

## 4th axis 4AUPC Upgrade Kit

Thank you for purchasing our 4th axis 4AUPC upgrade 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.

		4th Axis 4AUPC Upgrade Kit
Quantity	Reference	Part
1	C4	.1uF 50v Capacitor
1	C10 OR C11	10uF 50V Electrolytic Capacitor
1	R4	8.66K 1/4 W 1% (Gray Blue Blue Red Brown)
1	R8	178 1/4 W 1% (Brown Violet Gray Black Brown)
2	RS7,RS8	.2R 3 W 1% Current Sense Resistor
1	RN4	10K 6 Pin SIP Resistor Network
1	VR4	1K 1/2 W Potentiometer
1	U4	21 Pin Driver Chip
1	TB4	6 Position Terminal Block
1	J1,J2,J3	2 X 3 Pin Header
3	J1,J2,J3	Jumper Shunts
1		Step by Step Instructions
1		Kit Contents List

### Tools Required For Assembly:

15-25 Watt soldering pencil  
 1/32" Rosin core solder  
 Side cutters  
 Pliers

### Construction Step by Step:

1. Insert the 8.66K (R4 Gray Blue Blue Red Brown) resistor. Simply bend the leads over to fit the PCB holes and solder in. Trim the leads.
2. The 178R resistor (R8 Brown Violet Gray Black Brown) is next. Trim the leads.
3. Install .1uF (C4) Capacitor. It have NO orientation. Trim the leads.
4. Install (2) .2R 3W Current Sense resistors (RS7,RS8). No orientation is required. Trim the leads.
5. Solder in (1) 10K Resistor Networks (RN4). **Orient** the dot with the PCB silkscreened dot. Trim the leads.
6. The capacitor 10uF (C10 OR C11) solders 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.
7. Install (1) Potentiometer (VR4) now. Trim the leads.
8. Solder the 2 X 3 (J1,J2,J3) Header Pin in now. (Installing the Jumper/Shunts onto the pins makes holding them in place easier!) Refer to the PCB Connections drawing for proper orientation.
9. The 6 Position Terminal Block (TB4) solders in now. **Orient** the holes for the wires facing "out".
10. Install (1) 21 pin Driver Chip (U4) now. It can only go one way. Trim the leads.

11. 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
8	A direction
9	A step

### 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 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 BIPOLAR 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.

### 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.

**CAUTION:** 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". Please join and share the experience!

Dave Rigotti  
Hobby CNC