



AOR AR6000

US\$6500 £5700 €6500

OVERVIEW

Billed as a "Super Wide-band Multi-mode receiver" we rather think the AOR AR6000 has the widest frequency coverage of any receiver ever reviewed by *WRTH* and is also amongst the most expensive. Perhaps best viewed as the latest incarnation of the much-respected AR5001, the AR6000 offers continuous coverage from 9kHz to an astonishing 6GHz and handles USB, LSB, CW and FM, the latter as both narrowband and wideband and with provision for stereo reception.

FEATURES

The AR6000 is realised as a substantial and well-finished metal box measuring 305 x 220 x 101mm and weighing a impressive 5.2kg. As will be seen from the photograph, the receiver is rather deeper than it is wide. The front panel is dominated by the large backlit dot-matrix display at upper right with an analogue S-meter to its left; in the context of such advanced equipment the latter looks mildly old-fashioned and out of place. Rotary volume and squelch controls and a slot for an SD card are at lower left and a 5 x 4 numeric and shifted-function keypad is at lower centre. A large rotary VFO knob is mounted to the right of the display and a secondary rotary control handling a variety of functions is at lower right, with four additional keys above it. The 'feel' of the keypad is quite pleasant with a well-judged combination of low breakout force and quite short travel although there is rather a lot of 'slop' in the buttons and essentially no tactile feedback. The VFO knob is quite heavily damped and exhibits a small amount of play in its bearing. A substantial tilt bail on the bottom of the receiver sets the front at a pleasant height and angle for use on the average table and a handle is provided on one side.

The rear drop is a busy place. There are two

N-type antenna sockets, one for 9kHz-3.15GHz and the other for 3.15-6GHz. A SMA connector allows connection of an external 10MHz reference standard. This is a facility which we find very useful and one which ideally would be provided as a matter of course on high-grade receivers nowadays given the easy availability of highly accurate GPS-derived 10MHz references. A USB I/Q connector makes in-phase and quadrature outputs available when the receiver is tuned to frequencies between 100kHz and 6GHz. An optional I/Q output board and software costing an extra £550 (\$700) is required to facilitate this and was included in the review sample. It appears from the literature that the board intercepts I/Q data from the receiver's main DSP at 72Mbps and the software presents this at the USB port as a 900kHz-wide spectrum centred on the frequency to which the receiver is currently tuned. Unfortunately time constraints meant that we were unable to test this feature. The 45.05MHz IF output is also available on a BNC connector, as are external-speaker and line-level outputs. Suitable software with which to interface the AR6000 with a PC is available from the manufacturers' web site but here again lack of time did not allow us to try this. We gather from comments on the internet that the software is very similar in functionality to that used for the AR5001 and presumably allows almost unlimited memory capacity. However, given that the AR6000 comes with no less than 2,000 memories divided into 40 banks of 50 channels, it is rather difficult to envisage running out of memory space!

The internal architecture of the AR6000 is complex and fascinating. In essence, the unit is a direct-conversion receiver using direct sampling techniques between 9kHz and 25MHz and uses standard double and triple conversion elsewhere

in its coverage. One might infer from this that the receiver is in part a conventional superheterodyne, which it is as far as the 45.05MHz third IF. Thereafter the signal is presented to an analogue/digital converter (ADC). If we have understood the accompanying literature correctly, the signal path in the MF/HF region below 25MHz consists of a switchable attenuator and a group of eight bandpass filters followed by a 65Ms/s ADC and further processing, presumably in one or more dedicated FPGAs. In such a complex wideband receiver, the mixing paths and the consequent potential for 'birdies' and internal spurious responses must be enormous and no doubt AOR includes a good deal of internal filtering. That the unit provides excellent performance with very few such spurs is a tribute to the design team.

Surprisingly the IF bandwidths are fixed rather than variable. They are normally associated with particular modes but can be manually selected by pressing the function button, rotating the sub-VFO knob and pressing the MHz key. Below 25MHz the bandwidths available are 200 and 500Hz and 3, 6, and 15kHz. Bandwidths of 30, 100 and 200kHz are available elsewhere. The 6kHz filter is effectively used in conjunction with synchronous detection for AM reception.

PERFORMANCE

We chose to concentrate our evaluation of the AR6000 on the MF and HF broadcast bands although we will confess to a degree of exploration of "other" areas where the very fast scan, search and spectrum-display functionality came into their own. The spectrum display width can be adjusted between 400kHz and 10MHz and exhibited an extremely fast refresh rate; it is quite possibly the best we have seen on a wideband receiver. Suffice it to say that *WRTH* readers whose interests extend rather higher than the broadcast HF spectrum will greatly enjoy the capabilities of the AR6000.

Most of our testing took place with the aid of the resident Wellbrook ALA-1530 supplanted by wire dipoles and a seven-element tri-band Yagi for the amateur bands where we were interested in comparative evaluation against a Rascal RA3791 and a WinRadio *Excalibur Pro*. A busy amateur HF band can be a very challenging environment for a receiver, especially during contest conditions where very strong local stations can be considerably stronger than broadcasters. Generally speaking the AR6000 acquitted itself very well. The claimed sensitivity between 100kHz and 25MHz is 0.7µV for 10dB S/N in a 3kHz bandwidth and this specification was almost exactly met over the range. In the narrower CW bandwidths the MDS was about -121dBm which is not quite as good as some high-grade receivers of yesteryear but represents a sensitivity which will be adequate for real-world HF reception. The strong-signal performance was

good enough for use with quite large antennas although very strong signals in the MF and HF region sometimes seemed to generate peculiar in-band and out-of-band artefacts whose origin was not obvious. Tuning across strong local amateur CW signals in particular revealed a family of 'comb-and-paper' noises about 50-60dB below the wanted signal for several kilohertz. However, a switchable attenuator and RF amplifier is provided and the -10 and -20dB steps of attenuation proved very useful. The three-position switchable AGC worked quite well although in the slow position there was a slight degree of audible 'pumping' on strong SSB signals and none of the settings was quite ideal for medium-distance HF broadcasts subject to rapid fading and flutter. The top-mounted speaker gave very good performance on strong local signals but results were rather better on headphones, on which very low noise and distortion levels were audible.

CONCLUSION

For those who want a receiver capable of producing very good results on everything from AM broadcasting to whatever is available and decodable at the dizzy heights of 6GHz – for which some decidedly specialised antennas are required, incidentally – the AOR AR6000 almost recommends itself. There are very few products in this exalted category. Equally, one assumes that the professional and governmental users for whom it is presumably chiefly intended will not be particularly troubled by what in consumer terms is the very high price. Whether the unit offers value for money is difficult to say since in this market sector "value" is an entirely subjective concept. In fairness it must also be said that a far longer evaluation period than was available would be required to get to grips with every facet of such a complex and capable receiver. But there is little doubt that from a technical point of view the AOR AR6000 is an outstanding achievement. We are very grateful to Messrs Waters & Stanton for making one of the first examples in the UK available to us for review.

Rating table for AR-6000

Constructional quality	★★★★
Sensitivity	★★★★
Dynamic range	★★★★
RF intermodulation	★★★★
Audio quality	★★★★
Versatility	★★★★
VFM	★★★★
Overall rating	★★★★

Key:

★ = Poor ★★ = Fair ★★★ = Average
 ★★★★ = Good ★★★★★ = Excellent
 VFM = Value for money