Big Little Paddles for a Big Little Rig

by
Richard Meiss, WB9LPU

The new Elecraft KX-1 is a little rig with big features, and its growing popularity is well deserved. In a very small box it incorporates (among other things) digital frequency generation and readout, an optional antenna tuner, audio readout of frequency and program menus, and an iambic keyer circuit. It also accepts a tiny iambic paddle that mounts to the front of the unit. This paddle does an adequate job in providing a compact and effective input device, but it does lack the feel of a larger set of paddles. I took this as an opportunity to design some alternative small paddles, and this article describes some of the design process and some of the results. The working name of the paddle(s) is the Kxer, although I am open to suggestions for improvements.

There were a number of criteria that the design had to meet. Among them were:

- It must be small, light, and easy to pack along with the rig.
- It must use only the existing mounting connections on the KX-1
- No modification of the KX-1 should be necessary.
- It should be adjustable to the user's taste - paddle travel, tension, etc.
- It should have the feel of a bigger paddle - crisp action, definite stops at the end of the travel, and no "drag" while the paddle is moving.
- It should also be usable as a "stand-alone" paddle with a conventional cable connection to the rig.
- Construction should be as simple as possible as long as the other goals were met.

I decided to start with an iambic version at first, because that design is the easiest to work out. A single-lever version could come later. The first design problem was how to attach the paddle to the rig. The KXPD1 Elecraft paddle kit uses an offset design, which permits a captive screw to secure it to the rig via a PEM nut that is permanently mounted to the case of the rig. A standard stereo phone plug makes the electrical connections through a socket just below the PEM nut. The Elecraft arrangement allows the paddle to be set up for right- or left-hand use. For mechanical simplicity of the paddle design, I opted for a centered mounting position. This unfortunately ruled out the simple and direct mounting method used by Elecraft, since the paddle mechanism would get in the way of the mounting screw. The drawing below shows one of the solutions to the problem that has been worked out, and the various pictures in the article show other variations. I have finally settled on a simpler approach, which does away with the mounting angle bracket. This is used on the single paddle at the end of the article.

The paddle itself is the iambic type, with the tension provided by opposed magnets mounted on the inside of the paddle arms. The earlier versions used 2-56 screws as pivots for the paddle arms - not very elegant, but it worked pretty well. I have now switched to using 3/16" brass ball-bearings as pivots; the action is very smooth, with little lost motion. The knurled screws on either side set the paddle travel distance, and they are treated with a little bit of Loctite so that they hold their settings. A brass strip runs down the inside center of each paddle for electrical connections and to hold the magnets in place. Both the fixed and moving contacts are polished brass. The center member holds the stationary contacts and magnets. Thin stranded wires connect each paddle to the proper terminal on the stereo plug, which is mounted at the front of the paddle and held in place with a set screw.

For stand-alone use, the paddle fits on a little brass tripod-like base, as shown in some of the pictures. The base, which has three legs extending outward to provide stability, is drilled out to contain the legs for storage. This allows a wide footprint in use, which makes the paddle pretty stable, especially with the rubber feed at the ends of the legs. Connection to the rig is made with a stereo cable with a female end for the paddle and a male plug for the rig. Stand-alone operation is not as compact as with the paddle attached, but it gives a little more operating flexibility. Some bases with swing-out legs were also made, but the tripod base seems to work the best, since there is no tendency for the legs to loosen up while you are sending.

The single paddle version is still under development - there are about 5 designs on paper, some of them rejected before they were built because a better idea came along. The picture shows one version that works successfully. Though it sounds strange, it is harder to design a good single paddle than an iambic one. The problem is getting a positive center position with a definite "stop" - if it is not positive enough, the paddle will tend to overshoot and give a false output. This is especially true if you are using close spacing at high speeds. The design shown, which uses a spring-type movement that I call a "wobble-toggle", works well at up to about 25 words per minute, which is faster than I can copy anyhow. Another design is in the prototype stage - it can be either spring or magnetic, and it appears to be easier to make and a little less fussy.

While this is not a "how to" article, I would be glad to correspond with anyone who would like to adapt a paddle to the KX-1. I have made many false starts (the rejects are not shown in this article!), and perhaps I can offer some tips. At any rate, this has been a nice design and building challenge. It also makes using this super little rig even more fun. My hat is off to the folks at Elecraft for another winner.

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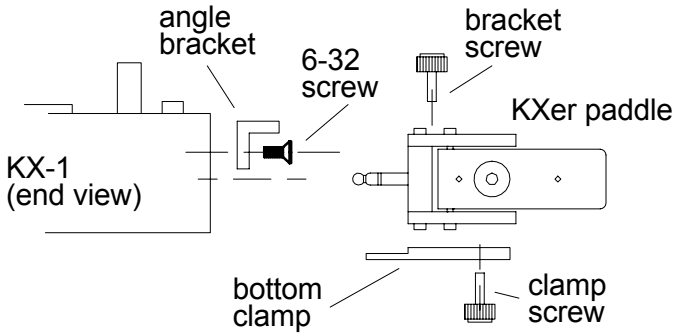
Here are some pictures of the Kxer paddle:



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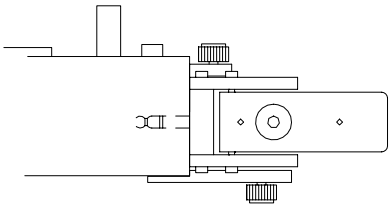
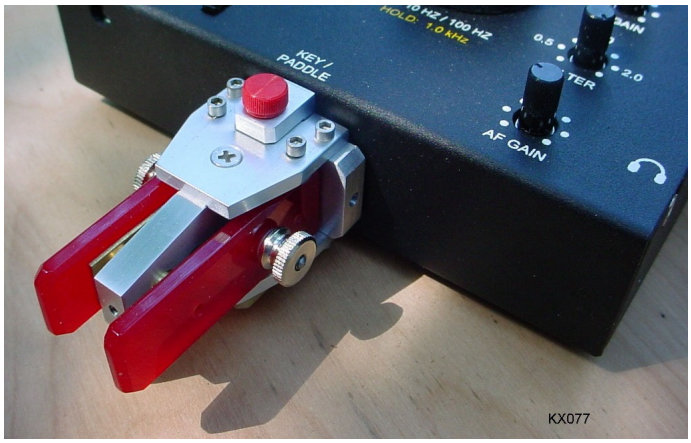
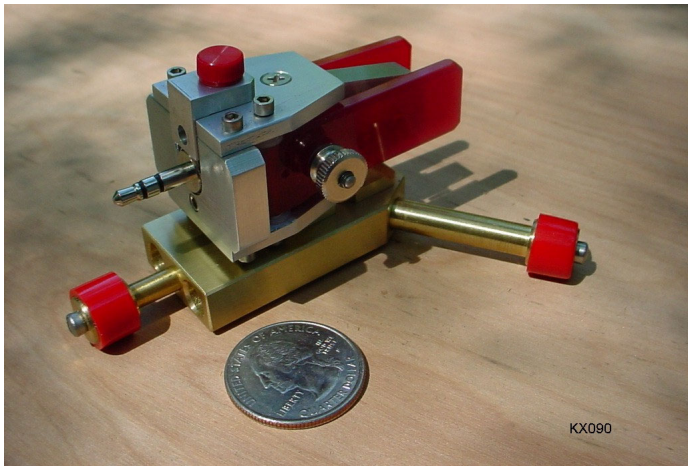


Paddle Attached to KX-1

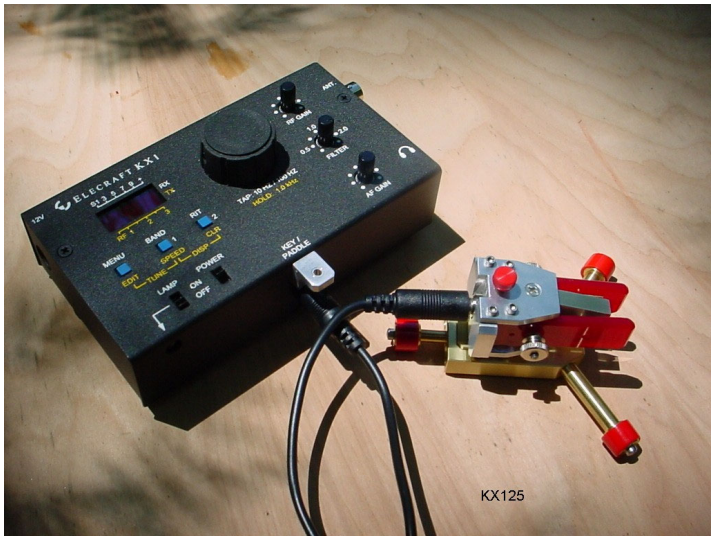
This drawing shows on method of mounting the paddle. The angle bracket is first mounted to the KX-1, then the paddle is plugged in and the bracket is secured to the paddle with the bracket screw. The bottom clamp holds the paddle securely and eliminates any movement while the paddle is in use.



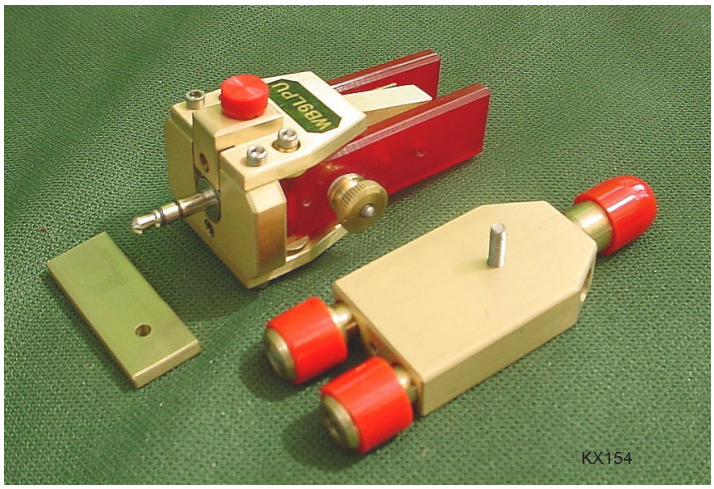
Here is the paddle mounted to the KX-1. The brass contact strip may be seen on the inside of the dot-paddle.



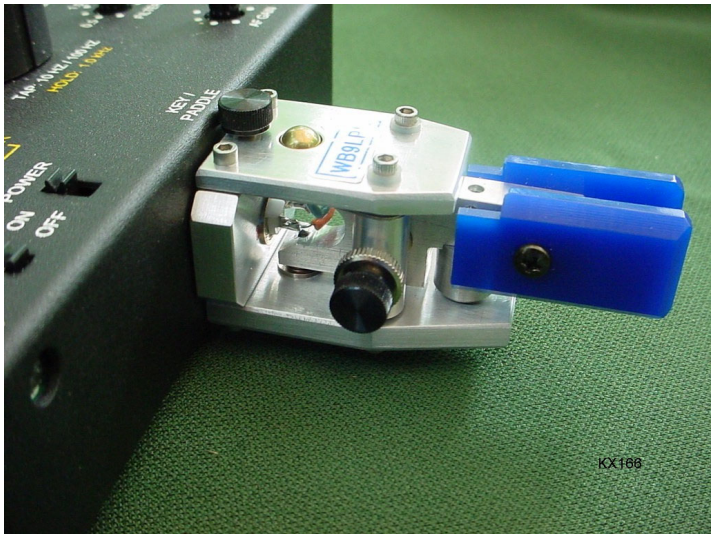
In its stand-alone mode, the tripod legs provide stability, and the brass base provides just enough weight so that the paddle doesn't move (with a moderately light touch). The paddle is raised slightly above the base by using the bottom clamp as a spacer.



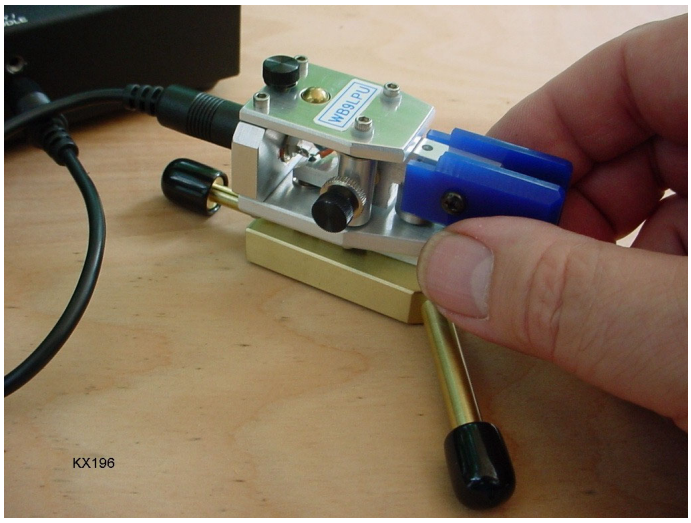
Here the paddle is connected to the rig with a stereo cable. This arrangement gives a little bit of flexibility to the operating position.



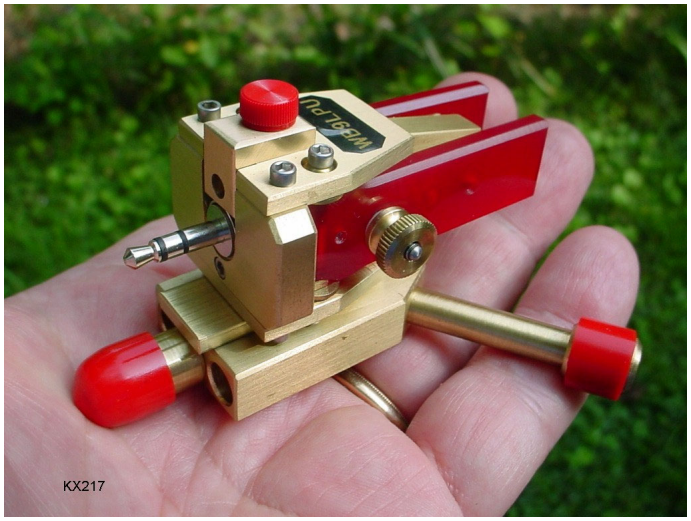
This is the paddle removed from the base. The legs have been stowed in the base, where they are held by internal threads.



The single paddle prototype mounted to the KX-1. This version uses a ball-bearing below the paddle arm and a single brass ball above the arm. The "wobble-toggle" spring assembly is just below the front of the fingerpieces. Contact spacing is set by the black knobs, which can be locked. The paddle mounting uses a variation of the bracket method, substituting a 6-32 stud for the bracket and holding it with the upper black knob. A bottom clamp provides stability.



This is the single paddle operating as a "stand-alone". The next single paddle will be a bit smaller and will use a different tensioning mechanism.



This is an all-brass version, mounted on its base. It uses 3/16" brass balls for bearings and is very smooth in action. The brass construction makes it a bit heavier than the aluminum model, which provides a little more stability when it is standing alone. Here the bottom clamp is used as a spacer.

Here is a group photo of all of the versions tested so far. They all work pretty well, but there are still some refinements that are underway.