

Yaesu VR-500 Portable Scanner

The Yaesu VR-500 is a multi-mode, wide coverage receiver small enough to fit in one's palm.

Its array of modes, wide frequency coverage, and 1000 memory channels with alpha labels, competes with the Alinco DJ-X10T (Nov. 1998 *MT*), ICOM IC-R10 (Mar. 1997 *MT*), and AOR AR-8200 (Oct. 1998 *MT*). Its diminutive size is in the same class as the ICOM IC-R2 (Apr. 1999 *MT*) and AOR AR16 (Aug. 1999 *MT*). All of these models can exchange frequency information with a computer when used with optional software and cable.

The VR-500 is advertised in the USA as covering 0.1 - 1299.9995 MHz, excluding cellular phone bands. Our VR-500 (s/n 9G031495) has three additional gaps above 600 MHz (see Measurements section). This is a compromise which permits the VR-500 to comply with new FCC regulations mandating a minimum 38 dB rejection of cellular phone signals.

Basic Features

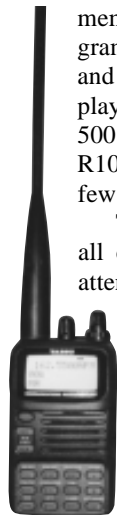
The Japanese-made VR-500 detects NFM, wide FM, AM, USB, LSB, and CW signals. There are 13 step sizes ranging from 50 Hz to 100 kHz. Like most of the competition, the VR-500 sports an S-meter. It employs rotary volume and squelch knobs and a numeric keypad. The plastic belt clip fastens to the rear with a single screw which loosened a few times.

The VR-500's adjustable contrast display and keypad can be backlit for easy night viewing. Lighting is triggered by pressing any key. You can configure the backlighting to latch on or time out after 5 seconds.

Both the VR-500 and IC-R2 are powered by two AA batteries. The IC-R2 is sold with 800 mAh NiCd cells and a 7 hour charger, but none are furnished with the VR-500. Our VR-500 consumes only 73 mA while scanning, a 33% savings over our IC-R2. On the other hand, our VR-500 consumes more current while turned off. The VR-500 is fitted with an external power jack so the radio can be powered by a 9 - 16 VDC source.

Memory and Such

The VR-500 has one VFO and 1000



memory channels in 10 banks. You can program an 8 character label for each channel, and both the label and frequency are displayed while scanning or stopped. The VR-500 label scheme works better than the IC-R10 in which the label is only visible for a few seconds in manual mode.

The VR-500's RF attenuator is global to all channels and the VFO. The IC-R10's attenuator may be programmed on a per-channel basis.

Searching and Scanning

The VR-500 supports both VFO and limit searches with 10 pairs of frequency limits. You can designate a step size or have the VR-500 choose an "Auto" step size based on the frequency.

Up to 100 frequencies may be skipped during a search and they are stored in separate memories which are retained until you clear them.

Smart Search resembles the auto store feature in other models but is quite limited. Program upper, lower, and start frequencies and the VR-500 will search for signals, storing active frequencies into temporary memory locations. We find the Smart Search to be dumb for these reasons: The scanner makes only one sweep through the designated spectrum. Smart Sweep memories can be read only after the sweep, become inaccessible when exiting the Smart Sweep mode, and are erased the next time you enter Smart Sweep mode.

Unlike the IC-R2, the VR-500 can scan various combinations of memory banks. The global rescan delay can be set from 1 to 12 seconds. Each channel has a "preferential" flag instead of lockout. You can option the VR-500 to scan all channels in selected banks or only channels with the preferential bit set. It sounds complicated but works well in actual use. The VR-500 supports a mode scan, but we can't think of a good use for it.

The VR-500 has a Dual Watch mode which is simply a way to scan pairs of channels. There are 10 dedicated pairs of Dual Watch memories which you can program with different frequencies and modes.

VHF/UHF Performance

The supplied antenna uses a BNC connector and appears to be base loaded. Our an-

tenna has a deep null centered near 159 MHz which extends a few MHz on either side. A local 159.15 MHz repeater barely produces an S-meter reading. The S-meter springs to almost full scale when using the antenna from a Uniden/Sportcat SC200.

MEASUREMENTS

YAESU VR-500 SCANNER S/N 9G031495

List price \$399

Yaesu USA, 17210 Edwards Rd.,
Cerritos, CA 90703

Frequency coverage (MHz):

0.1 - 1299.9995 except gaps at cell phone bands and 620.9 - 629.3, 784.6 - 797.195, 807.1 - 819.695

Frequency steps (kHz):

0.05, 0.1, 1, 5, 6.25, 9, 10, 12.5, 15, 20, 30, 50, 100

Sensitivity: see graphs

RF attenuator:

20 dB @ 40 MHz, 21 dB @ 155 MHz, 14 dB @ 460 MHz, 23 dB @ 860 MHz, 15 dB @ 1200 MHz

FM modulation acceptance: 11 kHz

Intermediate Frequencies (MHz):

429.1 / 248.45, 10.7, 0.455

Image rejection:

58 dB @ 40 MHz, 46 dB @ 155 MHz, 61 dB @ 460 MHz, 56 dB @ 860 MHz

Noise floor: -129 dBm at 14.02 MHz

2 tone IMD dynamic range:

49 dB @ 14.02 MHz, 20 kHz spacing, CW mode

Audio output power at earphone jack:

46 mW @ 10% distortion into 8 ohms

Practical memory scan speed: 9 ch/sec.

Search speed: 11 steps/sec.

Current consumption at 3.0 VDC:

off - 0.64 with peaks of 0.91 mA

manual - 66 mA

scan - 73 mA

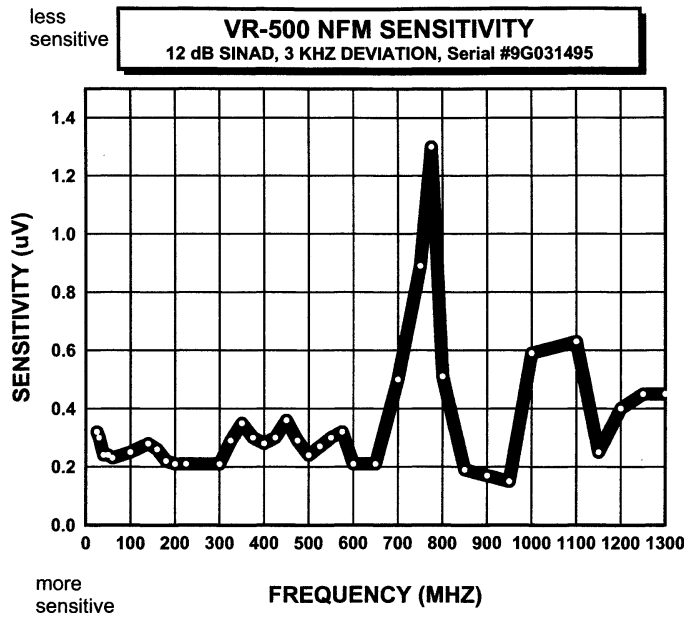
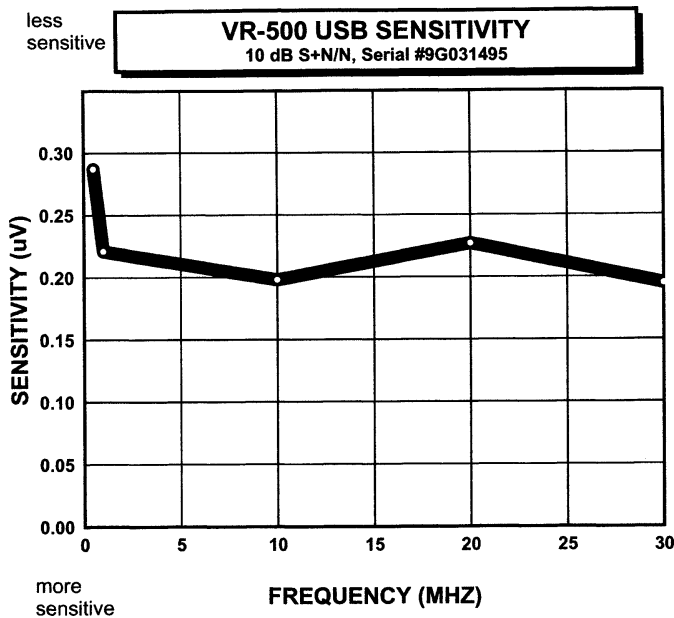
full volume - 111 mA

lamps - 37 mA additional

Battery saver: after 5 sec. in Manual

Low battery warning: 2.02 VDC

Shutdown: 1.97 VDC



Birdies above 30 MHz strong enough to open squelch (MHz)

- 70.8475, 12.76.0, 78.45, 91.225, 96.575, 104.6, 125.215, 130.55, 132.335, 193.175, 195.825, 201.175, 203.85, 264.665, 271.835, 305.775, 320.01, 324.29, 327.415, 330.47, 332.975, 340.48, 340.555, 340.595, 344.14, 344.855, 347.71, 348.175, 364.435, 371.84, 389.115, 394.185, 398.485, 402.6875, 406.7, 453.9875, 454.0875, 466.1375, 468.3625, 475.5, 475.575, 475.675, 521.5625, 526.9125, 531.25, 578.325, 579.25, 581.0, 581.425, 585.0125, 586.35, 589.025, 596.625, 602.1875, 631.825, 634.5, 635.8375, 638.5125, 639.85, 642.525, 660.95, 676.7375, 676.8, 679.475, 681.15, 683.9375, 689.0, 694.2375, 695.4875

Our VR-500's VHF/UHF reception is good with two exceptions. There are 20 birdies in the 225 - 400 MHz military band (see inset) and our receiver is prone to intermodulation in the 860 MHz range. We hear cellular phone and mixes of other signals when traveling in RF-rich areas.

Our 3rd order IMD (intermodulation) measurements show our VR-500 and IC-R2 roughly in the same league except in the 860 MHz range, where the IC-R2 has a significant advantage.

The squelch threshold remains the same for all modes except wide FM and there is a noise burst at the end of each NFM transmission. Our VR-500's audio is acceptable for a radio its size - better than our AR-16 with

less treble than our IC-R2. You can disable the audio amplifier when the radio is squelched. This is designed to save current but produces a popping sound when the squelch opens so we leave the amplifier enabled.

Shortwave Performance

Our VR-500 is sensitive on shortwave and we measured a noise floor of -128 dBm (near 14 MHz). The IF bandwidth is fixed and it is wide for listening in a crowded band, especially on USB, LSB, and CW.

The VHF/UHF antenna supplied with our radio permits shortwave reception of high power transmitters and is hearing impaired for everything else. Better shortwave performance requires a different antenna and a 6 foot length of wire makes all the difference. A 132 foot dipole overloads our VR-500 and comparable models we tested when tuning shortwave. This is consistent with our VR-500's IMD (intermodulation) dynamic range measurement of only 49 dB (see Measurements).

Our VR-500 behaves better on shortwave when 40 dB or more of attenuation is added between the radio and the 132 foot dipole. The internal attenuator can furnish only about 20 dB. The bottom line is that our VR-500 and IC-R2 are quite usable for casual listening below 30 MHz if fitted with an antenna scaled to their signal handling abilities.

Tuning across a carrier in CW or LSB modes using .05 or 0.1 kHz steps produced a second, weak response.

Opinion(s)

We don't have the space to describe the

bandscope or memory manipulation functions. A CTCSS/DCS decoding squelch would be more useful than the band display and mode scan facilities.

For everyday, nontrunking use, we think the VR-500 and IC-R2 are tops. They're great for low profile, stealth scanning when hidden in a shirt pocket.

The numeric backlit keypad, squelch and volume knobs, multibank scanning, and text labels make our VR-500 easier to use than the smaller IC-R2. Our VR-500's susceptibility to intermod in the 860 MHz band could be a problem for some listeners. We prize the IC-R2's CTCSS squelch and smaller size, but it hears signals it shouldn't in the 480 - 520 MHz range.

The VR-500's small size and long battery life are significant advantages over the DJ-X10T. As one VR-500 owner remarked, it seems to run forever on a pair of AA alkaline batteries.

The Yaesu VR-500 is available for \$339.95 plus \$12 shipping from Grove Enterprises (800-438-8155 or order@grove-ent.com)

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