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## AMP-0039-ITS (5000 LINE) & AMP-0040-ITS (8192 LINE) Brushless Amplifiers for Fadal CNC Machines



**ITS Brushless amplifiers are the result of the latest technology!**  
**Here's three direct benefits:**

1) *Motor Short Protection*

Engineered for maximum performance and reliability, features such as Motor Short Protection.

Our special Motor Short Protection circuit provides automatic protection when a motor or wiring becomes bad. With other amplifiers, a motor short typically destroys the output devices or melts circuit board traces, permanently damaging unprotected amplifiers.

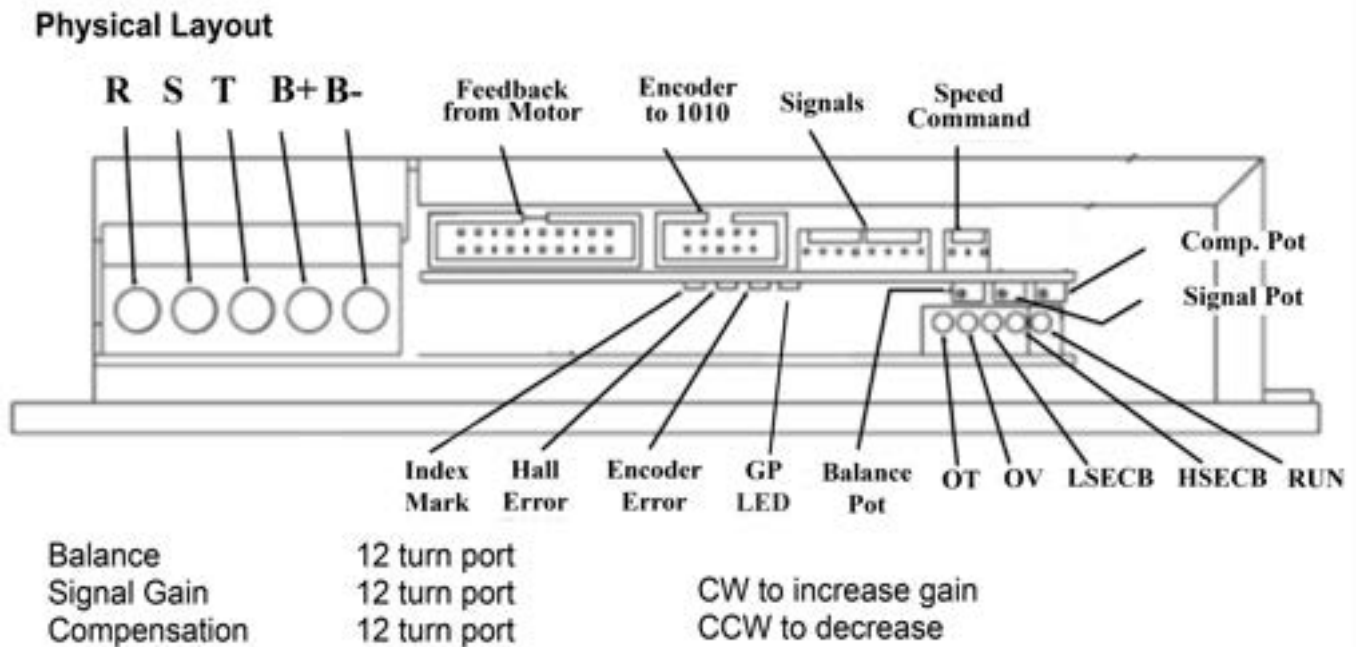
2) *Faster Servo Response*

The servo loop is 2x faster which provides better tracking during motion and 2x the zero-speed stiffness for more consistent positioning and backlash adjustments.

3) *Better FAULT Management*

We designed better current output conditions in three stages: continuous, peak and fold back modes. Rather than just shutting down the amplifier after a 3 second peak current output like other amplifiers. We designed this our amplifier to light the fault LED and automatically fold back to continuous motor output instead of simply faulting after the peak current has been exceeded.

This helps to keep the machine running and also to indicate when the torque requirement is exceeding the normal operation, usually because of a heavy cutting load, a bad motor or some other mechanical issue.



### Overview - Amplifier Adjustment Potentiometers:

The amplifiers are pre-adjusted and should be ready to use. For final adjustments see page 4. These adjustments should be made only if you have a problem.

**Caution: Do not adjust the sealed potentiometers on the lower circuit board. Only adjust the potentiometers on the upper circuit board under J5.**

Note: The multi-turn pots used are 12 turn pots, after turning over that amount you will be at the maximum value.

- 1) **Signal Gain Pot** - The SIG Pot scales how the amplifier converts the +-10 vdc servo signal to a motor RPM value. A low adjustment will cause the machine not to get up to the Rapid Traverse speed (large following error) and it will generate a MOTOR OVERLOAD fault; a high adjustment will cause the machine to sound "crisp" and "bang" or as it moves.  
Preset Adjustments:  
 Fully CW then CCW 7 turns.
- 2) **Balance Pot** - The Balance Pot adjusts the offset of the Signal to achieve the same following error in both directions.  
Preset Adjustments:  
 Fully CW then CCW 7 turns.
- 3) **Compensation**- The COMP pot adjusts the overall response time of the servo system. Too fast and the motor buzzes, too little causes slow motor response.  
Preset Adjustments:  
 CW then CCW 7 turns.  
 AMP-0021i Fully CW then CCW 1/4 turn.

## Overview - Amplifier LEDS:

**FAULT** - Rather than just lighting an LED when the amplifier is in a FAULT mode, we added better functionality to help with diagnostics.

A) The FAULT LED lights up when the amplifier exceeds the continuous duty cycle to indicate starting the 3 sec 200% PEAK current output. After 3 seconds, the amplifier folds back to the 100% continuous output rating.

B) The LED goes OFF while in the continuous rating and the 3 second Peak output capability is restored.

C) During the Peak Current or Fold-back condition when the FAULT LED is ON, the +10 VDC Fault Signal to the CNC remains high at +10 vdc. The Fault signal goes Low when the amplifier is actually Faulted (unable to output power) or the motor/wires are shorted.

**GP LED** – The General Purpose (GP) LED flashes if there are any system errors. The LED will flash if one of the following errors occurs:

1. Over Speed fault
2. 5V Power Supply fault
3. Bus Overvoltage fault
4. +/-15V Power Supply fault
5. Over Temperature fault
6. Encoder fault
7. Halls fault

**HS ECB** - High Speed Electronic Circuit Breaker provides circuit board protection. Power ON/OFF or press the ESTOP button to reset.

**LS ECB** - Low Speed Electronic Circuit Breaker provides circuit board protection. Power ON/OFF or press the ESTOP button to reset.

**RUN** - Indicates amplifier is ready for operation.

**TEMP** - Lights when a operating temperature has been exceeded. Verify the cooling fans are operational in the amplifier chassis and vents are clear.



**Safety Notice:** This equipment contains High Voltages; up to 340 DC Volts. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the installation and start-up procedure.

SERIOUS PERSONAL INJURY IS ALWAYS A HAZARD IN AN INDUSTRIAL ENVIRONMENT. EXTREME CAUTION, IN ALL FACETS OF SAFETY, SHALL BE MAINTAINED. ALL COMPANY SAFETY STANDARDS, PRECAUTIONS AND REGULATIONS OF O.S.H.A. SHALL BE MAINTAINED DURING TRAINING, INSTALLATION, AND REMOVAL OF THE SPINDLE DRIVE.

**Disclaimer:** In no event shall ITS Inc. or any of our affiliates be liable for any damages whatsoever, and in particular ITS Inc. or any of our affiliates shall not be liable for special, indirect, consequential, or incidental damages, or damages for lost profits, loss of revenue, or loss of use arising out of use of this product, whether such damages arise in contract, negligence, tort, under statute, in equity, at law, or otherwise.

# Brushless Amplifier Adjustment Procedure

## Before you start:

1) Verify the position display show FOLLOWING ERROR not LOAD % next the axis position. The display option can be selected using the SETP command. When adjusting the amplifier you'll need to reference the FOLLOWING ERROR (a number proportional to the feedrate).

2) At Power-On, the Axis Controller card will try to rotate the motor slightly as a power-up test. Failure to rotate can cause an **ERROR #1 or #3**. When installing a new amplifier, this Error E-stop can be caused because the motor does not rotate. Check Preset Adjustments before powering on. If this continues, rotate the SIGNAL Pot. more CW and try again.

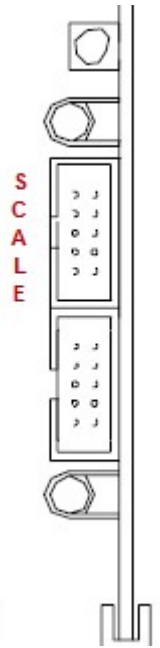
This power-on test can be temporarily disabled until the adjustments are completed by installing a jumper at J8 of the corresponding 1010 axis controller card. When using the J8 Jumper, it's a good practice to power up the machine with the E-stop button down then release it manually, watching for any possible run away condition when the system powers up. Note with 1010-6 the jumper is labeled "DIAGNOSTICS".

## Machine with Scales:

Before adjusting the amplifier, verify that scale cable (if applicable) is disconnected from the 1010 axis card of the corresponding axis amplifier to be adjusted. If it is connected (using the glass scale feedback), power down the machine, disconnect the cable, and then power up the machine. See parameter note for Rotary Scale at the page of these instructions.

The scale feedback is the upper blue, 10 pin edge connector; the bottom connector is for the motor encoder feedback (it should not be populated).

After the amplifier is adjusted, you'll need to power down the machine and install the scale connector.



## Adjusting the amplifier:

- 1) With the E-stop button pressed in, power up the machine as normal. Release the E-stop button and press JOG to power up the amplifiers.

**Caution:** Be prepared to press the E-stop if any motors begin to run away.

- 2) For the Comp Pot - in most cases the Preset Adjustments are sufficient.

Optional fine tuning:

Slowly turn the **Compensation** potentiometer counterclockwise until the axis motor produces a high frequency vibration (Buzz), then turn the potentiometer clockwise until it stops buzzing and add 2 more full turns clockwise from that point.

- 3) Begin cycling the machine to adjust the **Signal Gain and Balance** potentiometers.

Enter the following program if adjusting an X, Y or Z axis:

```
N1 M91 M49 G91 F150.  
N2 G1 X-3.Y-3.Z-3.  
N3 X3.Y3.Z3.  
N4 M99 P2
```

Press AUTO, to start the program running.

**You can also load Program #5811 to check and adjust the balance.**

- 4) Turn the **Signal Gain** potentiometer until the CNC display of the axis to be adjusted reads the correct following error count while running the program.

Clockwise will reduce the following error and counterclockwise will increase the value.

The following error is the number displayed to the right of the position display value.

**For Metric Pitch Ballscrew's the target value is 605.**

**For Inch Pitch Ballscrew's the target value is 595.**

All three axes (XYZ) should have the same following error when adjusted correctly. Use the SETP command to check the current Ballscrew Type if you're not sure about which ballscrew you may have.

The goal of the adjustment is to match the other axis, so the system is dynamically matched with all the XYZ axes. It's not required to be exactly set the value, it can be +/- 10 counts, in most cases. However, it does somewhat affect the contouring accuracy; the closer the better.

- 5) Press the SLIDE HOLD key and adjust the **Balance** potentiometer of the amplifier to read a following error between +1 and - 1 (or as close as you can get to zero).
- 6) Press the SLIDE HOLD key to stop the machine. Press the MANUAL key and then type SETCS and HO, to send the machine home.

Adjustment of the amplifier is complete.

#### **LIMITED WARRANTY:**

Any amplifier sold by Independent Technology Service Inc. or any of our affiliates, which, under normal operating conditions in the plant of the original purchaser thereof, proves defective in material or workmanship within specified time (one year) from the date of shipment by us, as determined by an inspection by us, will be repaired or replaced, at our discretion, free of charge for repair. The customer is responsible for the shipping costs.

Provided that you promptly send to us notice of the defect and establish that the amplifier has been properly installed, maintained, and operated within the limits of rated and normal usage, and that no factory adjustments have been tampered with or damage has occurred from contamination, i.e., water, coolant, any foreign material such as chips or dust. We cannot warranty an amplifier that has failed due to contamination, over voltage surges or lightning strikes. Amplifiers that have obvious burn marks and blown-up components are not covered under warranty.

Independent Technology Service Inc. or agents' liability is limited to repair or replacement of defective parts as examined and determined by us. Repaired items will carry a 90-day warranty or until fulfillment of original warranty time; whichever is greater.

All expressed and implied warranties, including the implied warranties of merchantability and fitness for a particular purpose are limited in duration to the warranty period, and no warranties, whether expressed or implied, will apply after this period.

Under no circumstances shall Independent Technology Service Inc. or any of our affiliates have any liability whatsoever for claims or damages arising out of the loss of use of any product or part sold to you. Nor shall we have any liability to yourself or anyone for any indirect or consequential damages such as injuries to person and property caused directly or indirectly by the product or part sold to you, and you agree in accepting our product or part to save us harmless from any and all such claims or damages that may be initiated against us by third parties.

#### **POLICY INFORMATION:**

**RESTOCKING FEE:** We cannot receive a return part that has been damaged or in a condition that makes it unable to resale as originally sold. Parts being returned must be returned in the same packaging and in the same condition (as determined by us) as it was originally received. Amplifiers returned to us that are not under warranty repair will be subject to a 15% restocking fee. We will contact the customer to discuss returns considered unusable or damaged for possible solutions.

**SHIPPING:** The customer is responsible for all shipping unless determined by us to be our fault, i.e. the wrong part was shipped.