THE QRP TLC-KEYER

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Preparing for a QRP DXpedition usually means packing to travel light. Unfortunately, adding even a few basic accessories can overload the radio bag in a hurry. Take electronic keyers, for example. Mine is larger than my QRP transceiver, and loaded with features I rarely use. To make life on the road less awkward, I decided to build a miniature keyer — one designed specifically for portable use. Not wanting to spend a lot of money, I settled on a single-paddle type employing inexpensive ICs available from Radio Shack.

The circuit

The design I chose is a popular one using NE555 timers.[1] The circuit performed well on the breadboard, but required over 20 mA at 9 volts to operate. This was too much current for sustained operation with a small 9-volt battery. To solve this problem, I substituted TLC555s — a CMOS direct replacement for the NE555 (hence the name TLC-Keyer). This change reduced continuous current drain to a scant 1.4 mA, making battery operation practical and allowing me to include a reed relay output circuit. I prefer using reed switching because it interfaces with virtually any rig.

The circuit consists of three simple timer stages. U1 generates the space interval between characters, while U2 and U3 generate dot and dash outputs, respectively. A 10-k linear pot varies sending speed by raising or lowering the timing interval of all three chips simultaneously. Spacing and character timing may be altered by substituting new values for the 33 and 82-k series resistors in this portion of the circuit. For example, changing the 82-k resistor to 100 k results in longer dashes.

A 2N2222 DC switch actuates relay K1 whenever the output of U2 or U3 goes high. For self-powered operation from a 9-volt battery, a 470-ohm current limiting resistor is connected in series with the 5-volt relay coil. For 12-volt operation, use 1.2 k or install a jumper and a 12-volt relay.

Construction

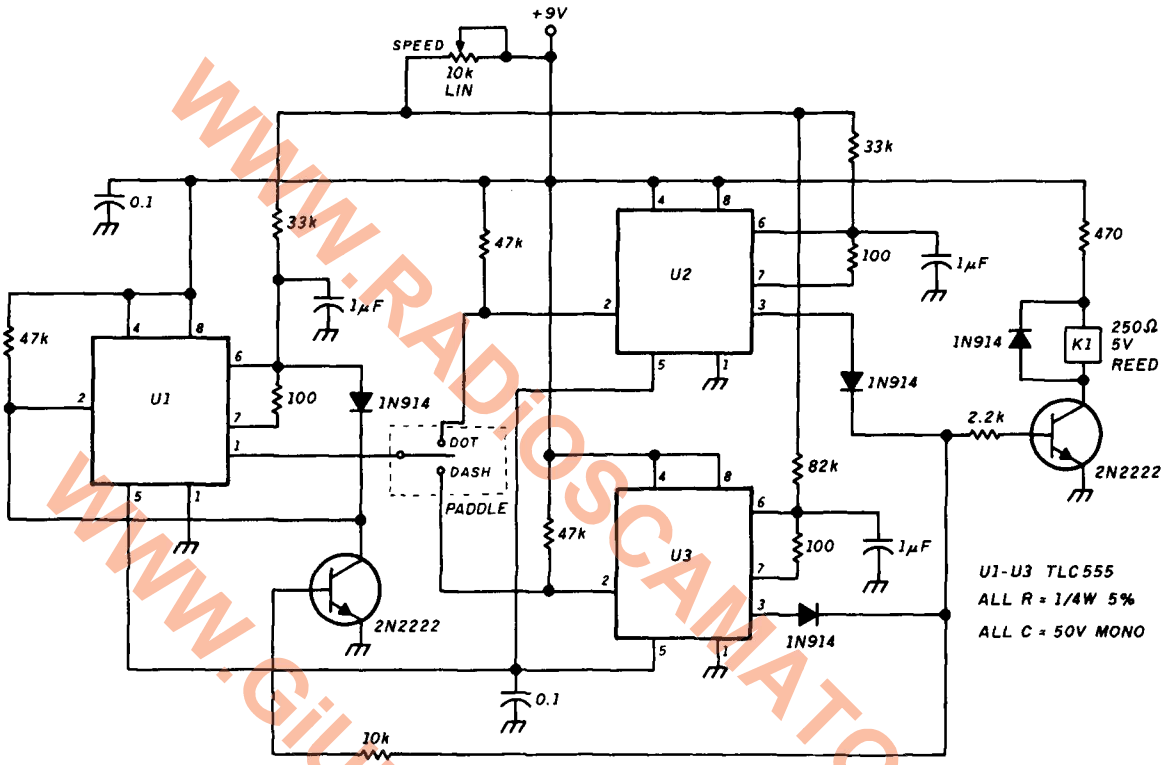
Board construction is straightforward — simply follow the parts placement diagram shown in **Figures 1A** through **1C**. Remember to observe CMOS handling precautions when installing the TLC555s. Also, install jumpers and interconnecting leads.

Details for constructing and mounting the paddle assembly are shown in **Figure 2**. I fabricated the paddle arm from scrap G-10 board (all copper removed). The key contact is a 1/4-inch no. 4-40 screw and no. 4 nut. I filed the screw tip flush with the nut, and polished it to make a better contact surface. Lexan™ or Styrene™ sheet stock makes a good paddle, and is readily tapped to accept no. 2-56 or no. 4-40 mounting screws. Standard 3/8-inch no. 6 spacers and 90-degree L brackets support the paddle assembly above the pc board components. Two 3/4-inch no. 4 spacers serve as dot and dash contacts. Contacts should be roughly aligned and screws tightened before the pc board is installed in a cabinet or on a base.

Final packaging depends on how you intend to power the keyer. One option is to mount the board, paddle, and battery in a small project box. This lets you operate on internal power and use the keyer with any rig. The second option is to borrow power from your transceiver — replacing the key jack with a stereo jack, and using the tip connection to supply 12 volts. Obviously, eliminating the battery will reduce the size and weight of the keyer package.

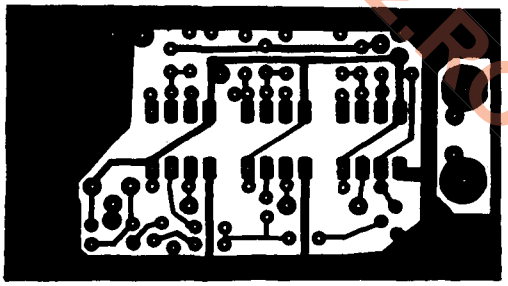
I don't recommend mounting the keyer electronics inside your rig. For one thing, the "common" key line of this circuit is the output of U1, and this must remain isolated from ground. Also, the pc board fits neatly on the keyer base without contributing to its size. No real space saving is gained from putting it inside the radio. Whether you package the keyer in a project box or on a weighted base plate, cement a rubber pad to the bottom. This will reduce skidding on smooth surfaces.

FIGURE 1A



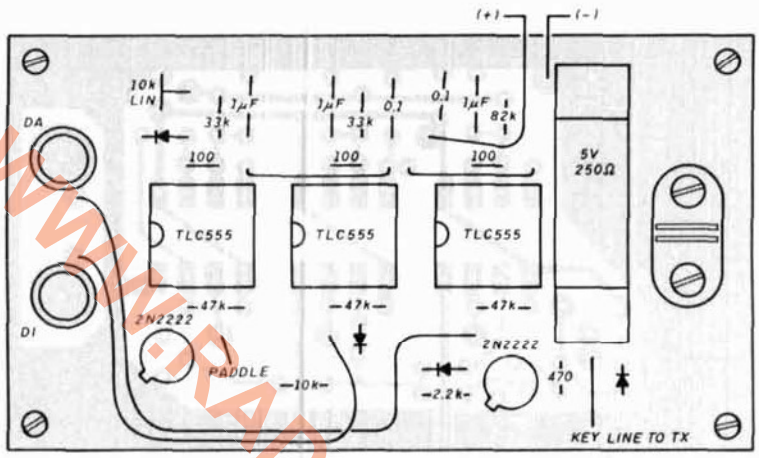
The circuit schematic.

FIGURE 1B



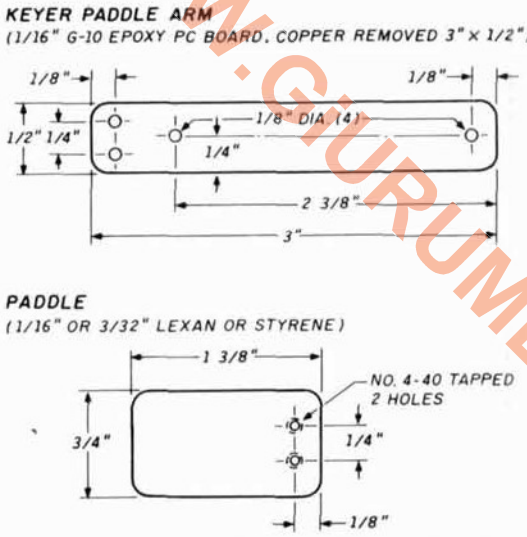
The foil side of the pc board.

FIGURE 1C



The component placement guide.

FIGURE 2



The paddle assembly.

PARTS LIST

Capacitors

2	0.1 μF Mono
3	1 μF Mono or equivalent

Resistors

3	100
1	2.2 k
1	10 k
2	33 k
3	47 k
1	82 k
1	10-k linear pot

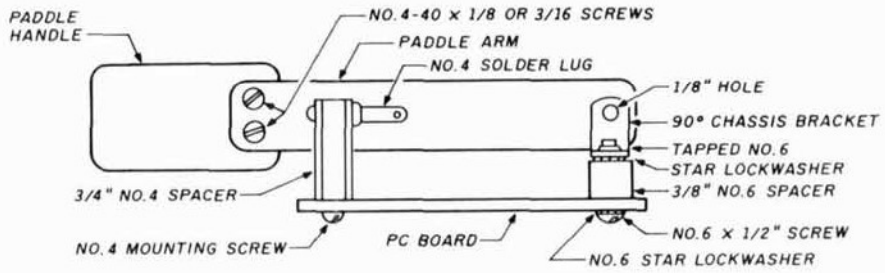
Semiconductors

3	TLC555
2	2N2222
4	1N914

Miscellaneous

1 pc board (Available from Far Circuits, 18N640 Field Court, Dundee, IL 60118, for $4.00. Price includes shipping and handling.)

FIGURE 3



Dimensions of the completed paddle assembly.

Operation

Keyer setup is purely mechanical. To make fine centering adjustments on the arm, place the tip of a flat-blade screwdriver between the two support spacers and torque the arm gently in the desired direction. When you've completed this operation, you may want to readjust the dot/dash posts for the desired contact spacing. Finally, connect the keyer output to an oscillator or rig, set the speed control midway, and start sending. If the keyer fails to operate, confirm that you have power and that diodes, chips, and transistors are positioned correctly.

Conclusion

The finished key, shown in **Figure 3**, measures 2.6 by 1.5 by 1.5 inches, and weighs only a few ounces. This represents a vast improvement in portability over my old one! The keyer works well — with one minor reservation. I had used the Curtis 8044s for years, and the TLC's unbuffered input threw me on my first sending attempts. With no buffer, the keyer can't accept a dot while a dash is completing. Consequently, I rapped out a few "CO DE M1BOTs" before I brought my thumb under control. However, I adapted quickly and can now switch from one keyer to the other without difficulty.

The TLC-keyer is now a permanent part of my QRP station, and I travel several pounds lighter for my effort. If you face a similar dilemma at packing time, give it a try. The price is right, and so is the size! hr

REFERENCES

1. Wes Hayward, W7ZOI, and Doug DeMaw, W1FB, *Solid State Design For The Radio Amateur*, ARRL, 1985, pages 177-178.