



Texas MicroCircuits

TMC3in1 – Torch & Motion Controller 3in1
Plasma THC - 5 Axis Breakout Board – Spindle Controller

Vol. 04: FAQ and Troubleshooting Guide

For use with TMC3in1 Plugin Rev: 4.1.x.x

Author:
Randall L Ray
Very Sr. Engineer
Texas MicroCircuits

Table of Contents

1. FAQ (Frequently Asked Questions)	3
Q1: How do I get started with the TMC3in1	3
Q2: Something isn't working, HELP!.....	3
Q3: What do I need to run the TMC3in1?	3
Q4: Do I need to power the ESS?.....	3
Q5: After touching off and starting a pierce, the torch just sits there for a few seconds before it starts to move. At the end of the cut the torch just sits there for a few seconds before it picks up to go to the next location.....	3
Q6: Should I use the allow THC control even when not in THC mode on the mill options tab?.....	4
Q7: What does the THC ON/OFF button do on the main screen?.....	5
Q8: My torch dives into the metal when I start cutting?	5
Q9: Why are the Torch Up and Torch Down LEDs flashing in the screen set's Diagnostics screen?	6
Q10: Where do I look to see the actual commanded Torch Up and Torch Down signals?	7
Q11: Touch Off stuff? My torch isn't doing an actual touch off. It floats above the plate and retracts to different heights, but my DRO for both the machine coordinates and the work coordinates are changing from where they were originally zeroed. So with the touch off, is Mach automatically zeroing itself?	8
Q12: My plasma unit is turned off, but the TMC3in1 shows a constant voltage of 320V or 857V or some other value.....	9
2. Basic Troubleshooting Steps.....	10
Hardware Jumpers	10
Power	10
Software	10
Communications	11
Settings.....	12
Basic Function Testing	13

1. FAQ (Frequently Asked Questions)

Q1: How do I get started with the TMC3in1

A: Read the manual. It details how to set everything up in Hardware and Software. The manual should have come with this document otherwise you can find it at:

www.TexasMicroCircuits.com

Q2: Something isn't working, HELP!

A: Read the Troubleshooting Basics section of this document first. It walks you through all of the important first steps in making sure there are no problems with the hardware or the software.

Q3: What do I need to run the TMC3in1?

A: You will need at least the following:

- Mach3 (Mach4 support is in development)
- An Ethernet SmoothStepper (ESS)
- A plasma unit
- We also recommend a touch off

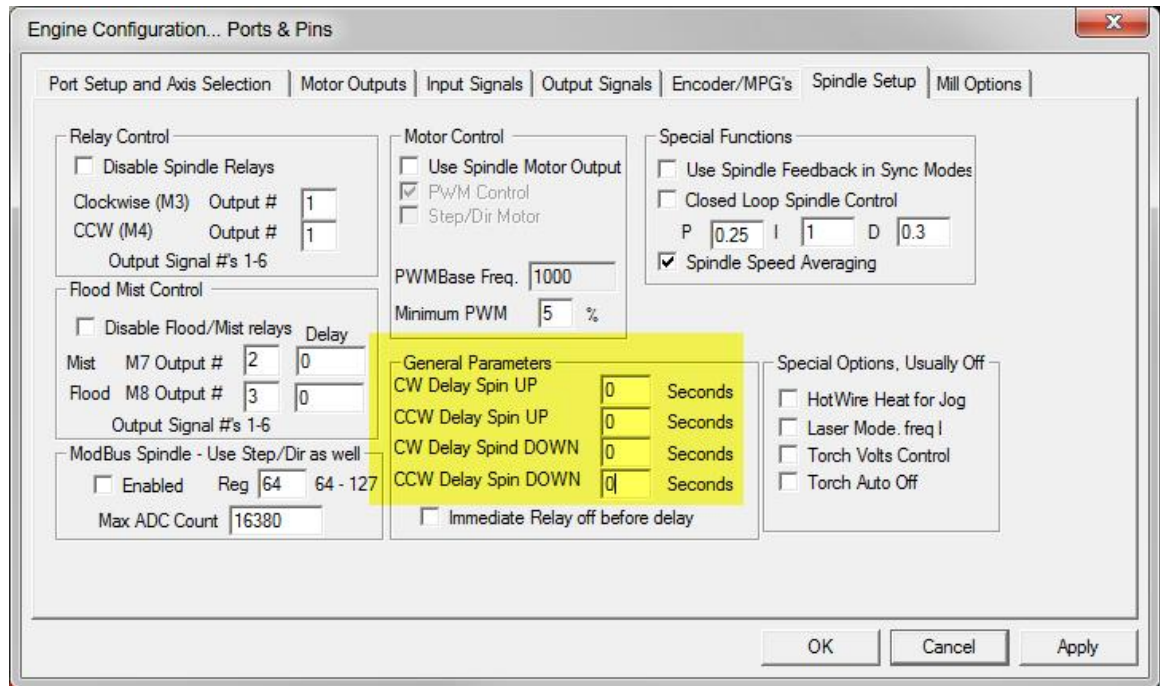
Q4: Do I need to power the ESS?

A: No! Please do not provide power to the ESS via J6! The TMC3in1 will power the ESS through 2 pins on the expansion header. Also do not place the jumper on the ESS's J4 next to Port 3 when you are assembling it. In addition, do not power the ESS through Ports 1 or 2 with a BOB. However, you may power the BOB from the ESS/TMC3in1 if it is low current.

Q5: After touching off and starting a pierce, the torch just sits there for a few seconds before it starts to move. At the end of the cut the torch just sits there for a few seconds before it picks up to go to the next location.

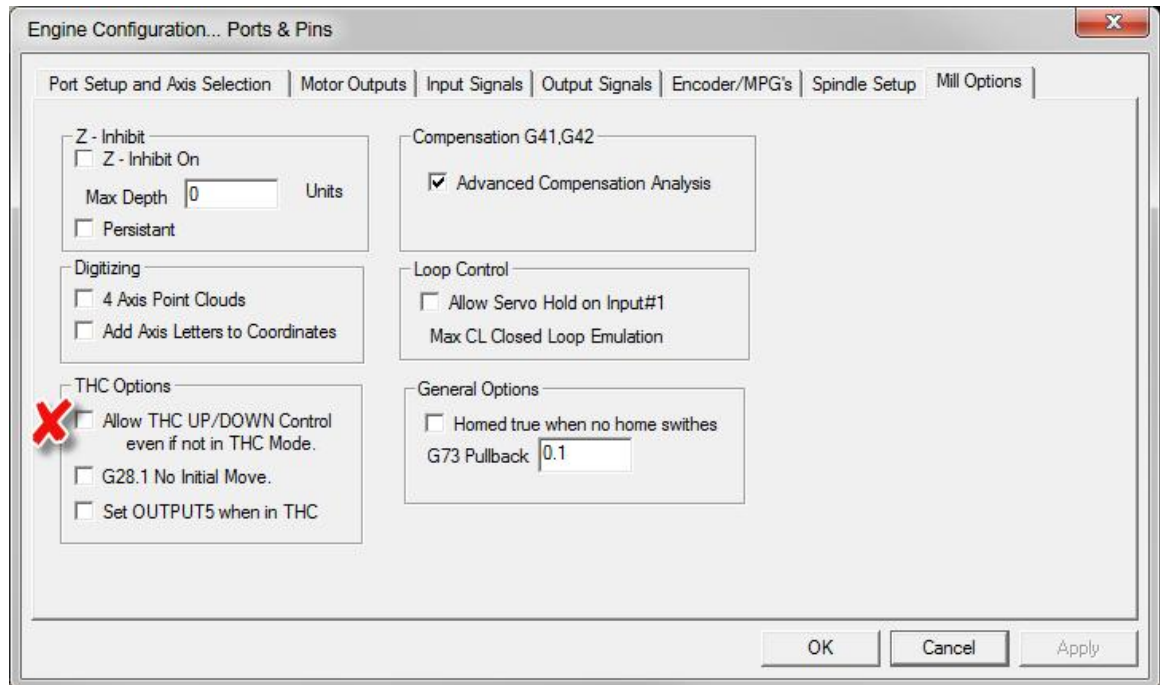
A: You most likely have delay times enabled in your spindle spin up and spin down settings. Please go into Menu -> Config -> Ports and Pins -> Spindle Setup and make sure that for your General Parameters that all of the spindle delays are set to 0, since

any other value will cause a delay.



Q6: Should I use the allow THC control even when not in THC mode on the mill options tab?

A: NO! Don't use it! It takes away control from the THC On Off button on the main screen! That option should ONLY be used for an Oxy-Acetylene setup where the operator will manually adjust Z height while cutting.

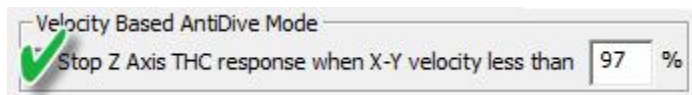


Q7: What does the THC ON/OFF button do on the main screen?

A: When OFF, you will cut your metal, but not adjust the Z height via THC. When the THC button is ON, the Z axis can be adjusted via the TMC3in1 THC Up and THC Down signals. If your button will not turn on, it is because you are in the Demo Mode of Mach3. You must have a licensed version of Mach3 for this button to activate and THC to operate.

Q8: My torch dives into the metal when I start cutting?

A: The first thing to do is make sure you check the box for Stop THC response when X-Y Velocity is less than N %.



At slow speeds, the tip voltage increases, and in order to reach the commanded tip volts, the torch will be lowered, sometimes causing a tip crash. This is an Antidive feature to prevent the torch from diving due to slow velocities at the beginning of a cut, the end of a cut, and in corners.

The second thing to try is to increase your commanded tip volts by 5 to 20 volts higher than what the manual says. If your tip does not crash or drag at the higher voltage

setting, then there is a discrepancy between the manual and your system at these settings. You can either remember to set higher than the manual calls for, or you can adjust your THC Offset volts to make a more permanent compensation. You may need to go negative or positive with your compensation voltage in the THC Offset Voltage field.



Worn out consumables...

Normally you will see a decrease in cut quality when your consumables (tips) wear out. However, if you really continue using a worn out tip, it may blow out or:

The Thermodyne manual stated that a cut height of 0.110” and a Tip Voltage of 126V was ideal.

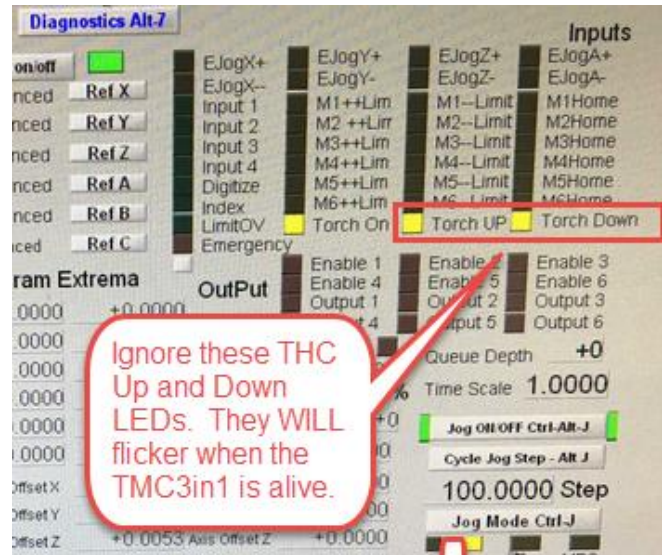
Old Consumable: Commanded (and controlled to) Tip Volts 142V gave a height of 0.042”

New Consumable: Commanded (and controlled to) Tip Volts 142V gave a height of 0.250”

New Consumable: Commanded (and controlled to) Tip Volts 130V gave a height of 0.115”

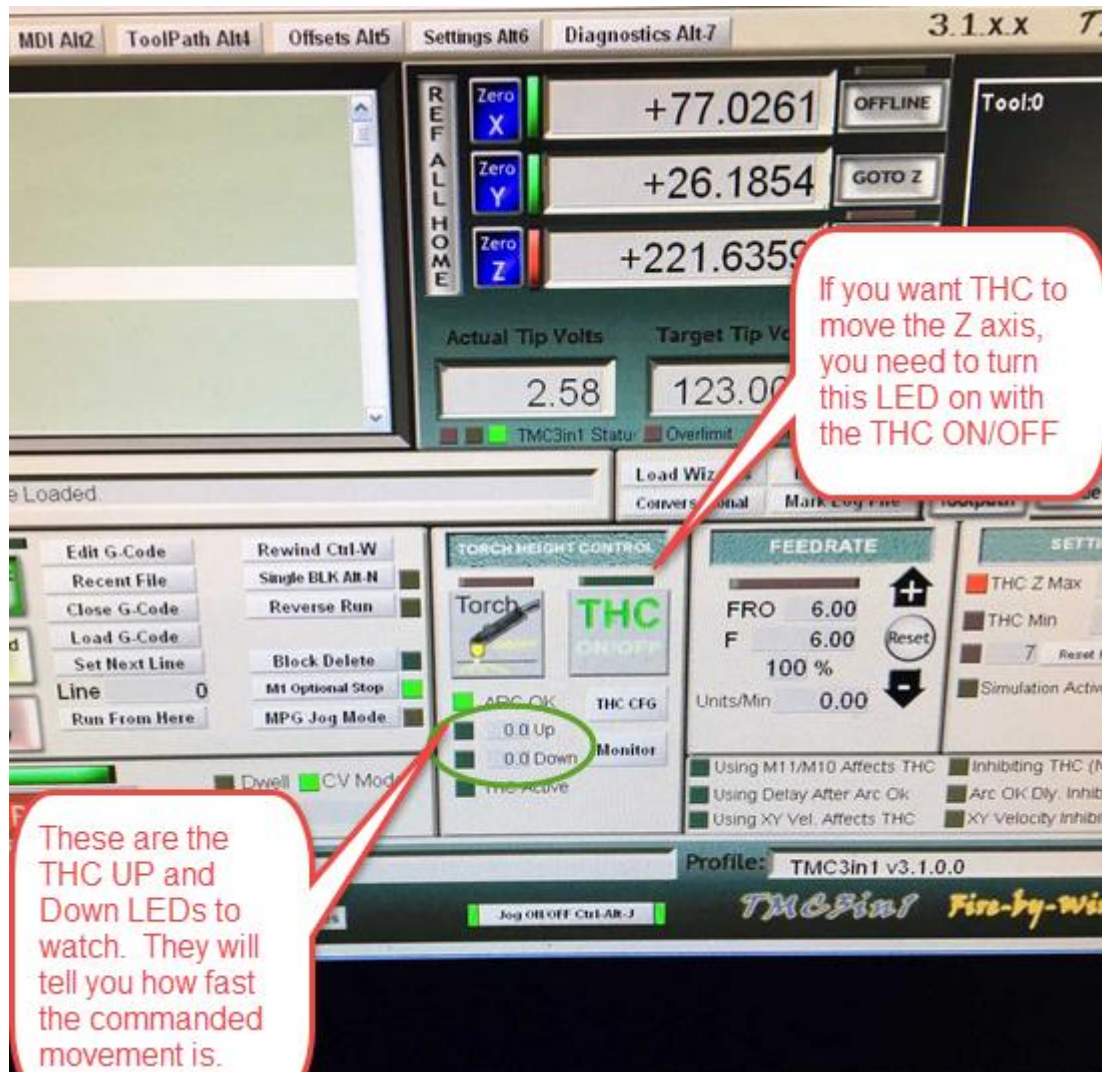
Q9: Why are the Torch Up and Torch Down LEDs flashing in the screen set's Diagnostics screen?

A: The Torch Up and Torch down LEDs will flicker constantly when the TMC3in1 is alive and working. These do not represent actual THC Up and Down commands, but rather the data controlling where the Z axis should go to.



Q10: Where do I look to see the actual commanded Torch Up and Torch Down signals?

A: The main screen of the TMC3in1 Screenset shows you the commanded up and down THC velocities that correspond to your Z axis motor tuning.



Q11: Touch Off stuff? My torch isn't doing an actual touch off. It floats above the plate and retracts to different heights, but my DRO for both the machine coordinates and the work coordinates are changing from where they were originally zeroed. So with the touch off, is Mach automatically zeroing itself?

A: When you do a touch off, you then zero your Z in work coordinates, and then retract a known distance. This helps a lot with the pierce, since a large sheet of metal can vary significantly in height due to:

- * Warpage (typically in thinner metals)
- * Inclines (Not laying flat across your bed)

* Physical damage or splatter type debris on top of the sheet of metal.

If you were always working with thick steel plate (1/2" plus) you could probably get by without a touch off. If you are working with thinner stuff (i.e. doesn't lay flat every time all the time), I would really say that you should consider getting a touch off

Q12: My plasma unit is turned off, but the TMC3in1 shows a constant voltage of 320V or 857V or some other value.

A: The TMC3in1 has a very high input impedance (or low leakage), which means that once its inputs are charged up to a voltage level, it can stay there for minutes or longer. If your plasma unit left its divided Tip Volts output charged, the TMC3in1 will continue to read that until the charge slowly leaks away, or your plasma unit is powered again and actively drives its divided Tip Volts output to a new value. You can test the input voltage measuring functionality of the TMC3in1 at any time by going to the appropriate Troubleshooting section

2. Basic Troubleshooting Steps

Hardware Jumpers

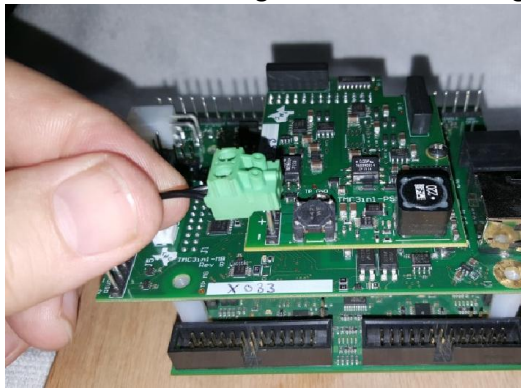
Ensure that you only have the correct jumpers on the board:

1. J10 should be connected from either Common Select to GND (for positive logic signals to your motors) or from Common Select to +5V (for inverted logic signals to your motors)
2. J21 SHOULD NEVER BE JUMPERED. If it is jumpered the master processor will never be able to update its firmware.
3. J24 SHOULD NEVER BE JUMPERED. If it is jumpered, all of the processors will always be on, and will never be able to reset, which is required for firmware updates.

Power

Ensure that you are powering your hardware correctly:

4. DO NOT power the ESS from the ESS J6 connector. The TMC3in1 will power the ESS.
5. DO NOT power the ESS from a BOB on port 1 or 2, but you may power a BOB on port 1 or 2 from the ESS (assuming it is low current).
6. Make sure that you are supplying the TMC3in1 at J1 on the top power board, with power in the range of 12V DC to 24V DC. Please use a multimeter to ensure that the voltage is stable in this range.



Software

Please make sure that you are running the correct software versions:

1. Make sure you are using Mach3 R3.043.062 Older versions of Mach will not function properly. Mach3 R3.043.066 is the same as .062 other than it broke

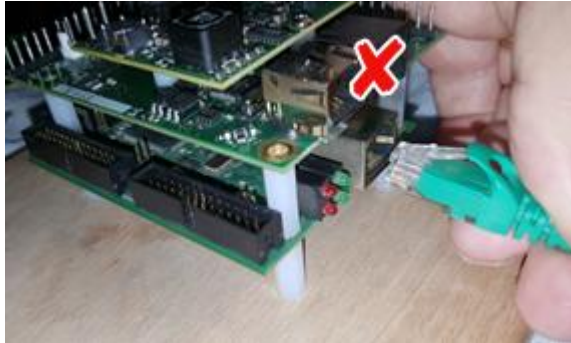
compatibility with the SmoothStepper, and Mach3 development ceased at that point.

2. Make sure you have a valid license for Mach3. THC and Lathe mode will not work without a valid license.
3. Make sure you are using the current version of the TMC3in1 plugin.
4. Make sure you are using the ESS plugin sent with the current TMC3in1 plugin since they are matched pairs.
5. Make sure you are using the Screen Set sent with the current TMC3in1 plugin since they are matched pairs.

Communications

Ensure that your boards are communicating correctly:

1. Make sure that the Ethernet cable from your PC is connected into the RJ-45 connector of the ESS, next to the pair of Red and Green LEDs. DO NOT connect the Ethernet cable from the PC into the TMC3in1 board.



2. Make sure that the ESS is communicating correctly with Mach3. Please follow the ESS Troubleshooting guide here: warp9td.com/index.php/gettingstarted/Troubleshooting
3. Make sure that Mach3 is communicating with the TMC3in1. You should see the Green LED on here:

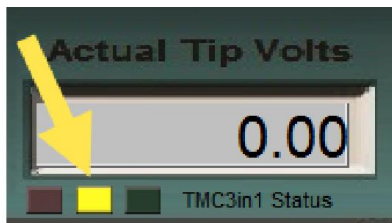


4. The TMC3in1 is updating its firmware (possibly on all 3 of its processors) If you see a flashing red light, here.



If this is the case, please wait for a few minutes for the update to complete. If after 5 minutes, it is still running, close Mach3, power cycle the ESS/TMC3in1, and let it try again.

5. If the TMC3in 1 has a yellow LED here:



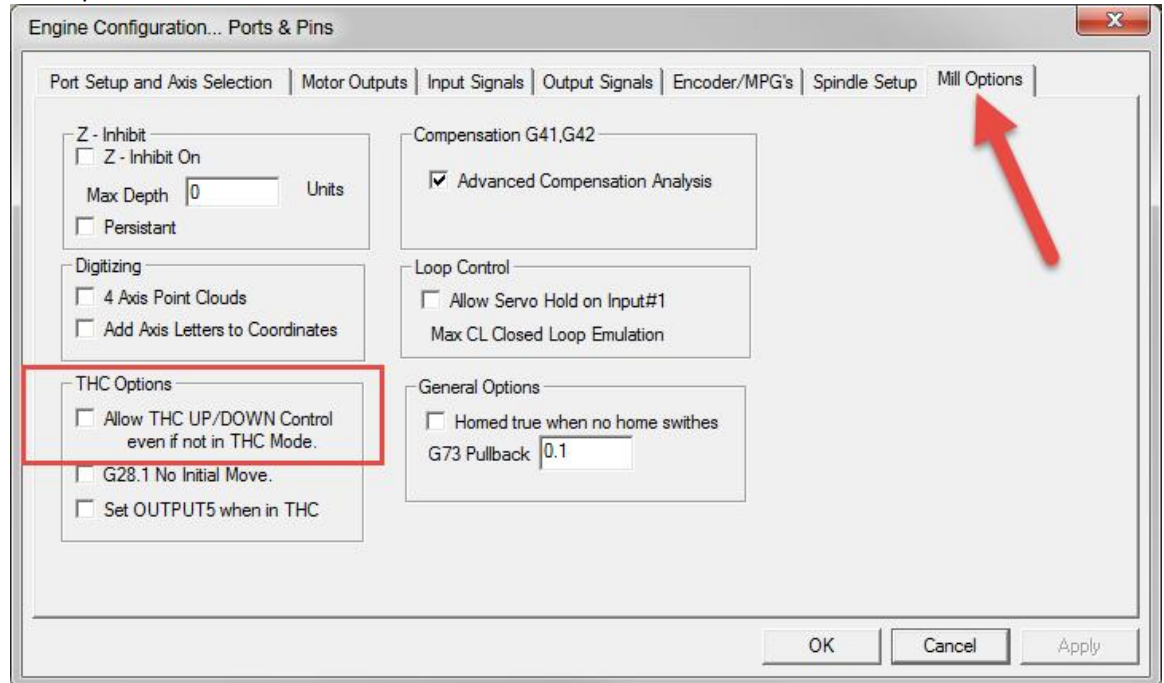
Then it is not communicating with Mach3. Please try the following steps:

- a. Make sure that you have released Mach3 from Reset
- b. Make sure that the TMC3in1 plugin is enabled in Menu -> Config -> Config Plugins
- c. Make sure that the TMC3in1/ESS boards are powered.
- d. Make sure that you are using the latest plugin for the TMC3in1 and the ESS plugin that is paired with it. Make sure that there are no other ESS or TMC3in1 plugins in the "C:\Mach3\Plugins\" folder.

Settings

1. Make sure your Spindle delays are all set to 0 PICTURE

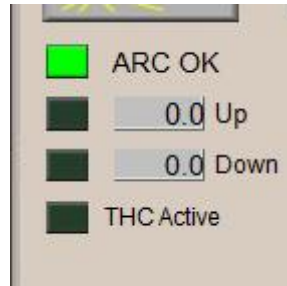
2. Make sure your “Allow THC UP/DOWN Control even if not in THC Mode” on the Mill Options tab is NOT checked.



Basic Function Testing

Important note! The screws on the green connectors will only have electrical connection when screwed fully closed. If they are the slightest bit open, they may not make electrical connection. Testing with a short wire coming out of the terminal (screwed fully closed) will give you very good measuring conditions. Testing the pins that are soldered to the PCB will also give you very good measuring conditions.

1. Testing the Arc Okay functionality. You can test Arc Okay Input functionality of the TMC3in1 at any time by powering off the plasma unit (and any other high voltages or motor drivers) and then removing the 8 pin connector J7. At that point you can short out the two pins Arc Okay Pins (1 and 2) on your TMC3in1 with a screw driver or paperclip. The LEDs just to the left of the J7 connector should now alternate red then Green. The Green LED indicates that the Arc Okay signal is active. If you look at the Screenset indicator for Arc OK, you should see it active as well.



2. Testing Torch Relay functionality - You can test the Torch On/Off relay functionality of the TMC3in1 at any time by powering off the plasma unit (and any other high voltages or motor drivers) and then removing the 8 pin connector J7. At that point you can hook your multimeter up to your two relay pins (1 and 2) in resistance or continuity mode. When activated your resistance should go to essentially 0 Ohms (or your continuity mode meter will buzz). When off you should see your resistance to more than 1M Ohm or (OL) Over Load (or your continuity mode meter will be quiet).



3. Testing Tip Volts functionality - You can test the Divided Tip Voltage measuring functionality of the TMC3in1 at any time by powering off the plasma unit (and any other high voltages or motor drivers) and then removing the 8 pin connector J7. At that point you can hook a battery (1.5V or 9V), or a benchtop power supply, or an existing 5V or 12V DC source up to your Tip Voltage pins. The Actual Tip Volts on the Screenset should be the voltage you are supplying multiplied by your voltage divider selection.

