AOR AR5700D

US$5840   £4595   €5010

OVERVIEW

The AR5700D is a high-performance wide-band communications receiver. As well as resolving the common modes of AM, SAM, FM, WFM(S), SSB and CW it also decodes the TETRA (including Direct Mode, Traffic Channel and GSSI user group filtering), DMR, NXDN, D-STAR, DPMR, APCO 25, YAESU and Alinco EJ-47 digital voice modes. It sports a backlit LCD main display with a frequency span of up to 10MHz. It has provision for computer control, and free software is provided along with the required USB to PC leads. With a frequency coverage of 9kHz to 3.7GHz and multi-mode reception, the AR5700D has all the makings of an extremely capable receiver.

FEATURES

The AR5700D comes in a smart looking case not dissimilar to the AR5000, AR5001 and AR6000. The front panel markings appear prominent with the buttons, controls and display standing out well. The unit is reasonably weighty at around 5kg and measures approximately 225mm x 110mm x 330mm. It has a carry handle on one side and four feet on the opposite with a retractable tilt bail on the underside. The overall black finish contrasts with the grey trim and white lettering to give a very neat appearance. The characters on the dot matrix LCD display, while looking pixelated, stand out well. The analogue signal strength meter is on the small side but easily readable and has a pleasant amber backlight. Signal strengths are repeated in dBm or dBu on the LCD display.

The front panel controls are good quality and consist of three rotary encoders – one volume, one squelch and one acting as a sub dial – and the main tuning control, which is free running. The front panel also has a selection of push buttons,

all having more than one function, there is a 3.5mm phones socket, an SD card port and also an 8-pin mini DIN accessory socket.

On the rear panel there are two Type N sockets for aerial inputs. Ant 1 is for frequencies over 25MHz and Ant 2 is used for the full coverage of the radio, although please note that this changes when using the software (see below).

There are sockets for IF out (BNC with 15MHz bandwidth), 10MHz external reference clock input (SMA), video out (phono/RCA), USB (type B) for I/Q and Computer Control, 9-pin D for receiver serial control or an optional Ethernet controller, Aux 2 8-pin Mini DIN (provided for 'future applications'), and two 3.5mm jacks for speaker and line output. 12V DC power to the set is taken from the supplied external mains unit which plugs into a 2.5mm socket. The main DC power-off switch is located on the rear panel.

We found little information available on the inner workings of the set but the sales literature states that the radio is fitted with four Renesas SH2 CPU's, three Analogue Devices Blackfin DSPs, one Analogue Devices ADSP-2185 DSP, and four Intel Altera Cyclon FPGAs. These devices providing signal processing, demodulation and decoding. It is claimed that 63/65MHz sampling frequencies are used for the analogue to digital converters. Clearly, the AR5700D benefits from some advanced technology. There are 33 RF bandpass filters and AOR claim IP_3 figures of +20dBm at 14.1MHz Preselector off, +6dBm at 50MHz and +5dBm at 620MHz Preamp off.

There is provision for instant recording and playback to the supplied 16Gb SD Card.

Two thousand memory channels are provided in 50x40 banks and these can be customised to hold between 5 to 95 channels per bank in a form

of 'dynamic memory', allowing banks with only a few entries to be set aside for specific uses. There are also 40 search banks, and 1230 pass or priority channels can be set. The supplied manual describes the basic operations.

EVALUATION

We are grateful to Frederic Collin of AOR Japan for supplying the review unit, which came with firmware version Main-007A DON7B P007A installed. Updates to the AR5007D firmware can only be installed at AOR dealers. Aerials used in the evaluation were a 66ft inverted L and home made Active Loop for HF, and a Diamond V2000 and discone for VHF. These were connected to the rear panel with ANT1 for VHF and ANT2 for HF. The AR5007D is a complex radio and only the main features will be discussed.

Having experience of an AR5000+3 it soon became apparent that operating the AR50007D is very similar. The rotary controls for AF Gain, Squelch and Sub Dial are of the detent type, giving a positive click as they were rotated and the main tuning control is free-running and smooth enough. Mode and step size – tuning steps from 1Hz to 999.999kHz are available – may be altered by a short press of the red Mode and Step buttons next to the main tuning control. Settings are then selected by stepping through the options with the sub dial and pressing the red MHz/ENT button to select. A long press on the Mode or Step button will select default settings. There are five variable frequency oscillators (VFO) on the AR57000D and each may be stepped through by continually pressing the red VFO button. Each VFO retains its main settings and can be used as a quick and convenient form of memory channel. IF bandwidths can be changed by pressing the Func button and then the 3/IF BW button. Again selection is by the sub dial. The radio is restricted to fixed filter bandwidths when not under computer control. The narrowest setting for SSB is 3kHz which can be considered slightly wide for use on Amateur bands but in the past has been common on receivers for the commercial market. AGC can be selected in a similar fashion but this time using the Func Step/AGC button. Settings are Fast, Medium, Slow and Off with RF gain being selected with button 6; the Squelch control thus becoming the RF Gain control, indicated by two small parallel bars on the LCD display. Direct frequency entry is made using the front panel keypad and can be entered as either kHz or MHz.

An interesting inclusion is a 10-0.4MHz wide Band Scope (or spectrum display) on the LCD. This gives an effective indication of activity either side of the frequency being monitored. The bandwidth is adjusted using the Func-tuning wheel.

The AR57000D is capable of dual band reception where one receiver operates on frequencies below 25MHz (Main) and the second on frequencies above 25MHz (Sub). The 'up' and 'down' buttons being used to toggle between the control of the main and sub receivers. Volume balance can be adjusted between the two and it is possible to tune the radio while in this mode. An Offset and Triple receive mode is also provided.

During the evaluation it was noticed that with the attenuator there was a delay before the set reached full gain when switching from either the 10dB or 20dB settings directly back to Auto.

Noise reduction has three settings, with Low and Medium giving the best results; the High setting sounding rather 'watery'.

Sensitivity was checked against published figures over the broadcast bands up to 108MHz and it was found that these were broadly met.

Operation on the VHF broadcast bands produced clean and crisp audio and the IF filter setting of 100kHz rejected adjacent channel interference from strong stations while still providing good-quality audio. Stereo reproduction through PC speakers when using the software was good.

LW and MW reception quality was again good and the 6kHz IF filter setting was just right for busy bands. There was some interference noted from the supplied PSU between 621-931kHz.

On HF the receiver showed it had good strong-signal handling capability with no signs of overload. Synchronous AM was effective on noisy broadcast stations, taking the edge off fading signals, and IF shift worked well to remove interference. CW reception is limited to the 500kHz filter so reasonably careful tuning is needed when looking for signals, this is easy enough with 10Hz steps selected and once tuned the filter is effective at rejecting adjacent signals. General SSB reception is good but the 3kHz filter, while providing good audio quality, was found to be a touch too wide on the amateur bands, however this ceases to be a problem when under PC control.

A quick evaluation was made of the digital voice modes DMR, D-STAR and NXDN. Signals were decoded fairly easily, both manually and with the 'DALL' automatic setting, although the signals had to be moderately strong and clear.

Overall the set coped very well and returned a good signal to noise ratio on some noisy bands.

AR-IQ-III SOFTWARE

This accompanying software for the radio is supplied on a USB dongle. Installation is reasonably straightforward and full details are given in the manual. The software considerably enhances operation and, as Microtelecom make it under licence, it will be familiar to Perseus users.

When under software control the AR5700D shows 'Remote' on the display and all control is undertaken by the software. The software screen is dominated by a spectrum display that can also be set as a waterfall – but not both. Here the spectrum may be viewed up to a maximum of 900kHz bandwidth. Signal amplitude can be read on the vertical axis as dBm with a scale at the left

side of the window. Mode selection is below this, and there is a 'User' button. When the User demodulator is selected the Virtual Audio Cable output is fed with zero-IF IQ samples, which is useful when a third party application wishes to process this data stream at the selected frequency. It seems that automatic frequency control does not function on WFM and there are no digital mode settings when using the software.

When the radio is in 'local control' and is being used as a normal receiver the antenna inputs are ANT1 25MHz to 3.7GHz and ANT2 9kHz to 3.7GHz, but under computer control these are reversed. This means that if both local and PC control is required, users will either have to swap the connections or supply a reversing switch. Incidentally this also applies when using the IF output as the inputs are reversed for this as well.

There is a smaller 'secondary' spectrum window where the receiver's IF bandwidth range can be selected and varied. A right click drags the entire bandwidth and the upper and lower bandwidth edges can also be dragged independently with a left click and drag.

There are sliders for Pass Band Tuning, Notch, Auto Notch, CW Peak, spectrum display averaging and a fully variable Noise Blanker. To the far right of this box is another slider with AGC settings, Marker Select, Memory Bank, an S Meter calibrated in dBm and S Units, and a Database selector. The database selector, used for example with EIDB, looks up the frequency the radio is tuned to and if there is an entry found, displays station information. To the right of this box are sliders for AF Volume and also Variable Noise Reduction. At the bottom of the screen are settings for recording and playback of the whole 900kHz spectrum of the receiver. We found that on our system the software would not save to the hard drive of the PC but happily saved to other drives. This may be connected to our setup as the feature worked well on another Windows 10 PC.

With the USB dongle plugged into the computer it is possible to run multiple instances of AR-IQ-III, thus the radio can be simultaneously controlled and recordings made in one instance, while playing back saved files for analysis in others. As well as the dongle, there need to be two further free USB ports on the computer one for the I/Q line and another for computer control.

MEMORY MANAGER
Also available for our evaluation was a small memory management utility, the AR57000D Editing Software v.1.1.1.0, which facilitates the editing of memory banks and channels, scan groups, search banks and search groups. This is a useful addition as while it is possible to edit these details directly into the receiver the process can be tedious. Using this utility to set up two new search banks took mere seconds. Memory editing is a little slower but still much quicker than

doing so from the keypad. Data is not saved to a hard drive but sent directly to the radio. A 'save to disk' feature would be a useful addition.

CONCLUSION
The AOR AR5700D sales brochure states, 'Your wide-band signal detection, monitoring, voice decoding, recording and playback solution' and this is certainly true. The radio is reasonably intuitive to use and any previous owner of an AR5000-6000 would be immediately at home. The front panel controls are nice and positive and with multiple VFOs set up for different frequencies and reception modes it is a breeze to step between the many different operating modes the set provides. The AR5700D is in some ways two different receivers, because the AR-IQ-III software significantly extends the versatility of the receiver and adds features that are not available in standalone mode, all of which were found to be effective. The software also allows the spectrum to be visually monitored and recorded when searching for signals. What sets the AR5700D apart from most other radios is the inclusion of all the popular VHF/UHF digital voice modes.

Taking everything into account the AR57000D is an exceptionally versatile tool for spectrum searching or monitoring as well as surveillance or unattended operation.

Its performance on all the broadcast bands was excellent, coping well under various conditions. It covers all modes; has admirable computer control; and has a discriminator output, so that whatever the AR5700 cannot do itself, can be sent to external devices or software that can. In short, it offers users just about everything they would ever need in a receiver.

Rating table for AOR AR5700D	
Constructional quality	★★★★★
Sensitivity	★★★★★
Dynamic range	★★★★★
RF intermodulation	★★★★★
Versatility	★★★★★
VFM	★★★★
Overall rating	★★★★★

Key:
★ = Poor   ★★ = Fair   ★★★ = Average
★★★★ = Very Good   ★★★★★ = Excellent
VFM = Value for money

The reviews in this section have been prepared in the main by **Keith Rawlings** (G4MIU). Keith writes extensively on radio matters and currently has a monthly column in *RadioUser* magazine. First licensed in 1976 under the call G8MCK, and with a life-long interest in radio and electronics, he has been involved with telecommunications professionally for many years.