

CMOS SUPER KEYER III - Construction Notes

PC Board

The kit provides all of the components needed to populate the printed-circuit board. The order of assembly isn't crucial. However, the following is suggested: (1) Install and solder the 40-pin socket for U1 and 8-pin socket for U2 oriented as shown in the parts placement diagram (2) Install and solder the ceramic resonator Y1. Its symmetrical inside, so orientation doesn't matter (3) Install and solder all bypass capacitors C1-C9 and C11, and speed-timing capacitor C10. Again, orientation doesn't matter. All capacitors have the same value, but the timing capacitor C10 and has a different appearance and tighter tolerance. Before you install the capacitors, measure their resistance with your VOM to make sure none is shorted. (4) Install and solder all resistors R1-R15. Since they are not all the same, make sure the correct value goes in each spot. If you're not sure of the color code, use your VOM to measure the value. (5) Install and solder transistors Q1 and Q2. Make sure they're oriented properly with the "flat" towards U1. Do not install U1 or U2 yet - that's the very last step.

Next, prepare 13 insulated stranded (never solid!) wires, each a foot or so long, by stripping and tinning one end. Install and solder each wire to the PC board in the holes labeled 5V, GND, SPK, SPEED, DASH, DOT, MES1-MES6 and KEY. There are several possible locations for the GND wire, so pick the one that's most convenient for your assembly. Using wires of different colors will help to avoid confusion during final assembly.

Now is the time to carefully examine your work! Recheck that all resistors are in their proper place, and that U2, Q1, and Q2 are correctly oriented. Visually inspect all solder joints for good flow and lack of blobs or whiskers. Good light and a magnifier will come in handy. Shorts are most likely to occur in the areas between pins 8-9 and 10-18 of the socket for U1. Get out your VOM and make some resistance measurements. You should find the following:

From U1-7 to:		From U1-4 to:								
U1-8	U1-9	U1-10	U1-11	U1-12	U1-13	U1-14	U1-15	U1-16	U1-17	U1-18
open	open	15K	15K	15K	15K	15K	15K	15K	15K	open

If 0 Ohms is measured, a short has crept in that must be removed using a sharp blade,

Keyer Unit

The keyer unit comprises the completed PC board along with a chassis, power source of about +5V, connectors, switches, and potentiometer of your liking. Choose momentary push-button switches that are normally open and that have a good action and feel. After installing all chassis-mount components, complete the wiring of the grounds to the speaker, connectors, switches, and center terminal of the potentiometer. Then mount the PC board on two sturdy standoffs.

Cut each pendant wire to length and solder to its proper destination (check twice, cut and solder once!). The SPK wire goes to one side of the speaker, GND to the common chassis ground, 5V to the positive side of the power source, DASH and DOT to the paddle input connector, MES1-MES6 to the six message switches, KEY to the output jack, and SPEED to the potentiometer. Make sure the message wires go to the switches in the correct order. When wiring to the pot, choose the terminal that provides increasing resistance with clockwise rotation. And be sure to leave a 'service loop' in the wires so that emergency access to the back of the PC board is possible.

Find your VOM again. Measure the resistance from pin 9 of the socket for U1 to ground. it should vary from 1K to 101K as the speed pot is rotated. Now apply power to the unit (remember, the sockets are still empty!) and take some voltage measurements with respect to ground. The table following shows the measurements you should take and what you should find. The symbol +V stands for whatever your supply voltage is and should be in the range from +3.5 to +5.5. Several pins will should have no voltage present and, depending on your type of VOM, may measure as 0.

U1 pin	Voltage	U1 pin	Voltage	U1 pin	Voltage	U1 pin	Voltage	U2 pin	Voltage
1	+V	11	+V	21	none	31	0	1	0
2	+V	12	+V	22	none	32	0	2	0
3	+V	13	+V	23	none	33	0	3	0
4	+V	14	+V	24	none	34	0	4	0
5	none	15	+V	25	none	35	none	5	none
6	none	16	+V	26	none	36	0	6	none
7	none	17	+V	27	none	37	0	7	0
8	none	18	none	28	none	38	none	8	none
9	0	19	none	29	0	39	none		
10	+V	20	0	30	0	40	+V		

Plug in your paddles. Closing the dash paddle should cause pin 10 of the U1 socket to go to 0 Volts. Similarly, closing the dot paddle will cause pin 11 to be 0 Volts. Closing message switches 1 through 6 will cause pins 12 through 17, respectively, to measure 0 Volts. If any of the foregoing measurements doesn't checkout, you've got a wiring problem somewhere that you'll have to find and repair.

Install U1 and U2

When you're satisfied that all is well, first (1) remove power, and (2) install U1 and U2 properly oriented in their sockets, taking care not to mangle any of the pins. Close visual examination should reveal if any pin has folded under. Apply power and listen for the keyer to spring to life by sending OK. Then get on the air and enjoy!

Modification for Negative Keying

As noted in Operating Manual, the output transistor Q2 will only key positive voltages. If you have an older rig with tube finals, it is likely that a negative voltage is present on the key line, requiring a level-converter to be added. Such a circuit is shown below (from QST, June 1991, page 45). As a safety factor, the transistor and bypass capacitor should handle a voltage at least twice that measured on your the rig's key line. Suitable high-voltage PNP transistors include the MPS-A92 (300V, 50 mA) and 2N5415 (200V, 50 mA).

