

# Plasma Setup

## Electronic Connections Installation

Using the color coded diagram connect the electronic components in the following manner.

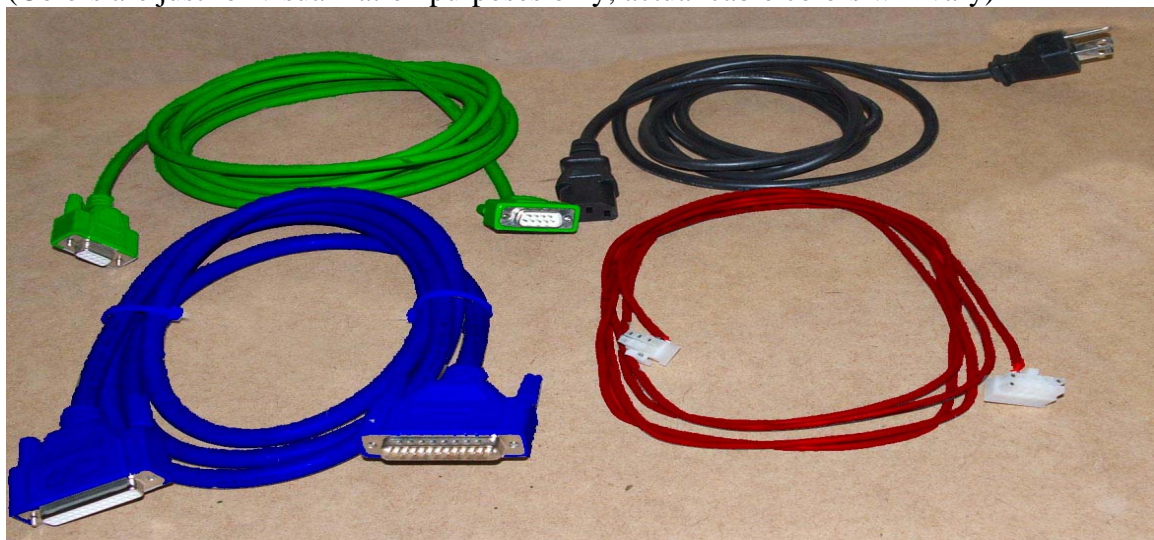
**Green:** RS 232, DB9 from serial port on your Computer to Signal Generator.

**Red:** The 6-pin Molex connector is installed to the back of the Plasma Interface box, which is then connected to the Signal Generator using the 10-pin connector.

**Blue:** The DB25 pin Parallel Port Cable is connected from the 25-pin port on the back of the Signal Generator to the 25-pin port on the Driver Box.



Below are the corresponding cables for the electronics connections listed above. The Black cable supplies power to the Driver Box from a 110 volt connection. (Colors are just for visualization purposes only, actual cable colors will vary)




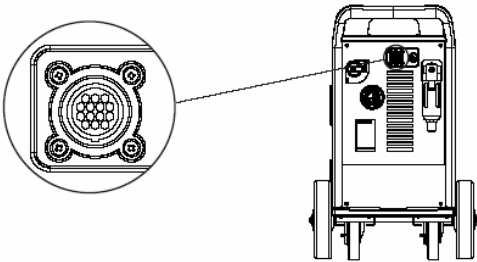
## START SWITCH CIRCUIT

If you did not purchase the Arc Voltage Height Control, the plasma cutters start circuit will connect directly to the plasma interface in the following manner.



Connect the Plasma Interface to the start circuit of your plasma cutter. Typically the start circuit can be accessed through a pigtail that is located on the main torch cable, or through the CNC interface cable.

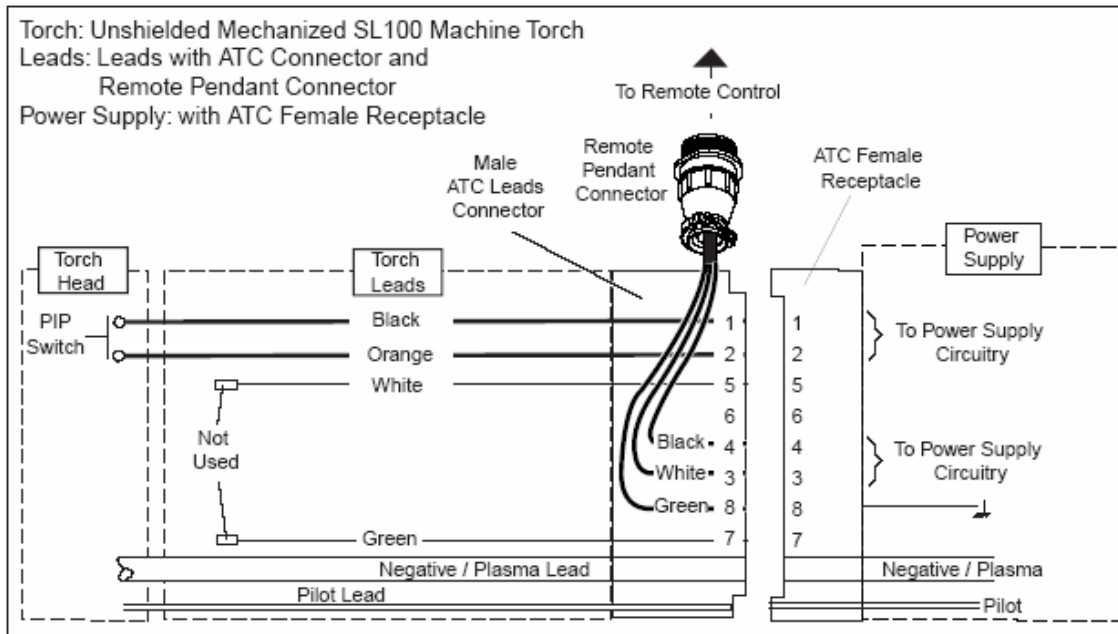
## Hypertherm Powermax Series

 <p><b>WARNING</b> The ON/OFF remote pendant will not operate when a hand torch is installed.</p> 	Signal	Start (start plasma)
	Type:	Input
	Notes:	Normally open. 18VDC open circuit voltage at START terminals. Requires dry contact closure to activate.
	Rear panel sockets	3, 4
	Cable wires of 023206	Green, Black

Powermax 1000, 1250, and 1650 with CNC interface will use the green and black wires for the start output; these will connect to the two terminals on the plasma interface\*. If you do not have the CNC interface cable, or are using the hand torch, consult the manufacture's instructions for the plasma start circuit

\* The plasma interface is a dry contact switch and there is no polarity for this connection

**Thermal Dynamics Cutmaster Series:**



Thermal Dynamics Cutmaster 51, 81, 101, and 151 will use the white and black wires in the remote pendant connector. The machine torches may include a manual trigger which can be utilized for the connection to the plasma Interface. If the trigger was included with the plasma cutter, disassemble the trigger handle and disconnect the black and white wires from the switch, these two wires will attach to the screw terminals on the plasma interface<sup>†</sup>. The other end will connect to the pigtail on the main torch cable

**Cutmaster Start Switch Connection**



**Cutmaster Manual Trigger Assembly**



<sup>†</sup> The plasma interface is a dry contact switch and there is no polarity for this connection

## Optional Arc Voltage Height Control Installation

Using the color coded diagram Connect the following electronics

**Cyan** 20 gauge or thicker insulated wire from Plasma Interface to **START INPUT** on the AVHC

**Orange** Use the start switch connection from the plasma cutter described in the previous diagrams to connect to the **START OUTPUT**

**Purple** 9 pin barrel connector on the AVHC to 15 pin serial port on the lifter station

**Yellow** 4 pin barrel connector on the AVHC to the Modified serial port on the lifter station

**Green** 4 pin barrel connector on the AVHC to two bare wires attached to the voltage leads inside the Plasma Cutter.<sup>‡</sup>



**Barrel connectors for the AVHC.** The four pin connector has two separate cables, the yellow has the modified serial port and the green has the two bare wires (Colors are just for visualization purposes only actual cable colors will vary)

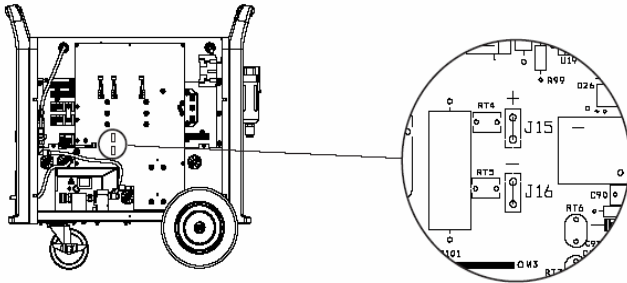


<sup>‡</sup> It is critical to match the polarity for the Arc voltage connections. The Red wire connects to the Positive(+) lead, the Black wire connects to the Negative(-) lead

**!WARNING! Never remove the plasma cutter's cover with the power connected. Unplug the power cable BEFORE attempting to connect to the arc voltage points! It is CRITICAL that the positive and negative wires are connected to the correct points. Improper wiring WILL result in damage to the Plasma Cutter and Height Control electronics.**

**Hypertherm 1000 1250 and 1650 Voltage Leads:**

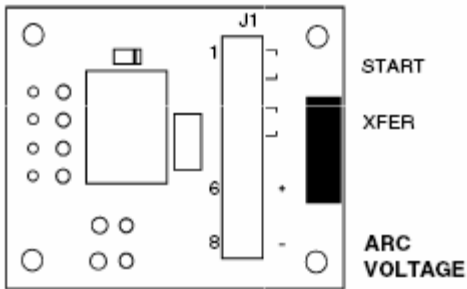
The raw arc voltage take-off points are located inside the plasma cutter on the left side of the circuit board in the lower left hand corner. The coordinates are labeled as follows: J15 (+ red wire), and J16 (- black wire)



Signal:	Arc Voltage (torch height control)
Type:	Output
Notes:	Full arc voltage. No voltage divider. 300VDC maximum. (Signal not available on rear panel connector.)
J15	+VDC
J16	-VDC

**Hypertherm 900:**

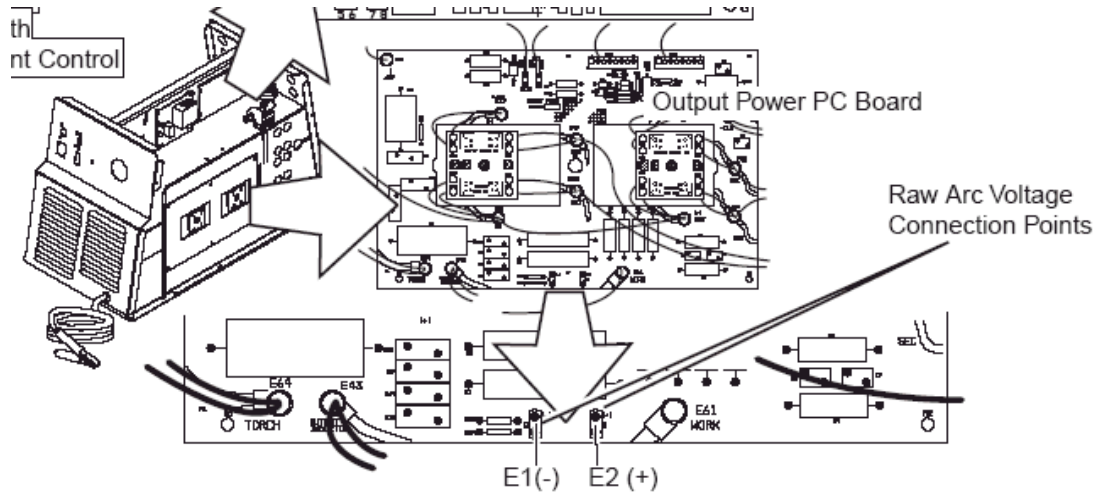
Find the machine interface board on the top of the unit near the Powermax900 Control board. The arc voltage cable will connect to J1-6 (+ red wire) J1-8 (- black wire) (please see manual for attaching a Powermax 900 without the machine interface board)



<b>Signal:</b>	<b>ARC VOLTAGE (torch height control)</b>
<b>Type:</b>	Output
<b>Notes:</b>	Full arc voltage. No voltage divider. 300VDC maximum. (Signal not available on rear panel connector.)
<b>J1-6</b>	+VDC
<b>J1-8</b>	-VDC

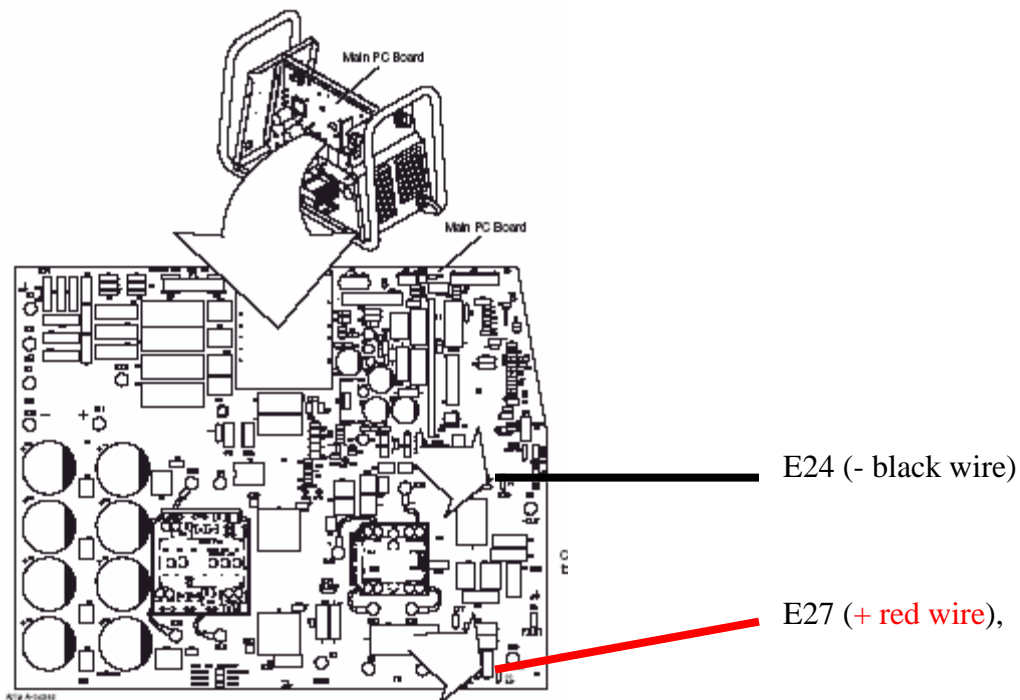
**Thermal Dynamics Cutmaster 81, 101, and 151 Arc Voltage Leads:**

The raw arc voltage take-off points on the machine are located inside the machine on the right hand circuit board. These coordinates are labeled as follows: E2 (+ red wire), and E1 (- black wire)

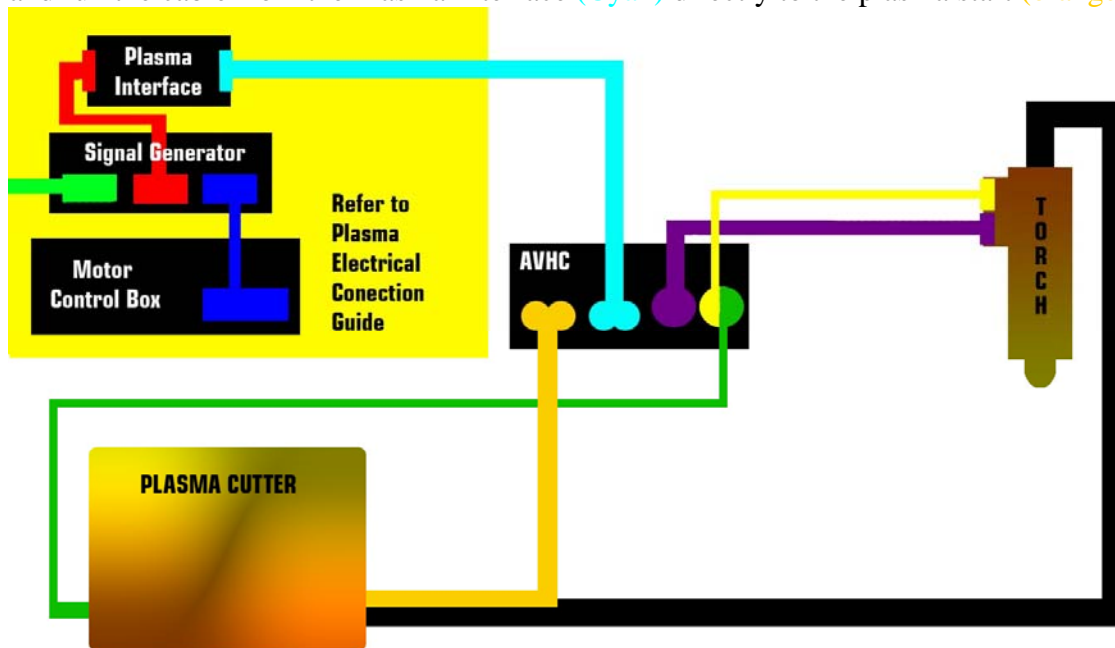


**Thermal Dynamics Cutmaster 51 Arc Voltage Leads:**

The raw arc voltage leads are located on the main power board on the right side of the board. E27 (+ red wire), and E24 (- black wire)



This diagram shows the integration of all the electronic parts including the AVHC and the plasma cutter. The Torch is held in position by the height control lifter station. If you are not connecting the AVHC you can ignore the purple yellow and green cables, and run the cable from the Plasma Interface (Cyan) directly to the plasma start (orange)



### Setting the Pierce Height

Dialing in your pierce height is the cornerstone to successful plasma cutting. Ideally, the pierce height should be set to 1/8" to 3/16" off of the material surface you are cutting, to allow the plasma to penetrate. This will also help to maintain the height of the torch tip while the voltage is being read during manual cutting.

To begin, turn on all of the Torchmate electronics (Driver box, Signal Generator). When all are powered up, open the Driver Software Program, go to the Controller menu, and select Online to establish a communication link between your PC and the Signal Generator. Now, power up your Arc Voltage Height Control unit, but leave the plasma cutter turned **OFF**.

Set three of the switches on the height control unit as follows: Set, Man, and Cut. Dial the small knob on the front of the height control unit so that the indicator line is pointing straight up at "High Noon". Flip the first switch on the left to Read, and the last switch to NO CUT. Now go to your driver software's main screen window, and toward the lower right area, click on the AUX button. AUX stands for Auxiliary, and is the manual control for turning your plasma On & Off. Once you have clicked the AUX button, the screen will change showing you a grey colored button that displays "1- Plasma (Off)". Click on this button once, where a precautionary window will appear alerting you that the plasma cutter is about to turn on and asking if it safe to proceed. If you are, press OK. The torch will lower to the material, sense it, and then back off to the pierce height. Since our switch is flipped to Manual, the torch will stay at the pierce height position until you press the button again to turn the torch off. Measure the distance that the torch tip now rests away from the material surface. It may be as high as 1/4" to 3/8" off the material surface. Once you have measured the gap distance, write it down, go

back to the auxiliary tab and click on the yellow button (Plasma On) to open the circuit and return the torch to its normal resting height.

If the pierce height was too high turn the knob counter-clockwise to lower the pierce height. If the pierce height was too low, turn the knob clockwise to raise the pierce height. Adjust the position of the pierce knob in the desired direction, and then re-test the pierce height using the method described above. Use small adjustments during the setup. Continue testing the pierce height control until the pierce height adjustment rests between 1/8" and 3/16" off the material (thinner material can pierce with the tip as close as 1/16" off the plate, thicker material will need more room between the tip and material for the initial pierce material to escape before the pierce is complete).

If you find that you are as far to the left as the small adjustment knob will go, and the pierce height is still above 3/16 of an inch, contact Torchmate Tech Support for more information.

### **Setting the Dwell Timing**

To set your Dwell Timing, click on the Configuration menu, and select Custom M Codes (or "M Code Definitions" on version 2.14 or later). Toward the top half of the page you will see the M Codes area. As you can see there are two fields for setting your dwell times, under the headings of M50 and M51. The delay times are shown at the right side of each column between Before and After. This is where you may change the dwell timing for your machine.

Since different plasma units don't use the same firing routine you will need to calibrate the start delay to your machine. If you are using a Hypertherm or Miller Plasma cutter change the M50 delay time to 3.5-4.0 seconds. Thermal dynamics should start at 5 seconds. This should allow enough time for the torch to lower to the material, sense and back off to the Pierce Height, then fire the pilot arc. Turn on the plasma cutter and run a small sample program with the switches in read, manual, and cut. If your torch moves through the program before the pilot arc is established you will increase the delay time. If the torch ignites and stays in position for longer than half a second lower the delay time. Ideally the torch will ignite and complete the pierce a fraction of a second before the torch moves through the program. If you find that you are not getting the pierce quality you are looking for, adjust your dwell timing, in .10 sec intervals until you achieve your desired pierce quality.

The M51 (Plasma Off) is the amount of time after the torch turns off that it will remain idle, while the compressed air cools off the tip of the torch, before moving to the next cut. This should be set between 1 and 1.5 seconds. If your plasma cutter has a low duty cycle rating it may be necessary to increase the timing to allow your plasma cutter more time to recover between cuts.



### **Starting in AUTO mode:**

Now that the pierce height and delay are set you will perform a few more manual cuts to read the current working voltage. Set the switches to Read, Manual, and CUT. Run a small sample cut but this time Focus on the LCD display on the AVHC. This will display the current working voltage while the plasma is running. You should notice a spike at the beginning of a cut but the reading should level out to a constant reading after that, write this number down. Flip the switches to Set, Auto, and CUT the LCD display will display the Set voltage. Turn the large SET VOLTS knob until the display reads the voltage you wrote down earlier. Set the switches back to Read, AUTO and CUT. Try another small sample. The torch will now try to maintain the set voltage during a cut even if the material warps. Lower voltage settings will lower the tip to work distance. Higher voltage settings will increase the tip to work distance.