

MaxStepper **Serial Step and Direction Pulse Generator**

Kit Instructions



Table of Contents

Helpful Hints	3
Parts List.....	3
PCB Construction	4
Serial Cable Construction	6
AC Adapter Preparation.....	7
Circuit Board Mounting Pattern.....	7

IMPORTANT: Read the instructions carefully before beginning construction.

Helpful Hints

- Check the parts list to verify that you have all parts **before** you begin assembly.
- Use an old towel under the printed circuit board (PCB) to protect your work surface.
- Use a wet sponge to keep your soldering pencil tip clean, and clean the solder pencil tip frequently.
- Use fine diameter solder like .032" 60/40 (part # 64-009 from Radio Shack).
- If you can, use No-Clean type solder. Consult the usage and cleaning directions for your solder.
- Use a fine tipped soldering pencil or soldering iron.
- When soldering, press the solder pencil tip against the pad and part lead, then slowly add solder.
- It should take only 1 to 2 seconds to solder the small pads. The larger terminal block and 7805 pads take a few seconds longer.
- Pay attention to how the parts are inserted. Some have leads that must be oriented in a specific way. These are indicated by *** in the step-by-step instructions.
- Use a small diagonal cutter for trimming the part leads.

Parts List

Qty	Description
1	Printed Circuit Board (PCB)
8	.1 uF Capacitors
1	10 uF Capacitor
10	5.1K OHM RES
1	Red 5 Volt LED
1	Green 5 Volt LED
1	MaxStepper MCU
1	RS232 Driver
1	40 MHz Oscillator
1	16 Pin Socket
1	40 Pin Socket
1	7805 5 Volt Regulator
1	2 Position Terminal Block
1	3 Position Terminal Block
3	6 Position Terminal Block
2	8 Position Terminal Block
4	.5 Inch Standoffs
4	4-40 Nuts
4	4-40 Screws
1	9 Pin D-Sub Connector
1	9 Pin D-Sub Hood
8	Feet of 22 gauge 3 conductor shielded cable
1	AC Adaptor (9 VDC 200 ma)

PCB Construction

1. Insert R1 and R2. Solder and trim leads. Both R1 and R2 are 5.1Kohm resistors. See figure 1.
2. Insert J1. Solder and trim leads. J1 is made from the extra wire left when you trimmed R1 or R2. See figure 1.
3. *** Insert the 40 pin socket and the 16 pin socket. Check for proper orientation, and then solder. No trimming is necessary for these parts. The notch should match-up with the silk screen markings.
4. ***Bend the 7805 leads 90 degrees towards the back of part (away from lettering on part face). Insert and solder. Trim leads.
5. Insert the .1uF capacitors (8). Solder and trim leads. See figure 1.
6. ***Insert the RED LED into the RX LED slot, and insert the GREEN LED into the TX LED slot. Solder and trim leads. The short leads are negative, and should go into the holes with a square pad (closest to the edge of the board).
7. ***Insert the 10 uF capacitor. Solder and trim leads. The short lead is negative and should go into the hole with a square pad. See figure 1.
8. ***Insert the 40 MHz oscillator. Solder and trim leads. Be sure to orient the part so that the pointed corner is aligned with the silk screen markings.
9. ***Insert the 2 and 3 position terminal blocks. Solder. No trimming is necessary for these parts. Be sure to orient the terminal blocks so the wire openings face the closest edge of the PCB.
- 10.***Insert the 6 position terminal blocks (3). Solder. No trimming is necessary for these parts. Be sure to orient the terminal blocks so the wire openings face the closest edge of the PCB.
- 11.***Insert the 8 position terminal blocks (2). Solder. No trimming is necessary for these parts. Be sure to orient the terminal blocks so the wire openings face the **center** of the PCB.
12. Use a nylon brush to clean the solder side of the PCB, removing any solder droplets between pads. If you used a No-Clean solder, you do not have to remove the flux.

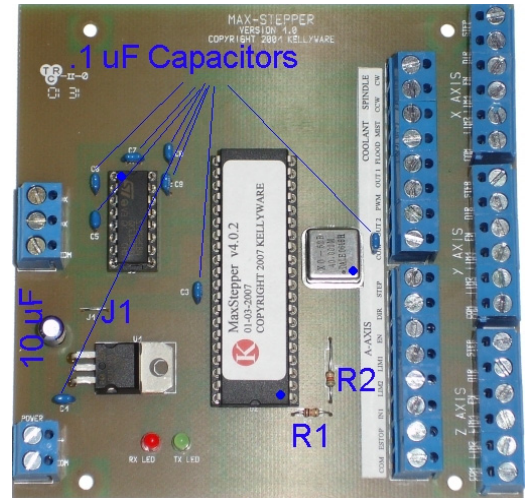


Figure 1

Optional Pull-up Resistors

Steps 13-17 add pull-up resistors to the PCB. Add these if you want to directly connect limit switches to MaxStepper without TTL logic drivers. If you choose not to add the pull-up resistors, you will need TTL logic drivers or limit switches with 0 and 5 volt dc outputs. For TTL only, skip to step 18. **If you are not sure if you need them, install them anyway.**

13. Prepare (8) 5.1 K ohm resistors by trimming one lead on each to 1/8 inch in length. This trimmed lead will be soldered to a pin on the 40 pin socket later.

14. Solder the short lead of the 1 resistor to Pin 33 of the 40 pin socket. **Be careful not to make a solder bridge with an adjacent pin.** See figure 2.

15. Solder the long lead of the resistor (in step 14) to Pin 11 of the 40 pin socket and trim lead. **Be careful not to make a solder bridge with an adjacent pin.** See figure 2.

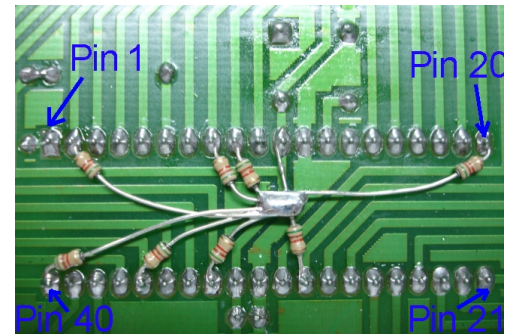


Figure 2

16. Solder the short lead of the 7 remaining resistors to Pins 2, 8, 9, 20, 29, 36 and 40 of the 40 pin socket. **Be careful not to make a solder bridge with an adjacent pin.** See figure 2.

17. Solder the long leads of the 7 remaining resistors to the long lead of Pin 11 resistor. Trim the excess leads. Make sure the resistor leads do not make contact with other pins or traces on the PCB. If they do make contact, a short circuit may occur. See figure 2.

If you opt not to install pull-up resistors, continue here:

18. Carefully bend the leads on the RS232 Driver IC and the MaxStepper MCU so they are at a 90 degree angle with their body. You can do this by holding the edges of the IC and pressing one row of pins against the table surface, pushing gently until the pins are at a 90 degree angle. Press the other side down in the same manner. This will ease the installation into the sockets.

19. Insert the RS232 Driver IC into the 16 pin socket. Make sure the notch in the IC lines up with the notch in the socket and silk screen.

20. Insert the MaxStepper MCU into the 40 pin socket. Make sure the notch in the IC lines up with the notch in the socket and silk screen.

Serial Cable Construction

1. Strip 1 inch of outer sheath from each end of the 3 conductor serial cable. **Be careful not to nick the inner insulators.**
2. At one end of the cable, strip 1/8 inch of insulation off of the black, red and white wires and tin the exposed copper using the soldering iron. Trim the shield drain wire completely off. Cover the end of the sheath with electrical tape. See figure 3.
3. ***Insert the white wire into the TX terminal block and tighten the holding screw. Insert the red wire into the RX terminal block and tighten the holding screw. Insert the black wire into the COM terminal block and tighten the holding screw.
4. At the other end, cut off 1/4 inch of the black, red and white wires, letting them extend 3/4 of an Inch from the sheath. Leave the shield drain wire 1 inch long.
5. ***Insert the white wire into the pin 2 solder cup of the 9 pin d-sub connector and solder. Insert the red wire into the pin 3 solder cup of the 9 pin d-sub connector and solder. Insert the black wire into the pin 5 solder cup of the 9 pin d-sub connector and solder. Solder the end of the shield drain wire to the metal case of the d-sub connector, just behind the metal screw plate. See figure 4.
6. Cut open and empty the d-sub hood plastic parts bag. Place the two cable clamp halves over the cable just before the sheath end. Insert and tighten the two small screws. See figure 5.
7. Place the two d-sub hood halves over the 9 pin d-sub connector. Insert the two shell screws and nuts. Set the nuts by turning the screws one revolution clock wise, but do not tighten completely.
8. Place the two square washers on the d-sub hood and insert the computer clamp bolts. Tighten the shell screws completely.

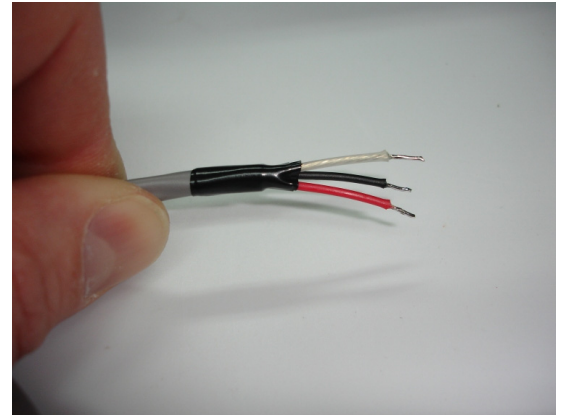


Figure 3

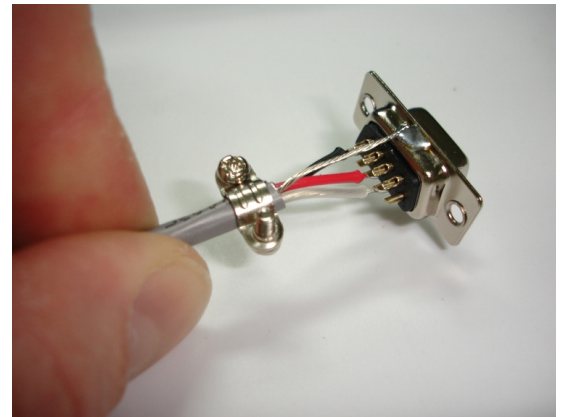


Figure 4

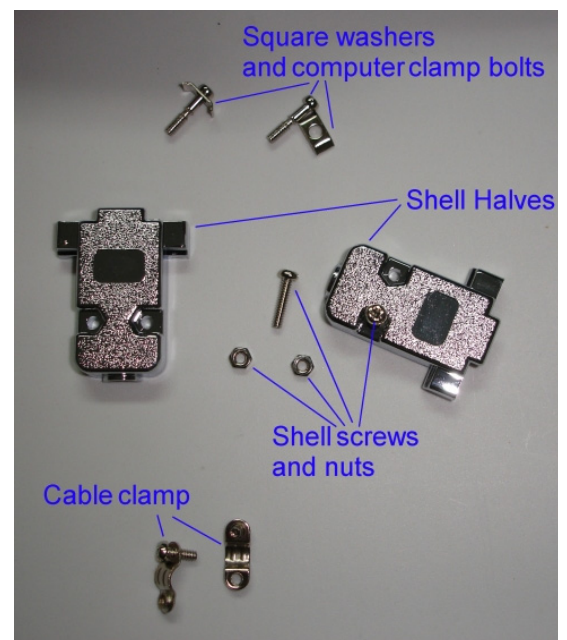


Figure 5

AC Adapter Preparation

1. Cut off and discard round barrel connector on end of AC Adaptor. Spit the wire ends, strip 1/8 inch of insulation off ends and tin the wire using soldering iron. See figure 6.
2. ***Insert the AC Adaptor's positive wire into the positive (+) terminal of the two position power terminal block. The positive wire is denoted by a white stripe. Insert the AC Adaptor's negative wire into the common (COM) terminal of the power terminal block.
3. Before applying power to the AC Adaptor, double check the orientation of the Serial Driver IC, the MaxStepper MCU, and the AC adapter wire polarity on power terminal block. Failure to do so may destroy components.
4. Apply power and connect to PC. The red and green LED's should remain off until KCam is running and configured to communicate with MaxStepper.



Figure 6

See *MaxStepper User Manual* for further instructions and information.

Circuit Board Mounting Pattern

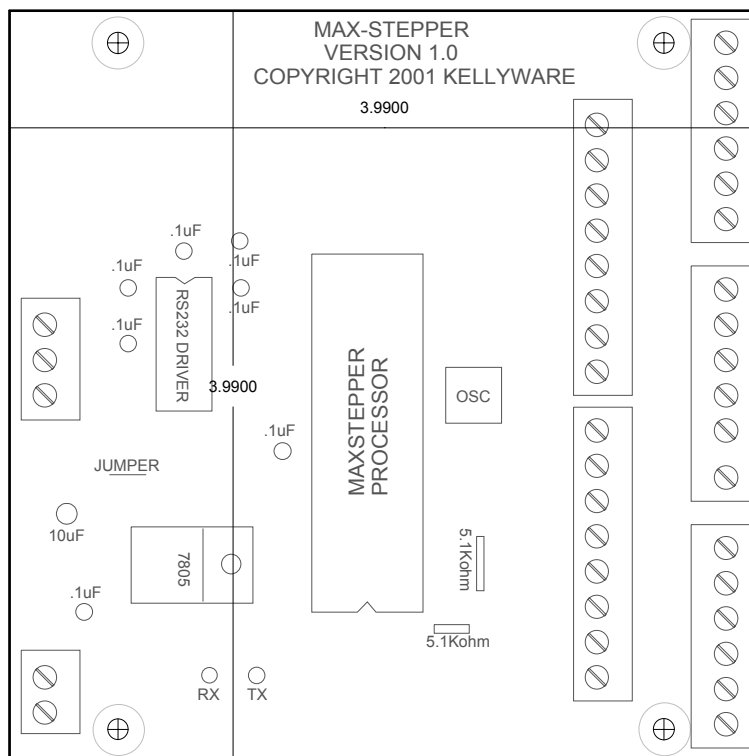


Figure 7