

THE PETER HART REVIEW

AOR AR3030 HF Receiver

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TOWARDS THE END of 1993, AOR unveiled a new high performance HF communications receiver, the AR3030, which looks an interesting receiver for the SWL. It is well suited to the needs of the amateur bands listener as well as for the broadcast bands, HF SSB point to point, data and utility modes. The transmitting amateur has a wide range of transceivers available from which to choose but the SWL has much less choice. The number of true communications receivers aimed at the 'hobby market' can be counted on the fingers of one hand.

PRINCIPAL FEATURES

THE AOR AR3030 IS a 12V radio covering the continuous frequency range from 30kHz to 30MHz. It is equipped for reception on USB, LSB, CW, AM, FM, synchronous AM and FAX. FAX mode is basically USB with a tailored audio frequency response and tuning offset to suit external facsimile decoders. Synchronous AM is being provided on more and more HF receivers and is useful in reducing distortion when selective fading is experienced.

The 34mm diameter main rotary tuning knob has a maximum resolution of 5Hz tuning steps and about 50 steps maximum per revolution of the knob. 100Hz, 1kHz and 1MHz tuning steps may be selected for more rapid changes in frequency and the selected step size is indicated by an underscore placed under the relevant digit on the frequency display. The frequency may be entered directly in kHz or MHz using numeric keys and this is also probably the quickest way of coarse setting the frequency. The numeric keypad is very simple to use, with no dual function or select keys, and includes a back-space key for correcting errors.

Some 22 frequency bands are recognised



AR3030 viewed from the front.

for the different amateur bands and broadcast bands and the last used frequency, mode, VFO, step size, filter, AGC and input attenuator setting is stored in the band memory for selection the next time that band is accessed. These band stores are accessed by keying in the metre designation for that band finishing with the 'mtr' key, eg '20 mtr' or '49 mtr'. Unfortunately, 80 mtr is only recognised as 3500 - 3575 kHz and 160 mtr as 1907.5 - 1912.5 kHz, the Japanese allocations for these bands. Band store data is not updated continuously during tuning but only when the receiver has been static on one frequency for more than about 10s.

There are two selectable VFOs provided (A,B) and 100 memories in addition to the 22 band stores. The memories each store frequency, mode, AGC time constant, attenuator setting, IF and AF filter settings, BFO and lockout status and step size. Apart from the usual store and recall from any memory channel to VFO, a quick store facility will automatically store into the lowest numbered empty memory channel. Memories may be deleted either singly or as a block. There is no direct tune from a memory channel, it is necessary to transfer first to a VFO, and there is no provision for preview of memory contents without first tuning to that memory channel.

Scanning of the memory channels is a

feature provided, but not programmed frequency scan. It is possible to scan all occupied channels or a subset of channels and individual channels may be skipped. Scanning is relatively slow, pausing on each channel for between 1 and 10s.

Two IF bandwidth settings, normal and narrow, are selectable on all modes except FM. The standard radio is fitted with a 2.4kHz bandwidth ceramic filter for normal bandwidth on SSB, CW and FAX and the narrow AM setting. Also a standard fitment is a 6kHz bandwidth Collins 8-resonator mechanical filter in the AM normal position. The manual and brochures take great pains to emphasise the performance of this filter and indeed the top of the case sports a large 'Collins Inside' logo. Optional Collins mechanical filters may be fitted to give a CW narrow bandwidth of 500Hz or SSB 2.5kHz with improved skirt selectivity. These mechanical filters have a much improved skirt selectivity compared with the ceramic filters although at a substantially higher cost.

Two settings of audio bandwidth are selectable, high giving a cut-off frequency of 3kHz and low giving a cut-off of 1.8kHz. On CW the cut-off is set to 800Hz. Unusual in a modern receiver, a variable BFO pitch control is provided to set the most comfortable pitch on CW and provide a form of passband tuning / IF shift on SSB and CW modes. It is necessary to offset this control to give single signal reception on CW. Two AGC speeds are provided, fast and slow, but no facility to switch the AGC off. An RF gain control is provided, three levels of input attenuation 0, 10 and 20dB and an all-mode squelch. A noise blanker is not incorporated.

A conventional analogue S meter is fitted and a backlit LCD panel which indicates frequency to 10Hz resolution, memory number and various status indicators. The S-meter and LCD illumination may be turned off via a rear panel switch to save current when powered from internal batteries.



AR3030 rear panel.

THE AR3030 REVIEW

Three antenna possibilities are catered for via two antenna connectors on the rear panel and selected by a three position slide switch. A BNC socket provides either 50Ω coaxial input or high impedance whip antenna input to a high impedance amplifier / impedance converter. A separate connector for end fed wire antennas is provided at about 450Ω impedance level.

Connectors on the rear panel provide for DC power input, external speaker and constant level audio for FAX and data decoders. An RS232 computer interface is fitted which may be directly connected to a computer serial port without the need for the usual external interface box / level converter. 4800 and 9600 baud rates are accommodated and most of the functions of the radio can be set or read including the S-meter reading. An auxiliary socket is provided for general interfacing giving AGC level, audio record output, IF output, squelch controlled relay contacts and access to the RF gain control which may be used for transmit muting.

A small mains PSU is provided with the receiver giving 12V nominal output (model AA3030UK in the UK). Alternatively any suitable external PSU can be used with the optional DC lead. The receiver can be powered from internal dry batteries, and the battery compartment in the rear panel gains access to the battery holder which holds 8 AA sized cells. However, the manual quotes only 30 minutes life with Manganese and 45+ minutes with alkaline cells. NICADs can also be used. These times seem somewhat pessimistic considering the measured current consumption of 360mA. The internal batteries are automatically disconnected when the

external power lead is connected.

The receiver may also be fitted internally with one of two VHF converters. VHF-AM converter covers 108 to 140MHz and VHF-FM covers 140 to 170MHz. The memory and scanning features also extend to cover the VHF converter when fitted and a separate antenna connector is provided on the rear panel for the converter input.

The AR3030 is provided with a 54-page A5 operating manual. This covers very well the operation of the receiver, interfacing to other units, operation of the computer interface and some useful advice on antennas and propagation. A block diagram is included but no circuit or servicing details. A separate service manual should be available as an option.

DESCRIPTION

THE AR3030 IS HOUSED in a rectangular case measuring 250mm (W) by 88mm (H) by 240mm (D) and weighs 2.2kg without batteries. This is a good size for a receiver, large enough to be ergonomically easy to use yet small and light enough to be used anywhere. The two-piece case unscrews to reveal five easily accessible PC boards, mainly mounted on either side of a central chassis. These boards comprise the receiver front-end and first IF, receiver back-end from 2nd IF, frequency synthesiser, BFO, and the front panel PCB which also contains the microcontroller. The grill on the front panel suggests a front facing loudspeaker.

87

AOR AR3030 MEASURED PERFORMANCE

FREQUENCY	SENSITIVITY SSB 10dBs+n:n	INPUT FOR S9	IMAGE REJECTION
1.8 MHz	0.25µV (-119dBm)	28µV	79dB
3.5 MHz	0.22µV (-120dBm)	28µV	87dB
7 MHz	0.25µV (-119dBm)	28µV	88dB
10 MHz	0.2µV (-121dBm)	25µV	90dB
14 MHz	0.2µV (-121dBm)	22µV	93dB
18 MHz	0.28µV (-118dBm)	35µV	87dB
21 MHz	0.2µV (-121dBm)	25µV	90dB
24 MHz	0.2µV (-121dBm)	22µV	90dB
28 MHz	0.45µV (-114dBm)	40µV	75dB

S-READING (14MHz)	INPUT LEVEL
S1	1.3uV
S3	2.5uV
S5	5.6uV
S7	13uV
S9	22uV
S9+20	200uV
S9+40	7mV
S9+60	63mV

AM sensitivity (21MHz): 1uV for 10dBs+n:n at 30% mod depth

FM sensitivity (21MHz): 0.32V for 12dB SINAD 3kHz pk deviation

AGC threshold: 2.2µV

90dB above AGC threshold for +10dB audio output (see text)

AGC attack time: see text

AGC decay time: 0.5 - 1s (fast), 3 - 4s (slow)

Max audio before clipping: 2W into 8Ω

MODE	IF BANDWIDTH	
	-6dB	-60dB
SSB,CW	2740Hz	4170Hz
AM	5910Hz	9740Hz
AM(narrow)	2740Hz	4170Hz
FM	9240Hz	15.1kHz

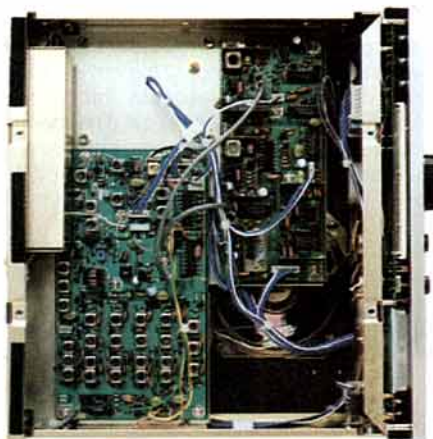
INTERMODULATION (50kHz TONE SPACING)

FREQUENCY	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
1.8 MHz	+8dBm	91dB
3.5 MHz	+5dBm	90dB
7 MHz	+6dBm	90dB
14 MHz	+5dBm	91dB
21 MHz	+5dBm	91dB
28 MHz	+10dBm	90dB

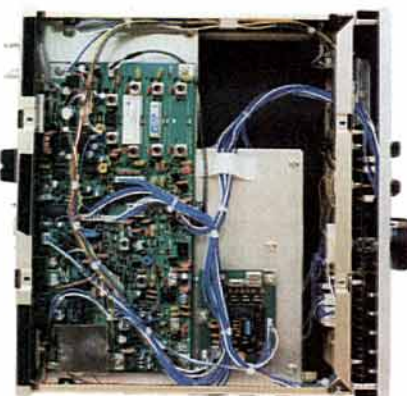
TONE SPACING (7MHz BAND)	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
5kHz	-31dBm	66dB
7kHz	-25dBm	70dB
10kHz	-16dBm	76dB
15kHz	-1dBm	86dB
20kHz	+2.5dBm	88dB
>30kHz	+6dBm	90dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING
3 kHz	71dB	unmeas
5 kHz	77dB	-38dBm
10 kHz	85dB	-37dBm
15 kHz	87dB	-25dBm
20 kHz	94dB	-13dBm
30 kHz	97dB	-3dBm
50 kHz	102dB	-3dBm
100 kHz	107dB	-3dBm
200 kHz	111dB	-3dBm

NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB.



AR3030 top view with cover removed.



AR3030 bottom view with cover removed.