Servo Amplifier - Troubleshooting Guide - CHC

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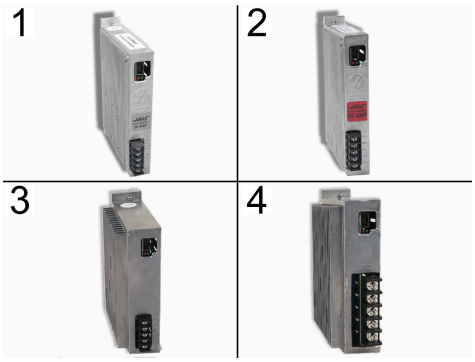
Introduction



There are four versions of Haas amplifiers. 30A [1], 45A [2], 60A [3], and 90A [4]. All four operate the same way.

Smart Amplifier assemblies are powered from the 320 VDC Bus from the Vector Drive assembly or Minimill Power Supply. They each have a red LED FAULT light, and a green LED POWER ON light to show the status of the amplifier.

Electrical Safety

Caution: When you do maintenance or repair on CNC machines and their components, you must always follow basic safety precautions. This decreases the risk of injury and mechanical damage.

- Set the main circuit breaker to the **[OFF]** position.

Danger: Before beginning any work inside the control cabinet the High Voltage indicator light on the 320V Power Supply / Vector Drive must have been off for at least 5 minutes.

Some service procedures can be dangerous or life-threatening. DO NOT attempt a procedure that you do not fully understand. If you have any doubts about doing a procedure contact your Haas Factory Outlet (HFO) and schedule a service visit.

Symptom Table

Symptom	Possible Cause	Corrective Action
Alarms 161-164 AXIS DRIVE FAULT	Amplifier detected a short.	Check cables for contamination or damage.
Alarm 993 AMPLIFIER SHORT CIRCUIT **Alarm 2040** VECTOR DRIVE OR SPINDLE AMPLIFIER-SHORT CIRCUIT	The amplifier has a internal short circuit.	Do the **Amplifier Short Circuit Inspection** section. **Note:** If a short-circuit is found, inspect the cable and motor for a short circuit before installing a new amplifier.
Alarms 161-164 AXIS DRIVE FAULT and **Alarm 986** CALIBRATION FAULT	Amplifier internal calibration.	Check the command cable from the Maincon / Mocon PCB to amplifier. Check the 320 VDC voltage to amplifiers.
Alarms 161-164 AXIS DRIVE FAULT and **Alarm 992** AMPLIFIER OVER CURRENT	Axis mechanical blockage.	Axis mechanical blockage.

Alarms 161-164 AXIS DRIVE FAULT and **Alarm 994** AMPLIFIER OVER LOAD	Incorrect application.	Change speed and check for tool damage.
	Axis mechanical blockage.	Remove Blockage.
	Incorrect Low Voltage Input supply to Maincon or Amplifier.	See the **Low Voltage Inspection** section.
Alarms 161-164 AXIS DRIVE FAULT and **Alarm 991** AMPLIFIER OVER TEMPERATURE	Problem with the cooling fan.	Check cooling fan.
Alarm 991 AMPLIFIER OVER TEMPERATURE.	The Maincon/Mocon axis channel is defective, or there is a broken pin on the connector.	Remove the encoder/drive cables from the Maincon/Mocon PCB axis channel. Inspect the connectors pins. Test the axis on a different Maincon/Mocon channel, if the problem goes away there is a problem with the axis channel.

Mechanical Blockage

Corrective Action:

Make sure the axis has a clear path of travel. Tools, part fixtures, or workpieces that are too large can crash into the machine enclosure.

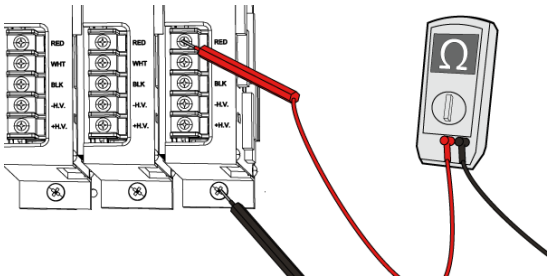
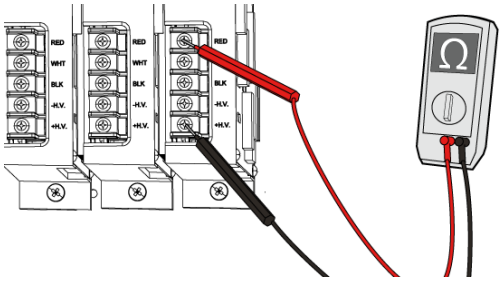
Look at the machine's alarm history. Overload alarms followed by over current alarms are a sign of a crash.

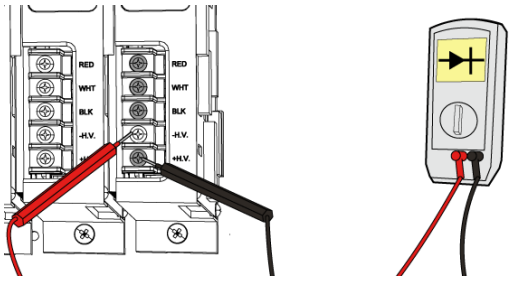
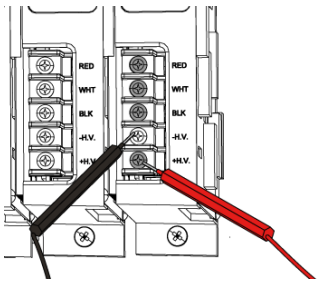
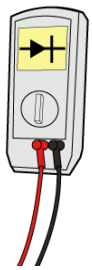
Look at the machine enclosure, spindle and tooling for damage. Damage to the tooling, fixtures and enclosure are signs of a crash.

If there are no signs of a crash, inspect the ballscrew and linear guides. They must move or turn freely by hand.

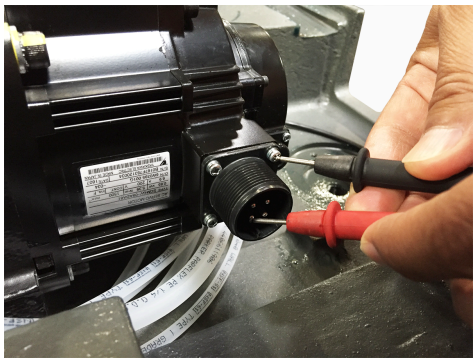
Amplifier Short Circuit Inspection

Check the amplifier for a short. Power off the machine. Disconnect the cables for the axis servo motor at the amplifier that generates the alarm.

Place MultiMeter Leads Here	Instructions
	Set the meter to ohms, and take the following readings: Ground screw to RED, WHT, and BLK terminals If the meter does not show open (o.l) the amplifier is damaged.
	Set the meter to Ohms, and take the following readings: Black lead on HV (+) and Red lead to HV (-), RED, WHT, and BLK terminals. The meter should show high resistance readings typically in the Kilo or Mega ohms. If the meter reads very low resistance the amplifier is damaged.

	Set the meter to diode test mode, and take the following readings: Red lead on HV (-) and black lead to HV (+), RED, WHT, and BLK terminals If the meter does not show a voltage drop ranging from 0.2 to 0.8 volts the amplifier is damaged.
 	Set the meter to diode test mode, and take the following readings: Black lead on HV (-) and red lead to HV (+), RED, WHT, and BLK terminals If the meter does not an open circuit (O.L) the amplifier is damaged.

Servo Motor Short Circuit Inspection



Corrective Action:

Check the cables for a short: Make sure the axis servo motor cables are not contaminated or pinched. Contaminated or pinched cables can cause a short. Replace the cables if necessary.

Inspect the servo motor. Disconnect and inspect the power cable connector at the motor. Make sure that there is no coolant contamination. Coolant contamination can cause this alarm and damage the amplifier. Measure the resistance from the pins labeled A, B and C at the motor connector to chassis ground.

- The reading should show an open circuit.
- If there is not open resistance, the servo motor is at fault.

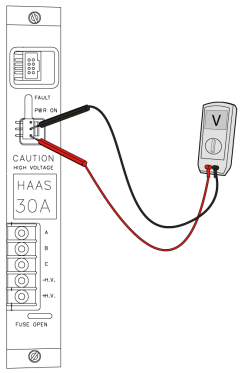
Review the Part Program

Corrective Action:

The machine load is too high. Decrease the feeds to decrease the machine load. Examine the cutting tool for damage.

Test the axis that generates the alarm. Write a program in MDI to move the axis. If any movement at any feed rate causes the alarm, then the servo amplifier is at fault.

Low Voltage Inspection



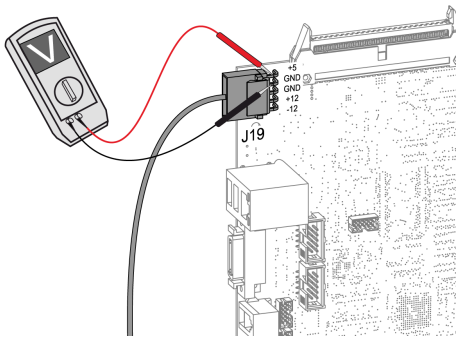
Non Smart Amplifiers Low Voltage Input.

Non Smart Amplifiers - Use a low voltage power supply module to supply +12/-12VDC to the amplifier. This voltage is critical to the correct operation of this amplifier.

With the power on, using a volt meter set to DC carefully measure acrross Yellow/Black and White/Black.

- Yellow = +12VDC
- White = -12VD
- Black = Ground

Use the table below for the correct voltage range.



Mocon/Maincon Low Voltage Input

Corrective Action:

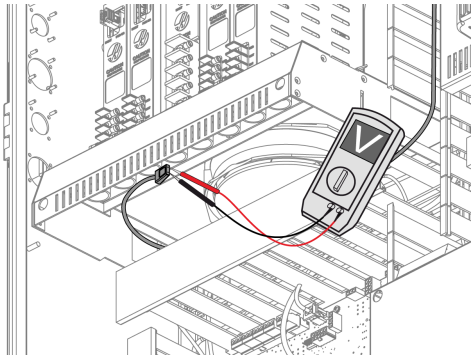
Measure the low voltage power supply voltage levels at the Maincon or Mocon PCB. Make sure you do not short or cross your multimeter pins.

Cycle power to the machine. If the fault stays, then the amplifier is faulty.

If every axis amplifier in the machine generates the alarm at the same time, and the low voltage power supply is correct, then the Maincon or Mocon PCB may be at fault.

Pins	Correct Voltage
+5 and GND	+4.90 to +5.20 V dc
+12 and GND	+11.85 to +12.50 V dc
-12 and GND	-11.85 to -12.50 V dc

Cooling Fan



Corrective Action:

Note: The maximum temperature for safe operation of Haas CNC machines is 122 °F (50 °C). The amplifier over temperature sensor will trigger at 195 °F (90 °C).

Make sure the cooling fan for the servo amplifiers operates correctly.

If the fan does not operate correctly, measure the voltage it receives. Disconnect the cable from the cooling fan. Measure the voltage

between the leads of the cable. The correct voltage 120 VAC.

- If the cable has the correct voltage, the cooling fan is defective.

Electrical Diagram