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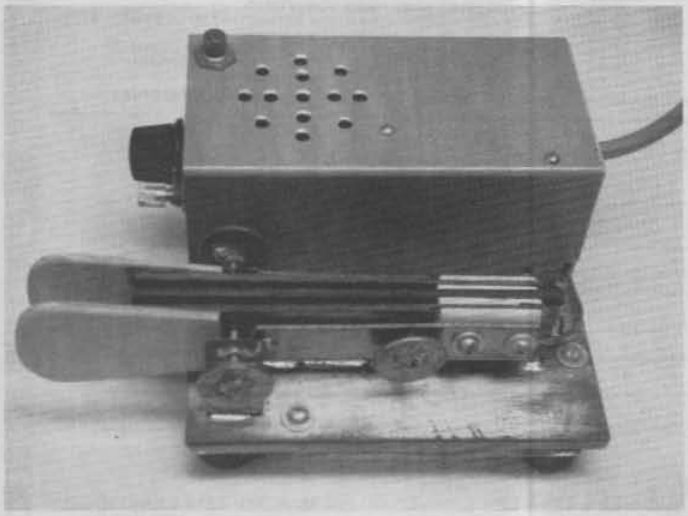
The MINI-MOUSE Key

— perfect companion to the MINI-MOS keyer

WA6EGY reveals the secret ingredients of his funny-looking key.

When my article on the MINI-MOS keyer appeared in the August, 1976, issue of *73*, many readers were puzzled by the funny-looking dual-paddle key that was shown in the photos together with the keyer. Several wrote me and inquired about the key which they thought was "built up from scraps of PC board." So, forthwith, I will reveal the secret ingredients of this mystery key, which, because of its mouse-grey, ear-shaped plastic paddles, may be referred to as the MINI-MOUSE key.

A straight key is actually nothing more than a contact that makes and breaks a keying circuit. If need arises, any contact can be pressed into service for this purpose. Some readers might remember that dramatic scene in the movie classic "Union Pacific" where the hero (was it John Wayne?) taps out the life-saving code message by hitting his gun barrel against the downed telegraph wire. To build a reliable, easy-to-use dual-paddle key, however, is another story. The necessary low-friction bearings, lockable stops, and tension springs normally make the construction of such a key a project beyond the capabilities of the average ham. While several good dual-paddle keys are available from manufacturers advertising in *73*, none were small enough to be used with the MINI-MOS keyer. For this reason, a matching key was designed. In the design, great care was exercised to use only materials and tools that are readily available to the average ham. A close-up of the key is shown in the photo.



Close-up view of the MINI-MOUSE key mounted with the MINI-MOS keyer on a common base plate.

The material used for the construction of the key was G-10 (fiberglass epoxy) circuit board, single-sided, with a measured thickness of .046 inches. This board, which was surplus material, is somewhat thinner and more flexible than the more common 1/16 inch PC board. One starts by cutting parts 1, 8, 6a, 6b, 4a (twice), and 4b (twice) from the board according to the dimensions shown in Fig. 1. By drilling and filing, or with a fine jigsaw, one then cuts the slot in parts 4a, leaving only about 1/16 of an inch of material at the edge. These sections will later act as a flexible "hinge" around which the paddles pivot and, thus, solve the problem of the bearings. Next, parts 4a-4b and 6a-6b are laminated

together (foil sides out) as indicated by the dotted lines in Fig. 2, using contact cement. As indicated in Figs. 1 and 2, the foil on both sides of part 6 is cut 1/4 of an inch from the edge by removing a narrow strip. This can be done with a router, cross-feed table on a drill press, bit of a high-speed hand tool, or even with the blade of a hacksaw. Then one corner of the part is notched according to the dimensions shown in Fig. 1.

Next, the position for hole "Y" on part 4b and holes "U", "V", and "X" on parts 4b and 8 are marked according to the dimensions shown in Fig. 1. Parts 2 (four each) and 3 (two each) are cut from any kind of suitable plastic of the correct thickness. Next, all parts (with the exception of parts 3) are stacked together in the sequence shown in the "explosion" drawing, Fig. 2. Parts 4 and 6 should line up at the front edge, with all other parts lining up with parts 4 at the rear with part 6 protruding by about 1/4 of an inch. The whole stack is tightly clamped together or, if no suitable clamps are available, it is wrapped tightly with wire or clear plastic adhesive tape. While making sure that the corners of the stack remain lined up, holes "U" and "V" are drilled using a No. 33 drill. After the first hole has been drilled, a 4-40 screw is inserted through the hole, which helps keep the stack from moving while the second hole is drilled. Then hole "Y" is drilled, which serves the purpose of lining up the contact rivets when they are soldered in place. The diameter of hole "Y" should be chosen to center the part of the contacts protruding on the side of the spring opposite the contact surface. Next, part 1 is removed from the stack of parts and, using the screws in holes "U" and "V" to keep everything lined up, hole "X" is drilled using a No. 42 drill. Then the stack is separated and hole "X" enlarged to a diameter of about 1/4 of an inch in parts 4 and 6; but not in part 8. The contacts, part 5, are soldered in place on parts 4 and 6, using the holes to line them up, and the same is done with nut 15 on part 8. Parts 3 are cemented to part 4, as shown in Fig. 2, again using contact cement. Make sure part 3 does not cover part 4 by more than 3/4 of an inch. Parts 4 will later be pulled out by "springs" 1 and 8 respectively, with the help of linkage 10. This linkage, a short piece of flexible stranded wire or copper braid, is soldered to part 4 in the appropriate location; the other end will be connected later. Then part 6 is soldered to the ground plate along its center line, making sure the two parts are positioned perpendicular to each other, with the notch of part 6 lined up with the edge of part 4.

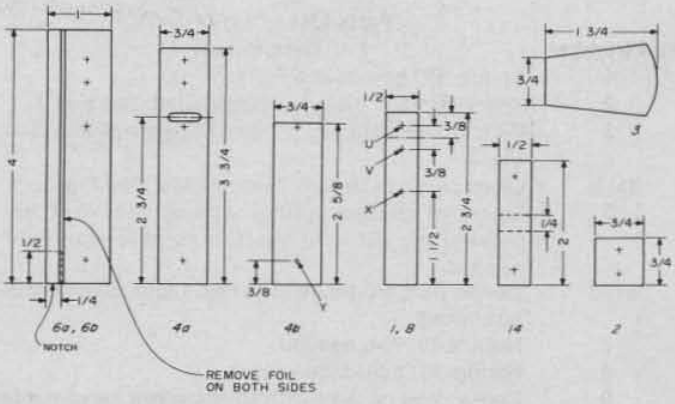


Fig. 1. Dimensions for most parts. For details of the materials to be used, see parts list.

Now, everything is ready for the final assembly. If one wants to protect the beauty of the MINI-MOUSE key permanently, however, one has to keep the copper foil on the PC board from tarnishing. First, the contacts and all places where one must solder during assembly will have to be masked with patches of masking tape. Then all parts are sprayed with several coats of a clear plastic lacquer. Before the final assembly, the setscrews 9 are prepared. Knurled discs of exactly the correct size in a handsome copper-nickel alloy are available from the U.S. Mint for the price of 10 cents each. To drill a hole through the center of the dime, however, and to solder the 2-56 screw in place, might be the most difficult task of the construction project.

Using a larger drill bit or a sharp knife, one removes the foil around holes "U" and "V" on both sides of part 6 and on parts 4a and 4b. This prevents the screws from shorting out the foil on the parts. These foil surfaces on part 6 will be connected to the dot and dash terminals of the keyer by lengths of wire which are soldered to the foil at the rear end of part 6. The negative supply voltage, −Vss, will be connected to the foil surfaces of parts 4a and 4b which face part 6. This arrangement has the effect that the foil surfaces of parts 4, which, for rf, shield the dot and dash contacts and, thus, reduce the effect of stray rf fields. The connection to the foil of parts 4 can be made by inserting a U-shaped strip of copper foil between parts 4 and 2, which connects both parts 4, and then soldering the −Vss connection to this foil.

All parts can now be stacked as shown in Fig. 2 and, after checking that the contacts line up properly, the compression nuts and screws can be tightened. The thumbscrew inserted through nut 15 should pass through

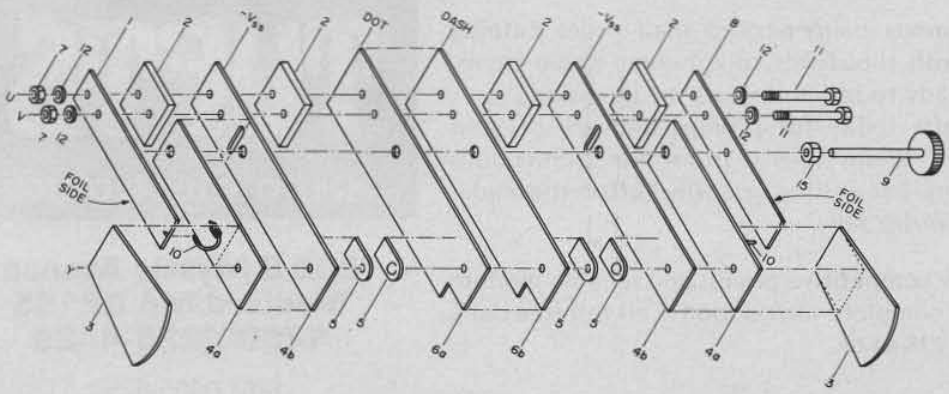


Fig. 2. This "explosion drawing" shows how the many parts fit together.

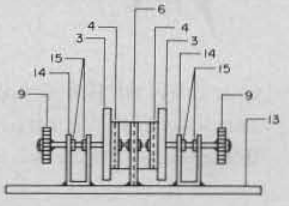


Fig. 3. Front view of the key.

Parts List

Part Number	Description
1	Spring, PC board. See Fig.1.
2	Spacers, 1/16" plastic. Four needed. See Fig. 1.
3	Paddle, 1/8" plastic or wood. Two needed. See Fig. 1.
4a, b	Lever parts, PC board. Two needed. See Fig. 1.
5	Pieces of contact springs with contact rivet, approximately 1/2" long, cut from surplus relay. Four needed.
6a, b	Center part, PC board. See Fig. 1 and assembly instructions.
7	Nuts, 4-40. Two needed.
8	Spring, PC board. See Fig. 1
9	Screw, 2-56 × 3/4" with thumbscrew head made from dime with hole drilled through center and soldered to screw. Three needed.
10	Stranded copper wire or fine braid. Two pieces about 3/4" long needed.
11	Screw 4-40 × 3/4". Two needed.
12	No. 4 washer. Four needed.
13	Base plate, PC board, 2" × 4".
14	Metal strip, brass or tinplate cut from can. See Figs. 1 and 3. Two needed.
15	Nut, 2-56. Five needed.

part 6 and both parts 4 without touching, and should contact only part 1. This screw is tightened slightly until parts 1 and 8 begin to spread. Then the linkages 10 are cut to length and soldered to parts 1 and 8.

Next, the brackets 14 (Fig. 3) for the stop-screws have to be prepared. They are bent according to the dotted lines in Fig. 1, and the locations for the holes are marked so that they line up with the centerline of part 6 when the brackets are soldered to the ground plate. The holes are drilled, and two No. 2 nuts are soldered to the inside of the brackets. With the thumbscrew inserted, the brackets are then soldered to the ground plate in such a way that the setscrews can touch parts 4 without rubbing against parts 3 and 1, or 8, respectively.

Fig. 3 shows the key as viewed from the paddles. This completes the assembly of the key. The ground plate is mounted to some suitable base, either alone or together with the keyer as shown in the photo. The contact clearance can be adjusted separately by the thumbscrews in the U-shaped brackets. If these screws tend to turn on their own, unscrew them from one of the nuts, spread the bracket slightly, and turn the screws back in against the force of the bracket, which acts as a brake. The stiffness of the paddles can be controlled with the screw that spreads parts 1 and 8.

One word of warning for operators who are used to Vibroplex-type semiautomatic keys: The MINI-MOUSE key works best with little contact clearance and minimal stiffness of the paddles, a characteristic it has in common with the FYO-key (now sold by HAL Communications Corporation). If the key is hit hard, as you would do with a Vibroplex key, you can get contact bounce and erroneous code elements. Once you are used to the different feel, however, you can operate the key with nothing more than a very slight finger movement, and you will find that the MINI-MOUSE key, together with the MINI-MOS keyer, greatly reduces operator fatigue and keying errors. ■

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