HT2000®

Kip Valve Upgrade

Field Service Bulletin
802800 - Rev. 0

HYPERTHERM®

HT2000
Kip Valve Upgrade

Field Service Bulletin
IM-280
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HT2000 Kip Valve Upgrade

In this bulletin:

INTRODUCTION

Purpose

This field service bulletin will enable a qualified electronics technician to upgrade the following components on the HT2000 system:

	Gas Console	Motor Valve Console	Off-Valve Assembly	Off-Valve Cable	Firmware
From	073068	073069	029703	023804	G
To	073218	073219	129168	123185	J

General

This upgrade replaces solenoid valves manufactured by MAC to ones manufactured by KIP. Since the MAC valves have 3 ports and the KIP valves have 2 ports, the gas console and motor valve console hardware configuration has changed. Additional wires also need to be added to the power supply to accommodate additional signals from the relay board to the 1X2 (Gas Console) and 1X3 (Motor Valve Console) receptacles.

Customer Required Tools

Phillips head screwdriver
wrench set (non-metric)
9/64" Allen wrench
5/16" nut driver

HT2000 Kip Valve Upgrade Kit (128155):

Part No.	Description	Qty.
128155	**HT2000 Kip Valve Upgrade Kit**	
073218	HT2000 Gas Console II	1
073219	HT2000 Motor Valve Console II	1
129168	Off Valve Assembly, HT2000 Machine Torch	1
123185	Cable: HT2000 Motor Valve/Torch Off-Valve	1
081004	Firmware HT2000 Power Supply Rev. J	1
129205	Wire group HT2000 Kip Valve Upgrade	1
074005	Cable tie: 7/8"	6
074216	Cable tie: 3-7/8"	6
802800	Field Service Bulletin: HT2000 Kip Valve Upgrade	1

INSTALLATION

There are 5 steps involved with this upgrade.

I. Replacing the Gas Console

II. Replacing the Motor Valve Console

III. Replacing the Off-Valve Subassembly and Cable

IV. Installing new firmware

V. Adding wires to the 1X3 and 1X2 power supply receptacles

WARNING

SHOCK HAZARD: Always turn off power and wait 5 minutes before removing any cover of the HT2000 power supply system. If power unit is directly connected to a line disconnect box, place line disconnect switch to OFF position. Lock out and tag out switch before proceeding!

WARNING

Turn off all gas supplies before performing this upgrade!

I. REPLACING THE GAS CONSOLE

1. TURN OFF ALL POWER AND GASES TO THE PLASMA ARC SYSTEM! See warnings on page 3.

2. Remove all hoses and cables from the 073068 gas console. Fig. 1.

3. Attach all hoses and cables to the 073218 gas console. Fig. 2.

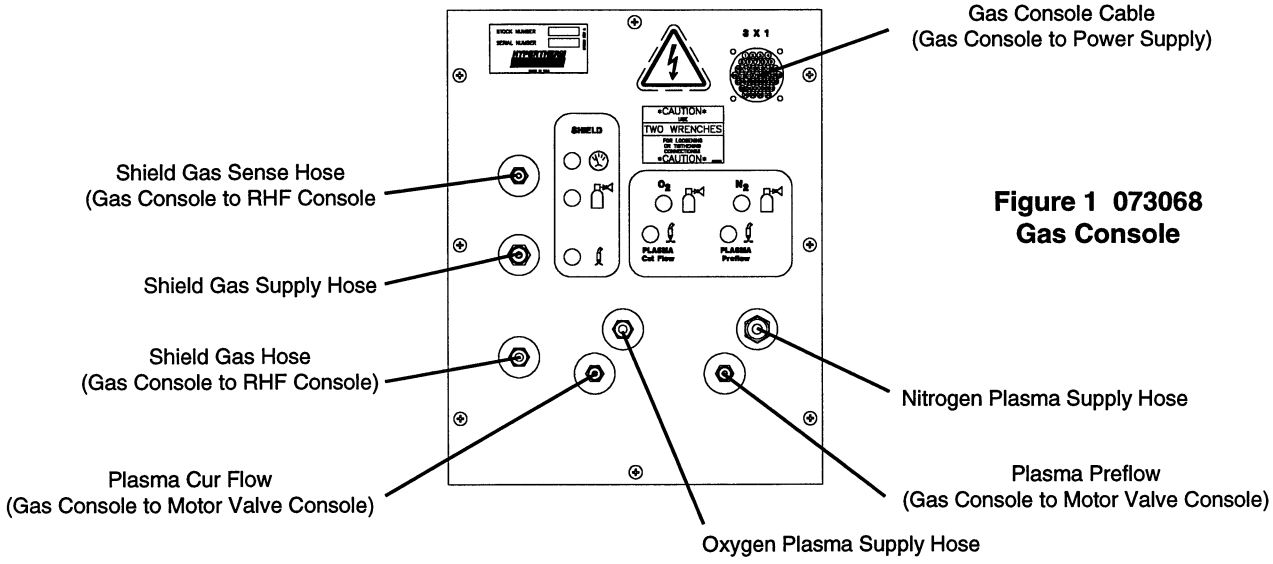


Figure 1 073068 Gas Console

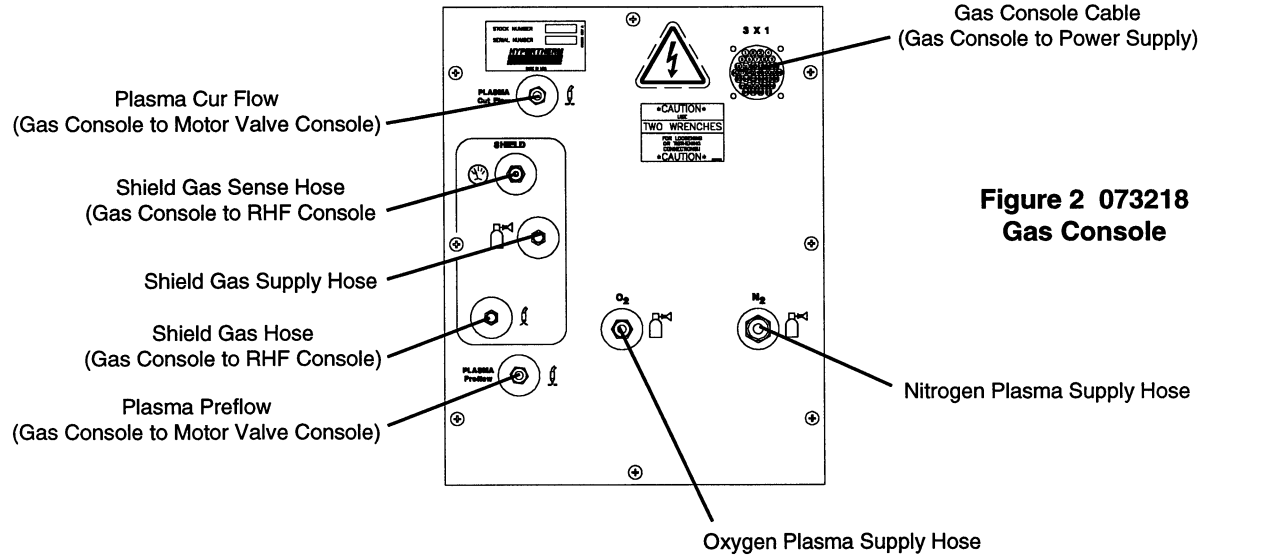


Figure 2 073218 Gas Console

II. REPLACING THE MOTOR VALVE CONSOLE

1. Remove all hoses and cables from the 073069 motor valve console. Fig. 3.

2. Attach all hoses and 4X1 cable to the 073219 motor valve console. Fig. 3.

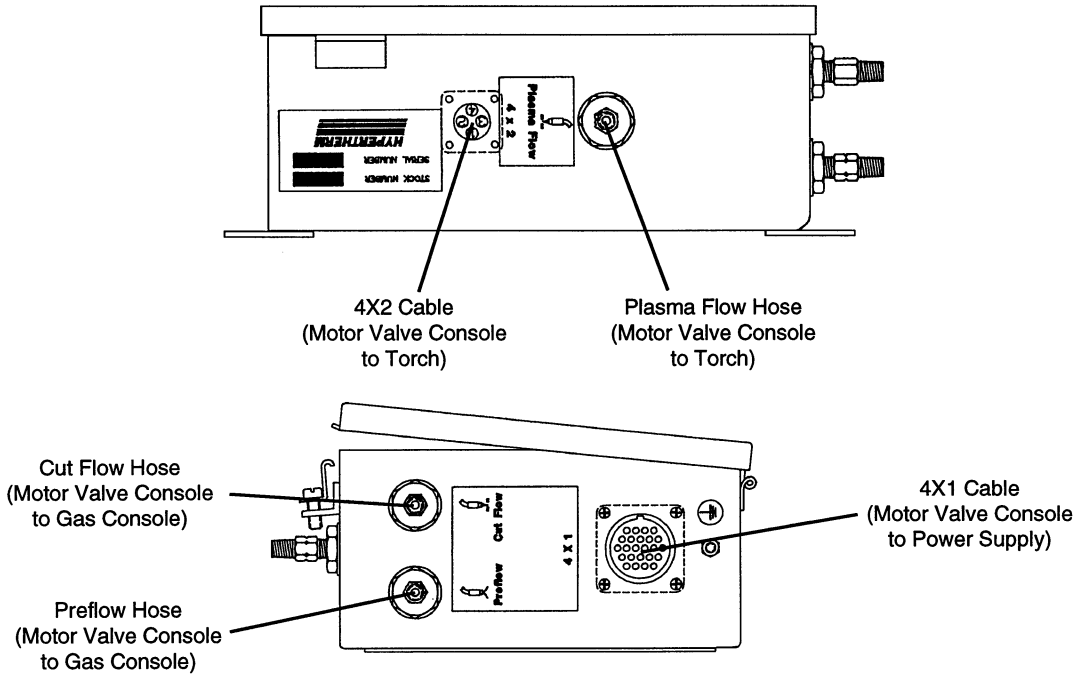


Figure 3 Motor Valve Console Connections (073069 and 073219)

III. REPLACING THE OFF-VALVE SUBASSEMBLY AND CABLE

The torch mounting sleeve and the plasma hose from the torch to the off-valve are provided with the upgrade kit. For ease of replacement, these instructions recommend not replacing the torch sleeve or plasma hose unless they are damaged.

Replacing the Off-Valve Subassembly

1. Remove any cable ties from off-valve cable and plasma flow hose.
2. Disconnect both hoses attached to the off-valve subassembly (029703).
3. Loosen off-valve mounting bracket from torch sleeve using the 9/64" Allen wrench.
4. Remove 029703 off-valve subassembly from torch.
5. Remove supplied torch sleeve from 129168 off-valve subassembly.
6. Slide 129168 off-valve subassembly onto existing torch sleeve.
7. Tighten screw in the 129168 bracket to secure off-valve subassembly to torch sleeve.
8. Remove the plasma hose that is attached to the 129168 subassembly.
9. Attach the plasma hose from the torch to the off-valve subassembly. Fig. 4.
10. Attach the plasma hose from the motor valve console to the off-valve subassembly. Fig. 4.

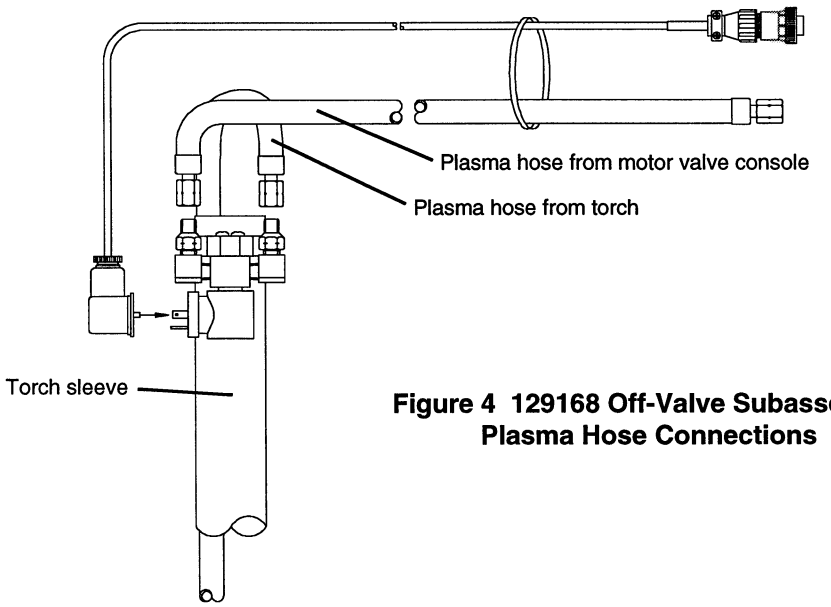


Figure 4 129168 Off-Valve Subassembly Plasma Hose Connections

III. REPLACING THE OFF-VALVE SUBASSEMBLY AND CABLE (Continued)

Replacing the Off-Valve Cable

1. If rubber gasket is not pressed into the off-valve cable connector, place rubber gasket into cable connector.
2. Connect the off-valve cable connector to the solenoid valve on the off-valve subassembly.
3. Insert cable connector screw into the off-valve cable connector and tighten.
4. Connect the other end of the off-valve cable to the 4X2 connector on the motor valve console.
5. Wrap the 074216 cable ties around cable and hose every 24" (600 mm).

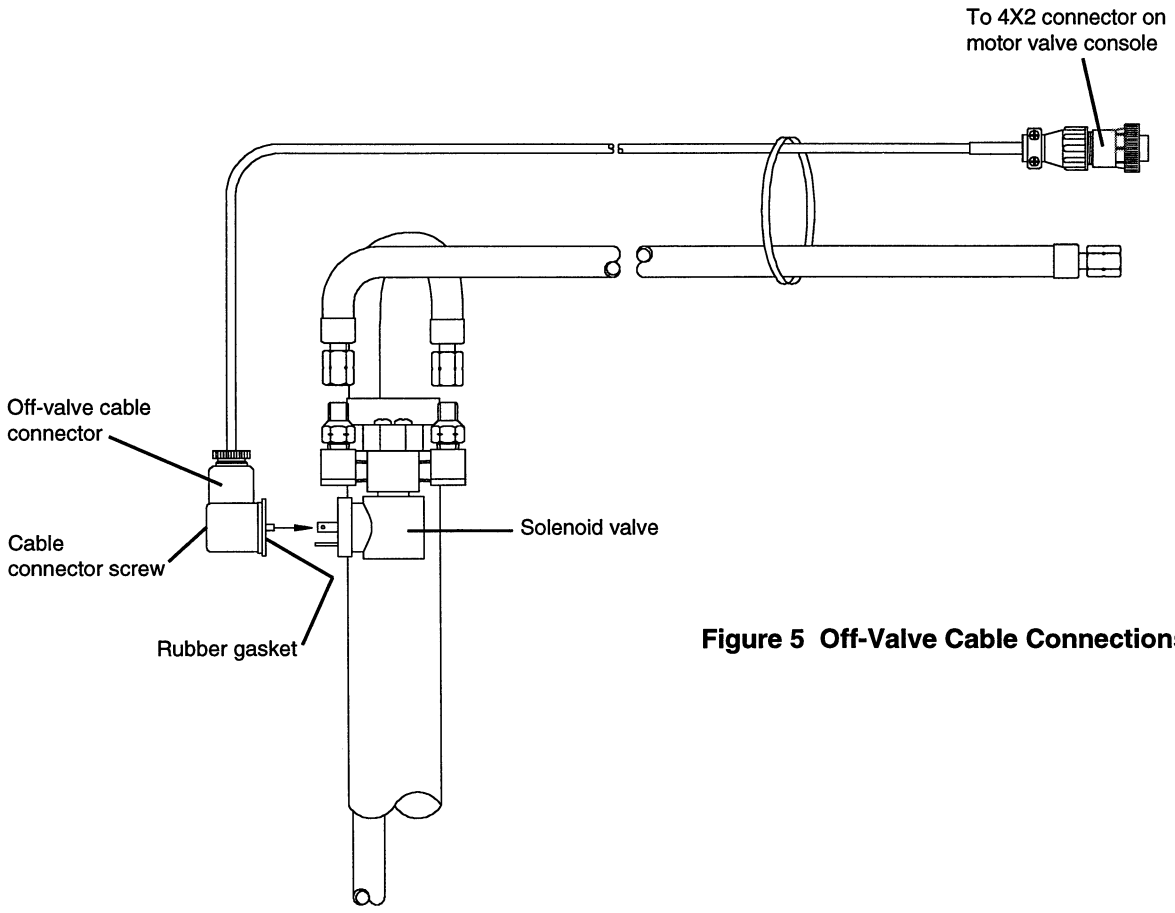


Figure 5 Off-Valve Cable Connections

IV. INSTALLING NEW FIRMWARE

1. Remove front panel of power supply.

2. Unscrew control panel and rotate it to sit on top of the power supply with the electrical wires still attached.

3. Find Control Board PCB2 and firmware IC **081004**. Firmware IC is located in socket labeled **U9** underneath high-frequency cover. See Fig. 6

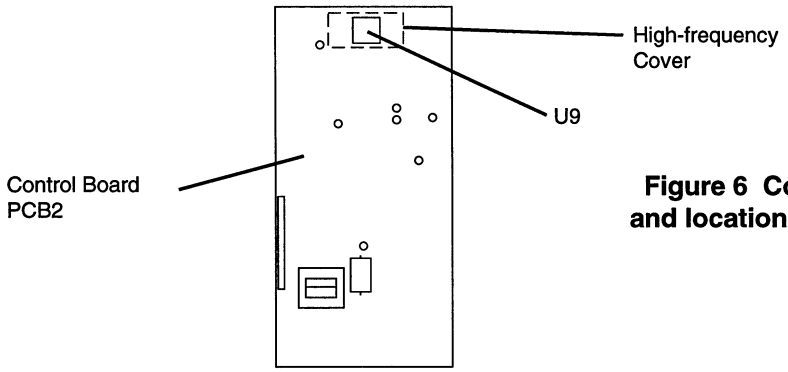


Figure 6 Control Board PCB2 and location of firmware 081004

4. Remove 081004 firmware from U9 socket.

5. Carefully install latest version (Rev. J) of 081004 firmware into U9 socket.

   a. Orient firmware by aligning dot and bevel on IC (indicating pin 1) to dot on socket. (Some firmware has only a bevel indicating the side where pin 1 is located.) See Fig. 7. Be careful not to bend any pins during installation.

   b. Press IC into place. See Fig. 8. When properly installed, IC will be flush with top of socket.

6. Reinstall high-frequency cover.

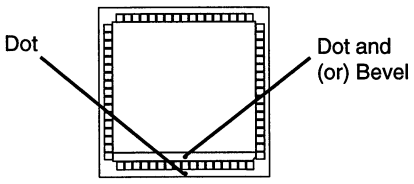


Figure 7 HT2000 Firmware 081004 (shown in socket)

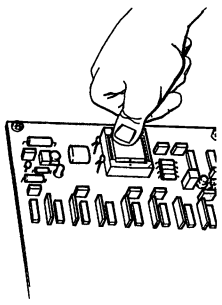


Figure 8 Press Firmware 081004 in Socket (typical)

V. ADDING WIRES TO THE 1X3 AND 1X2 POWER SUPPLY RECEPTACLES

Adding Wires to the 1X3 Receptacle

1. Remove right side panel of power supply.
2. Find PCB4 relay board in the front of the HT2000 power supply. See Fig. 9.

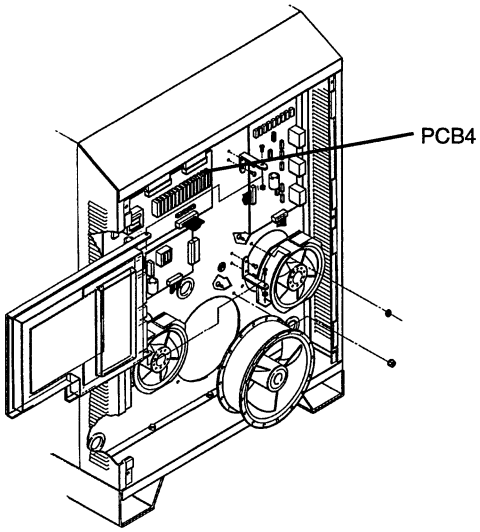


Figure 9 Location of PCB4

3. Find PL4.3 on PCB4 (PL4.3 connector plugs into RECP3 receptacle on PCB4). See Fig. 10.
4. Insert red wire from one of the two twisted wire pairs from 129205 wire group into socket 4 of PL4.3. Note that socket 1 is on the far right of PL4.3.
5. Insert red/black wire from the same twisted wire pair into socket 3 of PL4.3.

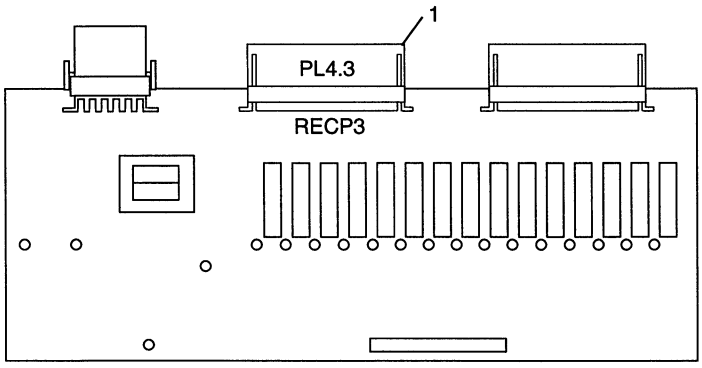


Figure 10 Location of PL4.3 on PCB4

V. ADDING WIRES TO THE 1X2 AND 1X3 POWER SUPPLY RECEPTACLES (Continued)

Adding Wires to the 1X3 Receptacle (Continued)

6. Route twisted wire pair from PL4.3 to rear wall of power supply.
7. Find the 1X3 receptacle on the power supply rear panel (Motor Valve Console).
8. Insert the red wire into socket 23.
9. Insert the red/black wire into socket 24.
10. Insert one of the two ground wires (black) from the 129205 wire group into socket 25.
11. Attach the other end of the ground wire to one of the daisy-chain ground studs nearby.

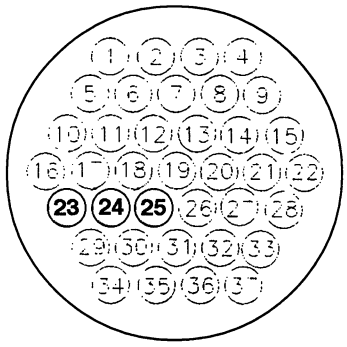


Figure 11 Location of 1X3 sockets (viewed from the inside of the power supply)

Adding Wires to the 1X2 Receptacle

1. Find PL4.4 on PCB4 (PL4.4 connector plugs into RECP4 receptacle on PCB4). See Fig. 10.
2. Insert red wire from one of the two twisted wire pairs from 129205 wire group into socket 14 of PL4.4. Note that socket 1 is on the far right of PL4.4.
3. Insert red/black wire from the same twisted wire pair into socket 13 of PL4.4.

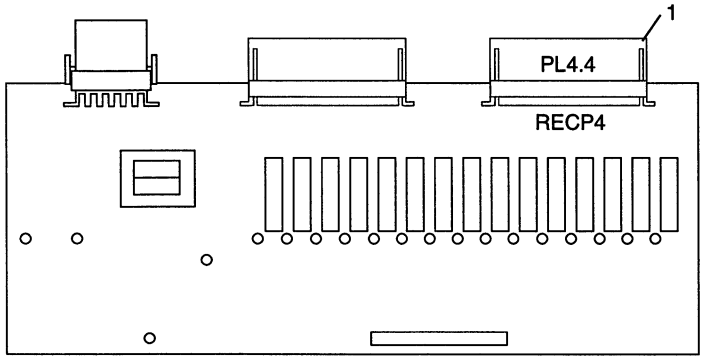


Figure 12 Location of PL4.4 on PCB4

V. ADDING WIRES TO THE 1X2 AND 1X3 POWER SUPPLY RECEPTACLES (Continued)

Adding Wires to the 1X2 Receptacle (Continued)

4. Route twisted wire pair from PL4.4 to rear wall of power supply.
5. Find the 1X2 receptacle on the power supply rear panel (Gas Console).
6. Insert the red wire into socket 27.
7. Insert the red/black wire into socket 28.
8. Insert the other ground wire (black) from the 129205 wire group into socket 22.
9. Attach the other end of the ground wire to one of the daisy-chain ground studs nearby.

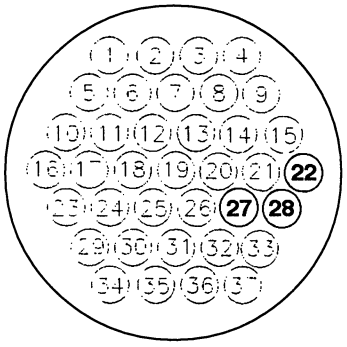


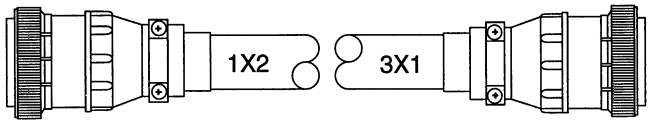
Figure 13 Location of 1X2 sockets (viewed from the inside of the power supply)

Replace all power supply covers and refasten.

This completes the valve upgrade for the HT2000 system. See **Section 6** in the HT2000 instruction manual to operate the system.

The following pages in this bulletin represent changes in the HT2000 instruction manual relevant to the KIP valve upgrade.

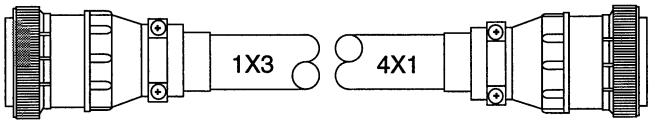
(6) *Gas Console Cable - PS to Gas Console*



From 1X2	To 3X1	Color	Signal
29	29	Black	S3 / MV2 Increase
30	30	Red	Spare
34	34	Shld	Shield
5	5	Black	S3 / MV2 Decrease
6	6	White	S3 / MV2 Common
1	1	Shld	Shield
2	2	Black	LT1 / DC ON
3	3	Green	LT1 / DC ON
7	7	Shld	Shield
8	8	Black	SV1A / O2 / N2
9	9	Blue	SV1A / O2 / N2
4	4	Shld	Shield
27	27	Red	SV1B / O2 / N2
28	28	Brown	SV1B / O2 / N2
22	22	Shld	Shield
16	16	Black	SV2 / O2 / N2
17	17	Yellow	SV2 / O2 / N2
10	10	Shld	Shield
11	11	Black	SV3 / Preflow Trap
12	12	Brown	SV3 / Preflow Trap
18	18	Shld	Shield
19	19	Black	S1 / N2 / O2
20	20	Orange	S1 / N2 / O2
13	13	Shld	Shield
14	14	Red	S2 / Test / Preflow
15	15	White	S2 / Test / Common
21	21	Shld	Shield
35	35	Red	S2 / Test / Operate
36	36	Green	S2 / Test / Common
31	31	Shld	Shield
32	32	Red	PS1&PS2
33	33	Blue	PS1&PS2
37	37	Shld	Shield

Part No.	Length
023549	**15 ft (4.5 m)**
023605	**25 ft (7.5 m)**
023757	**38 ft (11.5 m)**
023606	**50 ft (15 m)**
023607	**75 ft (23 m)**
023608	**100 ft (30.5 m)**
023743	**125 ft (38 m)**
023609	**150 ft (46 m)**

(7) *Motor Valve Console Cable - PS to Motor Valve Console*



From 1X3	To 4X1	Color	Signal
16	16	Black	SV4A/ Cutflow
17	17	Yellow	SV4A/ Cutflow
10	10	Shld	Shield
23	23	Red	SV4B/ Preflow
24	24	Yellow	SV4B/ Preflow
25	25	Shld	Shield
29	29	Black	SV5 / Plasma OFF
30	30	Red	SV5 / Plasma OFF
34	34	Shld	Shield
11	11	Black	MV2 Decrease
12	12	Brown	MV2 Decrease
18	18	Shld	Shield
14	14	Brown	MV2 Motor Increase
21	21	Shld	Shield

Part No.	Length
023551	**15 ft (4.5 m)**
023590	**25 ft (7.6 m)**
023776	**35 ft (10.5 m)**
023591	**50 ft (15 m)**
023592	**75 ft (23 m)**
023593	**100 ft (30.5 m)**
023594	**150 ft (46 m)**
023658	**200 ft (61 m)**

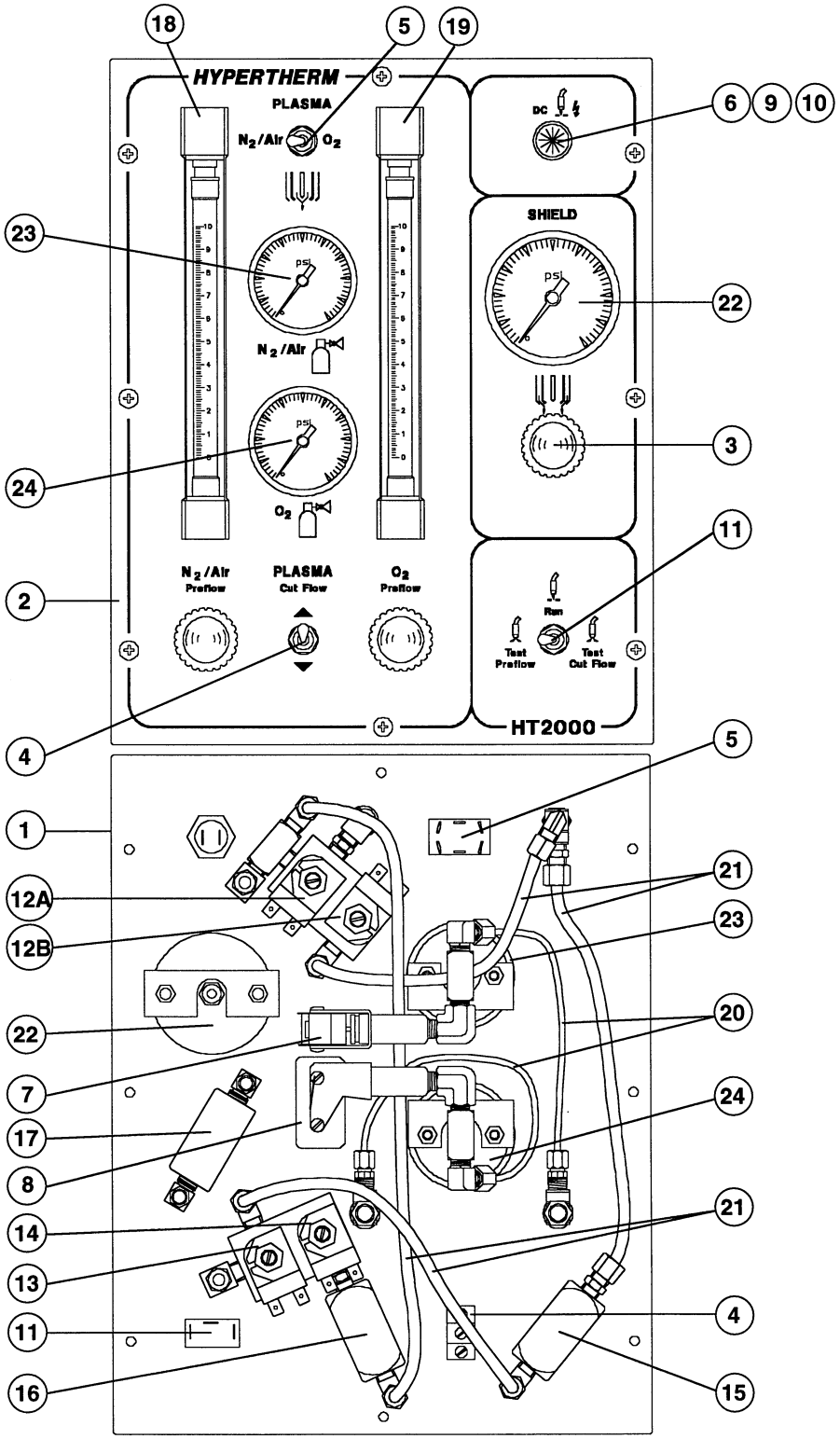


Figure 9-13 Gas Console

Gas Console (3) #073218

Item	Part Number	Description	Designator	Qty.
	073218	**HT2000 Gas Console II**		
1	001335	Encl: 2000 Gas Csl		1
2	001622	Pnl: HT2000 Gas Csl II		1
3	004117	Cap: Ndl Valve		3
4	005042	Tgl Sw: Sp Mom ON/OFF/ON	**S3**	1
5	005181	Tgl Sw: DPDT Maint ON/NONE/ON	**S1**	1
6	005089	Lens:White for 005088		1
7	005093	Switch, Pressure 0-90 PSI	**PS1**	1
8	005093	Switch, Pressure 0-90 PSI	**PS2**	1
9	005149	Bulb, 120VAC T2	**LT1**	1
10	005151	Lamp Holder		1
11	005180	Tgl Sw: SP3T, Maint ON/OFF/ON	**S2**	1
12A	006066	Solenoid Valve:150# Manf 120V 2WNC	**SV1A**	1
12B	006066	Solenoid Valve:150# Manf 120V 2WNC	**SV1B**	1
13	006066	Solenoid Valve:150# Manf 120V 2WNC	**SV2**	1
14	006066	Solenoid Valve:150# Manf 120V 2WNC	**SV3**	1
15	006064	Valve, Ndl 1/8 FPT .125 Orf	**MV2**	1
16	006064	Valve, Ndl 1/8 FPT .125 Orf	**MV3**	1
17	006064	Valve, Ndl 1/8 FPT .125 Orf	**MV4**	1
18	011053	Flowmeter: 7.8 GPM/44 CFH	**FM1**	1
	011058	Fltube w/Float /BP-8 Flt:0-10 SC Cal 2%		
	011008	Shield: Plastic, for 011053 or 011056		
	011081	Flowmeter Float Stop		
19	011053	Flowmeter: 7.8 GPM/44CFH	**FM2**	1
	011058	Fltube w/Float /BP-8 Flt:0-10 SC Cal 2%		
	011008	Shield: Plastic, for 011053 or 011056		
	011081	Flowmeter Float Stop		
20	046048	Tubing, 1/8 OD Blk Air Brake		-
21	046077	Tubing, 1/4 OD X .040 Blu Nyl		-
22	022008	Gauge, Press 100#/Bar 2.5" Dia.	**PG3**	1
23	022020	Gauge, Press 160#/Bar 2" Dia.	**PG1**	1
24	022020	Gauge, Press 160#/Bar 2" Dia.	**PG2**	1
	015299*	Filter:.10 Micron 1/8FPT Brass Inline	**FL1, FL2**	2
	004718**	Manifold, valve		2

* Located behind O_2 and N_2 inlet connections
** Located behind solenoid valves

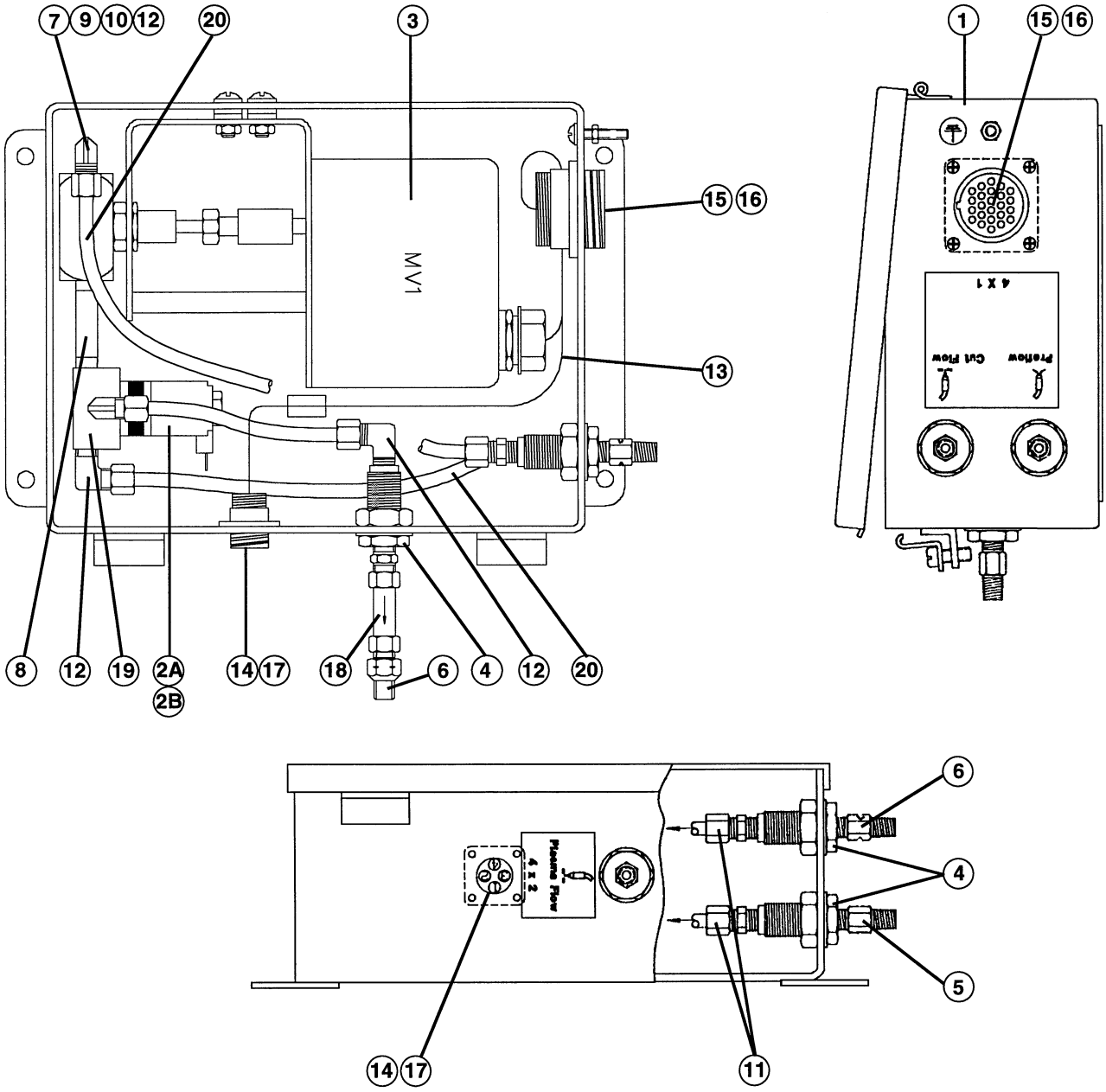


Figure 9-14 Motor Valve Console

Motor Valve Console (4) #073219

Item	Part Number	Description	Designator	Qty.
	073219	**Motor Valve Console II, HT2000**		
1	002218	Encl: HT2000 Mot Valve Csl		1
2A	006066	Sol. Valve:150# Manf 120V 2WNC	**SV4A**	1
2B	006066*	Sol. Valve:150# Manf 120V 2WNC	**SV4B**	1
3	006063	Mtr Valve: Elec 1/8 FPT .125 Orf	**MV2**	1
4	015050	Adapter, Bulkhead, 1/8 x 1-1/2		3
5	015116	Adapter, 1/8 NPT x Oxy 'A'		1
6	015210	Adapter, 1/8 NPT x Acet 'A'-LH		2
7	015530	Street Elbow 1/8		1
8	015588	Nipple, 1/8 x 2"		1
9	015608	Sleeve, Delrin 1/4" OD		6
10	015609	Insert Brass (1/4 OD)		6
11	015611	Connector Male 1/4 Tube x 1/8		2
12	015612	Elbow, Male 1/4 Tube x 1/8 NPT		4
13	**129166**	**Harn: HT2000 Mtr Valve Csl**		1
14	008210	Receptacle, 11-4 Rev Sex	**4X2**	1
15	008447	Receptacle, 23-37, Std Sex	**4X1**	1
16	008176	Pin, 20-24 AWG Type III+		10
17	008186	Socket, 20-24 AWG Type III+		4
18	015299	Filter:.10Micron 1/8FPT Brass In Line	**FL3**	1
19	004718	Maniflold:Motor Valve		1
20	046077	Tubing:1/4"OD .04W Blue Nylon		

* SV4B located behind SV4A

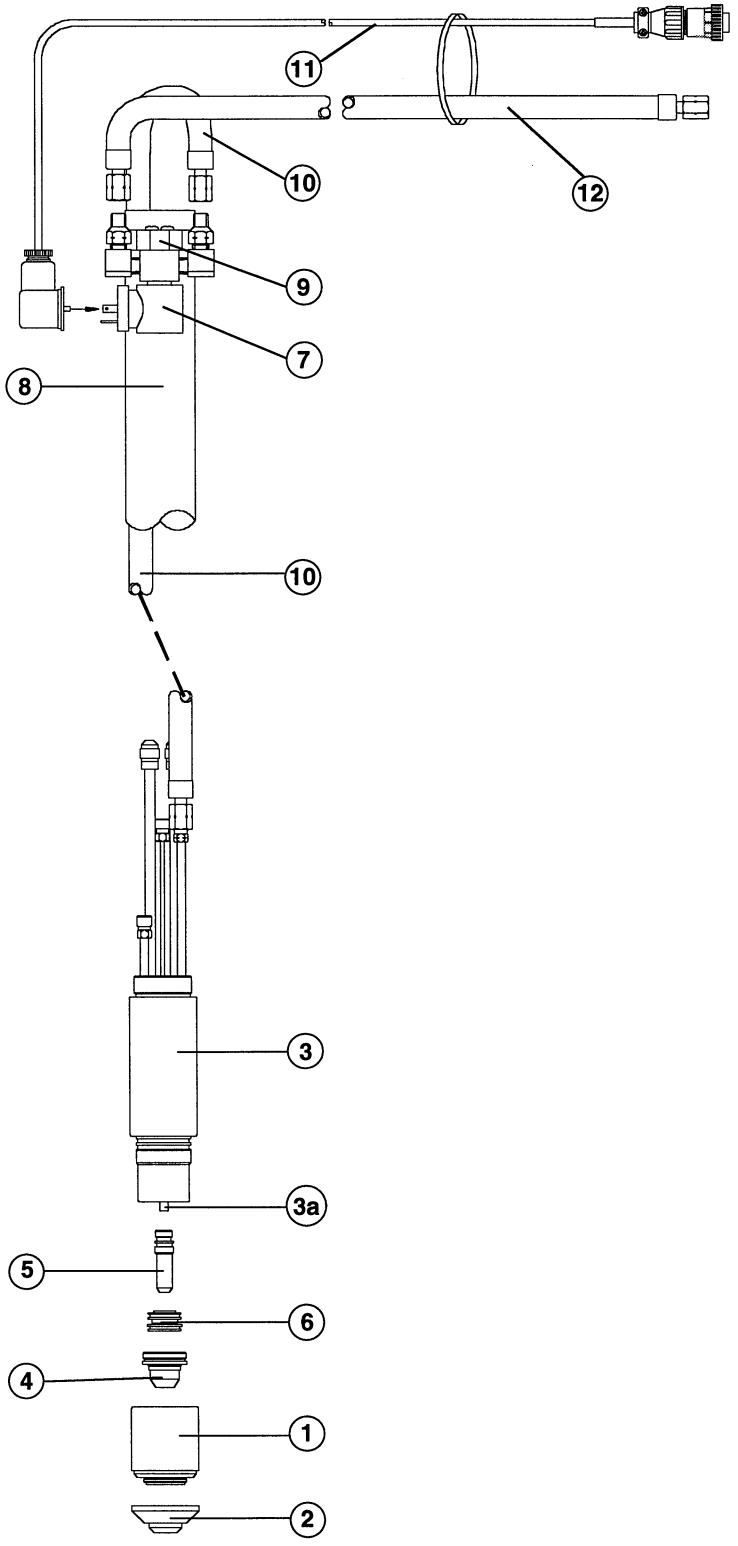


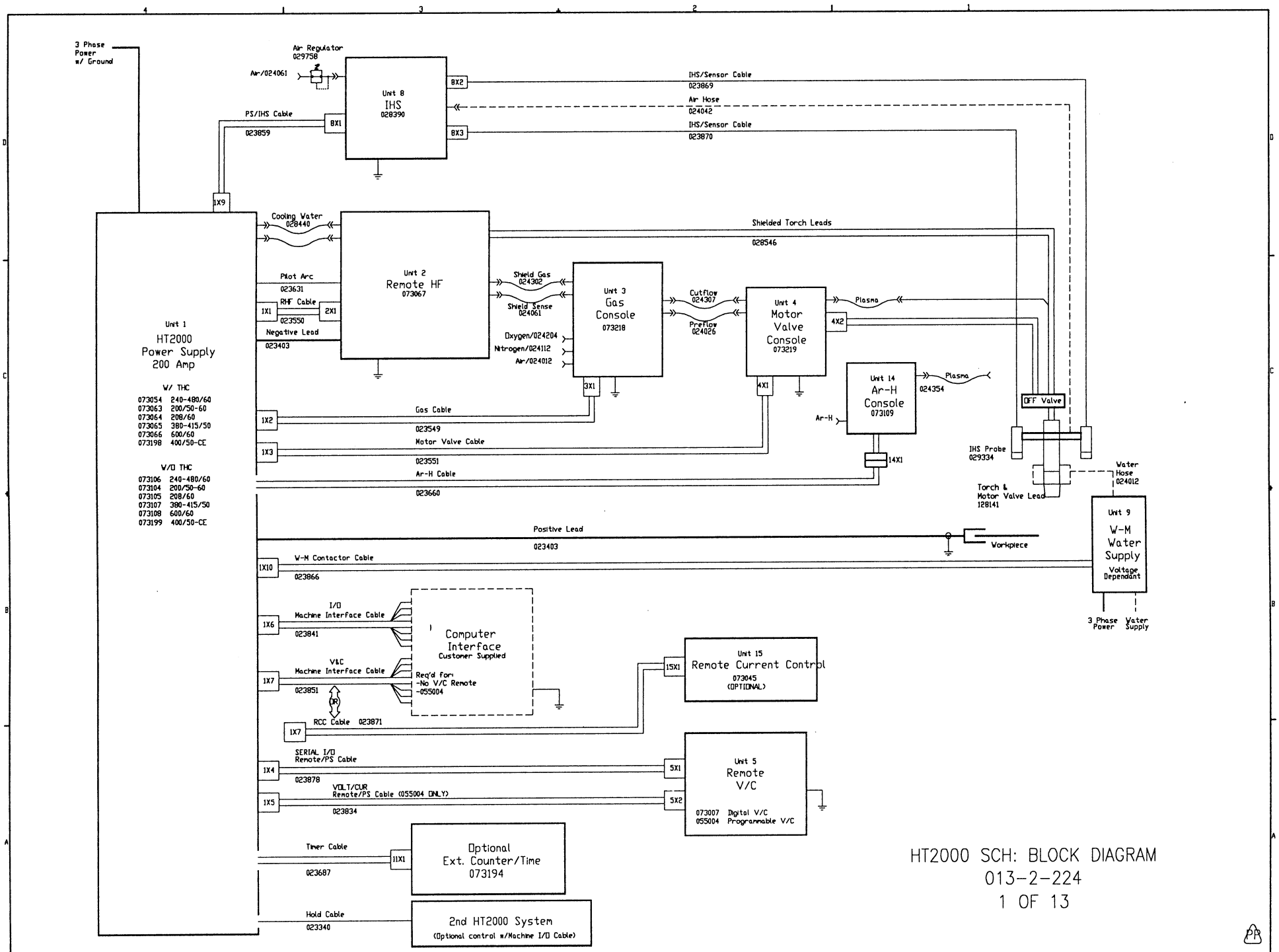
Figure 9-20 HT2000 Machine Torch

Machine Torch (9) #128141

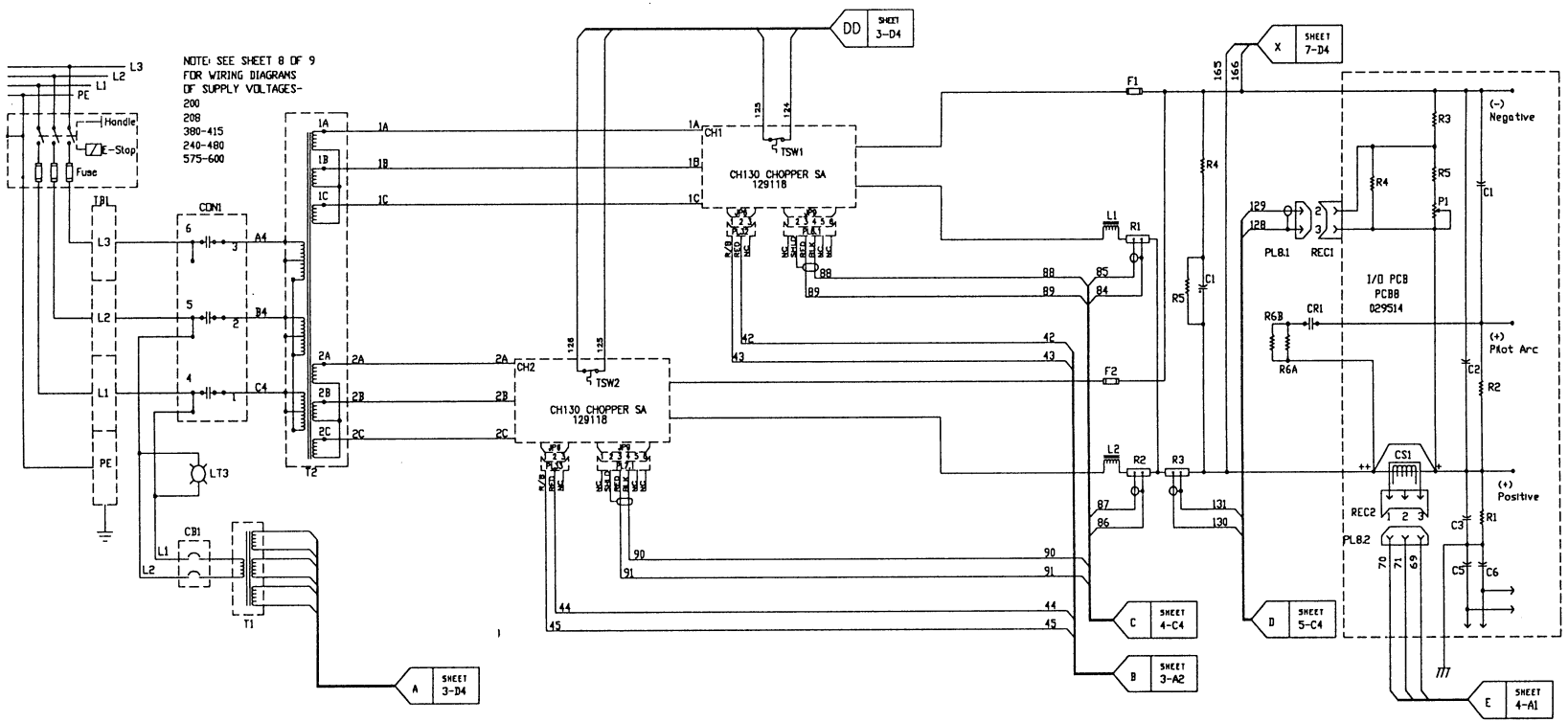
Item	Part Number	Description	Designation	Qty.
	128141	**HT2000 Machine Torch Assy w/Valve**		
1	020423	Cap, Nozzle Retaining, MAX200		1
2	020424	Shield, MAX200/HT2000 200A		1
3	**020470**	**MAX200 Machine Torch Main Body**		**1**
3a	020963	Water Tube:PAC200T/2000 Electd Cool		1
4	020605	Nozzle, MAX200 200A .082 O2		1
5	020664	Electrode: HT2000 200A O2		1
6	020678	Swirl Ring: HT2000 O2		1
	129168	**Off-Valve SA: HT2000 Mch Tch**		**1**
7	006100	Solenoid Valve:150# 1/8 FPT		1
8	020431	Tch Mtg Sleeve:1-3/4" GNRC		1
9	120492	Bracket:1-3/4" Dia Torch Off-Valve II		1
10	024355	Hose Assy:3/16Blu LH'A' 1'		1 ft
11	**123185**	**Cable, Torch Off-Valve**	**4X2**	1
12	**024354**	**Hose SA, 3/16 Blu LH 'A'**		1

Torch Mounting Bracket #020522

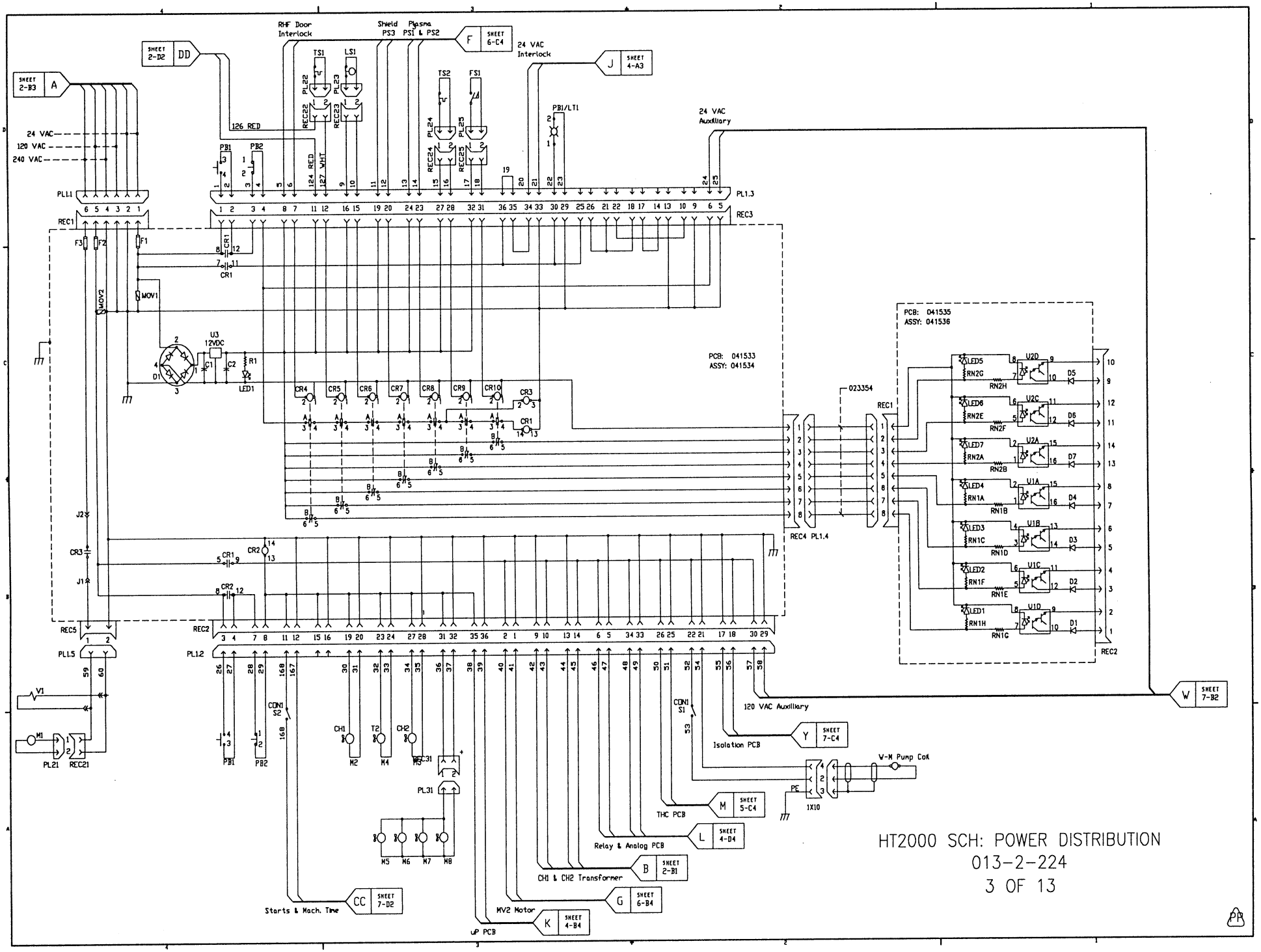
Part Number	Description	Designation	Qty.
020522	**Torch Mntg Brckt with Clevis**		**1**
020044	Adapter, Brckt, Torch		1
020432	Torch Mntg Brckt, Machine Torch		1

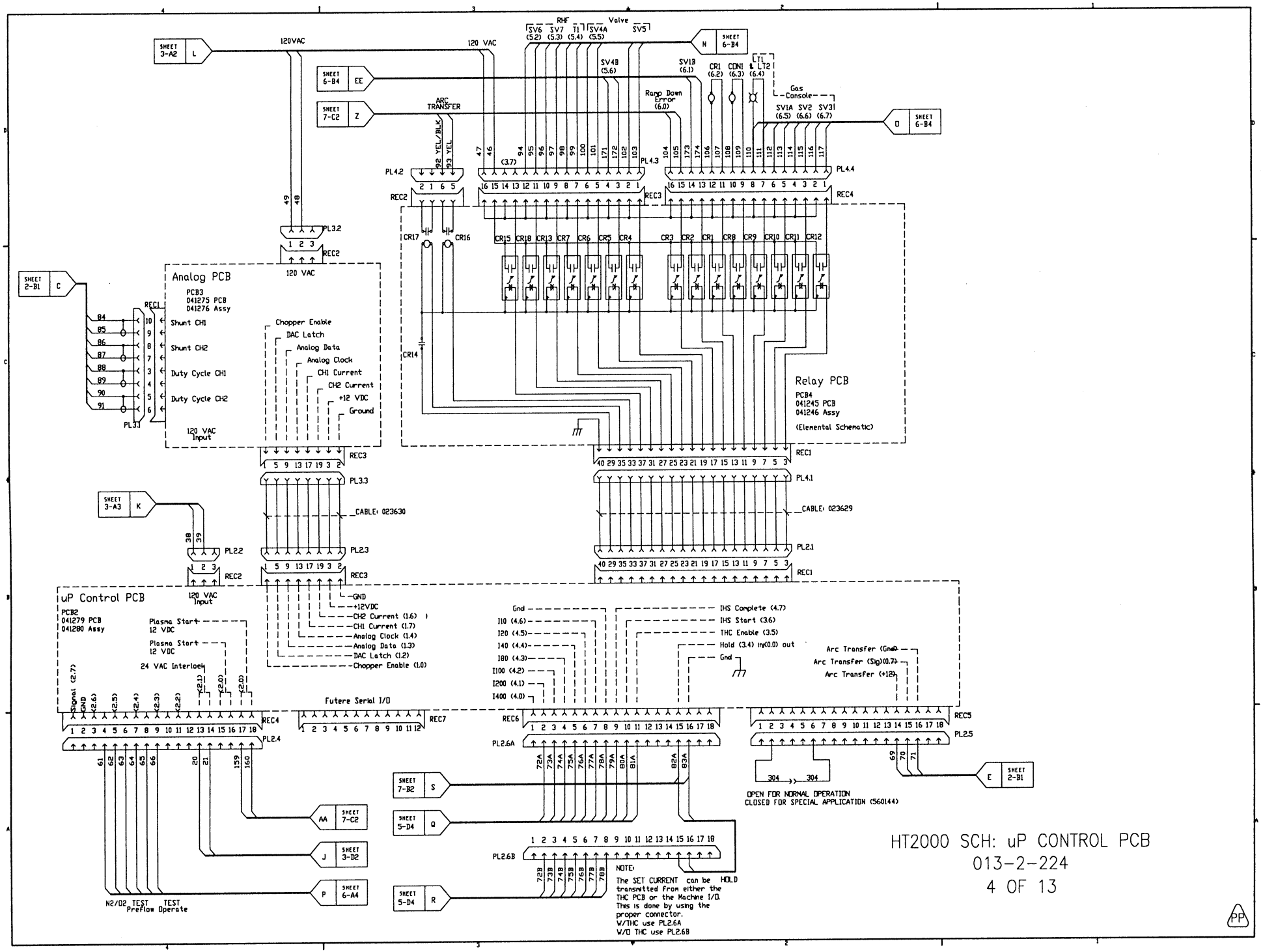


HT2000 SCH: BLOCK DIAGRAM
013-2-224
1 OF 13

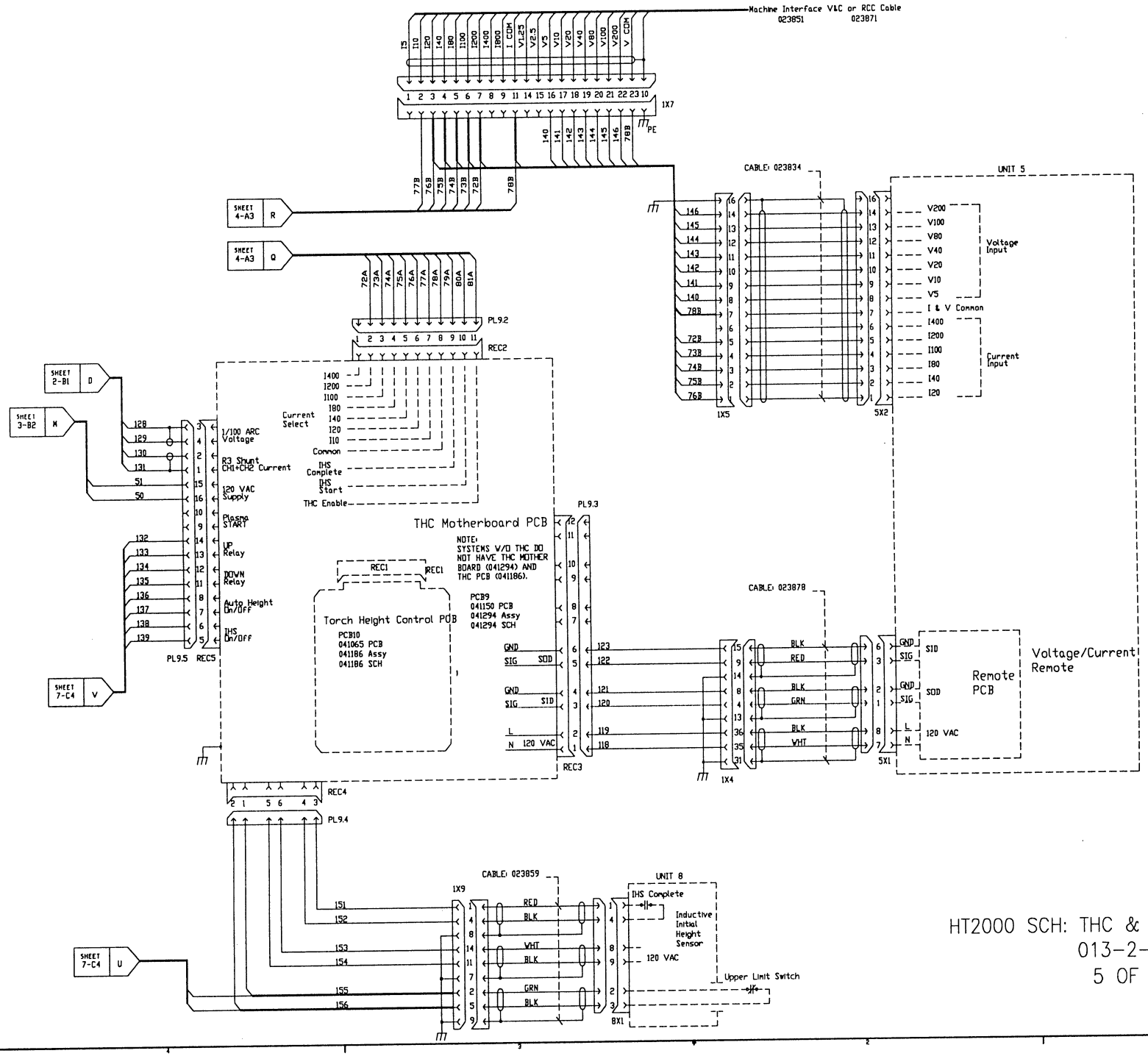


HT2000 SCH: DC POWER
013-2-224
2 OF 13

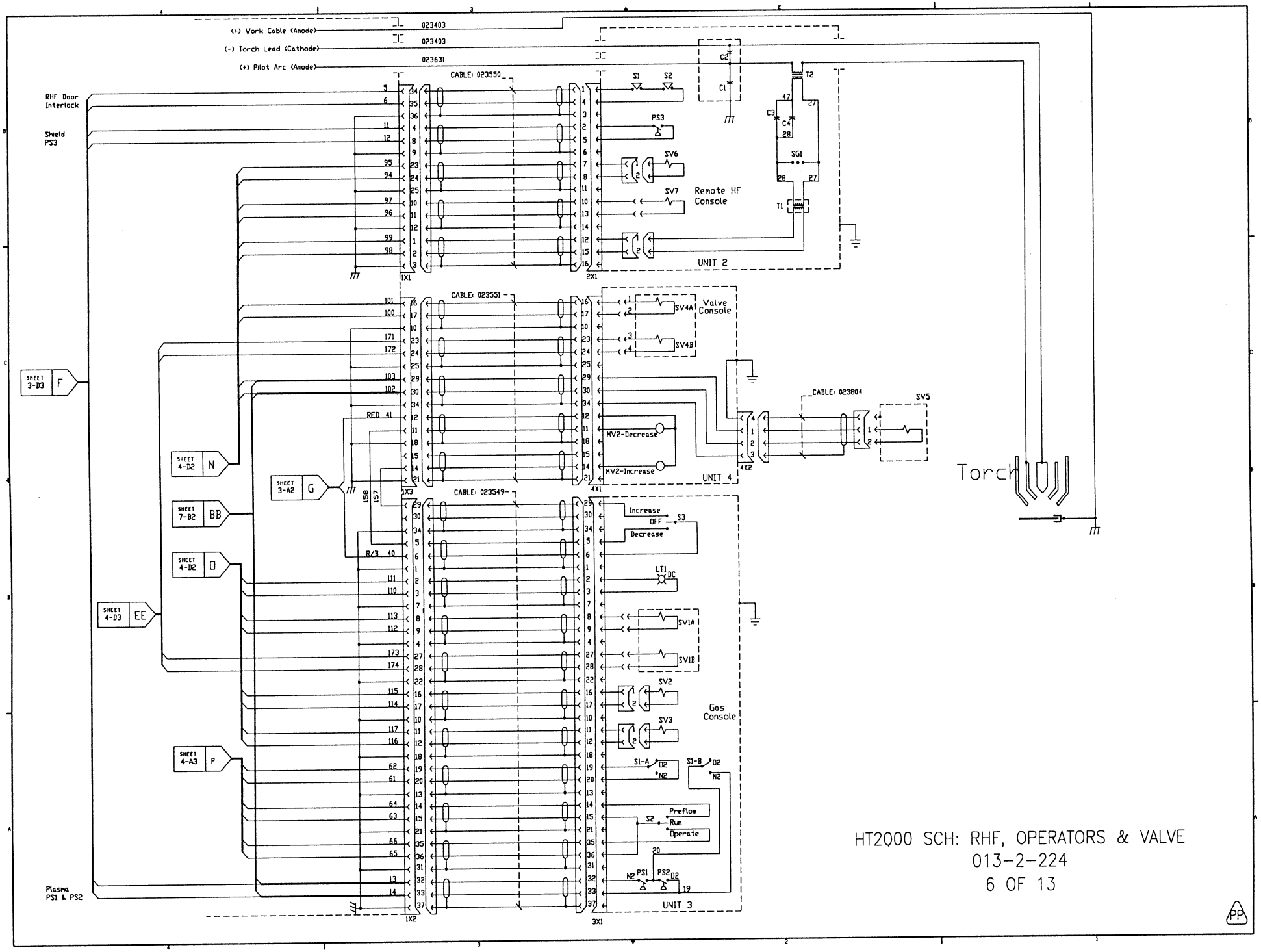

RHF Door Interlock
Shield PS3
Plasma PSI & PS2
24 VAC Interlock
24 VAC Auxiliary
120 VAC Auxiliary
126 RED
24 VAC
120 VAC
240 VAC
PCB: 041533
ASSY: 041534
PCB: 041535
ASSY: 041536
023354
REC1
REC2
REC3
REC4 PL1.4
REC5
PL1.1
PL1.2
PL1.3
PL1.5
PL21
REC21
PL31
Isolation PCB
THC PCB
Relay & Analog PCB
CH1 & CH2 Transformer
MV2 Motor
uP PCB
Starts & Mach. Time
W-M Pump Cord
1X10
HT2000 SCH: POWER DISTRIBUTION
013-2-224
3 OF 13



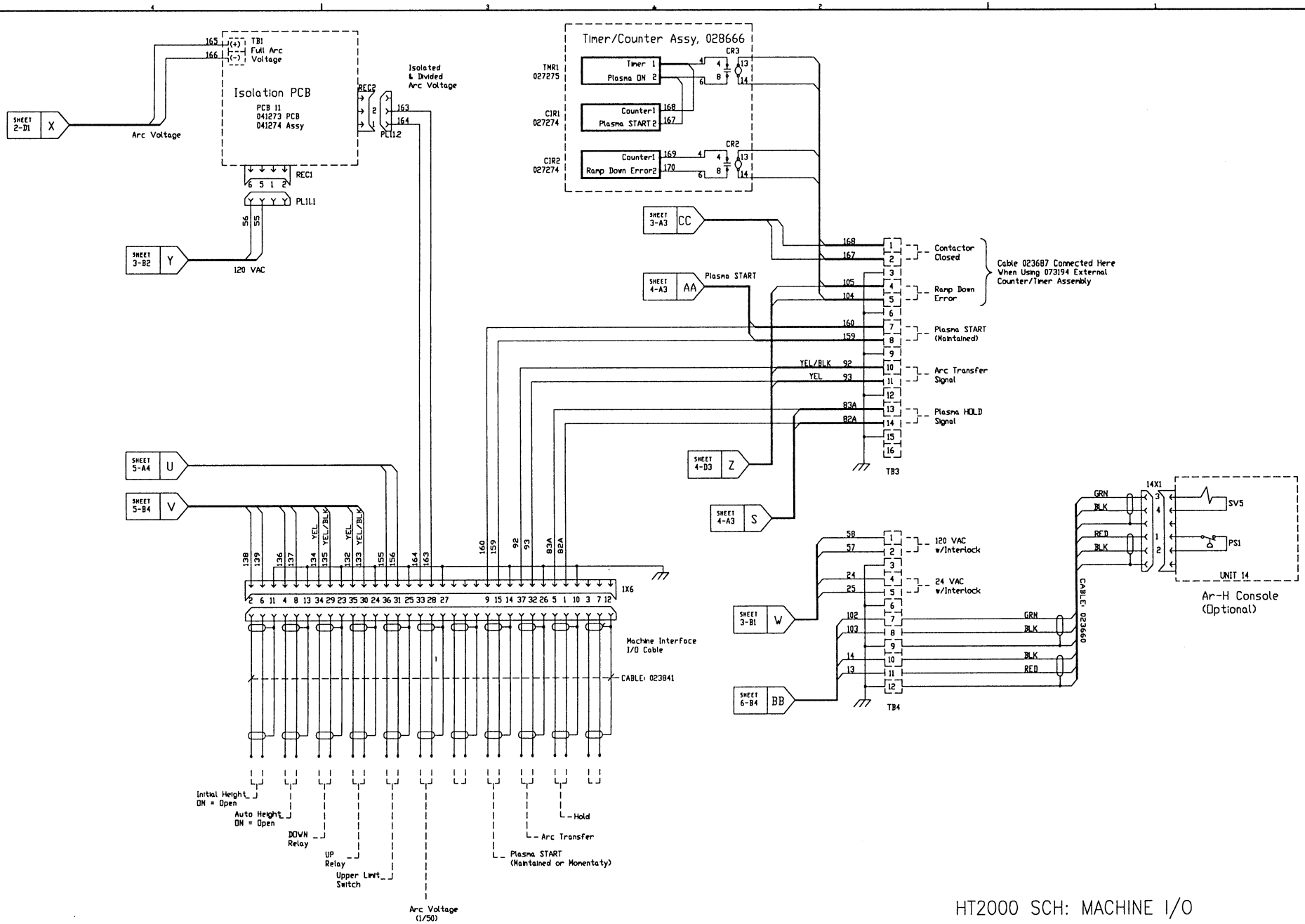
HT2000 SCH: uP CONTROL PCB
013-2-224
4 OF 13



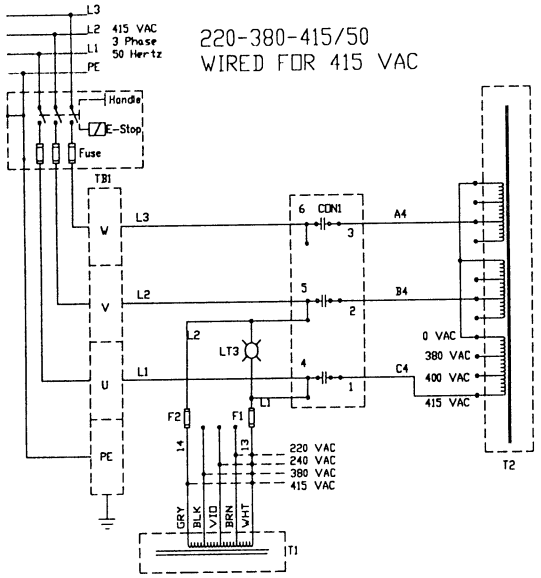
HT2000 SCH: THC & TERMINAL BLOCKS
013-2-224
5 OF 13

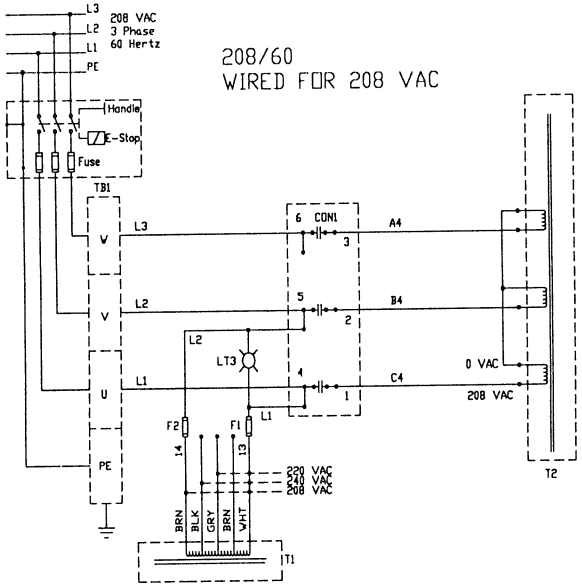


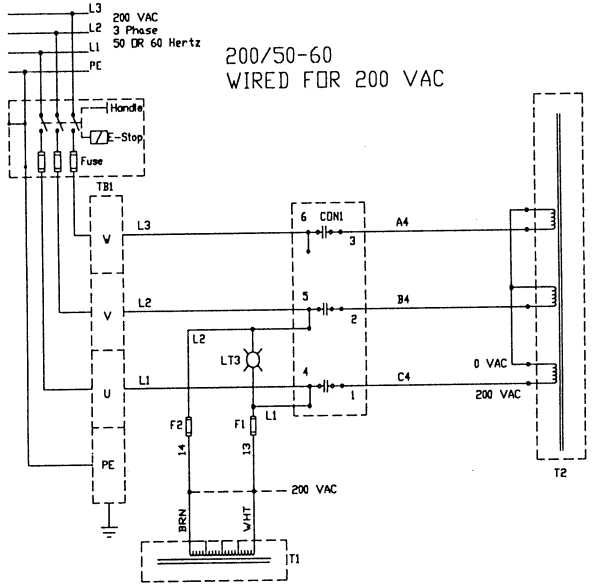
HT2000 SCH: RHF, OPERATORS & VALVE
013-2-224
6 OF 13

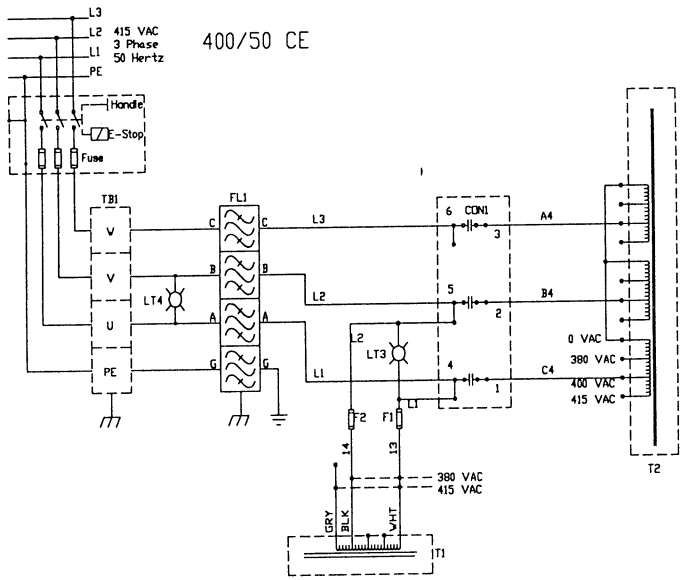


HT2000 SCH: MACHINE I/O
013-2-224
7 OF 13



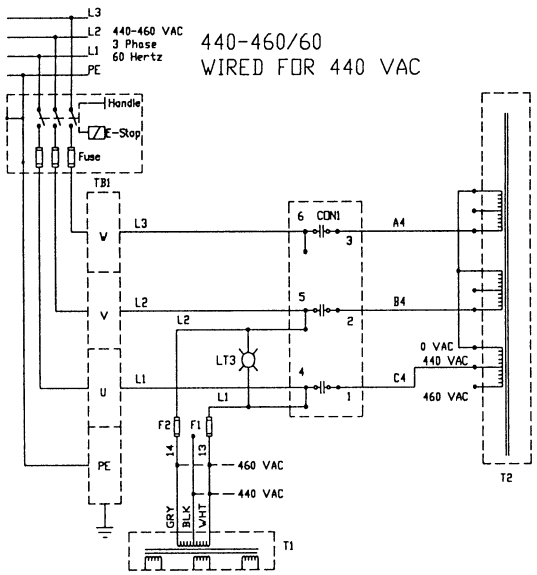




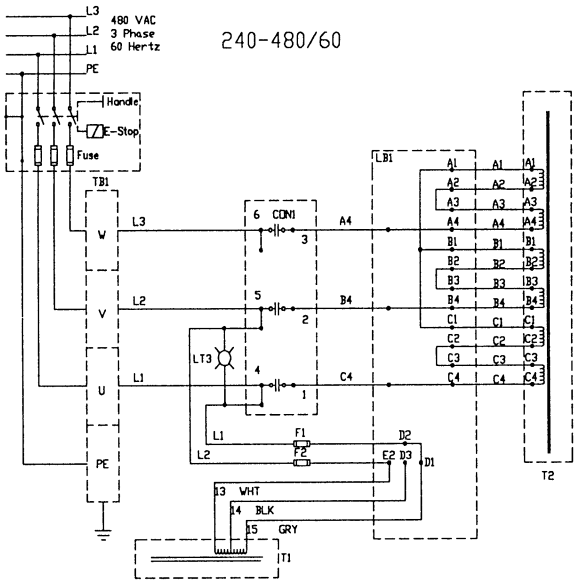


HT2000 SCH: PWR SPLY VOLTAGES
013-2-224
8 OF 13

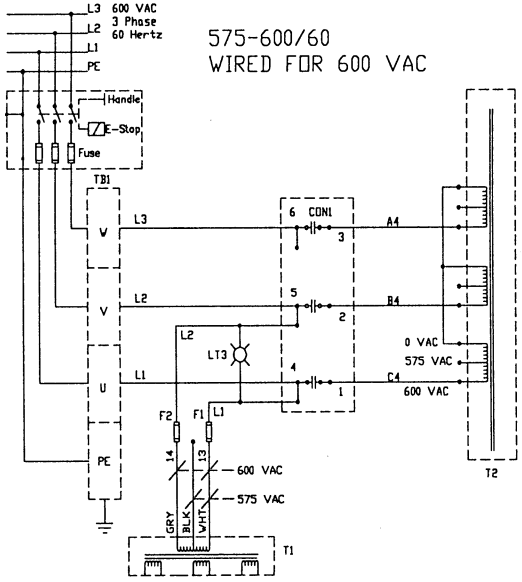
PP



440-460/60
WIRED FOR 440 VAC



240-480/60



575-600/60
WIRED FOR 600 VAC

HT2000 SCH: PWR SPLY VOLTAGES
013-2-224
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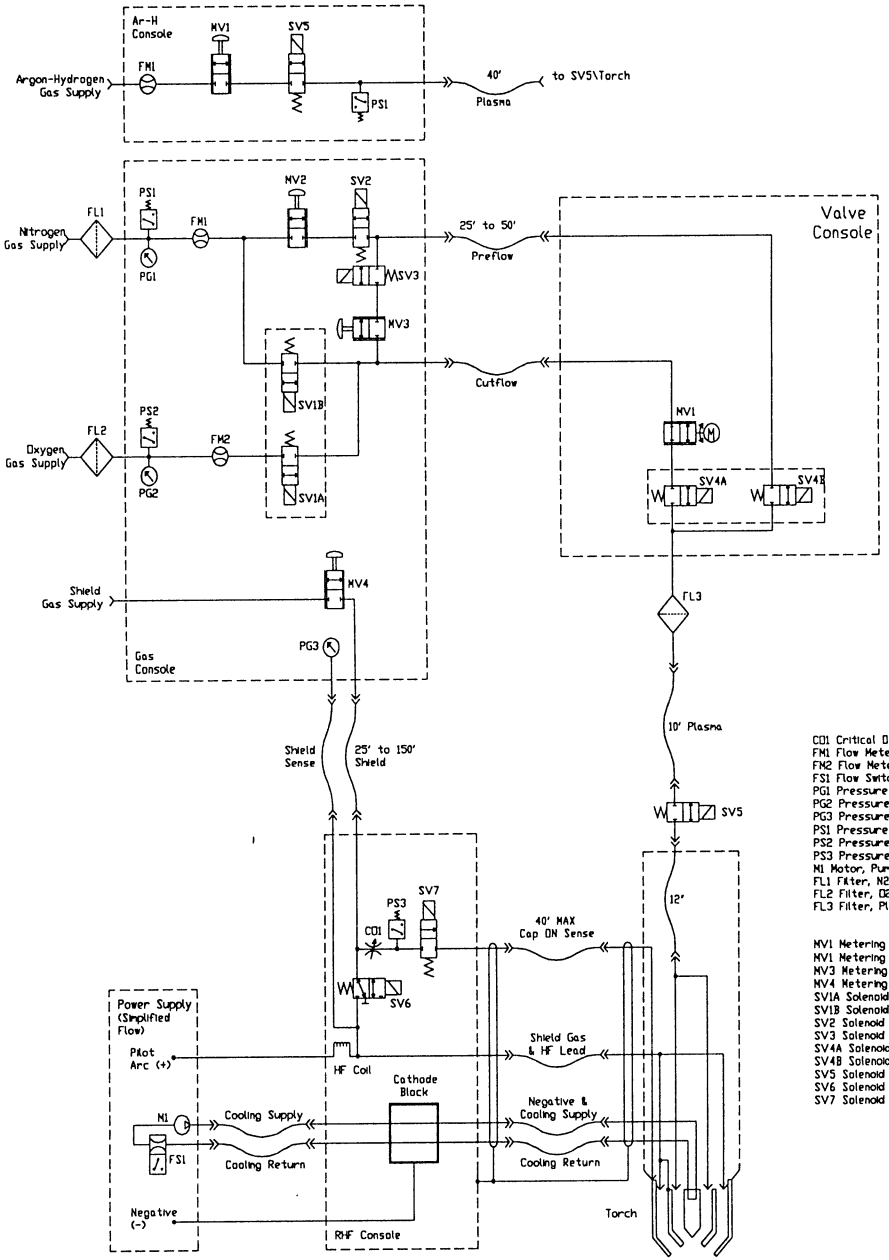

CO1 Critical Orifice, Cap OFF
FM1 Flow Meter, Nitrogen
FM2 Flow Meter, Oxygen
FS1 Flow Switch, Cooling
PG1 Pressure Gauge, Nitrogen Inlet
PG2 Pressure Gauge, Oxygen Inlet
PG3 Pressure Gauge, Plasma
PS1 Pressure Switch, Nitrogen Inlet
PS2 Pressure Switch, Oxygen Inlet
PS3 Pressure Switch, Shield/Cap OFF
M1 Motor, Pump Cooling
FL1 Filter, N2
FL2 Filter, O2
FL3 Filter, Plasma

MV1 Metering Valve, Plasma Motor
MV1 Metering Valve, N2 Preflow
MV3 Metering Valve, O2 Preflow
MV4 Metering Valve, Shield
SV1A Solenoid Valve, O2
SV1B Solenoid Valve, N2 Cutflow
SV2 Solenoid Valve, N2 Preflow
SV3 Solenoid Valve, O2 Preflow
SV4A Solenoid Valve, Cutflow
SV4B Solenoid Valve, Preflow
SV5 Solenoid Valve, Plasma OFF
SV6 Solenoid Valve, Shield ON
SV7 Solenoid Valve, Cap OFF

HT2000 SCH: GAS SYSTEM #2
013-2-224
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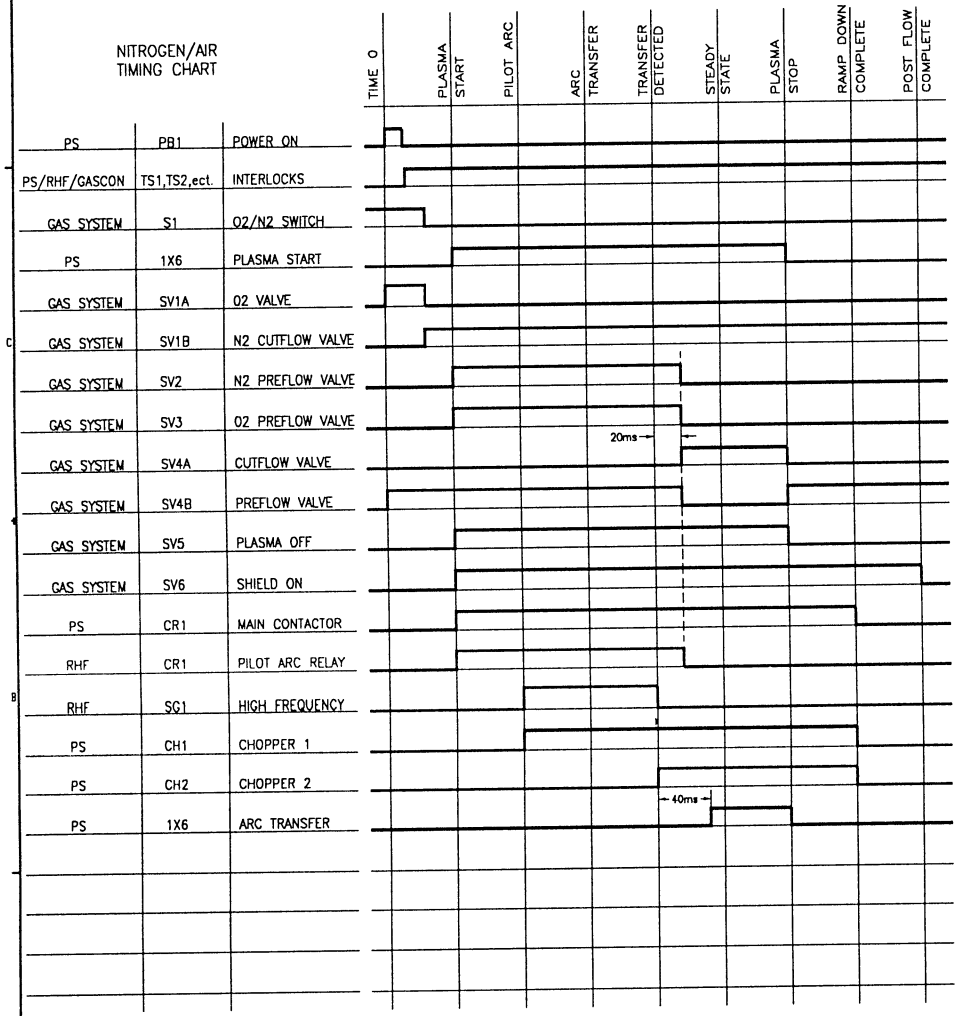
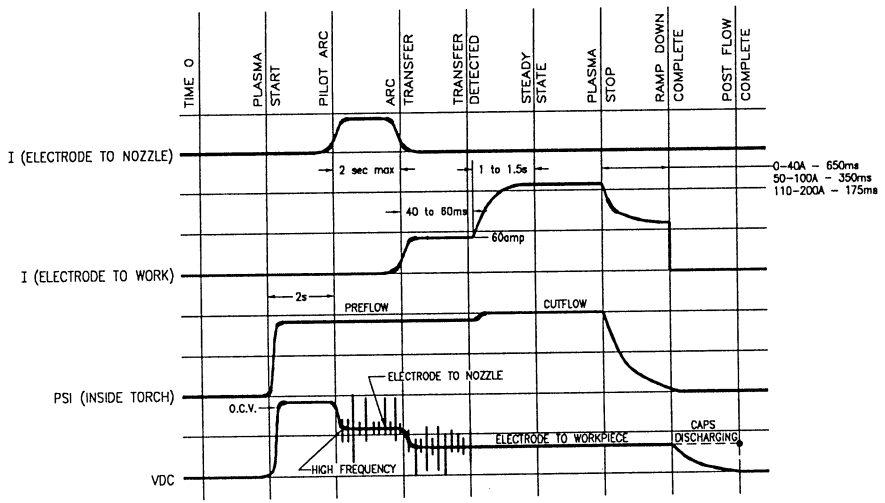
NITROGEN/AIR TIMING CHART



NITROGEN/AIR OPERATION CURRENT, PRESSURE, AND VOLTAGE WAVEFORMS



HT2000 TIMING CHART
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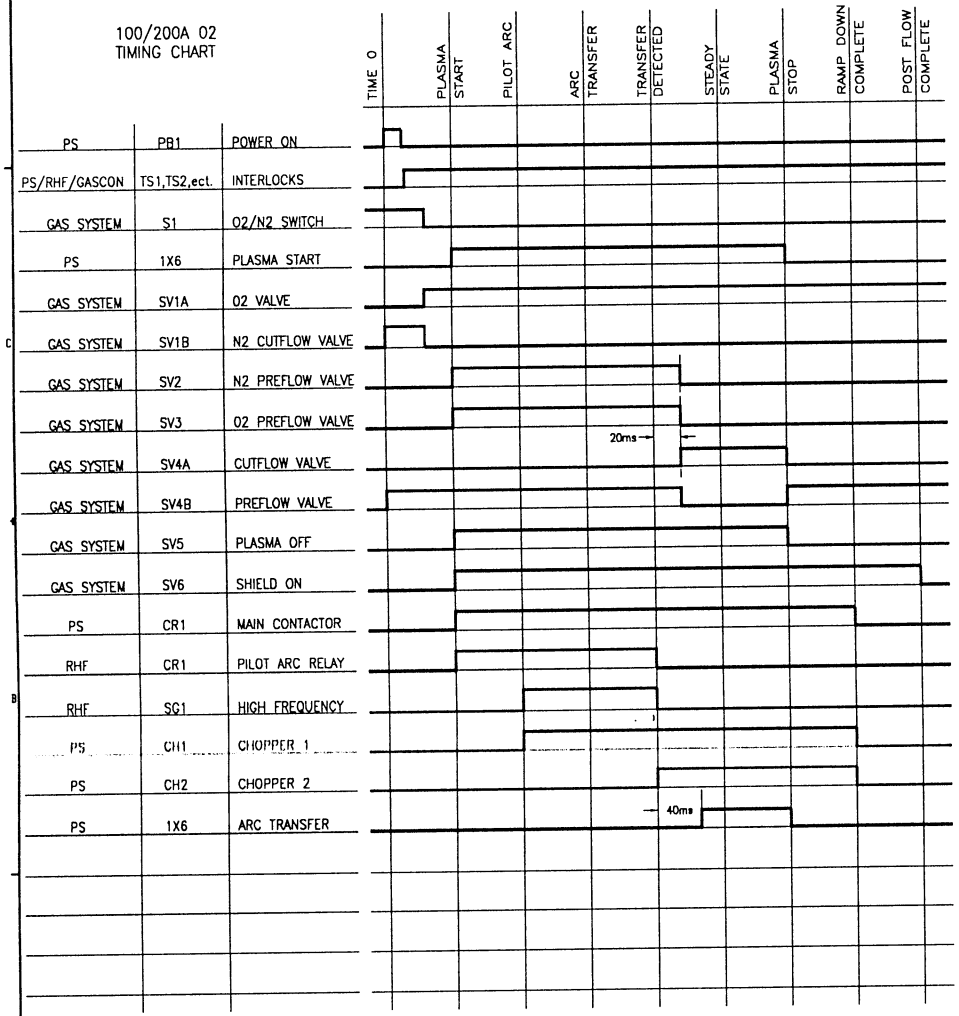
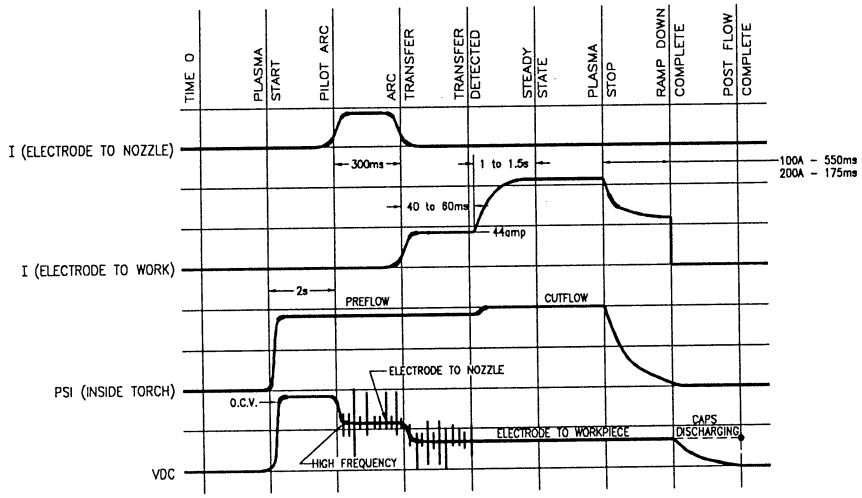
100/200A 02 TIMING CHART



OXYGEN OPERATION CURRENT, PRESSURE, AND VOLTAGE WAVEFORMS



HT2000 TIMING CHART
013-2-224
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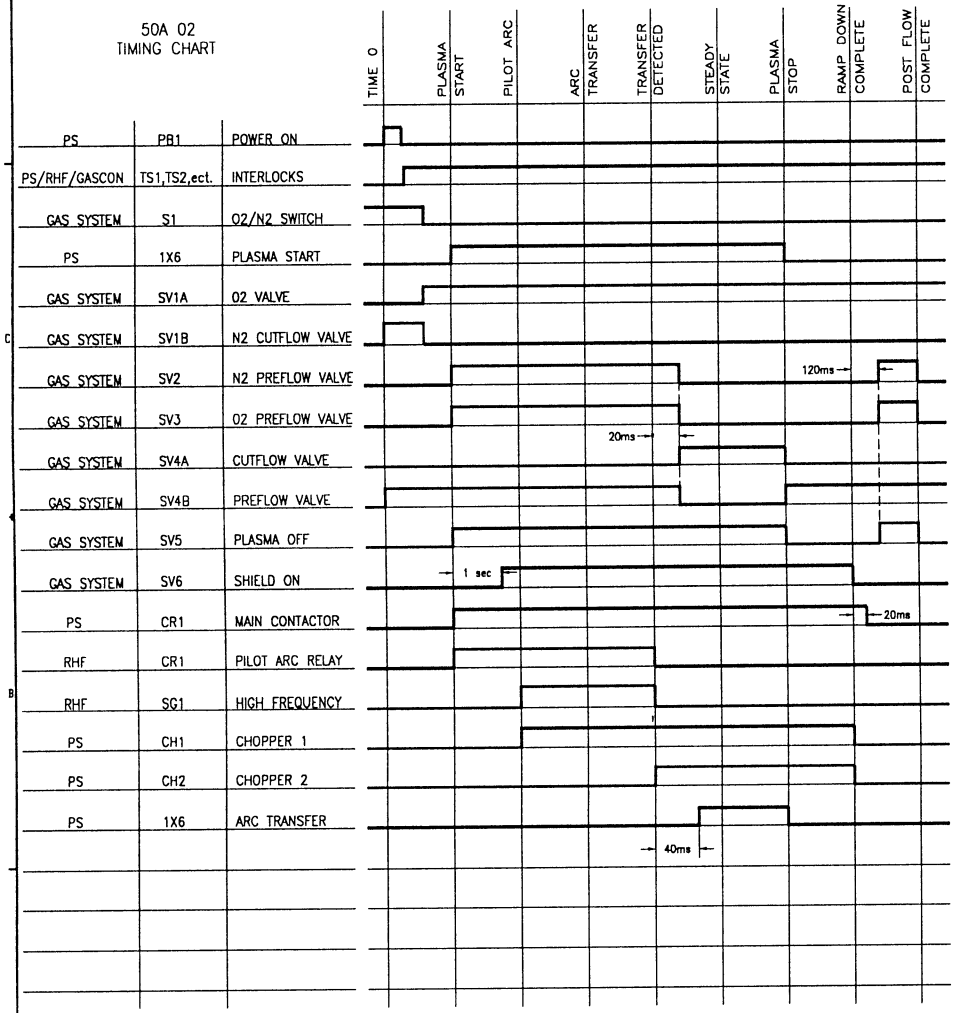
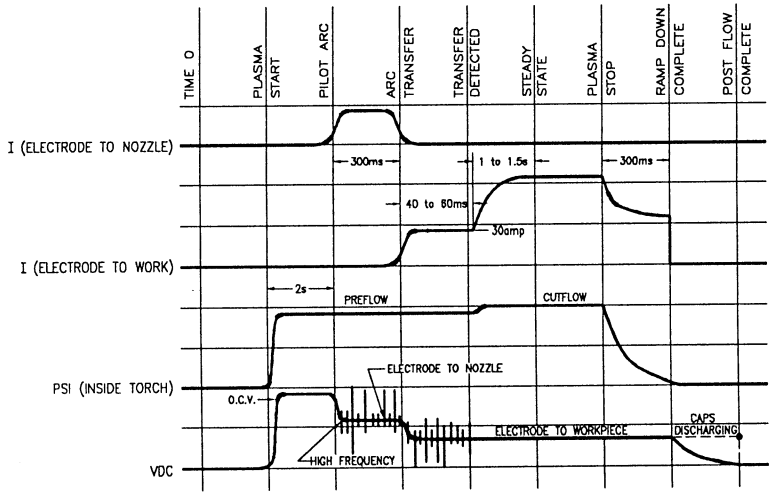
PP

50A O2 TIMING CHART



OXYGEN OPERATION CURRENT, PRESSURE, AND VOLTAGE WAVEFORMS



HT2000 TIMING CHART
013-2-224
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PP