CandCNC
FeatherTouch
Ohmic Sensor

Power
SENSE

WARNING Use with Floating Torch Only

OUT **IN**

1.627"

FeatherTouch™ Ohmic Sensor
for
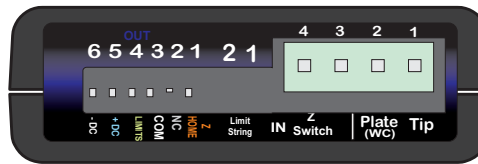CandCNC BladeRunner. Plazpak
and MP3000-DTHC(II) units.

For REV1 & REV2 Units

MANUAL RELEASE 5

FRONT SIDE VIEW

2.502"

OUT
6 5 4 3 2 1   2 1

4 3 2 1

-DC +DC LIMITS COM NC HOME Z Limit String   IN Z Switch   Plate (WC) Tip

If your lable shows TIP as 2 and Plate as 1, it is WRONG. Use this manual

The CandCNC FeatherTouch   Ohmic Sensor Module is designed to work with all existing CandCNC plasma controls including all MP1000-THC, MP3000-DTHC/DTHCII, BladeRunner Dragon-Cut, and Plazpak systems. It uses an active circuit to sense the tip of the torch touching the plate (material to be cut). It is totally isolated from the normal inputs to the Table I/O. The inputs on all CandCNC interface and BoB products have always been isolated from the PC ground to both prevent spikes and surges from harming sensitive port inputs on the PC and to reject noise that might come through sharing a dirty ground. The Table I/O inputs all use the same input common and it is designed to "float" and not be attached to a circuit that has a ground connection to the table (i.e. switches and devices not connected to the table electrically). If you allow one side of the Table I/O circuit to be connected to the table side ground than the isolation is partially or completely defeated. Noise from plasma cutting is exponentially higher than from routing or milling setups and needs to be considered in any input or sensor feed to the controls
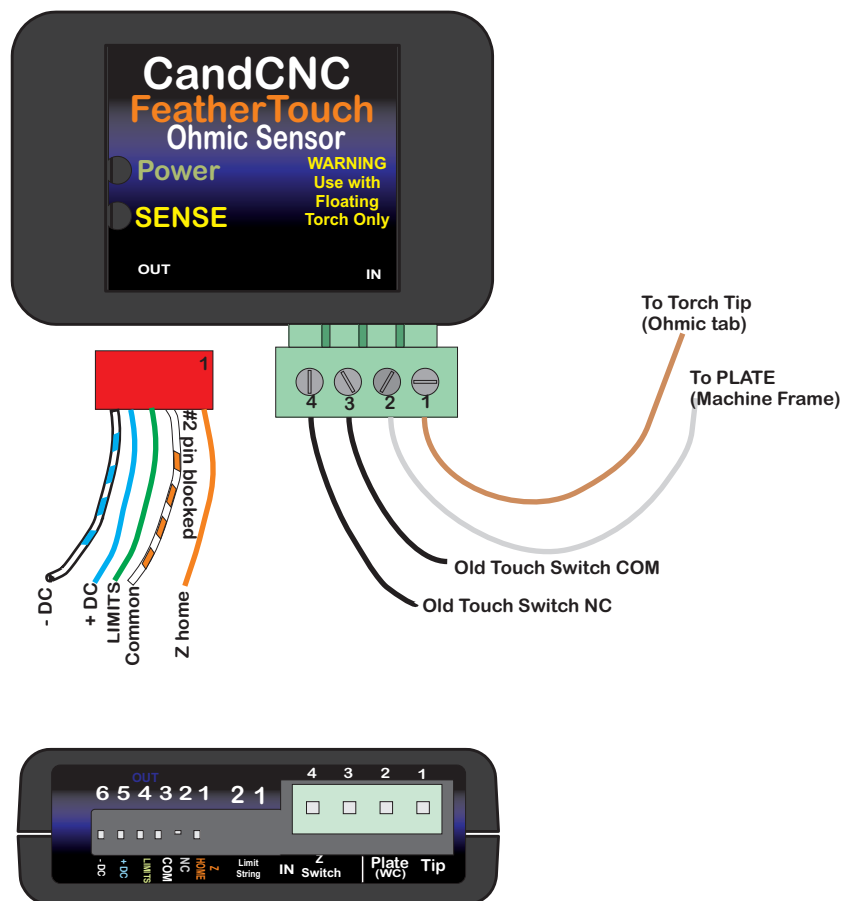
The Ohmic Touch circuit is operated from it's own stand-alone power source (9 to 14VDC wallplug) and it's output is opto isolated so it can maintain the integrity of the noise canceling and isolated inputs of the Table I/O. It's sensor input is surge and voltage protected so normal plasma start and run voltages do not effect it. It offers a fairly low sense impedance and filtering to prevent false triggering.

Here is a list of rules to follow to get good results:

1. Always use the Ohmic Touch with a backup sensing system that will stop down motion if the sensor fails to work. This can happen on dirty, oily, rusty or painted metal. The Floating Torch Holder (mechanical Touch-off) acts as both a mechanical shock absorber and a limit switch to protect the torch from damage. DO NOT RUN WITHOUT A BACKUP MOTION LIMIT.
2. Keep the tip of the nozzle on your torch clean and free from trash and slag. If you start to have contact problems on material that is rusty or dirty, keep a spray bottle of water handy and wet down the surface for better conduction..
3. Be careful to observe polarity when hooking up the Inputs to the Torch Tip and Plate (ground) terminals. A reversed connection can result in a false signal and possible damage if left connected wrong.
4. The DC power terminals are marked for polarity. Do NOT reverse connect a source of DC or you will damage the module. If in doubt, meter it out! The + must go in the side marked + on the label.
5. Make sure to go though the hookup and calibration to test the proper functions of the Ohmic touch and the backup limit to stop the motion.
6. Do not attempt to use ohmic touch with unshielded consumables. it won't work. Some consumables may need special shields (like the Hypertherm Fine Cut with a special Ohmic shield)
7. The ohmic touch is designed for use with automated plasma cutting using controls from CandCNC. We cannot support other uses or interface to outer users systems..

FT-01 FeatherTouch Ohmic Sensor for use with CandCNC BladerRunner Dragon-Cut , BladeRunner Ether-Cut, MP3000-DTHCII, MP3100-DTHCIV MP3500 and Plazpak.

REV 6 Manual
4/15/14

CandCNC
FeatherTouch
Ohmic Sensor
Power
SENSE
WARNING
Use with
Floating
Torch Only
OUT
IN

To Torch Tip
(Ohmic tab)

To PLATE
(Machine Frame)

1
#2 pin blocked

4 3 2 1

Old Touch Switch COM
Old Touch Switch NC

- DC
+ DC
LIMITS
Common
Z home

OUT
6 5 4 3 2 1   2 1   4 3 2 1

- DC + DC LIMITS COM NC HOME Z Limit String   IN Z Switch   Plate (WC) Tip

This manual contains new connection suggestions for the FT-01 based on previous manuals. If you already have an FT-01 installed and working you should review this manual and determine if you should make changes to the installation

IMPORTANT INFORMATION:

It has been brought to our attention that with the old touch-off swtich wired to the table I/O limits input as per the previous manuals, the swtich does NOT stop motion if the Z is a **homing move** and the FT-01 fails to sense. In this manual we have changed where the Z safety switch is connected so it now functions as an E-stop rather than a limit. The previous labeled LIMITS wire (Green) in the UTP cable is now no longer connected to the 5 wide connector but is connected as shown.

UPDATE 4/15/14: The above modification is now part of the new REV 12.2 version card and does not need to be done to get the FT-01 and the old Z switch to trigger an E-stop . You can disregard the instructions to remove the green wire from the connector. To check the REV level of your card please see the drawing below
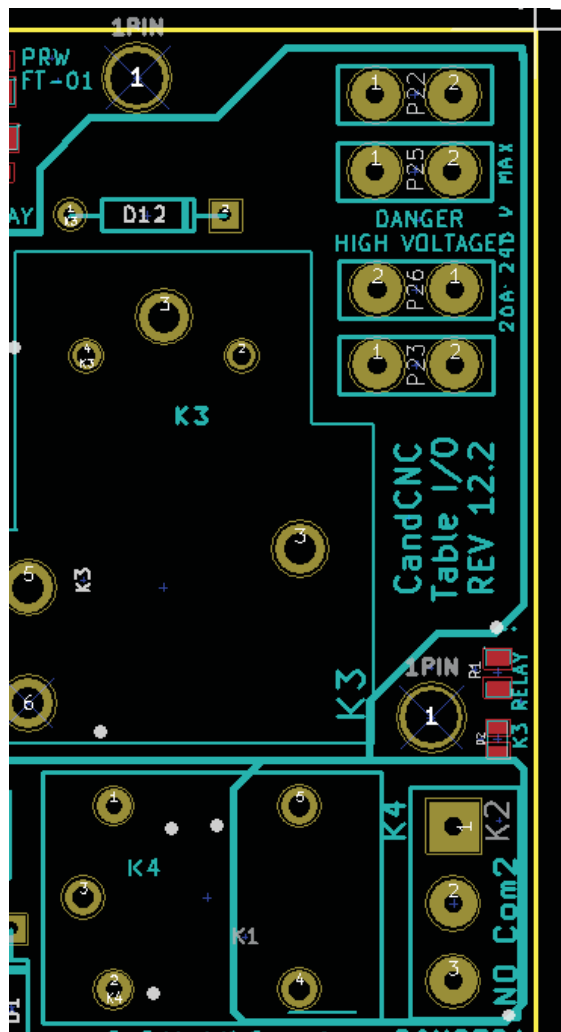
CandCNC label, Part name and REV Level located on top of card in the area shown (white on green prinitng)

Connecting up the old TOUCH=OFF switch (Z Safety Switch)

1. You should check your Z safety switch and make sure it can be wired as Normally Closed. That means there is conduction between the COM and the NC terminal when the switch is not activated and it OPENS (no conduction) when the switch is activated (Tripped). Use an ohmmeter or continuity tester to check the switch. THE E-STOP INPUT SIGNAL IN MACH CANNOT BE CHANGED to make it work with a Normally open. There are other switches in the EPO circuit (in series).

2. When you strip jacket off the UTP cable to expose the individual wires take off enough so you can make the green LIMIT wire about 3 to 4 inches longer than the others.

3. Strip back about 1/4" of insulation off the green wire and apply a .250 Crimp-on terminal to the exposed wires.

4. Remove the factory supplied jumper wire across the EPO (E-Stop) tabs on the Table I/O card.

5. Temporally plug the LIMITS wire to the EPO terminal as shown in the illustration. Measure so the remaining wires in the UTP will reach the header fo the 5 pin connector and cut them off.

6. Unplug the Limits wire and strip each wire in the UTP cable so about 3/16" is exposed and insert them in the screw terminal openings in the 5 pin connector as shown.   It is important that the insulation is off back far enough that the exposed wires are making good contact with the metal contacts in the screw terminal but that the bare wires do not stick out far enough that they can touch each other. Poor wiring on this plug is the leading cause of problems with the FT-01 not working.

7. Once you have the 5 wide plug wired insert it into the header on the board as shown and reconnect the Green Limits wire over to the OUTSIDE EPO TAB (closest to the edge with the other TABS) tab as shown.

To test the EPO part of the install power everything up and take MACH out of RESET. IF you cannot get MACH to come out of reset and you have an "External E-STOP Event " error flash in the diagnostics screen than the Z safety is either not wired as Normally Closed . or there is a wiring problem with the 5 wide connector.

Connecting up the Z Safety Switch (CONT)

8. To test if the EPO is still working, temporarily short across the two EPO pins and make sure you can come out of RESET . In systems with an ESP or ESPII power supply from CandCNC (BladeRunners, Plazpaks,) the Motor DC Power MUST be ON before you can come out of RESET.

9. You MUST have the LIMIT STRING jumper in place on the FT-01 module of LIMIT STRING or you must have a string of Normally Closed switches connected in series into these inputs.

10. The previous "LIMIT" switches on your system **will become E-STOP switches** when wired in through the FT-01. If you want to keep them as LIMITS, you will need to wire the two ends of the string with one end tied to any of the Table I/O common TABS (inside row), and the other end into the old LIMITS input (center terminal) on the 5 pin connector. You will need to setup you LIMITS as before using the X++ (X limits) input.

11. It is highly recommended that you get your system moving and cutting using the Z switch wired as a touch-off switch per the user manual of the controller model you are using BEFORE you add the FT-01 into the mix and start changing the E-Stop connections.

212 732　　226 763　　212 733　　219 676　　212 724　　212 734
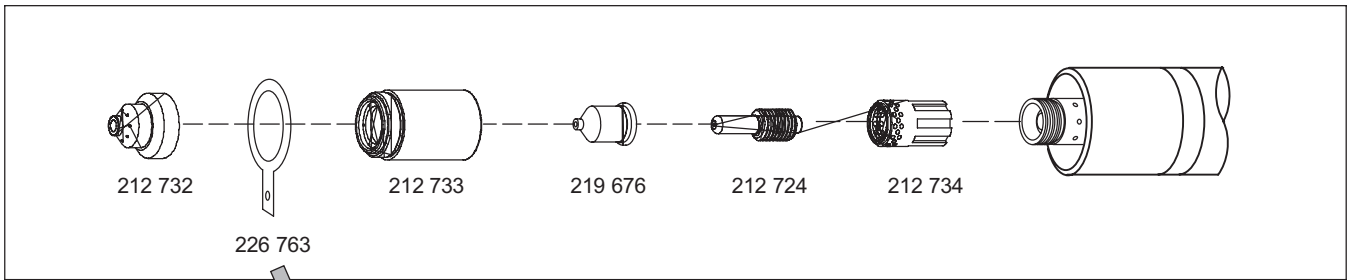
Note. Your ohmic sensor for your torch may be different that those shown here. The objective is to have a connection to the shield at the tip of the torch and it is not connected to the body of the torch or touching the frame of the torch holder.
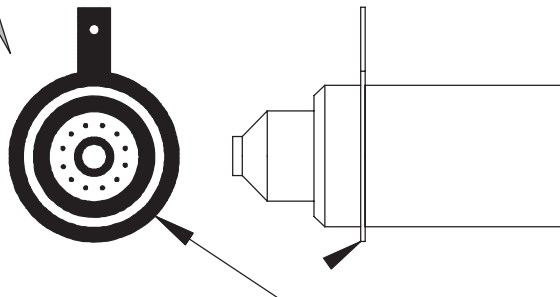
Shield sense tab provides feedback to a compatible torch height controller before starting the cutting process. Place the shield sense tab between the cup and shield.

Newer 45/65/85/105 consumables for Machine Torch
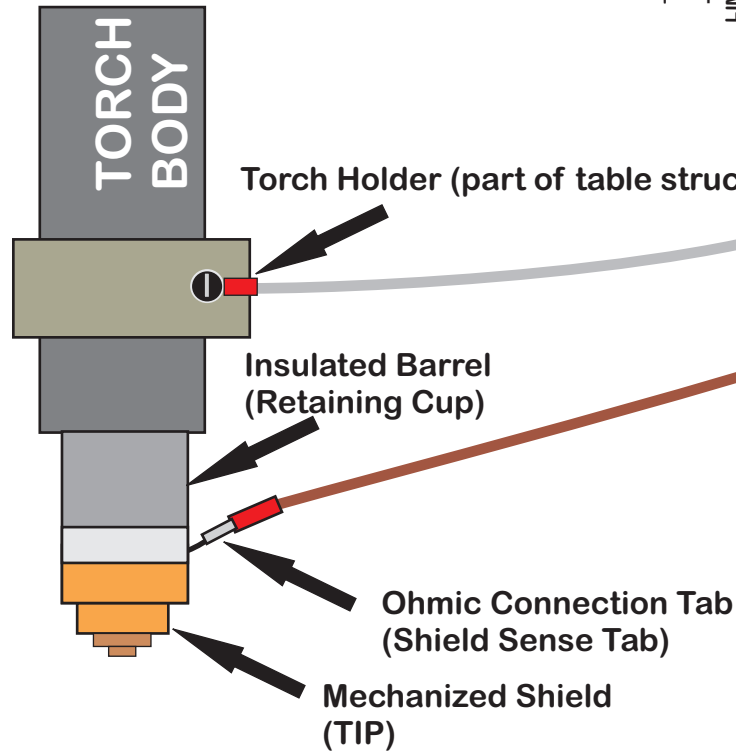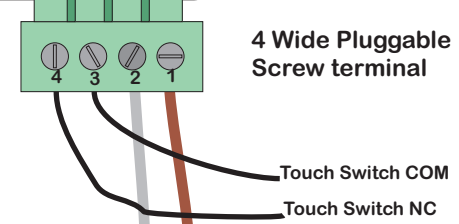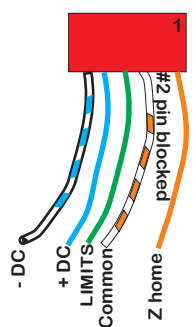
45A

65A
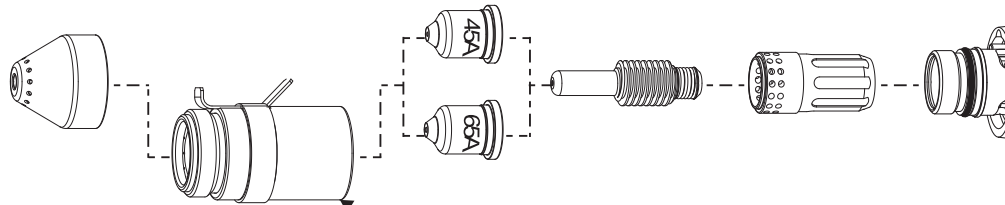
Ohmic Retaining Cap
Hypertherm Part # 220953

FineCut Consumables
Ohmic Shield
Hypertherm Part # 220948
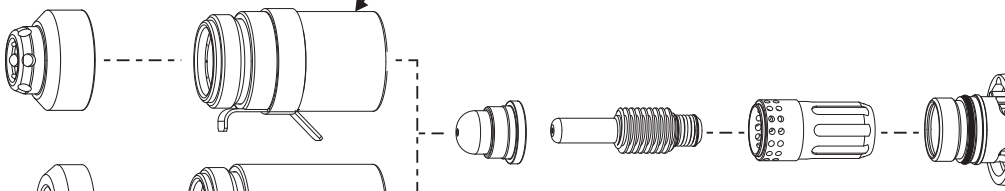
220930
Fine Cut
Nozzle

Normal Fine Cut uses unshielded ring. Will not work with Ohmic Touch

CandCNC
FeatherTouch
Ohmic Sensor

Power

SENSE

WARNING Use with Floating Torch Only

OUT   IN

1

#2 pin blocked

- DC
+ DC
LIMITS Common
Z home

4 Wide Pluggable Screw terminal

4 3 2 1

Touch Switch COM

Touch Switch NC

TERM2 (PLATE)

Stranded Insulated Wire size 24 -to 16ga

TERM 1 Ohmic Tab

TORCH BODY

Torch Holder (part of table structure)

Insulated Barrel (Retaining Cup)

Ohmic Connection Tab (Shield Sense Tab)

Mechanized Shield (TIP)

Requires special Ohmic Consumable See your torch vendor for ordering
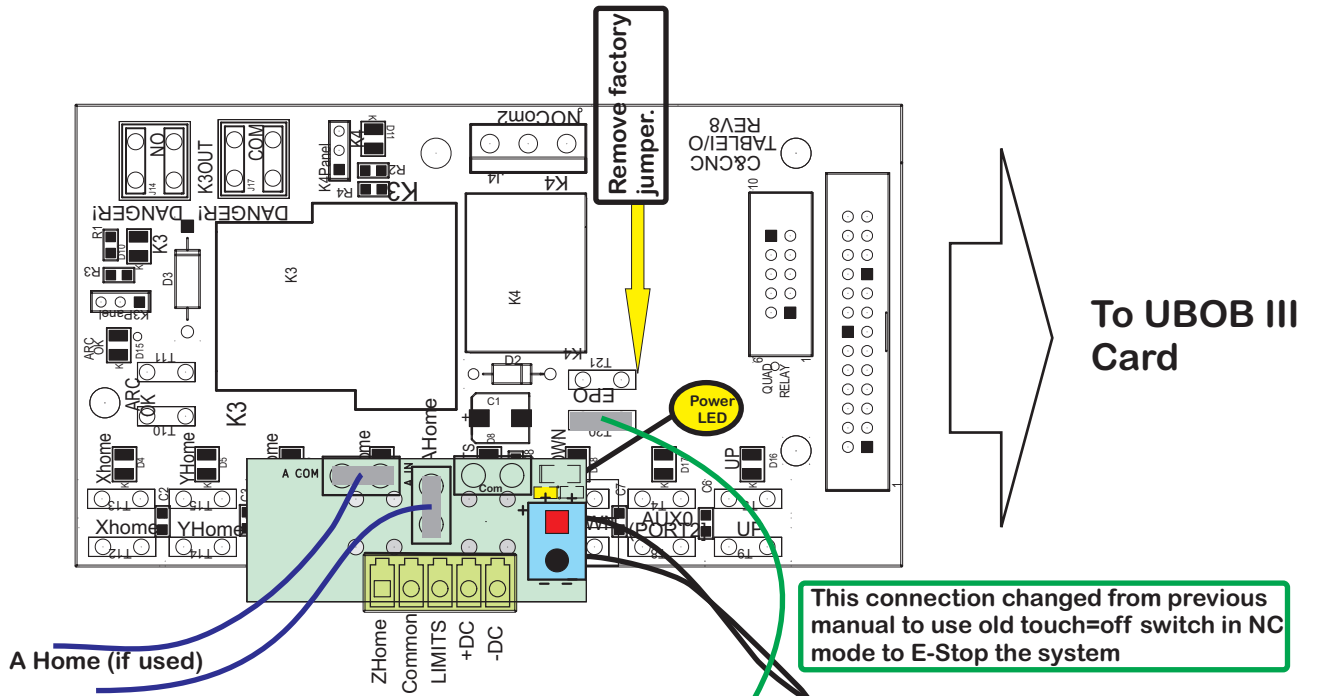
1. Attach the Ohmic Sensor module close to the torch mount on the Z carriage. Use a Velcro strip
2. BE CAREFUL of POLARITY when making the connections. If the PLATE and TIP leads are connected backwards and the torch is fired possible damage to the Ohmic Sensor Module is possible. Units are not repairable.

NOTE: SOME REV1 UNITS HAD THE TERMINALS MARKED WRONG ON THE LABEL SEE THE DIAGRAM ON PAGE 1

3. *The PLATE lead must be connected to metal that is part of the cutting grid (where the metal to be cut is placed)* Most tables are electrically connected between the gantry and fable parts and the cutting grid. If your table has a separate table for cutting make sure it is attached to the gantry superstructure and torch holder via a strap or you will have to extend the PLATE wire (Term 2) down to the actual plate you are cutting.

OUT

6 5 4 3 2 1   2 1   4 3 2 1

#2 pin blocked

Z

Limit String   IN   Z Switch   Plate (VDC)   Tip

Jumper MUST be in place on installs that do not have a string of LIMITS already setup. See the instructions for more details

Shipped Jumpered
See text to use as part of string of limits

These Wires are not part of the cable bundle and are not supplied

UTP CABLE

NO
COM
NC

Existing Touch-off Switch on Floating Torch Holder wire as NORMALLY CLOSED

**Table I/O REV 6 - 8 versions
Earlier versions will work as well**

C&CNC TABLEI/O

UP   UP

DOWN   DOWN

EPO

NO Com2   K4

LIMITS   LIMITS

K4Panel   K4

COM J5

K3   K3

AHome   AHome

ZHome   ZHome

DANGER!   DANGER!

NO   ON

YHome   YHome

ARC OK

XHome   XHome   Tip

+ DC

- DC

Table I/O Card Located inside BladeRunner and newer Plazpaks

NOTE: The indicators on the Table I/O card will light when the signal is active (ON) between the input terminal and the Common terminal across from it (inner row). It will give you visual indication that the signal is getting to the inputs and that the Table I/O is connected to the UBOB card in the controller.

TABLE I/O REV 8 w/ Ohmic Sensor Interface Card

Table I/O REV 6 - 8 versions
Earlier versions will work as well

Remove factory jumper.

To UBOB III Card

This connection changed from previous manual to use old touch=off switch in NC mode to E-Stop the system

A Home (if used)

ZHome
Common
LIMITS
+DC
-DC

To 9 - 14VDC power source

End view

X

Strip wires and attach plug as Shown
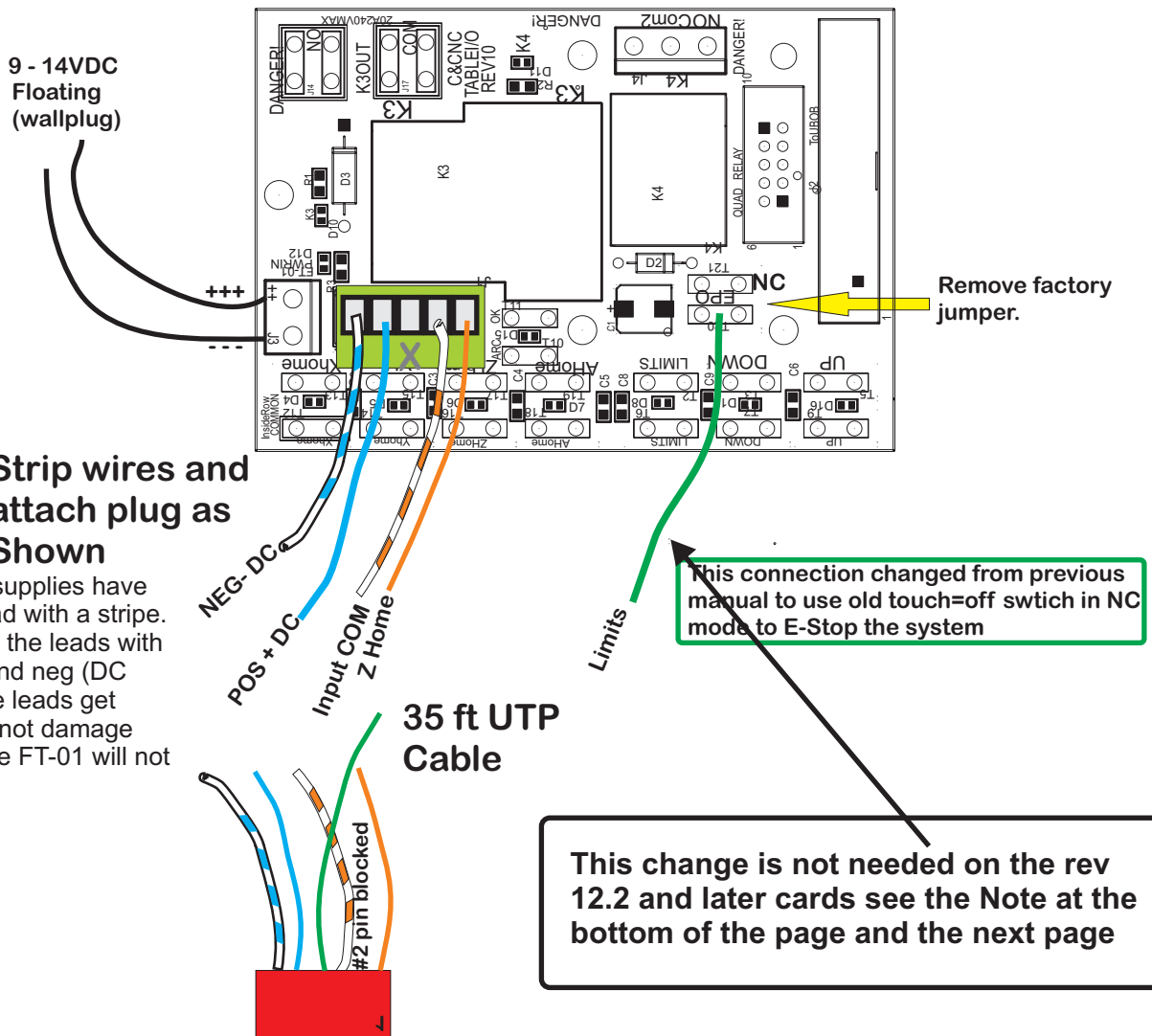
35 ft UTP Cable

ZHome
Common
LIMITS
+DC
-DC

#2 pin blocked
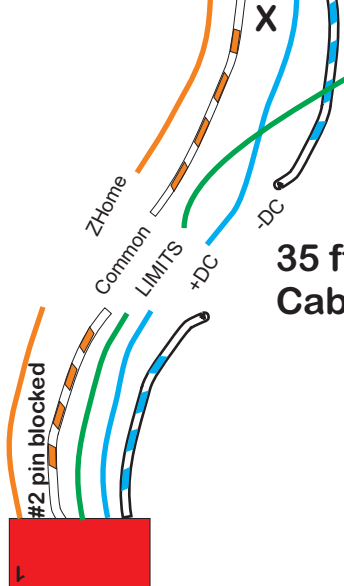
TO FT-01 Ohmic Sensor module

The 35 ft UTP cable is shipped with the 6 wide IDC connector attached and the other end of the cable unterminated. **The 5 pin Mini Eurostyle plug is shipped un-attached to the cable so the cable is easier to thread down exiting cable routes.** Cut the cable to length then Strip the wires on the unterminated end and carefully wire the wire colors as shown. It is important that you get the wires oriented as shown. the 5 pin and jack are keyed so it only fits one way. Plug it in the jack first to determine the orientation. **NOTE in the cable there are 8 wires but only 5 are used. The White/Green wire and the Brown and White/Brown are NOT used.**

TABLE I/O REV 10 w/ Ohmic Sensor Interface Card

REV 10 Table I/O was released to production 2/15/13

9 - 14VDC Floating (wallplug)

Remove factory jumper.

Strip wires and attach plug as Shown

Most wallplug supplies have the Positive lead with a stripe. it is best to test the leads with a meter for + and neg (DC VOLTS). If the leads get reversed it will not damage anything but the FT-01 will not power up.

NEG- DC

POS + DC

Input COM Z Home

Limits

This connection changed from previous manual to use old touch=off swtich in NC mode to E-Stop the system

35 ft UTP Cable

#2 pin blocked

This change is not needed on the rev 12.2 and later cards see the Note at the bottom of the page and the next page

Shown Above: New Table I/O REV 10 table I/O card. This card is a redesign. The PORT 2 inputs are removed (not used). Jack for Ohmic Sensor is added along with the floating power input for the Ohmic Sensor Module. It uses the same cable as the previous REV 8 model with the Ohmic Sensor Interface Card. The normal Port 1 inputs and outputs are the same as the previous Table I/O cards although the exact position on the cards has changed. The card is smaller and easier to get into tight spaces. The 35 ft UTP cable is shipped with the 6 wide IDC connector attached and the other end of the cable unterminated. The 5 pin Mini Pluggable Termial is shipped un-attached to the cable so the cable is easier to thread down exiting cable routes. Cut the cable to length then Strip the wires on the unterminated end and carefully wire the wire colors as shown. It is important that you get the wires oriented as shown. the 5 pin and jack are keyed so it only fits one way. Plug it in the jack first to determine the orientation. NOTE: in the cable there are 8 wires but only 5 are used. The White/Green wire and the Brown and White/Brown are NOT used. Cut them off If you have enough length you can use them for the wires to connect your TIp and Material (plate) wires and/or your old touch-off switch.
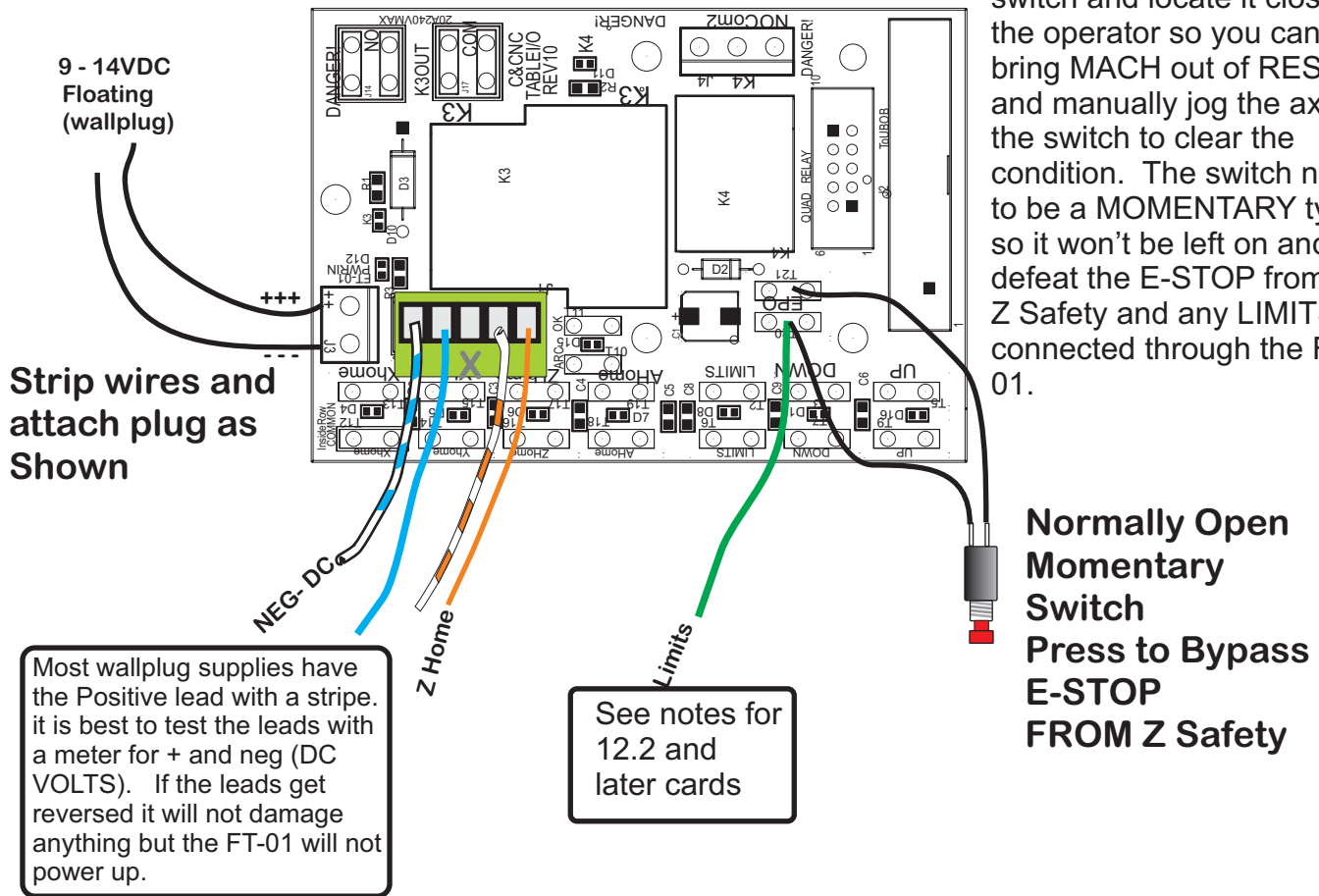
NOTE THE REV 12.2 CARDS RELEASED 4/15/14 HAVE THE LIMITS NOW CONNECTED TO THE EPO ON THE CARD . YOU DO NOT NEED TO REMOVE THE GREEN WIRE FROM THE CONNECTOR.

TABLE I/O REV 12 w/ Ohmic Sensor Interface Card
BY-PASS OPTION SWITCH FOR E-STOP
(not included in FT-01 kit)

You can setup a bypass switch and locate it close to the operator so you can bring MACH out of RESET and manually jog the axis off the switch to clear the condition. The switch needs to be a MOMENTARY type so it won't be left on and defeat the E-STOP from the Z Safety and any LIMITS connected through the FT-01.

9 - 14VDC
Floating
(wallplug)

Strip wires and attach plug as Shown

NEG- DC

Z Home

Limits

Most wallplug supplies have the Positive lead with a stripe. it is best to test the leads with a meter for + and neg (DC VOLTS). If the leads get reversed it will not damage anything but the FT-01 will not power up.

See notes for 12.2 and later cards

Normally Open Momentary Switch Press to Bypass E-STOP FROM Z Safety

You will need to crimp two wires into the EPO Tab that has the green wire. Cut off the crimp terminal on the Green wire and strip back the insulation on both wires and carefully warp the wire from one side of the Bypass Switch around the green wire and then crimp the pair into the fresh crimp-on terminal. The type of switch used for the Bypass is not critical as long as it is Normally Open and closed when you push it. When you release it should return to Normally Open. Most pushbutton switches are configured this way. Because the circuti is NC most of the time noise on the Bypass Switch or wires has no effect .
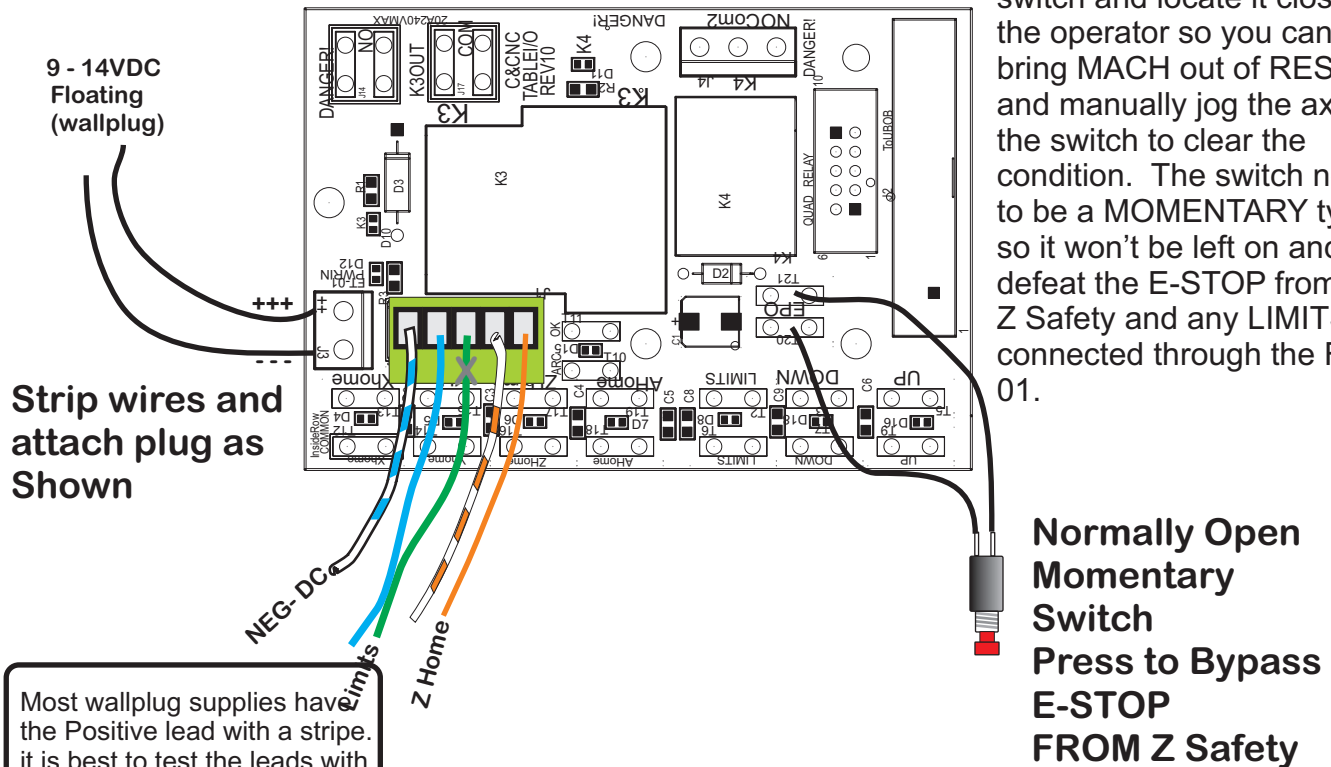NOTE: This can be used on any Table I/O version shown if the EPO is used for other E-STOP inputs.

See the next page to wire the 5 wide green connector on the rev 12.2 and later versions of the card. The green wire is left the connector

TABLE I/O REV 12.2 w/ Ohmic Sensor Interface Card

BY-PASS OPTION SWITCH FOR E-STOP
(not included in FT-01 kit)

You can setup a bypass switch and locate it close to the operator so you can bring MACH out of RESET and manually jog the axis off the switch to clear the condition. The switch needs to be a MOMENTARY type so it won't be left on and defeat the E-STOP from the Z Safety and any LIMITS connected through the FT-01.

9 - 14VDC Floating (wallplug)

Strip wires and attach plug as Shown

NEG- DC

Limits

Z Home

Most wallplug supplies have the Positive lead with a stripe. it is best to test the leads with a meter for + and neg (DC VOLTS). If the leads get reversed it will not damage anything but the FT-01 will not power up

Normally Open Momentary Switch Press to Bypass E-STOP FROM Z Safety

Using .250 quick connect crimp on terminals crimp   the wires from both sides of the Bypass Switch around the green wire and then crimp the pair into the fresh crimp-on terminal. The type of switch used for the Bypass is not critical as long as it is **Normally Open** and closed when you push it.   When you release it should return to Normally Open. Most pushbutton switches are configured this way. Because the circuit is NC most of the time, noise on the Bypass Switch or wires has no effect .

NOTE: This can be used on any Table I/O version shown if the EPO is used for other E-STOP inputs.

NOTE THE REV 12.2 CARDS RELEASED 4/15/14 HAVE THE LIMITS NOW CONNECTED TO THE EPO ON THE CARD . YOU DO NOT NEED TO REMOVE THE GREEN WIRE FROM THE CONNECTOR.
Put the green wire into position 3 (center)

SETUP AND TESTING:

1. Make the connections between the Ohmic Sensor and the Table I/O card as shown on page # . . Provide DC power to the module. Modules ship with a DC wallplug power supply that should be used unless you have access to a source of FLOATING (ground neg side is not tired to any other circuit). See the section power hookups and options.

2. Make sure the wire jumper is in place at the location indicated. The jumper is applied at the factory and only should be removed if you are going to integrate the LIMIT for the touch off in with existing limits on your table (see section on hooking to existing limit string.

3. Use the section on hooking up the touch-off switch (not part of the Ohmic Touch kit) on your Floating Torch Holder.

4. Plug in the power to the Ohmic Sensor. Confirm that the power LED (Green) is on. If it is not unplug it immediately and locate the cause of the lack of power to the module using a DVM

5. Check the settings on your Limits input. The limit input is port 8 pin 11 in all most UBOB based systems. (new Ether-Cut system is an exception) At least one of the ++ or – signal (usually X--) needs to be Enable (green check) if you are using it for just the touch off. It has to be set different than if you are using other limits in a normally closed string

THIS SECTION HAS BEEN SUPERCEDED BY USING THE Z SAFETY SWITCH AS AN E-STOP
THIS IS INCLUDED ONLY IF YOU WANT TO CONTINUE TO USE AN EXISTING STRING OF LIMITS
WIRED DIRECTLY TO THE TABLE I/O

Engine Configuration... Ports & Pins

Port Setup and Axis Selection | Motor Outputs | Input Signals | Output Signals | Encoder/MPG's | Spindle Setup | Mill Options

Signal	Enabled	Port #	Pin Nu...	Active ...	Emulated	HotKey
X ++	✔	8	11	✔	✘	0
X --	✘	0	0	✔	✘	0
X Home	✔	1	11	✔	✘	0
Y ++	✘	0	0	✔	✘	0
Y --	✘	0	0	✔	✘	0
Y Home	✔	1	12	✔	✘	0
Z ++	✘	0	0	✔	✘	0

Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen

Automated Setup of Inputs

OK   Cancel   Apply

This needs to be turned on (enabled) for LIMIT INPUT to work. Active Low setting detemines if it trips on NO or NC switch action.

Use this setup if you have no limits setup and are connecting the LIMITS up directly to the table i/o and NOT through the FT-01. IF they are connected through the LIMITS STRING input terminals on the FT-01 they are Np longer Limits and become part of the E-STOP chain

What to do if you already have a string of LIMITS

OPTION ONE (add the Z Safety touch switch into the existing limits string of NC switches)
1. Using the screw access on top, Remove the jumper from the LIMIT STRING INPUT
2 Remove the ends of the limit string from the limit terminals on the Table I/O card and re-route them to the.LIMIT.String Input.
3 Wire your Touch off switch on the Floating Holder **as Normally Closed (NC)** by using the COM and NC terminals on the switch.
4. The Touch Off switch is now in the limit string and ANY switch that is activated including the Touch off should cause MACH to go into reset. *You no longer need to define any LIMITS (++ or - - inputs) since the old limit string is now part of the E-STOP (EPO) string*

OPTION TWO (Use the limit string wire directly to the LIMIT input on the Table I/O) You can setup your LIMITS as shown in the Ports & PIns.

Ports & Pins setup screen from Ether-Cut systems that have a PORT2 set of inputs to allow the LIMITS input tab on the table I/O board to be used. This is ONLY if you want separate LIMITS and E_STOP

Engine Configuration... Ports & Pins

| Port Setup and Axis Selection | Motor Outputs | Input Signals | Output Signals | Encoder/MPG's | Spindle Setup | Mill Options |

Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey
X ++	✓	2	2	✗	✗	0
X --	✗	2	2	✗	✗	0
X Home	✓	1	11	✓	✗	0
Y ++	✗	0	0	✗	✗	0
Y --	✗	0	0	✗	✗	0
Y Home	✓	1	12	✓	✗	0
Z ++	✗	0	0	✗	✗	0
Z --	✗	0	10	✓	✗	0

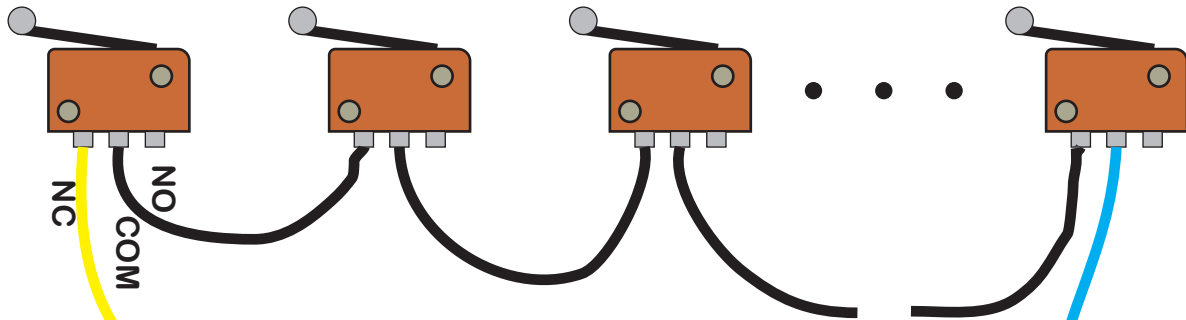Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen

Automated Setup of Inputs

OK   Cancel   Apply

FOR SETUPS THAT HAVE EXISTING SEPARATE LIMITS ON OTHER AXIS USING a NC STRING OF SWITCHES:
(if you do not have this setup then (disregard this page)

Note Your switch pinout may be different

SEPARATE LIMIT SWITCHS (Normally Closed)

NC
NO
COM

THIS SETUP PUTS THE LIMITS in the STRING INTO the E-STOP circuit and they operate as part of the ESTOP and no longer just limits. They will NOT be ignored durign a Homing Move

Beginning of Limit String

End of Limit String

OUT
6 5 4 3 2 1   2 1   4 3 2 1

-DC +DC LIMITS COM NC HOME Z   Limit String   IN Z Switch   Tip Plate (WC)
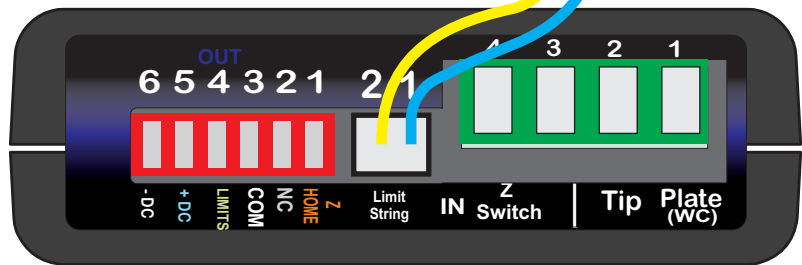
1. Take Limit string loose from Table I/O card
2. Remove jumper on limit string
3. Put two ends of limit string into the LIMIT STRING terminals
4. Connect the LIMITS OUT wire (white in this manual) as shown to LIMITS input terminal.
5. Make sure your Z switch is wired Normally Closed (NC)
6. See previous pages for connection to Table I/O card