAL NUMBER, TESTER TO BE SILKSCREENED, STAMPED OR STENCILED IN LOCATION SHOWN - 3/32 LETTERING FUTURA BOLD.
4. DOUBLE COAT BOARD AFTER ASSEMBLY USING ITEM 72 COATING THICKNESS TO BE .008 IN. MIN. ITEMS TO BE FREE OF PROTECTIVE COATING 37,66-71.
5. ALL RESISTOR VALUES ARE IN OHMS UNLESS NOTED OTHERWISE.
6. DO NOT COAT MOUNTING HOLES ON EITHER SIDE WITH CONFORMAL COATING (ITEM 72).
7. ORIENT ALL POLARIZED COMPONENTS (DIODES & CAPACITORS) W/POLARIZED LEAD IN SQUARE PAD.
8. DIP SWITCH SW2 (ITEM 67) (DPDT) PLACE BOTH SWITCHES IN OFF POSITION
9. REMOVE P/N 674975 AND RESTAMP WITH P/N 674976 BEFORE APPLYING PROTECTIVE COATING (ITEM 72).

Fig. 12 - SCR Control P.C. Bd. (P/N 674976) Schematic (see notes 1 & 3 on page 8)

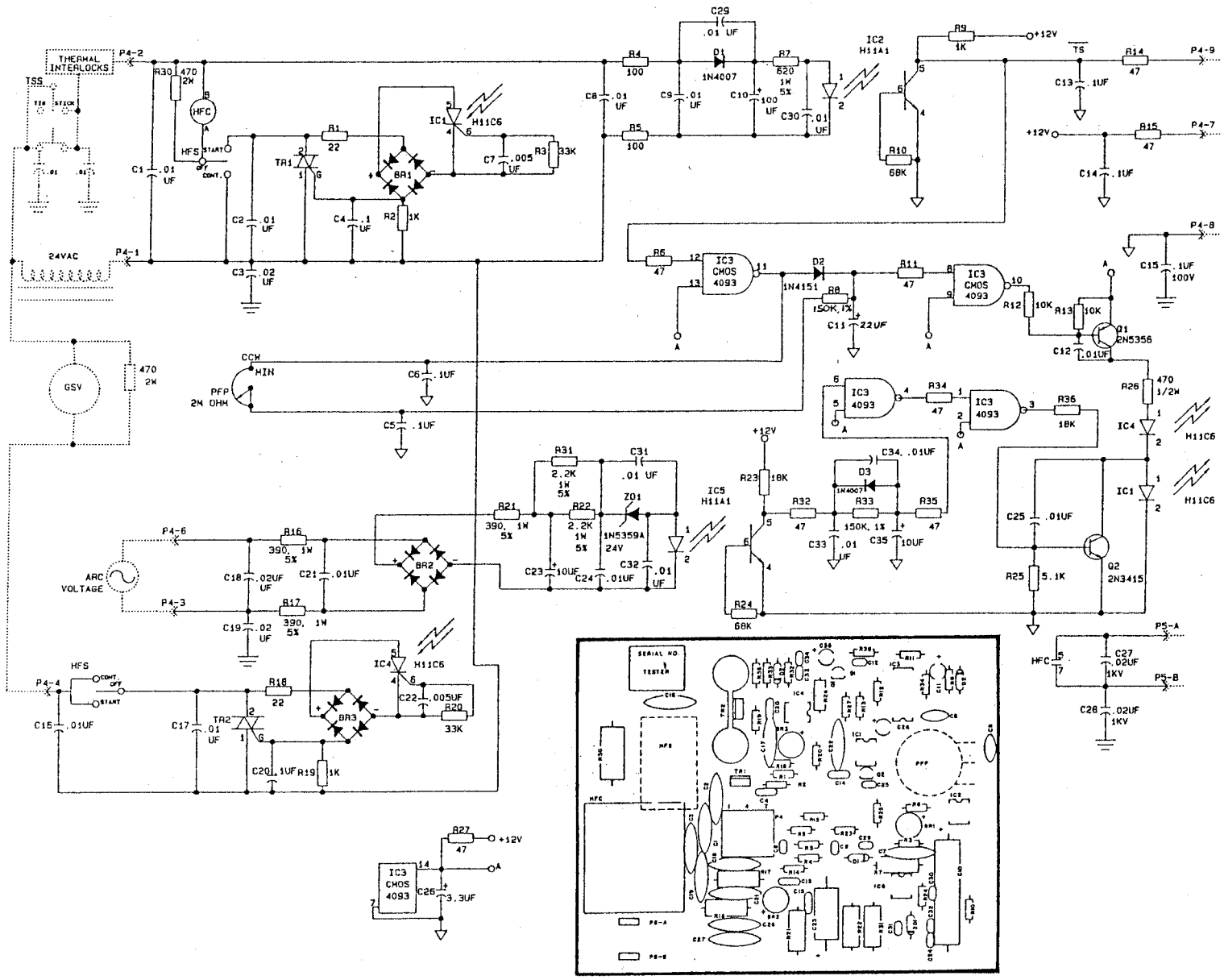
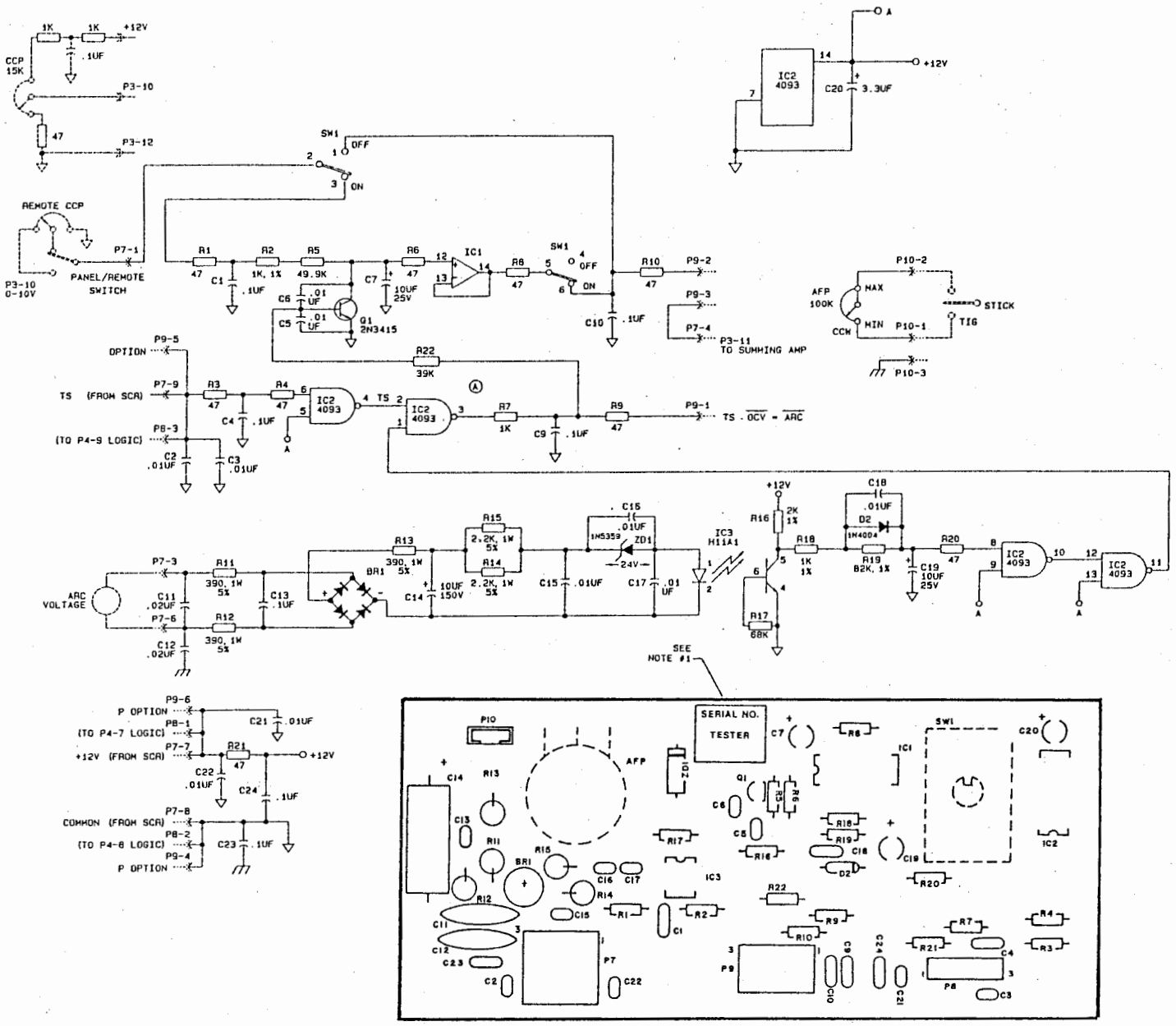


Fig. 13 - Logic P.C. Bd. Schematic

NOTES

1. AFTER TESTING STOCK AS 7675421
2. TEST PER A-680750
3. LATEST REVISION LETTER , MANUFACTURED DATE (YEAR AND WEEK) SERIAL NUMBER AND TESTER TO BE SILKSCREENED, STAMPED OR STENCILED IN LOCATION SHOWN - 3/32 LETTERING FUTURA BOLD.
4. COAT BOARD AFTER ASSEMBLY USING ITEM 55. COATING THICKNESS TO BE .0015 IN. MIN. ITEMS TO BE FREE OF PROTECTIVE COATING 45, 46, 48, 49, 51.
5. ALL RESISTOR VALUES ARE IN OHMS UNLESS NOTED OTHERWISE.
6. INSTALL ITEMS 51 & 46 AFTER FLOW SOLDER OPERATION AND HAND SOLDER IN LOCATIONS SHOWN, BEFORE CONFORMAL COATING.
7. DO NOT COAT MOUNTING HOLES ON EITHER SIDE WITH CONFORMAL COATING (ITEM 55).

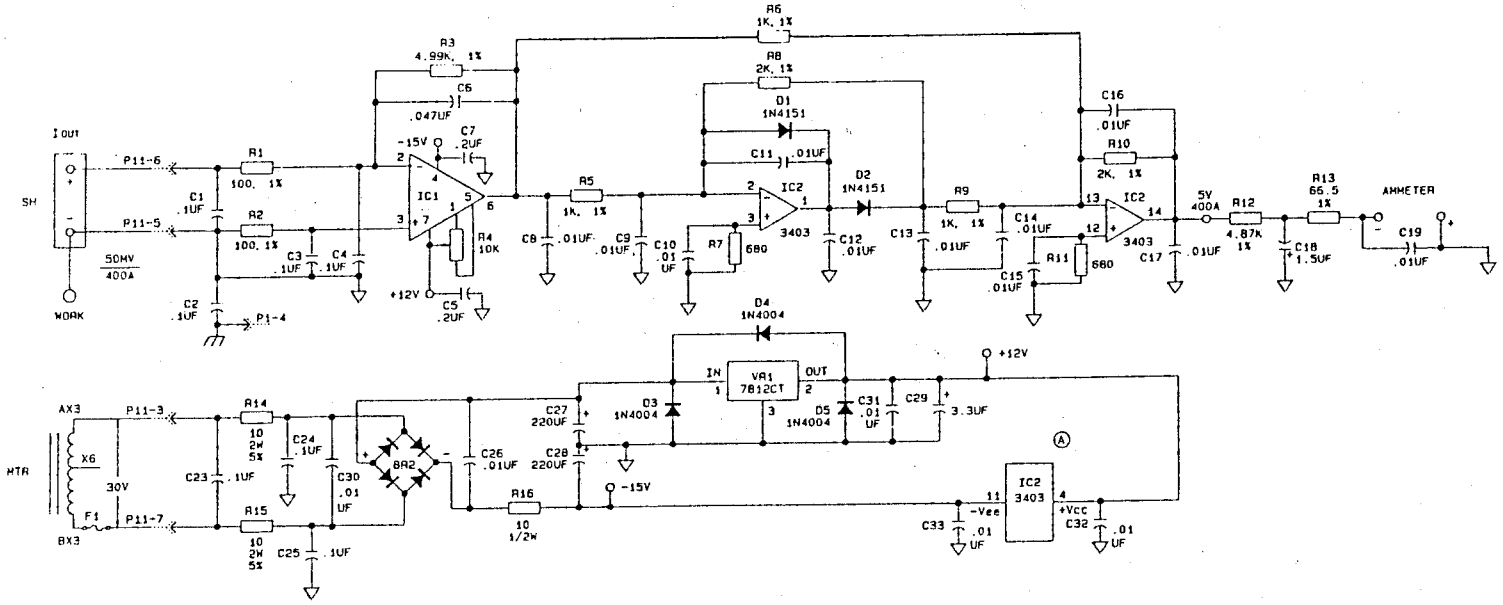
D- (8) 675492



NOTES

1. AFTER TESTING STOCK AS 8675492
2. TEST PER
3. LATEST REVISION LETTER , MANUFACTURED DATE , (YEAR AND WEEK) SERIAL NUMBER AND TESTER TO BE SILKSCREENED , STAMPED OR STENCILED IN LOCATION SHOWNED - 3/32 LETTERING FUTURA BOLD.
4. COAT BOARD AFTER ASSEMBLY USING ITEM 39 COATING THICKNESS TO BE .008 IN. MIN. ITEMS TO BE FREE OF PROTECTIVE COATING 31, 32, 34-37, 40.
5. ALL RESISTOR VALUES ARE IN OHMS UNLESS NOTED OTHERWISE.

Fig. 14 - Soft Start P.C. Bd. Schematic



NOTES

1. AFTER TESTING STOCK AS (8) 675497
2. TEST PER A-680999
3. LATEST REVISION LETTER , MANUFACTURED DATE, (YEAR AND WEEK) SERIAL NUMBER AND TESTER TO BE SILKSCREENED, STAMPED OR STENCILED IN LOCATION SHOWN – 3/32 LETTERING FUTURA BOLD.
4. COAT BOARD AFTER ASSEMBLY USING ITEM COATING THICKNESS TO BE .008 IN. MIN. ITEMS TO BE FREE OF PROTECTIVE COATING
5. ALL RESISTOR VALUES ARE IN OHMS UNLESS NOTED OTHERWISE.

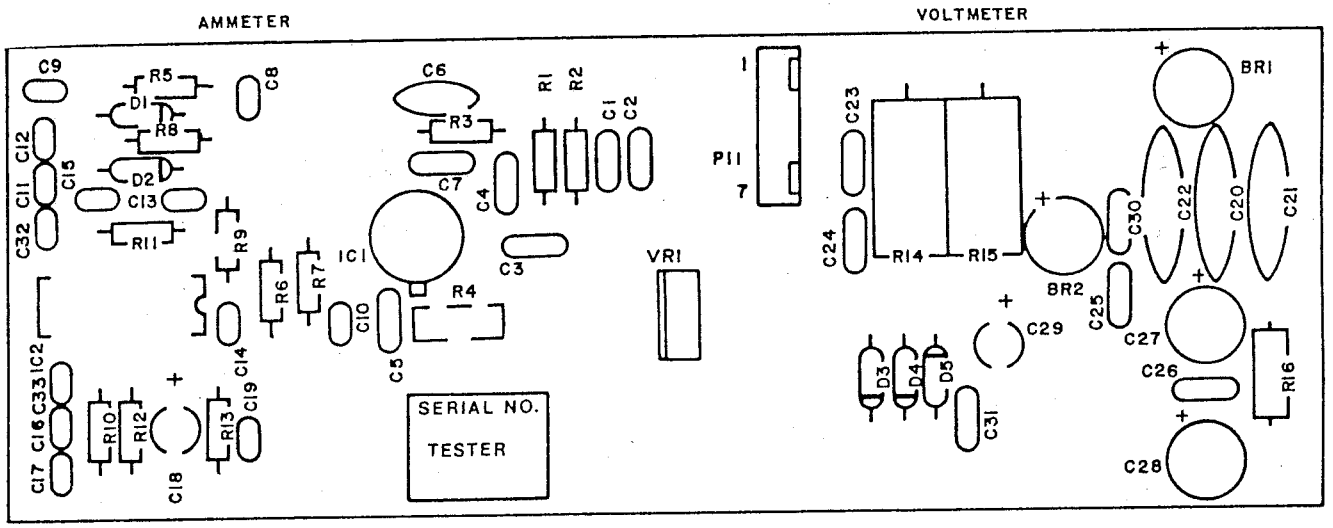
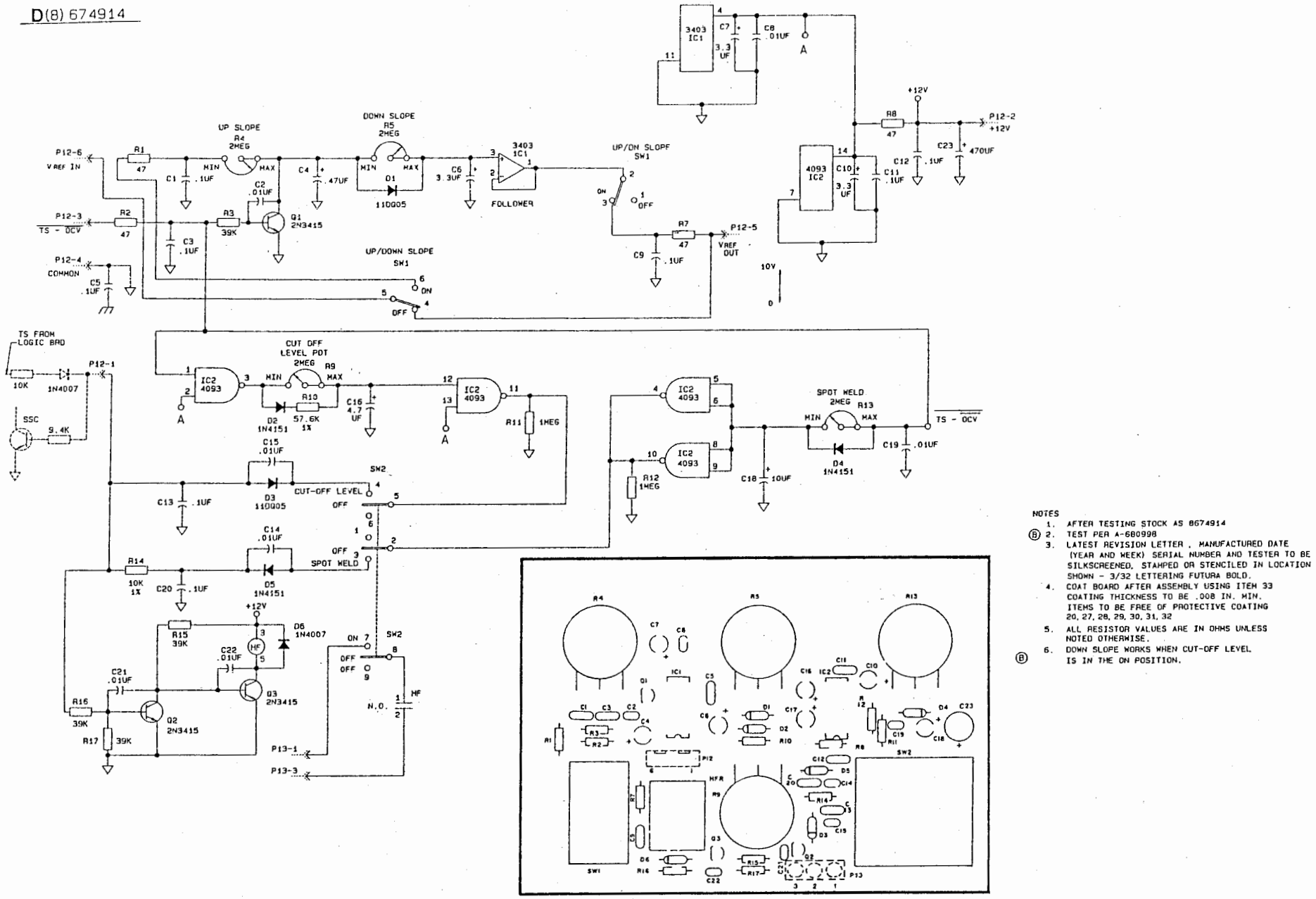


Fig. 15 - Analog Meter P.C. Bd. Schematic

D(8) 674914

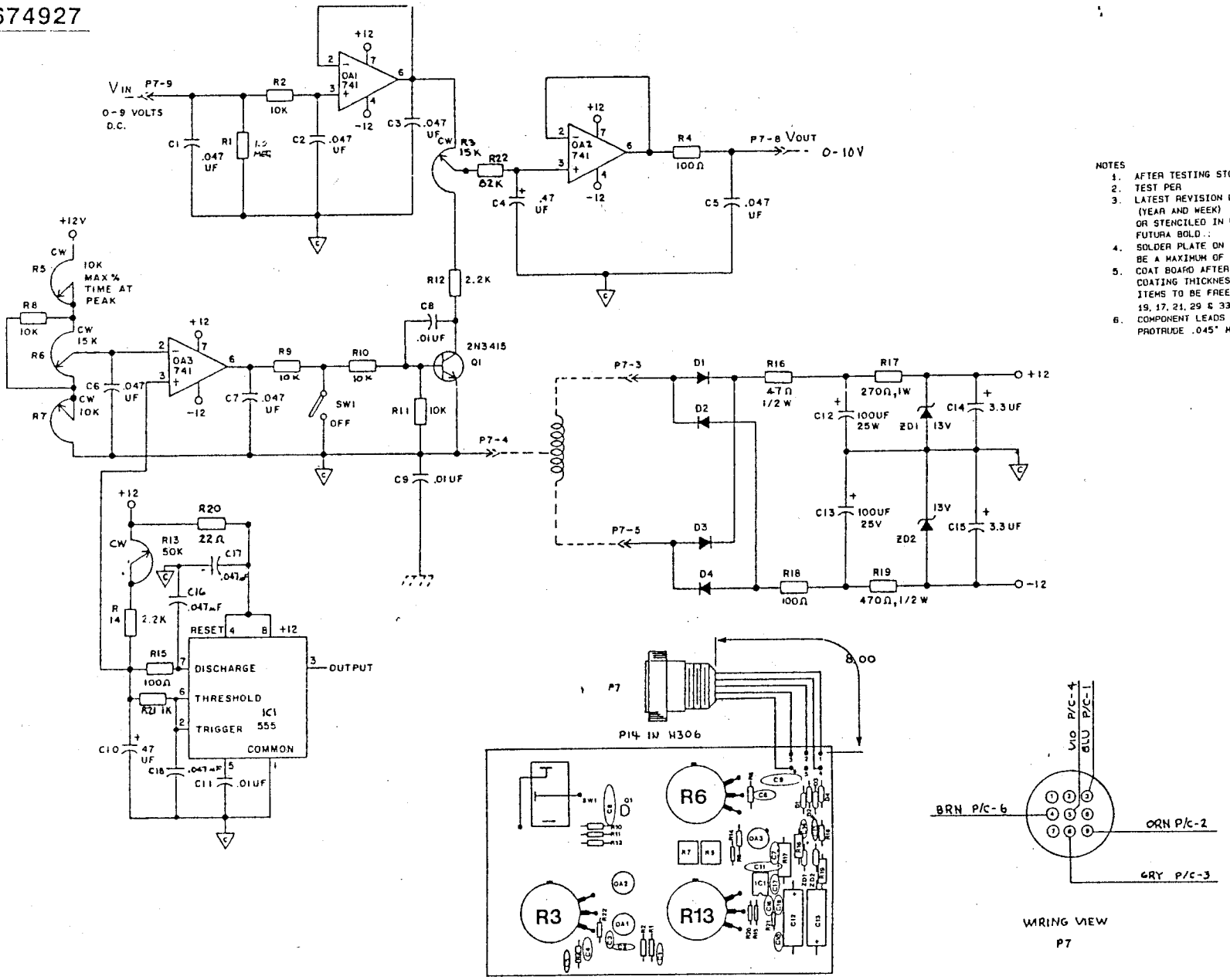


NOTES

1. AFTER TESTING STOCK AS 8674914
2. (B) TEST PER A-680998
3. LATEST REVISION LETTER , MANUFACTURED DATE (YEAR AND WEEK) SERIAL NUMBER AND TESTER TO BE SILKSCREENED, STAMPED OR STENCILED IN LOCATION SHOWN - 3/32 LETTERING FUTURA BOLD.
4. COAT BOARD AFTER ASSEMBLY USING ITEM 33 COATING THICKNESS TO BE .008 IN. MIN. ITEMS TO BE FREE OF PROTECTIVE COATING 20, 27, 28, 29, 30, 31, 32
5. ALL RESISTOR VALUES ARE IN OHMS UNLESS NOTED OTHERWISE.
6. (B) DOWN SLOPE WORKS WHEN CUT-OFF LEVEL IS IN THE ON POSITION.

Fig. 16 - Up/Dn Slope-Spotweld P.C. Bd. Schematic

D- 674927

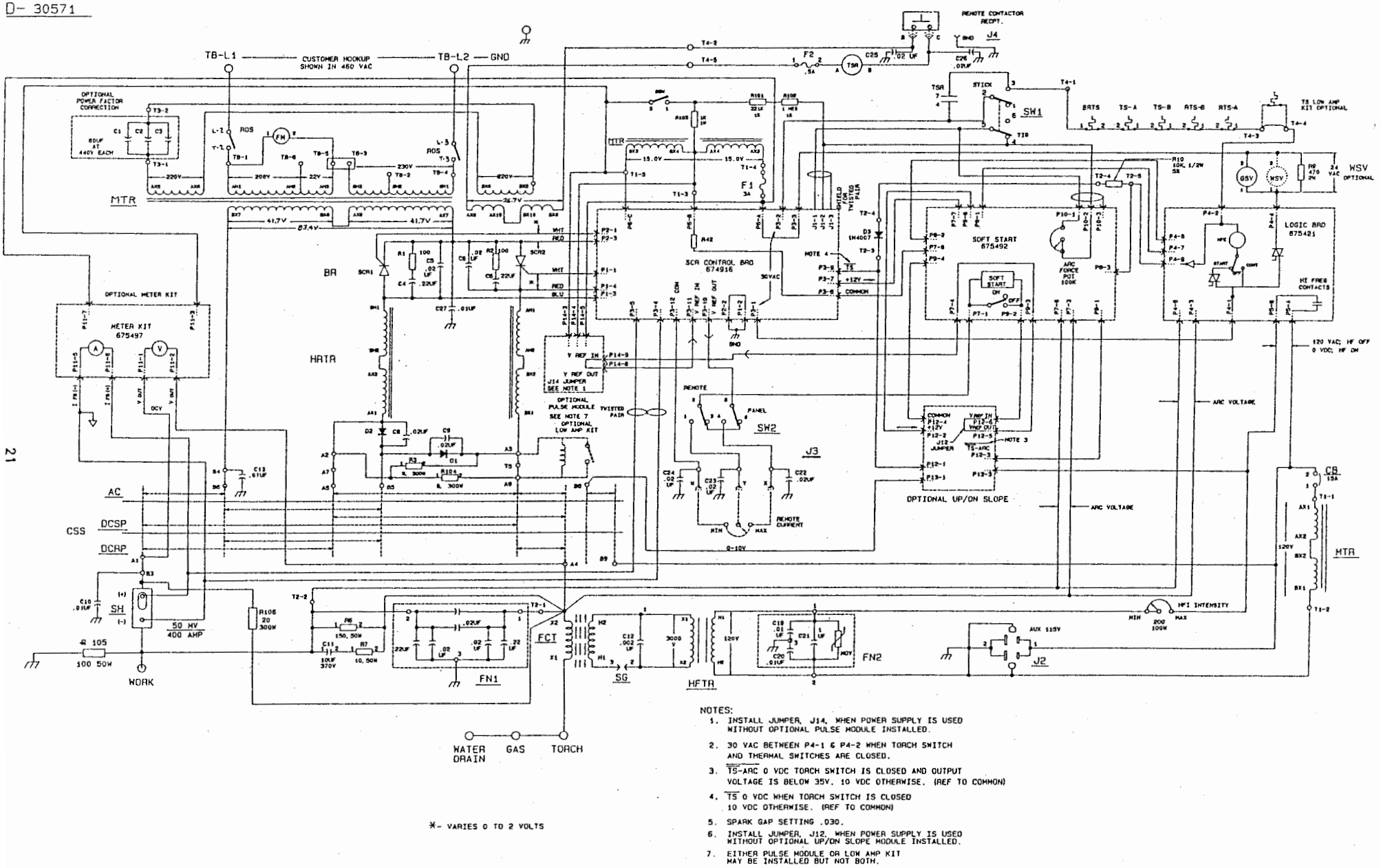


NOTES

1. AFTER TESTING STOCK AS
2. TEST PER
3. LATEST REVISION LETTER , MANUFACTURED DATE (YEAR AND WEEK) TO BE SILKSCREENED , STAMPED OR STENCILED IN LOCATION SHOWN - 3/32 LETTERING FUTURA BOLD .:
4. SOLDER PLATE ON CIRCUIT AREA AFTER WAVE SOLDERING TO BE A MAXIMUM OF 0.0003 INCH THICK.
5. COAT BOARD AFTER ASSEMBLY USING ITEM 32 COATING THICKNESS TO BE .008 IN. MIN. ITEMS TO BE FREE OF PROTECTIVE COATING 19, 17, 21, 29 & 33.
6. COMPONENT LEADS ON CIRCUIT SIDE TO PROTRUDE .045" MAX.

Fig. 17 - Pulse P.C. Bd. Schematic

D- 30571



NOTES:

1. INSTALL JUMPER, J14, WHEN POWER SUPPLY IS USED WITHOUT OPTIONAL PULSE MODULE INSTALLED.
2. 30 VAC BETWEEN P4-1 & P4-2 WHEN TORCH SWITCH AND THERMAL SWITCHES ARE CLOSED.
3. $\overline{\text{TS}}$-ARC 0 VDC TORCH SWITCH IS CLOSED AND OUTPUT VOLTAGE IS BELOW 35V. 10 VDC OTHERWISE. (REF TO COMMON)
4. $\overline{\text{TS}}$ 0 VDC WHEN TORCH SWITCH IS CLOSED 10 VDC OTHERWISE. (REF TO COMMON)
5. SPARK GAP SETTING .030.
6. INSTALL JUMPER, J12, WHEN POWER SUPPLY IS USED WITHOUT OPTIONAL UP/DN SLOPE MODULE INSTALLED.
7. EITHER PULSE MODULE OR LOW AMP KIT MAY BE INSTALLED BUT NOT BOTH.

*- VARIES 0 TO 2 VOLTS

Fig. 18 - Schematic Diagram - Basic (see notes 2 & 3 on page 8)

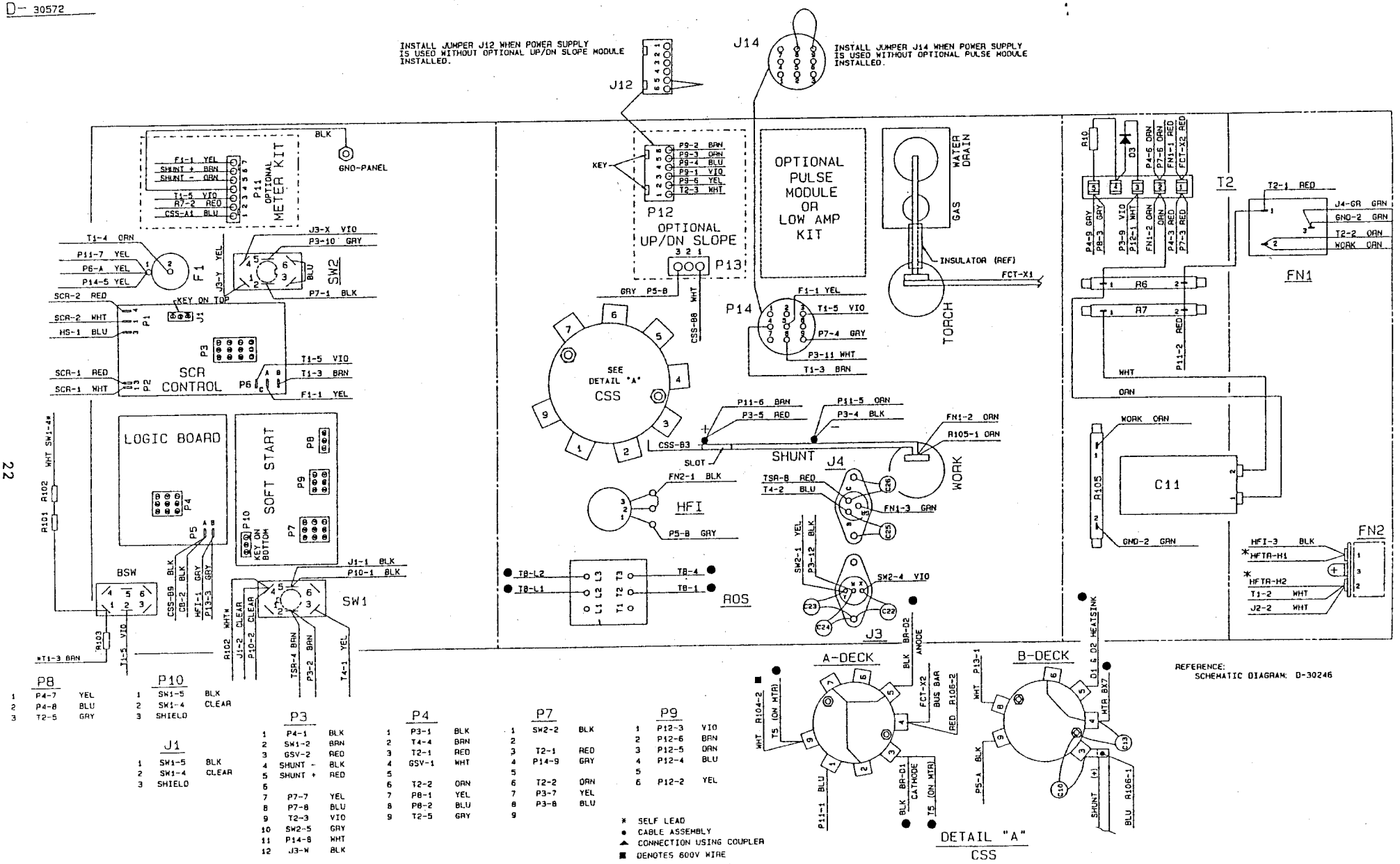


Fig. 18A - Wiring Diagram Sheet No. 1 of 2 - Basic (see notes 2 & 3 on page 8)

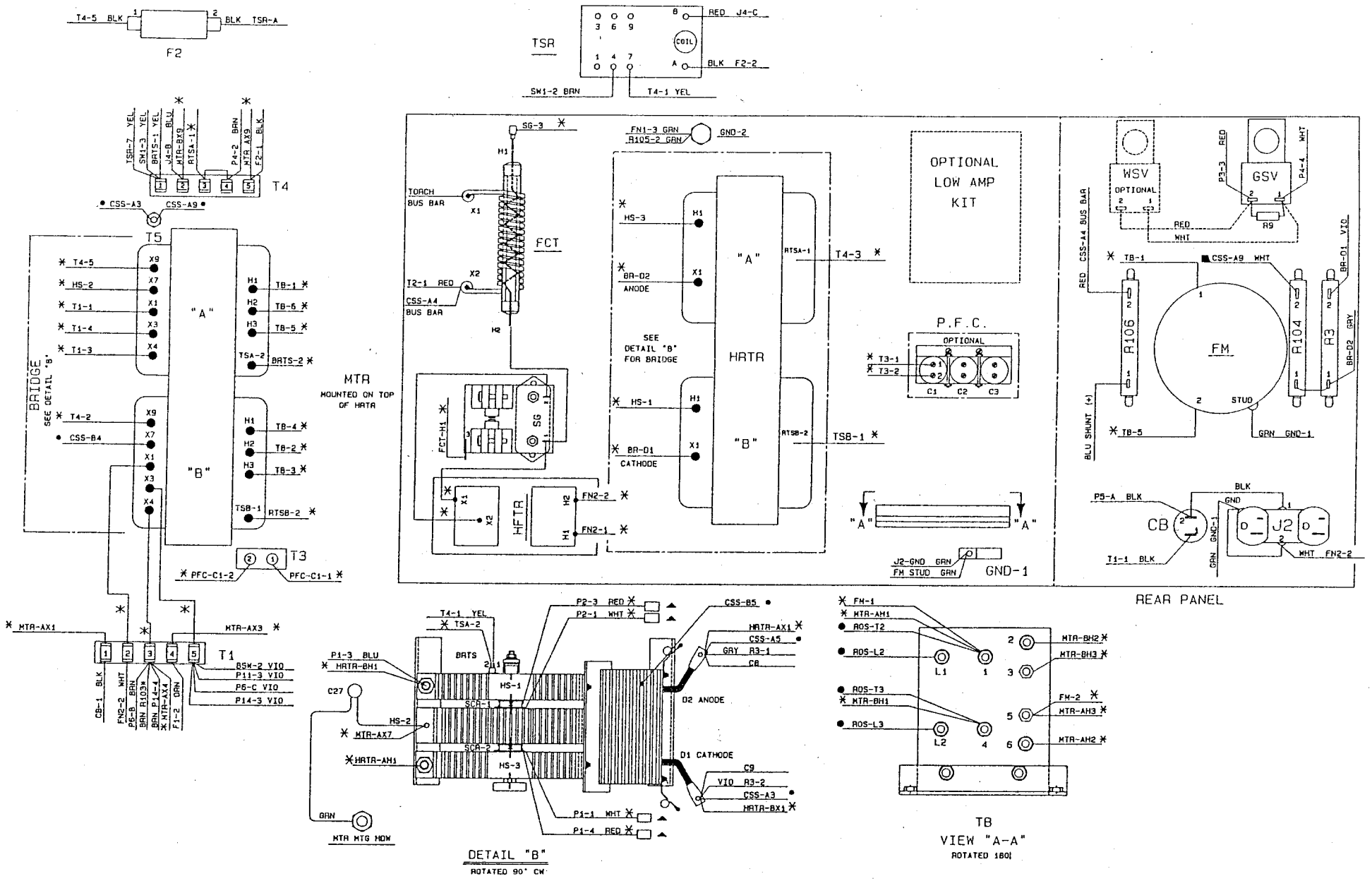


Fig. 18B - Wiring Diagram Sheet No. 2 of 2 - Basic (see notes 2 & 3 on page 8)

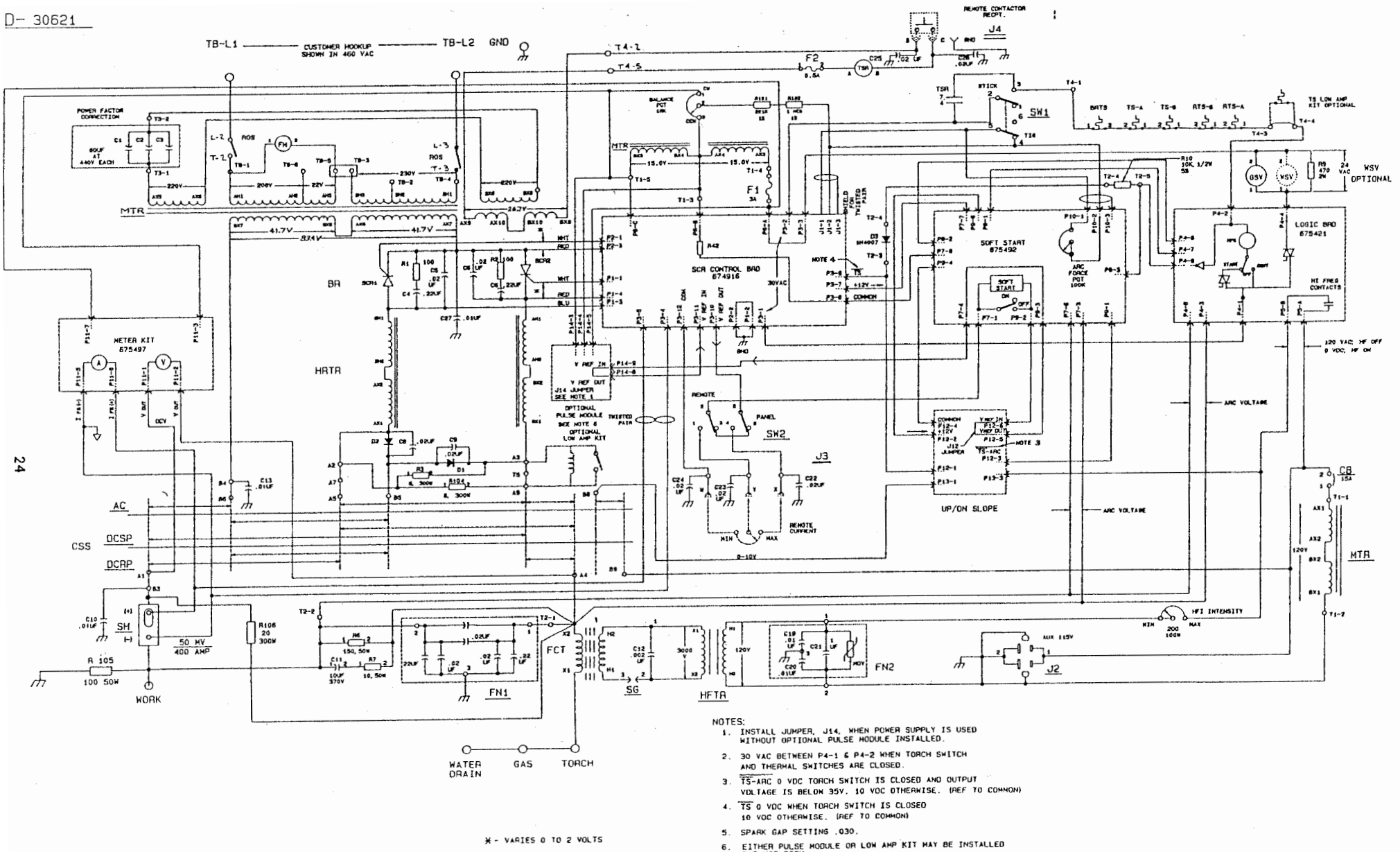
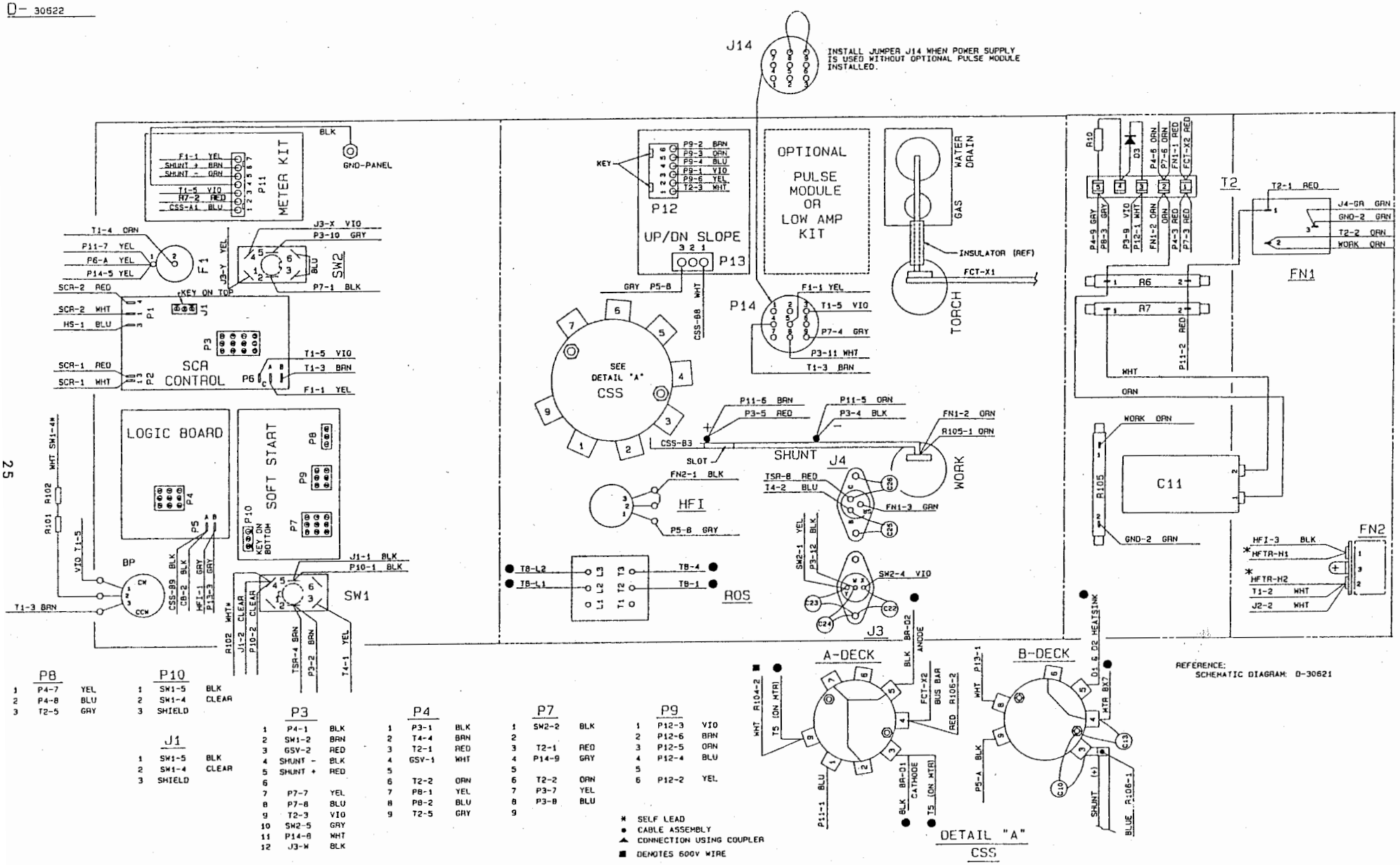


Fig. 19 - Schematic Diagram - Deluxe (see notes 2 & 3 on page 8)



P8		
1	P4-7	YEL
2	P4-8	BLU
3	T2-5	GRY

P10		
1	SW1-5	BLK
2	SW1-4	CLEAR
3	SHIELD	

J1		
1	SW1-5	BLK
2	SW1-4	CLEAR
3	SHIELD	

P3		
1	P4-1	BLK
2	SW1-2	BRN
3	GSV-2	RED
4	SHUNT -	BLK
5	SHUNT +	RED
6		
7	P7-7	YEL
8	P7-8	BLU
9	T2-3	VIO
10	SW2-5	GRY
11	P14-8	WHT
12	J3-W	BLK

P4		
1	P3-1	BLK
2	T4-4	BRN
3	T2-1	RED
4	GSV-1	WHT
5		
6	T2-2	ORN
7	P8-1	YEL
8	P8-2	BLU
9	T2-5	GRY

P7		
1	SW2-2	BLK
2		
3	T2-1	RED
4	P14-9	GRY
5		
6	T2-2	ORN
7	P3-7	YEL
8	P3-8	BLU
9		

P9		
1	P12-3	VIO
2	P12-6	BRN
3	P12-5	ORN
4	P12-4	BLU
5		
6	P12-2	YEL

Fig. 19A - Wiring Diagram Sheet No. 1 of 2 - Deluxe (see notes 2 & 3 on page 8)

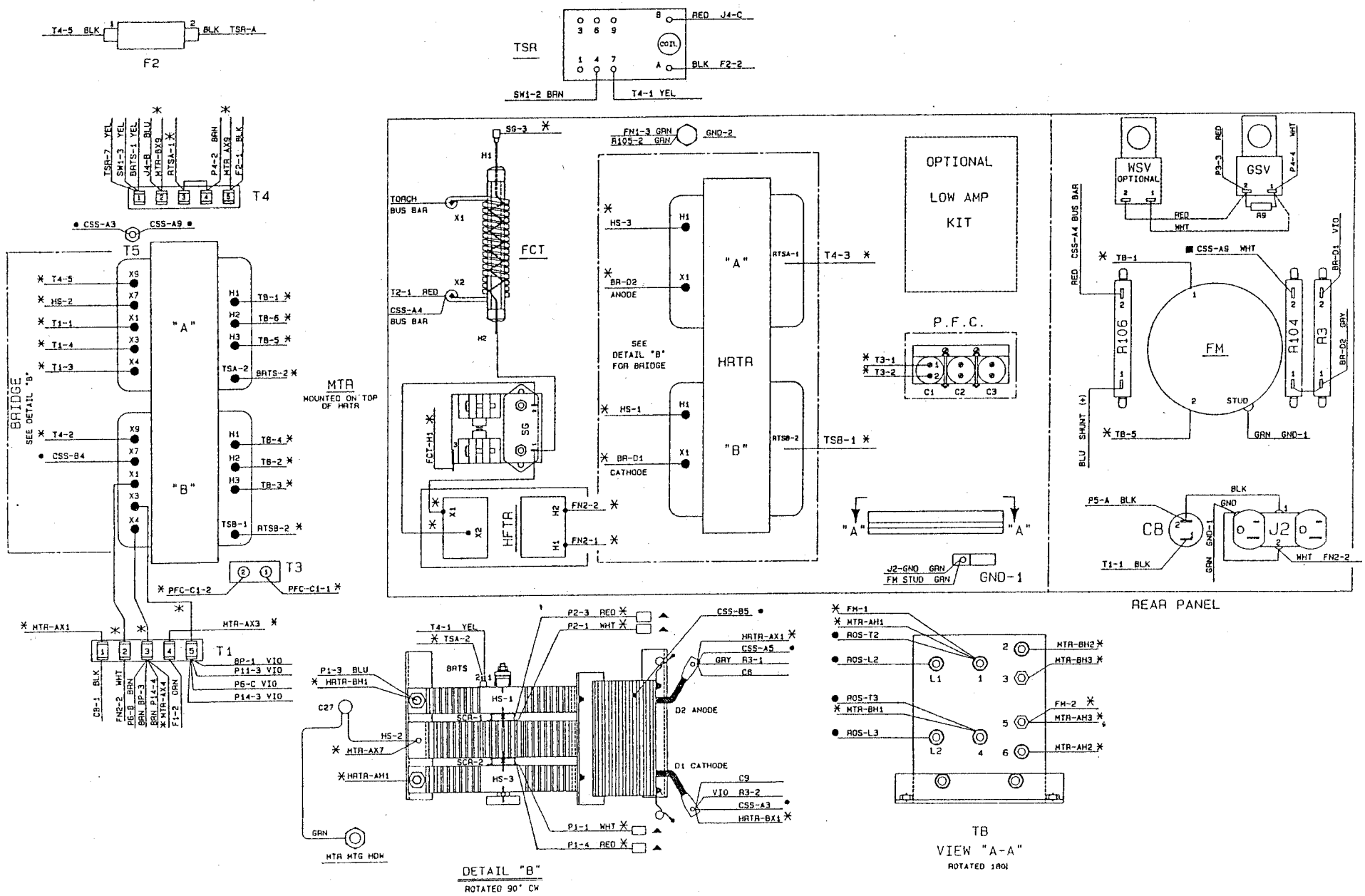
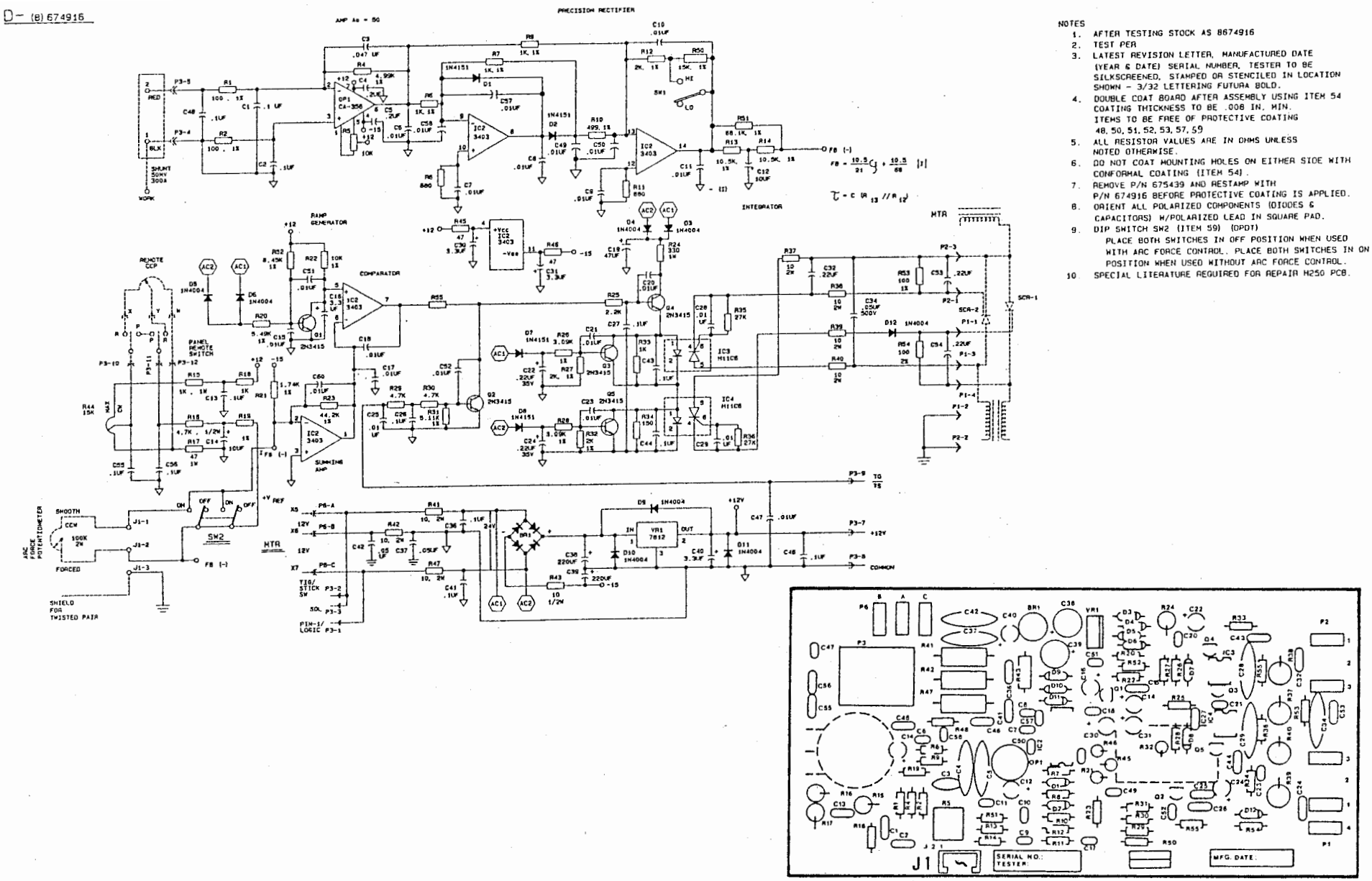


Fig. 19B - Wiring Diagram Sheet No. 2 of 2 - Deluxe (see notes 2 & 3 on page 8)



NOTES

1. AFTER TESTING STOCK AS 8674916
2. TEST PER
3. LATEST REVISION LETTER, MANUFACTURED DATE (YEAR & DATE) SERIAL NUMBER, TESTER TO BE SILKSCREENED, STAMPED OR STENCILED IN LOCATION SHOWN - 3/32 LETTERING FUTURA BOLD.
4. DOUBLE COAT BOARD AFTER ASSEMBLY USING ITEM 54 COATING THICKNESS TO BE .008 IN. MIN. ITEMS TO BE FREE OF PROTECTIVE COATING 48, 50, 51, 52, 53, 57, 59
5. ALL RESISTOR VALUES ARE IN OHMS UNLESS NOTED OTHERWISE.
6. DO NOT COAT MOUNTING HOLES ON EITHER SIDE WITH CONFORMAL COATING (ITEM 54).
7. REMOVE P/N 675439 AND RESTAMP WITH P/N 674916 BEFORE PROTECTIVE COATING IS APPLIED.
8. ORIENT ALL POLARIZED COMPONENTS (DIODES & CAPACITORS) W/POLARIZED LEAD IN SQUARE PAD.
9. DIP SWITCH SW2 (ITEM 59) (DPDT)
   PLACE BOTH SWITCHES IN OFF POSITION WHEN USED WITH ARC FORCE CONTROL. PLACE BOTH SWITCHES IN ON POSITION WHEN USED WITHOUT ARC FORCE CONTROL.
10. SPECIAL LITERATURE REQUIRED FOR REPAIR H250 PCB.

Fig. 20 - SCR Control P.C.Board (P/N 674916) Schematic (see notes 2 & 3 on page 8)

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