CTCSS capable rig to test this feature.

Another Yaesu exclusive feature is *ARTS* — Automatic Range Transponder System. If you and your buddy both own Yaesu rigs equipped with ARTS, your radios can be configured to transmit "polling" signals at regular intervals (along with CW identifications). Whenever either radio hears the other, it sounds an alert to let participants know when they are within simplex communications range.

And speaking of simplex group activities, I had to admire the FT-1900R's busy channel lockout feature. Some would call this the *anti lid* function, but I prefer to be more charitable. Let's just say it assists our better natures by preventing us from transmitting on otherwise busy frequencies.

Finally, I had to smile when I saw the *Password* feature that allows you to create a password that effectively locks down the FT-1900R until you enter the proper characters. Not only does this block unauthorized use (think of mischievous children), it assures a bit of delayed justice in the event that the rig is ever stolen.

APRS and the FT-1900R

In addition to voice operation, I was able to put the FT-1900R to use as a 1200 baud APRS (Automatic Packet/Position Reporting System) transceiver. For those not familiar with the technology, APRS is a digital messaging and tracking network that you'll find primarily on 144.39 MHz. The only catch was that I had to adapt the output (audio and keying lines) of my APRS position encoder to a modular telephone style plug to fit the FT-1900R's microphone connector. According to on-air reports, my 1200 baud packet bursts were well modulated and clean.

Conclusion

The FT-1900R offers just about everything an active 2 meter FM operator could desire at a price that is budget friendly. Combine its durable construction and ergonomic design (not to mention its bright, easy to read display) and you've earned a substantial return on your investment.

Manufacturer: Vertex Standard, 10900 Walker St, Cypress, CA 90630; tel 714-827-7600; **www.yaesu.com**.

Popular Dual-Lever Keyer Paddles — *Part 1*

Reviewed by Bruce Prior, N7RR
ARRL Technical Advisor
n7rr@arrl.net

Previous *QST* Product Reviews described high end and portable dual lever keyer paddles, including some very expensive ones.[1,2] The six dual lever paddles reviewed here are mostly mass produced and, with one exception, are more modestly priced. Two (Bencher and MFJ) use a long spring design, two are low profile designs from Kent and Vibroplex, and two are spring return keys from European manufacturers Begali and Scheunemann.

Paired with electronic keyers, dual lever paddles use their two levers to control dits and dahs. They allow *iambic* operation, in which closing contacts with both levers simultaneously yields an alternating series of dits and dahs. With keyers featuring *dit and dah insertion* modes, holding the dit lever while tapping the dah lever inserts one dah into a series of dits (and vice-versa).

Table 2 highlights characteristics of the review paddles. The *Dislodging Pressure* column shows lateral force required to dislodge the paddle on a typical operating surface and on that same surface on top of a thin high-friction pad similar to those sold as kitchen shelf liners. Another column shows range of adjustment of the fingerpieces above the operating surface.

Thanks to Margaret Prior, K7MWP, Paul Greenough, KE7QPK, and Stan Schmidt, N7OC, for their help and advice with this review.

BENCHER BY-1

Bencher BY series paddles been around for more than a quarter century and are widely used. They wouldn't be so popular if they didn't work well for many amateurs, some of whom have used the same paddle for years. The black base BY-1 with chrome components is the most economical of the BY series. Others include the all chrome BY-2, the all gold plated BY-3 and the BY-4, with gold plated components on a black base.

A Bencher BY series paddle looks great on the operating desk. Its long spring is the big attention getter. That spring, which bends gently around a grooved vertical stay on the back of the instrument, is the innovative heart of Bencher design. The spring is long enough to make the return force more linear than other designs. That's probably what operators mean when they describe the BY action as *smooth*.

Spring tension is the name of the game with the BY paddles. Adjustments are made with two side screws that change the angle of the two spring ends relative to the rear grooved stay. That system makes the range of paddle return tension adjustment rather modest. Noted CW guru Chuck Adams, K7QO, moved the BY-1 stay forward about 0.6 inch to make the paddle tension light enough to match his keying style.[3] I'm inclined to agree with Chuck's assessment: the stock BY-1 cannot be adjusted with light-enough paddle tension for my taste. Many others obviously disagree.

Setting up the BY-1 to match an operator's preference is a rather complicated process. Morse Express, a Bencher dealer, has posted very helpful instructions on adjusting keys and paddles, including a section on adjusting the BY-1.[4] The bottom line is that the paddle can be set up to suit many different operating styles, but the task cannot be done quickly. An operator needs to adjust the paddle and then leave it alone during normal operation.

[1]B. Prior, N7RR, "High End Dual-Lever Keyer Paddles," Product Review, *QST*, Mar 2009, pp 49-52. Past *QST* reviews are available to ARRL members at **www.arrl.org**.
[2]B. Prior, N7RR, "Portable Dual-Lever Keyer Paddles," Product Review, *QST*, May 2009, pp 52-55.

[3]For details, see **www.k7qo.net**.
[4]**www.morsex.com/misc/keyadj.htm**

Bottom Line

The popular dual lever paddles reviewed here use a variety of materials and construction methods. One of these choices is sure to fit your keying style and operating preferences.

Operators with a moderate to heavy fist would do well to invest in the reasonably priced Bencher BY-1 paddle, introducing an attractive conversation piece to their stations in the bargain. Bencher paddles are made in the US and are available directly from the manufacturer or from Amateur Radio dealers.

Manufacturer: Bencher, 241 Depot St, Antioch, IL 60002; tel 847-838-3195; **www.bencher.com**.

MFJ-564B DELUXE IAMBIC PADDLE

MFJ, the popular manufacturer of Amateur Radio equipment and accessories, supplies a long list of products for the CW operator. Model MFJ-564B is a keyer paddle patterned after the Bencher BY-1 (Bencher has a working relationship with MFJ), but at a lower price.

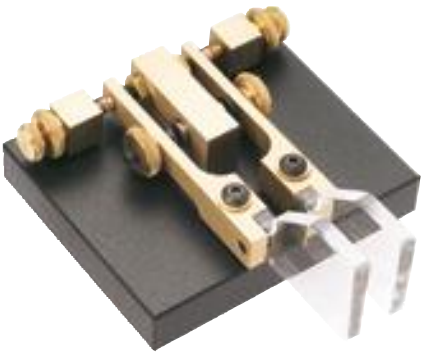
As with the Bencher, the adjustment of spring tension is possible, but only over a limited range through the adjustment of the pivot stop screws and then readjustment of the contact spacing to compensate. Use of a standard hex wrench is required for adjustment of the pivot stop screws. The contact spacing is also adjustable via a hex wrench. If the Phillips locking screws are loosened, however, the contact spacing can be adjusted by hand and then locked into position. No tools are supplied.

The MFJ-564B provides a very usable paddle at an attractive price for those who like the feel of the long spring return action. MFJ paddles are available directly from the manufacturer or from Amateur Radio dealers.

Manufacturer: MFJ Enterprises, PO Box 494, Mississippi State, MS 39762; tel 800-647-1800; **www.mfjenterprises.com**.

VIBROPLEX CODE WARRIOR JUNIOR

Vibroplex is a company steeped in the traditions of CW operation. Originally known for semi automatic bugs (sophisticated mechanical keys that produce strings of dits when the lever is pushed one way and manually formed dahs when the lever is pushed the other), Vibroplex currently produces a wide



selection of keyer paddles in the US for the CW enthusiast. In late 2009, Scott Robbins, W4PA, acquired the company and moved operations to Knoxville, Tennessee.

The Code Warrior Junior is an elegant low profile key with attracting magnetic lever return, silver contacts and oil impregnated brass bearings. Two hex wrenches for making adjustments are included with the paddle. Many operators will want to add a strain-relief on the bottom to secure the keyer cable, perhaps by replacing the machine screw holding the magnet assembly with a longer one.

The amount of lever tension depends on how close the black steel flat-head screws are set from the magnets. The screw distance is fixed by a lock nut. The actual adjustment process is fussy, since tightening the lock nut tends to turn the screw closer to the magnet. It is not a process that can easily be accomplished on the fly. The contact gap adjustment system works very well. The lock nuts are larger in diameter than the adjustment screws, so they are easy to manipulate in tandem.

Once adjusted, the Code Warrior Junior behaves nicely, with smooth action. As shipped, the fingerpieces are oriented upward, but they can be repositioned downward for keying close to the operating surface. Weighing price against performance, the Code Warrior Junior is a bargain.

A Chrome Warrior version is also available. Vibroplex has recently introduced a Lite Warrior paddle that looks identical to the Chrome Warrior but with an aluminum base. As its name implies, the Lite Warrior is lighter — it weighs 10 ounces. Without countersunk grooves for electrical connections beneath the paddle, however, mounting the paddle to some surface using, say, 3M Dual Lock fastener material, would be difficult.[5] The Lite Warrior might have to be held down by the operator's non keying hand to keep it in place. Vibroplex paddles are available directly from the manufacturer or from Amateur Radio dealers.

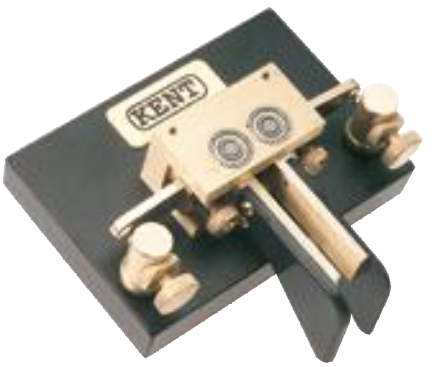
[5]**www.3m.com/product/information/Dual-Lock-Reclosable-Fastener.html**

Manufacturer: The Vibroplex Company, 2906 Tazewell Pike, Suite A2B, Knoxville, TN 37918; tel 800-840-8873; **www.vibroplex.com**.

KENT TWIN PADDLE MORSE KEY

The low profile Kent Twin Paddle key from England is similar in appearance to the Code Warrior Junior, but with a wider base and ball races evident from the top. This paddle is available either assembled or in kit form; we reviewed the assembled version.

The slightly convex silver plated contacts touch silver plated rounded points on the ends of brass screws, making for precise electrical contact. Contact spacing is secured by lock nuts, which work fine. There are two separate spring tension adjustment screws. Tension adjustment requires no lock nuts, so the design thoughtfully includes none. That makes quick tension adjustment a snap.



The paddle came with a cord attached. The customer must supply a stereo plug to match the keyer, which enables a choice of plug size and fingerpiece polarity. The cord that came with the review paddle had one wire that wasn't intact, so I replaced the whole cable. Apart from that minor issue, the Kent Twin Paddle oozes quality manufacturing. In operation, the Kent Twin Paddle feels as snazzy as it looks. Kent paddles are available from several US dealers or may be ordered directly from the manufacturer.

Manufacturer: Kent Engineers Ltd, 243 Carr Lane, Tarleton, Preston, Lancaster PR4 6BY, England; **www.kent-engineers.com**. *US Distributor*: Kent USA Inc, 214 Second St, Manchester, KY 40962; tel 606-598-2029; **www.kentkeys.com**.

BEGALI SIMPLEX

I never met a Begali paddle I didn't like. The Begali Simplex is the most economical of the extensive line of high quality dual lever paddles from this Italian manufacturer. The review Simplex features a palladium-plated base. A gold plated base version is also available for the same price.

Four ball bearing races are embedded in the base. Silver contacts are standard, and solid gold contacts are available as an option. A rudimentary thin gauge plastic dust cover is included. Long black plastic fingerpieces were installed on the paddle when shipped. Two spare short red anodized-aluminum fingerpieces were also included. The photograph shows the aluminum fingerpieces mounted.

Other thoughtful additions by Begali were a bag of spare fingerpiece screws, a dusting cloth and a 0.03 mm metal feeler gauge for adjusting contact spacing. The connecting cord is customer supplied. The solder connectors and the strain relief bar for the cord are all channeled on the bottom of the paddle, making it practical to remove the four rubber feet and to install a semi-permanent mounting system, such as 3M Dual Lock, either for use in a portable situation or for accommodating operators who send with a heavy fisted style.

The light alloy levers found on all Begali paddles make for lower mass movement with each stroke. This paddle, as the others, is especially designed for operators who prefer light touch and close spacing adjustment, although the Simplex is substantial enough to allow for heavier style paddling.

Fine threading with no locking nuts make quick readjustment simple. The two contact space adjustment screws are held in position with sleeve springs. Finger return pressure for two compression springs is individually adjustable for those who like different left and right pressure. Warning: if you buy a Begali Simplex, other paddles in your collection may gather dust.

Manufacturer: Officina Meccanica Pietro Begali, Via Badia 22, I-25060 Cellatica, Italy; **www.i2rtf.com**.

SCHEUNEMANN DER MORSE DIRIGENT

This German paddle is the most expensive of this group. "Der Dirigent" is translated as "the (musical) conductor." The paddle is a gleaming beauty under its integrated hinged acrylic dust cover (removed for photograph).

The technology of the Dirigent is utterly

simple, but it is elegantly executed. The Dirigent employs needle and seat bearings rather than the ball bearings more commonly found in high quality paddles. The seat is so precisely machined that the bearings are known to last for many years without any adjustment. The levers are brass, so more mass is moved with each stroke than is needed for lighter levers.

The Dirigent arrived ready to use, with a mini stereo plug and cord already installed. The electrical connections are inside the brass base, leaving the bottom flat. The low profile rubber feet could be removed and another mounting system could be installed for essentially immovable operation. This was the only paddle that tested more stable on the bare surface than with the added friction pad, but it required significant force to

Table 2

Popular Dual-Lever Paddle Summary

Model	*Return, Bearings and Base*	*Hardware and Contacts*	*Dislodging Pressure**	*Levers and Fingerpieces*	*Weight (lb)*	*Price*
Bencher BY-1	One long stretch spring; needle bearings on nylon; seats; black steel base	Chrome-plated brass hardware; gold-plated silver contacts	9.5 oz/ 15.5 oz	Clear triangular acrylic; 21 to 57 mm above operating surface	2.9	$110 (plus s/h)
MFJ MFJ-564B	One long stretch spring; needle bearings on nylon seats; black steel base	Chrome-plated brass hardware; gold-plated silver contacts	10.6 oz/ 11.3 oz	Clear triangular acrylic; 19 to 56 mm above operating surface	2.4	$70 (plus s/h)
Vibroplex Code Warrior Junior	Two rare earth magnets; oil-impregnated brass bearings; black steel base	Brass hardware; silver contact	2.5 oz/ 7.4 oz	Clear plastic; 18 to 44 mm above operating surface in upward orientation	1.3	$100 (plus s/h)
Kent Twin Paddle Morse Key	Two sleeve compression springs; four large race bearings; black steel base	Brass hardware; convex to rounded point silver plated contacts	8.5 oz/ 16.2 oz	Short brass levers and contact wings; black fingerpieces 7 to 40 mm above operating surface	2.6	$150 (plus s/h)
Begali Simplex	Two compression springs; four ball bearings; gold or palladium plated base	Gold plated hardware; 925/000 silver contacts†	8.5 oz/ 20.1 oz	Light alloy levers; standard long plastic fingerpieces 12 to 48 mm above operating surface†	2.6	$170 (plus s/h)
Scheunemann Der Morse Dirigent	Two compression springs; needle and seat bearings; coated brass base	Brass hardware; convex silver contacts	23.3 oz/ 18 oz	Coated brass levers; triangular clear acrylic fingerpieces 12 to 53 mm above operating surface	3.1	$350 (plus s/h)

*Lateral finger pressure required to move the paddle on a laminate surface (first figure) and with a friction mat. See text.
†Options include gold contacts and anodized aluminum fingerpieces in a variety of styles. See manufacturer's Web site for details.