4 axis 4AUPC Rev2 Chopper Driver Board Kit

Thank you for purchasing our 4 axis 4AUPC kit. The following information and the step-by-step instructions will assure complete success and satisfaction. Please read through the following before beginning any construction to get familiarized with the process. NOTE: Machinery driven with this device can and will start without warning and may cause injury or even death. The builder of this device assumes sole responsibility for its use! IF YOU DO NOT AGREE WITH THIS RETURN THE KIT FOR FULL REFUND, LESS SHIPPING AND HANDLING FEE, BEFORE STARTING ASSEMBLY.

Specifications:
4 Axis Unipolar Chopper control. Individual OR simultaneous control of 2/4 Phase Stepper Motors.
Accepts 5, 6, or 8 wire stepper motors. 4 wire types are not usable.
42 VDC maximum input voltage, 12VDC minimum input voltage
3.0 Amps Maximum per Phase, 500ma (.5A) minimum. Individually adjustable throughout this range.
1/2,1/4, 1/8, and 1/16 Microstepping
Step and Direction Control.
Power On Reset.
On board voltage regulation for 5-volt logic with 24VDC cooling fan from motor power supply.
On board connections for home and limit switches with 10K pullup resistor provided to each.
Minimum of components to make assembly fast and easy.

Tools Required For Assembly:
15-25 Watt soldering pencil
1/32" Rosin core solder
Side cutters
Pliers
Voltmeter

Construction Step by Step:
1. Insert the (4) 8.66K (R1,R2,R3,R4 Gray Blue Blue Red Brown) resistors. Simply bend the leads over to fit the PCB holes and solder in. Trim the leads.

2. (4) 178R resistors (R5,R6,R7,R8 Brown Violet Gray Black Brown) are next. Trim the leads.

3. (2) 249R resistors (R9,R10 Red Yellow White Black Brown) are now installed. Trim the leads.

4. Install (1) 6.49K (R11 Blue Yellow White Brown Brown) resistor. Trim the leads.

5. Install (1) 750R (R12 Violet Green Black Black Brown) resistor. Trim the leads.

6. Install (7) .1uF (C1,C2,C3,C4,C5,C6,C7) Capacitors. These have NO orientation. Trim the leads.

7. Install (8) .2R 3W Current Sense resistors (RS1,RS2,RS3,RS4,RS5,RS6,RS7,RS8). No orientation is required. Trim the leads.

8. Solder in (5) 10K Resistor Networks (RN1,RN2,RN3,RN4,RN5). **Orient** the dot with the PCB silkscreened dot. Trim the leads.

9. (4) Capacitors 10uF (C8,C9,C10,C11) solder in now. **Orient** the longest lead into the hole marked "+". The body has "-" marked on it to help identify the proper orientation. Trim the leads.

10. Install (4) Potentiometers (VR1,VR2,VR3,VR4) now. Trim the leads.

11. Solder the 2 X 3 (J1,J2,J3) Header Pins in now. (Installing the Jumper/Shunts onto the pins makes holding them in place easier!)   Refer to the PCB Connections drawing for proper orientation.

12. Solder P1 DB25 Male connector in now. Take your time as many pins are close together.

13. The 6 Position Terminal Blocks (TB1,TB2,TB3,TB4,TB5) solder in now. **Orient** the holes for the wires facing "out".

14. Install the 2 Position Terminal Blocks (TB6,TB7) next. **Orient** the holes facing "out".

15. The LM317HV (U7), **NOT the LM317**, is next to be soldered in place. **Orient** the tab towards C13. The PCB silkscreen shows this as a wide white band. Trim the leads.

16. The LM317 (U5) goes in now. **Orient** the tab towards R9. The PCB silkscreen shows this as a wide white band. Trim the leads.

17. The 7824 (U6) goes in now. **Orient** the tab towards C6. The PCB silkscreen shows this as a wide white band. Trim the leads.

18. Install (2) 680uF Capacitors (C12,C13) now. **Orient** the long lead into the hole marked "+". Again the body is marked with "-" to help with orientation. Trim the leads.

This completes the basic construction. DO NOT INSTALL U1,U2,U3,and U4 UNTIL THE FOLLOWING TEST IS MADE! To make sure no errors were made, apply at least 12VDC BUT less than 42VDC to TB6 labeled + and -. With a voltmeter verify that +5.0VDC to 5.2VDC is present at the pad labeled +5VDC. The black test lead touches the "-" on TB6. If not, review all the above steps and correct them. Failure to insure that +5.0VDC-+5.2VDC is present will BLOW the driver chips! (U5, R9, and R12 control the +5VDC voltage.)

19. Install (4) 21 pin Driver Chips (U1,U2,U3,U4) only after the above test is successful. They can only go one way. Trim the leads.

20. Clean the PCB with alcohol or a flux remover and inspect all solder connections with a MAGNYFING glass to assure against any solder bridges. These will cause ALMOST ALL failures!

Interfacing With the Printer Port
This section explains the connections the driver board makes to your computers parallel port. This is where the printer plugs into. The pinouts cannot be changed. These are as follows:

Pin	Function
2	X direction
3	X step
4	Y direction
5	Y step
6	Z direction
7	Z step
8	A direction
9	A step

10,11,12,13,15 are pulled up with a 10K resistor and are used for home/limit functions. Consult your software as to the type of switches needed.
14,16,17 are not pulled up and are available as needed.
18-25 Ground

Refer to your software for your specific requirements.

Be sure to use a DB25M to DB25F ALL lines wired straight thru parallel port cable.

Current Adjustment MOST IMPORTANT!
The stepper motor current **MUST be adjusted before connecting any steppers** to the driver board. Each axis can be adjusted to a different value. Current MUST be 500ma up to 3A per coil. With power applied

to TB6 (12VDC min, 42VDC max) use a voltmeter with the black lead connected to TB6 terminal "minus" and the red lead touching the axis pad to the left of VR1, VR2, VR3, VR4. Clockwise movement increases the voltage, counter clockwise decreases the voltage. The following voltage MUST be set to achieve the correct amperage:

500ma = .103VDC
1A= .18VDC
1.5A= .27VDC
2A= .36VDC
2.5A= .45VDC
3A= .54VDC

For any amperage not shown use the following formula: desired amps times .18 equals Vref. Below .103VDC will disable the driver chip output. Keep Vref above .103V!

Stepper Motor Hookup

This driver board will accept 5, 6 and 8 wire stepper motors rated at 500ma to 3A per coil. Over 2A per coil we recommend a heat sink and fan cooling. (4) wire BIPLOAR motors are not usable! The PCB silkscreen identifies which coil connects where. The coil commons connect to the 2 positions labeled "COM". Leads from "A" and "a" coil connect to positions labeled so. Likewise for "B" and "b". Simply reverse "A" for "a" and "a" for "A" connections to reverse the stepper motor direction. Most software allows for direction reversing. "Ballast" resistors are NOT required. Stepper motor leads should be kept as short as possible. 22ga stranded cabling will be fine for most applications.

Microstepping

The driver board allows (4) different modes of driving your stepper motors. These can be set differently between each axis if desired. As a side note, 1/8 and 1/16 stepping MAY require quite a lot of computer process power! The Microstepping is set as follows:

1/2 step=J2 OFF J3 OFF
1/4 step=J2 ON J3 OFF
1/8 step= J2 OFF J3 ON
1/16 step= J2 ON J3 ON

For reference, the driver chip steps best with a "low to high" transition signal.

Synchronous and Asynchronous Mode

Jumper J1 controls this function. **Synchronous function is recommended for use with 1/2 step mode only**. REMOVE J1 jumper for Synchronous mode. INSTALL J1 jumper for all other operating modes.

Stepper Power Supply

The stepper power supply MUST be capable of providing 60% of the TOTAL current draw of the steppers. A 2.5A stepper will draw 5 Amps! For example: 4 steppers rated at 2.5A will draw a total of 20Amps. Adequate fusing must be used on both the AC and DC side.

CAUTON: NEVER connect or disconnect the stepper motors with power applied. This will blow the IC's! **Wait a few minutes for the capacitors to completely discharge before removing any stepper wires.** Best to measure for ZERO voltage at TB6. Steppers will get warm. Also the chopper frequency can be heard in the steppers. This is normal.

We welcome your comments and suggestions. **All** customer support is handled thru our Yahoo support group named "hobbycnc". A link is on our homepage. Please join and share the experience!

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