Bob Parnass, AJ9S

AOR AR7000 Wide Coverage Receiver

The AOR AR7000 is different from the AR5000 and ICOM IC-R8500 wide coverage table top receivers we've reviewed in the past. The frequency and all other visual indicators are displayed on a 3-1/2" internal color LCD screen or can be viewed remotely on an NTSC video monitor (not supplied) connected to a phono jack on the rear of the cabinet. We are able to connect the AR7000 (serial number 050019) to the NTSC input of our PC's ATI All-in-Wonder video card and view the scanner indicators on our computer monitor screen while doing other work.

The LCD screen in our AR7000 has low contrast unless viewed at the proper angle and there are no contrast or brightness controls to compensate. The important functions may be performed using the included infrared remote controller. We connected the AR7000 to an old 12" black and white monitor and could easily read the screen across the room while tuning it with the remote control.

The AR7000 is specified to cover 0.1 - 2000 MHz (except cellular phone bands), but ours tunes down as low as 10 kHz, where it is insensitive. The tuning step arrangement is the best we've seen in any receiver. The step size may be set anywhere between 10 Hz and 1 MHz in 10 Hz increments, and the AR7000 does not coerce the display frequency to fit the step size. Frequencies are displayed down to 10 Hz versus 1 Hz in the AR5000.

Mechanicals

Physically, the AR7000 is well built — housed in a two piece metal clamshell cabinet and plastic front panel. The hinged tilt bale is made from rugged metal rod, padded with rubber. The unit requires 12 Vdc at 2 amps, and is supplied with a large, external power wart which plugs into the 117 Vac wall outlet. The metal label on our power wart gets uncomfortably hot, reaching temperatures above 105 degrees F when the radio is on.

Separate jacks are provided for headphone, external speaker, video out (PAL or NTSC selectable), and a DB-9 RS-232C computer port. There's no baseband audio jack *per se*, but our CSI CD1 display shows CTCSS and DTMF codes reliably when connected to the constant low level audio output jack on the rear of the AR7000.

An 8-pin DIN accessory socket provides 10 kilohm audio (for tape recording), squelch activated tape recorder control contacts, ground, +12 Vdc, and +5 Vdc. There is no external time base input for use with an external high stability oscillator, as found on the AR5000.

Construction inside our AR7000 is fairly orderly, except for a few capacitors which are glued to the boards with their leads soldered to resistors suspended in midair. The disorder may reflect last minute revisions in this early production unit. We saw similar "afterthoughts" in the AR5000 we tested but not in the IC-R8500.

A la Mode

Reception modes include AM, NFM, WFM, CW, USB, and LSB. You can choose CW offsets of 400, 600, or 800 Hz, each producing a different beat note. There is no tone control, though you can choose between high and low audio response in NFM.

There is one bandwidth for NFM and another for WFM. The AR7000 provides an interesting menu of bandwidths for the other modes. You can select from five CW bandwidths between 50 and 800 Hz. SSB selectivity choices are 2, 2.5, and 3 kHz. There is no AM synchronous detector, though you can choose a selectivity of 2, 6, or 8 kHz. An IF shift, adjustable between -8500 and +8500 Hz, is provided to aid in selectivity for all modes except NFM.

The shape factor for the most narrow CW bandwidths isn't nearly as steep as for the SSB and AM modes. DSP (digital signal processing) technology is used in the final 10.7 MHz IF stage, but the instruction manual contains no block diagram or mention of which bandwidths are implemented by conventional filters or by the DSP.

Memory, Searching and Scanning

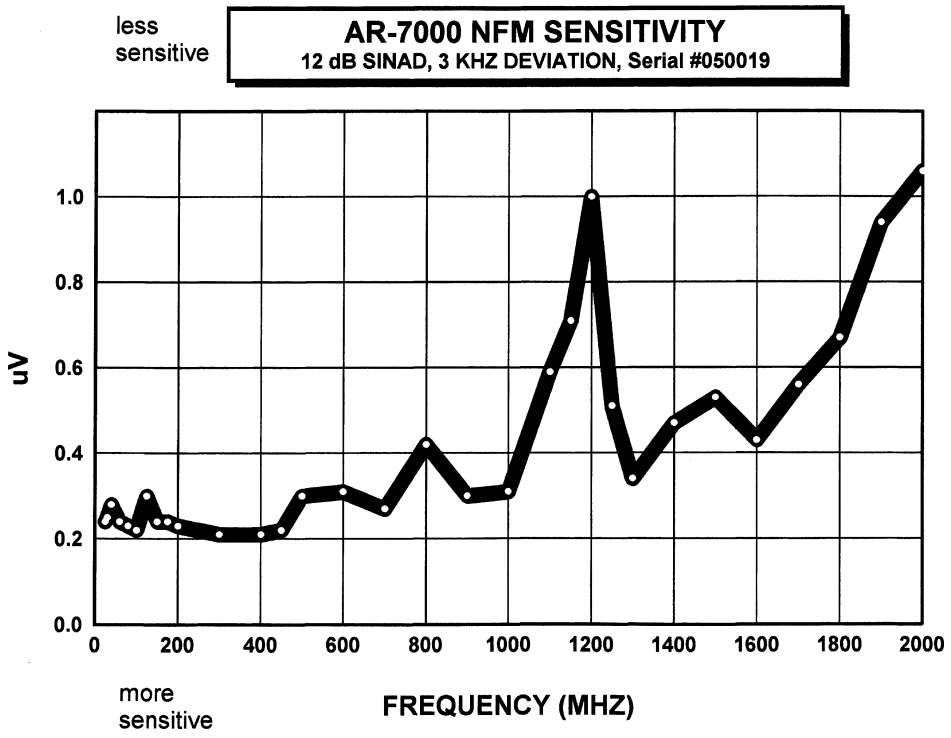
The AR7000 has two VFOs and its 1,500 memory channels are organized into 15 banks of 100 channels each. You can scan multiple memory banks provided they are adjacent. Our AR7000 scans a mixture of memory channels at only 12 channels/sec versus our AR5000's 43 channel/sec rate. The per-bank rescan delay is adjustable between 0.1 and 9.9 seconds.

You can search directly from a VFO frequency. For limit searches, you can set up 8 pairs of search limits (search banks) and designate mode, search direction, and step size. An auto store type feature lets you designate a memory bank into which active frequencies will be stored during a limit search, with a different target bank for each search bank. Duplicate frequencies are not stored during auto store.

Memory bank 14 holds frequencies which are locked out from searches. You can designate an addition bank for pass frequencies, making a total of 200 frequencies which can be locked out from a search.

A multicolor graphic portrays spectrum activity by displaying the S-meter values as vertical bars at each step during searches and while tuning the VFOs.

It's easy to assign alphanumeric labels to both search banks and memory channels using an onscreen menu.



Using It

Our AR7000's shortwave reception is head and shoulders above the handheld wideband scanners we've tried, especially in ham bands crowded with SSB transmissions. AM foreign broadcast reception is not quite as good as our IC-R8500. Reception in the 7.4 MHz region is peppered with QRN (man made noise) on our AR7000, but not on the IC-R8500, even with the ICOM's noise blanker off. This leads us to suspect some of the noise is generated inside our AR7000. The ICOM's smooth tuning knob is easier to use for band surfing than the smaller, detented knob on our AOR.

As in the ICOM IC-R8500 and AOR AR-5000, internal relays chatter as the AR7000 scans a mixture of memory channels on different bands. We hear a relay click when tuning across 20, 225, 860, and 1215 MHz boundaries (vs. 40, 400, 1000, and 1600 MHz in the AR5000 and 500, 1025, and 1200 MHz in the IC-R8500).

Instead of a simple squelch knob, you must press the Squelch key, then adjust the squelch level in discrete steps using the encoder knob, then press Ent. We have trouble finding a squelch setting which permits pausing a search or scan to hear weak signals without falsing. When the squelch is fully open in NFM, there is a "chuffing" noise while tuning the VFO.

Searches in the military air and VHF high bands are often interrupted by short noise bursts. This doesn't happen when using our AR7000 with the antenna disconnected, which makes us suspect an intermodulation problem.

Moderate and stronger NFM signals cause our AR7000 to stop searching 5 or 10 kHz off frequency where the audio is distorted. GRE scanners employ a window detector to ensure the search stops on the center frequency.

Our AR7000's audio is clear when monitoring most signals. As measured by our HP audio analyzer, distortion remains below 10% at full volume into a noninductive, resistive load. Our AR7000 has a modulation acceptance of only 5.8 kHz in NFM, unusually narrow compared with our other receivers. A few NFM signals with wider deviation sound rough on voice peaks.

The fast AGC setting distorts strong AM signals, but works well on weaker and moderate strength signals. We could find no noise blanker as included in the IC-R8500.

In Closing

We find our AR7000's menu driven squelch difficult to control, the display blurry at most angles, and FM searching problematic. Computer commands are not documented and should be.

Despite these glitches, the AR7000 packs a lot of features into a sturdy desktop package and offers much better shortwave performance than contemporary handhelds. The IR remote control, NTSC video output, accessory jack, and RS-232 serial port are attractive and we like the adjustable rescan delay, step size flexibility, and selection of AM and SSB bandwidths.

MEASUREMENTS
AOR AR7000 SCANNER
S/N 050019

Frequency coverage (MHz):
0.01 - 2000, except 824.01 - 849 and 869.01 - 894
Step sizes:
10 Hz - 1 MHz in increments of 10 Hz
NFM Sensitivity: see graph
AM Sensitivity (8 kHz IF bandwidth, 12 dB SINAD, 30% mod. 1 kHz tone):
4.0 µV @ 0.5 MHz
4.5 µV @ 1 MHz
3.3 µV @ 10 MHz
1.7 µV @ 20 MHz
1.2 µV @ 30 MHz
Attenuator: 18.5 - 23 dB
FM modulation acceptance: 5.8 kHz
Audio output (at ext. spkr jack):
0.26 W @ 8.6% distortion
Intermediate frequencies (MHz):
275.4 or 782.28, 45.0, 10.7
Practical memory scan speed:
12 channels/sec.
Search speed: 14 steps/sec.

ABREVIATIONS

Abbreviations used in this column

µV	Microvolts
AM	Amplitude modulation
CTCSS	Continuous tone code squelched system
CW	Continuous wave (Morse code)
DSP	Digital signal processing
DTMF	Dual tone multi frequency
F	Fahrenheit
HP	Hewlett Packard
IF	Intermediate frequency
IR	Infrared
kHz	Kilohertz
LCD	Liquid crystal display
LSB	Lower sideband
MHz	Megahertz
NFM	Narrowband frequency modulation
NTSC	Television standard used in U.S.
PAL	European television standard
PC	Personal computer
QRN	Man-made noise
S/N	Serial number
SINAD	Signal to noise and distortion ratio
SSB	Single sideband
USB	Upper sideband
Vac	Volts alternating current
Vdc	Volts direct current
VFO	Variable frequency oscillator
WFM	Wideband frequency modulation