



# **Index Designs, LLC**

## **FADAL Axis Installation Manual**

### **[AC or DC]**

VH7

VH8

VH9

VH11

VH15

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## Introduction

This manual is intended to provide a description of the installation of a Index Designs rotary table. Some knowledge of the different types of Fadal CNC machines will be helpful to understand the descriptions. The descriptions will be for either an AC or DC style machines.

## Requirements

Only service personnel with appropriate knowledge should install this device. It is highly recommended that an authorized Fadal distributor is consulted.

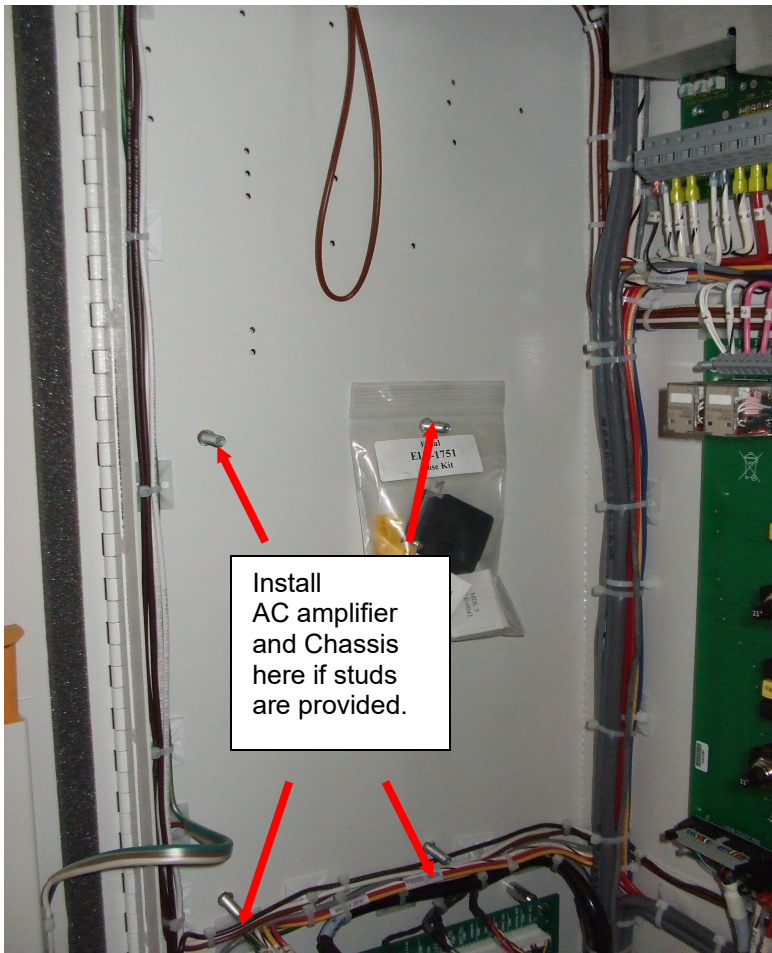
**Please review the instruction manual thoroughly before beginning installation. In addition, the installer should verify that proper space and clearance has been taken into account prior to drilling holes in any part of the CNC cabinets. This includes cable bending radius and cable length.**

## Installation

1. Power off the CNC machine before installing.
2. **Amplifier installation:**
  - a. Machine with DC Amplifier chassis:
    - i. Select location where the amplifier chassis can be installed. There is typically a location on the left side of the electrical cabinet that will accept the AC amplifier chassis, see Figure 1.
  - b. Machine with AC Amplifier chassis:
    - i. AC machines will have an open space for an A-axis amplifier. If there is already one installed, replace with the AC A-axis amplifier.
3. **Install signal and power cables:** If the machine has knockouts for the bulk head connectors, remove the knock out and install. If there are no knockouts, find a suitable location for the bulk head cables, drill a 7/8" hole and mount the bulk heads. See Figure 2 and Figure 3.
  - a. Plug the bulk head connector of the motor signals into the J5 amplifier connector. This will be marked "Motor" on the amplifier.
  - b. Insert the power wires from the bulk head motor connectors into the amplifier terminals:
    - i. The Black wire should be inserted into Phase T
    - ii. The White wire should be inserted into Phase S
    - iii. The Red wire should be inserted into Phase R
    - iv. Attach the green wire to the chassis ground which is just right of the power terminal (on the amplifier heat sink).
4. **Install axis card:** The A-axis card should be installed into slot 13 of the 1060 mother board.
5. **Install Fault line:** The fault line must be connected from J3 of the amplifier to the J5 plug on the 1060 mother board, see Figure 9 & Error: Reference source not found. If there is a brake valve installed, a "Axis Brake Inhibit" relay can be added. The relay will actuate when the brake is on and inhibit the amplifier. The relay coil is actuated by the M60/M61 120VAC signal on the power distribution board, see Figure 9A
  - a. Wiring the fault line p/n 851807 is as follows: The white and black coming off the amplifier go to the 1100-1 at position 1 and 6. And the purple (pink) wire goes to 1100-1 TB1-6

6. **Install encoder and resolver feedback.** The type of feedback expected by the Fadal control will be dependent on the version of axis card software used. Use one of these
  - a. Fadal axis cards with **AC** software will accept encoder signals directly from the amplifier. Insert one end of the flat ribbon cable provided into the J4 connection of the amplifier marked “Controller”. The other end of the flat ribbon connector should be plugged into the J5 connector of the Fadal axis card.
  - b. Fadal axis cards with **DC** software will need to have their signals conditioned. A encoder signal conditioner with resolver output must be used. Connect the long 10 pin ribbon from the J4 header on amplifier marked “Controller” to the side of the black box marked “To Amplifier”. Pin 1 is denoted by the red wire on the ribbon, see Figure 6. Connect the short 10 pin ribbon from the J5 header on the A-axis card to the axis card input side of the black box (pin 1 is denoted by the red wire on the ribbon). Connect the “resolver feedback” wire to the bottom coax of A-axis card.
7. **Install signal wire:** The signal cable will go from the J2 of the amplifier to the 3 pin Molex connector of the axis card. The axis card will contain a black or white Molex connector depending on the version. The black will latch into the axis card. If it is a white Molex version, it will be a press fit, see Figure 7.
8. **If a Amp Chassis was installed, continue below. Otherwise, skip to 9.**
  - a. **Install Emergency Stop:** the Chassis will have a relay that turns on the amplifier chassis when the machine is not in Emergency Stop. The A1 and A2 inputs on the relay are 120VAC coils that are powered by the Emergency Stop circuit of the machine. Refer to the wiring diagram for the machine it should show the TB1-8 and TB1-9 that turn on the axis chassis, see Figure 12.
  - b. **Install incoming 3 phase power:** the AC chassis is powered with 3 phase 230VAC. These connections can be made at the power disconnect side of the machine.
9. **Connect air to the Air brake:** Connect the black wires of the air valve to the M60/M61 output of the power distribution board. In addition to the valve, there is an included brake relay that disables the amplifier when the brake is on. Install the relay and the brake valve wires into M60/61 output. See Figure 17.
  - a. M60/M61 uses connections TB2 pins 39 and 40. Next to pin 40 is a 120 VAC connection. Jumper this 120 VAC connection to pin 39. Connect the two coil wires from the air valve to the **RET** next to pin 39 and to **pin 40**. (Note if the wires do not fit into the TB2 terminal, put a single wire into the terminal and splice the air valve and amplifier inhibit wires to the single wire).
  - b. Refer the machines maintenance manual for more information. Note that the fuse and the solid state relay must be installed and functioning properly for the M60 signal to work.

10. **Verify connections on the machine.**
11. **Power the machine.**
12. **Verify the Emergency Stop button will disable the AC chassis when the button is pressed.**
13. **Set the parameters:** Enable the A-axis in the parameters of the machine, set the ratio for the rotary to 90:1. Turn on the M60/M61 Brake option.
14. **Set Balance on amplifier:** While the rotary table is not moving, adjust the amplifier's Balance potentiometer so that the following error is stays around  $\pm 2$ .
15. **Verify the Signal Gain on amplifier:** The amplifier will come already set for the appropriate signal gain. To verify the amplifier's signal gain setting, load the service program O5815. Set the feed rate to F2000. While the program runs, the following error will be about 680. Change the program from G1 to G0 moves on the A-axis. Make sure the rotary table does not fault while running at full 100% rapid. Adjust the signal gain potentiometer on the amplifier accordingly.
16. **Install cable block and spring:** Mount the cable block to secure the cables at the point of entry into the chip enclosure, see figure 14. Adjust the amount of cable entering the chip enclosure so that there is enough rotary table cable available for the XY table to move it's complete travel, see figure 16. Install spring so that cable will be held up out of the chip trays for the complete XY table motion of the machine, see figure 15 and 16.

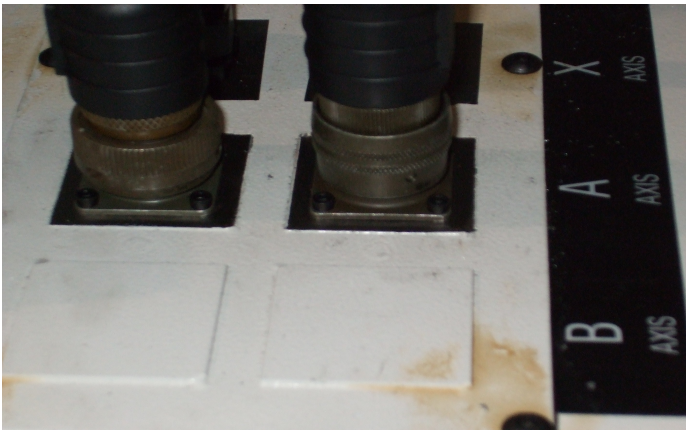


**Figure 1, (Only for DC machines)** There should be space for the AC chassis on the left wall of the cabinet. In some cases, four studs are available for mounting the chassis. Otherwise, another location will need to be found for the chassis.

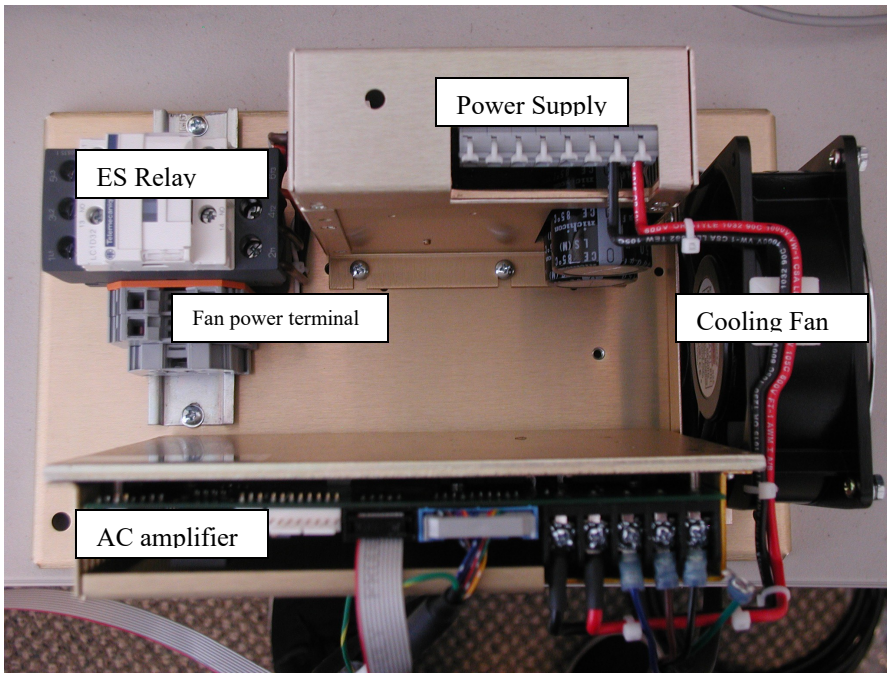




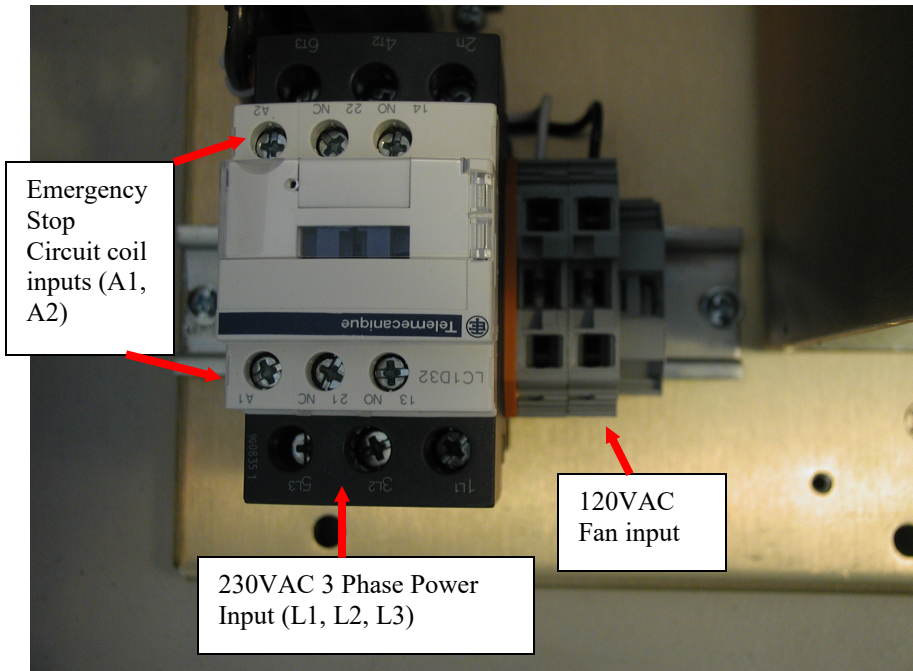
**Figure 2.** Mount the signal and power wires. If the electrical cabinet already has knock outs, use those holes. Otherwise, a 7/8" (22mm) hole will need to be drilled to allow the cables to enter the cabinet. **Important, do not let the cables twist or pull on the wires, they will break with too much force or twist.**



**Figure 3,** Bayonet style cables coming from the rotary table are then attached to the panel mounted connectors.

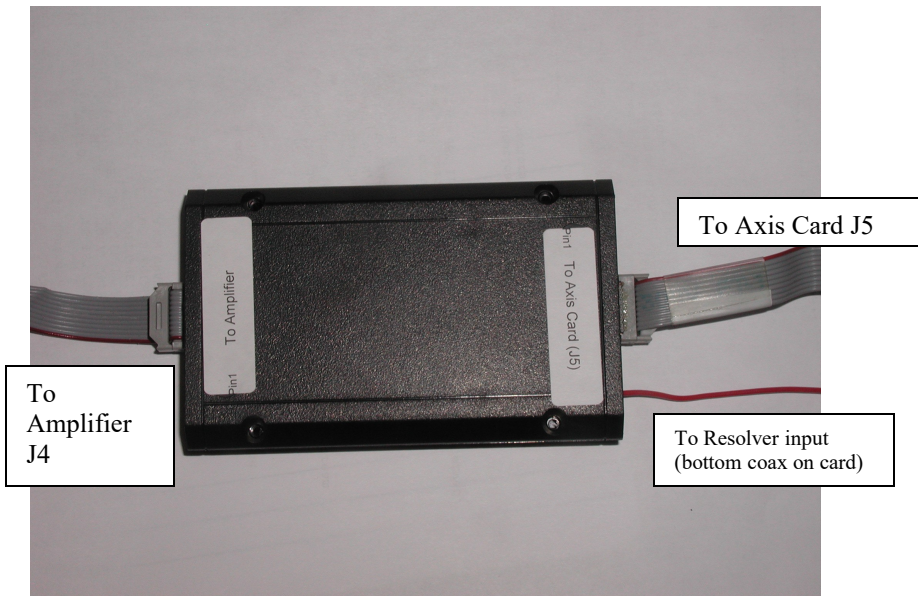


**Figure 4, (Note: Use the AC chassis if only a DC chassis exists in the machine).** Pictured above is the AC chassis with the AC amplifier mounted it it. The relay ES relay in the upper left corner is used as an emergency stop relay. It opens when the 120VAC Emergency stop circuit is removed. The 230VAC 3 Phase input connects to L1, L2, and L3.

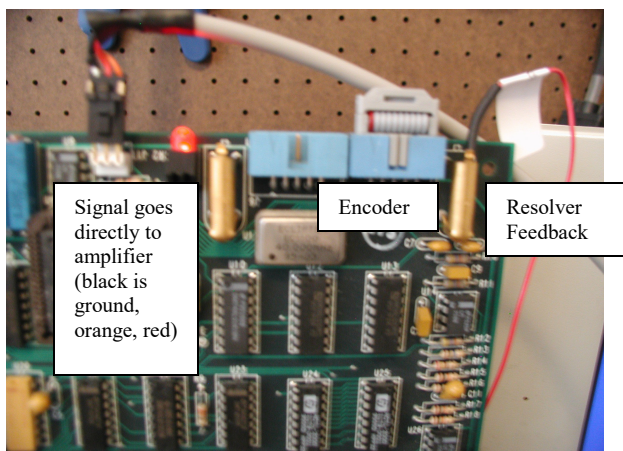


**Figure 5, (Only for DC machines with no AC chassis)** Mounted on the din rail on the chassis is the emergency stop relay and the fan input terminal blocks. The fan accepts 120VAC and is always powered when the machine is turned on. The power input is controlled by the Emergency stop circuit of the machine and is only enabled when the Emergency Stop circuit is active at 120VAC. This must be tested after installation. Ensure that the relay opens when the Emergency stop button is pressed. (see wiring diagram for the machine)

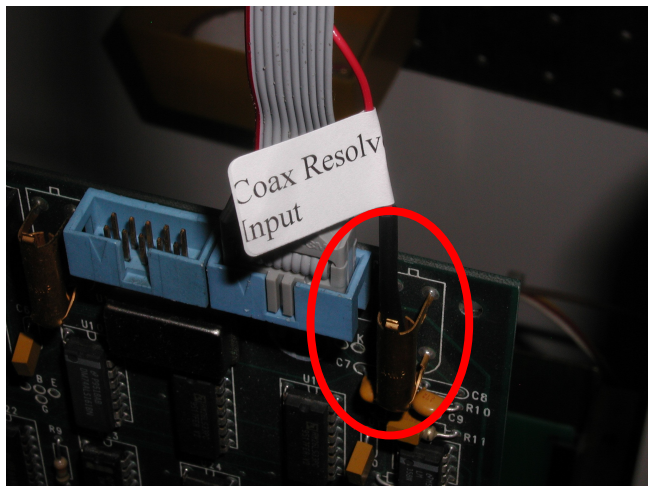




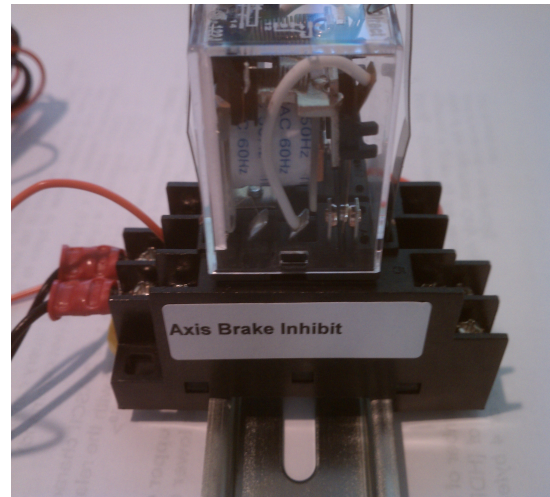
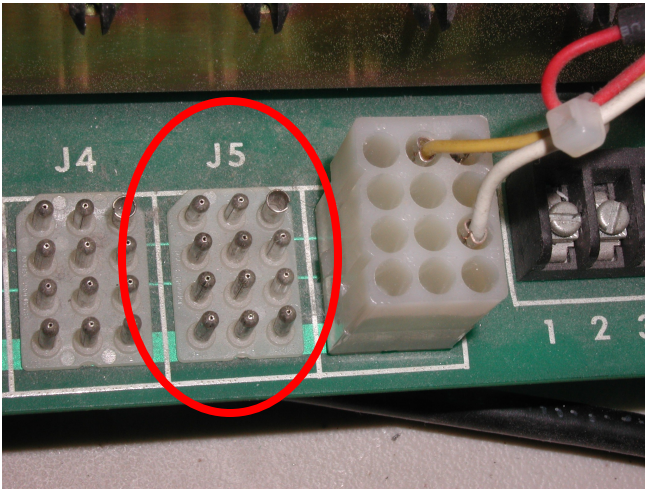
**Figure 6.** *(Only when using Fadal Axis cards with DC software, skip it using Axis card)* When DC style axis software is used with a Fadal 1010 card, a feedback converter box will be required. One side of the box will connect to the amplifiers J4 connection and the other side will connect to the axis cards J5 and Resolver Feedback input coax. The Resolver Feedback wire connects to the center pin of the resolver coax connector.



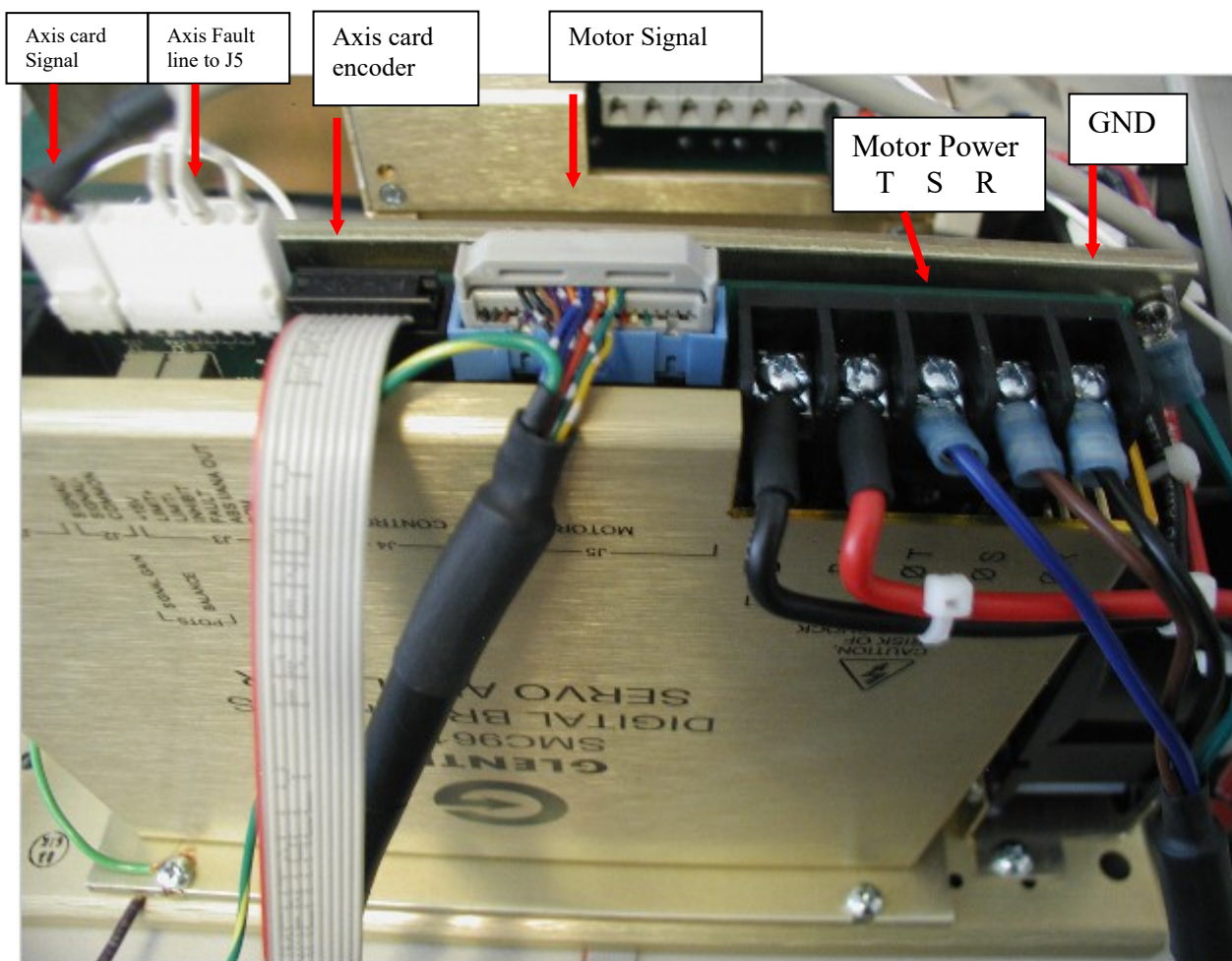
**Figure 7,** Install the axis card into slot 13 of the 1060 mother board. The axis card requires three cables connections. (Signal cable, the encoder ribbon cable and the resolver feedback cable.) *(Resolver feedback is used only when using Fadal Axis cards with DC software).*



**Figure 8,** *(Only when using Fadal Axis cards with DC software)* The following are the connections for encoder and the Coax resolver input.



**Figure 9 and 9A,** The J5 plug is directly below the A-axis card in slot 13. The provided 12 pin Molex connector is attached here. Note that the plug is keyed. One of the pins is a socket. The fault line of the card connects to the axis amplifier fault line on its J3 header. The relay shown is the Axis Brake inhibit. The coil is actuated by the 120VAC signal when the brake is turned on with M60/M61. If the relay has a time delay, this will set the amount of time till the amplifier is disabled. Setting a couple seconds will be sufficient for the axis to complete its move

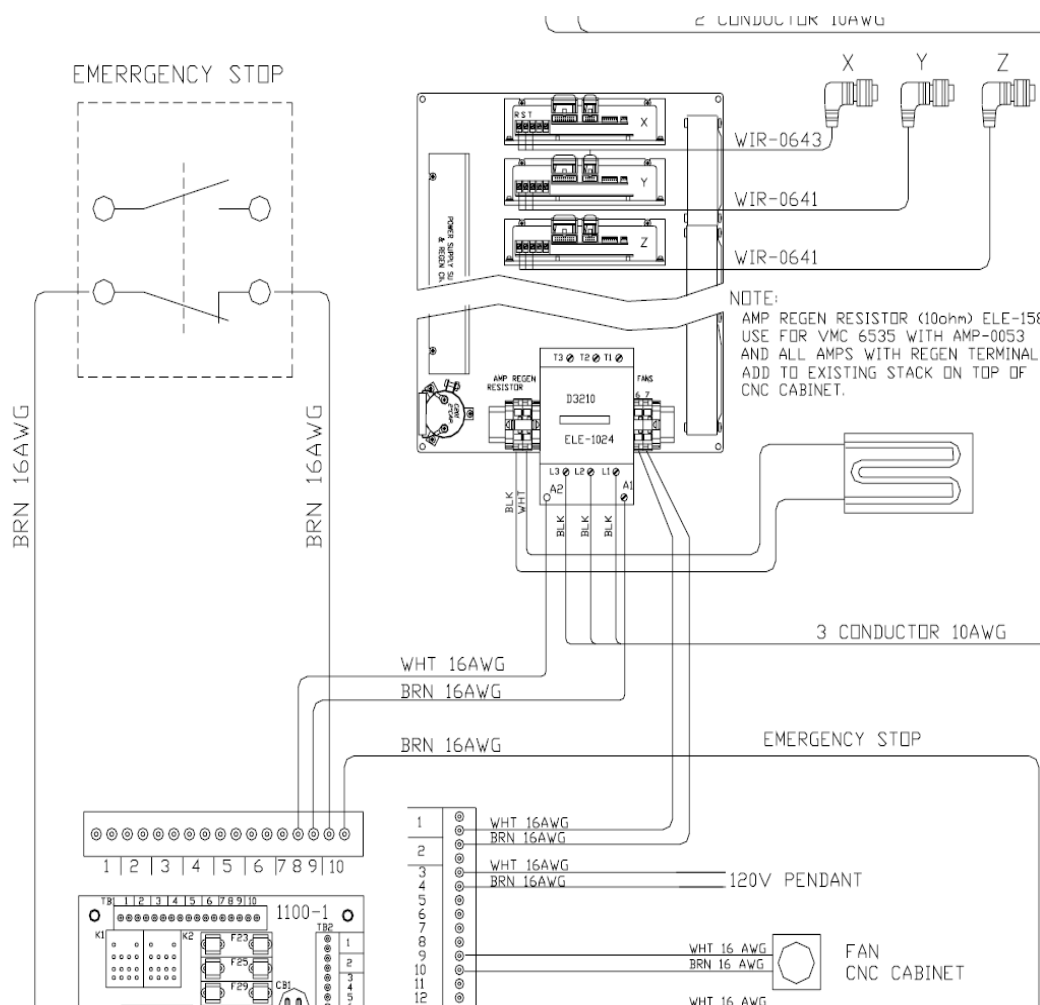


**Figure 10.** Connections to the AC amplifier.

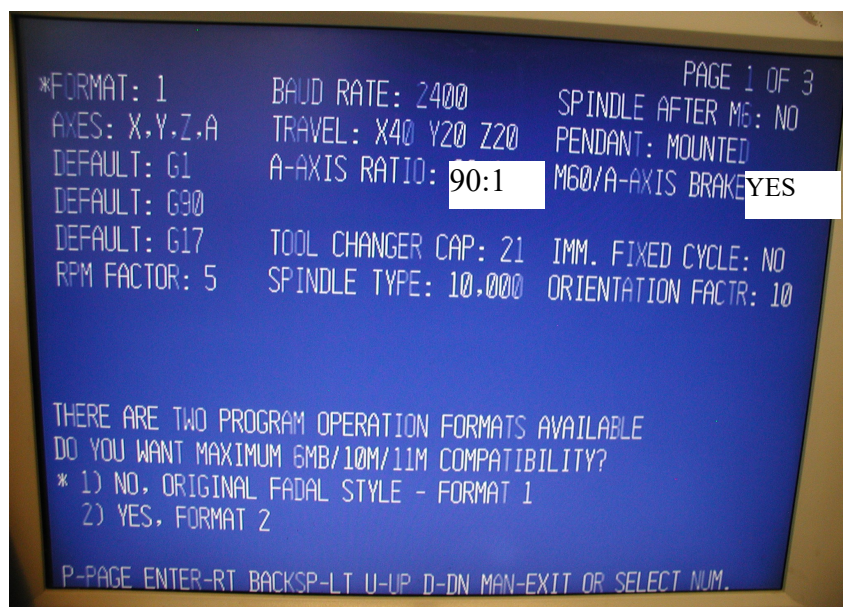




Figure 11, Use the provided special double cable tie wraps to organize the rotary table cabling in the work area. Note, the double cable tie may not be the one shown in the image above.



**Figure 12, (Only for DC machines without an AC chassis)** The DC chassis is enabled via the Emergency Stop circuit. The two lugs on either of these solid state relays will be powered with 120VAC when the machine is ready. Tap off the same circuit to enable the AC amplifier chassis. Refer to the wiring diagram for the machine shows the TB1-8 and TB1-9 that turn on the axis chassis, this is the power from the emergency stop circuit. When the emergency stop button is pressed this will turn off the chassis.



**Figure 13,** Set the parameters for the A-axis rotary as 90:1 with brake.

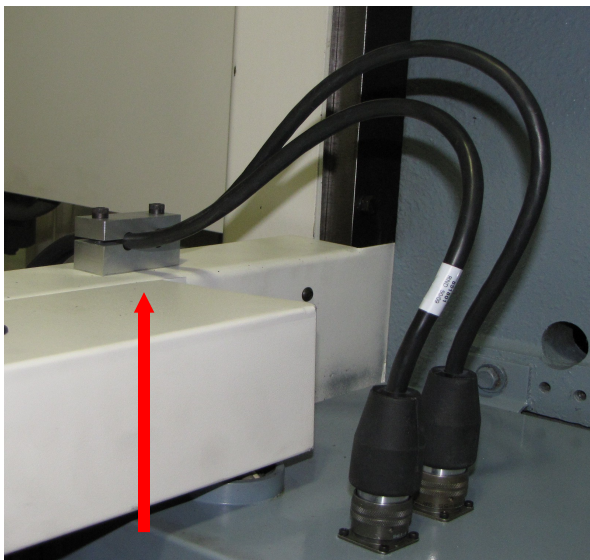


Figure 14, Cable holding block for signal and power cables.



Figure 15, Spring to hold cables slack up off the table





Figure 16, Make sure there is enough slack for machines table to move its complete travel with the rotary tables cables held up and out of the chip trays

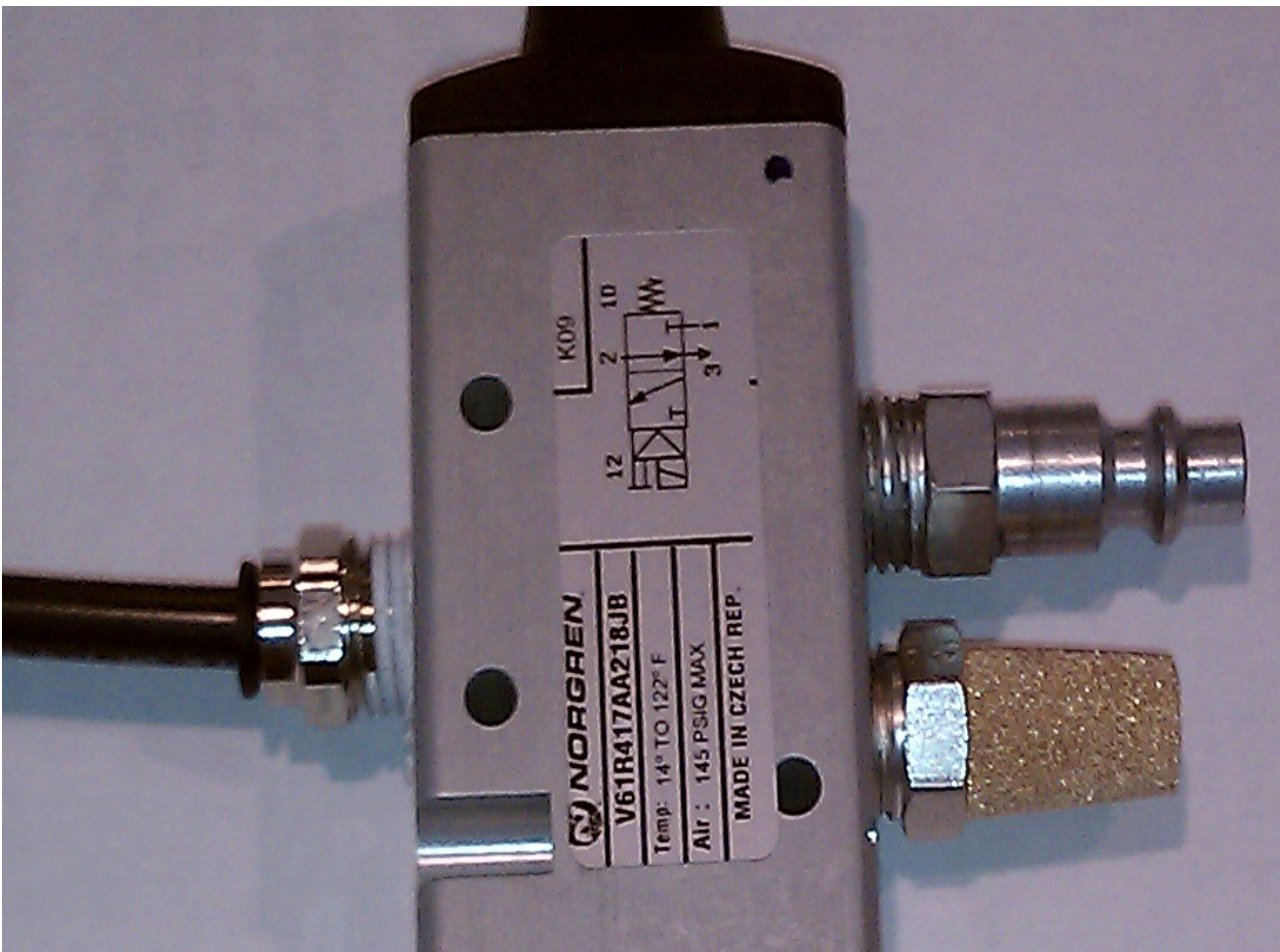


Figure 17, Port 1 (or P) is incoming air supply, Port 2 (or A) goes to brake to actuate brake, Port 3 ( or R) is exhaust when brake releases. Green wire is ground, Black wires go to M60/M61 120VAC output on power distribution.

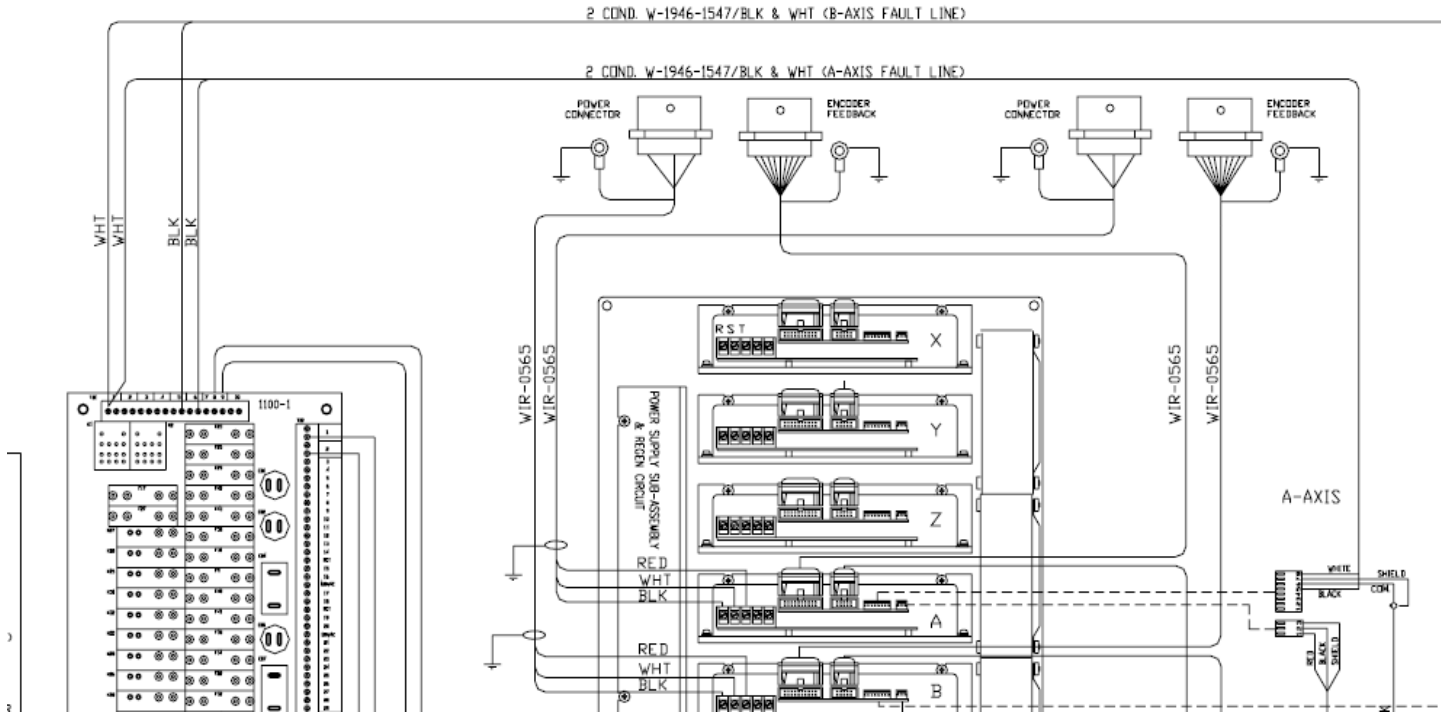


## Wiring the fault line p/n 851807

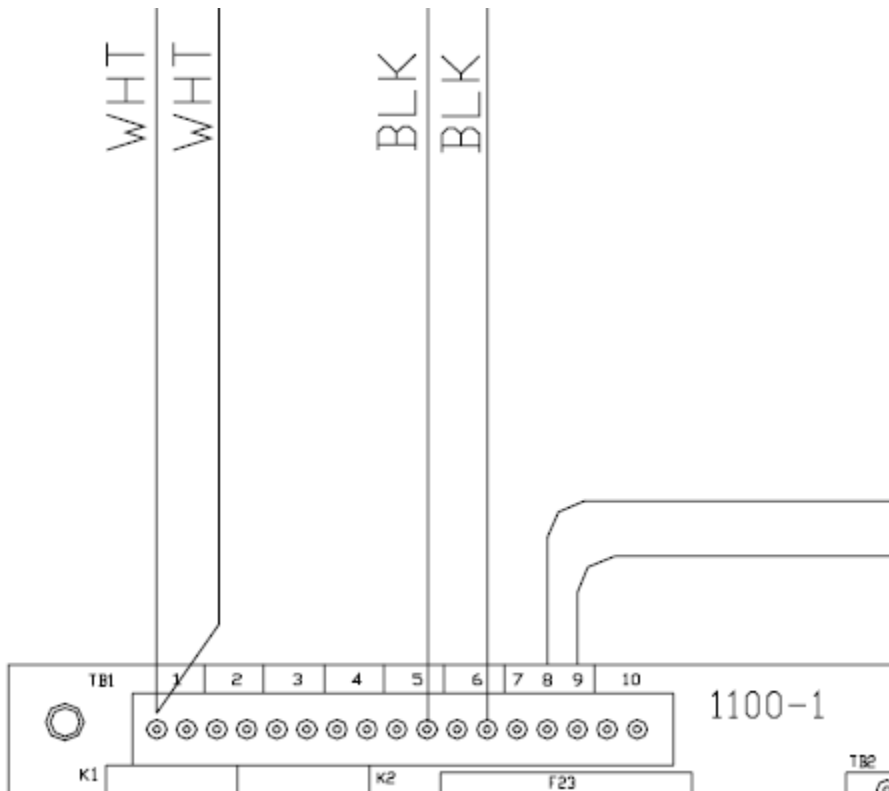
The A amplifier 8 pin connector's white wire goes 1100-1 at TB1-1 and the black wire to TB1-6. And the purple (pink) wire goes to 1100-1 TB1-6.

The B amplifier 8 pin connector's white wire goes 1100-1 at TB1-1 and the black wire to TB1-5. And the purple (pink) wire goes to 1100-1 TB1-5.

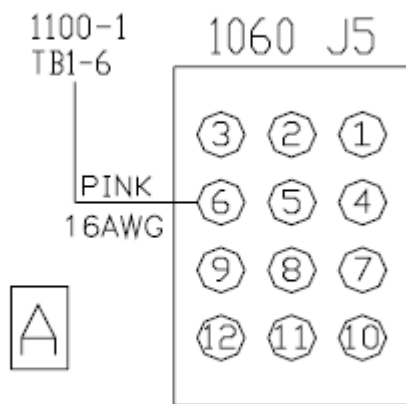
From the Fadal wiring diagram:



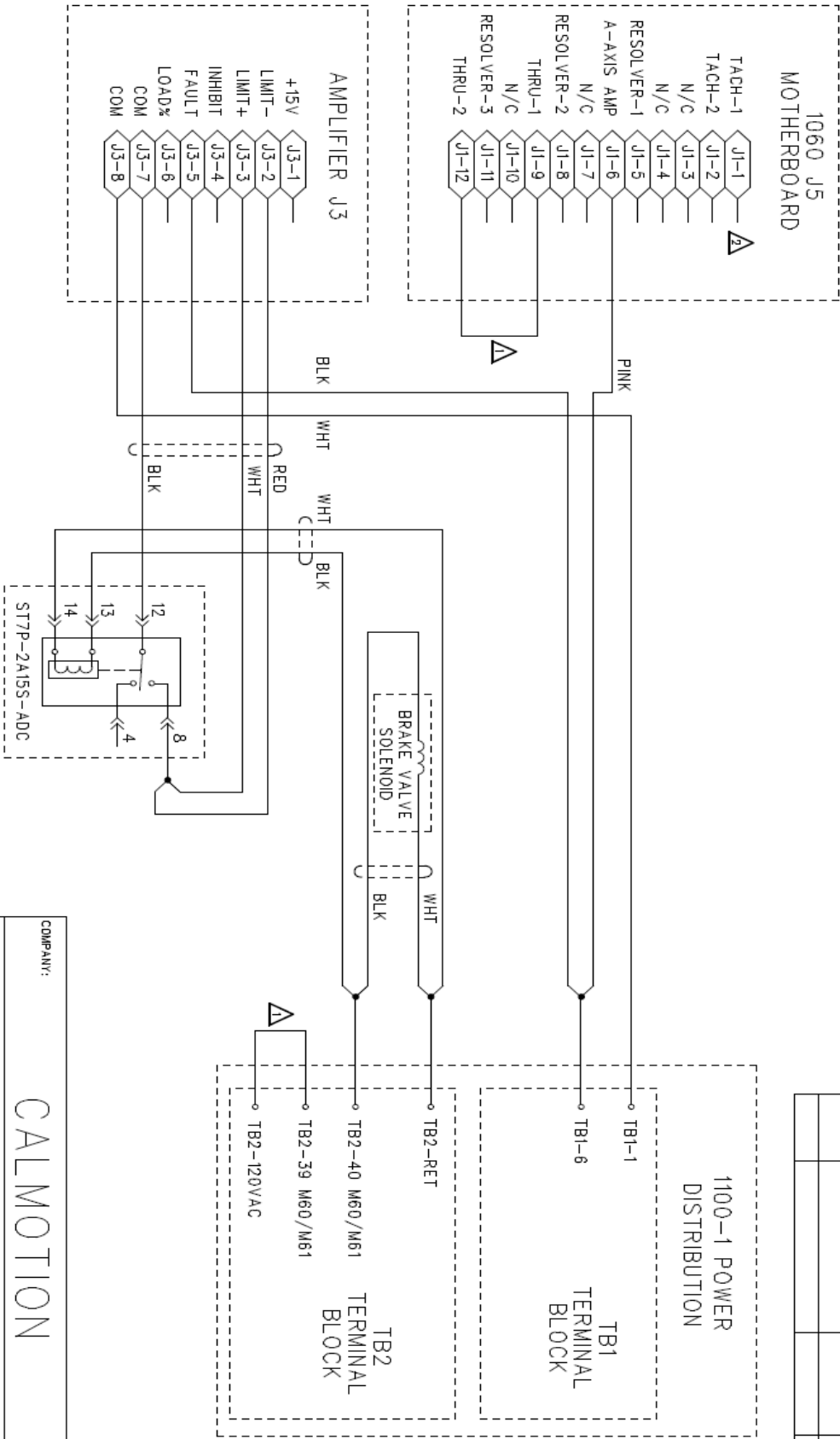
Zoomed in on the TB1 of the 1100-1:



The A-axis purple wire (pink) will also go to the location 6 on the TB1 connector.  
The B-axis purple wire (pink) will also go to the location 5 on the TB1 connector.



REVISION RECORD			
LTR	ECO NO.	APPROVED:	DATE:
-	INITIAL RELEASE	GDECAUSSIN	06/06/14



NOTES: UNLESS OTHERWISE SPECIFIED  
 A INSERT WIRELESS CRIMPED MALE PIN AT J1-1  
 A WHITE #22-AWG 7/30 STRANDED, 600V, HOOKUP WIRE.

COMPANY:		TITLE:	
CALMOTION		A-AXIS FADAL VERSION AMPLIFIER TO MOTHERBOARD FAULT AND BRAKE WIRING	
DRAWN: M.HANDY	DATED: 06/06/14	CHECKED: G.DECAUSSIN	DATED: 06/06/14
QUALITY CONTROL:	DATED:	CODE: NONE	SIZE: B
RELEASED:	DATED:	DRAWING NO: 851807-1	REV: A
SCALE: NONE		SHEET: 1 OF 1	