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Ten-Tec Omni V Model 562 160-10 Meter Transceiver

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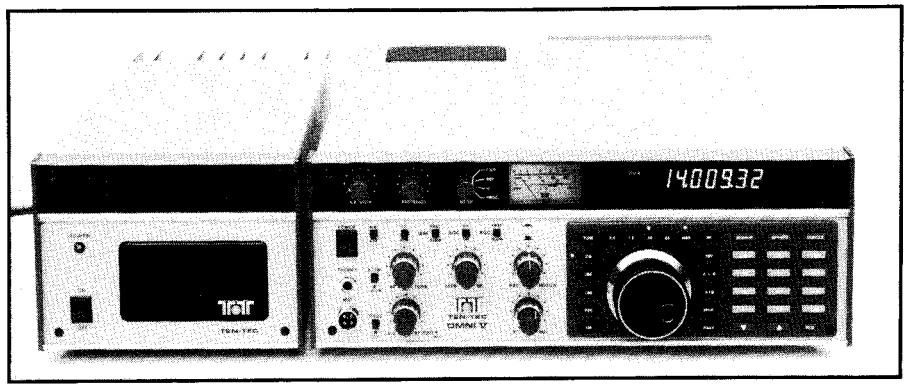
Ten-Tec Omni V Model 562 160-10 Meter Transceiver

Reviewed by Kirk Kleinschmidt, NTØZ

According to early Omni V advertising, Ten-Tec designed this rig to provide optimized ham-bands-only transceive performance, especially for contesters and DXers. The Omni V strongly resembles its established general-coverage-receive sibling, the Paragon. The 100-watt-output Omni V covers all amateur bands from 1.8 to 29.7 MHz, and transmits and receives CW, LSB, USB, FM (optional), FSK and AFSK. Its many features include two "VFOs" (actually tunable memories); a digital multifunction display; 25 memories that store frequency, mode and IF-filter selection; a broadband, no-tune transmitter; a speech processor; passband tuning; and full-break-in CW with two TR-turnaround speed choices. In addition, the Omni V includes some not-so-standard features: a 24-hour clock (that beeps at 16 minutes past each hour to alert you to the impending WWV propagation-forecast broadcast sent 18 minutes after each hour), and receive-audio filtering.



Technicalities

The Omni V's signal-generation scheme is based on a phase-locked-loop (PLL)-based frequency synthesizer that tunes from 198.8 to 221.2 MHz in 400-Hz steps. Dividing this signal by 40 produces 4.97- to 5.53-MHz output in 10-Hz steps. This signal is mixed with the output of a crystal oscillator for final conversion to the operating frequency. Ten-Tec adopted this hybrid approach to minimize local-oscillator phase noise, and ARRL Lab testing confirms the wisdom of this approach: In terms of composite transmitted noise (which consists largely of phase noise), the Omni V is among the very cleanest of all the current MF/HF Amateur Radio transceivers we've tested.

The Omni V incorporates a double/triple-conversion receiver (first IF, 9.0 MHz; second IF, 6.3 MHz; third IF [for FM reception only], 455 kHz). The Omni V comes with a 2.4-kHz-wide IF filter as standard. On all modes, the Omni V generates its transmitted signal at 9 MHz.

The Omni V includes a 3-V lithium cell to maintain its clock/calendar and microprocessor status registers when power is removed; the frequency/mode/filter memory information, stored in nonvolatile RAM, does not depend on this cell for survival.

Physically, the Omni V embodies Ten-Tec's hallmark modular construction. There's plenty of room "under the hood" and weekend mechanics should have little trouble figuring out what's what.

Front Panel

The Omni V's front panel includes a large tuning knob, the multifunction display, five pairs of concentric rotary controls (**MIC** gain/**RF PWR**; **AF** gain/**TONE**; **FADE/BP** [these adjust the Omni V's receive-audio-filtering circuits]; **PassBand Tuning/NOTCH**; **RF** gain/**SQueLch**; seven push-on/push-off push buttons (speech **PROC**essor on/off; **ATTN** (selects a 20-dB RF attenuator on receive); **N**.oise **B**.lanker on/off; **PTT/VOX**; **QSK FAST/SLOW**; **AGC ON/OFF**; and **AGC FAST/SLOW**); a main **POWER** switch; and 35 momentary push buttons. Many of the push buttons trigger an annunciator beep.

Clustered around the main-tuning knob are the mode and IF-filter keys, and the VFO and memory-select keys. Of note among these are the **REV**erse key (allows listening on the transmitting frequency during split-frequency operation), and the **SPLIT** key (allows the Omni V to transmit on one of its two VFOs and receive on the other); as discussed later, this function is used in lieu of a separate RIT (receiver incremental tuning—sometimes also called receiver offset tuning or clarifier) control.

To the right are the Omni V's band-select keys and additional VFO-control keys (**VFO →M**, **M →VFO**), **CLeaR/CLocK** (selects and sets the 24-hour clock); ↑ and ↓ (fast-tuning keys during normal operation, these also set time and date); and **V**oice **C**alendar **E**nable (selects calendar-display mode and/or the optional voice readout). Even though it holds many controls, the Omni V's front panel is open and "airy."

The Omni V's multifunction fluorescent display shows the rig's carrier frequency (with 10-Hz resolution) in ½-inch-tall, blue-green digits, and has annunciators that show which VFO is selected, when split operation is enabled, and when all memories are full. Instead of the annunciators common on the multifunction displays of most other transceivers, the Omni V has LEDs that indicate the status of the functions controlled by the **ATTN**, **PROC**, **TUNE**, **MT**, and the mode- and filter-selection buttons.

A **RESET** switch, accessed through a hole on the right side of the rig, restores proper microprocessor function if the Omni V's microprocessor locks up—a condition in which the tuning knob or other microprocessor-related controls fail to function properly. The review rig locked up once at turn-on (the front-panel tuning and keypad controls had no effect) and had to be reset.

Rear-Panel Connections

Rear-panel connectors of note (in addition to antenna, key and external-speaker jacks, etc) include a 4-conductor **POWER** connector that carries dc and enables ac-line input to the matching Model 961 power supply; a DB25 **RS232 INTERFACE** connector; **RX ANTENNA** (for connecting a separate receiving antenna); **TX OUT** and **TX EN** (normally jumpered together, these allow the Omni V to control specific external RF amplifiers, such as Ten-Tec's Titan); **AUX +13.8V** (sources 13.8 V, unfused, at up to 2 A); **AUDIO OUT** (a fixed, "line-level" audio output intended to drive a modem or tape recorder); **AUDIO INput** (up to 500 mV; mixes with mike-channel audio); **XVRT EN** (selects the Omni V's transverter-interface functions, which include disabling the Omni V's final RF power amplifier and switching a low-level transmit signal [approximately 0 dBm, or 224 mV RMS, with a 50-Ω load] to the Omni V's **XVRT OUT** jack.) Except for the **50 OHM ANTENNA**, **POWER**, **EXT. SPEAKER**, **GND** and **RS232 INTERFACE** connectors, all the rear-panel connections are made via phono jacks.

The Omni V's rear panel also includes eight controls: **RX/TRX** (connects the Omni V's receiver input to either the **50 OHM ANTENNA** [SO-239] or **RX ANTENNA** jacks); **SIDETONE PITCH**; **SIDETONE LEVEL**; **MONITOR LEVEL** (allows monitoring transmitted audio [SSB, AFSK, SSTV, etc]; controls how much, if any, transmit audio is fed to the Omni V's audio-output amplifier during transmission); **BEEP/VOICE** (sets key-

Table 1

Ten-Tec Omni V 160-10 Meter Transceiver, Serial no. 23A10499

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: 1.47-2.03, 3.47-4.03, 6.97-7.53, 9.97-10.53, 13.97-14.53, 17.97-18.53, 20.97-21.53, 24.47-25.03, and 27.97-30.03 MHz.	As specified.
Modes of operation: USB, LSB, CW, FSK and AFSK RTTY, FM (optional).	As specified.
Power requirement: 13.8 V dc. Receive, 1.5 A; transmit, 20 A max.	13.8 V, 17 A at 92 W output.
Transmitter	*Transmitter Dynamic Testing*
Transmitter power: At 14 V, 200 W max input on SSB, CW and FM for 20 minutes (continuous with forced-air cooling of heat sink).	Output power: 92-96 W (output varies slightly from band to band).
Spurious-signal and harmonic suppression: >45 dB below peak power output.	As specified. See Fig 1.
Third-order intermodulation distortion products: Not specified.	See Fig 2.
CW-keying waveform: Not specified.	See Fig 3.
Transmit-receive turnaround time (PTT release to 90% audio output): Not specified.	S1 signal, 18 ms; S9 signal, 18 ms.
Composite transmitted noise: Not specified.	See Fig 4.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity: SSB, CW and RTTY (2.4-kHz filter): 0.15 μV (−123 dBm) for 10-dB S/N.	Minimum discernible signal (noise floor) with optional 250-Hz filter: 3.5 MHz, −135 dBm; 14 MHz, −136 dBm.
FM (15-kHz filter): 0.30 μV (−117 dBm) for 12 dB SINAD.	Not tested (optional FM unit not installed).
Receiver dynamic range: 97 dB typ (signal spacing not specified).	Blocking dynamic range†: 3.5 MHz, 135 dB; 14 MHz, 135 dB.
	Two-tone, third-order intermodulation distortion dynamic range†: 3.5 MHz, 95 dB; 14 MHz, 97 dB.
Third-order input intercept: 12 dBm.	3.5 MHz, 6.5 dBm; 14 MHz, 9.5 dBm.
S-meter sensitivity (for S9 reading): 50 μV.	168 μV at 14 MHz.
SSB Squelch sensitivity: <0.6 μV.	As specified.
Notch filter attenuation: 50 dB typ.	More than 30 dB.††
Receiver audio output: 1.5 W at 2% distortion with an 8-Ω load.	As specified. 2.1 W at 10% total harmonic distortion (THD) with an 8-Ω load.
Receiver IF/audio response: Not specified.	377-2289 Hz at −6 dB.
Size (height, width, depth): 5.75 × 14.75 × 17 inches; weight, 16 lb.	

†Blocking dynamic range and third-order IMD dynamic range measurements were made at the ARRL Lab standard signal spacing of 20 kHz.

††Test-equipment limitations inhibit ARRL Lab notch-filter-attenuation measurements of notches deeper than about 30 dB.

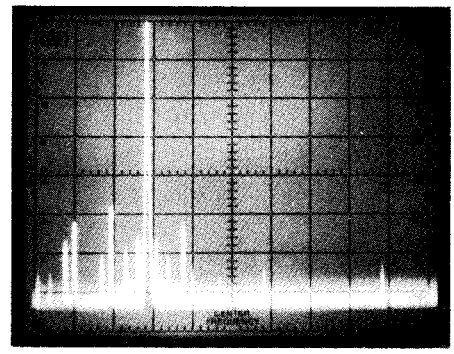


Fig 1—Worst-case spectral display of the Ten-Tec Omni V. Horizontal divisions are each 10 MHz; vertical divisions are each 10 dB. Output power is approximately 96 W at 28 MHz. All harmonics and spurious emissions are at least 48 dB below peak fundamental output. The Omni V complies with current FCC specifications for spectral purity for equipment in this power-output class and frequency range.

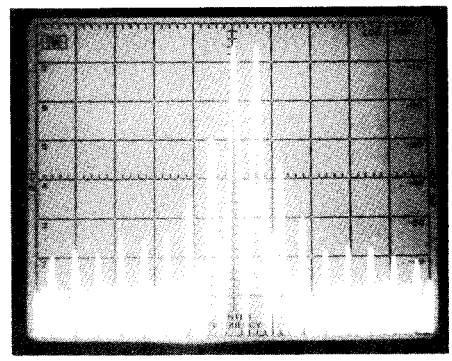


Fig 2—Spectral display of the Omni V during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 30 dB below PEP output, and fifth-order products are approximately 45 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transceiver was being operated at 100 W PEP output on 3.8 MHz.

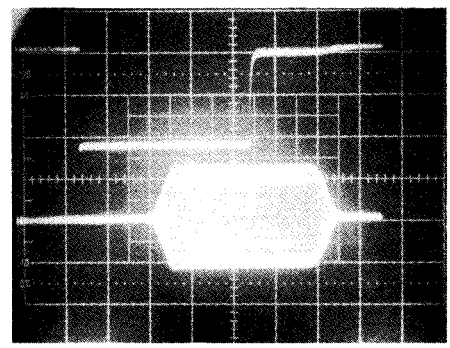


Fig 3—CW-keying waveforms for the Omni V in the full-break-in mode. The lower trace is the RF envelope; the upper trace is the actual key closure. Each horizontal division is 5 ms. The transceiver was being operated at 100 W output on 14.2 MHz. The Omni V's CW keying is very good.

annunciator-beep/voice-readout level); and VOX **DELAY**, **GAIN** and **ANTI**-trip.

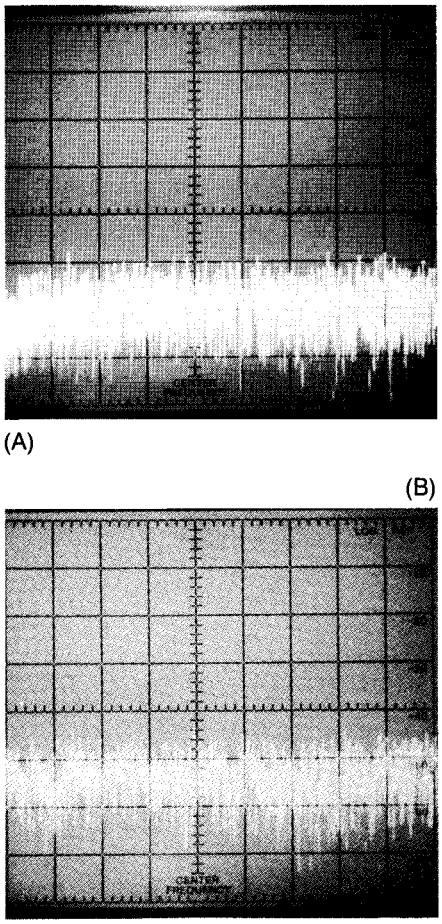
Frequency Control

Frequency control of the Omni V is straightforward and intuitive. The large main-tuning knob changes the frequency in 10-Hz steps in CW/USB/LSB/FSK (100 Hz in FM) when turned slowly; spinning the knob rapidly increases ("shifts") these steps to 50 Hz in CW/USB/LSB/FSK (500 Hz in FM). Pressing **FAST** changes the tuning steps to 50 Hz unshifted, 100 Hz shifted (CW/USB/LSB/FSK) and 500 Hz, regardless of how fast the knob is turned, in FM.

Quick in-band frequency excursions are easy with the ↑ and ↓ keys. Pressing either of them shifts the Omni V's operating frequency 10 kHz (30 kHz if **FAST** has been pressed) in the selected direction; holding either of these keys down repeats the function until the key is released.

Changing bands is easy. Simply press one of the band keys and you're there. When changing bands, the Omni V changes only the megahertz portion of the frequency. If, for example, you're at 21022.06 kHz and hit the **20** key, the Omni V jumps to 14022.06 kHz.

Like the readouts of most other current MF/HF transceivers that include numeric frequency displays, the Omni V's frequency readout is not frequency-counter based; it displays what it is commanded to by the



(A)

(B)

Fig 4—Spectral display of the Ten-Tec Omni V's transmitter output during composite-noise testing. Power output is 100 W at 3.5 MHz (A) and 100 W at 14 MHz (B). Each vertical division is 10 dB; each horizontal division is 2 kHz. The scale on the spectrum analyzer on which these photos were taken is calibrated so that the log reference level (the top horizontal line on the scale in the photos) represents −60 dBc/Hz and the baseline is −140 dBc/Hz. Composite-noise levels between −60 and −140 dBc/Hz may be read directly from the photographs. The carrier is 2 kHz off the left edge of the photographs. These photographs show composite transmitted noise at frequencies 2 to 20 kHz offset from the carrier. The Omni V has very good composite-transmitted-noise performance.

Omni V's microprocessor. As a result, the display's accuracy, stated as ±100 Hz at 25 °C, depends on how accurately the Omni V's oscillators are calibrated—and this calibration may drift somewhat with crystal aging, and as the Omni V warms up. Used at room temperature on 30 meters, for instance, the product review Omni V typically exhibited a frequency-readout error of +40 Hz at cold start and +110 Hz an hour later. Internal trimmer capacitors allow recalibration and compensation for the effects of crystal aging.

The Omni V does not have an RIT control. As mentioned earlier, Ten-Tec intends that Omni V users operate split in situations where offset tuning is necessary.

In addition to its 25 memories, the Omni V includes a "scratch-pad" memory that can be used to store a single, temporary frequency/mode/filter selection without affecting the main memory channels. For instance, the scratch pad can retain the location of a pileup or a contest station while you're tuning up or down the band. Pressing the **VFO →M** key once saves the current frequency, mode and filter settings to the scratch pad; pressing the **M →VFO** key once—with the memory tune (MT) function off—recalls the scratch-pad information.

Pressing the **VFO →M** key twice in rapid succession stores the current frequency, mode and filter settings in one of the Omni V's 25 main memories—the next available memory location, in ascending order. If this operation fills the last available memory, the right-most decimal point in the display lights, and the keypad-annunciator beep sounds at a lower-than-usual pitch. If all memories are already full, the current frequency/mode/filter settings are not saved, and the annunciator beep sounds at its lower-than-usual pitch. At this point, one or more memories must be cleared before more settings can be stored.

Selecting between the Omni V's 25 main memories involves pushing the **MT** key and tuning bidirectionally through the memories with the main-tuning knob. This displays each memory's stored frequency (but not filter and mode settings) *without changing the frequency/filter/mode settings currently in effect*. When you find a memory channel you'd like to use or clear, press **M →VFO** to load that memory's settings into the current VFO, or **CLR/CLK** to clear that memory. All the memories can be cleared at once by pressing the **CLR/CLK** key while turning on the rig's **POWER** switch.

If you're used to the memory systems found in current imported transceivers, the Omni V's memory system takes some getting used to. The Omni V's memories aren't tunable, and are identifiable only by their stored frequency. Once mastered, however, the Omni V's memory system is a powerful operating aid.

On the Air with the Omni V

Receiving

With the 6.3- and 9-MHz, 500-Hz-wide filters selected (**.50** and **NAR** pressed), the **BP** and **PBT** controls adjusted to coincide with the received-signal pitch, **FADE** turned all the way to the right (that is, fully selecting the Omni V's audio filtering, with no wideband audio mixed in) and **TONE** adjusted for maximum high cut, the Omni V provides *top-notch* CW reception. The Omni V's CW offset, fixed at 600 Hz, is, to my ears, more pleasant to copy than the 700- to 800-Hz CW receive pitch engineered into many MF/HF-transceivers. The Omni V also does a good job receiving SSB.

The Omni V's AGC "feel" is excellent regardless of whether **FAST** or **SLOW** AGC decay is selected—no popping here! The AGC returns the receiver to full gain after about 0.2 seconds in **FAST** and after 2 seconds in **SLOW**.

As shown in Table 1, the Omni V's receiver performance is excellent. The review rig was used for casual operation and CW and SSB contesting, and the receiver held up very well in these operating environments—including wall-to-wall contest sessions.

The Omni V's complement of QRM-fighting controls is varied and effective. In narrow CW reception, the **PBT** control functions like the **IF SHIFT** controls on most other transceivers; on SSB, it functions as a variable-IF-bandwidth control. The audio **NOTCH** filter cuts single-frequency heterodynes by more than 30 dB. Critically valuable for CW reception, the **BP** control adjusts the center frequency of the Omni V's band-pass audio filter from 220 to 1700 Hz.[1] Also of critical value in CW reception, the **FADE** control adjusts the mix of wideband and band-pass-filtered audio from all wideband, no band-pass (**FADE** all the way to the left) to all band-pass, no wideband (**FADE** all the way to the right). The Omni V's band-pass audio filter is a pleasure to use. It usefully sharpens the rig's audio response on CW without ringing significantly. Audio output from the Omni V is plentiful, and the rig's audio-power-amplifier chip is acceptably quiet.

The Omni V's noise blanker is effective on a wide variety of noise sources, from ignition noise to power-line noise to the over-the-horizon backscatter radar (the "woodpecker").

Transmitting

As shown in Table 1, the Omni V's transmitter specs compare favorably with those of other contemporary radios. Ten-Tec rates the Omni V's transmitter for up to 200 watts *input* in all modes, with a key-down limit of 20 minutes; no cooling fan is required. The rated key-down time is unlimited if you use an external cooling fan to force air through the fins of the rear-panel heat sink. An external fan is probably a good idea even if you don't intend to push the Omni V's 200-watt-input limit; the Omni V runs quite warm during extended RTTY operation at the 40-watt-output level.

QRPers and amplifier owners alike can take advantage of the Omni V's adjustable power output. The review rig puts out as little as 3.5 watts with **RF PWR** set to minimum. Its adjustable RF output makes the Omni V compatible with modern linear amplifiers that require only 30 to 50 watts of drive. Although the Omni V does not include an ALC output for connection to external amplifiers, this is not a serious

[1]Ten-Tec states that the −6-dB bandwidth of this filter is 35% of its center frequency; this equates to 77 Hz at a center frequency of 220 Hz, and 595 Hz at a center frequency of 1700 Hz. At the Omni V's 600-Hz-CW-offset receiving pitch, the band-pass filter therefore should be roughly 210 Hz wide at −6 dB.

omission because ALC is a second-rate solution to the problem of amplifier overdrive.[2]

Tuning up the Omni V is easy. First, set the **METER** switch to **FWD**, press the **TUNE** key and adjust **RF PWR** control for the desired output power. That's all there is to CW tune-up. For LSB or USB operation, speak into the mike in a normal voice and advance the **MIC** control until the **ALC** LED just lights on voice peaks.

Using the Omni V's speech processor involves adjusting the **MIC** and **RF PWR** controls as above, pushing the **PROC** switch and advancing the **PROCESSOR** control until the multifunction meter's needle centers in the black area of the **PROC** scale on voice peaks. (You may also need to reduce the mike gain so the **ALC** LED lights only on voice peaks.) The **MIC** and **PROCESSOR** controls interact a fair amount, and the correct settings vary by band. The effects of the processor can be heard via the built-in speech monitor circuit; the monitor makes proper processor adjustment easy. I used a moderate amount of processing in all of my SSB work with the Omni V, and I received favorable audio-quality reports.

Full-break-in CW operation is standard on the Omni V, with receiver recovery speed adjustable to **FAST** or **SLOW** via the **QSK** push button. The Omni V's fast QSK sounds thumpier than the QSK in other Ten-Tec radios I've used, but is still superior to most other current rigs. The **SLOW** QSK setting smooths everything out and is usable for most operating conditions. The Omni V's break-in works equally well in single-frequency and split operation.

Because QSK is the Omni V's only CW TR-switching mode, the PTT line is disabled during CW operation. This means that the transmitter *cannot* be hard keyed (held in the transmit mode). This is usually no trouble (once you've used Ten-Tec QSK, would you go back to anything else?) but is a problem when using unconventional accessories or external transverters.

The Omni V's mandatory QSK also disallows keying only the sidetone oscillator for zero-beating or keyer adjustment. Ten-Tec's service department can, however, provide information on a simple modification that allows you to hard-key the rig on CW.

By means of relay contacts accessible via the rear-panel **RELAY** jack, the Omni V can control external power amplifiers that do not feature QSK operation. The control-relay dropout delay is set via an internal control. In such an arrangement, the Omni V operates QSK, but the external amplifier is switched in and out as in semi-break-in operation. The relay, which is a bit noisier than I'd like, controlled my 3CX800A7 amplifier well. The Omni V is compatible with the TR-switching requirements of all current MF/HF digital modes.

Most current Amateur Radio transceivers include circuitry that reduces RF output power in response to rising SWR. The Omni V doesn't. Instead, it includes circuitry that limits the final-amplifier collector current to 20 amperes, maximum. If you can't achieve full power output with your Omni—the **ALC** LED comes on when current limiting occurs—it's likely that your antenna system does not look like a 50-Ω resistive load to the transceiver.

The Operator's Manual

The Omni V's 150+-page manual contains detailed descriptions and schematics of every circuit board in the rig. Ten-Tec engineers designed the Omni V to be field serviceable—unlike many modern "do-everything" radios—down to the board level. They succeeded admirably. The manual's operating-instruction section is not as strong as its technical pages, however, providing little more than enough information to get a user up and running. Certain features, such as the finer points of split-frequency operation (especially text describing how to use the dual VFOs in place of an RIT function), passband tuning, and the functions of available options, are sketchily explained. This rough edge is smoothed with an information packet entitled *Omni V, Model 562 Supplementary Data,* which is now incorporated into the operator's manual. If you own an Omni V that didn't come with this document, contact Ten-Tec for a copy.

Accessories

The Omni V has easy-to-install optional filters. For the 6.3-MHz IF, filters of 1.8, 0.5 and 0.25 kHz bandwidth are available. For the 9-MHz IF, filters of 0.25, 0.5, or 1.8 kHz can be installed (one at a time). The 6.3-MHz-IF filters plug into the passband-tuning board, and the narrow filter plugs into the 9-MHz IF board. The review radio was equipped with 2.4, 0.5 and 0.25-kHz filters in the 6.3-MHz IF and a 0.5-kHz filter in the 9-MHz IF. Filter selection is independent of operating mode. Any filter (or cascaded combination) can be selected on any mode. This is especially useful when operating RTTY.

Also available are the Model 256 FM board, the Model 257 voice-readout board (announces the displayed frequency), the Model 301 remote tuning encoder (an outboard knob in a case attached to a 6-foot-long cord that plugs into the rig's **RS232 INTERFACE** jack and functions in parallel with the main-tuning knob), the Model 259 ALC annunciator (useful for visually impaired operators, the annunciator beeps when the Omni V's front-panel **ALC** light comes on), and various microphones and keyers.

The Omni V is "plug-and-play" with the Hercules, Ten-Tec's compact solid-state amplifier. Used together, the two can provide 500 W of no-tune, full-break-in RF.

Service

Ten-Tec has repeatedly earned its reputation for service that's second to *none.* We had a couple of occasions to test this reputation with the review rig.

The optional 9-MHz-IF, 500-Hz filter we ordered and installed in the review rig was defective. A single phone call to Ten-Tec brought a replacement filter, shipped the same day, and a request that we ship them the defective filter upon receiving the new unit. The replacement filter, which works fine, came a few days later. Bravo, Ten-Tec!

Out of the box, the Omni V's display produced a high-pitched whine that was clearly audible to most people with reasonably sensitive hearing. Ten-Tec solved this problem by modifying the display-multiplexing circuitry in rigs made after the fall of 1989. Anyone with an affected radio can return it to Ten-Tec for a no-charge modification (less the cost of shipping the rig to the factory).

One truly odd problem with the Omni V turned up during lab testing. In one segment of the 10-meter band, the radio had high-level close-in spurs on transmit. Turning the tuning knob while transmitting made the spurs go away. This time, Ten-Tec needed a couple of weeks to fix the problem. Two traces on a circuit board were shorted by a hairline copper fragment. Ten-Tec's repair folks called us with regular progress reports during the trouble-shooting process, and they were always patient and willing to answer all of our questions. It's their judgment that this problem was a fluke occurrence with the review rig.

Rough Edges

As discussed in the manufacturer's *Omni V, Model 562 Supplementary Data*, the Omni V has an unusually large number of receiver spurs: "By actual count, 56. . . can be heard within the allocated ham bands, without an antenna. All but 13 of these birdies are S-1 or less and disappear when an antenna is connected and there is signal propagation. Nine of these, that can be heard at S-3 or so, are spread throughout the ten meter band. The other 4 are at 3.6, 3.999, 21.332 and 21.363 MHz."

In the review rig, I counted 83 spurs on the 10-meter band alone, with a few in the S3 to S7 range. As Ten-Tec states, however, most are so weak that they disappear into the noise when an antenna is connected. Realizing that few hams operate without an antenna, I don't consider the Omni V's quantity of receiver-spurs to be a fatal rough edge.

During SSB or wide-IF-bandwidth CW reception (with the **TONE** control adjusted for minimal high cut and **BP** turned all the way to the left), the review Omni V showed an undesirable trait: wideband IF noise that "bursted" with AGC onset. Annoying with hi-fi headphones, this effect could be

[2] See R. Measures, "Amplifier-Driver Compatibility," *QST*, Apr 1989, pp 17, 18 and 21.

minimized by adjusting the **TONE** control for maximum high cut, and all but eliminated by configuring the receiver for maximum-selectivity CW reception (as described in On the Air with the Omni V). Ten-Tec found that this noise resulted from an undesirably high-level inaudible spur at the input of the rig's IF amplifier. Their fix for this includes changing three components, and has been incorporated in production units since the spring of 1990 (contact Ten-Tec for more information if you have an Omni V made before then). This fix entirely eliminates the problem, as confirmed in the ARRL Lab.

The Model 961 power supply/speaker introduces significant 120-Hz hum into the Omni V's audio circuits when placed near the radio (especially on the left side). The supply must be placed as far from the rig as is practical to minimize this problem.

Although the Omni V has an RS-232-C interface and can be computer controlled, the operator's manual documentation of this function is sparse. (Most manufacturers of current MF/HF transceivers don't document their products' computer controllability any better.—*Ed.*) Diagrams show how to connect the Omni V to IBM® PC, Apple® Macintosh®, Commodore 64™ and 128, and Apple //c and //e computers; text and diagrams detail the Omni V's RS-232-C connector board; and a table lists command codes for the Omni V's computer-controllable functions. "For further information," says the manual, "refer to the programming information supplied with your software package."

Druthers

A rig's rough edges are one thing; its users' druthers are another. With Ten-Tec's stated Omni V design goals in mind, the reviewers proposed this Omni V "wish list":

NTØZ:

- Add a direct-frequency-entry keypad.
- Modify the **AF**-gain-control circuit to distribute its control range over more degrees of arc.
- Move the **MONITOR LEVEL** control to the front panel.
- Consider adding AM transmission and reception.

WJ1Z:

- Add a means of indicating memory channel number.
- Adjustable display intensity would be a help in low-light situations.
- Adjustable tuning-dial drag, and/or a dial-lock circuit, would help fumblers like me make better use of the Omni V's ultra-smooth, low-torque tuning feel.

NJ2L:

- Variable CW offset (and sidetone pitch that tracks it), an *IF* notch filter and variable IF bandwidth during narrow CW reception would go a long way toward making the Omni V *the* radio of choice among contesters.
- Adjustable transverter-output level would make life easier for VHF/UHF weak-signal enthusiasts and contesters.

The Bottom Line

Does the Omni V hit its target of providing superlative ham-bands-only performance for DXers and contesters? In my opinion, the answer is: DXers, the edge of the bull's-eye; contesters, *approaching* the bull's-eye.

In terms of phase noise (or, as we measure it, *composite noise,* which is a combination of phase noise, broadband amplifier noise and close-in spurs)—the Omni V is one of the best transceivers you can currently buy.

In the area of basic radio performance, the Omni V shines. This isn't a backhanded complement: You can pay close to a kilobuck for one radio that comes with, for example, distorted weak-signal CW audio as standard, or another that has receiver-audio that rolls off well below 2 kHz. *Good basic radio performance* is, amazingly, something you usually have to buy more than a basic radio to get!

Where the Omni V falls short of hitting the bull's-eye for DXers and contesters is in value-added features long termed *bells and whistles* but now considered by competitive contesters and DXers as necessities. Memories—callable, handlable and identifiable *by channel number*, and preferably tunable—are one such necessity; RIT—not just in function, but in fact—is another. Another is variable CW offset (and sidetone pitch that tracks it). Solitary hunt-and-pounce DXing is fading somewhat; networked, computer-aided, frequency-agile, PacketCluster™-assisted DXing is rising. This goes double in contesting, in which a rig (and its operator) must be able to be everywhere at once or sit on one frequency and comb a kilohertz or two for callers—with equal facility.

Many hams who demand excellent ham-bands-only radio performance, but who find the space-shuttle-cockpit aspect of other high-end transceivers intimidating, will find the Omni V to be their cup of tea.

Manufacturer's suggested retail price: Omni V, $2245; Model 961 power supply/speaker, $230; Model 256 FM module, $65; Model 257 voice synthesizer, $89; Model 259 ALC annunciator, $39; optional crystal filters (6.3- and 9-MHz IFs), $74 each; Model 301 remote frequency control, $75; Model 705 desk microphone, $83.

Acknowledgment

Dave Newkirk, WJ1Z, and Steve Powlishen, K1FO, contributed to this review.

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment off the shelf from Amateur Radio dealers. ARRL receives no remuneration from anyone involved with the sale or manufacture of items presented in the Product Review or New Products columns. —*Ed.*]

The ARRL-purchased Product Review equipment listed below is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and are discounted from the purchase prices.

Yaesu FT-470 hand-held VHF/UHF FM transceiver with technical supplement (see Product Review, Sep 1990 *QST*). Minimum bid: $318.

AEA AT-300 antenna tuner (see Product Review, Aug 1990 *QST*). Minimum bid: $144.

AEA MM-3 keyer (see Product Review, Jul 1990 *QST*). Minimum bid: $137.

ICOM IC-725 160-10 meter transceiver with optional 500-Hz CW filter (see Product Review, Mar 1990 *QST*). Sold as a package only. Minimum bid: $653.

Sealed bids must be submitted by mail and must be postmarked on or before November 27, 1990. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

In your bid, please clearly identify the item you are bidding on, using the manufacturer's name, model number, or other identification number, if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail. No other notifications will be made, and no information will be given to anyone regarding final price or identity of the successful bidder.

Please send bids to Bob Boucher, Product Review Bids, ARRL, 225 Main St, Newington, CT 06111.

CLARIFICATION: GARANT ENTERPRISES GD-8 PRODUCT REVIEW

September *QST* carried a review of the Garant Enterprises GD-8 Antenna. The review should have made clear that only the 500-watt version of the product (Model number GD-8/500) was reviewed. The comments contained in the review do not necessarily pertain to the 2000-watt version of the product.

The $17.19 collected by the US Postal Service upon delivery of the package consisted of $13.94 customs duty and a $3.25 handling charge for collecting the duty.

The manufacturer states that his product is the same as that described in the Appendix on pages 33-34 of August 1990 *QST*. Readers may wish to review that Appendix, and the article it accompanies, for further information on this general type of antenna. The manufacturer also notes that he expressly does not recommend the use of RG-58/U coaxial cable. QST