Product Review & Short Takes Columns from *QST* Magazine

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Product Reviews

ICOM IC-718 HF Transceiver

Yaesu FT-1500M 2-Meter FM Mobile Transceiver

Short Takes

ProLog2K for Windows

ICOM IC-718 HF Transceiver

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

Anticipating a larger number of HF operators in the wake of license restructuring, many manufacturers are eager to introduce new lower-priced HF transceivers. ICOM's entry in the race is among the first out of the gate: the IC-718.

At approximately 4 × 9 × 9 inches, the IC-718 is a compact desktop rig with a functional "military" appearance. The front panel is dominated by a sizeable amber LCD display, large **VFO** tuning knob and forward-firing speaker. Concentric **AF** and **RF/SQL** gain pots are positioned immediately below the display along with concentric **RIT** and **IF SHIFT** controls. Buttons you are likely to use most often—**MODE**, **FILTER** and **TS** (tuning step)—are prominent and easily accessible above the **VFO** knob. Most of the remaining buttons, including the direct-entry frequency keypad, occupy the right side of the front panel. Although the trend during the past several years has been to use modular microphone jacks and 1/8-inch headphone jacks, the IC-718 reverts to the more traditional 8-pin conventional mike connector and 1/4-inch headphone jack.

The rear panel lineup is refreshingly spartan. There is an SO-239 antenna port, a "standard" 6-pin Molex dc power jack, an antenna tuner control jack (for use with ICOM's external autotuners), and a 13-pin accessory jack. Jacks are also provided for computer control (using ICOM's optional CT-17 CI-V level converter), external speaker and CW key or paddle. There are separate RCA-type **ALC** and **SEND** jacks for controlling linear amplifiers.

The IC-718 provides 100 W on SSB, RTTY and CW and 40 W on AM. The RF power output is continuously variable between approximately 5 and 100 W (from 2 to 40 W on AM).

The No-Manual Test

Like any kid with a new toy, I tend to be more than a little impatient. When I pop open the box and catch the first whiffs of that new-radio fragrance, the last thing I want to do is read documentation. I want to use the radio *now!*

In the time-honored tradition of redefining one's own personality defects as an aptitude for creativity, I've devised the "no-manual" test. Not only is it an expedient way to determine the user friendliness of a radio, the no-manual test satisfies my inability to defer gratification.

The concept is simple: use the manual to hook up the various cables, then toss it aside. The idea is to see how long it takes to get the radio on the air using your own intuition.

I'm an IC-706MKII user, so hooking up the IC-718 was particularly easy. I just unplugged the IC-706MKII cables and swapped them onto the '718. This included the control cable for my ICOM AH-4 remote-controlled antenna tuner. I use this device to feed a 90-foot length of wire strung between my tool shed and a tree in my backyard.

Pressing the front-panel **PWR** button, the IC-718 awoke with a metallic *ka-thunk*. Let's see… if the IC-718 is anything like my IC-706 the front panel **DN**/**UP** buttons should step me through the band selections. Bingo. I jumped to 10 meters, selected USB, set the **RF**/**SQL** control to fully clockwise and turned up the audio.

Nothing!

The S meter was twitching madly, but the speaker was utterly dead. Was the control set for maximum squelch? I spun the ring full counterclockwise, which I assumed would be the open-squelch position. Still nothing.

Now what? Was it time to admit defeat and read the manual? After a few more minutes of futile experimentation I decided to resort to the manual.

Sure enough, the answer to the mystery appeared on page 15. I discovered that the default configuration of the ring is to function as an RF gain control between the 7 o'clock and 12 o'clock positions, and a squelch from the 12 o'clock to 5 o'clock positions. I followed the instructions in the manual, set the contol to 12 o'clock and was rewarded with a flood of audio

Subsequent manual reading revealed that you can access the IC-718's menu system and redefine the dual-function ring configuration, choosing to have the ring act strictly as an RF gain or squelch control. I used a set-mode menu to set the ring to function solely as an RF gain adjustment and lived happily ever after.

The IC-718 makes use of two menus—a "quick set" and an "initial set" menu. There are 13 quick set menu selections that include the RF power output level, a three-step display dimmer (high, low or off), mike gain and VOX settings, and a handful of

Bottom Line

The ICOM IC-718 offers a nice collection of the more desirable features that are typically absent from transceivers in its price class.

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choices related to CW and RTTY operation.

The initial set menu includes selections for controlling a peak-hold function for the meter, a mode lockout feature, key beep, CW sidetone level, scan speed and resume condition, **RF/SQL** control behavior, key type and paddle sense, and some additional settings associated with the optional accessories.

The various menu selections are identified with alphanumeric character strings up to 8 characters long, so it's easy to find the specific setting you're looking to change.

Once the mystery of the ring was solved, the rest was easy. I punched the **TUNER** button and my AH-4 dutifully responded, tuning my end-fed wire for a 1.3:1 match on 10 meters. I answered a CQ and received a fine signal report from a station in Spain. On-the-air reports indicated that the supplied hand mike produced clear transmit audio, even when I activated the '718's

Table 1
ICOM IC-718, serial number 001069

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 0.03-30 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[1]; transmit, 1.8-2, 3.4-4, 7.0-7.5, 9.9-10.5, 13.9-14.5. 17.9-18.5, 20.9-21.5, 24.4-25.1, 28-30 MHz.
Power requirement: Receive, 2.0 A; transmit, 20 A (maximum).	Receive, 1.7 A; transmit, 18 A. Tested at 13.8 V.
Modes of operation: SSB, CW, AM, AFSK, FSK.	As specified.
Receiver	*Receiver Dynamic Testing*
SSB/CW sensitivity, bandwidth not specified, 10 dB S/N: 1.8-30 MHz, <0.16 μV.	Noise Floor (mds), 500 Hz filter: *Preamp off* / *Preamp on* 1.0 MHz –120 dBm / –129 dBm 3.5 MHz –129 dBm / –137 dBm 14 MHz –130 dBm / –139 dBm
AM sensitivity, 10 dB S/N: 0.5-1.8 MHz, <13 μV; 1.8-30 MHz, <2 μV.	10 dB (S+N)/N, 1-kHz tone, 30% modulation: *Preamp off* / *Preamp on* 1.0 MHz 5.4 μV / 1.8 μV 3.8 MHz 1.8 μV / 0.7 μV
Blocking dynamic range: Not specified.	Blocking dynamic range, 500 Hz filter: *Preamp off* / *Preamp on* 3.5 MHz 123 dB* / 121 dB* 14 MHz 120 dB* / 119 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 88 dB / 87 dB 14 MHz 87 dB / 85 dB
Third-order intercept: Not specified.	*Preamp off* / *Preamp on* 3.5 MHz +10.4 dBm / –2.3 dBm 14 MHz +6.8 dBm / –9.3 dBm
Second-order intercept: Not specified.	Preamp off, +54 dBm; preamp on, +55 dBm.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: preamp off, 149 μV[2]; preamp on, 38 μV.
Squelch sensitivity: SSB, CW, RTTY, <5.6 μV.	At threshold, preamp on: SSB, 6.4 μV.
Receiver audio output: 2 W into 8 Ω at 10% THD.	2.3 W at 10% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW-N (500 Hz filter): 324-849 Hz (525 Hz); CW-W: 182-1980 Hz (1798 Hz); USB-W: 136-2315 Hz (2179 Hz); LSB-W: 178-1988 Hz (1810 Hz); AM: 27-2069 Hz (2042 Hz).
Spurious and image rejection: 70 dB.	First IF rejection, 14 MHz, 92 dB; image rejection, 14 MHz, 93 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output: SSB, CW, FM, FSK, 5-100 W; AM, 2-40 W.	CW, SSB, FM, typically , <1-113 W; AM, typically <1-38 W.
Spurious-signal and harmonic suppression: ≥50 dB.	54 dB. Meets FCC requirements for spectral purity.
SSB carrier suppression: ≥40 dB.	As specified. 60 dB.
Undesired sideband suppression: ≥50 dB.	As specified. 64 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figure 1.
CW keyer speed range: Not specified.	6 to 48 WPM.
CW keying characteristics: Not specified.	See Figure 3.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 290 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 12 ms. Unit is not suitable for use on AMTOR.
Composite transmitted noise: Not specified.	See Figure 2.

Size (hwd): 3.8×9.4×9.3 inches; weight, 8.4 pounds.

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.
*Measurement was noise-limited at the value shown.
Third-order intercept points were determined using S5 reference.
[1]Sensitivity degrades below 100 kHz. Noise floor at 30 kHz is –53 dBm.
[2]S-meter has a rather narrow range between S1 (7.8 μV) and S7 (17 μV) with a much larger change from S7 to S9 (preamp off figures given).
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.

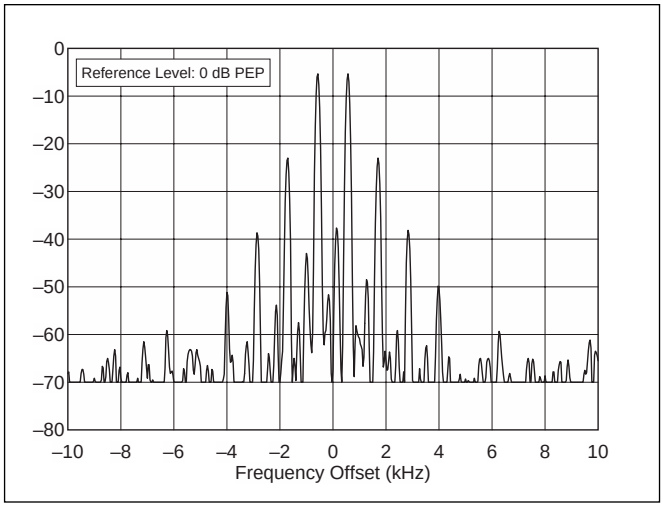

Figure 1—Worst-case spectral display of the IC-718 transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 25 dB below PEP output, and the worst-case fifth-order is approximately 39 dB down. The transmitter was being operated at 100 W output at 7.200 MHz (see text).

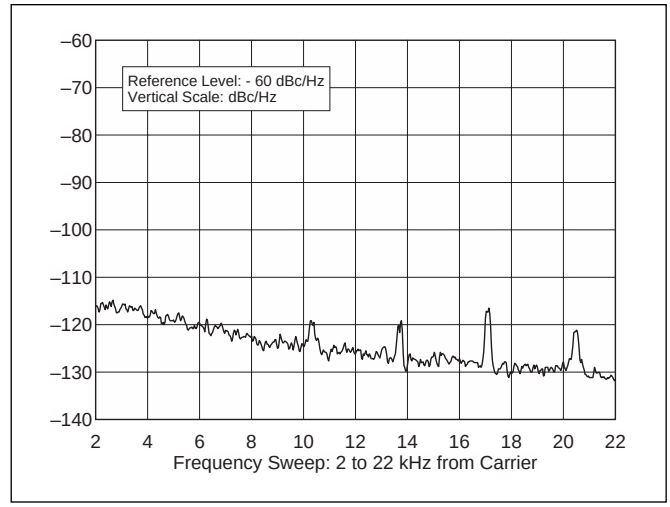

Figure 2—Worst-case spectral display of the IC-718 transmitter output during composite-noise testing at 14 MHz. Power output is 100 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

fixed-level speech compressor.

I found that the IC-718 was very easy to operate with a minimum of "manual" intervention.

Those of you who actually do spend time reading manuals will be very pleased with the provided documentation. It is complete, well organized and easy to follow. Separate foldout sheets with detailed schematic and block diagrams are included.

Familiar Features and Characteristics

As an IC-706 user, I found much that was familiar in the IC-718. Other than the fact that the '718 lacks FM capability, or 6 and 2 meters, it performed much like my '706—and shared many of the same features. I found myself wondering if the IC-718 was a direct design descendant of the '706.

Receive performance was very similar, right down to a similar tendency to become overwhelmed when too many signals populate the band. Before you interpret this as a criticism of the '718, bear in mind that this radio, like the IC-706, was never intended to have high-end "competitive" receive characteristics. The selectivity and dynamic range are more than adequate though—just what you would reasonably expect from a radio selling at well under $1000.

The ARRL Lab measurement data presented in Table 1 confirms that the IC-718's receiver performance numbers are very close to those that we reported for the IC-706MKIIG that we reviewed in the July 1999 Product Review column. These numbers compare favorably with—and in some cases slightly surpass—those of the other currently available transceivers in the '718's price class.

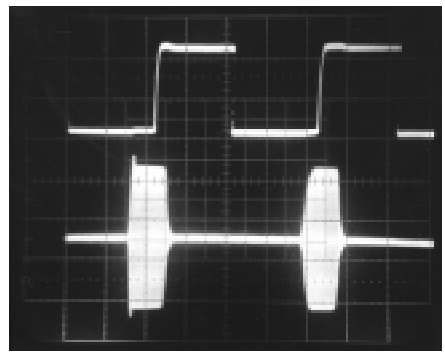

Figure 3—CW keying waveform for the IC-718 showing the first two dits in full-break-in (QSK) mode. The equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 100 W output at 14.2 MHz. Note that both dits are somewhat shortened. Only the first dit is shortened in semi-break-in mode. Also note the higher-power "spike" on the leading edge of the CW waveform (see text).

Another—less desirable—'706-like behavior that is evident in the IC-718 is the existence of a leading-edge high-power "spike" in CW or continuous carrier modes (see Figure 3). A brief power surge might trip protective circuitry or possibly cause damage to some amplifiers. Even with the transceiver's RF power output level throttled back to 25 W, a spike on the order of 50 W was observed.

Our IC-718 had the UT-106 DSP option installed—this is the same accessory unit that's applicable to a number of different ICOM transceiver and receiver models. The DSP board adds an automatic notch filter and a noise reduction feature.

The adjustable noise reduction worked extremely well, doing an outstanding job of cleaning up noise. The automatic notch filter was a pleasure. When you're operating SSB and the inevitable "tune-up" interference appears, you jab the front-panel **ANF** button once and—*poof*—it's gone.

It may have been my imagination, but the IC-718's IF shift seemed to be particularly sharp. With both CW and SSB signals, I was able to manipulate the IF shift to eliminate or reduce interference successfully in many instances.

Getting Around the Bands

As I've already mentioned, selecting a band is as easy as punching the front panel **UP** or **DN** buttons. You can use this method to hop from 160 through 10 meters in no time.

If spinning the VFO is more to your liking, the IC-718 makes it easy with the **TS** function, which allows you to vary the tuning increments to cover a lot of spectrum very quickly. In addition, as you spin the **VFO** knob faster, the tuning speed increases automatically.

If you know exactly at which frequency you wish to operate, just press the **F-INP/ENT** button on the IC-718 keypad, punch in the frequency digits, then press the button again. That's all there is to it.

Of course, the IC-718 has frequency/mode memories—101 of them, in fact. You can store all of your favorite frequencies into memory, then use the **CH** button in combination with the **UP**/**DN** buttons to step through the channels. Alternatively, you can simply enter a desired memory channel

number into the keypad. Spinning the **VFO** knob allows you to tune above or below the selected memory channel frequency.

The IC-718 supports two VFOs for split-frequency operation and the splits can be stored in memory as well.

Two scanning modes are offered in the IC-718. The memory scan steps through the designated memory channels. There are no provisions however, for locking specific memory channels out of a memory scan operation.

The programmed scan seeks signals between two specific frequencies. With the wide variation between signal strengths and the random noises encountered on the HF bands, programmed scanning can be problematic and, frankly, doesn't work all that well in most HF transceivers.

Digital Operation

Operating RTTY or PSK31 with the IC-718 was a breeze. The audio inputs and outputs, along with the transmit keying lines, are available at the 13-pin accessory jack. The pin designations matched my IC-706 closely enough that I was able to merely plug in my existing cable and go.

Although wiring up a 13-pin connector can be a considerable test of your soldering skills, at least you'll find clear descriptions of the connector pin outs for all of the jacks in the documentation. (Incidentally—a plug for this accessory jack is not packed with the transceiver.)

The fixed-level audio from the '718's accessory output was robust (somewhat stronger than what is available with my '706) and very clean. Working RTTY, the IC-718 kept its cool at full output during long ragchews. The cooling fan vents through the bottom of the enclosure. The noise level produced by the fan was not excessive.

Frequency stability was excellent as well—and there's even an optional high-stability crystal unit available. If you prefer FSK to AFSK RTTY, the IC-718 *does* provide an FSK keying pin at the accessory jack—FSK operation is not offered on the majority of the other low-end transceivers.

The IC-718 performed equally well on PSK31. Using my sound card interface I had no RFI or ground loop problems. According to the reports I received on the air, my signal was clean and stable.

I have some concerns about the performance of the IC-718 on the "burst modes" (PACTOR, G-TOR, AMTOR, Clover). While I was using the transceiver on SSB, I noticed that it seemed to take a while for the receiver to fully recover after releasing the PTT switch on the microphone. While this has little effect on SSB, RTTY or PSK31 operation, fast transmit/receive recovery is critical for the burst modes. The transceiver must be able to transmit a signal burst and switch back to full receive sensitivity within a very short amount of time (measured in milliseconds). If it cannot, it may not receive the beginning of the return burst from the other station and the link will eventually fail.

Lab measurements, taken using the keying connections available at the 13-pin accessory jack, confirmed my suspicions. The transmit/receive turnaround time measured on our review unit was about 290 ms. For proper 'TOR operation, the transmit/receive turnaround time should be less than 35 ms. ICOM reports that they have developed a modification that reduces the turnaround time to 25 ms, which meets the 'TOR requirements. Contact them for details.

CW Operation

The IC-718 will win the hearts of some CW operators with its built-in electronic keyer. The speed is adjustable from about 6 to 60 WPM and you can fudge the weighting as well. The CW pitch is adjustable from 300 to 900 Hz and the sidetone level is continuously variable. ICOM has even included a CW-reverse mode—often a very useful tool for reducing interference from nearby band activity.

You can plug your paddle or straight key into the rear-panel jack, or wire it into an 8-pin microphone plug if you prefer (the manual describes how to do this). You can even use a menu setting to assign paddle functions to the **UP**/**DN** keys on the hand mike—though effectively using these keys for generating readable code is probably going to take some practice!

Full break-in CW is available and it seemed to work reasonably well—although there is a bit of a racket from the transmit/receive relay. Again, it helps to remember that the IC-718 is designed primarily for casual CW operating.

Several Points Worth Noting

The IC-718 allows you to install one optional IF filter. We installed the 500-Hz filter in our unit and found that it performed well in crowded CW and RTTY conditions. If you're going to be using the transceiver primarily for CW and RTTY, the 500-Hz filter is a worthwhile investment. Alternative optional filters include a 250 Hz CW/RTTY filter and 3.3 kHz, 2.8 kHz and 1.8 kHz SSB filters. An optional AM filter (a desirable item for shortwave and utility listening) is not available.

Although the IC-718 shares many of the same filter choices as their '706 series transceivers, an optional filter installed in the '718 must be soldered into place—push-in sockets are used in the '706s. While the solder-in installation procedure is not particularly difficult, some '706 owners have expressed that they enjoy the flexibility offered by the plug-in arrangement. With the '706 it's a pretty simple operation to pop off the cover and swap in the desired filter for a specific application—SSB, CW, RTTY, etc.

Yes, the IC-718 offers a noise blanker, but this one is *continuously adjustable*—something you don't often see even in the high-end radios. To vary the level you press and hold the **NB** button for one second, then turn the **VFO** knob to select the desired level of noise reduction. In my brief experiments the noise blanker did a good job of suppressing pulse noise—ignition noise in particular.

As is the case with the comparable economy-class HF transceivers by the other manufacturers, the '718 does not include a built-in automatic antenna tuner—two optional external tuners are available.

Unlike some of the others however, this transceiver *does* include built-in SWR metering capability—a very welcome feature in any HF transceiver—and especially in one with dimensions that make it ideal for portable operation.

Phone operators will be pleased to hear that ICOM has included VOX in the '718. This is another example of a feature that is typically absent in HF radios in this price class.

Finally, a voice-synthesizer option is available. We didn't test this feature, but it is worth mentioning for the interest of visually impaired operators. The UT-102 synthesizer announces the operating frequency, mode and the S meter reading.

A Couple of Nits to Pick

The first nit focuses on FM—the lack of it, that is. Ten-meter FM is a more active mode than many believe. Listen to 29.600 MHz or any of the 10-meter repeater output frequencies when the band is open and you'll always hear signals. The IC-718 covers this frequency range, but without FM capability you can't take part in the fun. (The best you can do is switch to the AM mode and slope-detect the signals.) This feature would also be attractive to those that might want to connect the '718 to a trans-verter. While including FM in the IC-718 would have undoubtedly added to the final cost, it would have been nice if ICOM had at least made it available as an optional.

The second nit concerns the automatic gain control (AGC). You cannot vary the AGC setting in the IC-718. The AGC is fixed; there is no way to select fast or slow AGC. This is unfortunate because the ability to choose a fast or slow AGC response can make a substantial difference in received signal quality. You wouldn't expect a continuously variable AGC control in a rig of this type, but the lack of even a fast/slow AGC menu selection is puzzling.

Conclusion

For casual HF operating you don't need

to spend thousands of dollars on a transceiver. Those multi-kilobuck rigs are outstanding for hard-core DXing and contesting, but the casual operator will never use or need most of their advanced features and specs. Instead, all you really need is a radio that is easy to operate and gets the job done at a reasonable price. The IC-718 meets all of those criteria and includes several useful features that are not found in some of the alternative economy-class transceivers.

Manufacturer: ICOM America, 2380 116th Ave NE, Bellevue, WA 98004; 425-454-8155; fax 425-454-1509; **75540.525@compuserve.com**; **http://www.icomamerica.com**. Manufacturer's suggested retail price: $899. Typical current street price, $750. Suggested list pricing on accessories: UT-106 DSP Receive Unit, $166; UT-102 Voice Synthesizer Unit, $74; CR-338 High Stability Crystal Unit, $81; FL-52A 500-Hz CW/RTTY filter, $245 (alternative filters range in price from $190 to $245).

Yaesu FT-1500M 2-Meter FM Mobile Transceiver

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

The Yaesu FT-1500 is a single band 2-meter FM transceiver with an ample selection of the most important features. While it's not quite as fully equipped as Yaesu's alternative 2-meter mobiles—their feature-packed FT-3000M and their well-appointed FT-2600M transceivers—what the FT-1500M might lack in bells and whistles it makes up for in its remarkably compact dimensions and apparent ruggedness.

If you are particularly hard on your mobile transceivers mechanically—if you tend to drop or throw them, or perhaps even run them over with your car occasionally—you'll definitely want to make sure you include a look at the '1500M on your next radio shopping excursion. (This is not to say that we've verified the mechanical durability of this transceiver—ARRL Lab testing does not currently include a regiment of impact and mechanical stress testing. If looks and feel count for anything though, I'm confident that this radio would be up to just about any such tests we could reasonably subject it to.)

A Small Wonder

The FT-1500M is undisputedly the smallest 50 W 2-meter FM Amateur Radio transceiver available today. It is however, somewhat larger than the FT-90R—Yaesu's dualband VHF/UHF FM mobile.

Notable features include 130 memories with 6-character alphanumeric label capability, expanded receive coverage from 137 through 174 MHz (AM aircraft reception is not supported); 1200/9600 bps packet operation; S meter squelch; CTCSS encode, decode and tone scan; automatic repeater offset; a variety of scan modes, a time-out timer and automatic power shut off.

Yaesu has also tossed in their exclusive "Smart Search" feature. Once activated, this system will scan through the band and automatically load any active frequency that it encounters into a dedicated 31-channel memory bank. You can then sort through these manually and memorize any that are of interest into the regular memory positions. The Smart Search memories will be erased when you exit the search though, so you'll want to transfer desired frequencies into the regular memories immediately.

Conspicuously absent from the '1500M are two features that had seemed to become staples on nearly every Yaesu VHF or VHF/UHF transceiver released over the last few years; digital code squelch (*DCS*) and their automatic range transponder system (*ARTS*). While these can be useful capabilities, they are not currently finding wide use. The vast majority of operators will probably never miss them.

The Hard Facts

The body of the transceiver consists of two die-cast aluminum covers that mate together clamshell-style. There are no separate front or rear panel assemblies, these two enclosure sections wrap completely around the internal electronics. The aluminum's thickness appears to be about $^{3}/_{16}$-inch.

A smallish liquid crystal display is recessed into the front panel and presents frequency or alphanumeric information as $^{1}/_{4}$-inch tall characters on a blue background. Icons representing activated features appear along the top and left edges of the display—a 10-segment signal/RF power output meter occupies the bottom edge. The display background illumination intensity can be adjusted to 10 different levels or shut off completely.

Display legibility is good from nearly any angle, but bright lighting can cause problems with glare. For mobile applications, choose your mounting location accordingly.

Two large knobs are positioned to either side of the display window. The knob on the left controls the volume. The right knob—labeled **DIAL**—is used for tuning through frequencies or memories, or for selecting and changing settings when in the set mode.

Five rubberized buttons for controlling the most common operations are positioned

Bottom Line

The FT-1500M is the smallest 2-meter FM mobile transceiver on the market today. Yaesu has squeezed in all of the most important features and has even managed to provide nearly total remote control from the microphone.

Table 1
Yaesu FT-1500, serial number 0E030077

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 137-174; transmit, 144-148 MHz.	Receive and transmit, as specified.
Power requirement: Receive, 0.7 A; transmit, 8 A (high power).	Receive, 0.52 A; transmit, 8.0 A. Tested at 13.8 V.
Modes of operation: FM.	As specified.
Receiver	*Receiver Dynamic Testing*
FM sensitivity, 12 dB SINAD: <0.2μV.	For 12 dB SINAD, 0.17 μV.
FM adjacent channel rejection: Not specified.	20 kHz channel spacing: 77 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing: 71 dB; 10 MHz channel spacing: 100 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	82 dB.
S-meter sensitivity: Not specified.	Maximum indication: 5.1 μV.
Squelch sensitivity: Not specified.	At threshold: 0.06 μV.
Receiver audio output: 3.5 W at 10% THD into 4 Ω.	3.4 W at 10% THD into 4 Ω.
Spurious and image rejection: Not specified.	First IF rejection, 102 dB; image rejection, 85 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output (H/L3/L2/L1): 50 / 25 / 10 / 5 W.	50 / 24 / 9.5 / 3.8 W.
Spurious-signal and harmonic suppression: ≥60 dB	68 dB. Meets FCC requirements for spectral purity.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 105 ms.
Receive-transmit turn-around time (tx delay): Not specified.	16 ms.
Bit-error rate (BER), 9600-baud: Not specified.	Receiver: BER at 12-dB SINAD, 2.5×10^{-3}; BER at 16 dB SINAD, 4.4×10^{-5}; BER at –50 dBm, 1.4×10^{-4}; transmitter: BER at 12-dB SINAD, 9.3×10^{-3}; BER at 12-dB SINAD + 30 dB, 3.0×10^{-4}.
Size (hwd): 1.4×5.0×5.0 inches; weight, 2.2 pounds.	

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

"keyboard-style" across the front edge of the top cover. These include **MHz**/**SET**, **REV**/**DW**, **LOW**/**A/N**, **D/MR**/**MW** and the **PWR** buttons. These keys and the two knobs are the only controls on the chassis of the radio. The majority of the more advanced operations—the squelch level, the repeater shift, the tuning steps and various CTCSS settings, for example—are controlled through a set-mode menu.

On the back side of the enclosure you'll find a chassis mounted SO-239 antenna connector, a $^1/_8$-inch external speaker jack and a 6-pin mini DIN data jack. Dc power is connected through a 9-inch cable that's terminated with the conventional T-type Molex connector. A separate 9-foot power cable, with a mating connector and fuses in both leads, is also supplied.

A small internal speaker is mounted inside the top cover.

Microphone Magic

The MH-48 hand microphone supplied with the FT-1500M features a backlit 16-button DTMF keypad, side-mounted **LAMP** and **LOCK** switches, top-mounted **UP** and **DWN** buttons that mimic the operation of the front panel **DIAL** control and, of course, the **PTT** button.

Four additional keys—**P1**, **P2**, **P3** and **P4**—are located just below the 16-button keypad. In their factory-default configurations, **P1** opens the squelch, **P2** activates a "Smart Search," **P3** initiates a CTCSS tone search and **P4** switches the receiver to a preprogrammed band of 10 standard NOAA Weather Broadcast channels. You can reprogram the buttons to provide instant access to any one of these four operations or chose from one of six others—CTCSS tone activation, tone burst, duplex direction, dc voltage indication, display brightness or memory channel skip settings for scanning.

When the radio is in the receive mode, pressing the **number** buttons on the DTMF keypad allows you to enter frequency digits directly. When you enter the 6th digit in the string (or press the **#** key if the desired trailing digits are all 0), the radio will instantly tune to the entered frequency—no additional "enter" button stroke is required. Punch in a memory number followed by the ***** key and the radio will tune to that memory channel.

DTMF keypad entries with the **PTT** button pressed will result in transmitted DTMF tones for repeater control and autopatch applications. There are also 9 autodial memories that can hold up to 16 digits each. The speed of the transmitted string and a start delay setting can be varied with a menu setting.

The MH-48 is very similar to the MH-38B microphones that have been packed with the last few Yaesu transceivers we've looked at, but this one has a few more tricks up its sleeve.

When the radio is in the receive mode, the DTMF **A**, **B**, **C** and **D** buttons will perform the same functions as the keys mounted on the body of the transceiver. This allows control of every operation of the radio—with the exception of the volume level and power on/off—from the microphone.

Nearly all of the buttons on the microphone (and on the radio itself) sound a unique note when pressed. After you become used to their sounds, this confirms that you've pressed the desired key without having to divert your attention to the legends on the buttons or the information on the radio's display. This would certainly be a useful feature for the vision impaired. Unfortunately, a voice synthesizer option is not available.

Hittin' the Road

While many FT-1500Ms will likely end up finding applications in portable and fixed stations operations, this radio's small size and extensive microphone control capabilities should make it a very popular choice for permanent mobile installations.

The included mobile mounting bracket is unique. It consists of a $3 \times 2^3/_4$-inch plate with a pivoting rod system that allows you to adjust the angle of the chassis. You can mount the bracket to the top or the bottom of the transceiver—whichever suits your situation best.

Workin' It

Yaesu provides a small 44-page *Operating Manual* and a folded sheet of paper

with detailed schematic and block diagrams. The step-by-step instructions given in the manual are easy to follow. I didn't run into any difficulties programming or varying the settings on even the most advanced features.

The operations that you use most—selecting the memory, home or VFO mode; adjusting the RF power output level; writing VFO information to a memory; toggling to the input frequency of a repeater; for example—are directly controlled through the keys located on the top of the front panel. Their primary assignments are activated with a quick press. Pressing and holding a key for a second or two brings up its secondary assignment. There's no function button to fumble with.

The duplication of these top panel keys on the microphone's **A, B, C** and **D** buttons is particularly handy for mobile operation. It would have been nice to have them specifically labeled with their functions, but it probably won't take long to commit their assignments to memory.

The radio makes extensive use of a set-mode menu for controlling the more advanced operations. There are a total of 35 selections. All are clearly identified with alphanumeric titles up to 6 characters long and are arranged alphabetically. It certainly makes it much easier to locate the desired selection. Good going Yaesu!

I used the FT-1500M in both mobile and fixed station operation and was generally very pleased with the control configuration and performance.

Transmit audio reports gathered from my usual test group of local audiophiles positioned the FT-1500M's transmit sound quality squarely in the "communications grade" category. While the gang agreed that it didn't sound objectionable, all preferred the fuller range of audio frequencies rendered by my trusty old shack transceiver.

The receive audio—although plenty loud—does suffer the usual consequences of being reproduced through a comparatively small speaker. The '1500M's receive audio clarity benefits greatly from the use of a larger external speaker. With an external speaker connected, the 3½ W audio output is more than sufficient in even the noisiest environments.

What's Cookin'?

The FT-1500M—as is the case with nearly all of the current single band FM mobile transceivers—does not enjoy the luxury of an internal cooling fan. Part of the design philosophy of its die-cast aluminum enclosure is to allow the entire surface area of the radio to act as a heat sink.

Extended periods of relatively high duty cycle operation at full power output can bring the temperature of any transceiver's heat sink (the whole radio in this case) to a pretty significant level.

I spent an evening rag chewing with a couple of the locals. With the RF power output set to the 50 W level, after about a half-hour of exchanging our usual fast-paced witty banter, I noticed that the temperature of the transceiver had risen to a considerable level. Shortly afterward, protective circuitry in the radio recognized the dire implications of such a temperature increase and automatically switched the RF power output to the low setting.

I don't find this particularly alarming, but let me provide a couple of suggestions (incidentally, these are valid for any transceiver). 1) Resist the temptation to mount any transceiver in a location that restricts air movement around the enclosure. (This warning is found in every transceiver's owners manual—save some H-Ts, perhaps.) With a chassis size as small as this, it's difficult to resist mounting it in the small storage compartments prevalent in most modern car interiors. Just don't. 2) Use the minimum amount of RF power output necessary for effective communications. (Now where have we seen this "suggestion" before?)

A particularly nice feature provided on the FT-1500M is the ability to assign one of four RF power output levels—5, 10, 25 or 50 W—to any programmed memory. Repeaters that are located close to your usual stomping grounds can be programmed in with lower power settings. Those further away can be allocated higher settings. Make use of this feature.

Table Scraps

Looking over the data presented in Table 2 reveals a respectable level of performance.

The 10 MHz offset IMD number, typically a good measure of a transceiver's ability to reject interference from nearby VHF commercial communications just to either side of our 2-meter band, came in at 100 dB. This level is well above the running average of the numbers posted by the single band VHF mobile transceivers we've recently reviewed.

The receiver sensitivity, the IF rejection and the image rejection measurements, while not chart topping, all compare favorably with similar units.

Bit Error Rate (*BER*) testing for 9600-baud operation produced results that point to poor performance. It should be noted that we've seen similar problems with the majority of the 9600-baud capable FM-only transceivers that we've tested over the last 5 years. If 9600-baud operation is important to you, please refer to *"9600-Ready" Radios: Ready or Not?* by Jon Bloom, KE3Z, in the May 1995 issue of *QST.*

Wrappin' It Up

The FT-1500M possesses all of the features that are required for the vast majority of the 2-meter FM operation that I typically participate in. Its small dimensions should offer a wider variety of mounting options to those looking to install radio equipment in modern vehicles, and its rugged construction and simple operation makes it an attractive choice for public service and portable applications.

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

Manufacturer's suggested list price: $279. Typical current street price: $200.

NEW PRODUCTS

2000 TECHNICAL BOOK CATALOG FROM PROMPT PUBLICATIONS

◊ Howard J. Sams and Company and Prompt Publications have released the 2000 edition of their *Technical Book Catalog*. The catalog contains over 200 publications listings on a variety of electronics related topics.

This year's edition has been redesigned to feature Prompt's best-selling titles, and divides titles into specific categories—regardless of the publisher—making it much easier to locate titles on a particular area of interest.

Sections include audio, communications, electronics basics, electronics technology, professional reference, projects, test and measurement, troubleshooting and repair, and video technology.

New sections, not provided in previous editions, cover automotive, business and electrical technology.

The 2000 edition features select titles from Butterworth-Heinemann, Macmillan Computer Publishing and IDG Publishing, and videos from the UCANDO Educational series.

To get a free copy of Prompt Publication's *2000 Technical Book Catalog* visit your local participating electronics distributor or contact Howard W. Sams and Company, 2647 Waterfront Pkwy E Dr, Indianapolis, IN 46214; tel 800-428-7267, fax 800-552-3910; **http://www.hwsams.com**.

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FEEDBACK

◊ Please refer to Jim Kocsis, WA9PYH, "Improving the Hamtronics R139 VHF Weather-Satellite Receiver Interface," *QST*, May 2000, p 41. The URL in endnote 5 is now **http://www.hffax.de/WX_Satellite/WXSat/wxsat.html**.

QST

ProLog2K for *Windows*

In the good old days logs consisted of pen or pencil renderings in spiral-bound journals. When personal computers invaded Amateur Radio 20 years ago, the paper logs gradually gave way to software databases. At the time most people assumed that logging software would always stay in the database mold—sort, display, print and so on.

Most people were wrong.

ProLog2K represents the new generation of programs that extend beyond mere data handling. It's probably more accurate to call *ProLog2K* "station automation" software. Some hams blanch at the idea of anything that would automate a station in any way, but reserve your judgement until you've read the full story.

If you want *ProLog2K* to simply log contacts, it will do that. But *ProLog2K* does much more than store data. When you enter a contact, *ProLog2K* immediately serves up a wealth of information (see Figure 1). Unfamiliar with the call sign? *ProLog2K* will tell you which DXCC entity the call sign represents, the distance to the target, the short and long-path bearings (for those with rotatable antennas), the DX station's CQ zone and ITU zone. If you've worked this station before, *ProLog2K* will tell you instantly. You'll also know instantly whether you need the station for DXCC, WAC or other awards. If you've purchased the QSL Manager Database option, *ProLog2K* will flash up the call sign of the DX station's QSL manager (I was particularly impressed with this feature).

ProLog2K provides fields for you to enter the frequency, band, mode (including PSK31, bless their hearts!) and other information. You can indicate whether you are QSLing direct or via the bureau and, when the coveted card arrives, you have the pleasure of marking it as "received." Of course, with its extensive report-generating capabilities *ProLog2K* gives you the ability to review the status of your award pursuits, QSLs sent and received, and more. Printing QSL labels is a snap.

You can create up to 36 different logs in *ProLog2K*, depending on your preferences. You can cross-merge one log with another. You can even merge contest logs created by other software into *ProLog2K*. This is particularly handy if you enjoy using contests to glean contacts for your DXCC or other awards.

Station Automation

I don't know about you, but I'm a busy guy on the home front. Between parenting a 6-year-old daughter and doing endless household chores, I have to squeeze Amateur Radio into whatever free moments I can find. Thanks to *ProLog2K*, I can hunt DX and still keep my child from applying duct tape to the cat. With remarkably little effort you can set up *ProLog2K* to function as a watchdog for your packet TNC or on-line Web cluster. Depending on how you configure the program, *ProLog2K* will dutifully watch the incoming DX data and continually compare it to your log. Since *ProLog2K* "knows" the status of your various awards, it will alert you with an insistent audio beep when a must-have contact is spotted on the air.

If you have *ProLog2K* configured to control your radio, the next step is easy. You examine the nature of the "alert," scratch your chin a bit, then say to yourself, "Yes. I want that contact." With a keystroke your rig zips to the necessary frequency and mode. You're ready for action.

ProLog2K supports computerized rig control for most popular transceivers. Datamatrix also markets the LCU-3, a hardware control interface that directly replaces ICOM's CT-17, Kenwood's IF-232C and Yaesu's FIF-232C at a fraction of the cost.

ProLog2K runs on PCs using *Windows* 95/98/2000/NT. The main program and manual are supplied on CD-ROM, so you'll need a CD drive (and a 3.5-inch floppy drive for the validation diskette).

Manufacturer: Datamatrix, 5560 Jackson Loop NE, Rio Rancho, NM 87124-1504; tel/fax 505-892-5669 (information and tech support); 800-373-6564 (orders); **http://www.qth.com/prolog**. *ProLog2K Logging Program, $49.95; w/QSL Route Database, $64; Upgrade package for existing DOS ProLog Users, $25; QSL Database Update Subscription (6) (sent via e-mail), $36; QSL Database Update Subscription (6) (First Class Mail), $42; IOTA Database, $15. Shipping is additional.*

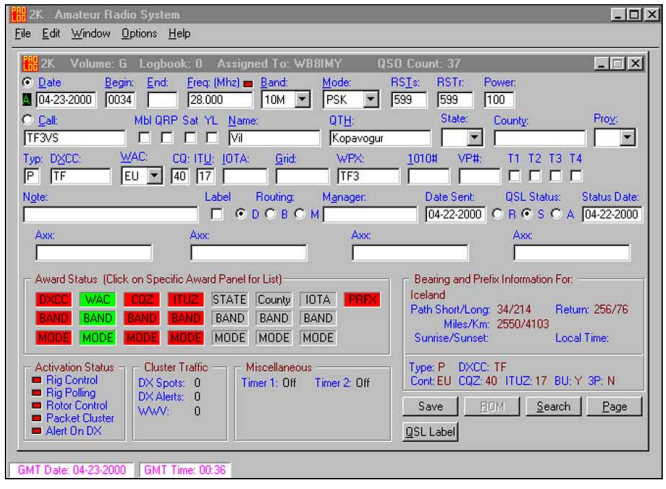
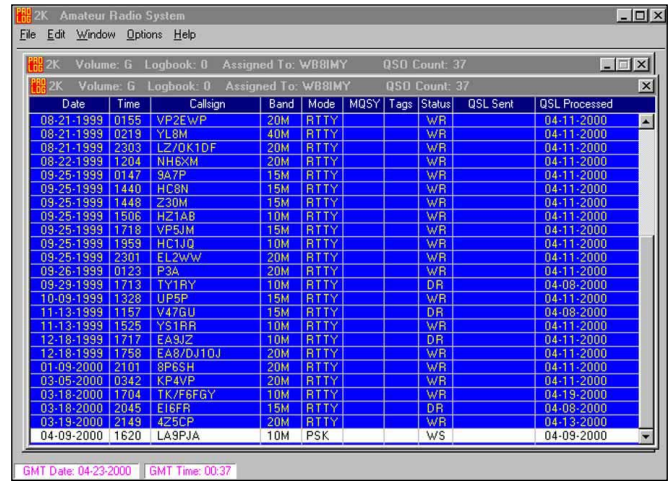


Figure 1—*ProLog2K*'s main logging window. Just plug in a call sign and you're rewarded with helpful information.



Viewing an individual log page by page (in this case, my RTTY log).

Steve Ford, WB8IMY ♦ QST Managing Editor