SHOPTASK- SHOPMASTER

SOLD 1990- 2008

COMPUTER NUMERICAL CONTROL

7A MICROSTEPPING DRIVERS

WINDOWS BASED SOFTWARE

INSTRUCTION MANUAL

The G201/G210 control box was developed as a low cost alternative to the expensive CNC systems on the market. It is intended for the home hobbyist, the entrepreneur and home businesses. It provides the efficiency of computer control with the power of accomplishing tasks that are difficult if not impossible to do by manual machining. It relieves the boredom of repetitive tasks and can open new horizons to the home shop.

The G201/G210 CNC unit consists of a stepper motor drivers , power supply, cooling fan, heat sinks power management and connections for signals from the PC. G code interpreter programs like MASTER 5 CNC or Mach3 CNC can be used and provide awesome capabilities. Other programs such as MAXNC, SUPERCAM, STEPSTER, BASIC CNC AND CNC PLUS , will work with the 3/4 axis stepper motor driver/controller using signals from a PC Printer Port (parallel port). Master5 CNC/Mach3 CNC is designed to run under Windows and uses the parallel port to deliver the information to the controller which in turn moves the stepper motors and the machine. Master5 CNC/Mach3 CNC/Mach3 is a standard G code interpreter that will runs many of the basic and advanced G codes.

The stepper motor controller/driver is a full three axis stepper motor controller capable of running 3 stepper motors to 800 oz inches simultaneously. The drivers are rated at 7 amps per phase and operate at 36VDC for good speed. The controller includes the power supply, a lighted power switch, an All Windings Off switch (for manual positioning), three stepper motor connectors a IEC power entry module and a DB25 connector to mate the controller with the parallel port. . The controller will work with Master 5 CNC/Mach3, Supercam, CNCPRO as well as Maxnc (step and direction) and other step and direction CNC programs all though the limit switches may be different. The driver uses replaceable state of the art

chopper drivers that are set in the half step mode for maximum smoothness and reduction of stepper motor resonance problems. The on board chopper oscillator is set for 18-20 KHZ.

MASTER 5 CNC/Mach 3 has home and limit switch capabilities and motor reversal configuration files. Since the controller is designed to work with different software the markings on the back of the controller may be used differently. These instructions will provide the information necessary to set them up.

Master5 CNC/Mach3 will run most home machines very nicely. With stepper motors in the 150-300 oz in range and a 2/1 or 3/1 ratio timing belt and pulley, the machine will have excellent power to machine steel, aluminum, cast iron, plastic and other Materials with good speed and resolution. The accuracy you obtain is dependent on the backlash and rigidity of your machine. It will equally direct drive small sherline type machines that use 20 TPI leadscrews.

With the standard leadscrews linear moves can easily be made to within .001 of an inch depending on the condition of you machine. The speed of the machine will be in the 10-60 inches a minute range depending on stepper motor used and how tight the gibs are adjusted any other mechanical drag. Most cutting is accomplished below this speed and this is where the stepper motors have more power. When installing the pulleys and stepper motors, some stepper motor pulleys are to tight a fit on the motor shaft. NEVER pound the pulleys/ motor couplings on. They must be a slip fit. It will damage the bearings and ruin the motor (not covered by warranty and cause slow operation of the machine. Make sure that the pulleys do not drag against the base.

The Controller is designed to work with other 4, 6 or 8 wire, 50-800 oz. inch stepper motors capable of powering many different types of machines. This controller is a full three axis with independent modules for each stepper motor. This controller may be used on bench top drill presses, mill/drill machines and lathes to 13" swing as well as any other type of machines requiring 1-3 stepper motors. The speed of the controller will run the stepper motors down to a fraction of an inch per minute up to 10+ inches per minute depending on the stepper motor used, the alignment of the machine the leadscrew pitch or pulleys used. It most cases this controller will run your machine faster than you could under manual control..

The Front Control Panel has two controls. They are:

LIGHTED POWER SWITCH
MOTOR ENGAGE SWITCH

The functions of these controls are as follows:

LIGHTED POWER SWITCH is use to turn the controller and cooling fan on or off. A red light will come on indicating that the controller is receiving 110VAC and the unit is ready for operation. Shut off the controller when ever you are not using it. Shut it off if the fan fails to run. The power switch may also be used as an emergency shutdown switch to stop the stepper motor. This is no substitute for an E switch that will shut down your machine.
If the light does not come on when the top part of the switch is pressed, check that the unit is connected to a 110VAC source and the other end is plugged into the IEC module. If there still is no power the fuse may be blown in the IEC module. See the section on the IEC power entry module for instruction on how to change the 100VAC fuse.

MOTOR ENGAGE SWITCH is used to allow manual movement of all axes. This is a two position switch. In the up position (ON) all motors are ENGAGED. In the down Position the motor windings are Disengaged (OFF). The motor must be engaged for it to operate in the CNC mode. This switch can also be used to stop the motors at any time. Be careful that when you reengage the motor in either mode unexpected operation or speed may occur due to the settings. ALWAYS DISENGAGE THE MOTORS WHEN THE MACHINE IS NOT RUNNING. This will reduce the heat build up and keep the unit running below it designed operating temperature of 130F.
Never motorized the stepper motors. Never engage the power feed on the axis with the windings engaged. Never disconnect a stepper motor while the motor is engaged. It will destroy the stepper motor driver and will void the warranty.

The Back Panel has several connector for various functions:
DB25 PARALLEL PORT CONNECTOR
OVERTRAVEL PROTECTION CONNECTOR
HOME SWITCH CONNECTOR
STEPPER MOTOR CONNECTORS
IEC POWER ENTRY MODULE
+5 (implemented on some models (if a red 22AWG cable is supplied that connects to the pc floppy drive connector then it must be used as the return signal path)
Relay A (for external relays- Not implemented in this model)
Relay B (for external relays- Not implemented in this model)

The function of each connector is as follows:

DB25 Parallel port connector is designed to be used only in the CNC mode. The supplied parallel port cable is a DB25 male to DB25 female straight through cable. Your unit was supplied with the correct cable.

(LIMIT) connector is located on the rear panel toward the lower left. It three holes with only two pins. This connector can be used with Master5 for the Range switch. The top pin is the signal ground from the parallel port to the controller's signal ground .The bottom pin is connected to pin 15 of the parallel port. Be aware that different software program use different pins for different function. In this program the Range switch is the LIMIT switch. Use normally open micro switches with a 1" long lever and a roller at the end. Most micro switches have three connection,. N.O. Normally Open, N.C. Normally Closed, and COMM. Common. Connect the common side of all the limit switches to the ground pin on the range connector. Connect all the Normally Open (N.O.) side of all the switches to the other pin. See the schematic diagram at the end of this manual. In Master 5 CNC there is a command that will home the machine to the Zero points. When any of the switches is activated (closed) the machine will stop. Note that micro switches are not included in the controller but may be purchased separately.
The parallel port may need a pull up resistor on pin 15. Ensure that your parallel port can handle the +5V on pin 15.
Last, note that the home switches (not provided) cannot be used as the limit switches. To add limit switches (not provided) locate them .030" outside of the home switches.

HOME SWITCH. See the schematic at the end of this manual. This connector is used with a normally open micro switch (not supplied with the controller). For Master 5 CNC the top pin is logic ground connected to pins 18-25 of the parallel port and logic ground on the controller. The second pin is connected to pin 10 of the parallel port which is used for the X axis home switch. The third pin is connected to pin 12 of the parallel port for the Y axis home switch. The fourth pin is connected to pin 13 of the parallel port for the Z axis home switch. . Note that limit switches must be placed outside the home switches by about .030" if used and they are not provided with the controller but may be purchased separately.

STEPPER MOTOR CONNECTOR is a 6 pin Molex connector to be used with standard 4, 6 or 8 wire stepper motors. The motor you purchased will be set-up and ready to plug in. If not supplied, connect phase (A) of your stepper to pin 1 and the other side phase (B) to pin 3. Connect phase (C) to pin 4 and the other side of phase (D) to pin 6.
CAUTION Never connect or disconnect the stepper motor plug from this connector while there is power on. It will destroy the output side of the controller and is not covered by warranty. Always shut off the power switch, wait ONE MINUTE, then plug the connector from the stepper motor before removing. Never force the male and female connectors together. Straighten the pins if necessary for a smooth fit. Never run the power feed on the x axis while the controller is turned on and the motor engage switch is on.

IEC POWER ENTRY MODULE is designed with a 3 AMP slow blow fuse to accept 110VAC 60HZ power. Do not try using this controller on 220VAC. It will destroy the power module. Use the supplied IEC grounded power cable. The AC side of the controller is grounded to the case for safety. Simply plug the matching connector into the IEC module and plug the other end into a standard GROUNDED 3 conductor receptacle.

If the fuse should ever blow, set the Power switch to the OFF position, Disconnect the IEC cable from the power receptacle and pull the cable from the IEC module. You will notice a little drawer that contains the fuse. Simply pull this out and replace with an EXACT replacement fuse.

+5 (implemented on some models (if a red 22AWG cable is supplied that connects to the pc floppy drive connector then it must be used as the return signal path)
Follow the instructions for your PC and remove the outer cover. Plug the red 4 pin connector on the Red 22 ASWG cable to an unused floppy drive connector. Make absolutely sure the red wire on the cable connects to the RED wire on the PC floppy drive connector. This is the +5Dc which is the signal return path. Connect the other end of the 22 AWG Red cable with 2 pin end connector to the back panel of the control box.

RELAY A AND B these connectors are two- pin Molex connector. These are not connected on the basic CNC set-up.
CAUTION. Always boot the computer first and load the program before turning on the Controller. The reason for this is that as the computer boots up it cycles the parallel port and could turn on or off accessories connected with solid state relays in an unplanned manner. Never boot the computer or load the program with the Controller ON. Always load the program first then turn on the controller. Always insect the home and limit switches before operation to ensure proper operation

There are no user serviceable components internal to the case except for axis fuses. If there is a malfunction or the unit isn't working properly, contact your supplier for repairs or servicing. DO not remove the cover from the case. There is 110V present at all times when the controller is connected to a power source. Severe injury or death may occur if you contact the 110V AC present inside the case.

CAUTION
Computer Numerical Control machines may move unexpectedly do to a wide variety or problems.
All computer controlled machines may cause injury or death under a variety of circumstances. This controller is no exception. By connecting this controller the purchaser agrees to assume all risk with the use of this product and the software.

WARNING
NEVER BOOT the PC with the controller turn on. As the computer boots up it checks the parallel port and may send signals that could cause damaging motion. Always start your PC first. Load the program. Lastly, turn on your controller.

Warning: The use of automated machines is dangerous! Use at your own risk.

INSTALLATION- Controller

1. Locate the driver/power supply case where it will receive airflow from the sides. Locate the controller where coolants, chips and other industrial debris cannot get into the controller. Locate where the operator has easy access to the controls. Locate the controller where the ambient temperature is under 90F. Do not operate this controller if the ambient temperature is greater than 90F for extended periods of time.
2. Install the stepper motor on the machine. Never pound the pulleys/coupling onto the stepper motor it will void the motor warrantee. Call, in the event of a poorly fitting stepper motor pulley. Connect the matching connector from the stepper motor to the back panel of the case for the correct axis.
3. Insert the IEC power cable into the back panel power module. Check that the power switch is off on the front panel. Connect the three prong grounded power cable to a three prong grounded 110V AC 60 HZ only power source.
4. Connect the DB25 supplied cable to the PC and to the back panel.
5. Connect the +5 Red 22 AWG cable to the PC floppy drive connector and the other end to the +5 connector on the back panel (this is required if the steppers are to move.)

COMPUTER INSTALLATION

1. Shut the power off and disconnect the IEC cable from the 110V AC power source.
2. Connect the supplied DB25 male to female straight through cable to the back panel of the drivers. With your COMPUTER OFF connect the other end to the DB25 matching connector on your PC.
3. Reconnect the IEC power cable to a 110-120VAC 60HZ power source using a grounded receptacle.
6. DO NOT TURN THE POWER ON AT THIS TIME. BUT SET THE CONTROL PANEL SWITCHES.
Set the power Switch to OFF (Press on bottom side of Lighted Rocker switch)
Set the Motor Engage switch to OFF

COMPUTER REQUIREMENTS:
Windows XP / 2000 or higher
Pentium 400 Mhz or faster)
256 MB Memory
3.25 floppy drive.
CDROM
Hard drive
SVGA monitor and video card. With 600X800

COMPUTER SOFTWARE INSTALLATION
Leave the Programmable controller OFF for now.

MACH3 CNC

Must Have an XP/ Windows 2000 Operating system.

Download Mach3 from www.artofcnc.ca
Load the software by clicking on the setup*.exe program. It will guide you through the installation.**
After the program is installed, you may purchase the full license and copy the Mach3 Lic.dat file to the Mach3 directory
You may contact Shopmaster at shoptask@shoptask.com for detailed instructions for the installation of mach 3, mach 3 manuals and pre-configured XML files to save time in your Mach 3 setup.