Hypertherm®

HyDefinition HD3070®

Automatic Gas Console Upgrade

Field Service Bulletin
(P/N 803100)

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Hypertherm

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Introduction

This field bulletin describes how to perform the required procedures below in order to complete this upgrade:

- Replace the existing automatic gas console with the new automatic gas console.
- Replace the existing off-valve with the new off-valve.
- Upgrade the HD3070 power supply control board.

Tools Required

2 Phillips head screwdriver
7/16-inch open end wrench
5/8-inch open end wrench
11/16-inch open end wrench
3/4-inch open end wrench
5/32-inch (4 mm) hex wrench
008197 Connector Pin Extractor Tool*

*Included in Kit

Upgrade Kits

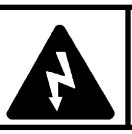
The automatic gas console upgrade kits are listed below. The kit part number is determined by the gas lead length required (between gas console and off-valve).

Upgrade Kit Part No.	Gas Lead Part No.
128267	128175 – 15 ft (4.6 m)
128268	128176 – 20 ft (6.1 m)
128269	128177 – 25 ft (7.6 m)
128270	128178 – 30 ft (9.1 m)
128271	128179 – 35 ft (10.6 m)
128272	128180 – 40 ft (12.2 m)
128273	128181 – 50 ft (15.2 m)
128274	128182 – 75 ft (23 m)
128275	128183 – 100 ft (30.5 m)

Kit Contents

Part No.	Description	Quantity
078061	Automatic Gas Console	1
128175 - 128183	Gas Leads (see above)	1
129239	Off-Valve	1
123256	Off-Valve Cable (part of 129239)	1
041752	HD3070 Auto Gas console III, Control PCB	
123387	Jumper Wire	1
008197	Tool: Connector Pin Extractor	1
803100	Field Bulletin, HD3070 Automatic Gas Console Upgrade	1

Procedure



WARNING

Turn off all power to HD3070 system. Always press the power unit OFF (O) pushbutton switch and set the line disconnect switch to Off. Lock-out and tag-out switch.

Remove Old Gas Console and Off-Valve

1. At the gas suppliy cylinders shut the gases off.

2. At the gas console
   - Disconnect the inlet gas hoses.
   - Disconnect the gas lead hoses and control cable plug 3X3.
   - Disconnect control cable plugs 3X1 and 3X2.
   - Disconnect control cable plug 3X4.
   - Disconnect the PE ground wire.
   - Remove the top cover to remove the six screws and washers securing the gas console to the power supply.
   - Remove the gas console.

3. At the off-valve
   - Disconnect the gas lead hoses and control cable plug 4X1. (Discard gas lead.)
   - Disconnect the 10-inch plasma and shield gas hoses.
   - Disconnect the PE ground wire.
   - Remove off-valve and discard.

Install New Gas Console and Off-Valve

1. At the power supply
   - Place new the gas console on top of the power supply and remove the top cover.
   - Align the four mounting holes and secure with screws and washers.

2. At the gas console
   - Connect the inlet gas hoses.
   - Connect the new gas lead hoses and control cable plug 3X3.
   - Connect control cable plugs 3X1 and 3X2.
   - Connect control cable plug 3X4.
   - Connect the PE ground wire.

3. At the off-valve
   - Connect the gas lead hoses and control cable plug 4X1.
   - Connect the 10-inch plasma and shield gas hoses.
   - Connect the PE ground wire.

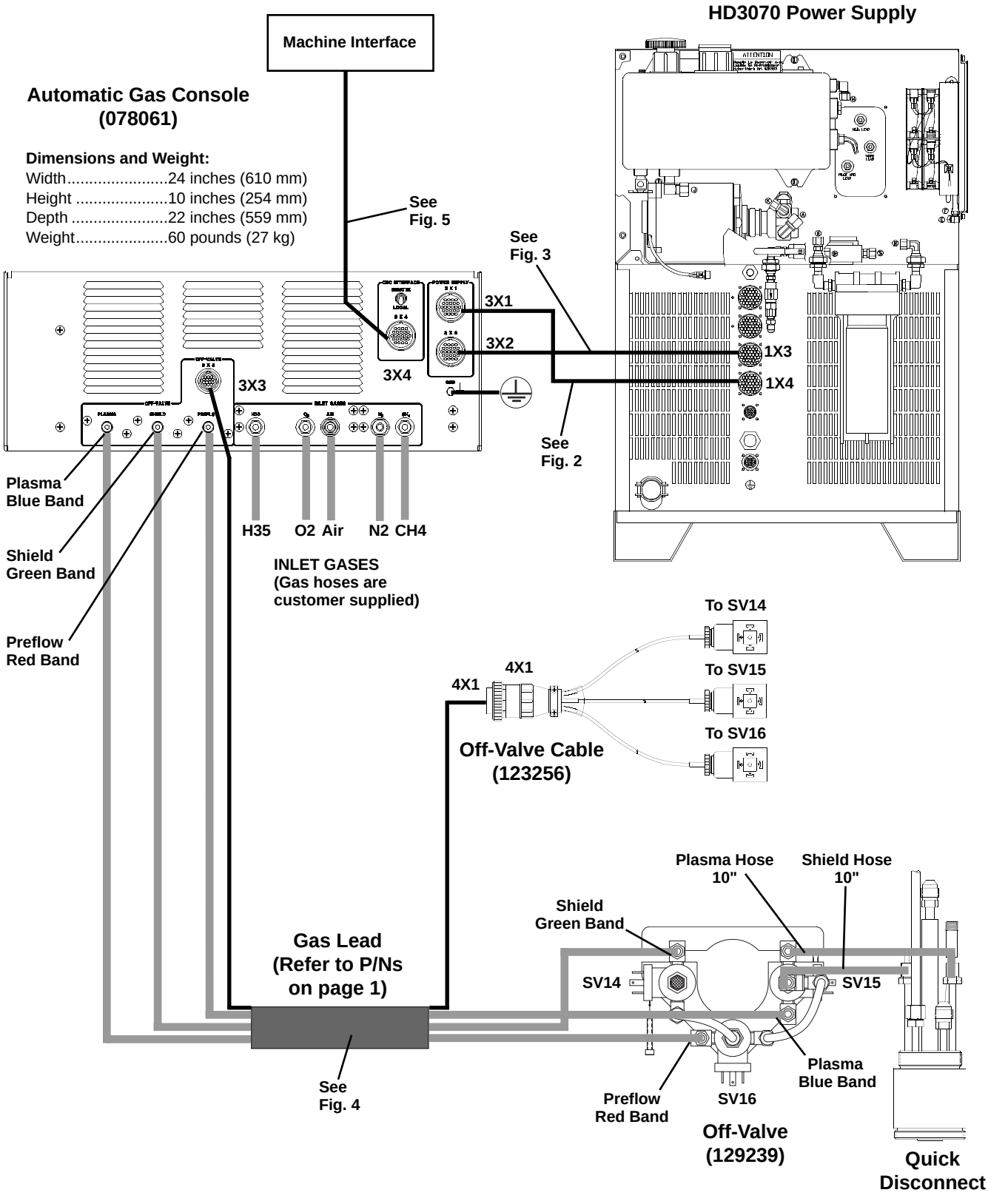
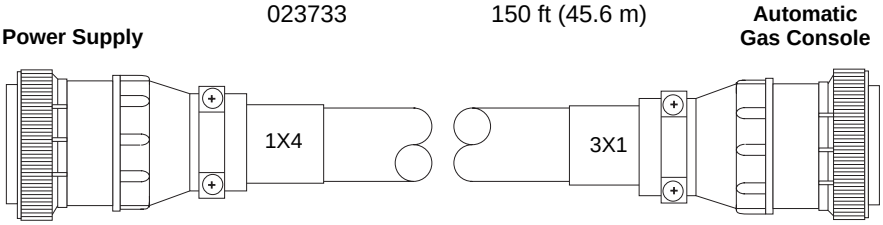


Figure 1 Automatic Gas Console Upgrade Installation Diagram

Part Number	Length
023673	6 ft (1.8 m)
023558	10 ft (3 m)
023472	25 ft (7.6 m)
023556	50 ft 15 m)
023557	75 ft (23 m)
023760	100 ft (30.5 m)
023744	125 ft (38 m)
023733	150 ft (45.6 m)

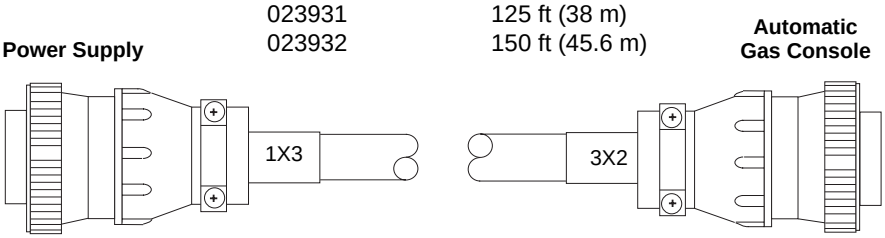


RUN LIST

SIGNAL	PLUG 1X4	COLOR	PLUG 3X1
Message Number	14	Black	14
	15	Green	15
-	9	Shield	9
Shield Operate	12	Black	12
	13	Yellow	13
-	7	Shield	7
Air Plasma	23	Black	23
	24	Blue	24
-	29	Shield	29
Shield Preflow	10	Black	10
	11	Orange	11
-	5	Shield	5
H35 & N_2 Plasma	25	Black	25
	26	White	26
-	31	Shield	31
Plasma On & Off	1	Black	1
	2	Brown	2
-	6	Shield	6
O_2 Plasma	27	Red	27
	28	Brown	28
-	33	Shield	33
Unassigned	3	Black	3
	4	Red	4
-	8	Shield	8
Gas System Power	36	Red	36
	37	Brown	37
-	32	Shield	32
Unassigned	34	Black	34
	35	Red	35
-	30	Shield	30
Key	N/A	N/A	16

Figure 2 Control Cable 1X4/3X1

Part Number	Length
023671	6 ft (1.8 m)
023927	10 ft (3 m)
023672	25 ft (7.6 m)
023928	50 ft 15 m)
023929	75 ft (23 m)
023930	100 ft (30.5 m)
023931	125 ft (38 m)
023932	150 ft (45.6 m)



RUN LIST

SIGNAL	PLUG 1X3	COLOR	PLUG 3X2
Gas Pressure	1	Red	1
or Contact Closure	2	Black	2
-	6	Shield	6
Gas System	3	White	3
or Contact Closure	4	Black	4
-	8	Shield	8
H35 & N_2 Plasma	10	Green	10
Contact Closure	11	Black	11
-	5	Shield	5
Test Operate Flow	14	Yellow	14
Contact Closure	15	Black	15
-	9	Shield	9
Test Preflow	12	Blue	12
Contact Closure	13	Black	13
-	7	Shield	7
O_2 Plasma	21	Brown	21
Contact Closure	22	Black	22
-	17	Shield	17
DC On Light	23	Red	23
	24	White	24
-	19	Shield	19
Unassigned	20	Orange	20
Contact Closure	18	Black	18
-	16	Shield	16

Figure 3 Control Cable 1X3/3X2

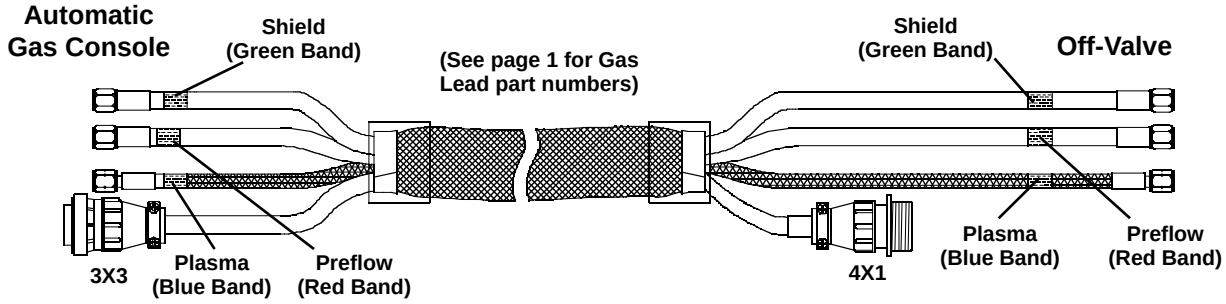
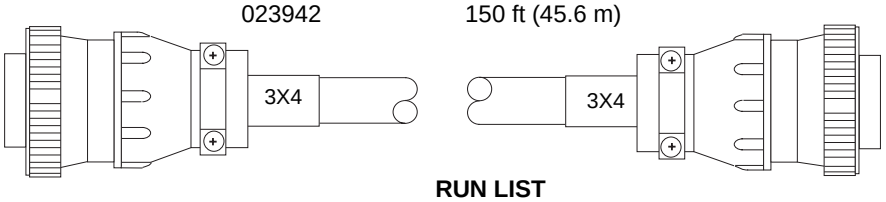


Figure 4 Gas Lead

Part Number	Length
023667	25 ft (7.6 m)
023831	28.2 ft (8.6 m)
023938	50 ft 15 m)
023939	75 ft (23 m)
023940	100 ft (30.5 m)
023941	125 ft (38 m)
023942	150 ft (45.6 m)



RUN LIST

SIGNAL	PLUG 3X4	COLOR (PAIR)	MACHINE INTERFACE
Gas Flow Set 1 (+)	1	Black	1
Gas Flow Set 2 (+)	2	Red	2
Gas Flow Set 4 (+)	3	Black	3
Gas Flow Set 8 (+)	4	White	4
GFS Common (U) (-)	5	Black	5
Gas Flow Set 10 (+)	6	Green	6
Gas Flow Set 20 (+)	7	Black	7
Gas Flow Set 40 (+)	8	Blue	8
Gas Flow Set 80 (+)	9	Black	9
GFS Common (10) (-)	10	Yellow	10
Gas Flow Set 100 (+)	11	Black	11
Valve Select 1 (+)	12	Brown	12
Valve Select 2 (+)	13	Black	13
Valve Select 4 (+)	14	Orange	14
Valve Select 8 (+)	15	Red	15
Valve Sel Common (-)	16	White	16
Write (+)	17	Red	17
Read Complete Out (+)	18	Green	18
Common (-)	19	Red	19
NC	20	Blue	20
Remote Test/Operate (+)	21	Red	21
Remote Test/Preflow (+)	22	Yellow	22
Remote Air Plasma	23	Red	23
Remote H35 & N_2 Plasma	24	Brown	24
Remote O_2 Plasma	25	Red	25
Common (-)	26	Orange	26
Error Output (+)	27	Green	27
Common (-)	28	White	28
NC	29	Green	29
NC	30	Blue	30
NC	31	Green	31
NC	32	Yellow	32
NC	33	Green	33
NC	34	Brown	34
NC	35	Green	35
NC	36	Orange	36
Shield O/A	37	N/A	37

Figure 5 Machine Interface Control Cable

Power Supply Control Board Upgrade

1. Remove front cover from power supply.
2. Locate control board 1XPCB3 (See figure 6).
3. Remove old board and install new board.

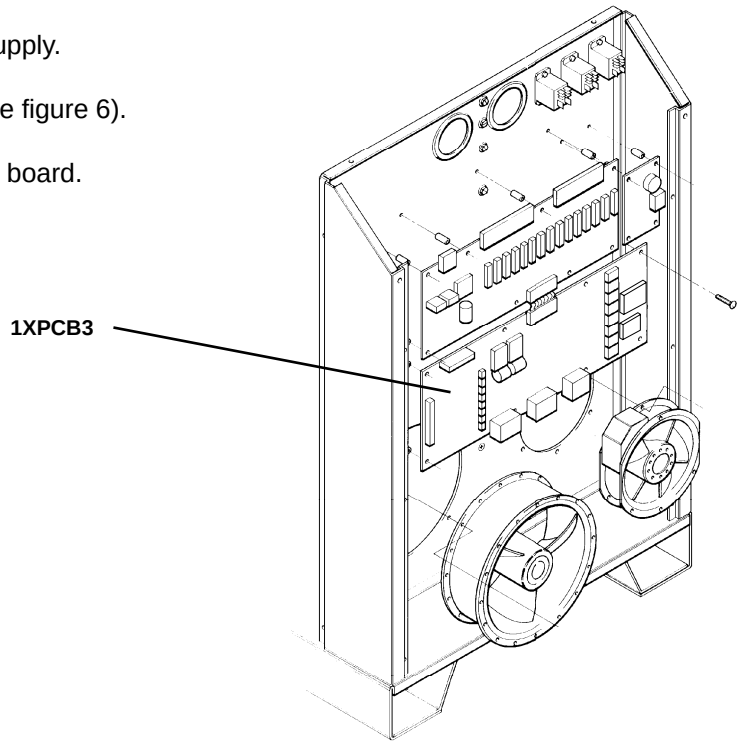


Figure 6 Power Supply Control Board 1XPCB3 and Firmware IC (U9) Locations

4. Install 123387 jumper wire to Power Supply 1XPCB3 Control Board (Figure 6):
   a. Remove plug PL11 and PL10 from the 1XPCB3 control board.
   b. Using pin extractor tool 008197:

      Remove pin 12 from plug PL11.

      Remove pin 3 from plug PL10.

   c. Insert 123387 jumper wire into pin hole 3 of plug PL10.
   d. Insert 123387 jumper wire into hole 12 of plug PL11.
   e. Install plug PL11 and PL10 to the 1XPCB3 control board.
5. Replace power supply front cover.

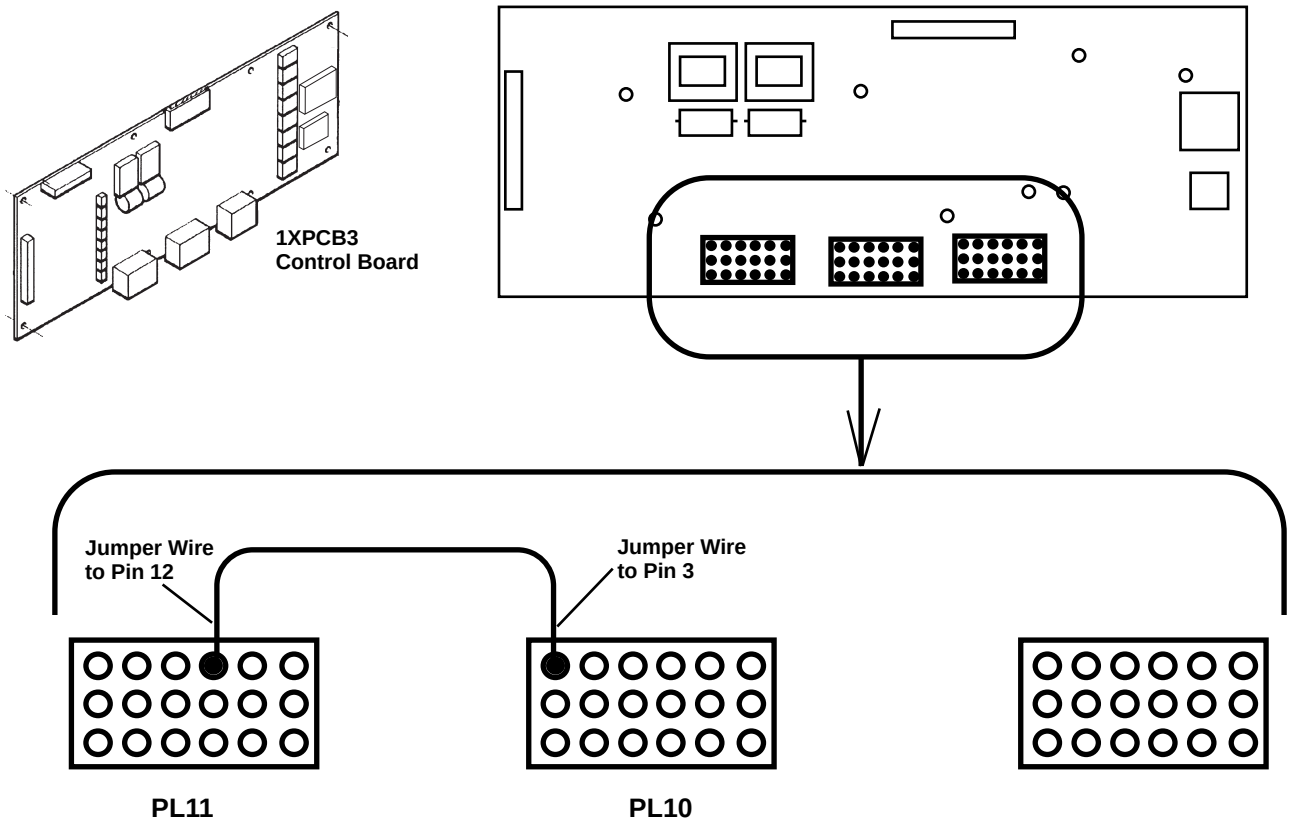


Figure 7 Install Jumper Wire to Control Board Plugs

Gas Console Front Panel Controls and Indicators

The front panel controls, Fig. 8, are under manual control only when the **REMOTE/LOCAL** toggle switch on the rear panel is set to the **LOCAL** position. Note that the LCD display is active in either mode.

- **PLASMA GAS SELECTION – O_2/AIR/H35 & N_2** Toggle Switch

  Selects the use of either oxygen, air or a mixture of argon-hydrogen and nitrogen as the plasma cutting gas.

  Note that changing the switch positions will automatically cause the gas lead hoses to be purged for 40 seconds (preflow for 20 seconds and cutflow gases for 20 seconds) and shown on LCD display.

- **Test Preflow/Run/Test Cut Flow** Toggle Switch

  Flowrates are set either manually in LOCAL or from the CNC in REMOTE. The flowrates are expressed as a percentage of full range (100 %).

  Test Preflow – Used to set the test preflow gas flowrates on the LCD display using **PREFLOW** potentiometers (**1**) and (**2**). Test preflow flowrates are specified in the *Cut Charts.* In this test position the arc cannot be fired.

  Test Cut Flow – Used to set the test cut gas flowrates on the LCD display using the **SHIELD Cut Flow** potentiometers (**3**) and (**4**) and the **PLASMA Cut Flow** potentiometers (**5**) and (**6**).
  Potentiometer 6 and assoicated LCD display field only operate when H35 is selected. Test cut flowrates are specified in the *Cut Charts*. In this test position the arc cannot be fired.

  Run – This is the normal operating position. This position enables the firing of the arc.

- **LCD Display**

  The LCD display is divided into functional fields. When operating in either the local or remote mode, the following data, as shown in Fig. 8, are displayed.

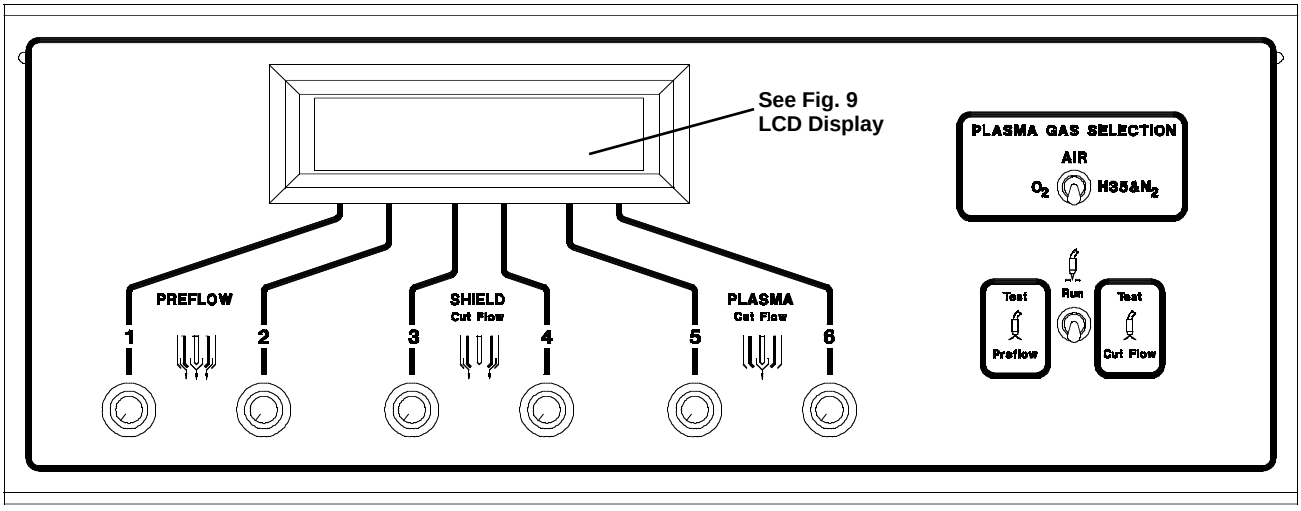
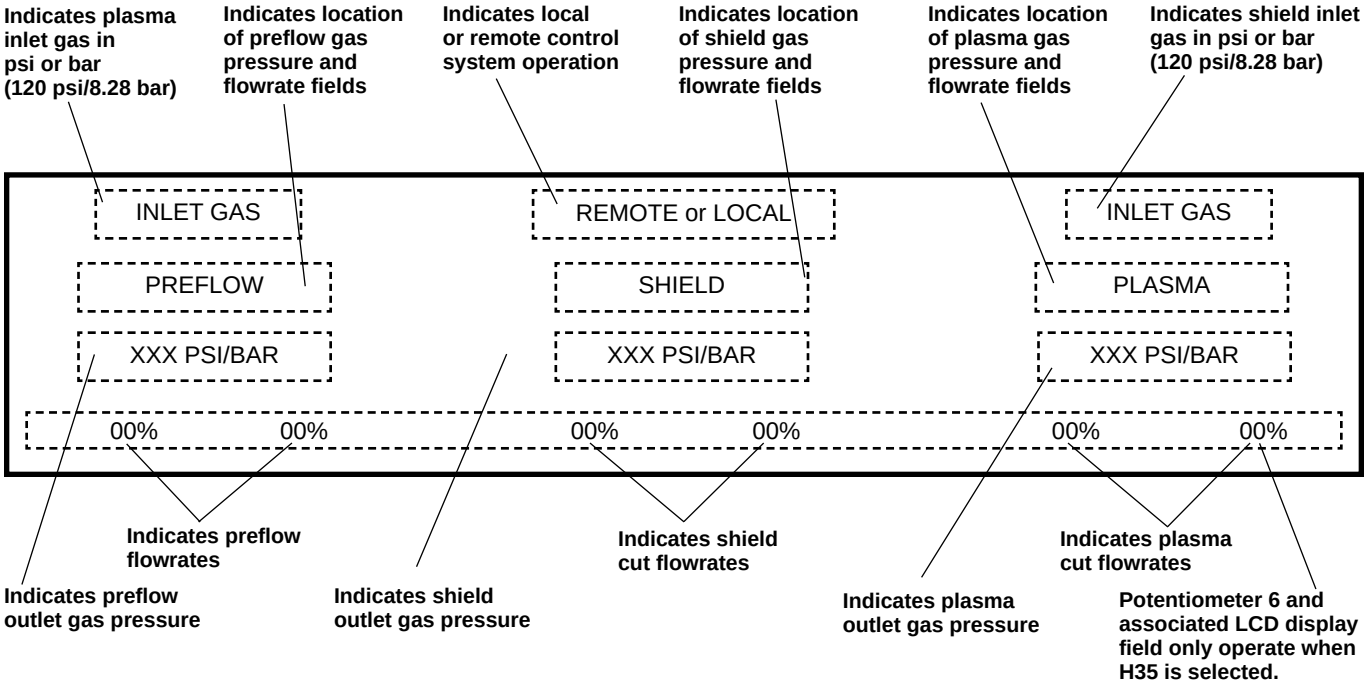


Figure 8 Front Panel Controls and Indicators



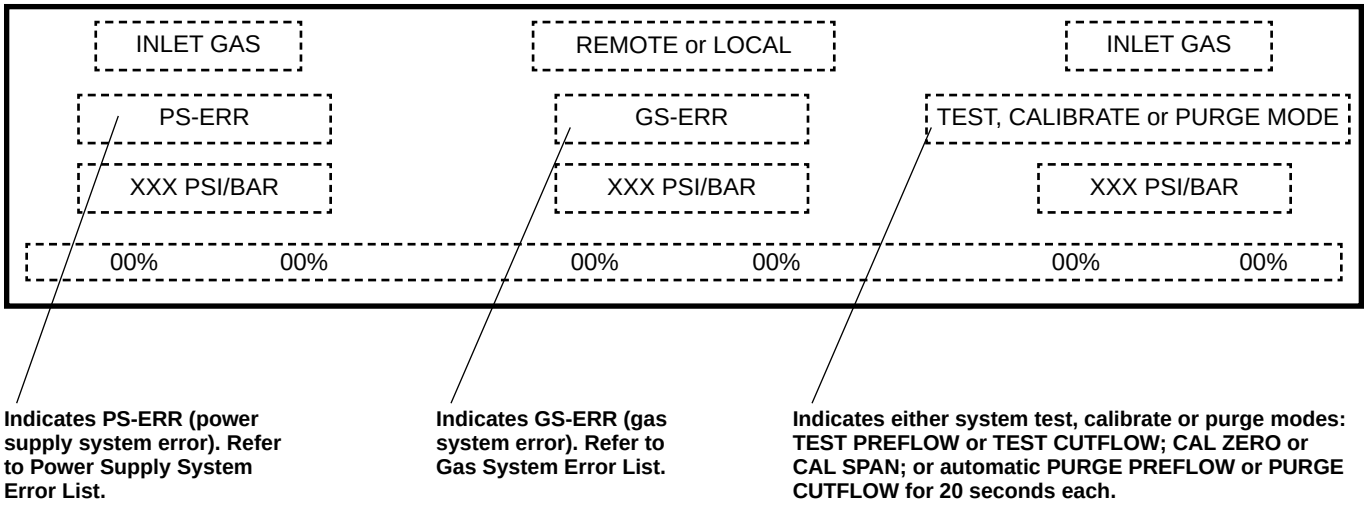


Figure 9 LCD Display

LCD Display Error Messages

Power Supply System (PS-ERR)

Error Message	Error Code	Description
NO ERROR	0	
LOW COOLANT LEVEL	1	This error signal is issued as a warning to the CNC that the coolant reservoir needs to have coolant added.
INTERLOCK ERR	2	This error is issued during operation when one of the pressure or temperature switches connected to the power distribution PCB is opened. Check STATUS LEDs on power supply.
HOLD TIMEOUT ERR	3	This error signal is issued if the HOLD INPUT signal was not released within 10 seconds after the end of preflow.
NO PILOT TIMEOUT ERR	4	This error signal is issued when the high frequency was unable to ignite the pilot arc within 1 second.
PIERCE DELAY ERR	5	This error signal is issued when the PIERCE COMPLETE signal should have been received within 2 seconds of the transfer signal.
TRANSFER TIMEOUT ERR	6	This error signal is issued when the transfer of current to the work was not sensed within 4 seconds of torch ignition.
RAMPUP BLOWOUT ERR*	7	This error signal is issued when the arc was extinguished after current transfer to the workpiece, but before steady-state operation.
RUNNING ARC BLOWOUT ERR*	8	This error signal is issued when the arc was lost during steady-state operation.
ARC OVER VOLTAGE ERR*	9	This error signal is issued during steady-state operation when the measured arc voltage exceeded the programmed maximum allowable arc voltage (200V).
RAMPDWN ARC BLOWOUT ERR*	10	This error signal is issued when the arc was lost during current ramp down, but before the programmed ramp down time has elapsed.

Power Supply System (PS-ERR) (continued)

Error Message	Error Code	Description
WRONG STATE ERR	12	This error signal should never occur. It indicates that the software has a very serious error that caused it to transfer control to an undefined program state. It is very important to record what the exact operating conditions were prior to the error.
PHASE LOSS ERR	13	This error signal is issued when the phase loss protection circuit has shutdown the system due to voltage phase loss or input voltage dropping below 80% of nominal.

* These errors will also cause the error counter output signal to the CNC to increment.

Gas System (GS-ERR)

Error Message	Error Code	Description
NO ERROR	0	
LOW PLASMA GAS ERR	1	This error signal is issued if the plasma gas inlet pressure is below 105 psig (7.2 bar).
LOW SHIELD GAS ERR	2	This error signal is issued if the shield gas inlet pressure is below 105 psig (7.2 bar).
HIGH PLASMA GAS ERR	3	This error signal is issued if the plasma gas inlet pressure is above 135 psig (9.3 bar).
HIGH SHIELD GAS ERR	4	This error signal is issued if the shield gas inlet pressure is above 135 psig (9.3 bar).
MV1 ERR*	5	This error signal is issued when the MV1 motor valve does not move when commanded. When this error occurs service is required.
MV2 ERR*	6	This error signal is issued when the MV2 motor valve does not move when commanded. When this error occurs service is required.
MV3 ERR*	7	This error signal is issued when the MV3 motor valve does not move when commanded. When this error occurs service is required.

Gas System (GS-ERR) (continued)

Error Message	Error Code	Description
MV4 ERR*	8	This error signal is issued when the MV4 motor valve does not move when commanded. When this error occurs service is required.
MV5 ERR*	9	This error signal is issued when the MV5 motor valve does not move when commanded. When this error occurs service is required.
MV6 ERR*	10	This error signal is issued when the MV6 motor valve does not move when commanded. When this error occurs service is required.

* Plasma system must be powered down and then restarted if any of the motor valve errors occur.

Gas Console Rear Panel Control

- **CCNC INTERFACE – REMOTE/LOCAL** Toggle Switch

  Selects either remote or local control of the HD3070 gas console. In **REMOTE** the gas console is under complete control of the CNC machine controller. In **LOCAL** the gas flowrates are set manually on the front panel.

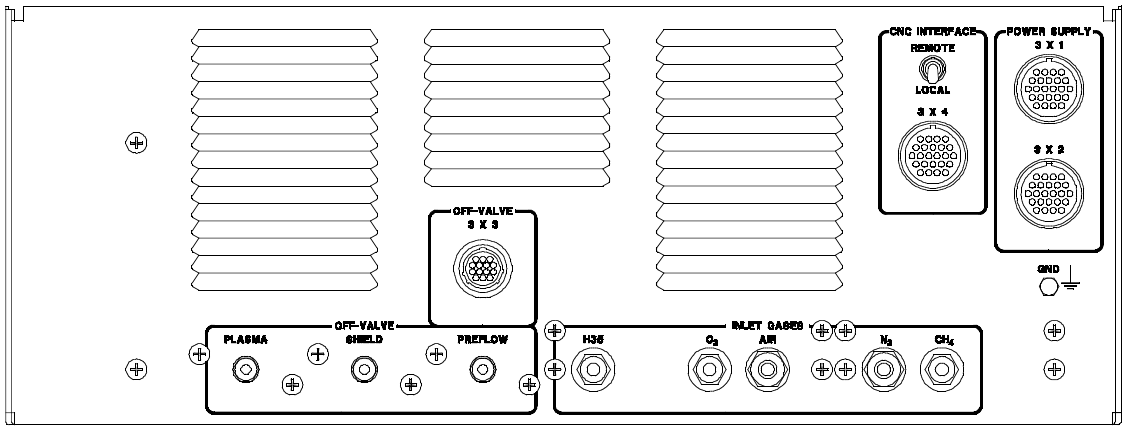


Figure 10 Rear Panel Controls and Indicators

Daily Operating Procedure

The HD3070 system can be operated in either the local or remote mode. Prior to operation, ensure that your cutting environment and that your clothing meet the safety requirements outlined in the *Safety* section of the instruction manual. If problems occur during start up, refer to the installation data.

Local Mode

To start up the HD3070 system on a daily basis, in the local mode, proceed as follows:

1. Select consumables based on the material to be cut. If the consumable parts are to be reused, check for wear or damage. Refer to *Changing Consumable Parts* in this section.

2. After checking the consumables, ensure that the torch is at right angles to the workpiece (0° and 90°) to get a clean, vertical cut. Use a square to align the torch.

3. Select the plasma gas using the **PLASMA GAS SELECTION** switch on the gas console front panel.

4. Apply system power by setting the main disconnect switch for the power supply to **On** and turning on the power supply by doing the following:

   - Depress **POWER ON (1)** switch (PB1) until the **STATUS-COOLANT FLOW LED** lights.

   - Ensure the green **POWER ON** indicator (LT1) remains lit. If not check the **STATUS** LEDs on the power supply and check for plasma and gas system error messages on the gas console LCD display. Refer to Fig. 8 and the *Error Messages* list.

     Note: If the **COOLANT FLOW** LED does not light, unscrew filler/vent cap on coolant tank (item 9, Fig. 6-10 in the Instruction Manual). Add 2 quarts (1.9 liters) of coolant.

5. Also at initial startup, the gas lines will be automatically purged for 40 seconds total. The gas console LCD display, Fig. 9, will indicate PURGE PRELFOW for 20 seconds and then PURGE CUT FLOW for 20 seconds.

6. Ensure that the plasma and shield inlet gas supplies are available at 120 psi (8.2 bar) dynamic pressure on the gas console LCD display (Fig. 9).

7. Set the test cut and test preflow gas flowrate percentages. To do this, proceed as follows:

   - Set the test preflow flowrates (1) and (2) as specified in the *Cut Chart.*
   - Set the shield test cut flowrates (3) and (4) and plasma test cut flowrates (5) and (6) as specified in the *Cut Chart.* Potentiometer (6) and assoicated LCD display field only operate when H35 is selected.
   - Set the **Test Preflow/Run/Test Cut Flow** switch to **Run.**
   - At CNC controller, set cutting current, arc voltage, travel speed, initial pierce height and pierce delay time according to cut charts. (Current and pierce delay can also be set on power unit.)
   - The system is now ready for cutting.

     Note: If the system has been powered up, but not in use for a while, purge the gas lines by positioning the **Test Preflow/Run/Test Cut Flow** switch to **Test Cut Flow** for 5 seconds and then to **Test Preflow** for 5 seconds. After purging the gas lines, set the switch to **Run. Failure to purge the lines may result in short consumable life due to contamination of water residue in the torch.**

Remote Mode

To start up the HD3070 on a daily basis, in the remote mode, proceed as follows:

1. Select consumables based on the material to be cut. If the consumable parts are to be reused, check for wear or damage. Refer to *Changing Consumable Parts* in this section.

2. After checking the consumables, ensure that the torch is at right angles to the workpiece (0° and 90°) to get a clean, vertical cut. Use a square to align the torch.

3. Apply system power by setting the main disconnect switch for the power supply to **On.**

4. Initiate the power on control signal from the CNC interface to power up the power supply. This signal should be activated for 15 seconds or until the POWER INTERLOCKS OK signal is returned to the CNC controller.

5. Ensure the POWER INTERLOCKS OK signal is returned to the CNC controller. If not check the **STATUS** LEDs on the power supply and check for plasma and gas system error messages on the gas console LCD display. Refer to Fig. 9 and the *Error Messages* list.

   Note: If the **COOLANT FLOW** LED does not light, unscrew filler/vent cap on coolant tank (item 9, Fig. 6-10 in the Instruction Manual). Add 1.9 liters (2 quarts) of coolant.

6. Also at initial startup, the gas lines will be automatically purged for 40 seconds total. The gas console LCD display, Fig.9 will indicate PURGE PRELFOW for 20 seconds and then PURGE CUT FLOW for 20 seconds.

7. Initiate the control signals from the CNC interface to select the required input gas proocess plasma and shield gases at the gas console.

8. Set the gas flowrate percentages on the gas console metering valves from the CNC interface using BCD set-points. The CNC controller should provide the following sequence to set up the gas metering valves:

   - Selects the BCD code for the valve number (1 - 6) to be set on the four VALVE SELECT lines. These signals should be pulled low (common) to make them active.
   - Selects the BCD code for the set- point (0 - 100%) to be set on the nine GAS FLOW SET lines. These signals should be pulled low (common) to make them active.
   - Pulls WRITE line low (common) and wait for return of a READ COMPLETE signal.

This process should occur in under 100 milliseconds. At this point the CNC controller should release the WRITE signal. The above process should be completed for the remaining four valves.

   Note: The gas console microprocessor stores the the gas flow data for each metering valve during normal operation. If power to the gas console is removed for any reason, it will be necessary to resend the gas flow data from the CNC interface.

9. The CNC controller should now ensure there is no ERROR OUTPUT signal from the gas console and the POWER INTERLOCKS OK signal is still active from the power supply.

10. The system is now ready for cutting.

   Note: Initiate the test cut and test preflow control signals from the CNC interface to purge the gas lines if the system has been powered up, but not in use for a while. Hold each position for 5 seconds.

Operating Data (Cut) Charts

The *Cut Charts* on the following pages are optimized to provide the best cut angle, least dross and best cut surface finish. Keep in mind that these charts provide a good starting point and that optimum cutting must be tuned to the application and materials on site. Increasing cut speed, lowering the torch standoff, higher current consumables on thinner metals or increasing the oxygen ratio in the shield mix, for example, all present certain tradeoffs as mentioned in *How to Get Better Cut Quality* in the Instruction Manual. Depending on the cutting application, it is up to the operator to determine if the tradeoffs are acceptable.

The cut chart also provides part numbers and illustrations of the consumables required to cut at a specific amperage. For more detailed information, refer to the gas console control and indicator descriptions and the daily operating procedure at the front of this section.

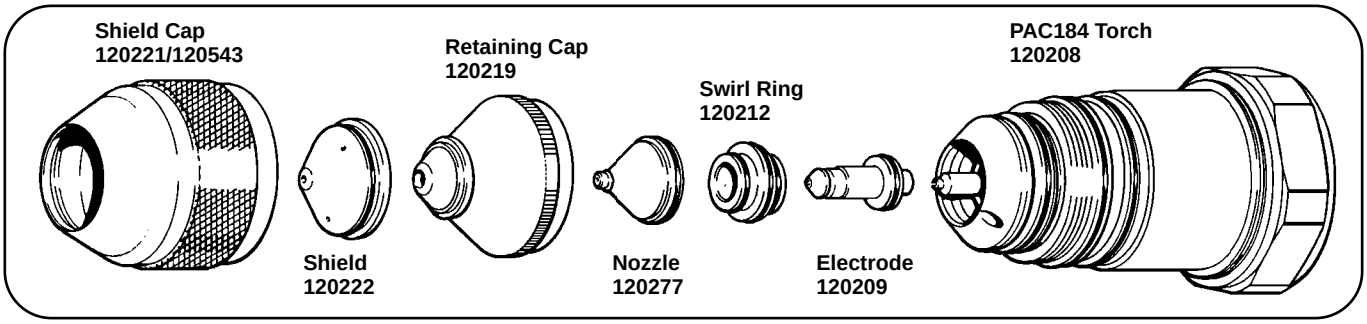
Cut Chart Index

PAC184

Mild Steel

O_2 Plasma / O_2 & N_2 Shield

15 Amp Cutting



Material Thickness (GA)	(in)	(mm)	Test Preflow* Flowrates (%) Preflow O_2 (1)#	N_2 (2)#	Test Cut Flowrates (%) Shield O_2 (3)#	N_2 (4)#	Plasma O_2 (5)#	(6)#	Arc Voltage (volts)	Torch Standoff** (in)	(mm)	Travel Speed (ipm)	(m/min)	Initial Piercing Height (in)	(mm)	Pierce Delay (dial)	(sec)
26	0.018	0.5	5	75	30	10	40	–	134	0.020	0.5	145	3.68	0.040	1.0	0	0.05
24	0.024	0.6	5	75	30	10	40	–	135	0.020	0.5	129	3.28	0.040	1.0	0	0.05
22	0.030	0.8	5	75	30	10	40	–	136	0.020	0.5	115	2.92	0.040	1.0	0	0.05
20	0.036	0.9	5	75	30	10	40	–	136	0.020	0.5	100	2.54	0.040	1.0	0	0.05
18	0.048	1.3	5	75	30	10	40	–	137	0.020	0.5	85	2.16	0.040	1.0	0.5	0.16
16	0.060	1.5	5	75	30	10	40	–	142	0.030	0.8	65	1.65	0.040	1.0	1	0.27
14	0.075	1.9	5	75	30	10	40	–	144	0.040	1.0	45	1.14	0.060	1.5	1.5	0.37
12	0.105	2.7	5	75	30	10	40	–	148	0.040	1.0	35	0.90	0.060	1.5	2	0.50
10	0.135	3.4	5	75	30	10	40	–	151	0.040	1.0	25	0.64	0.060	1.5	2.5	0.60

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

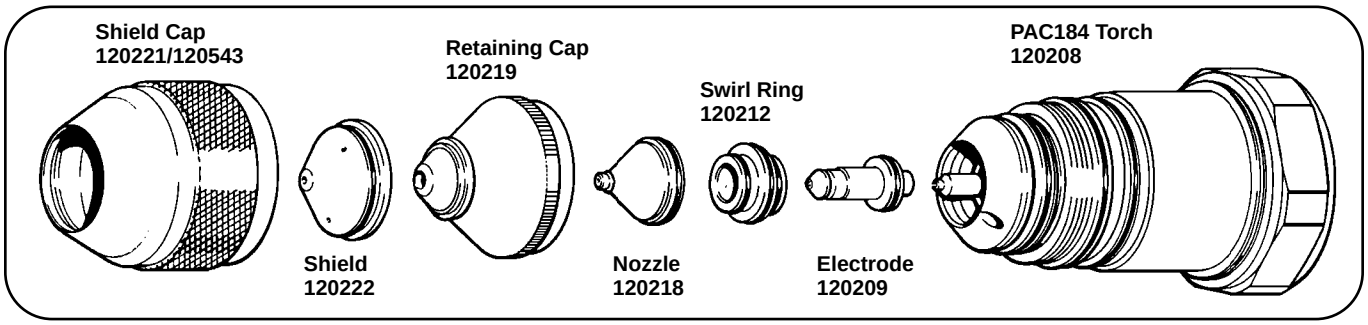
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC184

Mild Steel

O_2 Plasma / O_2 & N_2 Shield

30 Amp Cutting



Material Thickness			Test Preflow* Flowrates (%)		Test Cut Flowrates (%)				Arc Voltage	Torch Standoff**		Travel Speed		Initial Piercing Height		Pierce Delay	
			Preflow		Shield		Plasma										
(GA)	(in)	(mm)	O_2 (1)#	N_2 (2)#	O_2 (3)#	N_2 (4)#	O_2 (5)#	(6)#	(volts)	(in)	(mm)	(ipm)	(m/min)	(in)	(mm)	(dial)	(sec)
24	0.024	0.6	5	75	15	5	46	—	117	0.030	0.8	200	5.08	0.060	1.5	0	0.05
22	0.030	0.8	5	75	15	5	46	—	121	0.030	0.8	170	4.32	0.060	1.5	0	0.05
20	0.036	0.9	5	75	15	5	46	—	125	0.040	1.0	140	3.56	0.080	2.0	0	0.05
18	0.048	1.3	5	75	15	5	46	—	128	0.040	1.0	110	2.80	0.080	2.0	0	0.05
16	0.060	1.5	5	75	15	5	46	—	128	0.040	1.0	80	2.03	0.080	2.0	0	0.05
14	0.075	1.9	5	75	15	5	46	—	128	0.040	1.0	60	1.52	0.080	2.0	0.5	0.16
12	0.105	2.7	5	75	15	5	46	—	135	0.060	1.5	50	1.27	0.100	2.5	1	0.27
10	0.135	3.4	5	75	15	5	46	—	135	0.060	1.5	35	0.90	0.100	2.5	1.5	0.37
	3⁄16	4.8	5	75	15	5	46	—	135	0.060	1.5	32	0.81	0.100	2.5	2	0.50
	1⁄4	6.4	5	75	30	10	46	—	136	0.040	1.0	25	0.64	0.100	2.5	2.5	0.60

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

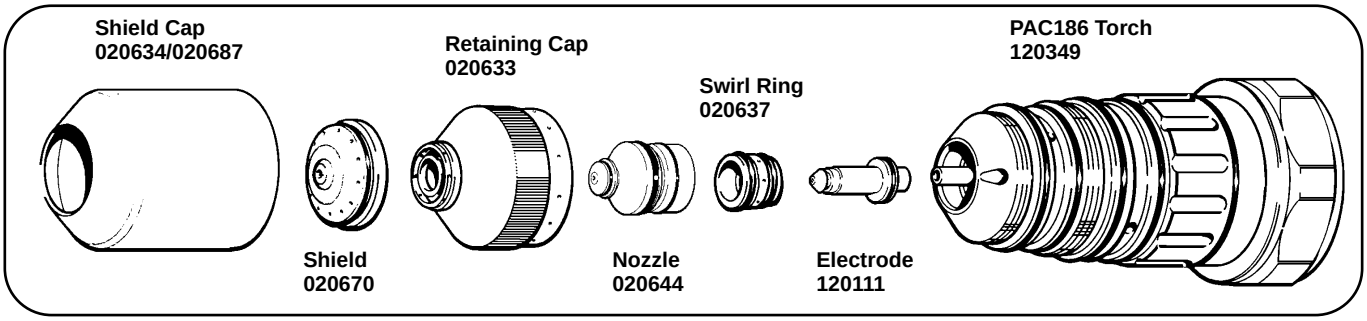
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Mild Steel

O_2 Plasma / O_2 & N_2 Shield

15 Amp Cutting



Material Thickness (GA)	(in)	(mm)	Test Preflow* Flowrates (%) Preflow O_2 (1)#	N_2 (2)#	Test Cut Flowrates (%) Shield O_2 (3)#	N_2 (4)#	Plasma O_2 (5)#	(6)#	Arc Voltage *** (volts)	Torch Standoff **, *** (in)	(mm)	Travel Speed (ipm)	(m/min)	Initial Piercing Height (in)	(mm)	Pierce Delay (dial)	(sec)
20	0.036	0.9	5	75	30	10	40	–	120	0.020	0.5	100	2.54	0.040	1.0	0	0.1
18	0.048	1.3	5	75	30	10	40	–	121	0.020	0.5	85	2.16	0.040	1.0	0	0.1
16	0.060	1.5	5	75	30	10	40	–	124	0.030	0.8	65	1.65	0.040	1.0	.5	0.2
14	0.075	1.9	5	75	30	10	40	–	130	0.040	1.0	45	1.14	0.060	1.5	1	0.3
12	0.150	2.7	5	75	30	10	40	–	132	0.040	1.0	35	0.90	0.060	1.5	1.5	0.4
10	0.135	3.4	5	75	30	10	40	–	134	0.040	1.0	25	0.64	0.060	1.5	2	0.50

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** To maintain the 0.020 inch (0.5 mm) torch standoff as the electrode wears, the arc voltage may have to be increased to avoid having the torch dive into the plate.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

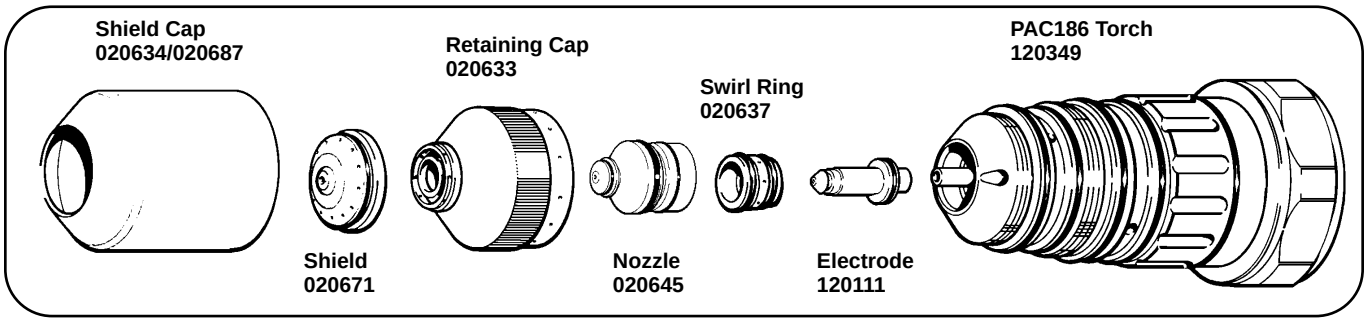
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Mild Steel

O_2 Plasma / O_2 & N_2 Shield

30 Amp Cutting



Material Thickness			Test Preflow* Flowrates (%)		Test Cut Flowrates (%)				Arc Voltage	Torch Standoff**		Travel Speed		Initial Piercing Height		Pierce Delay	
			Preflow		Shield		Plasma										
(GA)	(in)	(mm)	O_2 (1)#	N_2 (2)#	O_2 (3)#	N_2 (4)#	O_2 (5)#	(6)#	(volts)	(in)	(mm)	(ipm)	(m/min)	(in)	(mm)	(dial)	(sec)
24	0.024	0.6	5	75	15	5	46	–	103	0.030	0.8	200	5.08	0.040	1.0	0	0
22	0.030	0.8	5	75	15	5	46	–	108	0.030	0.8	170	4.32	0.040	1.0	0	0
20	0.036	0.9	5	75	15	5	46	–	110	0.040	1.0	140	3.56	0.060	1.5	0	0
18	0.048	1.3	5	75	15	5	46	–	112	0.040	1.0	110	2.80	0.060	1.5	0	0
16	0.060	1.5	5	75	15	5	46	–	115	0.040	1.0	80	2.03	0.060	1.5	0	0.1
14	0.075	1.9	5	75	15	5	46	–	118	0.040	1.0	60	1.52	0.060	1.5	0	0.1
12	0.105	2.7	5	75	15	5	46	–	121	0.060	1.5	50	1.27	0.080	2.0	.5	0.2
10	0.135	3.4	5	75	15	5	46	–	124	0.060	1.5	35	0.90	0.080	2.0	1	0.3
	3⁄16	4.8	5	75	15	5	46	–	125	0.060	1.5	32	0.81	0.080	2.0	1.5	0.4
	1⁄4	6.4	5	75	30	10	46	–	124	0.040	1.0	25	0.64	0.080	2.0	2	0.5

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

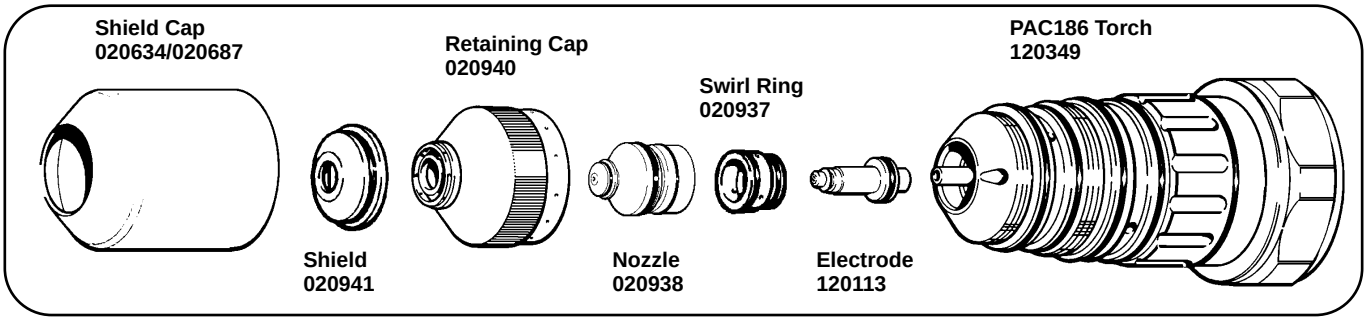
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Stainless Steel##

Air Plasma / Air Shield

30 Amp Cutting



Material Thickness (GA)	(in)	(mm)	Test Preflow* Flowrates (%) Preflow Air (1)#	(2)#	Test Cut Flowrates (%) Shield Air (3)#	(4)#	Plasma Air (5)#	(6)#	Arc Voltage *** (volts)	Torch Standoff **, *** (in)	(mm)	Travel Speed (ipm)	(m/min)	Initial Piercing Height (in)	(mm)	Pierce Delay (dial)	(sec)
27	0.016	0.4	75	0	30	0	60	–	70-75	0.020	0.5	250	6.35	0.040	1.0	0	0
24	0.024	0.6	75	0	30	0	60	–	70-75	0.020	0.5	220	5.59	0.040	1.0	0	0
22	0.030	0.8	75	0	30	0	60	–	70-75	0.020	0.5	200	5.08	0.040	1.0	0	0.1
20	0.036	0.9	75	0	30	0	60	–	70-75	0.020	0.5	180	4.57	0.040	1.0	0	0.1
18	0.048	1.3	75	0	30	0	60	–	73-78	0.020	0.5	150	3.81	0.060	1.5	.5	0.2
16	0.060	1.5	75	0	30	0	60	–	73-78	0.020	0.5	120	3.05	0.060	1.5	.5	0.2

Air inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

Stainless steel plate sometimes comes with a protective plastic film. Remove film prior to cutting.

* Slightly increasing the test preflow Air flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** To maintain the 0.020 inch (0.5 mm) torch standoff as the electrode wears, the arc voltage may have to be increased to avoid having the torch dive into the plate.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

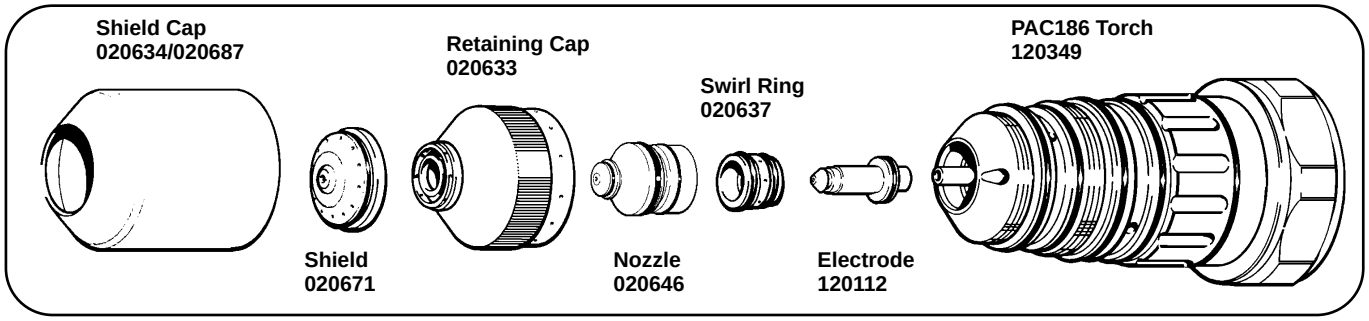
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Mild Steel

O_2 Plasma / O_2 & N_2 Shield

50 Amp Cutting



Material Thickness (GA)	(in)	(mm)	Test Preflow* Flowrates (%) Preflow O_2 (1)#	N_2 (2)#	Test Cut Flowrates (%) Shield O_2 (3)#	N_2 (4)#	Plasma O_2 (5)#	(6)#	Arc Voltage (volts)	Torch Standoff** (in)	(mm)	Travel Speed (ipm)	(m/min)	Initial Piercing Height (in)	(mm)	Pierce Delay (dial)	(sec)
22	0.030	0.8	5	75	40	0	40	–	103	0.040	1.0	270	6.86	0.060	1.5	0	0
20	0.036	0.9	5	75	40	0	40	–	103	0.040	1.0	210	5.33	0.060	1.5	0	0
18	0.048	1.3	5	75	40	0	40	–	104	0.040	1.0	160	4.06	0.060	1.5	0	0
16	0.060	1.5	5	75	40	0	40	–	109	0.050	1.3	120	3.05	0.080	2.0	0	0
14	0.075	1.9	5	75	40	0	40	–	113	0.050	1.3	100	2.54	0.080	2.0	0	0
12	0.105	2.7	5	75	40	0	40	–	119	0.050	1.3	75	1.91	0.100	2.5	0	0.1
10	0.135	3.4	5	75	40	0	40	–	122	0.060	1.5	55	1.40	0.100	2.5	.5	0.2
	3⁄16	4.8	5	75	40	0	40	–	124	0.060	1.5	45	1.14	0.100	2.5	1	0.3
	1⁄4	6.4	5	75	60	0	60	–	127	0.080	2.0	35	0.90	0.120	3.0	2	0.5

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

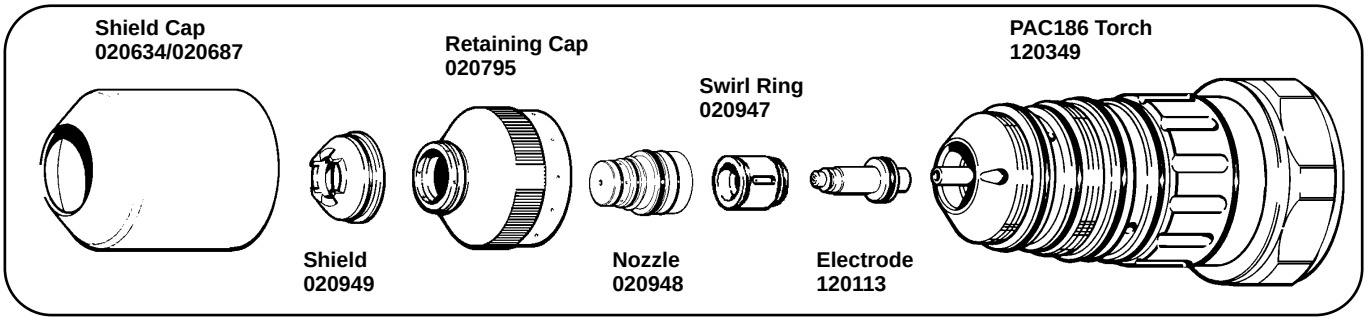
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Stainless Steel##

Air Plasma / Air Shield

50 Amp Cutting



Material Thickness (GA)	(in)	(mm)	Test Preflow* Flowrates (%) Preflow Air (1)#	(2)#	Test Cut Flowrates (%) Shield Air (3)#	(4)#	Plasma Air (5)#	(6)#	Arc Voltage (volts)	Torch Standoff** (in)	(mm)	Travel Speed (ipm)	(m/min)	Initial Piercing Height *** (in)	(mm)	Pierce Delay (dial)	(sec)
14	0.075	1.9	60	0	80	0	40	–	100	0.040	1.0	120	3.05	0.120	3.0	1	0.3
12	0.105	2.7	60	0	80	0	40	–	100	0.040	1.0	80	2.03	0.120	3.0	1.5	0.4
10	0.135	3.4	60	0	60	0	40	–	110	0.060	1.5	55	1.40	0.120	3.0	1.5	0.4
	3⁄16	4.8	60	0	50	0	40	–	115	0.080	2.0	40	1.02	0.160	4.0	2	0.5

Air inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

Stainless steel plate sometimes comes with a protective plastic film. Remove film prior to cutting.

* Slightly increasing the test preflow Air flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** Measured from tips of shield adapter 020949.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

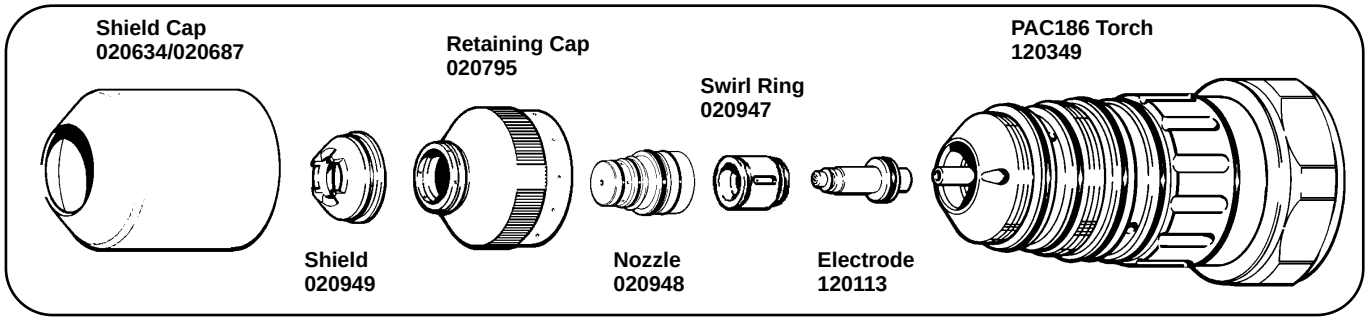
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Copper##

O_2 Plasma / O_2 & N_2 Shield

50 Amp Cutting



Material Thickness			Test Preflow* Flowrates (%)		Test Cut Flowrates (%)				Arc Voltage	Torch Standoff**		Travel Speed		Initial Piercing Height ***		Pierce Delay	
			Preflow		Shield		Plasma										
(GA)	(in)	(mm)	O_2 (1)#	N_2 (2)#	O_2 (3)#	N_2 (4)#	O_2 (5)#	(6)#	(volts)	(in)	(mm)	(ipm)	(m/min)	(in)	(mm)	(dial)	(sec)
16	0.060	1.5	35	40	20	10	40	–	92	0.080	2.0	70	1.78	0.100	2.5	4	1.0
14	0.075	1.9	35	40	20	10	40	–	92	0.080	2.0	70	1.78	0.100	2.5	4	1.0
12	0.105	2.7	35	40	20	10	40	–	94	0.080	2.0	65	1.65	0.100	2.5	7	1.5
10	0.135	3.4	35	40	20	10	40	–	94	0.080	2.0	65	1.65	0.100	2.5	9	2.0

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

Copper plate sometimes comes with a protective plastic film. Remove film prior to cutting.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** Measured from tips of shield adapter 020949.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

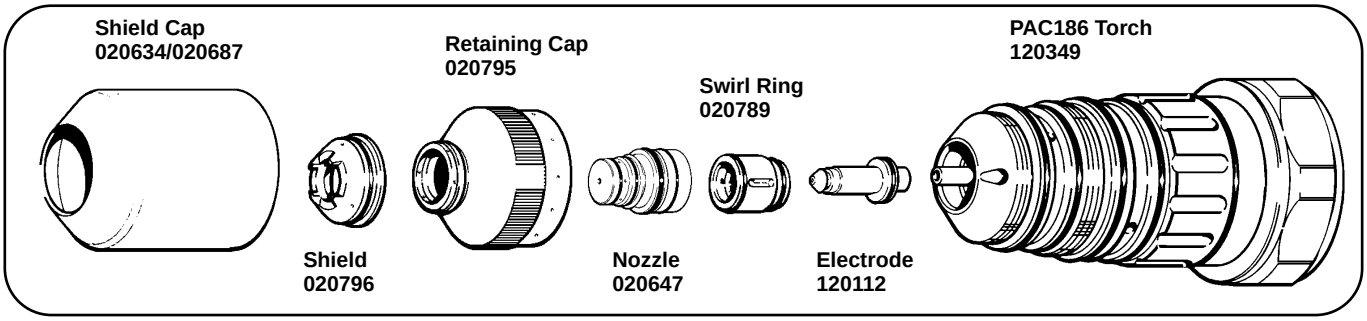
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Mild Steel

O_2 Plasma / O_2 & N_2 Shield

70 Amp Cutting



Material Thickness (GA)	(in)	(mm)	Test Preflow* Flowrates (%) Preflow O_2 (1)#	N_2 (2)#	Test Cut Flowrates (%) Shield O_2 (3)#	N_2 (4)#	Plasma O_2 (5)#	(6)#	Arc Voltage (volts)	Torch Standoff** (in)	(mm)	Travel Speed (ipm)	(m/min)	Initial Piercing Height *** (in)	(mm)	Pierce Delay (dial)	(sec)
16	0.060	1.5	5	75	0	100	25	–	107	0.060	1.5	280	7.11	0.100	2.5	0	0.1
14	0.075	1.9	5	75	0	100	25	–	107	0.060	1.5	230	5.84	0.100	2.5	0	0.1
12	0.105	2.7	5	75	0	100	25	–	109	0.080	2.0	185	4.70	0.120	3.0	0	0.1
10	0.135	3.4	5	75	0	100	25	–	114	0.080	2.0	150	3.81	0.120	3.0	.5	0.2
	3⁄16	4.8	5	75	0	100	25	–	119	0.080	2.0	120	3.05	0.120	3.0	1	0.3
	1⁄4	6.4	5	75	0	100	40	–	129	0.080	2.0	100	2.54	0.120	3.0	2	0.5
	3⁄8	9.5	5	75	0	100	40	–	135	0.100	2.5	65	1.65	0.160	4.0	4	1.0

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** Measured from tips of shield adapter 020796.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

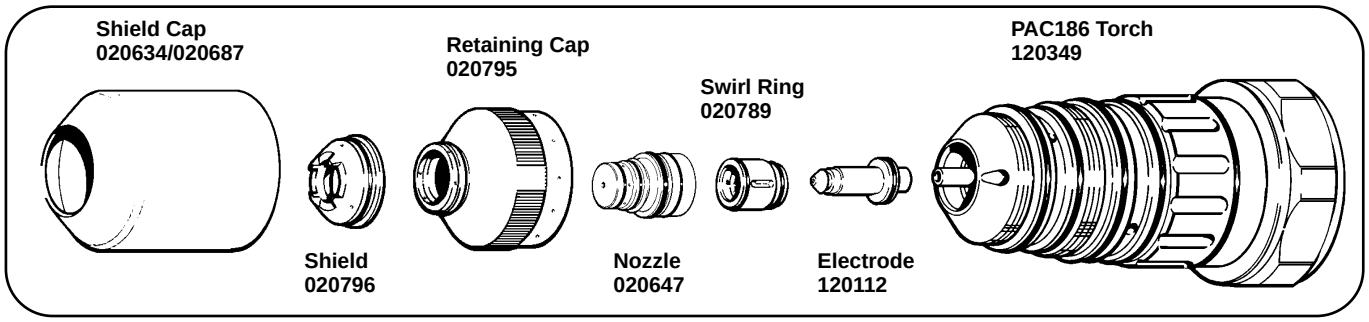
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Stainless Steel##

Air Plasma / Air & CH_4 Shield

70 Amp Cutting



Material Thickness			Test Preflow* Flowrates (%)		Test Cut Flowrates (%)				Arc Voltage	Torch Standoff**		Travel Speed		Initial Piercing Height ***		Pierce Delay	
			Preflow		Shield		Plasma										
(GA)	(in)	(mm)	Air (1)#	CH_4 (2)#	Air (3)#	CH_4 (4)#	Air (5)#	(6)#	(volts)	(in)	(mm)	(ipm)	(m/min)	(in)	(mm)	(dial)	(sec)
10	0.135	3.4	75	0	100	0	35	–	134	0.060	1.5	100	2.54	0.140	3.5	1	0.3
	3/16	4.8	75	0	60	3	35	–	139	0.080	2.0	80	2.00	0.140	3.5	1.5	0.4
	1/4	6.4	75	0	30	10	35	–	149	0.140	3.5	55	1.40	0.180	4.5	2	0.5
	3/8	9.5	75	0	30	10	35	–	164	0.140	3.5	30	0.76	0.200	5.0	2	0.5
	1/2	12.7	75	0	40	20	50	–	189	0.250	6.3	25	0.64	****		****	

Air and CH_4 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

Stainless steel plate sometimes comes with a protective plastic film. Remove film prior to cutting.

* Slightly increasing the test preflow Air flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** Measured from tips of shield adapter 020796.

**** Piercing 1/2 inch (12.7 mm) stainless steel is not recommended, it will shorten consumable life. Starting cuts at the edge of the metal is recommended.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

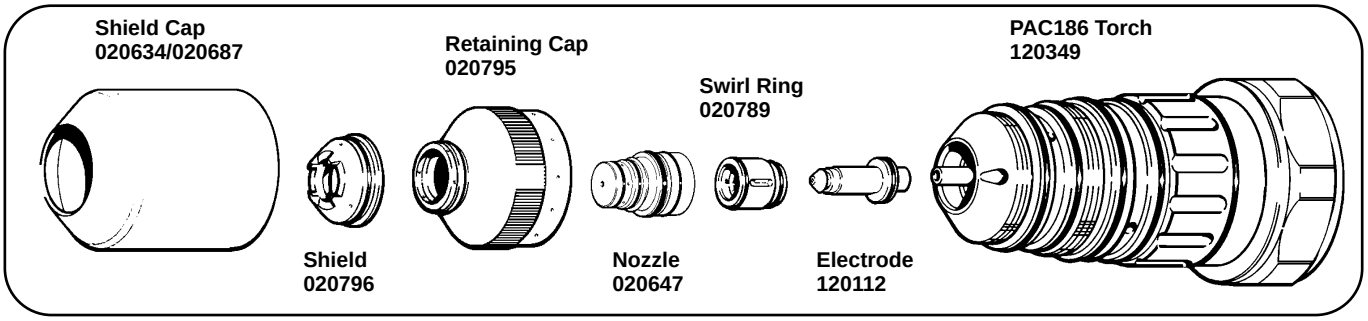
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Aluminum##

Air Plasma / CH_4 Shield

70 Amp Cutting



Material Thickness (GA)	(in)	(mm)	Test Preflow* Flowrates (%) Preflow Air (1)#	Preflow CH_4 (2)#	Test Cut Flowrates (%) Shield Air (3)#	Shield CH_4 (4)#	Plasma Air (5)#	Plasma (6)#	Arc Voltage (volts)	Torch Standoff** (in)	(mm)	Travel Speed (ipm)	(m/min)	Initial Piercing Height *** (in)	(mm)	Pierce Delay (dial)	(sec)
18	0.048	1.2	75	0	0	40	45	–	159	0.100	2.5	150	3.81	0.160	4.0	0	0.1
16	0.060	1.5	75	0	0	40	45	–	159	0.100	2.5	125	3.18	0.160	4.0	0	0.1
14	0.075	1.9	75	0	0	40	45	–	159	0.100	2.5	100	2.54	0.160	4.0	0	0.1
12	0.105	2.7	75	0	0	40	45	–	159	0.100	2.5	85	2.16	0.160	4.0	.5	0.2
	1⁄8	3.2	75	0	0	40	45	–	179	0.180	4.5	70	1.78	0.200	5.0	.5	0.2
10	0.135	3.4	75	0	0	40	45	–	179	0.180	4.5	65	1.65	0.200	5.0	.5	0.2
	1⁄4	6.4	75	0	0	40	45	–	179	0.180	4.5	45	1.14	0.200	5.0	1	0.3
	3⁄8	9.5	75	0	0	40	45	–	179	0.180	4.5	30	0.76	0.200	5.0	1	0.3

Air and CH_4 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

Aluminum plate sometimes comes with a protective plastic film. Remove film prior to cutting.

* Slightly increasing the test preflow Air flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** Measured from tips of shield adapter 020796.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

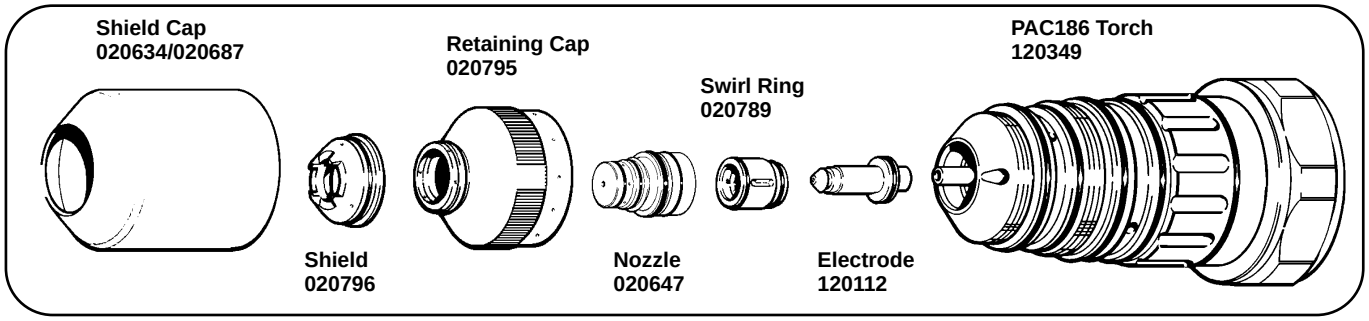
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Copper##

O_2 Plasma / O_2 & N_2 Shield

70 Amp Cutting



Material Thickness			Test Preflow* Flowrates (%)		Test Cut Flowrates (%)				Arc Voltage	Torch Standoff**		Travel Speed		Initial Piercing Height ***		Pierce Delay	
			Preflow		Shield		Plasma										
(GA)	(in)	(mm)	O_2 (1)#	N_2 (2)#	O_2 (3)#	N_2 (4)#	O_2 (5)#	(6)#	(volts)	(in)	(mm)	(ipm)	(m/min)	(in)	(mm)	(dial)	(sec)
10	0.135	3.4	5	75	75	50	50	–	133	0.120	3.0	60	1.52	0.160	4.0	9	2.0
	3/16	4.8	5	75	75	50	50	–	119	0.120	3.0	55	1.40	0.160	4.0	—	2.5
	1/4	6.4	5	75	75	50	50	–	123	0.120	3.0	55	1.40	0.160	4.0	—	3.0
	3/8	9.5	5	75	75	50	50	–	129	0.120	3.0	25	0.64	0.160	4.0	—	5.0

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

Copper plate sometimes comes with a protective plastic film. Remove film prior to cutting.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

*** Measured from tips of shield adapter 020796.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

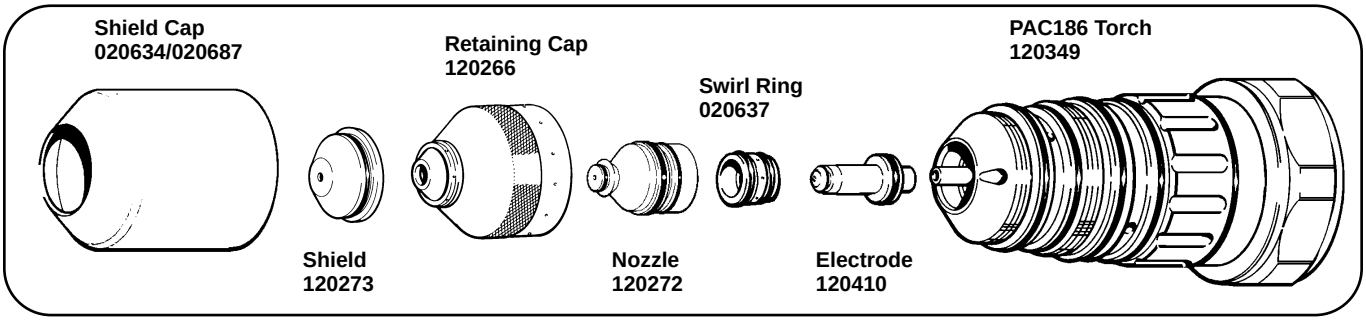
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Mild Steel

O_2 Plasma / O_2 & N_2 Shield

100 Amp Cutting



Material Thickness (in)	Material Thickness (mm)	Test Preflow* Flowrates (%) Preflow O_2 (1)#	Preflow N_2 (2)#	Test Cut Flowrates (%) Shield O_2 (3)#	Shield N_2 (4)#	Plasma O_2 (5)#	Plasma (6)#	Arc Voltage (volts)	Torch Standoff** (in)	Torch Standoff** (mm)	Travel Speed (ipm)	Travel Speed (m/min)	Initial Piercing Height (in)	Initial Piercing Height (mm)	Pierce Delay (dial)	Pierce Delay (sec)
1/8	3.2	10	100	35	90	60	–	137	0.125	3.2	275	7.0	0.180	4.6	0	0.00
1/4	6.4	10	100	35	90	60	–	141	0.125	3.2	135	3.43	0.300	7.6	0.4	0.22
3/8	9.5	10	100	35	90	60	–	145	0.125	3.2	95	2.41	0.300	7.6	0.7	0.27
1/2	12.7	10	100	35	90	60	–	147	0.125	3.2	64	1.62	0.300	7.7	1.0	0.37

O_2 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

* Slightly increasing the test preflow O_2 and N_2 flowrates may increase piercing capability on the thicker materials listed above. However, increasing the preflow flowrates too much may affect plasma starting reliability (misfiring).

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

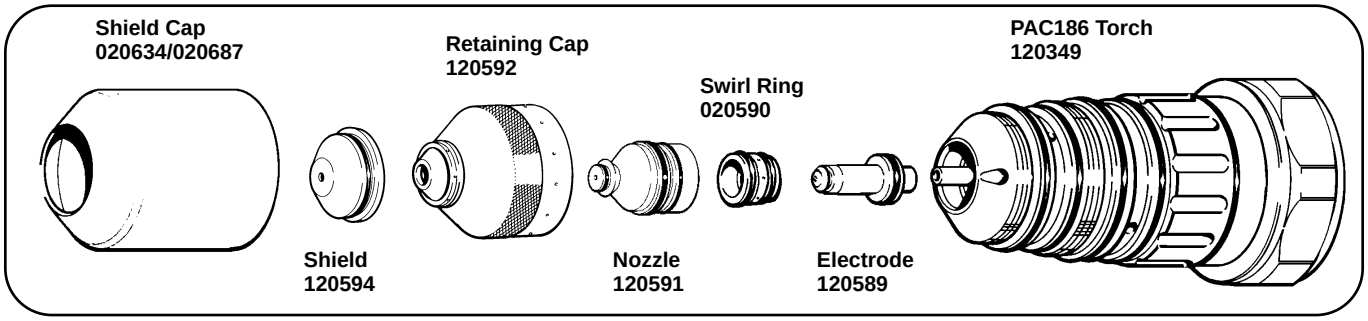
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Stainless Steel

H35 & N_2 Plasma / N_2 Shield

100 Amp Cutting



Material Thickness (in)	Material Thickness (mm)	Test Preflow* Flowrates (%) Preflow N_2 (1)#	Preflow N_2 (2)#	Test Cut Flowrates (%) Shield N_2 (3)#	Shield N_2 (4)#	Plasma N_2 (5)#	Plasma H35 (6)#	Arc Voltage (volts)	Torch Standoff** (in)	Torch Standoff** (mm)	Travel Speed (ipm)	Travel Speed (m/min)	Initial Piercing Height (in)	Initial Piercing Height (mm)	Pierce Delay (dial)	Pierce Delay (sec)
1/4	6.4	45	45	60	60	30	30	134	0.120	3.0	75	1.9	0.200	5.1	0	0.1
3/8	9.5	45	45	60	60	30	30	144	0.150	3.8	65	1.6	0.200	5.1	0.5	0.2
1/2	12.7	45	45	60	60	50	40	160	0.250	6.4	45	1.1	0.300	7.6	1	0.3

H35 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

Refer to LCD display Figure 9.

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

If the part is not completely cut away from the scrap, try modifying the leadout. Stop the cut 0.050 inch (1.3 mm) before the end of the part for 1/4 and 3/8 inch (6.4 and 9.5 mm) material and 0.100 inch (2.5 mm) for 1/2 inch (12.7 mm) material. The ramp down of the current and gases will complete the cut. If your program can not be modified, reduce cutting speed and use no leadout.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

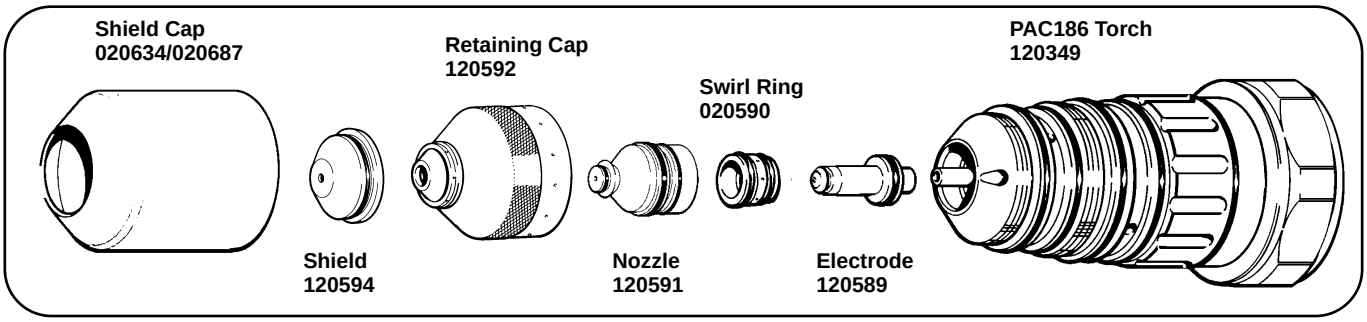
If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*

PAC186

Aluminum

H35 & N_2 Plasma / N_2 Shield

100 Amp Cutting



Material Thickness (in)	Material Thickness (mm)	Test Preflow* Flowrates (%) Preflow N_2 (1)#	Preflow N_2 (2)#	Test Cut Flowrates (%) Shield N_2 (3)#	Shield N_2 (4)#	Plasma N_2 (5)#	Plasma H35 (6)#	Arc Voltage (volts)	Torch Standoff** (in)	Torch Standoff** (mm)	Travel Speed (ipm)	Travel Speed (m/min)	Initial Piercing Height (in)	Initial Piercing Height (mm)	Pierce Delay (dial)	Pierce Delay (sec)
1/4	6.4	45	45	60	60	30	30	145	0.157	4.0	100	2.5	0.236	6.0	0	0.1
3/8	9.5	45	45	60	60	30	30	149	0.157	4.0	70	1.8	0.236	6.0	0.5	0.2
1/2	12.7	45	45	60	60	30	30	155	0.157	4.0	40	1.1	0.236	6.0	1	0.3

H35 and N_2 gas inlet pressures must be between 105 - 135 psi (7.2 - 9.2 bar) for all material thickness.

H35 flowrate must be 85 scfh (2407 l/hr) at fullscale.

Refer to LCD display Figure 9.

** Torch standoff tolerances are ± 0.005 inch (± 0.125 mm). When using a THC, tolerances are ± 1 volt.

Counter clockwise (CCW) consumables are available for mirror image cutting. Refer to Instruction Manual, Section 6, *Parts List.*

If problems occur with the cutting process, and the flowrates are suspect, refer to Instruction Manual, Section 5, Maintenance, *Gas System Back Pressure Checks.*