Product Review & Short Takes Columns from *QST* Magazine

November 2000

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Yaesu MARK-V FT-1000MP HF Transceiver

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Senior News Editor

When we first spotted the MARK-V FT-1000MP at the Yaesu booth at Dayton Hamvention 2000, we immediately began puzzling over the model nomenclature. We initially wondered what had happened to the MARK-I, II, III and IV. Had there been protypes of these models that never made it into production?

The mystery was soon solved. Glossy advertising brochures on the MARK-V touted five major refinements in the new version: higher RF power output (200 W), a 75 W Class-A mode, interlocked digital/analog bandwidth tracking, a receive preselector and enhanced ergonomics.

It has been five years since the original 'MP appeared on the market (see "Product Review," *QST* Apr 1996). In the intervening years, the (MARK-0?) FT-1000MP has become the reputed gold standard among many serious DXers and contesters. A proven "competition-grade" performer, the FT-1000MP is a veteran of the last two World Radiosport Team Championship events and countless contests.

When it comes to new gear, expectations always are high and frequently vastly overblown. The amateur community's elite corps naturally wants to know what Yaesu has brought to the table this time around. It's a lot like software. Is the MARK-V a major upgrade or an incremental one?

Or, perhaps more to the point: Did Yaesu incorporate all the things I longed for (but didn't find) in my original 'MP (or the earlier FT-1000)? And—the burning question of questions in hamdom—how much is my 'MP (or my FT-1000) worth now if I decide to trade up?

Without reiterating what some readers already will know, the original FT-1000MP is a full-featured competition-grade transceiver. It incorporates a main receiver and an in-band-only sub-receiver, digital signal processing, a vast arsenal of QRM-fighting features including crystal and mechanical filters, and lots and lots of flexibility.

The MARK-V is not fundamentally different in terms of its overall design architecture. If the original 'MP were a three-scoop ice cream sundae, the MARK-V is all that plus whipped cream with a cherry on top. In a real china dish, not a plastic cup.

Since we're looking at an upgrade of an existing product model here, this review will concentrate on how the MARK-V differs from—or stacks up against—the original 'MP. We would encourage readers to consult the original FT-1000MP product review for our insights and perspectives on the 'MP platform.

Technology Marches On

Five years is an eternity in the current technological environment. It would not be unreasonable to have expected the MARK-V to be a complete retooling of the FT-1000MP. A lot of very neat transceivers with myriad you-just-gotta-have-this features have come down the pike in the intervening years. We've seen significant improvements in the area of transceiver displays, digital signal processing technology, physical and ergonomic design, and flexibility through various user-settable adjustments.

When it was the new kid on the block in 1995, the original 'MP was among similar peers—the IC-775DSP and the TS-870—and DSP was still golly-gee-whiz stuff. At this point, it will be interesting to see how this unit stacks up in a marketplace awash with products bearing innovations that have appeared since the 'MP was a youngster.

So, where does the MARK-V fit into the lengthy technology parade? The MARK-V is a joy to behold with its slightly bolder styling and plethora of front-panel knobs and buttons—92 in all. This impressive new model has retained and, in some instances, significantly enhanced the performance of its predecessor while also retaining a few of its shortcomings.

Bottom Line

With a number of subtle enhancements, refined ergonomics and an all-new 200 W (Class A-B)/75 W (Class-A) MOSFET final amplifier, the MARK-V version of the FT-1000MP breathes new life into this proven competition-grade transceiver.

"I do think the Yaesu engineers tried to provide every feature needed for a competitive radio," one reviewer asserted.

While a few features failed to make the transition intact from the original 'MP to the MARK-V, the new radio incorporates some terrific technological advances. Like the original FT-1000, the MARK-V also puts 200 W of output power at your fingertips (that genetic trait must have skipped a generation). As one user said, "Having 200 W actually made it seem okay to just run barefoot."

All of this is built upon the solid (classic?) FT-1000MP foundation that serious operators have come to know and appreciate. The experiences of newcomers to this entry in the 'MP line likely will parallel those of the original FT-1000MP review team. This MARK-V 'MP is a transceiver with a steep learning curve and you still must learn to love it. By and large, our reviewers warmed to the MARK-V once they began to get a handle on it. It's quite a bit of radio.

Technological Innovation vs Window Dressing

Okay, so does the MARK-V represent *real* improvement or just so much window dressing aimed at getting additional mileage out of a proven platform? Inquiring minds want to know. Actually, it's a little of both.

We're sure Yaesu will want users to love the MARK-V for its mind, but let's focus on its looks and its ergonomics for a bit. This new 'MP at once looks a lot like the original—especially in the front panel—and yet different. The Euro look of its predecessor is still there. The more subtle differences become obvious upon closer inspection—and comparison with the original 'MP.

Perhaps the most striking physical feature is the obvious addition of the louvered heat sink cooling fins that occupy the top left-hand rear quadrant of the cabinet.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Table 1

Yaesu MARK-V FT-1000MP, serial number 0F020049

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 0.1-30 MHz; transmit, 1.8-2, 3.5-4, 7-7.3, 10.1-10.15, 14-14.35,18.068-18.168, 21-21.45, 24.89-24.99, 28-29.7 MHz.	Receive, as specified; transmit, 1.5-2, 3.5-4, 7-7.5, 10-10.5, 14-14.5, 18-18.5, 21-21.5, 24.5-25, 28-30 MHz.
Power requirement: Receive, 2.3 A, 13.8 V dc; transmit, 14.5 A, 30 V dc and 2.2 A, 13.8 V dc (200 W output).	As specified.
Modes of operation: SSB, CW, AM, FM, AFSK.	As specified.
Receiver	*Receiver Dynamic Testing*
SSB/CW sensitivity, 2 kHz bandwidth, 10 dB S/N: 0.5-1.8 MHz, <2.0 μV; 1.8-30 MHz, <0.16 μV.	Noise floor (MDS), 500 Hz filter: *Preamp off* / *Preamp on* 1.0 MHz: –115 dBm / –122 dBm 3.5 MHz: –127 dBm / –136 dBm 14 MHz: –127 dBm / –135 dBm
AM sensitivity, 10 dB S/N: 0.5-1.8 MHz, <13 μV; 1.8-30 MHz, <2.0 μV.	10 dB (S+N)/N, 1-kHz tone, 30% modulation: *Preamp off* / *Preamp on* 1.0 MHz: 8.7 μV / 4.3 μV 3.8 MHz: 2.8 μV / 1.1 μV
FM sensitivity, 12 dB SINAD: 1.8-30 MHz, <0.5 μV.	For 12 dB SINAD: *Preamp off* / *Preamp on* 29 MHz: 0.72 μV / 0.3 μV
Blocking dynamic range: Not specified.	Blocking dynamic range, 500 Hz filter: *Preamp off* / *Preamp on* 3.5 MHz: 129 dB / 128 dB 14 MHz: 129 dB / 126 dB
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range, 500 Hz filter: *Preamp off* / *Preamp on* 3.5 MHz: 98 dB / 94 dB 14 MHz: 101 dB / 98 dB
Third-order intercept: Not specified.	*Preamp off* / *Preamp on* 3.5 MHz: +24.3 dBm / +9.8 dBm 14 MHz: +25.7 dBm / +17.3 dBm
Second-order intercept: Not specified.	Preamp off, +68.3 dBm; preamp on, +68.5 dBm; with VRF on, preamp off, +110 dBm; preamp on, +112 dBm.[1]
FM adjacent channel rejection: Not specified.	20 kHz channel spacing, preamp on: 29 MHz, 85 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing, preamp on: 29 MHz, 79 dB.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: preamp off, 99 μV; preamp on, 30 μV;
Squelch sensitivity: Not specified.	At threshold, preamp on: SSB, 14 MHz, 2.0 μV; FM, 29 MHz, 0.15 μV.
Receiver audio output: 2.0 W at 10% THD into 4 Ω.	2.9 W at 10% THD into 4 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW-N (500 Hz filter): 439-925 Hz (486 Hz); CW-W: 440-1904 Hz (1464 Hz); USB-W: 376-2533 Hz (2157 Hz); LSB-W: 357-2247 Hz (1890 Hz); AM: 322-3550 Hz (3228 Hz).
IF and image rejection: main receiver, 80 dB; sub receiver, IF rejection, 60 dB; image rejection, 50 dB.	First IF rejection, main receiver, 106 dB; sub receiver, 104 dB; image rejection, main receiver, 98 dB; sub receiver, 90 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output: SSB, CW, FM, 200 W (high); AM, 50 W (high).	CW, SSB, FM, typically 215 W high, < 1 W low; AM, typically 50 W high, < 1 W low.
Harmonic suppression: 60 dB. Spurious: Not specified.	49 dB.[3] Meets FCC requirements for spectral purity.
SSB carrier suppression: 40 dB.	73 dB.
Undesired sideband suppression: 55 dB.	84 dB.
Third-order intermodulation distortion (IMD) products: 31 dB at 200 W PEP; 50 dB at 75 W PEP (Class A).	See Figures 1 and 2.
CW keyer speed range: Not specified.	9 to 39 WPM.
CW keying characteristics: Not specified.	See Figure 4.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 22 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 12 ms; FM, 9 ms. Unit is suitable for use on AMTOR.
Composite transmitted noise: Not specified.	See Figure 3.
Size (hwd): 5.3×16×13.7 inches; weight, 31 pounds.[1]	

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

Third-order intercept points were determined using S5 reference.

[1]Noise floor with VRF on was –121 dBm with preamp off and –129 dBm with the preamp on for 20 meters.

[2]Does not include power supply.

[3]Spurious suppression. Harmonic suppression: 66 dB.

An expanded test result report for this transceiver is available on the ARRL Members Only Web site. Printed copies are also available for those without Web access.

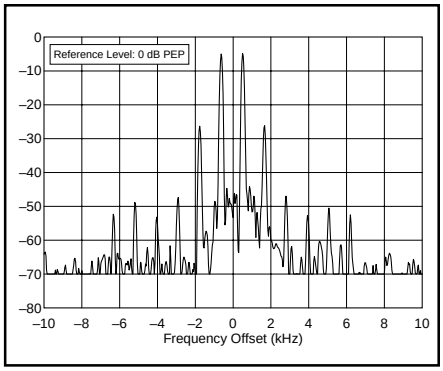


Figure 1—Worst-case spectral display of the MARK-V FT-1000MP transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 27 dB below PEP output, and the worst-case fifth-order product is approximately 48 dB down. The transmitter was being operated at 200 W output at 21.250 MHz.

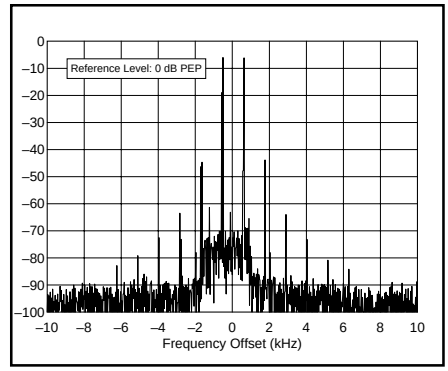


Figure 2—Worst-case spectral display of the MARK-V FT-1000MP transmitter during two-tone intermodulation distortion (IMD) testing in the Class A mode. The worst-case third-order product is approximately 45 dB below PEP output, and the worst-case fifth-order product is approximately 64 dB down (see text). The transmitter was being operated at 75 W output at 1.850 MHz. Note that the spectrum analyzer was set to a narrower scan bandwidth and a greater dynamic range (100 dB vs the 80 dB range that is normally used).

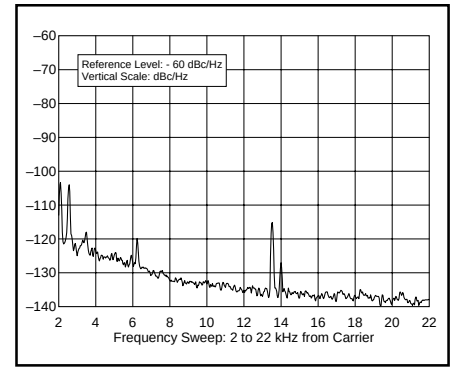


Figure 3—Worst-case spectral display of the MARK-V FT-1000MP transmitter during composite-noise testing at 3.520 MHz. Power output is 200 W. The carrier, off the left edge of the plot, is not shown. The plot shows composite transmitted noise 2 to 22 MHz from the carrier. Composite-noise testing in the Class-A mode provided similar results.

These, in combination with thermostatically controlled internal cooling fans, help dissipate the heat generated by the Philips BLF147 power MOSFETs that crank out the 200 W of RF. Less obvious is that the MARK-V is slightly smaller than the original 'MP, but not by much. We're talking fractions of inches here. And it's lighter by about two pounds—not counting the external power supply. More on that in a bit.

It just might be a subjective observation, but the MARK-V seems more hale and hearty than its predecessor.

MARK-V users liked the newly styled, slightly larger "rubberized" tuning knobs and the updated, larger, easier to grip anodized **SHUTTLE JOG** ring on the **MAIN VFO-A TUNING KNOB**. They also gave Yaesu high marks for replacing some of the smaller front-panel controls on the original 'MP with larger, rubber-grip units with calibrated knob aprons on the MARK-V. These small changes make a huge difference in the "look" of the front panel. The updates to the **MAIN VFO-A TUNING KNOB** and **SHUTTLE JOG** ring make it more pleasant to make large frequency excursions and to troll the band. The idea is you grasp the **JOG** ring on either side and twist it clockwise (to move up in frequency) or counterclockwise (to move down in frequency). Using the **SHUTTLE JOG** ring still takes a bit of practice to keep it under control.

A prime reason for the huskier **SHUTTLE JOG** ring on the MARK-V is that it now is home to two new control buttons. One button enables the new *Variable RF Front-End Filter (preselector)*; the other the new *Interlocking Digital Bandwidth Tracking* system—both of which we'll discuss in greater detail. "I didn't like the **VRF** and **IDBT** buttons on the **SHUTTLE JOG** ring," one ergonomics-conscious user said. "I kept thinking I was going to bump the dial if I tried to use them." They take some acclimation.

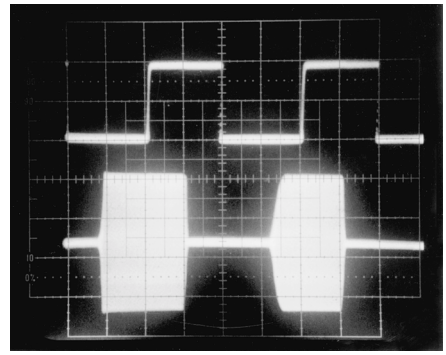


Figure 4—CW keying waveform for the MARK-V FT-1000MP showing the first two dits in full-break-in (QSK) mode. The equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 200 W output at 14.2 MHz.

On the subject of tuning: the direct digital synthesizers in the local oscillator are all driven from a single temperature-compensated master crystal oscillator. The resulting high stability, along with 13 user-selectable tuning steps that can be as fine as 0.625 Hz, should make the MARK-V popular with digital mode operators.

The display has undergone some minor but needed improvement. In the original 'MP, we'd noted that the inactive segments of the fluorescent discharge units "glowed faintly, especially at the high-intensity setting, making readability troublesome at most viewing angles." It appears that Yaesu has toned down the brightness of the fluorescent discharge display modules and used a darker lens to better hide the background. As we'd mentioned in the original 'MP review, the display is extremely busy—if you're not careful, it's easy to overlook that one function or another is enabled—or not.

Another change worth mentioning: In the 'MP, the AF gain controls for the main receiver and the sub receiver were concentric front-panel controls. In the MARK-V, Yaesu put the **RF GAIN** and **AF GAIN** controls for the main receiver on concentric knobs. The **SUB AF** gain control (which can also be set via a menu selection to serve as a main/sub balance control) has been relocated to the front-panel apron, where the **RF GAIN** control resides on the 'MP. Once they get the hang of where it is, most ops should find the new location more convenient (not all hams appreciate concentric controls), since the **SUB AF** knob is a control you'll use a lot in order to take maximum advantage of this transceiver.

We'd grumbled in the 'MP review that the proliferation of front-panel controls made some smaller controls hard to reach next to larger ones. The restyled knobs and some front-panel redesign has eliminated this issue. Reviewers also had complained that while using the concentric DSP and noise-reduction controls on the original 'MP, the RIT and sub-receiver knobs got in the way. This problem has gone away with the MARK-V, which has reconfigured the way you access the DSP functions to eliminate the rotary-style control. We'll discuss this further when we talk about how Yaesu has updated—and somewhat automated—the way DSP works in this newer 'MP.

Now For Something That's *Really* Different

In its advertising, Yaesu has been touting several brand-new aspects of the MARK-V not the least of which is the higher output power. As one user put it, "It's amazing what the feeling of an extra 3 dB

will do to your attitude." Another biggie is the Interlocked Digital Bandwidth Tracking System—or IDBT for short—which is aimed at simplifying and automating receiver DSP filtering. Then there are Yaesu's Variable RF—or VRF—front-end filter and the Class-A feature, both new with this model. Let's take a look at what Yaesu has added to the 'MP mix with this generation.

Interlocked Digital Bandwidth Tracking System

There's really not a whole lot you can say about the IDBT system because it pretty much does its thing without operator intervention. All you have to do is press the **IDBT** button on the **SHUTTLE JOG** ring. It's worth noting—because the *Operating Manual* does not—that IDBT only works in SSB.

The idea is that IDBT automatically matches up the bandwidth of the MARK-V's DSP passband with that of the IF filter passband. In practical terms, this means the DSP tracks the settings of the already very effective **SHIFT** and **WIDTH** knobs on the MARK-V. Yaesu says the idea is to eliminate having to make separate analog and DSP filter adjustments. In fact, Yaesu dropped the "bandpass" DSP filter selection on the MARK-V because IDBT makes it unnecessary.

The net effect is that with IDBT enabled, the MARK-V harnesses both digital and analog IF filtering for optimal impact on QRM. As one operator confronted with fools to the left and jokers to the right on a very busy 40-meter band described it: "I was able to work around loud signals about 1.8 kHz on either side just by using the **SHIFT** and **WIDTH** controls without IDBT, but switching in the IDBT cleaned up the annoying remnants."

Yaesu says the IDBT only works in SSB because that's where the greatest likelihood of a collision between wider and narrower bandwidths exists. On CW, Yaesu's philosophy is that the IF filters will do the job of rejecting QRM—assuming you've made the right selection and/or have the most effective filters installed—and you can resort to the narrow DSP CW Peaking Filter to bring very weak signals up out of the noise.

Enhanced Digital Signal Processing Enhancements

The number of EDSP "contours" in the MARK-V has been reduced from four to three, the "bandpass" setting largely obviated by the IDBT. Yaesu says the three available contours are "preset for different audio emphasis, using mathematical algorithms developed after thousands of hours of on-the-air testing." Pushing the contour buttons yields a visual cue: green for low-cut, orange for mid-cut and red for high-cut.

"The contour function was a good idea," one user proclaimed. "It's cool to listen to a pileup of stations and punch through the various contour options. You really hear stations come and go depending on where they are in the passband."

The EDSP **APF** (audio peaking filter) is great for weak-signal CW or data work. In CW, you can select from among 240, 120 or 60 Hz bandwidths. Somewhat like the **CONTOUR** settings for bandwidth, the **NR** (noise reduction) system permits the operator to pick one of four NR settings. One of these typically was more effective than the others in cutting back noise—even atmospherics. Some users still may wish for the sort of continuous adjustment available on other radios or on outboard DSP boxes, but these presets make for more snappy operating.

The EDSP functions, such as auto-notching, remain outside the AGC loop in the MARK-V. But in the case of notching, there's more than immediately meets the eye.

In addition to its DSP auto-notching capability, the MARK-V also lets you select a manual IF notch filter through the menu, and the DSP and IF notch filters can be cascaded. The manual IF notch is very effective and allows additional flexibility by letting you perform some filter shaping "on the fly." It can take a strong carrier out of the AGC loop, and the cascaded DSP auto-notch will eliminate any residual carrier audio bleeding through. The combination is quite formidable.

The EDSP still employs the 16-bit digital signal processing of the earlier 'MP, which runs at a 33-MHz clock speed.

EDSP is available in transmit as well, and the effects on your audio can be significant and even startling. It's possible to fashion everything from "contest" audio to "broadcast quality" by using the various EDSP menu settings in conjunction with tweaking the carrier frequency—also a menu option—to parameters that best suit your particular voice characteristics.

"The DSP feature was a plus," raved one reviewer. "I also had several unsolicited comments about the quality of the audio."

Variable RF Front-End Filter

This is a neat innovation that is another Yaesu exclusive, introduced with this model. Basically, VRF inserts a "preselector"—a tunable bandpass filter stage between the antenna and the fixed bandpass filters with their switching diodes—that's designed to offer additional protection from nearby strong signals in the bands from 160 through 20 meters. Yaesu says VRF is "ideal for multioperator contest environments." Although we did not have the opportunity to try it in one, we did find the VRF could be very effective—on the order of a few S units—in reducing "noise" from a very strong signal—even one in the same band. To get the maximum effect you might need to detune the VRF a bit away from peak sensitivity for the desired frequency. This will attenuate the signal, but the enhanced readability is worth the tradeoff. In the same regard, the VRF could be effective in cutting back "splatter" from a loud in-band signal too, although in most cases the other QRM weapons on board the MARK-V should do the trick as well or better.

Class-A SSB Operation

We've been particularly fussy over the years about how well transmitters are able to contain their higher-order intermodulation products on SSB. This aspect of performance can spell the difference between a transmitter that splatters and one that is kind to its neighbors. Yaesu's new Class-A function, available at the touch of a button, puts the RF output amplifier stage into IMD-friendly Class A mode. The idea here is that if you're driving a linear using a signal that exhibits superior IMD characteristics, you won't be making things unnecessarily worse when you crank up the amp. Class A mode on the MARK-V limits the output power to 75 W PEP.

The original 'MP did pretty well in the IMD department, with worst-case third order products down about 27 dB and fifth order products down about 43 dB (this was on 24.95 MHz). The MARK-V in Class A mode was considerably better, dropping the worst-case fifth-order products (observed this time on the 160-meter band) to –64 dB at 75 W PEP. On the other bands, fifth-order IMD was 74 dB down on 40 meters and a very impressive 85 dB down on 17 meters!

Either way, with 200 W in Class A-B or 75 W in Class A, you'll have plenty of power to drive an amplifier. "The 200 W is great!" one user enthused. "But the 75 W Class-A mode actually worked perfectly for me since my Alpha really only needs 80 W to get to full output."

Powering Up

To deliver the 30 V dc needed for the RF MOSFETs in Class A, Yaesu has paired the MARK-V up with a compact, external switching power supply. The lightweight model FP-29 dual-voltage unit comes with its own power switch and cooling fan.

Given the supply's trim profile, it begs the question why Yaesu didn't just incorporate the unit into the MARK-V and save the nuisance of having to route yet another cable in the shack. After all, the FT-1000 has a built-in supply, and one was an option on the original 'MP.

While one may reasonably assume that the engineers at Yaesu were concerned about heat dissipation and/or switching noise, the *Operating Manual* mentions a third consideration, stating that the power supply was kept separate "for safe trans-

portation" of the MARK-V during shipping or on a DXpedition. "The reduced weight inside the transceiver case provides a greater safety margin during the shipment of your MARK-V."

MARK-V Menuing

The strength of the MARK-V menu system is that the 80+ options allow tremendous flexibility in configuring the radio "your way." Its weakness is that in the years since the original 'MP (and a lot of other otherwise excellent transceivers) was designed, the menu system the MARK-V employs has not changed a whole lot from the original model. It's certainly utilitarian, but compared to what's out there in the market today, it's neither very elegant nor intuitive, and it no longer can be considered state-of-the-art. It's a bit like going back to *DOS* after years of working with *Windows*. By the same token, a lot of contesters continue to use *DOS*-based logging software, so maybe they won't really care.

As one reviewer remarked, "There are a lot of configurable options. It's too bad the user interface isn't more friendly." He suggested that Yaesu market a *Windows* software package that would allow the user to set all the necessary parameters via a PC. "Now that would be cool!" he concluded.

In the years since the original 'MP hit the market, some manufacturers have come out with user interfaces that feature plain English menu descriptions on an LCD graphical display. With the MARK-V, there's still no single "menu" button—you press **FAST** plus **ENT** to get into the menus—and you'd better keep the *Operating Manual*—or at least the thoughtful *Quick Code Sheet*—handy to "master the menu possibilities," to borrow a phrase.

As a result, fully customizing the MARK-V can take some time, and may try your patience. There is a veritable surfeit (that means "beaucoup") of user-settable items, from CW weighting to defining memory groups and setting the AGC for the sub-receiver. (Yes, the MARK-V offers 99 memory channels and scanning capabilities too.)

One reviewer began to acclimate to the MARK-V after a day or so of trying to bend the radio to his will. "I liked the radio better and began to see the potential," he conceded.

Filter Flexibility

The MARK-V boasts a whole new way to select filters. It was not a hit with everyone. As mentioned, the 'MP filter matrix has been supplanted by the EDSP **APF, NR**, and **CONTOUR** button panel. Filter selection has been reduced to three **BANDWIDTH** buttons to the right of the display: **NOR**, **NAR1** and **NAR2**. These three buttons determine filter selections for the 8.215 MHz second IF and the 455 kHz third IF.

Discerning readers likely already have done the math and figured out that you don't get quite as much flexibility in filter selection with three buttons and up to five optional filters on board. The original 'MP's filter matrix let you pick one from column A and one from column B—mix-n-match style. It was a feature many users appreciated. With the MARK-V, you predefine the filters you want assigned to each button via menus, which can be a bit baffling. Be careful: if you don't get it right, you might hear nothing at all when you press one of those **BANDWIDTH** buttons.

In the MARK-V filter selection scheme, you would, for instance, be able to define 2.4 and 6 kHz filters for the **NOR** selection, a pair of 2.4 kHz filters or a 2.4 and an optional 2.0 kHz filter for the **NAR1** position, and a pair of optional 2.0 kHz filters for the **NAR2** position on SSB. In CW, you might have a combination of 2.4 or 2.0 kHz and 500 or 250 Hz units in ascending degrees of selectivity. Some operators may find this limiting compared to the original 'MP, while others may find it more efficient.

Yaesu concedes that there *is* slightly less flexibility in filter selection in the MARK-V, in that you don't have on-the-fly ability to set a 250-Hz bandwidth by selecting, for example 500 and 250 Hz or 250 and 250 Hz filters in the 8.2 MHz and 455 kHz IFs.

"You need to predefine the selections you are most likely to want to make, and these then become the **NOR**, **NAR1** and **NAR2** selections," Yaesu told us. "The thinking was to free up that matrix slot on the left hand side of the main tuning knob and to make the radio easier to use at 4 in the morning at the same time."

The MARK-V offers stock 500 Hz crystal CW and 2.4 kHz SSB filters in the 8.215 MHz IF and a new 10-pole 2.4 kHz Collins mechanical SSB filter in the 455 kHz IF (the original 'MP used an 8-pole Collins SSB filter).

"With the filtering available, it was much easier to carve a hole in a very crowded 20-meter band," said one reviewer, relating his contesting experience with the radio. "I was also able to squeeze into a small opening on the upper end of 40 and actually have a decent run."

Held Over

Several really handy features survive in this 'MP incarnation. The MARK-V still offers the choice of two antennas via the **ANT A/B** front-panel button plus availability of a separate receive antenna. "It's nice to have two antenna inputs and a Beverage input," one well-known contester opined. "It worked just the way it should."

The MARK-V's flexible **CLAR**ifier (RIT) permits excursions of up to 9.9 kHz. There are separate **TX**, **RX** and **CLEAR** buttons, making the RIT available for quick split-frequency operation, such as working DX that's listening "up 2."

We've already received questions from members about whether Yaesu made any changes with respect to full-break-in (QSK) CW operation. The answer is no, nor did Yaesu include the capability to key the radio from an external source, such as a PC, while still providing access to the radio's internal memory keyer. The "bug" option has mysteriously disappeared from the keyer menu as well. A search is under way for the critter.

Speaking of the internal memory keyer, the MARK-V does not provide front-panel access to program this integrated accessory that offers six message memories and includes contest-style incremental numbering (even "cut numbers" if you want them). As with the earlier 'MP, accessing or programming the memory keyer functions requires the outboard accessory FH-1 Remote Control Keypad (or a homebrew keypad) that connects via a cable to the rear-panel **REMOTE** jack.

On a related note, the MARK-V also does not incorporate any sort of "tune" button (neither did the 'MP), but one is available via the FH-1 keypad. A digital voice recorder also remains an accessory. The optional DVS-2 Digital Voice Recorder has two 8-second or four 4-second messages. You also can record up to 16 seconds of incoming receiver audio for later playback.

The MARK-V's super off-the-air monitor works in all modes, including CW! The **MONI** button and level control are on the lower front-panel apron. The radio picks off the signal as it leaves the driver stage using the sub-receiver as a monitor. This is especially convenient to have when tailoring your audio using the MARK-V's manifold DSP capabilities.

The MARK-V's double-stacking register **BAND** keypad gives quick access to the last two frequencies (and mode and filter settings) you visited on a given band. It also permits direct keypad entry of a frequency. Pressing the **SUB** button then a **BAND** key lets you change bands or set frequencies and modes on the sub-receiver.

We'd complained in our earlier review about another front-panel characteristic that the original 'MP had carried over from the FT-1000—the row of smallish knobs and buttons along the lower apron. The MARK-V continues this tradition, but Yaesu swapped one control location and replaced another with the **CLASS-A** button.

Control legends for this lower tier of front-panel controls still tend to be a bit difficult to read, however, and the knobs still are the same shade as the front panel.

The "trap door" trimpot controls in the top of the radio still are there in the MARK-V. These still include the **TUN-M** control that you're not supposed to adjust (misadjustment could necessitate a factory

realignment). These require using a small Phillips' head screwdriver. Controls include such functions as audio levels to the headphone jacks; FM mike gain; VOX gain, delay and anti-vox; and the tuning meter adjustments for CW, packet and RTTY. One user wondered aloud why the CW VOX delay was set via the menu while the SSB VOX delay was set via a trimpot. "Why are they so hard to get to?," he asked. He said he'd rather see the two delay adjustments on the front-panel apron instead of the two squelch controls that he deemed much less likely to be needed.

The MARK-V still offers a menu-settable choice of flat or tuned preamps. There are three preamps in all—one a general-purpose "flat" amplifier and dual tuned units, one optimized for 1.8 to 7 MHz and the other for 24 to 30 MHz. (Yaesu says that on 14 MHz, the tuned and flat preamps have approximately the same gain, so there's not much difference between them.) To turn off the preamp, you turn on the IPO (intercept point optimization). While this may seem like backwards logic, Yaesu is not the only manufacturer use this kind of nomenclature.

Gone But Not Necessarily Forgotten

Some up-front items on the 'MP have been consigned all or in part to the menu. For example, the **USER** button has disappeared from the front panel and now lives in the menu. This function lets the operator set up a "custom environment" for a given user or type of operation. In the MARK-V, pressing and holding the **PKT** button accesses this menu to configure custom settings.

The **NB1** and **NB2** noise blanker buttons on the 'MP have been replaced by a single **NB** button on the MARK-V. You now go to the menu to select the type of noise blanker you prefer—depending upon the noise—and the desired blanking level. There's a menu shortcut to make changes on the fly—press and hold **FAST** and press **NB**.

The **SPLIT** button also is no more on the MARK-V. You go into split-frequency mode by pressing the appropriate red and green TX and RX LEDs near the main and sub-receiver tuning knobs. Not everyone was wild about the departure of the **SPLIT** button. Some operators thought it made operating the MARK-V more confusing and could lead to transmitting on the wrong VFO during the wee hours of a contest. The "**SPLt-SEt**" menu offers three split operating modes that vary largely in the degree of automation applied. The A=B mode, for example, applies a preset frequency offset to the sub VFO B when that VFO is enabled for transmit.

Performance Perspectives

How does the 'MP stack up where the rubber meets the road—on the air? Well, if there were any doubts that the new MARK-V offers some performance enhancements over the original 'MP, a look at the most critical lab testing numbers will quickly dispel them. Some quick comparison highlights:

- Two-tone, third-order IMD dynamic range in the MARK-V was about 4 dB better on the amateur bands, topping out at 101 dB on 14 MHz (preamp off). This is, like, totally *excellent* performance, dudes. Dynamic range defines the receiver's ability to distinguish and reflect the difference between weak and strong signals.
- The MARK-V's third-order intercept numbers were in the vicinity of +25 dBm (based on S5 reference), the highest we've seen for any receiver; the original 'MP's numbers were in the range of +14 dBm on the ham bands (preamp off in both cases).
- The second-order intercept numbers, around +68 dBm with the preamp on or off, although very respectable, were not as high as those we measured on the original 'MP. With the VRF feature activated however, the MARK-V managed to achieve another new high-water mark—+112 dBm with the preamp on and +110 dBm with the preamp off—the best we've seen by a wide margin.
- The typical transmitter high-order IMD numbers during Class-A operation are significantly better than any transceiver we've tested.
- The MARK-V's SSB/CW receiver sensitivity on the ham bands was within 1 dB of the original 'MP's.
- The MARK-V's blocking dynamic range (preamp off) was 11 dB worse, at 3.5 MHz and 13 dB worse at 14 MHz but at 129 dB, these are still excellent numbers.
- The MARK-V's AM sensitivity was slightly worse (by 1.7 μV) at 1.0 MHz (preamp off) and approximately the same everywhere else; FM sensitivity (preamp off) was slightly better (by 0.18 μV) at 29 MHz.
- FM adjacent channel rejection and two-tone, third-order IMD dynamic range numbers were 10 dB and 4 dB better on the MARK-V respectively (preamp on).
- The CW keyer range in the MARK-V tested out at from 9 to 39 WPM; the range of the original 'MP keyer was 6 to 120 WPM.

Puffs and Pans

Some user comments and observations, in no particular order:

- "Features seemed very similar to the original FT-1000MP, and it was not very hard to get used to them."
- "The notch filter is deep! But it has some menu-driven modes that require some practice."
- "The internal fan(s) in the MARK-V are pretty loud once the radio starts to break a sweat. The fan noise is audible even while wearing headphones."
- "Diversity reception is possible because of the flexibility offered via the menu for stereo headphone operation. You can listen to the main receiver in one ear, the sub-receiver in the other or to all of one or all of the other or even attenuated audio in the other ear from the other receiver."
- "The AF output jack on the back panel is a plus. Its constant level is great for grabbing audio for your sound card for digital modes or for just recording. You can plug in, set the levels, and then forget about it."
- "The dual receiver is well-done and very cool!"
- "The top-cover adjustments are not much better than the old FT-1000MP—ie, not very good."
- "The manual seemed to have more extensive explanations."
- "A true contester will learn to love this radio!"

Conclusion

With the introduction of the MARK-V FT-1000MP Yaesu has raised the bar, albeit incrementally in some cases, in the top-end transceiver marketplace. Have no doubt. This is a very fine radio that will hold its own in a competitive environment, and its enhanced DSP features are superb. A lot of current 'MP owners may be tempted to upgrade, and newcomers who are not intimidated by the challenge of a complex, feature-rich radio will give serious consideration to jumping aboard the FT-1000MP bandwagon with the MARK-V. Hams in the strong-signal areas of the world (Europe for example) should be particularly interested in this transceiver's strong-signal-handling capabilities.

While some may wonder why Yaesu didn't go further in some aspects of the redesign of the original 'MP into this MARK-V version, the new transceiver does offer several significant performance enhancements to a proven platform that has earned and continues to hold the respect of discerning contesters and DXers.

Thanks go to Randy Thompson, K5ZD; Dan Henderson, N1ND; Tom Frenaye, K1KI; and Dave Patton, NT1N, for using the radio and providing comments for this review.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; 562-404-2700; fax 562-404-1210; **http://www.yaesu.com**.

Manufacturer's suggested retail price, $4,200. Typical current street price: $3,300. List prices of selected optional accessories: DVS-2 Digital Voice Recorder, $238; FH-1 Remote Control Keypad, $88. The YF-114SN 2.0 kHz SSB filter, YF-114CN 250 Hz CW filter, YF-110SN 2.0 kHz SSB filter and YF-115C 500 Hz CW filter all list for $157.

The NorCal SMK-1 QRP Transceiver Kit

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

Since its inception in 1993, the Northern California QRP Club—better known as NorCal—has grown to be an extremely well known organization of low power Amateur Radio enthusiasts.

A few months ago NorCal announced something new: a full-featured 10-meter CW QRP transceiver kit that would use mostly surface mount components.

There has been enthusiastic response to that news, but several folks expressed a desire for a simpler project that would provide them an opportunity to gain some surface mount construction experience. The result was the SMK-1.

The SMK-1 was quickly developed by Dave Fifield, AD6A (of Red Hot Radio), and Doug Hendricks, KI6DS, not so much as a QRP transceiver kit but as an electronics construction project that would expose the builder to working with a variety of surface mount component packages. Most of the 84 parts that make up the kit are surface mount, but there's also a few through-hole components.

Noble Lineage

The SMK-1 40-meter CW transceiver consists of a transmitter section based on the late Doug DeMaw's (W1CER/W1FB) now legendary Tuna Tin 2 (see March 2000 *QST* for a complete retrospective on this QRP classic) integrated with a receiver modeled after Steve Bornstein's (K8IDN) MRX-40 direct-conversion receiver (featured in the September 1997 issue). Electronic transmit/receive switching, JFET receiver muting, VXO RIT and XIT circuitry, and a few additional modifications cooked up by Dave were incorporated, and surface-mount equivalents of virtually every component were substituted.

As was the case with W1FB's and K8IDN's projects, the resulting transceiver was never intended to be a high performance piece of radio equipment—a primary objective shared by all three is circuit simplicity.

It's a Small World, After All

Surface mount parts are available in a range of sizes. The components used in this kit are considered to be "the big ones." Designated 1206, the equivalents of conventional "two lead" parts—resistors, capacitors, inductors and diodes—measure about 0.12 × 0.06 inches.

There are also three surface mount 8-pin ICs, and a handful of surface mount transistors and electrolytic capacitors.

The tiny $2^1/_2 \times 2^1/_4$-inch circuit board is top quality. It's double-sided, solder masked and silk screened with the part

numbers and location outlines. All of the on-board components are provided in the kit. The builder will need to supply an enclosure and knobs, and connectors for external dc power, key or keyer, 'phones and antenna. A separate kit that includes predrilled enclosure panels, jacks, knobs and rubber feet—courtesy of the New Jersey QRP Club—is also available. (See NorCal's Web site for details.)

Let's Get It Together

As you can well imagine, the biggest challenge of surface mount construction is the handling and positioning of these tiny parts. Identifying a particular part can also be difficult—some don't carry any markings whatsoever.

The NorCal gang came up with a great solution to the identification problem. The parts are packaged in two clear plastic bags that are divided by a heat-sealer into a grid of 21 compartments, each containing specific components. "Grid maps" printed in the documentation act as a key.

I found surface mount part handling quickly became easier as assembly progressed. I used a large pair of surgical tweezers for handling and positioning the parts for soldering, and only really needed a magnifying lens for inspecting the finished solder connections. Your particular methods and needs, of course, may vary.

For some tips and techniques, visit NorCal's Web site, **http://www.fix.net/~jparker/norcal.html**. Also be sure to check out the ARRL Technical Information Service's information on this topic at **http://www.arrl.org/tis/info/surface.html**. (Copies of recent *QST* articles on this subject are posted here.)

The 8-page *Construction Manual* consists of four $8^1/_2 \times 11$-inch stapled sheets. There's not a tremendous amount of handholding offered in the assembly descriptions—the instructions walk you through installing the contents of the first pocket of "Bag #1" and then instruct you to proceed likewise down through the bags.

The final few assembly steps involve winding and mounting a 6-turn bifilar toroid and installing the through-hole components. Alignment is easy—I used my main station transceiver to listen for the transmitted signal, to peak the receiver, and to "calibrate" the XIT and RIT controls.

I've got to admit, although surface mount construction does present a unique set of challenges, I found it to be considerably easier than I had anticipated. I'm now eager to attempt a more sophisticated surface mount project.

Let's Get it On

I've used the transceiver to make several contacts with stations up and down the east coast and into the midwest—not bad considering it puts out about 350 mW and my antenna is an attic dipole! I've received reasonably good signal reports and noted only a very small amount of drift.

Spot checks of the SMK-1 by the ARRL Lab show a transmitter tuning range of approximately 7.038 to 7.039 MHz and a receiver tuning range between 7.035 and 7.040 MHz. The noise floor—or minimum discernable signal—measures –110 dBm at 3 kHz bandwidth. While this may seem a bit low, this is due to the essentially "wide-open" front end of the receiver. There's more than enough CW sensitivity available for typical 40-meter QRP operation.

The current draw (at 13.8 V) is about 20 mA on receive and 110 mA on transmit. The blocking dynamic range came in at a noise-limited 74 dB. Spurious signal and harmonic suppression was better than 30 dB. Unlike the original Tuna Tin 2, this transmitter does not require additional filtering to meet current FCC spectral requirements for a transmitter of this power level.

Conclusion

Let's face it, sooner or later the electronics hobbyist will have to accept the fact that technology marches on. Surface mount components will continue to supplant conventional leaded components in both consumer electronics products and commercially produced Amateur Radio gear. With the SMK-1, NorCal is providing us a great opportunity to learn the basic techniques and further develop the home construction methods that we'll need to work with them.

Manufacturer: The Northern California QRP Club; **http://www.fix.net/~jparker/norcal.html**.

The SMK-1 sells for $30 plus $4 shipping and handling. To order one, send a check or money order for $34 (made out to Jim Cates) along with a note indicating that you are ordering an SMK-1 to Jim Cates, WA6GER, 3241 Eastwood Rd, Sacramento, CA 95821. If possible, also follow this with an e-mail with "SMK-1" in the subject line to Doug Hendricks, KI6DS (**ki6ds@dospalos.org**), so that he can maintain an adequate parts inventory. QST

DXTelnet 4.7

DX Clusters have become the nerve centers of the HF and VHF DXing world. The first of these information-sharing networks was born in the heyday of amateur packet radio. Known as PacketClusters, the networks consisted of various interconnected packet switching nodes scattered throughout a state or region. These nodes functioned as hubs for packet radio connections established by dozens or even hundreds of DX hunters.

With the advent of the Internet, a few Web-based clusters have emerged, but radio-based PacketClusters are still very active. In fact, many PacketClusters have incorporated connections to the Internet. These are not Web connections in the sense that you might normally think of them. To access these clusters you need to use the TCP/IP *telnet* function. Back in the "old days" of the Internet (before the Web), this was a straightforward procedure if you knew the proper TCP/IP commands. Hams today are more accustomed to navigating the Internet through Web browsers and many Web browsers lack a telnet plug-in. This makes the process of establishing a telnet connection a baffling experience.

Enter *DXTelnet*

DXTelnet is a *Windows* based software package developed by Fabrizio Sartoni, IK4VYX. *DXTelnet* streamlines the process of connecting to DX clusters via telnet. Now you can connect easily, and enjoy a number of convenient features to boot!

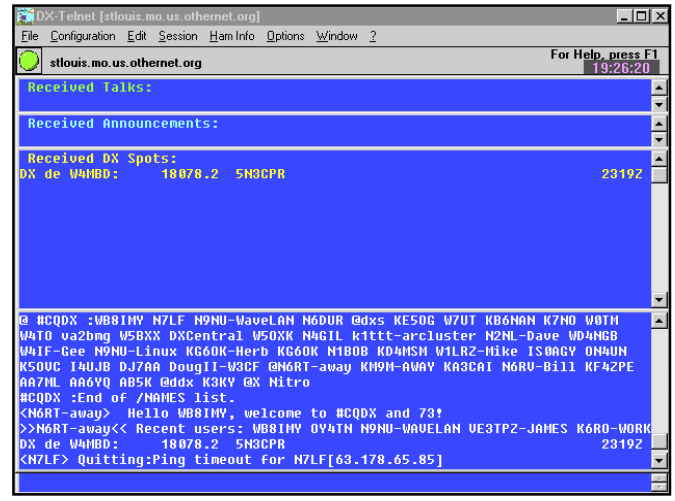
DXTelnet is really three *Windows* applications: *DXTelnet*, *DXPlorer* and *DXTNC*. *DXTelnet* is the telnet software, *DXPlorer* is a kind of specialized Web browser for Web-based clusters and *DXTNC* is designed for use with TNCs in radio-based PacketClusters. So, with one software package, you can choose any method you wish for connecting to your favorite DX spotting networks.

DXTelnet is much more than a simple terminal program or telnet client. *DXTelnet* is overflowing with bells and whistles that add even greater pleasure to the DXing game, especially for busy hams. For instance, you can filter DX spots so that duplicate spots (announcements about the same station posted more than once) are eliminated. You can set sound alerts that will chime when a spot for specific station call sign, or a particular entity, appears. You can even filter the alerts according to band. *DXTelnet* can export spot data into almost any log, or even to another cluster.

You can visually monitor the *DXTelnet* windows, or have *DXTelnet* audibly "announce" each incoming spot for you. If your PC is equipped with a sound card, *DXTelnet* will speak in a crisp voice with a slight Italian accent. Best of all—and this is a real hoot—*DXTelnet* can be configured to key a transmitter, such as a Family Radio Service (FRS) unit, and transmit the voice announcements to remote locations (it even includes an ID function). I tried this using two tiny Ranger FRS H-Ts and a jury-rigged keying line for the "base" unit. I set up *DXTelnet* to key the transmitter using an interface attached to my PC's printer port. Whenever a new DX spot showed up on the cluster, *DXTelnet* keyed the FRS rig and broadcast the call signs and frequencies to me while I was working in the yard. If you want to hear what this sounded like, listen to the audio sample at my personal Web site at: **http://home.att.net/~wb8imy/dxtelnet/dxtelnet.htm**.

On the Cluster

For this review I used *DXTelnet* primarily to connect to various Internet DX clusters and DX chat areas. You don't have to know the IP addresses to make a connection. *DXTelnet* has its own list of more than 50 active addresses. You begin by establishing your connection to the Internet. Once you are on line, bring up *DXTelnet* and click on the cluster you wish to try.



The main *DXTelnet* window (shown while connected to N6RT's popular CQDX-IRC node).

As you connect, *DXTelnet* logs you in automatically. If the site is active, you'll begin to see DX spots and other information within seconds. If you click on any received call sign and go to the HamInfo menu, you can activate a variety of online services to gather more information about the call sign. For example, you can do an address search, QSL manager search and so on.

By double clicking any displayed call you will get a pop-up window with information including the actual name of the DXCC country, distance, antenna heading, sunset and sunrise times, and much more.

I tried *DXTNC* briefly with a Kantronics KPC-3 TNC and it also worked very well. The split windows made reading easy and, once again, the voice announcements were particularly convenient. (This is especially so if you are puttering around the shack while trying to keep one ear on the radio.)

Downloading

DXTelnet is shareware and you can give it a try by downloading a copy at any of the following sites:

http://www.qsl.net/wd4ngb/telnet.htm
http://www.powernetonline.com/~dbald/dxtelnet.html
http://www.qsl.net/ad5xa/dxt.html

The unregistered version will operate for 30 minutes in the Web or telnet mode before shutting down. The TNC module will function for 60 minutes before quitting. If you enjoy *DXTelnet*, register the software and you'll not only get rid of the annoying premature shutdowns, you'll receive free "lifetime" upgrades as they become available.

Manufacturer: Fabrizio Sartoni, IK4VYX. $35, payable with VISA or MasterCard at the on-line ordering site on the Web at: **http://www.golist.net/**, *or visit* **http://www.geocities.com/dxtelnet/other.htm** *for information on other methods of payment. Minimum computer requirements: 486-66 or faster PC running* Windows 95, 98 *or* 2000.

Next Short Take

Steve Ford, WB8IMY ♦ QST Managing Editor

Ham University

As someone who teaches Amateur Radio classes in both theory and CW, I am constantly seeking new ways to help newcomers learn what they need to know. Hardly a week goes by without someone asking for the best way to learn theory, Morse code, or both. Often they mention specific tools, such as a particular book or some software they heard about from a friend. Only if I've actually worked with that item will I be able to give an answer based on anything except hearsay or rumor.

When I was offered an opportunity to try another tool, I couldn't refuse. Especially since I've heard so much about *Ham University* and its designer, Michael F. C. Crick. Over the years, many programs have been developed in the name of teaching about Amateur Radio. A few have withstood the test of time. This is one.

Installation and Use

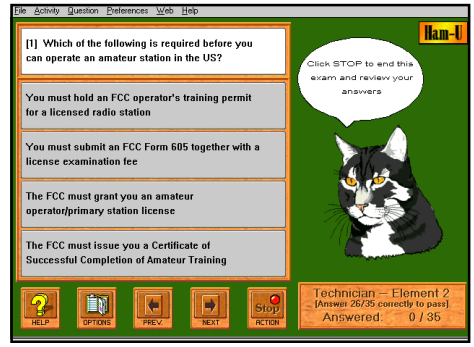
My home computer is a modest 486 PC running *Windows 95*. Since I found no mention in the installation and operation manual of specific computer requirements, I was a little concerned that my "ancient" machine might be too slow for the task. I was relieved to discover that program installed perfectly the first time. The book does say, however, that if you plan on using *Ham University* for learning Morse, a properly functioning sound card is necessary. I knew mine was working well (I've used it with the G3PLX PSK31 software), so I proceeded.

Using the instruction booklet, I quickly realized how easy this program is to use. At the title screen, you can pick from a variety of tools available under the "Activity" menu at the top of the page.

The first two items under the Activity Menu are FCC Question items. "Quiz" allows you to pick and choose which questions and/or topics you wish to be tested. The entire question pool is available to browse through, or you can focus on a particular topic. Each quiz is automatically given a default name (.QIZ extension) unless you assign a specific name. All option settings are saved when you leave. When you return, you can pick up right where you left off.

Clicking on FCC Question "Exam" brings a screen allowing you to either continue an existing exam or begin a new exam. All questions and answers are drawn word-for-word from the new FCC question pools, in use since April 15, 2000. At the end, the score shows exactly how many questions were passed and how many were missed. You can review those with incorrect answers. Exams are saved with .XAM extension, and can be saved before you start, during the exam, or after you've completed it.

Ham University takes a creative, entertaining approach to teaching Morse code.



"Morse" the cat grills you on Element 2 of the Technician exam.

Morse Training and Testing

Actual Morse code lessons are accessed by clicking on "Lessons." You must first put a Lesson Plan together. This is easily accomplished following the directions guided by Morris the Cat—an animated cat who assists by describing each function the mouse pointer indicates.

My favorite method is the "Exercise" approach done by copying with the keyboard. What you type is shown in the lower panel. At the end of the exercise, you can compare what you typed with the sent message displayed in the upper panel. Variables that you can manually adjust include speed in words per minute, character speed, message length and word length.

In addition to all this, *Ham University* offers a Morse game called PENTODE. The object is to build a large number of points in a short period of time. These points are received by connecting two or more tiles (the more the better), each containing the same character, as a diode (side by side), triode, tetrode or pentode. Personally, I found the game far less exciting than the speed exercise to copy Morse on the keyboard in the shortest possible time.

Conclusion

Ham University is an excellent tool for anyone wishing to use a computer to study for an Amateur Radio license, regardless of which level they wish to pursue. Of course, my recommendation is to use such a program in conjunction with a class. The interaction of others provides the additional element of experience, expertise, and a warm body to answer all of your questions.

In the absence of such a class, *Ham University* provides everything you need to go from ground zero all the way to Amateur Extra…in the comfort of your own living room.

I'd be remiss in this review if I neglected to mention something else. Displayed at the top of each page of the instruction booklet is a flag of a foreign country. Next to the flag is the appropriate country name, accompanied by its latitude and longitude, CQ Zone number and call sign prefix. This is a very nice touch, adding to the educational and instructional factor of the *Ham University* program.

Manufacturer: Michael F.C. Crick, MICA, 2845-140th Ave NE, Bellevue, WA 98005; **mica@crick.com**; **http://crick.com/hamu/**; *tel 425-883-2876 (9 AM to 9 PM PST). $40 with on-disk documentation; $45 with a printed manual (shipping via US Postal Service included).* QST

Next Short Take

Dan Miller, K3UFG ♦ ARRL Certification Specialist

LogWindows 3.07.30

Although *LogWindows* is primarily a logging program, it combines this function with transceiver and rotator control, PacketCluster monitoring, award tracking and QSL management into an integrated system. Additionally, the program is frequently updated to accommodate new hardware and add new features.

The first step in getting acquainted with *LogWindows* is to crack open the very thorough 170-page manual. It reminds me of an adage in public speaking: In order to get your point across, you have to tell your audience what you will be telling them, then tell it to them and finally tell them what it was you just told them. In other words, repetition is one of the best ways to commit something to memory.

Easy Navigation

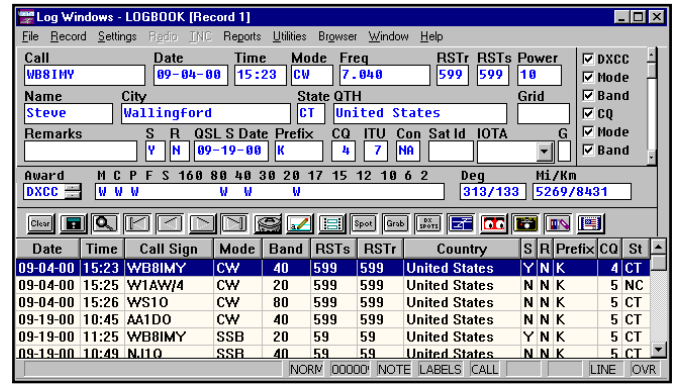
The program's main window is well organized. Data to be entered appears in the top portion, the bottom portion can be either a "terminal" (PacketCluster display) or a "browser" for contacts logged, and in between there is a row of boxes and a bar of buttons. The buttons perform special functions and the row of boxes indicates the direction and distance to the displayed contact as well as showing your progress toward earning particular awards. When the "terminal" is selected, there is also a row of buttons at the bottom of the terminal portion that are user-defined (typically used for PacketCluster command shortcuts). At the very bottom of the main window is a Status Bar showing some current program settings and messages to the user.

As expected, the data entry section includes fields for Call, Date, Time, Mode, Freq., RST Sent and Received, plus Power. Optional fields are available to enter Name, City, State, QTH, Grid and Remarks, plus QSL status and awards. The Remarks box is for brief comments; for more detailed comments there is a 255-character Operator Notes window that is opened and closed as needed (the notes are tied to the call sign, so the same notes appear for a particular call).

Buttons, More Buttons

The button bar is a row of icon type buttons that are used for the most common operations. The default buttons are: Clear, Save, Find, Go to First Record, Go to Previous Record, Go to Next Record, Go to Last Record, Delete Record, Open Notes Window, Print Label, Spot DX, Grab DX Spot, List Spots, Rotor Control, Pop-Up Database Browser, Capture TNC Data, Query Callbook and Query QSL Manager. Some of these items require appropriate hardware and/or software. For example, if you don't have a TNC, the DX Spot and Capture TNC Data functions will not be active. For those who prefer keyboard operations, there are also "hot-key" equivalents for each button.

Naturally, the Clear button empties all the entry fields so you can log a new contact. (The Date and Time fields are filled in for you and the Mode and Freq fields remain at their last settings. The RST and Power fields also receive default values.)The Save button preserves the data shown and the contact is not logged until the record is saved (so you can make as many changes as you need to before saving). To use Find, you clear the entry fields, type in a callsign or a partial call (with an "*" wildcard character) and click the magnifying glass. The data entry fields will display the first matching record and the browser (if selected) will show all matches. Other fields you can search by are Date, Prefix, State, QTH, Grid, CQ Zone and Continent. Band and Mode are ignored so you can't



search for all your CW contacts on 40-meters, but there is another way to do that (more on this in a minute). You can sort search results by Band, Call, Zone, Date, Mode, Prefix and State.

The record navigation buttons are very straightforward and they use arrow symbols similar to those on a VCR. The Delete button (a trashcan icon) removes the current record from the saved log. However, if you saved a record with a mistake in it, you don't have to delete it and reenter from scratch; instead you use Find to locate the record, fix the mistake and use Save to update the entry. The Open Notes window button (notepad with a pencil symbol) pops open a small window showing the operator notes. The print labels button (the icon is old style pin-feed address labels) prints labels for all the contacts you have marked for QSLing.

LogWindow's Spot, Grab and DX Spots (list) buttons gives folks with a TNC and access to PacketCluster node easy ways to log and "spot" DX stations. The Capture TNC Data (a camera icon) button allows you to save data from the TNC to a file. Lacking a rotator controller interface, I wasn't able to test the direction control (represented by a Yagi icon button).

Database Browser

The Database Browser window (a pair of eyes is the button for this) opens another window similar to the main window browse area, but with some additional search capabilities. In this window, you define a "query" (database lingo for search parameters). A query can be any combination of Date, Prefix, Zone, State, Band, Mode, and QSL status, with an additional box that lets you exclude up to 100 prefixes from the results.

The *Callbook* lookup button lets you query a callsign CD-ROM (all the ones I know of are supported) for address information and the Query QSL Manager button (a QSL card) will search an external QSL manager database for QSL route info. If you don't have a separate QSL manager, you can use the LWQSLMgr that is included with *LogWindows*.

Although the number of features included may seem overwhelming, the organization and screen presentation makes using this program a snap. *LogWindows* brings order to your station chaos, and it is a breeze to use!

Manufacturer: SCO, Inc (Les Scofield, W4SCO) with sales, support and development by Creative Services Software, 503 West State St, Suite 4, Muscle Shoals, AL 35661; tel 256-381-6100; fax 256-381-6121; **sales@logwindows.com**; **http://www.logwindows.com/**. *$69.95.*

Next Short Take

Michael Tracy, KC1SX ♦ ARRL Laboratory Engineer

RITTY 4.0

Several years ago, Brian Beezley, K6STI, developed one of the first high-performance RTTY programs for sound-card equipped PCs. Brian's *RITTY* software became extremely popular in the amateur digital community overnight. Actually, it was a little *too* popular. Before long, software pirates had copied *RITTY* and posted it on various Internet sites. That was the end of further *RITTY* developments—or so we thought.

We're happy to report that *RITTY* is back, and with improvements that make it well worth the wait.

What is *RITTY?*

For the uninitiated, *RITTY* is software that allows you to send and receive amateur radioteletype (RTTY) with a 486 DX or faster PC equipped with a 16-bit SoundBlaster-compatible sound card. *RITTY* is *DOS* software, but it can run in a "*DOS* window" in *Windows* on most Pentium-class PCs.

Instead of relying on an external interface to convert receive audio to data, and transmit data to audio, *RITTY* uses the sound card to perform the same tasks. This means you can send and receive RTTY with nothing more than your computer (even a laptop) and an SSB transceiver. Hardware connections for receiving involve an audio cable between your radio's line-level audio output (or external speaker) and the **MIC** or **LINE** inputs of your sound card. To transmit you need another audio cable between your sound card **LINE** or **SPEAKER** outputs and the auxiliary or microphone input of your radio. In addition, you'll need a keying interface (either a simple single-transistor homebrew circuit, or something more sophisticated such as a RIGBlaster interface) connected to your computer's COM port. Alternatively, you can allow the transceiver's VOX to do the keying. (*RITTY* also supports FSK keying if you can homebrew a dual-transistor interface for the COM port.)

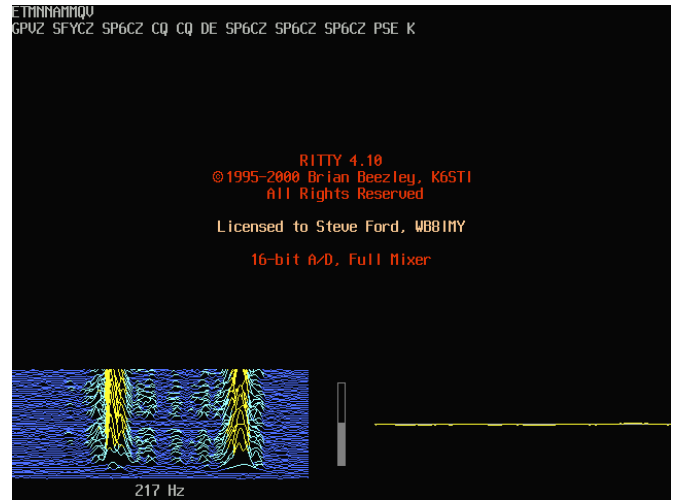
Turbo DSP

At the heart of *RITTY* are its high-performance digital signal processing algorithms. It's obvious that Brian has spent a great deal of time devising solutions for the peculiar problems of HF digital communication. Copying 1s and 0s while dealing with polar flutter, multipath, interference and noise isn't easy. Although *RITTY* doesn't claim to have conquered all of these gremlins completely, Brian has incorporated a number of effective DSP tools designed for troublesome conditions.

Take polar flutter, for example. Polar flutter amplitude-modulates a signal, generating incidental sidebands beyond the standard- or narrow-detector passbands. Depending on the severity, this can make decoding almost impossible. *RITTY* provides a special detector for polar flutter that uses wider channel filters to recover spread power. Like *RITTY*'s matched filters, its polar filters inherently have zero intersymbol interference. This property allows recovery of bits that flutter right down to the noise floor.

RITTY On the Air

Despite its technical sophistication, *RITTY* is simple to use on the air. The left-hand graph shows one of two spectral tuning indicators. If you opt for the line display, you see a horizontal line



***RITTY 4.0* on the air using the 3-D waterfall tuning display**

that seems to quiver slightly with the incoming noise. As you tune across a RTTY signal, the mark and space tones appear as twin spikes. The higher the spikes, the stronger the signals. *RITTY* locks onto the signals immediately and text begins marching across the black screen. Option two is a three-dimensional "waterfall" display in which RTTY signals look like ocean waves or mountain peaks moving from the bottom to the top.

The right hand graph displays one of three waveforms. The character waveform shows the demodulated mark-minus-space signal for one character length. The red tic marks locate samples for the start pulse, the five data bits, and the stop pulse.

When you begin typing, your text appears in the transmit buffer window, but will not be transmitted until you actually press the **PAUSE** button on your keyboard. As the characters are transmitted, they change from white to blue. You also have up to 12 macro keys that can be programmed with "canned" messages.

My performance tests were purely subjective, but the results were impressive just the same. I used *RITTY* during the SARTG RTTY Contest last August. In terms of coping with QRM on 20 meters, *RITTY* was the clear winner when I put it up against an external multimode data processor. *RITTY* also outperformed two other sound-card based RTTY programs that I had available at the time.

I had an opportunity to try *RITTY's* polar flutter decoder when I attempted to copy BY1DX on 15 meters in the late evening. His signals were extremely weak and unreadable with either the external multimode unit or my various sound-card programs. When I switched to *RITTY* and activated the polar flutter detector, the difference was astonishing. I could copy about 75% of BY1DX's transmissions, more than enough to make a contest exchange. Unfortunately, BY1DX couldn't hear me, but that has nothing to do with *RITTY!*

Manufacturer: Brian Beezley, K6STI, 3532 Linda Vista Dr, San Marcos, CA 92069; **k6sti@n2.net**. *$100 with delivery via e-mail, $5 additional for postal delivery. Check or money order only.* QST

Steve Ford, WB8IMY ♦ QST Managing Editor