

# Specifications of shortwave radios from various manufacturers

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Last updated June 6, 2006

The information below was compiled during my (so far unsuccessful) search for the ideal shortwave radio to replace my old Sony ICF-2010. I discovered that there was so much information to digest, the only way to organize it was to put it on a Web page. Much of this information has been pasted directly from the vendors' Websites and may or may not be factually correct. Where the information is known to be incorrect or misleading, this is noted. Most of the opinions are my own, based mostly on the publicly available specifications and comments from various Internet sources.

The information describes the specifications of receivers that I have not tested, and summarizes the opinions that seem to be generally held about each receiver based on comments I found on the Internet. I have not personally verified any of this information.

In case you're interested, I decided not to buy any of the radios listed here, but repaired my old Sony instead.

## Receivers

<a href="#">Drake R8B</a>	<a href="#">Icom R9000</a>	<a href="#">Icom R8500</a>	<a href="#">AOR AR5000</a>
<a href="#">AOR SR1050</a>	<a href="#">Ten-Tec RX-350D</a>	<a href="#">Icom R75</a>	<a href="#">Icom IC-PCR1500 and IC-R1500</a>
<a href="#">Icom IC-PCR1000</a>	<a href="#">Kaito WRX-911</a>	<a href="#">Palstar R30</a>	<a href="#">Grundig YB300</a>
<a href="#">Grundig G2000A</a>	<a href="#">Grundig YB550</a>	<a href="#">Grundig YB400</a>	<a href="#">Grundig Satellit 800</a>
<a href="#">Eton E1XM</a>	<a href="#">Panasonic RF-4900</a>	<a href="#">Yaesu FRG-7</a>	<a href="#">AOR AR-3030</a>
<a href="#">AOR AR-8600 Mark 2</a>	<a href="#">Collins 95S</a>	<a href="#">Sony ICF-SW7600</a>	<a href="#">Sony ICF-SW77</a>
<a href="#">Sony ICF-SW2010 Review</a>	<a href="#">Sony ICF-100 Review</a>	<a href="#">Yaesu FRG-9600</a>	<a href="#">Yaesu FRG-100</a>
<a href="#">AOR AR-One</a>	<a href="#">Lowe HF-150</a>	<a href="#">AOR AR7030+</a>	<a href="#">JRC NRD-545</a>
<a href="#">Kenwood R5000</a>	<a href="#">JRC NRD-525</a>	<a href="#">Icom IC-R3</a>	<a href="#">Yaesu VR-5000</a>
<a href="#">Ten-Tec RX-331</a>	<a href="#">Ten-Tec RX-340</a>	<a href="#">Sangean ATS-909</a>	<a href="#">Ten-Tec RX-320D</a>

## Software-defined radios

The number of software defined receivers is exploding. This is an incomplete list of a few popular SDRs, not necessarily the most capable or flexible ones. Many of these are nothing more than computer boards, and considerable expertise is needed to install and use the product. Others, like the Winradio, are more consumer-friendly.

See [http://www.dxzone.com/catalog/Software/Software\\_Defined\\_Radio/](http://www.dxzone.com/catalog/Software/Software_Defined_Radio/) for more information.

<a href="#">RFSpace SDR-14</a>	<a href="#">Avtec IF downconverter IFQ</a>	<a href="#">Flex Systems SDR-1000</a>	<a href="#">SignalWAVE</a>
<a href="#">TORNADO-PX/DDC4G</a>	<a href="#">WinRadio</a>	<a href="#">WinRadio G303</a>	<a href="#">WinRadio G313</a>
<a href="#">WinRadio 1550i</a>	<a href="#">WinRadio 1550e</a>	<a href="#">WinRadio 3150i</a>	<a href="#">WinRadio 3150e</a>
<a href="#">WinRadio 3500i</a>	<a href="#">WinRadio 3500e</a>	<a href="#">WinRadio 3700i</a>	<a href="#">WinRadio 3700e</a>
<a href="#">USRP</a>			

## Antennas

An incomplete list of some active antennas.

<a href="#">AOR LA350</a>	<a href="#">Wellbrook ALA 1530</a>	<a href="#">Wellbrook ALA 100</a>
<a href="#">LF Engineering H800 - Specs</a>	<a href="#">LF Engineering H800 - Review</a>	<a href="#">Amrad Active Antenna</a>
<a href="#">Raven Broadband Active Antennas</a>	<a href="#">101U Marine TV Antenna</a>	

## Drake R8B



Excellent sensitivity. Widely used receiver. AM synchronous detector is widely regarded as superior to synch in other receivers. No DRM output in current model. Minimum tuning step is 10 Hz.

Discontinued

Ergonomic and performance improvements over the R8A include: faster scanning, sideband selectable synchronous AM detection and 1000 alphanumeric memories. <sup>1</sup>Later production units tune from **10 to 30000 kHz**.

Drake R8B \$1159 \$1379.00 \$1499.00 plus shipping and handling. FOB factory.

1. Alphanumeric liquid crystal display provides for programmable display of station name in addition to frequency.
2. Direct entry of mode and bandwidth selection via keypad.
3. Selectable sideband, synchronous AM detector for improved quality of received AM signals, especially under severe fading conditions.
4. Extensive frequency range (**10 kHz to 30,000 kHz**). Additional VHF bands (35 - 55 Mhz and 108 - 174 Mhz) with optional VHF converter.
5. Five built-in filter bandwidths (6.0, 4.0, 2.3, 1.8, and 0.5 kHz).
6. 1000 programmable channel memories.
7. Selectable kHz and MHz display modes.
8. Choice of three tuning step sizes.
9. Multiple scan functions: carrier, time, or seek modes. Scan between frequencies or selected memories.
10. Two operating VFOs.
11. Built-in pre-amp and attenuator.
12. Built-in noise blanker.
13. Passband offset for better rejection of nearby interfering signals.
14. Selectable AGC for improved reception of fading signals.
15. Built-in, multi-voltage power supply.
16. RS232 serial interface for remote control of receiver functions.
17. Dual time zone clock.
18. Two event timers.
19. Sequential tuning through all memory preset channels.
20. Multiple antenna inputs.
21. Built-in speaker.
22. Connections for an external speaker and tape recorder.
23. Made in the U.S.A.
24. Photo
25. Drake Shortwave Accessories
26. Download Owner's Manual
27. Order Online!

## R8B Technical Specifications

### Frequency Range: 10-30,000 kHz

Modes: AM, LSB, USB, CW, RTTY, FM

Sensitivity: SSB, CW: Typical 0.5  $\mu$ V, 0.100-30,000 kHz  
(10dB S+N/N) Less than 0.25  $\mu$ V, 100-30,000 kHz (pre-amp on)

Sensitivity: AM: Typical 1.5  $\mu$ V, 100-30,000 kHz  
(10dB S+N/N) Less than 0.8  $\mu$ V, 100-30,000 kHz (pre-amp on)  
(1000 Hz, 30% mod)

Sensitivity: FM (12 dB SINAD):

Less than 0.5  $\mu$ V, 100-30,000 kHz

Frequency Stability:  $\pm$ 5 ppm, -10° to 50° C

Frequency Accuracy: Better than  $\pm$ 100Hz, -10° to 50° C

Selectivity: 6 kHz @ -6 dB, less than 12 kHz @ -60 dB

AM, LSB, USB, RTTY, CW modes:

4 kHz @ -6 dB, less than 8 kHz @ -60 dB

2.3 kHz @ -6 dB, less than 4.5 kHz @ -60 dB

1.8 kHz @ -6 dB, less than 3.6 kHz @ -60 dB

500 Hz @ -6 dB, less than 1.5 kHz @ -60 dB

FM Only: 12 kHz @ -6 dB, less than 25 kHz @ -60 dB

Ultimate Selectivity: Greater than 95 dB

Image Rejection: Greater than 80 dB, 100-30,000 kHz

IF Rejection: Greater than 80 dB, 45 MHz

Greater than 100 dB, 50 kHz

Dynamic Range:

95 dB, 100-30,000 kHz @ 20 kHz spacing, 2.3 kHz IF BW (pre-amp on)

99 dB, 100-30,000 kHz @ 20 kHz spacing, 2.3 kHz IF BW (pre-amp off)

Intercept Point:

+20 dBm @ 20 kHz spacing (pre-amp off)

+10 dBm @ 20 kHz spacing (pre-amp on)

Greater than -20 dBm @ 5 kHz spacing

First IF: 45 MHz

Second IF: 50 kHz

Tuning Step Sizes: 10 Hz

AGC Threshold: 0.8  $\mu$ V

Attack Time: 1 mS

Release Time:

SLOW: 2 Sec - FAST: 300 mSec

Less than 4 dB change in audio output for 100 dB input  
change ref. AGC threshold

Antenna 1, Converter: 50 Ohms unbalanced

Antenna 2: 50 or 500 Ohms unbalanced

Notch Filter Attenuation: AF type, 40 dB min. (500-5000 Hz)

External Speaker Output: 2.5 W, 4 Ohms @ less than 5% distortion

Line Outputs: 300 mV, 4.7 K Ohms

AC Power Requirements: 100/120/200/240 VAC,  $\pm$ 10% 50 or 60 Hz, 40 Watts nominal

DC Power Requirements: 11-16 VDC @ 2 amp

Operating Temperature: -10° to 50° C

Weight: 13 lbs. (5.9 kg)

Size: Height: 5-1/4" (13.4 cm) including feet

Width: 13-1/8" (33.4 cm)

Depth: 13" (33 cm) including front knobs and rear connectors

## Icom IC-R9000



www.icomreceivers.com

Discontinued? US\$ 4000+. One of the best radios ever made available to the general public. Has a CRT screen or optional LCD. Earlier models had an amber CRT screen.

- \* Frequency Coverage: 0.10000 - 1999.80000 MHz
- \* Modes: SSB (USB,LSB), CW, FSK, AM, FM, Wide FM
- \* Receive system: Superheterodyne
  - 0.10000~999.99999 MHz:
    - SSB, CW, FSK: Quadruple conversion
    - FM: Triple conversion
  - 30.00000~999.99999 MHz:
    - Wide FM: Double conversion
  - 1000.00000~1999.80000 MHz
    - SSB, CW, FSK: Quintuple conversion
    - FM: Quadruple conversion
    - Wide FM: Triple conversion
- \* Intermediate frequencies:
  - 1st: 48.79376-48.80000 MHz (0.1-29.99999 MHz); 778.60001-778.70000 MHz (30.0-499.99999 M
  - 2nd: 10.70000 MHz (0.1-29.99999 MHz); 10.70000 MHz (30.0-499.99999 MHz); 10.70000 MHz (5
  - 3rd: 455 kHz (0.1-29.99999 MHz); 455 kHz (30.0-499.99999 MHz); 455 kHz (500.0-999.99999
  - 4th: 10.70000 MHz (0.1-29.99999 MHz); 10.70000 MHz (30.0-499.99999 MHz); 10.70000 MHz (5

The above 1000.00000 MHz uses a crystal conversion system.

- \* Selectivity:
  - SSB, CW, FSK: More than 2.4 kHz/-6 dB
  - AM: More than 6 kHz/-6 dB
  - FM: More than 15 kHz/-6 dB
  - Wide FM: More than 150 kHz/-6 dB
- \* Sensitivity (Maximum sensitivity values are indicated in each range):
 

Frequency (MHz)	SSB/CW/FSK	AM	FM	Wide FM
0.1-0.49999	0.5 $\mu$ V	3.2 $\mu$ V	-	-
0.5-1.79999	1.0 $\mu$ V	6.3 $\mu$ V	-	-
1.8-29.99999	0.16 $\mu$ V	1.0 $\mu$ V	-	-
30.0-999.99999	0.32 $\mu$ V	1.4 $\mu$ V	0.5 $\mu$ V	1.4 $\mu$ V
1000.0-1239.99999	0.63 $\mu$ V	4.0 $\mu$ V	1.0 $\mu$ V	4.0 $\mu$ V
1240.0-1299.99999	0.32 $\mu$ V	2.0 $\mu$ V	0.5 $\mu$ V	2.0 $\mu$ V
1300.0-1599.99999	0.63 $\mu$ V	4.0 $\mu$ V	1.0 $\mu$ V	4.0 $\mu$ V
1600.0-1999.80000	1.0 $\mu$ V	5.6 $\mu$ V	1.4 $\mu$ V	5.6 $\mu$ V

10 dB S/N for SSB, CW, FSK and AM; 12 dB SINAD for FM and Wide FM.

The IC-R9000 receives below 29.9999 MHz in FM mode. FM specification guaranteed 30.0000-1999.7000 MHz (except Wide FM).

- \* Audio Output Power: More than 2.5 W at 10% distortion with an 8 ohms load.
- \* Audio impedance: 4-8 ohms
- \* Power Supply Requirement: 100-120 V AC
- \* Antenna impedance: 50 ohms (unbalanced) High impedance for a long-wire antenna
- \* Power consumption: Less than 110 VA
- \* Usable Temperature Range: -10°C ~ +50°C; +14°F ~ +122°F
- \* Frequency stability (-10°C ~ +50°C; +14°F ~ +122°F):
  - 0.10000-29.99999 MHz:  $\pm$ 25 Hz
  - 30.00000-1999.80000 MHz:  $\pm$ 0.25 ppm
- \* Dimensions (projections not included): 424(W) x 150(H) x 365(D) mm; 16.7(W) x 5.9(H) x 1
- \* Weight: 20.0 kg; 44.1 lb.

IC-R9000 IC-R9000L (CRT replaced with LCD) Options

1. \* AH-7000 SUPER WIDEBAND OMNIDIRECTIONAL ANTENNA: Frequency coverage: 25 to 1300 MHz.
2. \* CT-16 SATELLITE INTERFACE UNIT: Easy tuning for instant satellite communications with the IC-R9000 and another Icom transceiver.
3. \* CT-17 CI-V LEVEL CONVERTER: For remote control using a personal computer equipped with an RS-232C port.
4. \* SP-20 EXTERNAL SPEAKER: High performance speaker with audio filters for greater sound quality. Style and size match the IC-R9000.
5. \* UT-36 VOICE SYNTHESIZER UNIT: Announces the displayed frequency in English.

## Icom IC-R8500



Like most wideband receivers, has less sensitivity in HF than a dedicated HF receiver.

### Frequency range 100kHz - 2GHz

#### IC-R8500 Specifications

sale price 1439.95

list price 2156.00

This information is taken directly off of the Icom IC-R8500 brochure.

#### General

- \* Frequency Coverage:
  - o 0.10000 - 823.99999 MHz
  - o 849.00001 - 868.99999 MHz
  - o 894.00001 - 1999.99999\* MHz (\*guaranteed: 0.1 - 1000 and 1240 - 1300 MHz)
- \* Mode: SSB (USB,LSB); AM (Normal, Wide, Narrow); WFM; FM (Normal, Narrow); CW (Normal, Na
- \* Number of memory channels: 1000 (plus 20 scan edges and 1 priority channel)
- \* Antenna connector:
  - o Below 30 MHz: SO-239 (50 ohms/Phono [RCA (500 ohms)])
  - o Above 30 MHz: Type-N (50 ohms)
- \* Usable Temperature Range: -10°C ~ +50°C; +14°F ~ +122°F
- \* Frequency stability (in FM mode):
  - o Below 30 MHz: ±100 Hz (optional ±20 Hz)
  - o Above 30 MHz: ±3 ppm (optional ±0.6 ppm)
- \* Tuning steps: 10, 50, 100 Hz; 1, 2.5, 5, 9, 10, 12.5, 20, 25, 100 kHz; 1 MHz or program
- \* Power Supply Requirement: 13.8 V DC ±15% (negative ground) or 117/220/240 VAC (with AD-5
- \* Current drain (at 13.8 V DC):
  - o Standby: 1.8 A
  - o Maximum audio output: 2.0 A
- \* Dimensions: 287(W) x 112(H) x 309(D) mm; 11.3(W) x 4.4(H) x 12.2(D) in
- \* Weight: 7.0 kg; 15.4 lb.
- \* Receive system: Superheterodyne
- \* Intermediate frequencies:
  - o 1st: 48.8 MHz (0.1-29.99999 MHz); 778.7 MHz (30.0-499.99999 MHz); 266.7 MHz (500.0
  - o 2nd: 10.7 MHz (0.1-29.99999 MHz); 10.7 MHz (30.0-499.99999 MHz); 10.7 MHz (500.0-1
  - o 3rd\*: 455 kHz (0.1-29.99999 MHz); 455 kHz (30.0-499.99999 MHz); 455 kHz (500.0-102
- \* Sensitivity (typical):
 

Frequency band (MHz)	SSB/CW	AM	AM-N	AM-W	FM	WFM
0.1-0.49999	1.0 µV	6.3 µV	-	-	-	-
0.5-1.79999	2.0 µV	13.0 µV	-	-	-	-
1.8-1.99999	0.25 µV	3.2 µV	2.5 µV	-	-	-
2.0-27.99999	0.2 µV	2.5 µV	2.0 µV	-	-	-
28.0-29.99999	0.2 µV	2.5 µV	2.0 µV	-	0.5 µV	-
30.0-999.99999	0.32 µV	2.5 µV	2.0 µV	3.2 µV	0.5 µV	1.4 µV
1240.0-1300.00000	0.32 µV	2.5 µV	2.0 µV	3.2 µV	0.5 µV	2.0 µV
- \* Squelch sensitivity (threshold/tight):
  - o 1.8-29.99999 MHz:
    - + SSB, CW, AM-N: 10 µV/320 mV
    - + AM, AM-W: 0.5 µV/320 mV
  - o 28-29.99999 MHz:
    - + FM: 0.5 µV/320 mV

- o 30-1000, 1240-1300 MHz:
  - + FM, AM, AM-W: 0.4  $\mu$ V/320 mV
  - + WFM, SSB, CW, AM-N: 4.5  $\mu$ V/320 mV
- \* Selectivity:
  - o WFM: More than 150 kHz/-6 dB
  - o FM, AM-W: More than 12 kHz/-6 dB
  - o AM, FM-N: More than 5.5 kHz/-6 dB
  - o AM-N, SSB, CW: More than 2.2 kHz/-6 dB
- \* Spurious and image rejection ratio:
  - o 1.8-29.99999 MHz: More than 60 dB
  - o 30-1000/1240-1300 MHz: 50 dB (typical)
- \* Audio Output Power (at 13.8 V DC): More than 2.0 W at 10% distortion with an 8 ohms load
- \* IF shift variable range: More than  $\pm$ 1.2 kHz
- \* External speaker connector: 2-conductor 3.5 mm (1/8 in)/4-8 ohms

## Options

1. AH-7000 SUPER WIDEBAND OMNI DIRECTIONAL ANTENNA: Frequency coverage: 25 to 1300 MHz.
2. SP-7 EXTERNAL SPEAKER: Style and size are matched with the IC-R8500. Input impedance: 8 ohms. Max. input power: 5 W
3. SP-21 EXTERNAL SPEAKER: Input impedance: 8 ohms. Max. input power: 5 W
4. IC-MB12 MOBILE MOUNTING BRACKET: Receiver mounting bracket for mobile operation.
5. MB-23 CARRYING HANDLE: For easy portable operation.
6. CR-293 HIGH STABILITY CRYSTAL UNIT: Frequency stability:  $\pm$ 0.5 ppm at 0°C to +60 $\pm$ C
7. FL-52A CW NARROW FILTER: Center freq: 455 kHz; Bandwidth: 500 Hz/-6 dB
8. UT-102 VOICE SYNTHESIZER UNIT: Provides audible confirmation of an accessed band's frequency.
9. AD-55/A/V AC ADAPTER: Allows you to power the transceiver via domestic AC.

## AOR AR5000



AOR AR5000 \$2599

Goes down to 100kHz (or 10 kHz for the AR5000A). Good sensitivity. Very expensive. Also handles TV signals (TV demodulator is \$200 extra) But despite the high price you don't even get AM sync on the standard model.

The new AR5000"A" models cover all the way from 10 kHz to 3 GHz (less cellular on blocked models),

Modes of reception include: AM, FM-N, FM-W, LSB, USB and CW. Six bandwidths are supplied (3, 6, 15, 30, 110 and 220 kHz.) and a slot for a 0.5 kHz filter is available. The triple conversion circuit and varactor tuned front-end provide excellent overload characteristics. Two thousand memories in 20 banks of 100 are featured. Each memory channel may hold: frequency, mode, band width, LPF, HPF, de-emphasis, tuning step, step-adjust, frequency off-set, AGC, attenuator, CTCSS tone, antenna selection, 8 character text tag and lockout! Sophisticated scanning is available including channel pass, select scan and auto-store. Besides normal scanning (25 memories per second), there is also CyberScan (45 seconds) without channel tags. Scanning search (sometimes called sweep or spectrum scan) is also supported, allowing the radio to automatically tune between



user-defined frequencies. The large front panel is very comfortable to use. Other features include: two antenna inputs (N and SO-239), antenna attenuator, keypad entry, computer control, audio filter, dial torque adjustment, mute, AGC, lock, RS232 port, squelch, analog S-meter, preamp, removable feet raisers, scanning (25/50 channels/second) and sweep. In FM mode the AGC may be set to Off or On. In other modes the AGC may be set to Off, Fast, Middle or Slow. This radio may be run from 12 VDC at 1 Amp (with optional DC3000 power cord) or via supplied 110 VAC adapter. There is a programmable 10.7 MHz IF output on the back to drive the optional SDU5600. There is also a programmable 10 MHz External Frequency Standard input jack [BNC] for laboratory applications. Click here to view Quick Ref Card in PDF format. Installation of one or more filters is \$25.00 per filter at time of receiver purchase.

The "+3" version offers even more with synchronous AM, AFC and Noise Blanker. Popular with government agencies throughout the world. The AR5000+3 is a 'feature loaded' version of the AR5000 receiver with three enhanced options fitted, these options can only be fitted in the factory during manufacture or AOR workshop:

#### Synchronous AM

#### Automatic Frequency Control

#### Noise blanker

##### 1. Synchronous AM:

Synchronous AM is a useful tool to help reduce distortion due to selective fading, in particular on the short wave bands (long & medium wave bands too). In synchronous AM, the original carrier is phase locked to a stable internally generated synthetic reference which is used to replace the (variable) original carrier resulting in more stable reception with greater recovered audio, especially during deep fades. A wide lock range is provided by this detector to enable simple, quick & efficient operation (unlike some other synchronous units on the market which require extremely accurate tuning).

#### SAM Synchronous AM double side band

#### SAL Synchronous AM lower side band

#### SAH Synchronous AM upper (higher) side band

AM transmissions are constructed of a carrier and both upper & lower sidebands. Usually both side bands carry the same information so both or either may be selected with the same recovered resulting audio, however when adjacent interference is present, selecting synchronous single side band (SAL or SAH) can provide improved results.

2. Automatic Frequency Control (A.F.C.): Automatic frequency control is a 'global' facility, either OFF or ON (default is off). When A.F.C. is used in AM, FM and synchronous AM modes, the receiver is automatically tuned on to the centre frequency to provide the best signal strength and recovered audio. When used in synchronous AM modes, A.F.C. ensures that the signal is pulled within lock range for no-fuss operation. A.F.C. is particularly useful on the VHF-UHF bands to ensure that the AR5000 is receiving spot on frequency, especially when searching through unusual band plans or when the exact band plan is not known.

3. Noise blanker: The noise blanker is another 'global' facility, either OFF or ON (default is off). This facility is particularly useful to help reduce impulse noise and interference from vehicles ignition systems, whether from passing traffic or while the AR5000 is fitted into a mobile installation.

#### Options

1. AS5000 4 way external aerial switch
2. CT5000 Internal CTCSS unit
3. DS8000 Voice inverter unit (analogue)
4. CR5000 Tape recording lead for AR5000A
5. DC3000 12V DC lead for the AR5000A etc. Can be fitted with cigar plug
6. 8MINI 8 pin ACC1 mini-DIN plug for AR5000A
7. 8LMINI 8 pin ACC1 mini-DIN plug with free end lead for \* AR5000A
8. 5000PC RS232 lead to 9-way PC serial plug (other connections made to order) for AR5000A
9. MF500 Collins 500 Hz mechanical CW filter
10. MF2.5 Collins 2.5 kHz mechanical SSB filter

11. MF6 Collins 6.0 kHz mechanical AM filter
12. DA3000 16 element discone aerial, usable coverage \* 25MHz to 2,000MHz (2GHz). Supplied with 15m of coaxial cable and terminated in a BNC plug
13. SA7000 Twin Element ultra wide band receive aerial 30kHz to 2,000 MHz (2GHz). Supplied with 15m of coaxial cable and terminated in a BNC
14. Spectrum Master Windows/95/98/ME/XP control software for the AR5000 (maximum input frequency 2600MHz), bundled with software for the SDU5000 + SDU5500
15. TV5000 A new TV demodulator has been produced for the AR5000, it is called the TV5000. Currently it is available in NTSC format only, primarily being produced for the USA and Japanese markets. It is hoped that a PAL version (for European & UK operation) will become available in the future. For your information the USA list price for the TV5000 (NTSC) is US\$199.00 - February 2003

**AR5000AU/A+3U Frequency Range: 100 kHz to 3000 MHz**

AR5000AB/A+3B Frequency Range: 100 kHz to 3000 MHz (Cellular Blocked)

AR5000C Frequency Range: 100 kHz to 2600 MHz

Receive Modes: AM, FM, USB, LSB, CW

Nominal Filter Bandwidths: 3 kHz, 6 kHz, 15 kHz, 30 kHz, 110 kHz &amp; 220 kHz (provision for

Tuning Steps: 1, 10, 50, 100, 500 Hz, 1, 5, 6.25, 9, 10, 12.5, 20, 25, 30, 50, 100 and 500 k

Typical Sensitivity:

10 - 20 MHz    0.56µV AM    6 kHz filter 10dB S/N  
                   0.25µV SSB    3 kHz filter 10dB S/N  
                   0.36µV FM    6 kHz filter 12dB SINAD  
                   0.56µV FM    15 kHz filter 12dB SINAD

90 - 150 MHz    0.50µV AM    6 kHz filter 10dB S/N  
                   0.20µV SSB    3 kHz filter 10dB S/N  
                   0.25µV FM    6 kHz filter 12dB SINAD  
                   0.28µV FM    15 kHz filter 12dB SINAD  
                   0.50µV FM    30 kHz filter 12dB SINAD  
                   0.80µV FM    110 kHz filter 12dB SINAD  
                   1.12µV FM    220 kHz filter 12dB SINAD

400 - 700 MHz    0.56µV AM    6 kHz filter 10dB S/N  
                   0.23µV SSB    3 kHz filter 10dB S/N  
                   0.28µV FM    6 kHz filter 12dB SINAD  
                   0.32µV FM    15 kHz filter 12dB SINAD  
                   0.50µV FM    30 kHz filter 12dB SINAD  
                   1.80µV FM    110 kHz filter 12dB SINAD  
                   1.25µV FM    220 kHz filter 12dB SINAD

1.6 - 2.6 GHz    0.36µV AM    6 kHz filter 10dB S/N  
                   0.14µV SSB    3 kHz filter 10dB S/N  
                   0.20µV FM    6 kHz filter 12dB SINAD  
                   0.22µV FM    15 kHz filter 12dB SINAD  
                   0.40µV FM    30 kHz filter 12dB SINAD  
                   0.63µV FM    110 kHz filter 12dB SINAD  
                   0.90µV FM    220 kHz filter 12dB SINAD

The more recent sensitivity values in the manual are quoted as:

Receive frequency	10dB	12dB	12dB	12dB
	S/N	SINAD	SINAD	SINAD
	AM	SSB/CW	FM	FM
	6kHz	3kHz	15kHz	220kHz
	-----	-----	-----	-----
10kHz - 40kHz	63.00uV	17.70uV	-	-
40kHz - 100kHz	4.46	1.25	-	-
100kHz - 2MHz	2.23	0.40	-	-
2MHz - 40MHz	1.25	0.40	0.56	1.58
40MHz - 1,000 MHz	0.63	0.3	0.4	1.25
1,000MHz -2.6 GHz	0.63	0.3	0.36	0.89

Memory channels: 2000 (100ch x 20 banks)

Memory Scan Speed: 45 channels/second (max)

Search Speed: 45 increments/second 9max with step size of 100kHz or less)

PASS Frequency: 2100 total

Aerial Input: 50 OHM undalanced. N-Type &amp; SO239

Audio Output: 1.7 watts into 8 ohms (@ 13.5V) @ 10% distortion

Power Requirements: Nominal 12 VDC, @ 1 Amp or less

Dimensions: 8.5x3.5x10 inches (217x100x260 mm).

Weight: 7.8 Lbs. (3.5kg)



## AOR SR1050



Only goes down to 100kHz. Excellent sensitivity thru UHF. This is an AR5000+3 with a spectrum analyzer and a speaker stuck to it, in a rack mount.

AOR SR1050

AOR has built a package designed to meet the needs of the surveillance professional. Covering 10 KHz to 2600 MHz, the SR1050/SR1050V combines a state of the art receiver with an LCD Spectrum display unit, giving the operator unsurpassed capabilities to identify and monitor a specific signal and identify its characteristics.

The "heart" of the AOR SR1050 is the AR5000Plus3 high-performance wide-band all-mode receiver. With accurate tuning of 1 Hz, analog signal strength meter and a host of operator-selected features and options, its performance is highly respected by law enforcement, military and laboratory users. Teamed with the SDU5500 Spectrum Display Unit, the package is interactive and computer compatible. The AS5000 automatic antenna switch (included) works interactively with the AR5000Plus3, providing automatic selection among four antennas for maximum receiver sensitivity.

The SR1050V can be used as a vector analyzer, for use in monitoring digital communications. Data packets in PDC, PHS and GSM formats can be displayed and identified in binary. It is also possible to see HEX information at a point from which analysis can begin. PDC, PHS and GSM can be viewed from the pre-set mode. A manual mode is also available to change modulation modes and symbol rates. This can be useful in using other applications, such as analyzing modems. The display can depict eye diagram, vector trace, constellation, trellis diagram, hex dump and bin dump outputs. Main Features

1. Superior sensitivity
2. Rack mounted for mobile or fixed use.
3. 13.8 V DC input (3A)
4. Computer interface
5. All mode reception
6. TCXO receiver
7. Multiple IF bandwidths
8. Auto mode bandplan selection
9. Intended for government and export use only

### AR5000Plus3 Features

1. TCXO is standard
2. Cover 10 KHz - 2.6 GHz (No gap)
3. Tuning steps to 1 Hz
4. All modes - AM, FM, LSB, USB, CW
5. Automatic front end preselection
6. Multiple IF bandwidths
7. Multifunction LCD with 7 character alphanumeric text
8. Analog S Meter

## 9. CyberScan up to 45 channels/second

## 10. Auto memory storage

## 11. Excellent strong signal handling

AR5000Plus3 Specification **Frequency Range:** 100kHz to 2600MHz  
 Receiv Modes: AM, FM, USB, LSB, CW  
 Nominal Filter Bandwidths: 3kHz, 6kHz, 15kHz, 30kHz, 110kHz & 220kHz (provision for 500Hz  
 Tuning: NCO 1Hz to 999.999999kHz

## Typical Sensitivity:

10 - 20MHz	0.56uV AM	6kHz filter	10dB S/N
	0.25uV SSB	3kHz filter	10dB S/N
	0.36uV FM	6kHz filter	12dB SINAD
	0.56uV FM	15kHz filter	12dB SINAD
90 - 150MHz	0.50uV AM	6kHz filter	10dB S/N
	0.20uV SSB	3kHz filter	10dB S/N
	0.25uV FM	6kHz filter	12dB SINAD
	0.28uV FM	15kHz filter	12dB SINAD
	0.50uV FM	30kHz filter	12dB SINAD
	0.80uV FM	110kHz filter	12dB SINAD
400 - 700MHz	1.12uV FM	220kHz filter	12dB SINAD
	0.56uV AM	6kHz filter	10dB S/N
	0.23uV SSB	3kHz filter	10dB S/N
	0.28uV FM	6kHz filter	12dB SINAD
	0.32uV FM	15kHz filter	12dB SINAD
	0.50uV FM	30kHz filter	12dB SINAD
1.6 - 2.6GHz	1.80uV FM	110kHz filter	12dB SINAD
	1.25uV FM	220kHz filter	12dB SINAD
	0.36uV AM	6kHz filter	10dB S/N
	0.14uV SSB	3kHz filter	10dB S/N
	0.20uV FM	6kHz filter	12dB SINAD
	0.22uV FM	15kHz filter	12dB SINAD
	0.40uV FM	30kHz filter	12dB SINAD
	0.63uV FM	110kHz filter	12dB SINAD
	0.90uV FM	220kHz filter	12dB SINAD

Memory channels: 1000 (100ch x 10 banks)  
 Memory Scan Speed: 45 channels/second (max)  
 Search Speed: 45 increments/second (max with step size of 100kHz or less)  
 PASS Frequency: 2100 total  
 Aerial Input: 50 OHM undalanced. N-Type & SO239  
 Audio Output: 1.7 watts into 8 ohms (@ 13.5V) @ 10% distortion  
 Power Requirements: Nominal 12V DC, @ 1A or less  
 Dimensions: 217(W) x 100(H) x 260(D) mm  
 Weight: 3.5kg

## SDU5500 Features

- \* Menu driven operation
- \* Fully interactive with AR5000Plus3
- \* Wide coverage, +/- 5 MHz from input frequency
- \* Two frequency resolutions, 5 or 30 KHz
- \* Graphic display and statistical analysis
- \* PC remote control interface

## SDU5500 Specification Model: SDU-5500

Input Frequency: 10.7 MHz  
 Sweep Width: 1 KHz to 10 MHz (1 KHz step)  
 Frequency Accuracy: +/- 600 Hz  
 Resolution Bandwidth: 5 / 30 KHz  
 Reference Level: -10 , -40 dBm  
 Maximum Input Level: -10 dBm  
 Dynamic Range: 50 dBm min  
 Level Accuracy: Linearity within +/- 2 dB (within -40 dB from reference level)  
 Band Ripple: +/- 4 dB @ 10.7 MHz +/- 5 MHz  
 Temperature: +/- 6 dB (0 - 40 degrees Celcius, 32 - 104 degrees in Farenheit)  
 Marker Mode: Direct read-out for frequency and level  
 Peak Detect + continuous Peak Detect  
 Averaging ( 2 to 32 times sampling adjustment)  
 Plot Mode: Outline, Paint  
 Display Mode: SPECT / STRES / CHANL  
 Input Impedance: 20 K ohm  
 Display Type: 4.7" dot matrix STN LCD  
 Display resolution: 304 x 128 dots  
 Screen Refresh: 500 ms  
 Backup: From primary 12 V DC supply  
 Dimensions: 225 x 124 x 240 mm (W,H,D) approx.



button. Signals will be shown on the bar graph on opposite sides of the starting frequency. A cursor will appear and allow you to tune RX-350 to any signal visible on the screen. Easy!

The 1024 memories (in 8 banks of 128 channels each) retain frequency, mode and bandwidth information. Memories are grouped into several banks for easy storage of frequencies from different bands. An alphanumeric tag function of up to 8 letters allows memories to be tagged with specific names like "WSEV 930" or "VOA", etc.

Scan functions allow scanning of band segments or memory banks. Memory bank scan feature includes a memory lockout function for skipping of constantly busy channels. Band scanning is user-programmable; set the start and stop frequencies, push a button and the radio starts to scan between the two frequencies.

Built in clock displayed on LCD screen displays hours, minutes, and seconds in user-selectable 12 or 24 hour format. Timer circuitry and a squelch-activated output allow for monitoring and/or taping of band activity even when the user is not present. Timer function allows the radio to be set in a 'wait' mode, to power on at a specific time and to send a control signal for actuation of accessory equipment. Two separate timer outputs are provided for connection of two separate devices to be actuated by the timer circuit. The squelch-activated output allows the radio to be left on and squelched on a given frequency. When a signal is present to open the squelch, an actuation signal is sent via a rear-panel jack.

Rear panel Hi-Z and Lo-Z antenna inputs allow connection of virtually any antenna to the RX-350. Built-in AC switching power supply allows operation of RX-350 from either 115 or 230 VAC. Separate DC power input jack can be used for 13.8 VDC operation. AC and DC supply can be connected at the same time for back-up. Plug the RX-350 into the wall and connect to battery supply. If the AC power goes off, the connected DC source automatically takes over power to the receiver. Mute function for muting of receiver if used with a companion transmitter. 12.125x5x13 inches.

An optional remote encoder knob/keypad, model 302, is available for armchair operation of the RX-350. Simply plug the 302 into the rear panel of the RX-350 via the provided 6 foot cable. The 302 provides a duplicate of the main tuning knob of the receiver, a direct frequency entry keypad, and three functions buttons that can be user-assigned to control various receiver functions like mode switching, main tuning knob step size, SWEEP actuation, etc. Main tuning knob on the receiver front panel and all other receiver functions are active even when the 302 is in use. Sit back and relax!

No other shortwave receiver packs this much value 'under the hood'. To top it off, it's MADE IN USA and competitively priced! Put the RX-350 side-by-side with your present HF receiver and see for yourself why Ten-Tec is the fastest growing name in high-quality shortwave receivers. One year limited warranty. Made in Tennessee, USA. CE certified. This latest D version has 12 kHz IF output for DRM compatibility.

Note: Sensitivity is quoted for SSB only.

```

Frequency Range ..... 100 - 30000 kHz
Modes ..... AM, LSB, USB, CW, DIG, FM
                    Synchronous AM/DSB, SAM/LSB, SAM/USB.
Power ..... 110/220 VAC +/- 10% 50 - 60 Hz, or 12-14 VDC @1.5 A
Antenna Input ..... Coaxial: 50 ohms, nominal unbalanced.
                    Terminal Posts: 450 ohms, nominal unbalanced
Selectivity (-6dB) .. 34 bandwidths selectable from 0.3 kHz to 8 kHz.
                    Shape factor 1.5:1 or better. 6 to 60 dB.
                    300      900      2100     3600     6000
                    330      1050     2250     3900     8000
                    375      1200     2400     4200
                    450      1350     2550     4500
                    525      1500     2700     4800
                    600      1650     2850     5100
                    675      1800     3000     5400
                    750      1950     3300     5700
Sensitivity ..... <.35 µV (10 dB S+N/N) SSB @ 3 kHz
Frequency Accuracy .. ±90 Hz (at 25° C. for one year)
Image Rejection ..... >60 dB typical
I.F. Rejection ..... >60 dB typical
Audio Speaker Output. 1 watt 4 ohm
Audio Line Output.... 1 V p-p 600 ohm

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Headphone Output .... ¼ inch.  
 Passband Tuning ..... ±2 kHz in USB, LSB and CW  
 Spurious Responses... 90 dBm for 3 kHz bandwidth at 50 kHz tone spacing  
 Third Order Intercept +10 dBm typical  
 Noise Floor ..... -126 dBm @ 3 kHz bandwidth  
 Memories ..... 1024 channels (8 banks x128) (frequency, mode, bandwidth)  
 Spectrum Sweep ..... 8 widths from 240 Hz to 2.4 MHz with tuning cursor  
 and selectable Autosweep function.  
 RS-232 Port ..... ?? baud.  
 IF Frequencies ..... 1st: 45 MHz, 2nd: 455 kHz, 3rd: 12 kHz  
 Environment ..... 0-50° C (32-122° F)  
 Dimensions ..... 12.125 x 5 x 13 inches (308x128x330 mm)  
 Weight ..... 12 Lbs. net (5.45 kg)

## ICOM R75



Very popular and widely used. LF/MF/HF and lower VHF band. Relatively inexpensive.

Newer models have built-in DSP, which was optional on earlier models.

ICOM R75 Icom R75 All Mode HF and 50 MHz Receiver Regular Price: \$799.99 Sale Price!: \$549.99

Features include: **30kHz to 60MHz .03 to 60 MHz coverage**, AM/SAM/FM/USB/LSB/CW/RTTY, Triple Conversion Superheterodyne Rx, Synchronous AM Detection (S-AM), Superior Dynamic Range: >104 dB , Twin Passband Tuning (PBT), AF-DSP (optional), Noise Reduction, Auto Notch Filter.

The ICOM UT-106 Digital Signal Processing (DSP) module is a powerful option for the R75 receiver. This board requires only plug-in installation and provides:

**ANF Automatic Notch Filter** ---- This automatically minimizes beat signals and heterodynes while preserving the receive signal. Also, the notch frequency is automatically adjusted to follow interfering beat signals; for example, reducing interference from RTTY signals during SSB reception. Works in SSB mode.

**NR Noise Reduction** -- reduces noise components and picks out desired signals which are buried in noise. The received AF signals are converted to digital signals and then the desired signals are separated from the noise. Works in AM, FM and SSB modes.

Both ANF and NR features are accessed through the receiver's LCD display menu. The ANF function can be turned on or off via the menu. For NR, set the desired noise reduction level. The display will show what level you are setting as you rotate the knob.

The R75 has many features included in the base radio (the only radio in it's class with DSP) at an affordable price-check it out! MSRP = \$949.00 Check out our full specs. and information at our website [www.LeesElect.com](http://www.LeesElect.com) for all Icom radios. Instant Cash Coupons and Free UT-106 for a limited time only! Now is the best time to buy. Try the R-75 and start listening to the world today!

Selectivity: 6/2.1/\_/\_ kHz -6dB. [12 FM]  
 Circuit: Triple Conversion  
 Physical: 9.5x3.7x9.1" 6.8 Lbs.  
 Coverage: 30-60000 kHz Readout: Digital LCD 0.001

Features: ¼" Head. Jack, . S-Indicator . RF Gain . Clock-Timer . Preamp . Attenuator . 99 Mems (F/M) . 2 Band Edge Memories . Squelch . Keypad . NB . AGC FAST/SLOW/OFF . Twin PBT . Synchronous Detection . Scan/Sweep . Lock

Accessories: FL-52A 500 Hz CW Filter, FL-100 500 Hz CW Filter, FL-101 250 Hz CW Filter, FL-53A 250 Hz CW Filter, FL-103 2.8 kHz SSB Filter, FL-223 1.9 kHz SSB Filter, FL-96 2.8 kHz SSB Filter, FL-222 1.8 kHz SSB Filter, FL-257 3.3 kHz SSB Filter, UT-106 Audio DSP Notch/NR Option, RS-R75 Control Software, CR-282 High Stability, UT-102 Voice Synthesizer, CT-17 Level Converter, MB-23 Carry Handle, MB-5 Mobile Bracket New Price: \$549-699 Used Price: \$350-400

Comments: Memories are 8 character alphanumeric. Only one filter per IF may be added. The Sync detection does not hold lock well on weak signals.

The ICOM IC-R75 receiver continues the proud tradition of the earlier R-70 and R-71A models. With full coverage from 30 kHz to 60 MHz; all longwave, medium wave and shortwave frequencies are supported plus extended coverage to include the 6 meter amateur band. Some of innovative features of the R75 include: Synchronous AM Detection, FM Mode Detection (but not the FM broadcast band), Twin Passband Tuning, Two Level Preamp, 99 Alphanumeric Memories, four Scan Modes, Noise Blanker, Selectable AGC (FAST/SLOW/OFF), Clock-Timer, Squelch, Attenuator and backlit LCD display. Tuning may be selected at 1 Hz or 10 Hz steps plus there is a 1 MHz quick tuning step plus tuning Lock. The R75 exhibits very impressive and very linear sensitivity throughout shortwave. Superior dynamic range insures the handling of both weak and strong signals. The front-firing speaker provides solid, clear audio. The back panel includes a Record Output jack and Tape Recorder Activation jack (both 3.5mm mini). The R75 includes the Icom AD55A external 120 VAC 60 Hz to 16 VDC 1.5 Amp power supply adapter.

The R75 is an excellent single sideband receiver (SSB). The supplied 2.1 kHz SSB filter is suitable for utility, amateur, or broadcast SSB. However, two optional CW/SSB filter positions are also available (one per I.F.). [Click here to view filter chart.](#)

\* Intermediate frequencies:

Mode	1st (MHz)	2nd (MHz)	3rd (kHz)
USB/LSB*	69.0115	9.0115	455
CW*	69.0106	9.0106	455.9
RTTY*	69.0105	9.0105	456
AM*/S-AM	69.0100	9.0100	450
FM	69.0115	9.0115	450

\*May differ according to selected IF filter.

\* Sensitivity:

Frequency Range	SSB/CW/RTTY	AM/S-AM	FM
0.1 - 1.8 MHz (Preamp OFF)	2.0 $\mu$ V	5.6 $\mu$ V	-
1.8 - 28 MHz (Preamp 1 ON)	0.16 $\mu$ V	1.60 $\mu$ V	-
28 - 29.99 MHz (Preamp 1 ON)	0.16 $\mu$ V	1.60 $\mu$ V	0.22 $\mu$ V
50 - 54 MHz (Preamp 2 ON)	0.13 $\mu$ V	1.00 $\mu$ V	0.20 $\mu$ V

\* SQL sensitivity (threshold):

- o SSB, CW, RTTY: Less than 5.6  $\mu$ V (Preamp 1 ON)
- o FM: Less than 0.32  $\mu$ V (Preamp 2 ON)

\* Selectivity:

- o SSB, CW, RTTY: More than 2.1 kHz/-6dB, Less than 4.0 kHz/-60dB
- o AM, S-AM: More than 6 kHz/-6dB, Less than 20 kHz/-60dB FM:  
More than 12 kHz/-6dB, Less than 30 kHz/-60dB

\* Spurious and image rejection ratio: More than 70 dB (except IF through/50 MHz band)

\* Audio Output Power (at 13.8 V DC): More than 2.0 W at 10% distortion with an 8 load

\* PHONES connector: 3-conductor 6.35 (d) mm (1/4")

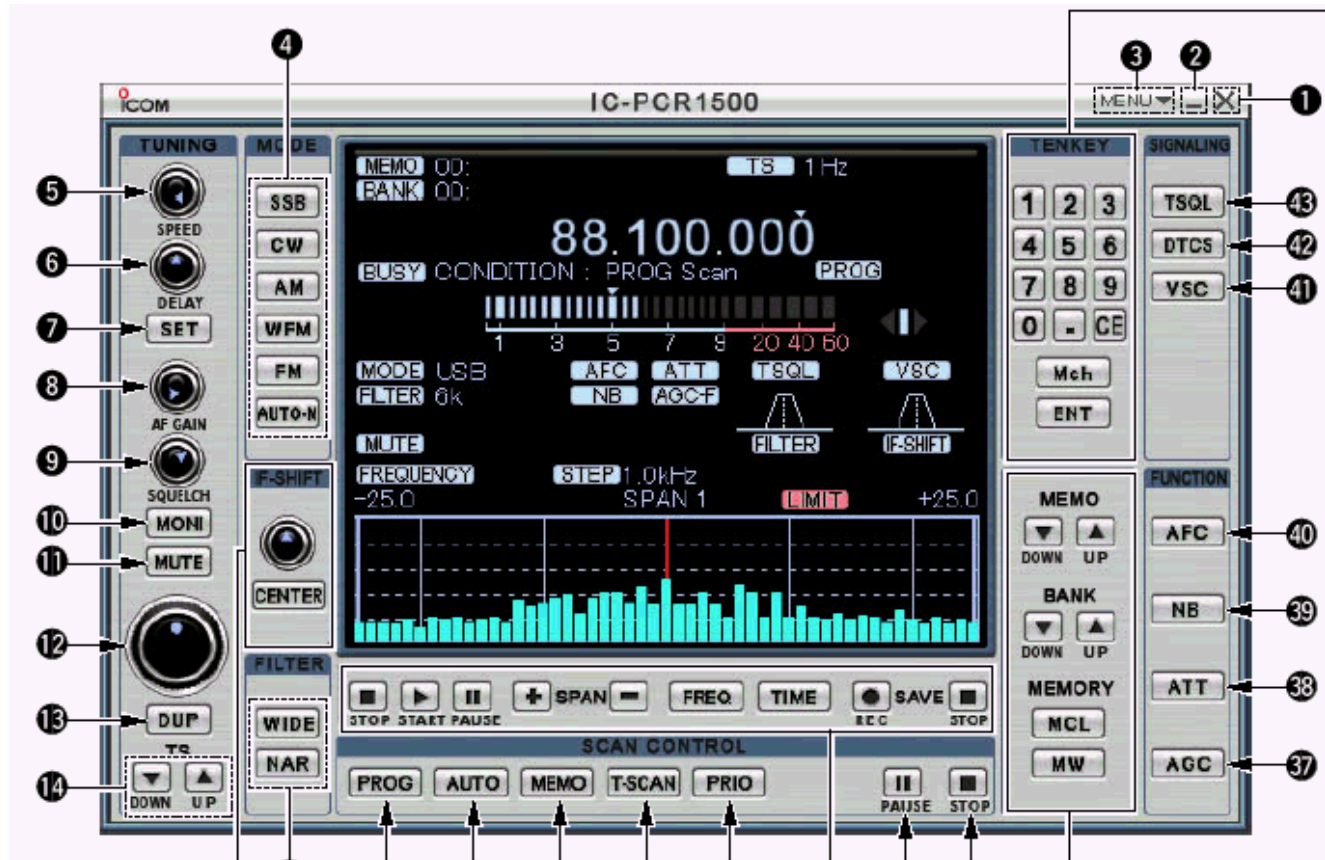
\* External SP connector: 2-conductor 3.5 mm (1/8 in)/4-8

The magazine QST measured the sensitivity and got these results:



	1MHz	3.8MHz	53MHz	
AM sensitivity, 10 dB(S+N)/N, 1 kHz tone, 30% modulation				
preamp off	1.7	1.2	2.4	uV
preamp one	0.8	0.6	1.0	
preamp two	0.6	0.4	0.5	
FM sensitivity for 12 dB SINAD	29 MHz	52 MHz		
preamp off	0.5	1.0		
preamp one	0.2	0.4		
preamp two	0.2	0.2		
Noise floor (mds), 500 Hz filter	1.0MHz	3.5MHz	14MHz	50MHz
preamp off	-130	-133	-132	-127 dBm
preamp one	-137	-141	-138	-136
preamp two	-140	-143	-142	-140
IF/Audio bandwidth (-6dB)				
CW-N (500 Hz filter)	751 Hz			
CW-W	2558			
USB-W	2504			
LSB-W	2533			
AM	2444			
Image rejection 14MHz, 72 dB				
First IF rejection 14 MHz, 81 dB				

## IC-PCR1500 and R1500



This is the appearance of the Windows controller screen.

**Frequency Coverage (MHz): 10 kHz - 3300.000 MHz**

This unit replaces the IC-PCR1000.

This unit has been replaced by the IC-PCR2500 and R2500, which have similar specifications but more features.

- Computer-controlled receiver (uses Windows)
- Connects to USB port
- No IF output.
- Has connections for TNC
- Not as sensitive as some but inexpensive



- Many tuning steps.
- Appears to be deaf above 1.3 GHz
- Frequencies below 1.7MHz are strongly attenuated.
- Has band sweep +/- 25 kHz or +/- 500 kHz; audio is muted while sweeping
- Tone/DTSC squelch
- Duplex operation
- IF shift (SSB/CW mode only)
- 2600 memory channel storage (?)
- R1500 differs from PCR1500 by having a detachable controller assembly which resembles a detachable car radio controller. This controller only shows 8 digits of the frequency. It has a fixed decimal point, so it only shows the frequency to the nearest 100 Hz.
- First became available in early 2006.

Frequency coverage (MHz)

U.S.A :

851.000 - 866.9999  
 896.000 - 1299.9999  
 1300.000 - 1810.9999  
 1852.000 - 1867.9999  
 1897.000 - 2811.9999  
 2853.000 - 2868.9999  
 2898.000 - 3299.9999

France :

50.200 - 51.2000  
 87.500 - 108.000  
 144.000 - 146.000  
 430.000 - 440.000  
 1240.000 - 1300.000

Other than above :

0.010 - 3299.9999

\*Guaranteed: 0.495 3000.000 MHz range only

Type of emission : FM, AM, WFM, USB, LSB, CW

Number of memory channels: 1050 (incl. 50 scan edges )

Frequency resolution : 1 Hz, 10 Hz, 20 Hz, 50 Hz, 100

Hz, 500 Hz, 1 kHz, 2.5 kHz, 5 kHz, 6.25 kHz, 8.33 kHz,  
 9 kHz, 10 kHz, 12.5 kHz, 15 kHz, 20 kHz, 25 kHz, 30 kHz,  
 50 kHz, 100 kHz, 125 kHz, 150 kHz, 200 kHz, 500 kHz,  
 1MHz, 10 MHz

Operating temperature range : 10°C to +60°C; +14°F to +140°F

Frequency stability : ±3 ppm ( 10°C to +60°C)

Power supply requirement : 12.0 V DC ±15%

Current drain (at 12.0 V DC: approx.) : standby 0.65 A (typical) max. audio 1.2A

Antenna connector : BNC (50 Ω)

Dimensions (proj. not included) : 146(W) ×41(H) ×206(D) mm

5 3/4 (W) × 1 5/8 (H) × 8 1/8 (D) in

Weight (approx.) : 1.2 kg; 2 lb 10 oz

RECEIVER

Receive system : Triple-conversion superheterodyne and down converter

Intermediate frequencies :

1st: 266.700 MHz,

2nd: 10.700 MHz

3rd: 450 kHz (except for WFM mode)

Sensitivity: FM (1 kHz/3.5 kHz Dev.; 12 dB SINAD)

28.000 - 29.999 MHz : Less than 0.63 µV

30.000 - 49.999 MHz : Less than 0.63 µV

50.000 - 239.999 MHz : Less than 0.5 µV

240.000 - 279.999 MHz : Less than 0.5 µV

280.000 - 299.999 MHz : Less than 0.5 µV

300.000 - 699.999 MHz : Less than 0.5 µV

700.000 - 1299.999 MHz : Less than 0.63 µV

1300.000 - 2299.999 MHz : Less than 5.6 µV

2300.000 - 3000.000 MHz : Less than 18 µV

WFM (1 kHz/52.5 kHz Dev.; 12 dB SINAD)

50.000 - 699.999 MHz : Less than 1.4 µV

700.000 - 1299.999 MHz : Less than 1.8 µV

1300.000 - 2299.999 MHz : Less than 18  $\mu$ V  
 2300.000 - 3000.000 MHz : Less than 56  $\mu$ V

AM (1 kHz/30% MOD.; 10 dB S/N)  
 0.495 - 1.799 MHz : Less than 25  $\mu$ V  
 1.800 - 14.999 MHz : Less than 2.5  $\mu$ V  
 15.000 - 49.999 MHz : Less than 2.5  $\mu$ V  
 50.000 - 299.999 MHz : Less than 2  $\mu$ V  
 300.000 - 699.999 MHz : Less than 2  $\mu$ V  
 700.000 - 1299.999 MHz : Less than 2.5  $\mu$ V

Note: no sensitivity is listed above 1300 MHz for AM or SSB/CW.

SSB/CW (10 dB S/N)  
 0.495 - 1.799 MHz : Less than 5  $\mu$ V  
 1.800 - 14.999 MHz : Less than 0.5  $\mu$ V  
 15.000 - 49.999 MHz : Less than 0.5  $\mu$ V  
 50.000 - 699.999 MHz : Less than 0.4  $\mu$ V  
 700.000 - 1299.999 MHz : Less than 0.5  $\mu$ V

Note: the following numbers apparently refer to the squelch threshold.

Sensitivity (threshold) : FM (1 kHz/3.5 kHz Dev.; 12 dB SINAD)

28.000 - 29.999 MHz : Less than 0.63  $\mu$ V  
 30.000 - 49.999 MHz : Less than 0.63  $\mu$ V  
 50.000 - 239.999 MHz : Less than 0.5  $\mu$ V  
 240.000 - 279.999 MHz : Less than 0.5  $\mu$ V  
 280.000 - 299.999 MHz : Less than 0.5  $\mu$ V  
 300.000 - 699.999 MHz : Less than 0.5  $\mu$ V  
 700.000 - 1299.999 MHz : Less than 0.63  $\mu$ V  
 1300.000 - 2299.999 MHz : Less than 5.6  $\mu$ V  
 2300.000 - 3000.000 MHz : Less than 18  $\mu$ V

WFM (1 kHz/52.5 kHz Dev.; 12 dB SINAD)  
 50.000 - 699.999 MHz : Less than 5.6  $\mu$ V  
 700.000 - 1299.999 MHz : Less than 7.1  $\mu$ V  
 1300.000 - 2299.999 MHz : Less than 71  $\mu$ V  
 2300.000 - 3000.000 MHz : Less than 220  $\mu$ V

AM (1 kHz/30% MOD.; 10 dB S/N)  
 0.495 - 1.799 MHz : Less than 18  $\mu$ V  
 1.800 - 14.999 MHz : Less than 0.89  $\mu$ V  
 15.000 - 49.999 MHz : Less than 0.89  $\mu$ V  
 50.000 - 299.999 MHz : Less than 0.71  $\mu$ V  
 300.000 - 699.999 MHz : Less than 0.71  $\mu$ V  
 700.000 - 1299.999 MHz : Less than 0.89  $\mu$ V

SSB/CW (10 dB S/N)  
 0.495 - 1.799 MHz : Less than 71  $\mu$ V  
 1.800 - 14.999 MHz : Less than 7.1  $\mu$ V  
 15.000 - 49.999 MHz : Less than 7.1  $\mu$ V  
 50.000 - 699.999 MHz : Less than 5.6  $\mu$ V  
 700.000 - 1299.999 MHz : Less than 7.1  $\mu$ V

Selectivity :  
 SSB/CW/AM More than 2.8 kHz/ 6 dB (typical)  
 SSB/CW/AM/FM More than 6.0 kHz/ 6 dB (typical)  
 AM/FM More than 15 kHz/ 6 dB (typical)  
 AM/FM/WFM More than 50 kHz/ 6 dB (typical)  
 WFM More than 230 kHz/ 6 dB (typical)

AF output power (at 12.0 V DC) :  
 More than 0.5 W at 10% distortion with an 8  $\Omega$  load  
 Ext. speaker connectors : 2-conductor 3.5 (d) mm ( 1 D8 3)/8 &  
 Data connectors : 2-conductor 3.5 (d) mm ( 1 D8 3)/100 K &

IF filters	2.8 kHz	6 kHz	15 kHz	50 kHz	230 kHz
USB/LSB	yes	yes	-	-	-
CW	yes	yes	-	-	-
WFM	-	-	-	yes	yes
AM	yes	yes	yes	yes	-
FM	-	yes	yes	yes	-

## IC-PCR1000



Manufacturing stopped in 2001.

**Frequency Coverage (MHz): 0.01000 - 1300.000**

Goes down to 10kHz. Not as sensitive as some but inexpensive.

IC-PCR1000 \$199.95 \$400-600

eham.net says:

runs in windows 3.1 or 95 as of 2002

bad sensitivity

bad software

\* USA Frequency Coverage (MHz):

o 0.010000 - 823.999999\*\*

o 849.000001 - 868.999999

o 894.000001 - 1300.000

o \*\*Specifications guaranteed 0.5 - 1300 MHz only. Cellular blocked (US versions); u

\* Mode: WFM, FM, AM, SSB, CW

\* Number of Memory Channels: 1000 channels per file (number of files created is up to the

\* Antenna Connector: BNC (50 ohm)

\* Useable Temperature range: 0° C to +50° C; 32° F to 122° F

\* Frequency Stability: ±3ppm at 1300 MHz

\* Frequency Resolution: 1Hz (minimum)

\* Power Supply Requirements (negative ground): 13.8 V DC = ±15%

for receiver unit or supplied AC adaptor

\* Current Drain:

o Power ON: (PC Power Off) 0.1 A

o Max. Audio: 0.7 A

o Standby (squelled): 0.6 A

\* Dimensions (projections not included):

o 126(w) x 30(h) x 199(d) mm

o 5(w) x 1.2(h) x 7.9(d) in

o Weight: approx 1 kg

o 2 lb, 3 oz

Receiver

\* Receive System: Triple Superheterodyne

\* Intermediate Frequencies:

o 1st -- 266.7 MHz

o 2nd -- 10.7 MHz

o 3rd -- 450 kHz (except WFM)

\* Selectivity:

o WFM -- 230 kHz/-6 dB (typical)

o WFM/FM/AM -- 50 kHz/-6 dB (typical)

o FM/AM -- 15 kHz/-6 dB (typical)

o AM/SSB/CW -- 2.8\* kHz/-6 dB (typical) \*software indicates 3 kHz

\* Receive Sensitivity:\*\*

Frequency (MHz)	SSB/CW(10dBs/N)	AM(10 dB S/N)	FM(12 dB SINAD)	WFM(12 dB SINAD)
0.5 - 1.799999	0.56 µV	2.5 µV	--	--
1.8 - 27.99999	0.28 µV	1.4 µV	--	--
28 - 29.99999	0.28 µV	1.4 µV	0.5 µV	--
30 - 49.99999	0.35 µV	1.8 µV	0.5 µV	--
50 - 59.99999	0.2 µV	1.0 µV	0.32 µV	0.79 µV
700 - 1300	0.25 µV	1.3 µV	0.4 µV	1.0 µV

\*\*When 230 kHz 9 (for WFM), 15 kHz (for FM), 6 kHz (for AM) and 2.8 kHz (for SSB/CW) passband widths are selected.

\* Squelch Sensitivity:

Frequency (MHz)	SSB/CW	AM	FM	WFM
-----------------	--------	----	----	-----

0.5 - 1.799999	14 $\mu$ V	1.8 $\mu$ V	--	--
1.8 - 27.999999	7.1 $\mu$ V	0.89 $\mu$ V	--	--
28 - 29.999999	7.1 $\mu$ V	0.89 $\mu$ V	0.63 $\mu$ V	--
30 - 49.999999	7.1 $\mu$ V	0.89 $\mu$ V	0.63 $\mu$ V	--
50 - 59.999999	5.6 $\mu$ V	0.71 $\mu$ V	0.5 $\mu$ V	5.6 $\mu$ V
700 - 1300	7.1 $\mu$ V	0.89 $\mu$ V	0.63 $\mu$ V	7.1 $\mu$ V

\* IF Shift Range: More than  $\pm 1.2$  kHz

\* Audio Output Impedance: 4 - 8 ohms

\* Max. Audio Output: 200 mW (at 10% distortion with an 8 ohm load)

#### System Requirements

\* Intel® 486DX4 or later CPU (Pentium® 100 or later recommended)

\* Microsoft® Windows® version 3.1 or 95

\* Minimum 10 MB of free space on hard drive

\* Minimum 16 MB of memory

\* FD drive, serial interface

\* Monitor with at least 640 x 480 pixel resolution

The following comment about the Icom IC-PCR1000 was found on www.eham.net:

"You will not need to worry about any noise with the Icom - it is so deaf it would have problems hearing a computer with serious noise problems."

This may be an exaggeration because the published specs are not too bad.

## KAITO WRX-911



Analog tuning. Not continuous coverage. Available in blue or black.

KAITO WRX-911 WORLD RECEIVER \$24.95

From vendor's website:

This beautiful worldband AM FM SHORTWAVE radio is very sensitive to weak signals so therefore it has excellent reception and it also has pleasant crisp audio.

The dimensions are 4 1/2 x 3 x 1" so it fits comfortably in your hand or in your shirt pocket. It weighs less than 8 ounces with two AA alkaline batteries installed (not included).

Some of the other notable qualities of this great little radio is the inclusion of a hand strap, a rear tilt bail, an on/off switch and a separate volume control, smooth tuning knob, smooth band selector, a power LED, an excellent tuning indicator that is off when no station is being received, glows dimly for off center tuning and glows brightly when a station is tuned in correctly. A 3 volt AC power jack is available for external power. The

tilt/telescopic antenna actually swivels a full 360 degrees for best reception for Shortwave and FM. An internal antenna is used for Medium Wave - AM reception.

The dial markings for the frequencies received are: AM: 530 kHz - 1710 kHz

FM: 88 - 108 MHz

SHORTWAVE:

4.60 - 5.20 MHz

5.75 - 6.40 MHz

6.95 - 7.65 MHz

9.30 - 9.90 MHz

11.55 - 12.10 MHz

13.55 - 13.85 MHz

14.85 - 15.80 MHz

17.40 - 18.05 MHz

21.30 - 21.95 MHz

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## Palstar R30



Low price. Better in MW than HF.

Palstar R30 \$495 "The Best radio for MW dx under \$1,400" £449.00

The R30 HF shortwave receiver is a compact high performance radio capable of receiving multimode signals in the 100kHz to 30 MHz spectrum. It provides excellent strong signal handling, high sensitivity and dynamic range to eliminate annoying intermodulation interference. The radio also features 100 programmable memories, variable rate tuning and switchable bandwidths in all modes. The R30 receiver is also equipped with a 10 AA cell internal battery pack that automatically connects to the radio when the external adaptor plug is disconnected allowing portable operation. No FM.

### SPECIFICATIONS

1. 100kHz - 29.9999MHz AM, SSB (U/L)
2. 20Hz, 500Hz tuning steps, synthesized (low phased noise performance)
3. 1MHz up/down
4. 45MHz 1st IF, 455kHz 2nd IF
5. RF derived AGC, fast/slow
6. Ceramic filter standard, optional Collins mech. filter at 455kHz
7. 4-pole crystal filter at 45MHz
8. Bandwidth, 6 kHz US / 4 kHz EU & 2.5 kHz SSB
9. 6-digit LCD display
10. Analog S-Meter
11. 100 memory channels
12. 5 Watt low distortion full fidelity audio amp
13. External soft muting
14. Line Audio output
15. +15dBm 3rd order intercept
16. Switchable 7 pole input filters
17. Portable battery operation

18. Ultra miniature size. 8" wide x 2.5" high x 9" deep

Specs measured by QST Magazine

AM Sensitivity 10dB (S+N)/N, 1kHz, 30% mod.  
 1MHz 1.4 uV  
 3.8 MHz 2.4 uV

## GRUNDIG YB300 PE

Yacht Boy 300



\$80

1. No sideband
2. PLL synthesized quartz digital tuning
3. FM/MW/SW1/SW2
4. SW bands cover 2.3-7.8 and 9.1-26.1MHz
5. FM band covers 87.5 to 108 MHz
6. MW (AM broadcast band) can be switched to the 9 kHz channel spacing used in Europe, Asia, and Africa
7. Direct entry of desired frequency via keypad
8. 24 memory presets for your favorite stations (6 per band)
9. 5 3/4" x 3 1/2" x 1 1/4"(145 x 90 x 30mm)
10. Radio or buzzer alarm
11. Clock with sleep timer
12. Weight 10 oz (283.5 g)

## GRUNDIG G-2000A PE

\$64.97 Reported to have poor sensitivity.

## GRUNDIG YB550 PE





\$149.95 Cute portable shortwave radio, weighs only 10 oz. Made in China.

AM: 530-1710 KHz

FM: 88-108 MHz

Shortwave: 1.711 to 29.999 MHz (continuous)

No sideband

Also known as TECSUN PL-230

1. PLL synthesized digital tuner
2. Direct keypad, up/down, scroll wheel, and autoscan tuning - scan the best available stations or user presets
3. 200 programmable station memory presets - create and customize memory pages for better organization in 4 ways: 4 pages of 50 memories, 5 pages of 40, 8 pages of 25, or 20 pages of 10
4. Illuminated multi-function LCD screen that simultaneously displays frequency and clock
5. Signal strength and battery power level indicators
6. Digital clock with selectable 12/24 hour clock display format
7. Alarm with snooze feature and ability to wakeup to a preset station or the last one tuned
8. 5-120 minute sleep timer
9. Built-in telescopic antenna for Shortwave and FM, and internal ferrite bar antenna for AM
10. Auto power off
11. Power failure backup feature
12. Supplementary Shortwave/FM antenna input
13. AC adaptor (optional) and earphone inputs
14. Complete kit includes: earbuds, snap-on stand, carrying case, owners manual, Shortwave Listening Guide, and 3AA batteries
15. FM Fine Tuning knob for tuning 1 kHz at a time
16. Adjustable Auto off Timer
17. Alarm clock function
18. Display light
19. DX/Local switch
20. External antenna jack
21. Lock switch to prevent accidental power on's and off's
22. Direct frequency input via front keypad
23. Fine tuning knob that allows tuning in 1 kHz increments.
24. Signal strength indicator

Dimensions: 5.7 x 3.5 x 1.2 inches / 145 x 87 x 31 mm.

Battery: Uses 3 AA size 1.5V. Battery.



Weight: approx. : 225 g. / 8 oz. (without battery)

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## GRUNDIG YB400 Yacht boy



**Frequency coverage: AM,SSB: 144-353 kHz, 520 kHz-30MHz; FM 87.5-108 MHz**

\$149 Features

1. Digital tuning
2. 40 memories
3. SSB reception
4. Dual-time clock
5. 4.8 inches high
6. uses 6 AA batteries

Specs measured by QST Magazine

Noise floor (minimum discernable signal)	
180 kHz	7.24 uV
1 MHz	0.8
14 MHz	0.08
AM Sensitivity (S+N)/N, 1 kHz, 30% modulation	
1MHz	6.02 uV
14 MHz	1.44
FM Sensitivity 12 dB SINAD	
100 MHz	1.64 uV

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## GRUNDIG Satellit 800



Grundig's best radio. GRUNDIG S800 discontinued

**Frequency coverage 0.1-30MHz SSB/AM, 87-108MHz FM, 118-137 MHz AM.**

Mediocre sensitivity in HF according to QST Magazine.

Information from <http://www.dxing.com>

1. General Coverage Portable Communications Receiver
2. Made In: China 2000-2004 Voltages: 110-127/220-240 VAC
3. Coverage: 100-30000 kHz +FMS +Air Readout: Digital LCD 0.1
4. Modes: AM/LSB/USB Selectivity: 6/4/2.3 kHz
5. Circuit: Double Conversion Physical: 20.9x9.25x8.25" 14.5 Lbs.
6. Features: ¼" Head. Jack, Analog S-Meter, Treble, Bass, Keypad, ANL, Line Out Jack, 70 Memories, Wide-Medium-Narrow, Sleep, FM Stereo, Lock, Synchronous Detection, VHF Air Band (118-137 MHz), Carry Handle, Antenna Jacks, Dial Lamp, Dual Clock-Timer 24 Hour, Attenuator, 9/10 kHz MW Step.

Accessories:

New Price: \$499 Used Price: \$350

Comments: Also operates from six D cells. Exceptionally full audio fidelity. Designed in collaboration with the R.L. Drake Company, borrowing many features from the Drake model SW8.

Specifications measured by QST Mag.:

AM Sensitivity	10dB, 30% modulation, 1kHz
	1 MHz 1.3 uV
	3.8 MHz 3.2 uV
	120 MHz 3.4
FM sensitivity,	12 dB SINAD, 15 kHz bandwidth
	100 MHz 1.2 uV
Spurious and image rejection	
First IF rejection	
HF	67 dB
AM aircraft	69
FM broadcast	89
Image rejection:	
HF	48 dB
AM aircraft	97
FM broadcast	62
Noise floor, 500 Hz filter	
	1 MHz -126 dBm
	3.5 MHz -124
	14 MHz -125
IF/audio response -6dB	
	USB-W 1865 Hz
	LSB-W 1799
	AM 2082

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**Eton E1XM**



- Replaces Grundig Satellit 800
- Coverage AM 100 kHz - 30 MHz, FM 76-90, FM 87-108, XM Satellite radio 2.3325 - 2.3450 (XM is optional and requires subscription)
- Minimum tuning step 10 Hz
- Similar to Sony 2010
- No internal ferrite bar antenna
- Small box at right of photo is the satellite antenna
- Made in India
- Passband tuning
- Slow/Fast/Auto AGC
- AM / USB / LSB / Enhanced SSB on HF
- Synchronous detection
- Dot-matrix LCD display generates small amount of RF noise

#### Specifications Etón E1XM AM/FM/Shortwave/XM Satellite Ready Radio

The E1XM is the world's first radio to combine AM, FM, Shortwave, and XM Satellite Radio technology into one ultra-high-performance unit. The finest port-a-top in the world, the E1XM offers powerful reception through its digitally synthesized PLL tuner with synchronous detector, passband tuning, and selectable bandwidth filters. Offering rich sound, the latest in radio technology, 1700 station presets, and memory scan function, the E1XM is designed without compromise, giving you direct access to news, sports, and music from around the world. Features " Frequency Coverage: 100-30,000 KHz, includes shortwave, medium wave AM broadcast band and longwave; 76-90, 87-108 MHz FM broadcast band; XM Satellite Ready Radio

Reception Modes: AM, FM-stereo, Single Sideband (selectable USB/LSB) and CW

Digital Display: large 5.7 inch square, 240 x 320 pixel, dot matrix display. Shows all modes and selected functions

Programmable Memories: 500 user programmable with alpha labeling plus 1200 user definable country memories, for a total of 1700

Memory Scan Function

Digital Phase Lock Loop (PLL) Synthesized Tuning with Direct Digital Synthesis (DDS) for drift-free frequency stability and finest tuning resolution

Dual Conversion Superheterodyne Circuit: results in minimized interference through superior selectivity

Excellent Sensitivity: yielding a true high-performance receiver High Dynamic Range: allowing for detection of weak signals in the presence of strong signals

Selectable Bandwidths: 7.0, 4.0, 2.5 kHz for excellent selectivity

Single Sideband Synchronous AM Detector: selectable USB/LSB or double sideband to minimize adjacent frequency interference and fading distortion of AM signals



Line Audio Input Jack: 1/8 inch (3.175 mm) stereo  
 Headphone Jack: 1/8 inch (3.175 mm) stereo

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## panasonic rf-4900



Panasonic rf-4900. coarse tuning. Said to be a "repackaged version of the poor performing RF-2900".

The following comment about the rf-4900 was posted on www.eham.net:

"Poor image rejection. Offers good reception of medium to strong AM stations on MW and SW. Other than that, its 'drift city' with constant 'Phantom' signals. Useless for utility stations. For a few bucks more - buy a used Icom 720 and get superior reception with transmit capabilities."

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## yaesu FRG-7



Yaesu FRG-7 300.00 hard to operate menu controls. Known affectionately by its owners as the frog-7. Not much known.

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## AOR AR-3030



Old model? Not much information available.

Type: HF receiver  
 Frequency range: 0.03-30 MHz  
 Mode: All-mode  
 Sensitivity: N/A  
 Selectivity: N/A  
 Image rejection: N/A  
 Voltage: 13.8 VDC  
 Current drain: ?

Impedance: 50 ohms  
Dimensions (W\*H\*D): ? mm  
Weight: ?  
Manufactured: 19xx-19xx  
Other: 100 memories  
Related documents:

## AOR AR-8600 MkII



<http://www.aorusa.com/b&m.html>

<http://www.javiation.co.uk/ar8600.html>

Whilst the AR8600 shares commonality in operation with the AR8200 / AR8200-II it should not be considered as just a base/mobile version of the AR8200 as it is a new receiver containing different RF stages and design that also includes the provision for the fitting of optional Collins mechanical filters.

### AOR AR-8600-II (Mark 2)

Main Features of the AR8600 are:

1. All mode receive and wide frequency coverage.
2. 'All New' front end and RF stages, this provides superior sensitivity and higher dynamic range.
3. Operation similar to the trendsetting AR8200 but circuit design is very different thanks to increased availability of space within the cabinet.
4. Five (5) optional SLOT CARDS (as used on the AR8200) may also be 'simultaneously' fitted with the option to select two to operate.
5. 8.33kHz airband channel spacing.
6. RS232 port is internally fitted as standard.
7. Optional Collins mechanical filters
8. A wide 10.7MHz i.f. output is provided for compatibility with the SDU5500 spectrum display unit.
9. Aerial input is via a BNC socket.
10. Internal Nicad Battery Pack option for mobile use
11. 12V d.c. operation.

Type: HF/VHF/UHF receiver/scanner  
Frequency range: 0.1-3000 MHz  
Mode: All-mode  
Sensitivity: N/A  
Selectivity: N/A  
Image response: N/A  
Voltage: 10.8-16 VDC  
Current drain: 70-400 mA



Impedance: 50 ohms, BNC  
 Dimensions (W\*H\*D): 155\*57\*195 mm  
 Weight: 2 Kg  
 Manufactured: 2002-200x

Other: 1000 memories in 20 banks, 37 ch/s. RS232 port. Built-in ferrite bar for MW reception. Slot card options include speech descrambler, extra memory channels, tone eliminator and more. Improved HF performance plus a couple of other new features. Cellular blocked in the US.

Specification Frequency Range: 100 kHz to 3000 MHz \*  
 \* Cell blocked in the USA for FCC rules  
 Receive Modes: WFM, NFM, SFM, WAM, AM, NAM, USB, LSB, CW  
 Sensitivity:

100 kHz ~ 1.9 MHz AM: 3.5 uV (10dB S/N)  
 1.9 MHz ~ 30 MHz AM: 2.0 uV (10dB S/N)  
 30 MHz ~ 470 MHz AM: 1.0 uV (10dB S/N)  
                   NFM: 0.35 uV (12dB SINAD)  
                   WFM: 1.0 uV (12dB SINAD)  
 470 MHz ~ 820 MHz NFM: 0.5 uV (12dB SINAD)  
 820 MHz ~ 3000 MHz NFM: 2.5 uV (12dB SINAD)

Sensitivity (from a different source):

100 kHz ~ 1.9 MHz AM: 2.5 uV (10dB S/N)  
 1.9 MHz ~ 30 MHz AM: 2.0 uV (10dB S/N)  
 30 MHz ~ 470 MHz AM: 1.5 uV (10dB S/N)  
                   NFM: 0.7 uV (12dB SINAD)  
                   WFM: 1.0 uV (12dB SINAD)  
 470 MHz ~ 1040 MHz NFM: 0.6 uV (12dB SINAD)  
 1040 MHz ~ 2040 MHz NFM: 3.5 uV (12dB SINAD)  
 2040 MHz ~ 3000 MHz NFM: 10 uV (12dB SINAD)

Selectivity:

SSB/NAM 3kHz (-6dB), 9kHz (-60dB)  
 AM/SFM 9kHz (-6dB), 20kHz (-40dB)  
 WAM/NFM 12kHz (-6dB), 25kHz (-40dB)  
 WFM 150kHz (-3dB), 380kHz (-20dB)

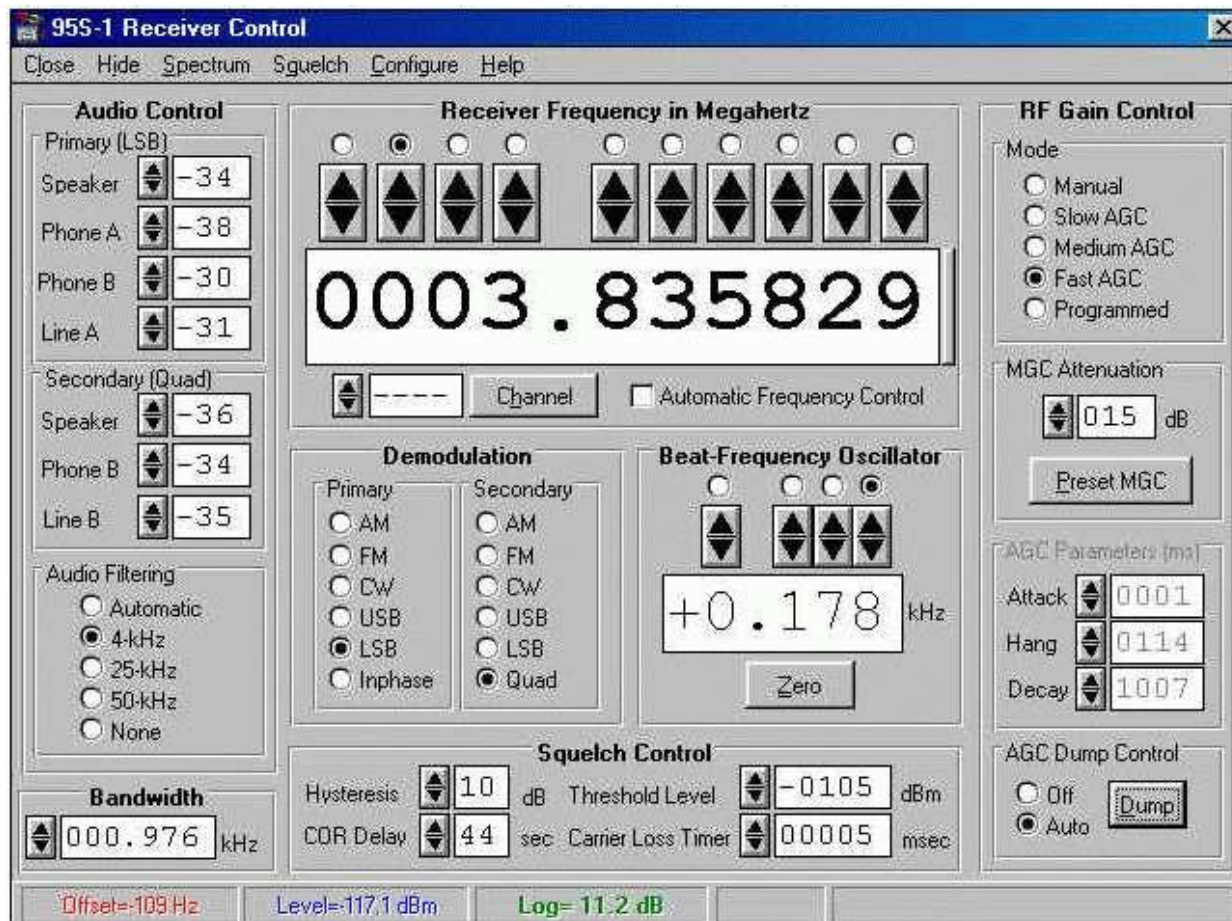
Aerial connection: 50 OHM BNC  
 Audio output: 800mW (8 OHMS) MAX @ 10% THD. Internal speaker, rear chassis 3.5mm socket, frc  
 Power Consumption: 400mA typical usage, 50mA on standby. 10.8 - 16V d.c. negative ground  
 Dimensions: 155(W) x 57(H) x 195(D) mm excluding projections  
 Weight: 2kg approx. (MW bar aerial included)  
 Memory channels: 1,000 (20 banks)  
 Select scan channels: 50  
 Priority channels: 1  
 Search banks: 40  
 PASS channels: 50 per search bank + 50 for VFO search  
 Scan/Search Rate: 37 increments per second maximum

**Notes** Minimum tuning step is 50 Hz. Although the AR-8600-Mark II has a 10.7 MHz IF output, its bandwidth is said to only be +/- 2MHz, so it is not suitable for use with a standard video demodulator. However, a special NTSC demodulator called the TV8600 designed exclusively for the AR-8600 MKIIB or MkIIU supposedly has a 10 MHz bw. If NTSC demodulator is installed, the 10.7 MHz IF output is no longer available.

This receiver is NFM only above 470 MHz.

## Collins 95S





\$9000 High-priced computer-controlled high-end receiver. Direct conversion receiver above 20 MHz which means no IF issues such as image rejection--and no telltale 455 kHz IF signal to give away your presence. Extensive DSP features.

<http://www.rockwellcollins.com/>

**Receiver Coverage 5Khz - 2Ghz** in 1 Hz steps with USB,LSB,AM,FM, Quadrature-phase, In-phase modes, 74 Selectable bandwidths from 100Hz to 300 Khz (3dB points), Programmable AGC system, Dual modulation in the same time and builtin IF DSP (Dual 16 bits DSP)

The 95S-1A is a rack-mounted, high-performance receiver designed for general purpose usage in narrow-band radio applications. The receiver provides 0.005- to 2000-MHz frequency coverage and features software-based, state-of-the-art digital signal processing (DSP). The modern homodyne architecture and spurious-free MFD synthesizer provide the high performance necessary for demanding communications and surveillance applications. A serial control interface allows control via RS-232/422/485. The receiver draws less than 22 watts from an internal ac power supply or external 9 to 16 V dc.

Features

1. 0.005- to 2000-MHz continuous coverage in 1-Hz increments.

2. 16-bit DSP.
3. Full function programmability including: frequency, BFO, bandwidth, sweep, AGC, squelch, volume, demodulation, and calibration.
4. Selectable digital I/Q output (16 bits).
5. Standard AM, FM, CW, USB, LSB, and ISB modes.
6. Seventy-four standard bandwidths selectable from 0.1 to 300 kHz, plus five user-defined downloadable filters.
7. Spurious-free homodyne and MFD synthesizer circuit architectures.
8. Dual DSP filtering, demodulation, and processing with programmable demodulation selection and output combining.
9. Open architecture system: nonproprietary interface specifications are provided, allowing third party customization to any application.
10. Packaged in a single rack unit chassis (1.72 inches high, 19 inches wide).
11. RS-232/422/485 serial control.

## Applications

The 95S-1A receiver is an excellent choice for any application requiring computer-controlled tuning of narrow-band radio signals. Several applications include:

Standard communications modes in the HF, VHF, and UHF bands (ie, AM, FM, CW, SSB) for civil, government, and military networks. Test equipment. Spectrum monitoring systems.

The Rockwell Collins 95S-1A general purpose receiver provides high performance at low cost and supports a wide variety of radio receiving applications. The 0.005 to 2000 MHz receiver is designed to satisfy user needs for applications ranging across commercial, government, and military communications, spectrum surveillance and test systems. It is suitable for fixed station, shipboard, or transportable environments.

The receiver serial command protocol is simple and yet minimizes the amount of data that must be transferred between the receiver and the controller. The protocol supports single command operations or can be operated in a multiple command mode that allows a sequence of commands to be executed in succession.

Rockwell Collins has planned the 95S-1A receiver to be an open architecture system, meaning that nonproprietary interface specifications are provided to users, allowing third party customization. Specifically, the memory in the receiver may be altered to download user-written DSP software and alternate control languages. The core Rockwell Collins DSP routines are non-alterable, but may be utilized or supplemented.

Frequency range .....	0.005 to 2000 MHz		
Frequency resolution .....	1 Hz		
Tuning time .....	13 ms (typical), with AGC disabled		
Frequency setability .....	+0.1 PPM, using electronic adjustment of the internal standard		
Frequency accuracy .....	+1 PPM, 0 to 50 °C		
Synthesizer noise .....	Characterized in the following table:		
	Frequency Separation	Noise Power @fo=100 MHz	Noise Power @fo=1000 MHz
	10 Hz	-55 dBc/Hz	-40 dBc/Hz
	100 Hz	-90 dBc/Hz	-75 dBc/Hz
	1 kHz	-105 dBc/Hz	-94 dBc/Hz
	10 kHz	-110 dBc/Hz	-94 dBc/Hz
	100 kHz	-135 dBc/Hz	-120 dBc/Hz
	>1 MHz	-145 dBc/Hz	-140 dBc/Hz
Noise figure			
0 to 30 MHz antenna .....	14 dB (typical)		
20 to 2000 MHz antenna ....	12 dB (typical)		
External standard in .....	1, 5, and 10 MHz		
External standard level .....	0 dBm (typical)		
BFO .....	1-Hz step, range of +/-4 kHz		
Serial control			
Interface .....	RS-232/RS-422/RS-485		
Data rate .....	75 to 38,400 bits per second		
Format .....	8 data bits or 7 data bits with 1 parity bit		
Internal preselector .....	20 to 2000 MHz (Dual conversion used for frequencies below 20 MHz)		

Demodulation modes ..... CW, SSB, ISB, AM, FM, I/Q  
 Carrier operated relay ..... Standard  
 AM sensitivity ..... 30% amplitude modulation at 400 Hz with  
     bandwidth of 6.4 kHz for 10 dB (s+n)/n  
     0.1 to 30 MHz ..... 3 uV  
     >30 MHz..... 2 uV  
 FM sensitivity ..... SINAD of 12 dB with bandwidth of 12.8 kHz  
     2 to 30 MHz ..... 1.1 uV  
     >30 MHz..... 0.5 uV  
 SSB/ISB/CW sensitivity ..... SINAD of 10 dB with bandwidth of 3.2 (1.6  
     CW) kHz and the input signal tuned 400 Hz  
     from the dial frequency  
     0.005 MHz..... 13uV (typical)  
     >0.1 MHz..... 0.4 uV  
 Second order input intercept  
     <30 MHz ..... +80 dBm (typical)  
     >30 MHz..... +60 dBm (typical)  
 Third order input intercept  
     <30 MHz..... +25 dBm (typical)  
     30 to 500 MHz ..... +7 dBm (typical)  
     >500 MHz ..... 0 dBm (typical)  
 Image rejection ..... >100 dB  
 IF rejection  
     <30 MHz ..... >80 dB  
     >30 MHz ..... >100 dB  
 Internal spurious ..... Less than equivalent antenna input  
     of -115 dBm  
 Conducted LO at antenna ..... <-110 dBm  
 Manual gain control ..... 1 dB increments  
     <30 MHz ..... 144 dB range  
     >30 MHz ..... 126 dB range  
 AGC range ..... +/-1.5 dB at audio output, with input  
     signal level range from 10 dB above  
     noise floor to 0 dBm  
 AGC programmability ..... AGC attack, hang, and decay time and  
     threshold values  
 Standard IF bandwidths ..... 74 programmable between 100Hz and 300kHz  
 Maximum input level  
     Operating  
         <30 MHz ..... +10 dBm  
         >30 MHz ..... 0 dBm  
     Nonoperating  
         <30 MHz ..... +43 dBm  
         >30 MHz ..... +33 dBm  
 Signal strength accuracy .... +/-2 dB over 0.1 to 2000 MHz frequency range  
 Postdetection audio filter .. Software selectable low-pass filters:  
     4.0 kHz, 25 kHz, 50 kHz, or bypass  
 Primary antenna input ..... 50 ohms impedance, VSWR <3:1; usable over  
     input frequency range of 2 to 2000 MHz, with  
     degraded performance below 30 MHz, compared  
     to HF antenna input  
 HF antenna input ..... 50 ohms impedance, VSWR <3:1; usable over  
     input frequency range of 0.005 to 30 MHz  
 HF antenna output ..... 50 ohms impedance, internally connected to  
     the primary antenna input when tune frequency  
     is below 30 MHz  
 Phone A&B out ..... 0.5 volt RMS into 100 ohms (max), 1% THD  
 Line A&B out ..... 0 dBm, 600 ohms (nominal)  
 Speaker A or B or A+B out ... 1 watt (max), 8 ohms, <10% THD  
 Input power ..... 9 to 16 V dc, 22 watts 85 to 240 V ac,  
     47 to 440 Hz  
 Mechanical  
 Packaging ..... EIA 1U rackmount, 1.72 in (43.6 mm)  
     H x 19 in (483 mm) W x 14.75 in (375 mm) D  
 RF connectors ..... BNC  
 Audio connector ..... DB1 5F  
 RS-232 connector ..... DB9F  
 Weight ..... Approx 9.0 Lb (4.8 kg)  
 Operating temperature ..... 0 to 50 °C  
 Storage temperature ..... -55 to +70 °C  
 Humidity ..... 95% noncondensing  
 Shock ..... Bench handling  
 Altitude ..... <10,000 ft  
 Cooling ..... Convection

Specifications subject to change without notice.

The 95S-1(A) receiver is a 0.005 to 2000 MHz high-performance modular receiver employing a direct conversion (homodyne) architecture. The receiver frequency scheme uses only one mix: a single synthesizer local oscillator tuned to the desired signal frequency converts a signal directly to baseband, or the zero-frequency "IF signal." Baseband signal waveforms are filtered and demodulated under the control of digital signal processor (DSP) technologies developed and patented by Rockwell Collins. The advantages realized with a homodyne, or direct conversion receiver (DCR) architecture are simplicity and performance. The DCR provides wide frequency coverage without spurious-generating multiple mixes, and allows receiver selectivity to be obtained using audio low-pass filters rather than the more complex RF/IF filtering required with heterodyne receivers. Additionally, a majority of receiver gain can be applied at baseband rather than in front end RF stages. Because a DCR has no "IF," there is no receiver performance degradation due to "IF" or image rejection. Similarly, there are no "crossover" spurious responses because there is only a single local oscillator.

The 95S-1(A) incorporates a high-dynamic range Rockwell Gallium Arsenide mixer, preceded by internally tracking preselectors over the 20 to 2000 MHz portion of the tuning range. The receiver utilizes a hybrid architecture for frequencies within the 0.005 to 30 MHz tuning range, with parametric upconversion to a 51.2 MHz IF frequency.

An MFD synthesizer with progressive modulo-2 division provides quadrature low-noise, spurious-free injection signals to the HF and VHF/UHF mixers. The quadrature channels are identically low-pass filtered, amplified (with AGC), and digitized by a sigma-delta ADC.

The DSP section utilizes twin 16-bit microprocessors to perform all Finite Impulse Response (FIR) filtering, demodulation, automatic gain control (AGC), and ancillary functions for the receiver. An additional microprocessor provides communications and command execution control. A complement of standard DSP functions is contained within a flash memory integrated circuit, allowing field upgrades and customization. Seventy-four filter bandwidths are standard, and five optional user-defined filter coefficient sets can be transferred to the receiver for specialized applications. Software support and documentation, for developing user-defined FIR filter coefficients for use with the 95S-1(A) receiver, may be purchased from Rockwell Collins or can be developed using standard FIR filter design tools. Two independent demodulators may be operated simultaneously.

Audio output is generated by twin DACs, using any combination of demodulated signals, routed through selectable low-pass filters, and applied to headphone, line, and speaker amplifier circuits.

Digital 16-bit I/Q output is also available with user selectable pickoff points in the DSP signal flow.

All parameters and command settings are preserved in nonvolatile memory. This assures that the receiver operation will be restored whenever power is cycled or a power interruption occurs.

The front panel contains a stereo headphone connector, status indicator lights, and a power switch. Two rear coaxial input connectors allow RF sources (antennas) to be either independently connected between the receiver DCR section (2 to 2000 MHz) and the hybrid converter section (0.005 to 30 MHz), or using the RF output (2 to 30 MHz) connected to the hybrid converter section. The two frequency tuning ranges can be multiplexed internally from a single antenna. The rear 9-pin serial control connector allows for RS-232/RS-422/RS-485 control. Independently adjustable left and right phone channels are available on the headphone connector. The rear panel audio connector provides access to a variety of audio signals including speaker, line, and phone outputs.

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## SONY ICF-SW7600GR

SONY ICF-SW7600GR



The Sony ICF-SW7600GR is a compact, dual conversion, microprocessor-controlled, frequency synthesized general coverage portable receiver. Direct access tuning is provided along with a multifunction LCD digital readout for unsurpassed convenience and accuracy (1 kHz step tuning on longwave, medium wave and shortwave). Just press the numbered keys to match the frequency you want to hear. Manual and automatic scan tuning plus memory scanning is provided. 100 memories are featured for your favorite stations. These memories are non-volatile and therefore will not be lost during the changing of batteries. The ICF-SW7600GR tunes from 150 to 29999 kHz for solid coverage of longwave, medium wave and shortwave. Smooth Single Sideband (SSB) and Morse code reception is available through a switch with separate LSB and USB positions plus fine tuning thumb-wheel. A special Synchronous Detector circuit reduces fading and annoying "beat" frequency interference from adjacent stations as well as distortion due to fading shortwave reception. FM stereo (87.6 - 108 MHz in 50 kHz steps) is provided to the mini stereo headphone jack. A record output jack is included for taping off the air.

Advanced features include: dial light, variable attenuator, 9/10 kHz MW step, "Tune" indicator, keypad lock, 1/5 kHz step tuning, flip-stand, tone switch and external antenna jack. This radio has a 24 hour digital quartz clock with dual timer. The current time is displayed when the radio is off. To view the time while the radio is on simply press the [EXE] key. The time will then display automatically for 9 seconds. Please click here to view left and right sides. Click here to view front controls.

Supplied accessories include: wind-up antenna, wrist strap, carry case and Sony Wave Handbook. Only 7.5 x 4.75 x 1.25 inches 22 oz. (191x120x32 mm 624 g). (3 Lbs. ship weight). One year limited warranty. Made in Japan. This radio requires 6 VDC or four AA cells (not supplied). See options below.

1. AM(LW/MW/SW)/FM Stereo Reception
2. Continuous LW/MW/SW coverage from 150 to 29999 kHz
3. 10 Key Direct Access™ Tuning
4. Short Wave Guide Book
5. PLL Quartz Frequency Synthesized Tuning
6. Hold Button
7. Compact Antenna
8. Synchronous Detection Circuitry
9. Auto Scan Tuning/Memory Scan
10. SSB Reception
11. 1KHz Step Tuning
12. 100 Station Memory Presets
13. World Time Clock/Dual Clock
14. Operates on 4 x "AA" batteries(not included) or optional AC adapter.
15. 7 1/8 x 4 1/2 x 1 1/4 inches (WxHxD)

## SONY ICF-SW77



Some comments about the SW77 from [www.eham.net](http://www.eham.net):

"This model replaced the ICF-2010. The ICF-SW77 allows you to store up to 162 frequencies, with station names, and even program in the time schedules for when these frequencies are used. The radio can then allow you to tune a broadcaster by name and will even pick the most appropriate frequency for a given time of day."

Made In: Japan 1992-2001      Voltages: 120 VAC or 4 C cells  
Coverage: 150-30000 kHz +FMS      Readout: Digital LCD 0.1  
Modes: AM/USB/LSB/CW      Selectivity: Two Position  
Circuit: Double Conversion      Physical: 11x7x2" 3.25 Lbs.  
Accessories: DCC-E160L Car Battery Cord  
New Price: \$470-650

### Features

1. Mini Head. Jack
2. S/Battery-Indicator
3. Tone
4. 162 Alpha Memories,
5. RF Gain
6. Record Jack
7. Dial Lamp
8. Dial Lamp Switch
9. Tilt Bar
10. Two Tuning Rates
11. Keypad
12. Synchronous Detection
13. Sleep
14. Clock-Timer
15. 9/10 kHz MW Step
16. Manual Tuning, Sweep, Up-Down Tuning
17. LCD Contrast Adjustment
18. Bass, Treble.

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## Yaesu frg-9600





The Frog-9600 is VHF/UHF only, no HF.

### Frequency 60 to 905 MHz

This comment about the Yaesu frg-9600 was found on the Internet.

"I have owned the FRG-9600 for a few short weeks. I just can't figure out the scanning set up of this unit. It has 100 memory channels all of which I can fill with frequencies to listen to but when it scans and stops on a memory channel the display digits start to blink from left to right and then it resumes scanning cutting off the conversation. I just don't get it." (see rest of review at [www.egm.net](http://www.egm.net)).

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## Yaesu frg-100



Frog-100.

Yaesu frg-100 £449.00 general coverage reception in CW, SSB, AM and FM (optional) modes. The frequency range is **50KHz to 30MHz**.

"Fully controlled by a microprocessor, all major functions and facilities are very easily used, with the accent on simplicity and high performance. With features that both new and seasoned shortwave listeners will appreciate. Ideal for shortwave decoding of FAX, RTTY, etc. as this unit has been very well screened, so works well next to your computer."

FM receiver mode requires the optional FMU100 unit.

### SPECIFICATIONS

1. Antenna Connector - SO239/ snap wire connector
2. Memories - 50
3. Power supply - 13.8VDC
4. Weight - 3Kg
5. Size - 238W X 93H X 243D mm

### FEATURES

1. Frequency - 50kHz - 30 MHz
2. 90 mW AF Output
3. Memory Channels:
4. Regular Memory; 50
5. Twin 12/24 hour clocks
6. User selectable bandwidths
7. Alarm and timer functions
8. Dual antenna sockets (coax and long wire)
9. Selectable AGC and noise blanker circuits

10. FMU100 FM Unit (29MHz)
11. PA-11C AC adaptor
12. TXCO-4 Temperature Compensated Crystal Oscillator
13. YF-110C CW filter (500Hz)
14. YC-110CN CW filter (250Hz)

## AOR AR-One



Good specs in VHF. Excellent in UHF. Ordinary in HF. Government use only.  
AOR AR-One \$5,599

Monitor Any **Frequency from 10 KHz to 3.3 GHz**. Ultra-stable reference frequency oscillator (0.1ppm)  
Surveillance operations are enhanced. Monitoring multiple frequencies is easier and faster. Computer control gives you maximum flexibility and unleashes the many features found in this advanced technology receiver. The AR-ONE is the right choice for the new world we now monitor. "GOVERNMENT USE OR EXPORT ONLY"  
Now available !

### AR-ONE Communications Receiver

1. Super wide coverage: 10 KHz ~ 3.3 GHz
2. 1000 memory channels
3. 10 VFOs
4. Monitor AM, NFM, WFM, USB, LSB, CW, Data
5. Ultra-stable reference frequency oscillator
6. Two RS-232C ports plus control head port
7. Control up to 99 AR-ONE Units with one PC
8. support computer controlled
9. Triple conversion superheterodyne front end
10. Antenna input level readout
11. Adjustable BFO
12. High intercept
13. Multi IF signal output (10.7 MHz or 455 KHz)
14. Excellent sensitivity

Specification Model: AR-ONE  
 Configuration: Triple conversion super heterodyne  
 Frequency coverage: 10KHz ~ 3.3 GHz (no gap)  
 Receive Modes: AM, NFM, WFM, USB, LSB, CW, DATA  
 Sensitivity: (AM mode -10dB S/N, NFM mode -12dB SINAD, CW/SSB mode -10dB S/N)

10 KHz - 40 KHz: CW 22.3 uV  
 40 KHz - 100 KHz: AM 4.5 uV CW 1.5 uV  
 100 KHz - 40 MHz: AM 2.5 uV  
 2 MHz - 40 MHz: AM 1.5 uV, SSB/CW 0.7 uV, NFM 0.89 uV  
 40 MHz - 1 GHz: AM 0.89 uV, SSB/CW 0.4 uV, NFM 0.5 uV, WFM 1.5 uV  
 1 GHz - 2.5 GHz: AM 0.7 uV, SSB/CW 0.32 uV, NFM 0.4 uV, WFM 1.5 uV  
 2.5 GHz - 3.3 GHz: AM 0.9 uV, SSB/CW 0.35 uV, NFM 0.5 uV, WFM 1.5 uV

IF frequencies: 1st IF : 754 MHz /265 MHz  
 2nd IF : 10.7 MHz  
 3rd IF : 455 KHz  
 Frequency steps: Standard steps: 1, 10, 50, 100, 500 Hz, 1, 5, 6.25, 9, 10, 12.5, 20, 2  
 Non standard steps: Less than 1 MHz (1 Hz incremental)  
 Selectivity:  
 B/W -6dB -60dB  
 0.5KHz 0.5KHz > < 2KHz  
 3KHz 3KHz > < 6KHz  
 9KHz 9KHz > < 30KHz  
 15KHz 15KHz > < 40KHz  
 30KHz 30KHz > < 70KHz  
 110KHz 110KHz > < 450KHz  
 220KHz 220KHz > < 600KHz  
 300KHz 300KHz > < 900KHz  
 Spurious Sensitivity: 60dB >  
 Adjacent Selectivity: 55dB >  
 Dynamic Range: 90dB >  
 Unwanted Spurious emission: < -57dBm  
 3rd IP: +2dBm > (-1dBm > above 2.5GHz)  
 Frequency stability: +/- 0.1ppm (-10 ~ 50C)  
 THD: 20dB > (< 10%)  
 Audio output: 1.5w (at 8ohms, THD < 10%)  
 Power requirement: 13.5V DC, < 2amp. (@ 1w audio output)  
 Antenna impedance: 50 OHM BNC  
 Antenna connector: N type  
 IF output level: -20dBm (10.7MHz or 455KHz)  
 External frequency standard input: 10MHz (0dBm +/-3dB)  
 Control interface: RS-232C  
 Operating temperature: -10 ~ 50deg.(C), -18 ~ 144deg.(F)  
 Dimensions: 157(W) x 58(H) x 270(D) mm  
 6.2(W) x 2.3(H) x 10.8(D) inch  
 Weight: Approx. 2.2Kg (4.9lbs)

## Lowe HF-150



Popular, compact digital shortwave radio. Has good sounding audio. Preselector or ATU needed to prevent reception of intermodulation products in LW. No longer manufactured. Optional keypad for direct frequency entry and storage. No FM. **Frequency range 30 kHz to 30 MHz.**

## AOR AR-7030+



Tunable to 0kHz. HF, MF & LF only. Great sensitivity specs on paper; however, the sensitivity is measured under non-standard conditions. Has remote control. Might be hard to use if remote control is broken. Must specify 500Hz CW filter at purchase time if you want filter. Menus, menus, and more menus. Designed for high-signal strength areas like Europe.

Minimum tuning increment is 2.65 Hz (compared to 1 Hz for RX-340 and Winradio). No DSP. No BFO knob.

AOR AR-7030 £799.00 (old model)

AOR AR-7030+ \$1499.95 [www.aorusa.com/products.html](http://www.aorusa.com/products.html)

Manual [aor-7030plus-manual.pdf](#)

Brochure aor-7030plus-brochure.pdf  
 at www.rnw.nl/realradio/html/ar7030plus.html  
 http://www.thiecom.de/english/ar7030el.htm

The AOR AR7030+ is the result of a combined project between the AOR Company of Japan and a designer group in England. The AR7030+ represents the very latest and best design featuring exceptionally strong signal handling and bristling with enhanced features. The AR7030+ has been targeted to handle strong signals that are of prime concern of European listeners. It offers greater than  $\approx 35$ dBm IP3 (Intercept point 3) and greater than 100 dBm dynamic range. This coupled with excellent selectivity make the AR7030 a strong choice for the shortwave broadcast listener or DXer. Although performance is excellent, features have not been forgotten. You get: Synchronous AM, Passband Tuning, six levels of attenuation, dual VFOs and 24 hour clock-timer. The 400 scannable memories store frequency, bandwidth, PBS, Squelch and BFO settings. The mini headphone jack will accept a mono or stereo 3.5mm plug. The two line 48 character backlit LCD gives you the status of the receiver.

The supplied full-featured 32 button infra-red remote provides access to virtually all facilities including: volume, tone, numeric keypad, memories, PBT, filter selection, etc. A remote RS-232 level port (5 pin 240° DIN) is also provided for computer control on the back panel. The Auxiliary Socket provides audio and timer outputs plus 455 kHz IF Output. The AR7030+ is similar to the AR7030, but with high tolerance components, 400 alphanumeric memories, enhanced RF attenuation and improved filters. Made in England. Includes 120 VAC wall transformer. The optional BP123 allows portable operation. The installation charge for installing one or two optional filters, or other option is \$30.00 per item at time of receiver purchase. This product carries a one year limited warranty by AOR USA.

Note: The sensitivity quoted by manufacturer is measured using non-standard conditions.

**Frequency Range:** 0 to 32 MHz  
 Receive Modes: USB, LSB, CW, AM, Synchronous AM, NFM, DATA

Sensitivity: (All measurements are p.d.at 50 ohm input)

20 kHz :	1.9 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (1.4 $\mu$ V / RF Preamp ON)
100 kHz :	0.73 $\mu$ V USB 2.2 khz filter 10dB S+N/N (0.34 $\mu$ V / RF Preamp ON)
500 kHz :	0.50 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (0.18 $\mu$ V / RF Preamp ON)
1.0 MHz :	0.52 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (0.19 $\mu$ V / RF Preamp ON) 0.88 $\mu$ V AM 5 kHz filter 10dB S+N/N (0.36 $\mu$ V / RF Preamp ON)
1.8 MHz :	0.52 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (0.21 $\mu$ V / RF Preamp ON) 0.95 $\mu$ V AM 5 kHz filter 10dB S+N/N (0.38 $\mu$ V / RF Preamp ON)
5.0 MHz :	0.50 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (0.19 $\mu$ V / RF Preamp ON) 0.86 $\mu$ V AM 5 kHz filter 10dB S+N/N (0.35 $\mu$ V / RF Preamp ON)
14.0 MHz :	0.58 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (0.23 $\mu$ V / RF Preamp ON) 1.0 $\mu$ V AM 5 kHz filter 10dB S+N/N (0.42 $\mu$ V / RF Preamp ON)
28.0 MHz :	0.60 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (0.23 $\mu$ V / RF Preamp ON) 1.0 $\mu$ V AM 5 kHz filter 10dB S+N/N (0.40 $\mu$ V / RF Preamp ON) 1.2 $\mu$ V NFM 10 kHz filter 12dB SINAD (0.48 $\mu$ V / RF Preamp ON)
32.0 MHz :	0.68 $\mu$ V USB 2.2 kHz filter 10dB S+N/N (0.24 $\mu$ V / RF Preamp ON)

Selectivity:

Performance of the 445 kHz IF system and ignores effects of the 45 MHz roofing filter and any 2.2 kHz filter characteristics: -6 dB bandwidth:

-60 dB bandwidth :  
 -80 dB bandwidth :  
 6/60 shape factor : 2.29 kHz  
 3.34 kHz  
 4.98 kHz  
 1 : 1.46

5.5 kHz filter characteristics : -6 dB bandwidth :  
 -60 dB bandwidth :  
 -90 dB bandwidth :  
 6/60 shape factor : 5.54 kHz  
 9.11 kHz

10.75 kHz  
 1 : 1.64  
 7.0 kHz filter characteristics : -6 dB bandwidth :  
 -60 dB bandwidth :  
 -90 dB bandwidth :  
 6/60 shape factor : 6.90 KHz  
 11.60 kHz  
 13.36 kHz  
 1 : 1.68  
 Memory channels: 400  
 Power Consumption: 15 VDC external adapter, current 300 to 500 mA typical, 1 Amp max. 30  
 Physical: 9.4 x 3.7 x 10 inches 4.9 Lbs. (238 x 93 x 277 mm 2.2 kg)

www.aoruk.com Frequency coverage 0 - 32 MHz

1. Mode reception: USB, LSB, CW, AM, Synchronous AM, \* NFM, DATA
2. Advanced IP3 greater than +35dBm
3. Very high dynamic range
4. >100dB in AM mode with 7kHz filter
5. >105dB in SSB mode with 2.2kHz filter
6. >110dB in CW mode with 500Hz filter
7. Seamless tuning using single loop DDS, no tuning "plops" at regular intervals
8. TCXO frequency standard fitted
9. Variable bandwidth synchronous detector with selection of
10. USB, LSB, DSB or anything in between
11. Automatically calibrated and aligned filters
12. Specially developed AGC release characteristic Passband tuning +/-5kHz
13. Audio pitch tune in CW & DATA modes
14. DOT MATRIX rear illuminated LCD with plenty of on-screen information
15. Assignable controls
16. Re-configurable receiver, switch between several favourite set-ups
17. 100 memory channels
18. Clock and timer facility
19. Supplied with full function infra-red-hand control
20. Performance figures relate to a typical production receiver and are not guaranteed levels.
21. Test signals :- AM mode : Modulated to 70% depth at 1kHz  
 FM mode : Deviated by 1.5kHz at 1kHz
22. SSB mode : Unmodulated carrier, resolved at 1kHz

All measurements are p.d. at 50 input. Figures in brackets indicate R F pre-amp switched on. SSB and AM values are for 10dB S+N/N, AM at 70% modulation. NFM value for 12dB SINAD.

Frequency Filter	USB 2.2KHz	AM 5.5KHz	NFM 9.5KHz filter
20KHz	1.9uV (1.4uV)	-	-
100KHz	0.73uV (0.34uV)	-	-
500KHz	0.5uV (0.18uV)	0.85uV (0.33uV)	-
1.0MHz	0.52uV (0.19uV)	0.88uV (0.36uV)	-
1.8MHz	0.56uV (0.21uV)	0.95uV (0.38uV)	-
5MHz	0.50uV (0.19uV)	0.86uV (0.35uV)	-
14MHz	0.58uV (0.23uV)	1.0uV (0.42uV)	-
28MHz	0.60uV (0.23uV)	1.0uV (0.40uV)	1.2uV (0.48uV)
32MHz	0.68uV (0.24uV)	1.1uV (0.43uV)	

Comments about the AR7030 from Radio Netherlands Media Network:

#### AOR AR-7030 PLUS

The AOR AR7030 PLUS follows on the successful AR7030 launch in early 1996. There are a number of improvements in the new version. ... [www.rnw.nl/realradio/html/ar7030plus.html](http://www.rnw.nl/realradio/html/ar7030plus.html)

1. Increased balance of the mixer for greatest IP2 & IP3
2. High tolerance 0.1% components in DDS ladder for low noise



3. Enhanced RF attenuator operation for minimal intermod
4. Higher spec wire aerial input transformer for minimal mixing products
5. Ceramic metal cased 4 kHz (displayed) AM filter fitted as standard (typical bandwidths: 2.2kHz, 4.0 kHz, 5.3kHz 9.5kHz)
6. Bourns optical encoder for the smoothest DX tuning
7. Features CPU fitted, 400 memories, multi timers and alpha tag

Otherwise, the PLUS's external appearance and functions are similar to the AR7030. The receiver was designed by John Thorpe, the designer of the popular Lowe HF-150. The receiver continues the British trend for producing high-quality receivers without frills at reasonable prices.

Other receiver features and capabilities include:

1. 0-32 MHz coverage in AM, AM synchronous, CW, USB, LSB and DATA modes.
2. Remote control keypad enabling direct frequency entry.
3. Antenna connectors are two: 50 Ohms and 600 Ohms unbalanced input for wire antennas.
4. Four IF filters with the option to add two additional filters.
5. Two VFOs.
6. Memories (400, up from 100 in the AR7030) that store frequency, bandwidth, mode, passband or BFO setting, squelch and scan include/exclude.
7. Computer control.

The following review the AR7030 PLUS was found on the Internet:

"The AR7030 PLUS continues the nested menus, displayed on the front panel display. The user must 'drill down' to find settings and options. It is quite different than the Japan Radio Company NRD-series receivers that have almost every function on a separate knob or switch. Our listener feedback suggests the menu structure approach is a 'love-hate' relationship with few users in the middle ground.

The AR7030 was an excellent receiver for the price, especially in Europe. Though we have not tested the PLUS version, the improvements cited by AOR UK should only make the receiver better."

The AOR AR7030 received the World Radio TV Handbook "Best Table Top Receiver" award for 1996-97.

The NB7030 multi-option is not fitted as standard to the AR7030 PLUS, just the 'features' CPU is fitted. Should you wish to add the hardware noise blanker and audio notch filter, order the UPNB7030 (slight saving in price).

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## Kenwood R5000



Discontinued in 1996 General Coverage (30kHz-30MHz) All Mode with VHF option <http://www.kenwood.net/>  
Kenwood makes mostly transceivers now.

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## JRC NRD-525



Not much known. Old model.

JAPAN RADIO CO. JRC [www.jrc.co.jp/](http://www.jrc.co.jp/) Japan Radio Company, Ltd Marine Electronics Manufacturer

Frequency range: 90 KHz-34 MHz  
 Mode: All-mode  
 Sensitivity: N/A  
 Selectivity: N/A  
 Image rejection: N/A  
 Voltage: 13.8 VDC or mains  
 Current drain: Max ? A  
 Impedance: 50 ohms  
 Dimensions (W\*H\*D): 13.5 x 5.2 x 11.3"  
 Weight: 19 Lbs  
 Manufactured: Japan, 1986-1992  
 Other: 114-174 / 423-456 MHz, RTTY demod, RS232 and CW-filter option  
 Related documents:

## JRC NRD-545



Current model. Not much known.

JAPAN RADIO CO. JRC [www.jrc.co.jp/](http://www.jrc.co.jp/) Japan Radio Company, Ltd Marine Electronics Manufacturer

Digital signal processing uses an algebraic operation method for signal detection, generation, inference, processing, or transmission. Compared to analog signal processing circuits, digital signal processors are more advantageous: They only require less precise components; they are robust against drift and interference; they are easier to integrate with high precision; and they offer greater flexibility with software processing. The DSP IC consists of a multiplier, an adder-subtractor, and a memory (shift register). The digital signal processing algorithm is based on repetition of operations such as data readout from the memory, multiplication, addition and subtraction. Features

1. Digital Signal Processing by One-Chip DSP
2. Wide-Band (30 to 2,000MHz) Converter Unit (Option)
3. Remote Control by Personal Computer
4. Frequency range: 0.1 to 29.999999 MHz
5. Type of reception: USB, LSB, CW, RTTY, AM, FM, WFM (with option board installed)

6. Frequency memory: 1,000 channels
7. Receiving system: Triple superheterodyne
8. Image rejection: 70dB or more
9. IF rejection: 70dB or more
10. Dimensions: 330W × 130H × 285D (mm)
11. Weight: Approx. 7.5kg

Catalogue of "NRD-545" is compiled in the "PDF" format. ( 373k )  
Not much known. Japan Radio Corp.

0.1 to 30Mc, 3xConv, DSP,USB, LSB, CW, RTTY, AM, FM,WFM option  
More info: <http://www.jrc.co.jp/product/comm/e-comm/jst-e.html>

AM sensitivity 10 dB (S+N)/N, 1 kHz tone, 30% modulation  
1 MHz 0.45 uV  
3.8 MHz 0.35 uV  
FM sensitivity 12 dB SINAD  
29 MHz 0.32 uV

**Frequency Coverage 0.1-30MHz (2GHz with optional CHE-199 converter)**  
Modes SSB, CW, AM, FM, AFSK.

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## IC-R3 portable TV receiver



One of the few video receivers for ham radio. Covers broadcast TV frequencies and part of the 2.4 GHz band used for wireless cameras. Different versions of the receiver, sold in different regions, handle NTSC or PAL. Said to be less sensitive above 2 GHz than the fixed-frequency receivers that are bundled with wireless cameras.

IC-R3 portable TV receiver 2-inch TFT color LCD built-in! See your information on screen!

**Super wide frequency coverage\_\_0.495 - 2450 MHz!** Covers from 0.495 to 2450.095 MHz of super wide frequency range\* with AM, FM, wide-FM and TV picture\* receive capability as standard.

\*some frequency ranges are inhibited with some versions \*depending on picture modulation system and version

Long hours monitoring capability. A Lithium Ion battery, BP-206, comes as standard\*, for more than 2 times longer operation than other types of batteries, during full feature operation. And the adopted external DC IN terminal allows you to operate with 3.6-6.3 V DC power source, or 12 V DC power source via the optional CP-18 CIGARETTE LIGHTER CABLE, all day long. In addition, the installed BP-206 can be charged simultaneously, while 5.5-6.3 V DC (more than 1 A) is supplied.

\*not supplied on some versions

TV picture receive capability. Not only can you see your operation status, you can display broadcast visual information. NTSC M, PAL B/G or other television systems are supported\*, depending on version. You can watch TV programs at anytime, anywhere. An FM-TV picture\* from wireless camera\* can also be displayed. Great for sporting events, security, or amateur TV without unpleasant wiring. Also, the IC-R3 offers an A/V output so you can transfer images to a TV monitor or a recording device.

\*some versions do not support any of these systems \*supplied from third party

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## yaesu vr-5000



This has been around for a while. Wideband receiver. Said to suffer from IMD. Yaesus have notoriously bad user interfaces.

yaesu vr-5000 <http://www.yaesu.com/> VR-5000 COMMUNICATIONS RECEIVER

\$995

**0.1 - 2599.99998 MHz** \* LSB/USB/CW/AM-N/AM/WAM/FM-N/WFM All-Mode Wide-Band Receiver (\*Cellular blocked)

The exciting world of communications monitoring, from Longwave to Shortwave to Microwave, comes to your home or station with Yaesu's new VR-5000 Communications Receiver.

Despite its incredibly compact size, the VR-5000 provides coverage of 100 kHz through 2599.99998 MHz (cellular frequencies are blocked) on all popular operating modes: LSB, USB/ CW, AM-Narrow, AM, Wide AM, FM-Narrow, and Wide FM. Making operation simple and efficient is the "Auto" mode, whereby the tuning steps and operating mode are automatically programmed according to the frequency you have selected. You won't miss those quick, important transmissions with the VR-5000

When monitoring on the "main" displayed frequency, you can simultaneously listen to a second station operating within 20 MHz of the main frequency in the AM and FM-Narrow modes. This can be especially helpful while monitoring public safety communications.

Featuring a handy world map showing the station's location, the special Shortwave Broadcast Station Memory Bank includes several different frequencies from a number of popular shortwave stations, including Voice of America, the BCC, Radio Japan, Voice of Russia, etc. The operating frequencies may be changed by the owner, to keep up with changing station schedules!

To aid in finding band activity, the VR-5000's Real-Time Band Scope, used while operating in the "VFO" mode, will sweep the band in search of activity, displaying the received signals graphically according to frequency and signal strength. The sweep width may be set to 100/200/250/300/500 kHz and up to 1/2/2.5/5/10 MHz, and you can also adjust the sweep steps for best resolution in the frequency range being observed!

The incredible 2000-channel memory capacity of the VR-5000 allows an astounding array of operating possibilities! The memories may be arranged in up to 100 Memory Groups, and you can attach an alpha-numeric label to both Memory Channels and Memory Groups to aid in channel identification. The memories store operating frequency, noise blanker status, and DSP information separately, so each channel is optimized for best reception.

The VR-5000's versatile scanning system allows lightning-fast sweeping of operating frequencies, so you won't miss any of the excitement on the bands! The scanner allows you to select from three scan-resume options, too: "Delay" Scan, which lets scanning resume after a programmed interval of waiting on an active channel; "Pause" Scan, which holds on an active channel until the incoming signal disappears; and "Hold" Scan, whereby scanning stops when activity is encountered. There is a wide array of scanning features available to the VR-5000 user: ? VFO Scan Sweeps the entire frequency range of the receiver (0.1 ~ 2599.99998 MHz). ? Memory Scan Choose from scanning of all memory channels, or channels within a particular memory group. ? PMS (Programmable Memory Scan) Scan within user-defined band limits, as though you were on a VFO. As many as 100 band-limit memories may be utilized for the setting of scanning borders. ? Smart Search<sup>TM</sup> Automatically loads up to 100 channels where activity is found. ? Main-Sub Two-Channel Scanning Allows watching of the Main and Sub VFO frequencies without listening to them simultaneously. ? Priority Operation Allows operation on one channel while periodically watching a "Priority" channel for activity. Operation will shift to the Priority channel if it becomes active.

The optional DSP-1 Digital Signal Processing Unit includes a number of features which can significantly enhance reception through improved interference rejection. ? Digital Bandpass Filter (SSB/AM/FM Modes) Provides razor-sharp selectivity for reducing adjacent-frequency interference and for shaping of the incoming station's audio frequency response. Both the low-cut and high-cut frequencies of the DSP Bandpass Filter are adjustable. ? Digital Noise Reduction Filter The DSP will analyze the incoming passband and suppress noise which is not directly associated with the incoming signal, providing quieter reception. ? Digital Notch Filter Automatically notches out annoying "beat" signals ("heterodynes") which can spoil reception, especially during Shortwave operation. ? CW Narrow-Bandwidth Peaking Filter Provides ultra-narrow bandwidths of 25/100/200/400 Hz for single-signal reception. ? CW Tone Pitch Control Allows you to adjust the center frequency of the CW filter for most comfortable reception.

Comments about the Yaesu VR5000 from [www.eham.net](http://www.eham.net)

"Selectivity OK, sensitivity good, gets overloaded with large antennas on HF. Excellent sensitivity above 1 GHz compared to the AR-8600 (Mk I & Mk II)"

"The VR5000 is difficult to operate with the multilayered menu controls. It had insufficient image rejection and it locked up on the fifth day, requiring me to hard reset the CPU which erased all memories."

Frequency Range: 0.1 ~ 2599.99998 MHz (Cellular Blocked)  
 Receiving Mode: CW/LSB/USB/AM/AM-N/WAM/FM-N/WFM  
 Antenna Impedance: 50 Ohm unbalanced, 450 Ohm unbalanced  
 Channel Step: 0  
 Main Band      LSB/USB/CW: 20 Hz/100 Hz/500 Hz/1 kHz/5 kHz  
                   AM-N/AM/WAM: 1/5/9/10/20/25/50/100/500 kHz  
                   FM-N: 5/6.25/10/12.5/20/25/50/100/500 kHz  
                   WFM: 10/50/100/500 kHz  
 Sub Band       AM: 1/5/9/10/20/25/50/100/500 kHz  
                   FM-N: 5/6.25/10/12.5/20/25/50/100/500 kHz  
 Memory Channel: Regular Memories: 2000 Channels  
 PS "Preset" Memories: 5 Channel  
 Operating Temp.:      -10 °C ~ + 50 °C  
 Sensitivity:  
     0.2 ~ 0.49998 MHz      SSB/CW   4.8 uV (10 dB S/N)  
                                   AM        10.8 uV (10 dB S/N)  
     0.5 ~ 1.79998 MHz      SSB/CW   1.0 uV (10 dB S/N)  
                                   AM        4.0 uV (10 dB S/N)

1.8 ~ 3.99998 MHz	SSB/CW	0.6 uV (10 dB S/N)
	AM	2.5 uV (10 dB S/N)
4.0 ~ 29.99998 MHz	SSB/CW	0.3 uV (10 dB S/N)
	AM	1.1 uV (10 dB S/N)
28.0 ~ 29.99998 MHz	FM-N	0.35 uV (12 dB SINAD)
30.0 ~ 1999.99998 MHz	SSB/CW	0.3 uV (10 dB S/N)
	AM	1.2 uV (10 dB S/N)
	FM-N	0.45 uV (12 dB SINAD)
	WFM	1.5 uV (12 dB SINAD)
2000.0 ~ 2599.99998 MHz	SSB/CW	0.5 uV (10 dB S/N)
	AM	1.8 uV (10 dB S/N)
	FM-N	0.8 uV (12 dB SINAD)

Conducted Spurious Emission: Less than 54 dBm  
 Supply Voltage: DC 13.5V ±15 %  
 Current Consumption: 0.7 A (@ audio output 1W)  
 Audio Output: At least 1 W @ 8 Ohm  
 Audio Output Impedance: 8 Ohm  
 Case Size: 7.1x2.75x8 inches 4.2 Lbs (180x70x203 mm) without knobs  
 Weight: Approx. 4.2 Lbs (1.9 kg)

**Note** Minimum tuning step is 1 kHz on AM, 20 Hz on SSB

## Ten-Tec RX-331



Remote-controlled by RS-232 serial port. **Frequency range 0 kHz to 30 MHz.** Has 57 varieties of selectivity from 100 Hz to 16 KHz. Tunable in 1 Hz steps.

The TEN-TEC RX-331 is a multi-mode HF receiver operating from 5 kHz to 30 MHz, fully synthesized and utilizing state-of-the-art Digital Signal Processing. DSP technology brings the performance and repeatability of expensive military grade communications receivers into the more economic range of commercial receivers.

The design flexibility of DSP provides 57 standard selectivity choices from 100 Hz to 16 KHz. It is also practical to customize filter bandwidths, shape factors and time delays to match unique customer requirements.

The RX-331 is designed specifically for remote controlled applications. Multi-drop RS-232 interface permits simultaneous operation of multiple receivers on a single network at baud rates from 300 to 19,200. Receiver may be controlled by either internal or external frequency reference and an optional high stability internal reference is available.

This receiver is a compact, rack mount unit only 1 3/4" high - ideal when available rack space is at a premium. Power consumption is a nominal 30 watts which can provide a measured advantage when comparing recurring system costs. All connections are arranged on rear panel. Front panel provides ON/OFF switch, headphone jacks with independent volume controls, serial port status indicators and power supply indicators.

Built-in Test (BITE) allows quick field verification of major subsystems. Built-in software provides a "field test" mode to allow complete receiver operation from a simple terminal without need of customer's complete control system.

### TECHNICAL SPECIFICATIONS \*

**FREQUENCY COVERAGE:** 50kHz - 30 MHz at typical sensitivity. Tunable down to 0 MHz with degraded performance.

**MODE:** USB, LSB, ISB, CW, AM, Synchronous AM, FM; all standard.

**TUNING RESOLUTION:** 1 Hz steps.



**FREQUENCY STABILITY:** +/-1 PPM per degree C within operating range 0 - 50 degrees C using internal reference. Optional TCVCXO provides +/- 1 PPM over entire operating range.

**ACCURACY:** All internal oscillators are locked to either internal or external frequency standard. The internal reference is adjustable by a continuously variable trimmer to allow calibration to any desired accuracy.

**EXTERNAL FREQUENCY REFERENCE:** 1, 2, 5, or 10 MHz ( +/- 1 PPM, 200 mv p-p into high impedance load). Receiver automatically switches to this reference upon application, at power up or after any serial link activity.

**SPURIOUS RESPONSES:** All spurious less than -119 dBm equivalent input-preamp on.

**IMAGE REJECTION:** 90 dB typical, 80 dB minimum.

**BFO:** Tunable in CW mode only, +/- 8kHz. Tuning in 10 Hz steps with a tuning accuracy of +/- 10 Hz of desired frequency setting. Fixed frequency in SSB/ISB (455 kHz), disabled in AM and FM.

**SYNTHESIZER LOCK TIME:** 10 msec typical

**ANTENNA INPUT:** 50 ohm, unbalanced, BNC connector. 2.5:1 VSWR max @ receiver's tuned frequency.

**SELECTIVITY:** 57 bandwidths selectable from .1 kHz - 16.0 kHz. Shape factor 1.5:1 or better. (6 to 60 dB)

**GROUP DELAY:** no more than .1 ms variation over passband of 300 Hz to 3050 Hz.

**ULTIMATE REJECTION:** 70dB minimum regardless of filter selected.

**LO PHASE NOISE:** -120 dBc/Hz @ 20 kHz offset typical, -110 dBc/Hz maximum.

**IF REJECTION:** 90 dB typical, 80 dB minimum.

**MEMORIES:** 100 memory store and recall.

**OPERATING TEMPERATURE RANGE:** 0 - 50 degrees C @ full specification. -10 - 60 degrees C with degraded performance.

\* Applicable from 500 kHz - 30 MHz unless otherwise stated.

\*Note: Sensitivity is quoted at 50% modulation, not 30% as is customary.

**SENSITIVITY:**  
(PREAMP OFF)

(PREAMP ON)

Mode	BW	SINAD	TypicaldBm/uV	MindBm/uV	TypicaldBm/uV	MindBm/uV
AM (50% mod @400 Hz)	6.0 kHz	10 dB	-103/1.6	-101/2.0	-112/.56	-108/.9
FM (6kHz dev @1kHzmod)	16.0 kHz	16 dB	-102/1.8	-100/2.2	-108/.9	-104/1.4
USB/LSB/ISB	3.2 kHz	10 dB	-112/.6	-107/.7	-119/.25	-115/.4
CW	.3 kHz	16 dB	-116/.35	-114/.45	-124/.14	-120/.22

**SENSITIVITY: LOW FREQUENCY RANGE (PREAMP OFF)**

Mode	Frequency	Typical dBm
CW @ 300 Hz BW SINAD - 16 dB	500 kHz	-116 dBm/.35 uV
	100 kHz	-115 dBm/.4 uV
	50 kHz	-114 dBm/.45 uV
	20 kHz	-107 dBm/1 uV
	15 kHz	-104 dBm/1.4 uV
	10 kHz	-94 dBm/4.5 uV
	5 kHz	-82 dBm/18 uV

**DYNAMIC RANGE:**

Mode	Noise Figure (dB)	Typ	Min	3rd Order Intercept (dBm)	Typ	Min
10 dB PREAMP ON		10	14		20	15
PREAMP OFF		17	19		30	25
15 dB ATTN		32	34		45	40

WIDEBAND OUTPUT, 1st MIXER: 45.455 MHz center frequency, output level 16 dB below receiver input. Bandwidth equivalent to preselector, no AGC.

IF OUTPUT, POST DSP: 455 kHz center frequency, -10 dBm nominal @ 50 ohms through BNC connector (AGC active ). Bandwidth determined by filter selection.

SIGNAL MONITOR OUTPUT, DELAYED AGC: 455 kHz, 16 kHz bandwidth (-6 dB point), - 10 dBm nominal (+/-3 dBm) @ 50 ohms through BNC connector. AGC delayed 40 dB.

SIGNAL MONITOR OUTPUT, 2nd MIXER, NO AGC: 455 kHz, 16 kHz bandwidth, output level equal to receiver input @ 50 ohms through BNC connector.

AGC: Fast, Medium, Slow, Programmable. Manual gain setting is provided in all four modes through RS-232 Interface, adjustable over 120dB range. Dump feature provided in all modes.

MODE	ATTACK (dB/ms)	HANG (sec)	DECAY (dB/sec.)	Threshold - 3.0 uV typical
FAST	0.8	0	1	600
MEDIUM	0.8	0	100	
SLOW	0.8	0	25	
PROGRAMMABLE	0.01-1.0	0.01-99.9	0.01-99.9	

(SEE RX-330B AGC SPECIFICATIONS FOR COMPARISON)

CONTROL INTERFACE: All receiver functions are controllable except headphone volumes. Multi-drop RS232 network @ DB25. Baud rate programmable from 300 to 19200. 7 or 8 data bits - even, odd, or no parity. Interface can be configured for multiple or single receiver applications.

MTBF: Not specified

POWER REQUIREMENTS: switch selectable 115/230 VAC, 48 - 440 Hz @ 30 watts nominal, Removable six foot line cord. Front Panel ON/OFF switch provided.

2ND ORDER INTERCEPT: 75 dBm typical, 60 minimum.

AUDIO LINE OUTPUT: 0 dBm (+/-3dBm) Two 600 ohm outputs (one for each sideband in ISB mode ) to DA-15 connector, ungrounded center tap. In all other modes, signal is mono. Terminals may be grounded or shorted together without damage. Two additional mono outputs are provided, one AC coupled, one DC coupled.

ISB HEADPHONE OUTPUT: Front panel mounted 1/4" stereo phone jack. Other modes mono. 10 mw maximum into 600 ohms. Front panel volume control.

MONO HEADPHONE OUTPUT: Front panel mounted 1/4" phone jack. LSB, USB or both available, switchable by software control only. Front panel volume control.

DIGITAL DATA OUTPUT: Provides post DSP IF and audio information in both serial and parallel data streams.

DIMENSIONS: 1 3/4"H x 19"W (1U) (44.45 X 482.6mm). Chassis depth 20" ( excluding front panel knobs, handles and rear panel connectors ). Sized to mount in standard 19" racks. Accepts Jonathan slide type 375QD.

WEIGHT: 12 lbs. ( 5.53 kg )

ADDITIONAL FEATURES: Squelch: FM mode only Passband Tuning: +/- 2 KHz in USB, LSB and CW Mute: for use in transmit/receive applications, mutes audio and post DSP IF output.

## Ten-Tec RX-340



Excellent receiver. Great sensitivity. LF/MF/HF only. Goes down to 0kHz. Very expensive. Rack mount. Beautiful design. Uses digital processing inside.

Discontinued in 2001 Ten-Tec RX-340 \$3950 <http://www.tentec.com/rx340.htm>

The following comments about the RX-340 was found on the Internet:

"It replaced a Drake R8B which, up to that time, was my choice for the best all-round HF receiver currently in production. It is better. Lots better."

The Ten-Tec RX-340 is a multi-mode, general coverage synthesized receiver utilizing extensive Digital Signal Processing. DSP brings the performance and repeatability of expensive military grade communications receivers into the price range of top end commercial receivers for shortwave listeners. Tunable from 5 kHz to 30 MHz, it provides tuning steps and display resolution of 1 Hz. All three displays are blue/green vacuum fluorescent and provide unparalleled contrast and readability.

The performance level of receivers in this class is possible only through extensive use of Digital Signal Processing. These designs utilize fewer analog circuits than traditional receivers. Powerful, specialized DSP microprocessors replace many of the discrete circuits with intensive software containing over 60,000 lines of code. High dynamic range analog stages provide 1st, 2nd and 3rd I.F.s (and 80 dB of AGC) where signals then pass through analog to digital converters. Everything else is accomplished in DSP including all mode detection, I.F. filters, AGC (remaining 40 dB), adjustable BFO, passband tuning and noise blanker. An astounding 57 I.F. bandwidths from 100 Hz to 16 kHz are included. All filters have shape factor of 1.5:1 or better (6 to 60 dB). USB, LSB, ISB, CW, AM, Synchronous AM and FM are built-in. Four AGC modes are provided. Conventional Fast, Medium and Slow modes are familiar but the "Programmable" mode is groundbreaking. User may build their own personal AGC characteristic by selecting attack, hang and decay rates. Manual control from front panel is also adjustable over 120 dB range. A tunable notch filter rejects unwanted signals in the passband. Receiver front end incorporates built-in preselector with eight 1/2 octave bandpass filters. Switchable 10 dB preamp and 15 dB attenuator are also provided. Signal strength meter is calibrated in both s-units and dBm.

Ten-Tec has been a supplier of commercial/government grade receivers for some years now. Our RX-331 was previously available only in a "black box" version for remote control. That model is used in government/military applications worldwide where multiple units run 24 hours/ 7 days a week without interruption. RX-340 uses these field proven circuits (the PC boards are identical) brought together in a new cabinet with a comprehensive front panel. This provides conventional operation from the panel while retaining all of the remote control aspects of its predecessor. A built-in multi-drop RS-232 interface permits remote operation at baud rates from 75 to 38,400. Accessed from rear panel DB-25 connector, the interface can be configured for single or multiple receiver applications. The complete command language is published in the manual so enterprising users can write their own remote control software. RX-340 also includes Built-in Test or "BITE". This self-test capability will identify virtually all faults to the board level.

Memory and scan features fall into four categories: a scratchpad memory, 100 memory channels, memory scan and F1 to F2 scan. Each memory channel retains the frequency along with mode, I.F. bandwidth and BFO setting. Dwell time is programmable, Channel lockouts are provided and a pause feature lets you interrupt scan momentarily. Squelch works in all modes and adjusts over a 150 dB range.

RX-340 has built-in TCVCXO to provide +/- 1 ppm frequency stability across the entire operating range of 0 to 50 degrees C. Audio is delivered to built-in speaker on the top panel, external speaker jack on rear and front panel headphone jack. Separate volume controls provided for speaker and headphone. Fixed level 600 ohm audio is also provided on rear panel. Front panel is a Lexan graphics overlay designed to last a lifetime. Chassis is aluminum with alodine plating on all parts to protect finish in less than ideal environments. Measuring 5.25"x19"x12.5"(HWD), RX-340 can be mounted in a standard 19" opening rack and weighs 12.5 lbs. One year warranty. Made in U.S.A.

RX-340 was recently endorsed by noted receiver design engineer, Dr. Ulrich L. Rohde, KA2WEU:

"In testing the RX-340, I find that this is the only affordable, totally DSP-based receiver where the digital AGC is as good, if not better than analog AGC systems. The intercept point for reasonable spacing is very impressive, better than +35 dBm in all cases."

What about DRM (Digital Radio Mondiale) decoding? RX-340 is ready to use for DRM - all you need is the decoding software available from DRM. Instructions for using the RX-340 to decode DRM can be read by clicking [here](#).

WorldStation, a sophisticated software package to operate the RX-340 under computer control, is now available from DXTra, Inc. Click [here](#) to access the DXTra website at [www.dxtra.com](http://www.dxtra.com) - DXTra, Inc. is a Ten-Tec authorized value-added reseller of Ten-Tec receiver products.

#### RX-340 SPECIFICATIONS

**FREQUENCY COVERAGE: 50kHz - 30 MHz** at typical sensitivity. Tunable down to 0 MHz with degraded performance (see Sensitivity tables) MODE: USB, LSB, ISB, CW, AM, Synchronous AM, FM; all standard.

TUNING RESOLUTION: 1 Hz steps.

FREQUENCY STABILITY: using built-in TCVCXO, provides +/-1 PPM over entire operating range 0 - 50 degrees C.

ACCURACY: All internal oscillators are locked to either internal or external frequency standard.

EXTERNAL FREQUENCY REFERENCE: 1, 2, 5, or 10 MHz ( +/- 1 PPM, 200 mv p-p into high impedance load). Receiver automatically switches to this reference upon application, at power up or after any serial link activity.

SPURIOUS RESPONSES: All spurious less than -119 dBm equivalent input - preamp on.

IMAGE REJECTION: 90 dB typical, 80 dB minimum

BFO: Tunable in CW mode only, +/- 8 kHz. Tuning in 10 Hz steps. Fixed frequency in SSB/ISB, disabled in AM and FM.

SYNTHESIZER LOCK TIME: 10 msec typical

ANTENNA INPUT : 50 ohm, unbalanced, BNC connector. 2.5:1 VSWR max @ receiver's tuned frequency.

SELECTIVITY : 57 bandwidths selectable from .1 kHz - 16.0 kHz. Shape factor 1.5:1 or better. (6 to 60 dB) Bandwidth is fixed at 3.2 kHz in ISB mode, and at 4 kHz - 16 kHz in SAM mode. Minimum bandwidth is 600 Hz in FM mode.

GROUP DELAY : no more than .1 ms variation over passband of 300 Hz to 3050 Hz.

ULTIMATE REJECTION: 70 dB minimum regardless of filter selected. L.O.

PHASE NOISE: -120 dBc/Hz @ 20 kHz offset typical, -110 dBc/Hz maximum.

IF REJECTION: 90 dB typical, 80 dB minimum.

MEMORIES: 100 memory store and recall.

OPERATING TEMPERATURE RANGE : 0 - 50 degrees C @ full specification. -10 to 60 degrees C with degraded performance.

**Note: The sensitivity quoted by manufacturer is measured using non-standard conditions.**

**SENSITIVITY:**

Mode	BW	SINAD	(PREAMP OFF)		(PREAMP ON)	
			Typical dBm/uV	Min dBm/uV	Typical dBm/uV	Min dBm/uV
AM (50% mod @400 Hz)	6.0 kHz	10 dB	-103/1.6	-101/2.0	-112/.56	-108/.9
FM (6kHz dev@1kHzmod)	16.0 kHz	16 dB	-102/1.8	-100/2.2	-108/.9	-104/1.4
USB/LSB/ISB	3.2 kHz	10 dB	-112/.6	-107/.7	-119/.25	-115/.4
CW	.3 kHz	16 dB	-116/.35	-114/.45	-124/.14	-120/.22

SENSITIVITY: LOW FREQUENCY RANGE (PREAMP OFF)

Mode	Frequency	Typical dBm
CW @ 300 Hz BW		
SINAD - 16 dB	>500 kHz	-116 dBm / .35 uV
	100 kHz	-115 dBm / .4 uV
	50 kHz	-114 dBm / .45 uV
	20 kHz	-107 dBm / 1 uV
	15 kHz	-104 dBm / 1.4 uV
	10 kHz	-94 dBm / 4.5 uV
	5 kHz	-82 dBm / 18 uV

DYNAMIC RANGE:

Mode Noise Figure (dB)	Typ	Min	3rd Order Intercept (dBm)	Typ
10 dB PREAMP ON	10	14		20
PREAMP OFF	17	19		30
15 dB ATTEN	32	34		45

2nd ORDER INTERCEPT: 75 dBm typical, 60 minimum.

WIDEBAND OUTPUT, 1ST MIXER: 45.455 MHz center frequency  
 IF OUTPUT, POST DSP: 455 kHz center frequency, bandwidth determined by filter selection  
 SIGNAL MONITOR OUTPUT, DELAYED AGC: 455 kHz, 16 kHz bandwidth, AGC delayed 40 dB  
 SIGNAL MONITOR OUTPUT, 2ND MIXER, NO AGC: 455 kHz, 16 kHz bandwidth

AGC: Fast, medium, Slow, Programmable. Manual gain setting is provided in all four modes, adjustable over 120 dB range. DUMP feature provided in all modes.

MODE	ATTACK (dB/ms)	HANG (sec)	DECAY (dB/sec.)
FAST	0.8	0	1200
MEDIUM	0.8	0	100
SLOW	0.8	0	25
PROGRAMMABLE	0.01-1.0	0.01-99.9	0.01-99.9

AUDIO LINE OUTPUT: 0 dBm (+/- 3 dBm) Two 600 ohm outputs (one for each sideband in ISB mode ) to DB-15 connector, ungrounded center tap. In all other modes, signal is mono. Terminals may be grounded or shorted together without damage. Two additional mono outputs are provided, one AC coupled, one DC coupled.

HEADPHONE OUTPUT: 1/4" stereo phone jack. Stereo in ISB mode, switchable to LSB, USB or both. Mono in all other modes. 10 mw maximum into 600 ohms. Front panel volume control.

DIGITAL DATA OUTPUT: Provides post DSP IF and audio information in both serial and parallel data streams.

POWER REQUIREMENTS: 90-264 VAC, 48-440 Hz @ 30 watts nominal. Removable six foot line cord included.

DIMENSIONS: 5.25"H x 19"W (3U). Chassis depth 12.5" ( including front panel knobs, handles and rear panel connectors ). WEIGHT: 12.5 lbs. ADDITIONAL FEATURES: Squelch: all mode Passband Tuning: +/- 2 kHz in USB, LSB and CW

## Sangean ATS 909



Sensitive, inexpensive, has text memories. Frequency coverage=??

From the manufacturer:

<http://windupradio.com/> The ATS 909 has the highest performance of any small portable radio made today. Audio is excellent for its size. Fine craftsmanship makes it a pleasure to carry with you. One button will put all of the local stations automatically into memory. Adjustable tuning increments allow precise tuning of stations. Comes pre-programmed with many popular SW stations. Each one of its 29 pages can be identified with an alpha description. If an FM station is using RDS their call letters will automatically appear on the screen. The antenna jack is grounded making it suitable for a two wire antenna system. Includes AC Adapter and Short wave antenna.

\$ 299.95 US\$

### 306 MEMORIES

1. 261 Short Wave Frequencies on 29 separate pages, preprogramming at our factory with the world's most popular shortwave stations, allowing instant access to the world of shortwave listening.
2. 18 AM stations on 2 pages for your favorite AM listening.
3. 18 FM stations on 2 pages for your favorite FM listening.
4. 9 LW stations on 1 page.
5. You can easily add or change stations at any time.
6. Direct Frequency Input using key pad
7. Auto-Scanning automatically scans and stops at every station
8. Manual Scanning
9. Memory Recall
10. Rotary Tuning
11. ATS - AUTO-TUNE SYSTEM - Automatically searches & presets all your memory channels on LW/AM/FM based upon signal strength of the stations
12. AUTO SW SEARCH - Automatically selects strongest SW station on each SW page.
13. MONO/STEREO SELECTOR SWITCH - Stereo icon appears in display when headphones are connected.
14. MANUAL ALPHANUMERIC EDITING - Allows user to insert any 8 alphanumeric characters in display for station identification.
15. SINGLE SIDE BAND RECEPTION - True LSB/USB selection with variable tuning down to 40HZ fine tuning.
16. RF GAIN CONTROL - Controls gain of incoming signal to reduce adjacent station interference
17. 42 WORLD CITY TIMES - Instantly displays preprogrammed time in 42 world cities. Also allows user to program additional cities.
18. DUAL TIME SYSTEM - Allows monitoring of Real Time and any additional world time zone simultaneously.
19. SELECTABLE MANUAL TUNE STEPS - Allows tuning steps from 100kHz down to 40kHz.
20. FUNCTION ICON LCD DISPLAY - Displays shows all features selected and active.



21. FULL RDS RECEPTION - Displays station call letters and correct time for any station transmitting an RDS signal.
22. DIRECT KEY - Recall your favorite station from anywhere by just pushing one button.
23. WIDE/NARROW FILTER - Reduces adjacent station interference
24. BATTERY & SIGNAL STRENGTH INDICATOR
25. 9KHZ/10KHZ SWITCH - Allows correct frequency indication for overseas reception
26. LCD DISPLAY - Light remains on for 12 seconds or continuously when AC adapter is used.
27. LOCK SWITCH - Locks all functions to prevent accidental altering. Each stations may also be locked individually.
28. SEPARATE AUDIO RECORDER OUTPUT & STAND-BY CONTROL JACKS - Allows user to program tape recorder to turn on at 3 different times.
29. TONE CONTROL
30. PRESET SWITCH - Resets the time and microprocessor only. All memory presets remain intact.
31. DAYLIGHT SAVINGS TIME SWITCH - Single switch changes all times automatically to DST eliminating necessity to reprogram all times in receiver.
32. 3 INDIVIDUAL TIMERS - Allows user to set wake up radio or buzzer to 3 different & independent items. Each time can use a different station.
33. ADJUSTABLE SLEEP TIMER - Adjustable from 90 minutes to 10 minutes
34. AC Adapter & Portable SW Antenna included
35. SIZE: - 8 1/4" x 5" x 1.5"
36. WEIGHT: 30 oz
37. BATTERIES: 4 x 1.5 Volt (AA)

Noise floor (minimum discernable signal)

180 kHz	0.14 uV
1 MHz	0.06
14 MHz	0.06

AM Sensitivity (S+N)/N, 1 kHz, 30% modulation

1MHz	0.67 uV
14 MHz	0.71

FM Sensitivity 12 dB SINAD

100 MHz	1.8 uV
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## Ten-Tec's RX-320D



Attaches to computer. Inexpensive. LF/MF/HF only. Not as good as the latest WinRadios but cheaper. Only goes down to 100kHz (compared to 9kHz for Winradio). Degraded response below 1 MHz. Specifications are available for writing Linux software for it.

**Note: The sensitivity quoted by manufacturer is measured using non-standard conditions.** Ten-Tec's RX-320D PC Radio - only \$329.00 factory direct Mute: for use in transmit/receive applications, mutes audio and IF outputs. (revised 3/6/00)

**FREQUENCY RANGE: 100 kHz - 30 MHz**

The introduction of the original Ten-Tec RX-320 HF DSP "PC Radio" in 1998 marked the first time that the power of a personal computer could be harnessed and dedicated to superb quality shortwave listening. Instead of traditional discrete electronic components inside the radio, the RX-320 utilized digital signal processors inside the 'black box' and used your personal computer for the horsepower to run the radio. Replacing components with software code resulted in less cost to manufacture the radio, and vastly better receiver performance than could be afforded at the same price with a traditional component-based shortwave radio.

In 2003, Ten-Tec remains on the cutting edge of receiver technology by offering "plug and play" capability for the new Digital Radio Mondiale (DRM) digital broadcasting standard in the new model RX-320D.

Q. What's the difference between the original world famous Ten-Tec RX-320 and the RX-320D model?

A. Only the addition of a 12 kHz I-F output jack that allows received signals to be streamed from the I-F directly to your computer's sound card for Digital Radio Mondiale decoding.

Q. What is Digital Radio Mondiale (DRM)?

A. Digital Radio Mondiale is a consortium of radio and electronics manufacturers from around the world that banded together in the late 1990's to create a universal digital system for the AM broadcasting bands below 30 MHz -- shortwave, mediumwave and longwave. The system that was created also bears the name of the group; Digital Radio Mondiale. DRM is the world's only non-proprietary, digital system for shortwave, mediumwave and longwave with the ability to use existing frequencies and bandwidth across the globe. There are extensive Q&A's addressed about the system, how it works, and how it will be used on the official DRM web site at [www.drm.org/newsevents/globfaq.htm](http://www.drm.org/newsevents/globfaq.htm)

Q. So I all I need is an RX-320D, or to have my existing RX-320 factory modified (see below for details on this) and I can plug the I-F output of the radio directly into my computer's soundcard and start hearing DRM broadcasts, right?

A. No. You need to have a capable radio, and you also need to have software for decoding DRM signals. This software is only available through the consortium via the DRM Software Radio web site located at [www.drmrx.org](http://www.drmrx.org). It is not available through Ten-Tec or any other distributor. There is a list of specific computer operating system and sound card requirements to be able to successfully decode DRM signals. The list of specifications is on the DRM software purchase page located at [www.drmrx.org/purchase.php](http://www.drmrx.org/purchase.php). The last specification listed is "suitable front end with 12 kHz output....." - that's the RX-320D.

There are two Digital Radio Mondiale websites that provide a lot of information about this revolutionary new transmission capability.

[www.drm.org](http://www.drm.org) is the DRM consortium website.

Users have made the following comment about the rx320d

"Using a 90' long wire as an antenna, I regularly get several of the European and N. African BC stations between 150kHz. and 250kHz, sometimes, well before nightfall."

No noise blanker or notch filter. Popular among Linux users because the hardware protocols are open source. All commands are sent at 1200 baud via the serial cable, which means it can be controlled by any computer with a serial port (or by some calculators).

The radio is not as well shielded as the Winradio and suffers from interference from the computer needed to control it. Placement of the receiver in reference to the monitor and DSL modem can eliminate most interference.

MODEL RX-320D SPECIFICATIONS:

MODES: AM, LSB, USB, CW  
 FREQUENCY RANGE: 100 kHz - 30 MHz  
 FREQUENCY ACCURACY: +/- 100 Hz at 25 degrees C.  
 MEMORIES: Limited only by available RAM in PC, virtually any PC will store 1000's of stati  
 SENSITIVITY:

MODE	B/W	Sensitivity
AM (80% mod @ 1 kHz)	6 kHz	.64 uV for 12 dB S+N/N
CW/SSB	2.5 kHz	.3 uV for 10 dB S+N/N

NOTE: Sensitivity was measured at 80% modulation, not 30%.

SELECTIVITY: 34 IF-DSP bandwidth filters built-in. 300 Hz, 330 Hz, 375-750 Hz in 75 Hz st  
 THIRD ORDER INTERCEPT: + 10 dBm  
 DYNAMIC RANGE: 90 dB @ 2.4 kHz bandwidth at 50 kHz spacing  
 I-F FREQUENCIES: 1st I-F 45 MHz, 2nd I-F 455 kHz, 3rd I-F 12 kHz  
 I-F REJECTION: > 60 dB  
 IMAGE REJECTION: > 60 dB  
 I-F OUTPUT: Center frequency, 12 kHz; bandwidth > 10 kHz; level approx. 2 V pk-pk into 600  
 ANTENNA: 50 ohm unbalanced for external antenna. High impedance at telescoping whip connec  
 PC INTERFACE: Industry standard serial interface on DB9 connector  
 CONNECTIONS: + DC input, DB9 for serial port, external antenna, line output to sound card,  
 POWER REQUIRED: < 500 mA at 13.5 - 15 VDC, wall transformer 110 VAC supplied  
 AUDIO: 1 watt at 4 ohms. > 1 v p-p output into 600 ohms (typical to drive a sound card).  
 CONSTRUCTION: 2 epoxy-glass PC boards, aluminum chassis, steel top and bottom  
 SIZE: HWD 3" x 6.25" x 6.5"  
 WEIGHT: 2.5 lbs (1.14 kg)

The following specifications for Ten-Tec's RX-320D were measured by QST Magazine. Note the large discrepancy between these figures and those supplied by the manufacturer.

AM Sensitivity 10dB, 30% modulation, 1kHz  
 1 MHz 7.4 uV  
 3.8 MHz 1.36 uV  
 Spurious and image rejection  
 First IF rejection 14 MHz, 54 dB  
 Image rejection: 14 MHz, 102 dB  
 Noise floor, 500 Hz filter  
 1 MHz -117 dBm  
 3.5 MHz -133  
 14 MHz -134

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## Software-defined radios and processor boards

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### RFspace SDR-14



Functions as a respectable HF receiver or spectrum analyzer. All demodulation and signal selection is done by the computer software. Uses USB 1.1 to communicate with a PC. The use of Fourier transform, 190 kHz continuous click-to-tune spectrum display, gives this device phenomenal capabilities for finding signals and tailoring the reception bandwidth. Internal buffer holds 262,000 samples. Rf section is wide open from 0 to 30 MHz. For higher frequencies, it would be fed from the 10.7 MHz IF output of a receiver and can display up to 4 MHz of spectrum. Thus, the SDR-14 could be thought of as a low-cost real-time spectrum analyzer. But it's much cheaper than the offerings from Tektronix, Anritsu and Agilent, which can cost 22 times more than the SDR-14. **Frequency coverage 0-30 MHz**

The only specs provided are minimum detectable signal which is around -134 dB from 1.5 to 30 MHz. Because of the speed limitation imposed by the USB 1.1 interface, the SDR-14 can only demodulate signals when the bandwidth is set to 190 kHz or less.

#### Information from the manufacturer

The SDR-14 is a 14-bit software defined radio receiver. It offers a broad range of spectrum analyzer and demodulation capabilities. The hardware samples the whole 0-30 MHz band using a sampling rate of 66.667 MHz. The digital data from the ADC is processed into I and Q format using a direct digital converter (DDC). The I and Q data is then sent to the PC for processing using a USB 1.1 interface. All of the demod and spectral functions are done on the PC side.

For sample rates faster than the USB can support, a memory buffer will store up to 262144 samples at up to 66Msamples/sec and then the SDR-14 will send the buffer at the slower USB rates back to the PC. This allows large FFT processing to be done on a block of contiguous sampled data at the full A/D sample rate. Demodulation is not possible since the blocks of data are not continuous.

The SDR-14 does not do any other signal processing except for the complex baseband conversion and downsampling. Any spectral analysis or demodulation must be done in software by the PC. In other words there is no digital signal processor in the SDR-14 available for demodulation, FFT's, or other custom processing. It is merely a sampling and down conversion/down sampling device.

The SDR-14 has 2 inputs. One is a direct input to the A/D for custom applications. The other input has a preamp and 30MHz antialiasing filter so that the input can be used for measuring/receiving signals from 0 to 30MHz without external filtering.

NEW! Supported formats at this time include USB, LSB, AM, FM, WFM, CW, CWr and DSB. Filter bandwidths are continuously adjustable. DRM is now supported via special demod mode using third-party software (DREAM) by routing the demod audio through the mixer control.

The SDR-14 comes with a High Frequency (HF) amplified frontend with switched attenuators and 1Hz tuning. A direct input port to the analog to digital converter is also included. This port can be used to sample signals directly up to 200 MHz+. This port can also be used to connect downconverters and spectrum analyzer frontends. The SDR-14 also supports high resolution spectral captures using up to 262144 point FFTs. The maximum spectral display width is 30 MHz simultaneously.

One of the most exciting features of the SDR-14 is the ability to record band segments of any band to hard drive in realtime. This is done at a rate of 52GB/day for a 150 KHz wide segment. The stored file contains

everything that happened in that segment of the band for the duration of the recording. The fidelity of the file is superb with over 96dB of dynamic range. The recording can be played back at any time with full tunability and choice of demodulation modes. The recording can also be analyzed for hidden signals and carriers.

NEW! The latest version of SpectraVue supports a network SDR-14 under the InputSource menu. Server software is available for Windows and Linux platforms. Due to the massive amount of data transferred, full demod capabilities are only supported on intranets with over 2 Mb/s rates (50KHz BW). A linux USB driver is now available for the SDR-14.

The list of possible uses of the SDR-14 include:

1. Panoramic adapter for use with communications receivers. (HF band IF frequencies 8.83, 10.7, 21.4, etc)
2. Radio astronomy spectral analysis.
3. Direct HF band reception using appropriate antenna.
4. Ionospheric and band propagation monitoring.
5. Interference surveying.
6. Power, noise and antenna measurements.
7. Law enforcement.
8. Homeland security.
9. Search for coherent signals hidden in noise.
10. Educational.

SpectraVue Software The SDR-14 uses Windows software for all of the display and demod functions. There are currently Windows and Linux drivers for the USB chipset used in the SDR-14 hardware. The command structure will be made available to those wishing to write their own applications. There is also the possibility that a windows Activex control will be made available. The SDR-14 is supplied with the latest version of SpectraVue software by Moetronix. This software includes Raw I&Q, 2D, 3D, Continuum (power vs. time) and waterfall displays.

Full Band Spectral Scans This is a 30 MHz wide HF spectral scan during a thunderstorm. The horizontal burst are caused by lightning. The receive antenna is a Cushcraft A3S. There is a lot of local interference at low frequencies as shown on the plot.

These are some of the spectrograms captured using the SDR-14. Click on the preview picture to enlarge. (Some browsers does not support this large of an image. If this occurs, right click and select "save as".)

High Resolution (14252x1355px) image of the 14.000 to 14.500 MHz band. NEW

Spectrogram of Amsat Oscar 40 Satellite at 2.4 GHz. Signal was converted to 10.7 and processed using the SDR-14.

This spectrogram shows the 26 to 28 MHz band using a 406Hz resolution bandwidth (RBW). The ionospheric sounder can be seen streaking up the band.

This spectrogram shows the 14.2 to 14.3 MHz SSB portion of the Amateur 20 meter band. The ionospheric



sounder can also be seen. The 3 KHz wide signals are the actual SSB stations. This image is at a RBW of 74Hz.

This spectrogram shows the 14.0 to 14.1 MHz CW portion of the Amateur 20 meter band on a Sunday morning. The update speed is so fast that the CW can actually be read on the screen.

This spectrogram shows the 14.0 to 14.35 MHz Amateur 20 meter band. This image is at a RBW of 74Hz.

This spectrogram shows the 144 to 148 MHz Amateur 2 meter band. The FM repeaters can be as well as the packets stations keying on and off. There is some cable TV egress showing up as evenly spaced vertical lines. This image is at a RBW of 1KHz.

This spectrogram shows the 28.0 to 30.0 MHz Amateur 10 meter band. This image is at a RBW of 813Hz.

## Avtec IF downconverter IFQ

Converts RF directly to baseband digital signals that are sent to your PC via a USB 2.0 port. User must write their own software to control the downconverter, select the frequency, and demodulate the signal. To use this device, you would also need to add a front end with an LNA + some type of mixer to generate the 100-195 MHz IF. With some work, this digitizer board could form the basis of a nice SDR.

- Standalone unit in optional box with a BNC and USB connector
- Tunable IF frequency 100 - 195 MHz
- Receive sensitivity -79 dBm
- Receive bandwidth up to 7.7 MHz
- Programmable digital filter and decimation
- Received signal strength indicator
- Tuning size 10 kHz
- Receiver Noise Figure: 4 dB
- Digital Quadrature Sample Rate: 20 Msps
- Digital Quadrature Quantization: 12 bits
- Post Downconverter Digital Filter: Programmable
- Post Downconverter Decimation: Programmable
- Digital Interface: High-speed USB 2.0
- Bias T provides power for upstream LNB (low noise block downconverter)
- High-speed USB 2.0 Driver Software, Application-specific Programming Interface (API) Documentation

## Flex Systems SDR-1000 HF+VHF Software defined radio

An open source transceiver. Single conversion receiver. \$1375 including 100 W amplifier, not including computer.

### Manufacturer's Specifications

#### Frequency coverage:

Receive: 0.01-65 MHz

Transmit: 1.8-2, 3.5-4, 5.33-5.4, 7-7.3, 10.1-10.15, 14-14.35, 18.068-18.168, 21-21.45, 24.89-24.99, 28-29.7, 50-54 MHz.

#### Power requirement:

Receive: 1.0 A max

Transmit: 25 A (max).

Modes of operation: SSB, CW, AM, FM.

CW sensitivity: 500 Hz bandwidth, 26 dB INA setting: 141 dBm.

Two-tone, third-order IMD dynamic range: 500 Hz filter, 90 dB

Sensitivity measured by ARRL (QST, October 2005)

Noise floor (mfs), 500 Hz filter:

Preamp off low med high

```

1.0 MHz  99  110  122  132 dBm
3.5 MHz  97  109  122  132 dBm
14 MHz   98  109  121  130 dBm
AM sensitivity 1 kHz tone, 30% modulation:
Preamp  off  low  med  high
1.0 MHz  51  18   4.4  1.5 uV
3.8 MHz  65  20   4.8  1.7 uV
FM sensitivity, 12 dB SINAD
Preamp  off  low  med  high
29 MHz  31  9.6  3.2  1.0 uV
500 Hz filter: Spacing 20 kHz (5 and 2 kHz data identical)
Preamp  off  low  med  high
3.5 MHz 105 105 111 111 dB
14 MHz  108 109 111 110 dB
Two tone, 3rd order IMD dynamic range, spacing 20 kHz (5 and 2 kHz identical)
Preamp  off  low  med  high
3.5 MHz  81  83  97  96 dB
14 MHz   86  85  99  98 dB
Third order intercept, spacing 20 kHz (5 and 2 kHz identical)
Preamp  off  low  med  high
3.5 MHz +24 +14 +24 +15 dBm
14 MHz  +31 +20 +26 +17 dBm
Second-order intercept
Preamp  off  low  med  high
       +70 +73 +75 +74 dBm
FM adjacent channel rejection: 20 kHz channel spacing,
Preamp high: 29 MHz, 36 dB.
FM two-tone, third-order IMD dynamic range: 20 kHz channel spacing,
Preamp high: 29 MHz, 37 dB.
Squelch sensitivity at threshold, preamp high
SSB 14 MHz 5.0 uV

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## SignalWAVE



This is a card with a field-programmable gate array (FPGA) chip that has been used as a SDR / DAC. Computer hardware expertise is needed to build a radio around this device.

SignalWAVE The SignalWAVE is one of the most powerful DSP/FPGA entry-level development board on the market, with extensive support for basic development tools: Texas Instruments' Code Composer Studio and Xilinx Foundation. Combine with system-level tool Matlab/Simulink for an advanced rapid-prototyping platform. The SignalWAVE TM (Wireless, Audio, Video) is our entry level development platform stemming from the higher end SignalMaster TM . It features all I/O capabilities for wireless (IF), audio and video signals, a complementary DSP/FPGA archi-tecture and support for model-based design tools MAT-LAB TM /Simulink TM .

### Highlights

- StandAlone
- One Texas Instruments<sup>TM</sup> TMS320C6713<sup>TM</sup> DSP @ 225 MHz (225 MIPS, 1350 MFlops peak)
- One 3M gates Xilinx Virtex-II<sup>TM</sup> FPGA XC2V3000 (3 Million gates) 32MB SDRAM
- High Speed ADC and DAC up to 65MHz with Programmable Gain, 125MSPS 14-bits DAC,
- Video Encoder and Decoder NTSC/PAL
- Audio Codec
- 3 external Virtex-II GPIOs

### Specifications

DSP

1X TMS320C6713 @ 225MHz  
32 MB of SDRAM @ 100MHz  
OTAG Port  
VIRTEX-II FPGA  
XC2V3000-FF1152  
DSP's EMIF signals directly connected to the FPGA.  
Dedicated 32 MB (8X32-bits) SDRAM  
JTAG Port of FPGA is available on a 6-pins header  
(Parallel Cable 3 compatible).

MCU  
ELANSC520-100AC  
2 X 2MB FLASH , 32MB SDRAM  
LCD  
Ethernet Controller  
2 Serial Ports (1 DB-9 + 1 header)

ADC  
Analog Devices' AD6644  
65MHz Sampling Frequency  
DC-Coupled  
Analog Programmable Gain  
Acquisition Clock : Programmable Clock or External Clock

Digital I/Os  
3 external Virtex-II GPIOs

DAC  
Analog Devices' AD9754  
125 MHz Sampling Frequency maximum  
DC-Coupled  
Acquisition Clock : Programmable Clock or driven by FPGA

Video Decoder  
Philips SAA7111A  
Supports 8-bits and 16-bits data path

Video Encoder Analog Devices ADV7171  
Supports 8-bits and 16-bits data path

Audio CODEC  
Burr-Brown PCM3008  
Audio Sampling Frequency from 8 kHz to 48 kHz  
Sample resolution 16-bits

User Story: description of an HF SSB radio based on the SignalMaster DSP/FPGA architecture. Uses Mathworks' Simulink system-level tool as the principal development environment.

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## TORNADO-PX/DDC4G rev.2x

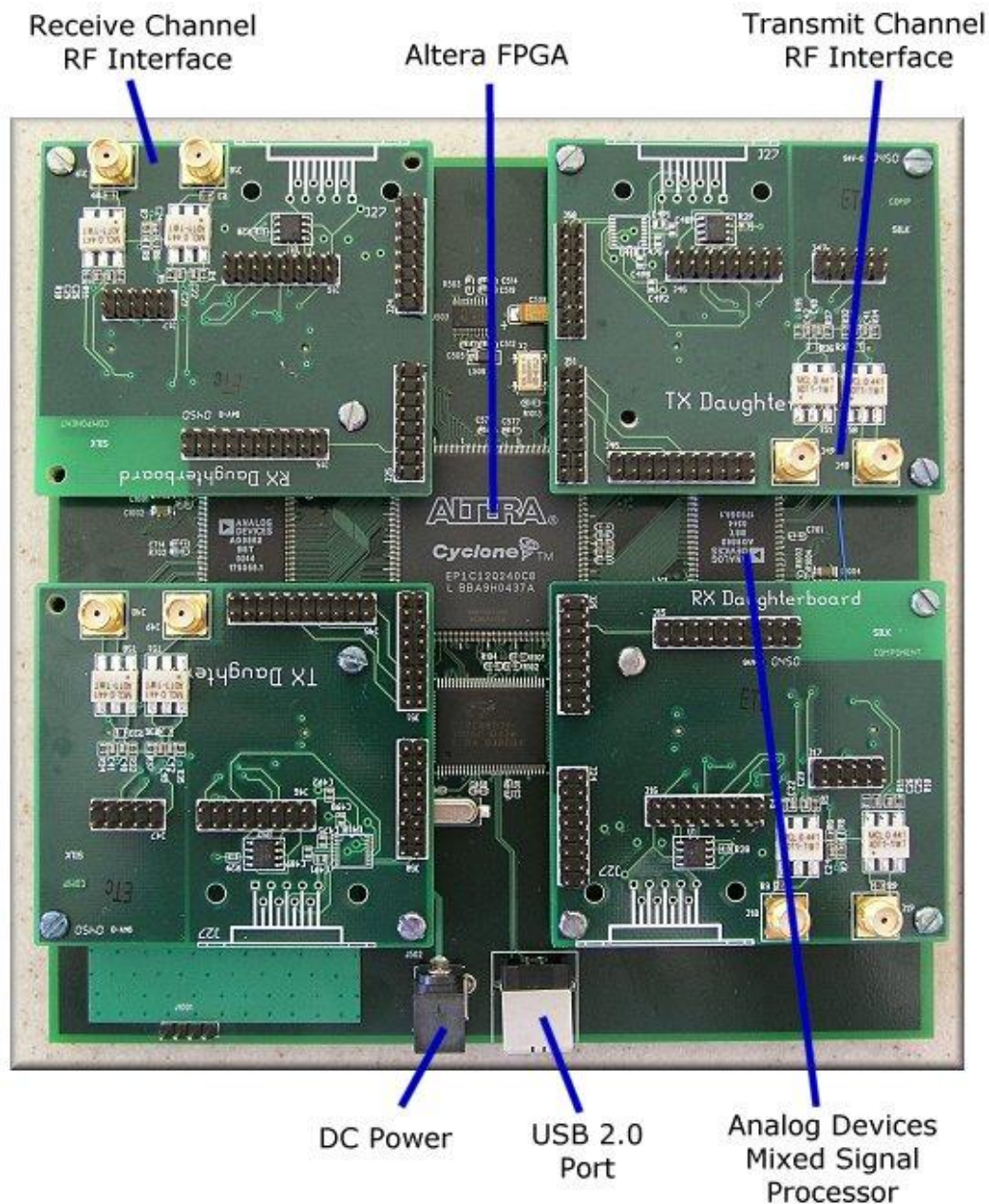


Quad Channel Multi-Standard 105 MSPS Digital Radio Receiver Coprocessor/Controller for TORNADO DSP Boards and Stand-alone Applications. Made in Russia

General features

- Digital radio coprocessor for all TORNADO DSP boards plugs into the 32-/16-bit PIOX daughter-card module (DCM) site
  - Stand-alone operation with external power for embedded DRR applications
  - Complete quad channel multi-standard digital radio receiver solution with on-board ultra-high performance DSP requires only external RF tuners and I/F amplifiers
  - A variety of on-board I/O peripherals offers easy interfacing to external peripherals and/or external host PC
  - Multi-board expansion for multi-channel data acquisition and multi-DSP signal processing
  - Quad 16-bit DACs for analog AGC of external I/F amplifiers, headphones control and general purpose analog output
  - Uses ultra-high performance 1 GHz TMS320C6416 32-bit fixed-point DSP with on-chip 1Mbyte RAM and Viterbi/Turbo decoders
  - USB 2.0 480 Mbit/s device interface
  - ADC sampling frequency 234kHz - 105 MHz
  - A/D resolution 14 bits
  - Input signal bandwidth 10 kHz & 150 MHz (OPA input); 200kHz & 250MHz (RF transformer input)
  - PFG frequency resolution < 0.1 Hz
  - PFG frequency stability  $\pm 2$  ppm (standard and super-low phase noise option) or  $\pm 50$  ppm (ultra-low phase noise options)
  - PFG phase noise standard: -85dBc/Hz @ 100Hz, -105dBc/Hz @ 1kHz, -115dbc/Hz @ 10kHz, -135dBc @ 1MHz, super- and ultra-low phase noise options are available
- 

## USRP



[A device](#) that allows you to create a software radio using any computer with a USB 2 port. Various plug-on daughterboards allow the USRP to be used on different radio frequency bands. Daughterboards are available from DC to 2.9 GHz at this time. The entire design of the USRP is open source.

The USRP works with GNU Radio, a free-software (open source) framework for the creation of software defined radios. Both the USRP and GNU Radio work on all of the following operating systems: Linux Windows Max OS X, PPC and Intel processors FreeBSD and NetBSD

Fully open source, but the web page is quite vague about what these components actually do. From what I can tell, it's basically a DAQ system presumably with an RF amplifier and filters. The digitized data are sent to your PC via a USB 2.0 port. From there, you're on your own. GnuRadio may be able to demodulate some types of signals. This is a promising concept, but is still very much a work in progress. No specs available yet.

## Summary of WinRadio models

Winradio has been producing some very interesting wideband computer-controlled receivers for several years. The performance has been gradually increasing. Most models come in both an internal and an external version. Some have digital signal processing (DSP) features such as spectrum display. However, be careful with internal



versions, because some early models are only available with ISA cards. Software for early models was 16-bit and may or may not run in Windows 2000 or XP.

Winradio came out with the 'G3' series a few years ago. They are bucking the trend again by producing HF radios (30 MHz maximum) on a PCI card. The G3 series introduced the computer-adjustable demodulator that allows you to set the bandwidth to as little as 1 Hz. This was an option on the G303i but standard on the G313i. The latest G series is the G305 and G315, which cover from 9 kHz to 1800 MHz.

Winradio has gradually overcome resistance to the concept of a radio inside the noisy environment of a computer. The shielding on the card is reportedly adequate to completely eliminate computer noise. However, Win radios must be used with an antenna that is placed far away from the computer. An active antenna connected by a 30 meter coaxial cable is sometimes adequate to prevent computer noise. However, in my experience, interference from computers and networking equipment (especially hubs) still gets into radios, even when using a shielded cable and an active antenna located many meters away. This interference consists of evenly-spaced carriers that range from 17 kHz to well over 140 MHz. Before buying a software radio, my advice is to set up the antenna first and measure the amount of interference using a cheap portable radio or scanner.

The biggest disadvantage of the Winradio is the fact that it runs only on Windows. Although there is a [linradio](#) site, Linradio appears to be a long-abandoned project that never approached parity with the Windows version. With Microsoft's operating system encumbered with ever more obtrusive and annoying features, such as the new requirement that users install a piece of spyware known as "Windows Genuine Advantage" on their computers, Winradio may lose many potential customers despite producing a first-rate radio.

Another disadvantage of a software radio is the lack of portability. You can't just move the computer around because of the requirement for a shielded cable and external antenna. Another disadvantage is that if a Winradio is installed on a desktop computer, it would be useless during a power outage, when reception is best.

The Winradio software supports [Radio Basic programming](#). The API is documented, which allows developers to access the receiver hardware. (Note that the programming information available online consists mainly of function calls to a binary-only Windows DLL; it's unclear how difficult it would be to access these functions under Linux). Winradios conform to the XRS (Extensible Radio Specification) which allows third-party plugins to be created.

The Windows software for Winradios includes features like spectrum display and various signal decoding options that previously have only been available to specialized users with unlimited funds (e.g., the military). While the Winradio is by no means in this class (it doesn't analyze radar signals, for example, and superior versions of the spectrum display can be obtained using software that analyzes the audio signal), it comes closer than most others. Even on HF, digital waveforms are gradually replacing analog. Many of the signals you will hear on a shortwave radio are FAX, RTTY, or slow-scan TV transmissions. On UHF, you will find a great many digital signals, including digital audio and TCP/IP. These signals are just noise to a receiver that only handles AM, SSB, and CW. Winradio is one of the few companies that provides something powerful enough to allow members of the general public to analyze these types of signals. However, these functions require purchase of additional software.

	price	bandwidth	AM sensitivity	
			150kHz	10MHz
WinRadio WR-G303i	\$499	9 kHz - 30 MHz	2 to 9	0.9 $\mu$ V
WinRadio WR-G303i/pro demodulator	\$599	9 kHz - 30 MHz	2 to 9	0.9 $\mu$ V*
WinRadio WR-G313i	\$999.95	9 kHz - 30 MHz	1.6	0.9 $\mu$ V*
WinRadio WR-G313i/180	\$1249.95	9 kHz - 180 MHz	1.6	0.9 $\mu$ V
WinRadio WR-1550e RCV47-E	\$549.95	150 kHz - 1500 MHz	5	1 $\mu$ V
WinRadio WR-1550i RCV47-I	\$499.95	150 kHz - 1500 MHz	5	1 $\mu$ V
WinRadio WR-3150e RCV48-E	\$1849.95	150 kHz - 1500 MHz	5	1 $\mu$ V
WinRadio WR-3150i-DSP RCV48-I	\$1375.00	150 kHz - 1500 MHz		
WinRadio WR-3500e RCV49-E	\$2395.95	150 kHz - 2600 MHz	5	1 $\mu$ V
WinRadio WR-3500i-DSP RCV49-I	\$2395.95	150 kHz - 2600 MHz	5	1 $\mu$ V
WinRadio WR-3700e RCV50-E	\$2895.95	150 kHz - 4000 MHz	5	1 $\mu$ V
WinRadio WR-3700i-DSP RCV50-I	\$2895.95	150 kHz - 4000 MHz	5	1 $\mu$ V

\* Vendor quotes AM sensitivity at 0.9 uV at 30% modulation and

0.35 uV at 80% modulation.

## Sales blurbs from manufacturer

<http://www.winradio.com>

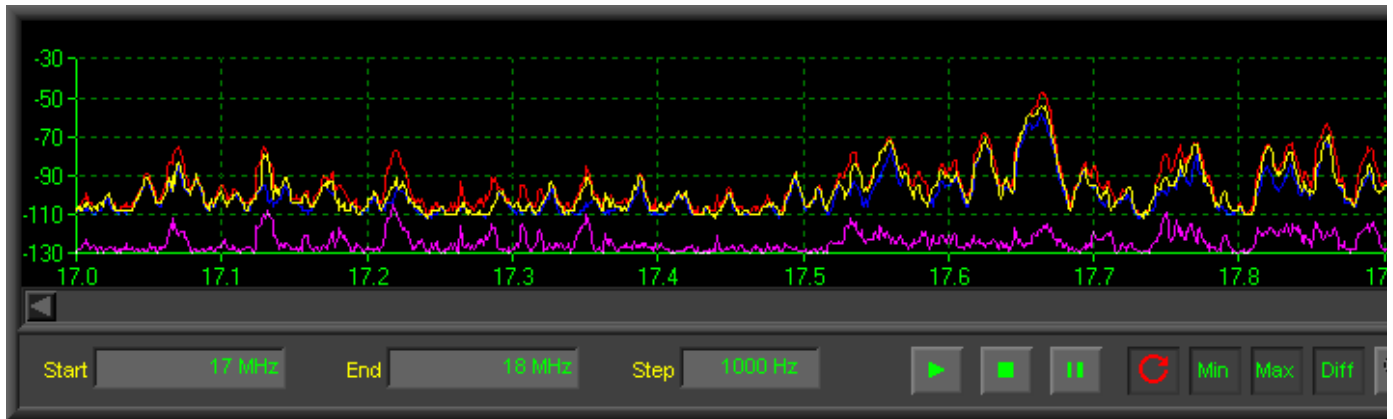
## WinRadio G-303i



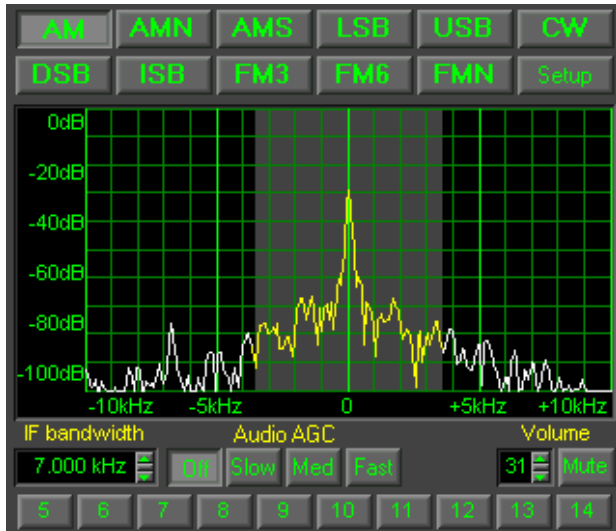
If you purchase an internal Winradio, make certain it is a PCI card, not an ISA card, since few computers have ISA slots nowadays.







Spectrum scope



Professional demodulator window (\$100 extra)

Phenomenal signal processing capabilities. Good sensitivity. Goes down to 9kHz.

\$500

Old model. See G313i. See Shortwave Magazine review.

professional demodulator(needed for adjusting bandwidth) \$150

bundle \$525

The G303 Series receivers are low cost software-defined shortwave receivers, for amateur and less demanding professional applications. **Frequency range is 9 kHz to 30 MHz.**

See also the optional G303 Professional Demodulator which further enhances the performance of this ground-breaking receiver.

This is an internal model, where the entire front end of a very sensitive shortwave receiver is contained on a PCI card, extremely well shielded against the effects of PC-generated interference. The demodulation is performed by the PC using advanced digital signal processing techniques. Simple "Plug and Play" installation.

The "G3" stands for "the third generation": As the original, award-winning, first-generation WR-1000i receiver was the world's first commercially available wide-band receiver on a PC card when launched years ago, the newly introduced WR-G303i is the world's first dedicated shortwave receiver on a PC (PCI bus) card. It is also the first commercially available receiver where the entire final intermediate frequency stage and an all-mode demodulator are entirely executed in software, running on a personal computer.

Additional demodulator types are planned as further options, including a DRM (Digital Radio Mondiale) demodulator.

Receiver type DDS-based dual-conversion superheterodyne with software-defined last IF stage and demodulator

Frequency range 9 kHz - 30 MHz  
 Tuning resolution 1 Hz  
 Mode(See Note 1.) AM, AMN, AMS, LSB, USB, CW, FM3, FM6, FMN  
 Image/Spurious Rejection 60 dB  
 IP3 +5 dBm @ 20kHz  
 MDS -135 dBm  
 Phase noise -148 dBc/Hz @ 100 kHz  
 RSSI accuracy 5 dB  
 RSSI sensitivity 1  $\mu$ V  
 Selectivity(-6dB)(See Note 2.)  
 AM 6 kHz  
 AMN 4 kHz  
 AMS 4 kHz  
 LSB,USB 2.5 kHz  
 CW 500 Hz  
 FM3 3 kHz  
 FM6 6 kHz  
 FMN 12 kHz  
 Scanning speed 40 channels/s  
 Sensitivity  
 (AM/SSB/CW 10dB S/N)(FM 12dB SINAD)  
 (See Note 3.)

Mode	0.009-0.1 MHz	0.1-2 MHz	2-30 MHz
AM	9.0 $\mu$ V	2.2 $\mu$ V	0.9 $\mu$ V
LSB,USB	3.0 $\mu$ V	0.7 $\mu$ V	0.3 $\mu$ V
CW	1.2 $\mu$ V	0.2 $\mu$ V	0.1 $\mu$ V
FM3, FM6, FMN	2.2 $\mu$ V	0.4 $\mu$ V	0.2 $\mu$ V

#### Intermediate frequencies

IF1: 45 MHz  
 IF2: 12 kHz  
 Frequency stability 10 ppm (0 to 60° C)  
 Antenna input 50 ohm (SMA connector)  
 Output 12 kHz IF2 output  
 (sound card Line Input compatible)  
 Form factor 2/3 length PCI card  
 Interface PCI 2.2 compliant  
 Dimensions Length: 195 mm (7.68")  
 (excluding mounting bracket)  
 Height: 99 mm (3.90")  
 (excluding edge connector)  
 Thickness: 19 mm (0.75")  
 (incl. components on either side)  
 Weight 310 g (10.9 oz)

#### Notes:

1. The Professional Demodulator offers two additional demodulation modes, DSB and ISB.
2. The Professional Demodulator offers continuously adjustable IF bandwidth from 1 to 15000 Hz.
3. The AM sensitivity is specified at 30% modulation for 10 dB S/N ratio. For 80% modulation, typical AM sensitivity of WR-G303i is 0.3  $\mu$ V in 2-30 MHz range. The Professional Demodulator improves sensitivity further by making it possible to extend filter lengths, and adjust the IF bandwidth for optimum reception of the received signal: This results in a typical improvement by 2-3 dB on AM/SSB/FM and up to 10 dB on CW.

The WR-G303i receiver is truly one of the most sensitive receivers available, yet with an excellent dynamic range.

The following table illustrates the effect of the AM modulation depth and the Professional Demodulator on typical sensitivity figures:

AM Sensitivity (10 MHz, 10 dB S/N)		
Demodulator	30% modulation	80% modulation
Standard	0.9 $\mu$ V	0.3 $\mu$ V
Professional	0.6 $\mu$ V	0.25 $\mu$ V

standard demodulator This demodulator is supplied as part of the G303 receiver package. It features AM, AMS (synchronous AM), AMN (narrow band AM), LSB, USB, FM3 (3 kHz FM), FM6 (6 kHz FM), FMN (15 kHz

FM) and CW modes, with fixed bandwidths.

There is a real-time spectrum scope which shows the actual situation on the received band.

An interesting feature is Audio AGC (in addition to the existing hardware IF AGC).

g303 professional demodulator

This advanced demodulator is offered as an optional extra. It adds DSB and ISB modes, additional Audio AGC settings and continuous IF bandwidth adjustment (from 1Hz to 15 kHz). There are also user-definable IF bandwidth preset buttons at the bottom.

Many more exciting facilities are hidden under the Setup button: Optimized filter settings make it possible to increase the receiver sensitivity typically by 2 dB on AM, SSB and FM; and by up to 10 dB on CW.

The left part of the Setup window is similar to the Standard Demodulator. The right one contains some surprises: The demodulator parameters (such as the digital filter length) can be adjusted by the user. There are separate "tabs" for independent setting of each of the eleven demodulation modes.

Clicking on the View Demodulator Structure button discloses an interactive diagram of the demodulator structure:

At the top there is a block diagram showing the structure of the currently selected demodulator (each modulation mode has its own demodulator). Below, there are also two spectrum analyzers. Left clicking on any of the color points inside the block diagram will connect the left spectrum analyzer to the associated point (the color of the point will change to red). Right clicking will connect the right spectrum analyzer (the point color will turn blue).

At bottom left, there is a Vector Voltmeter showing amplitude and phase differences between the two selected points, at the cursor frequency.

There are also THD (total harmonic distortion) and SINAD (signal-plus-noise-plus-distortion to noise-plus-distortion) meters, to complement this unique instrument.

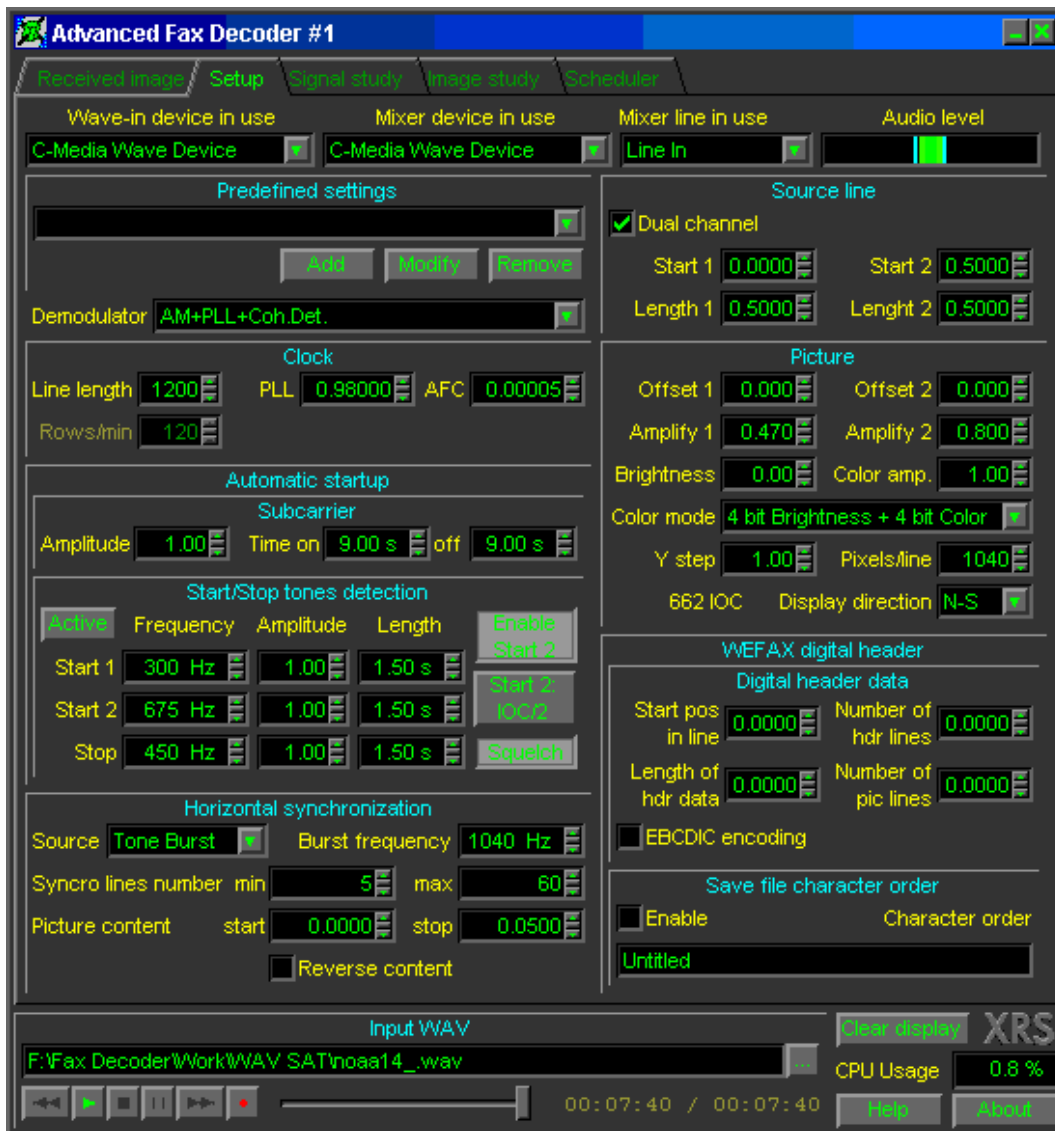
## **Advanced digital suite**

The extra ADS software (\$199.95) includes

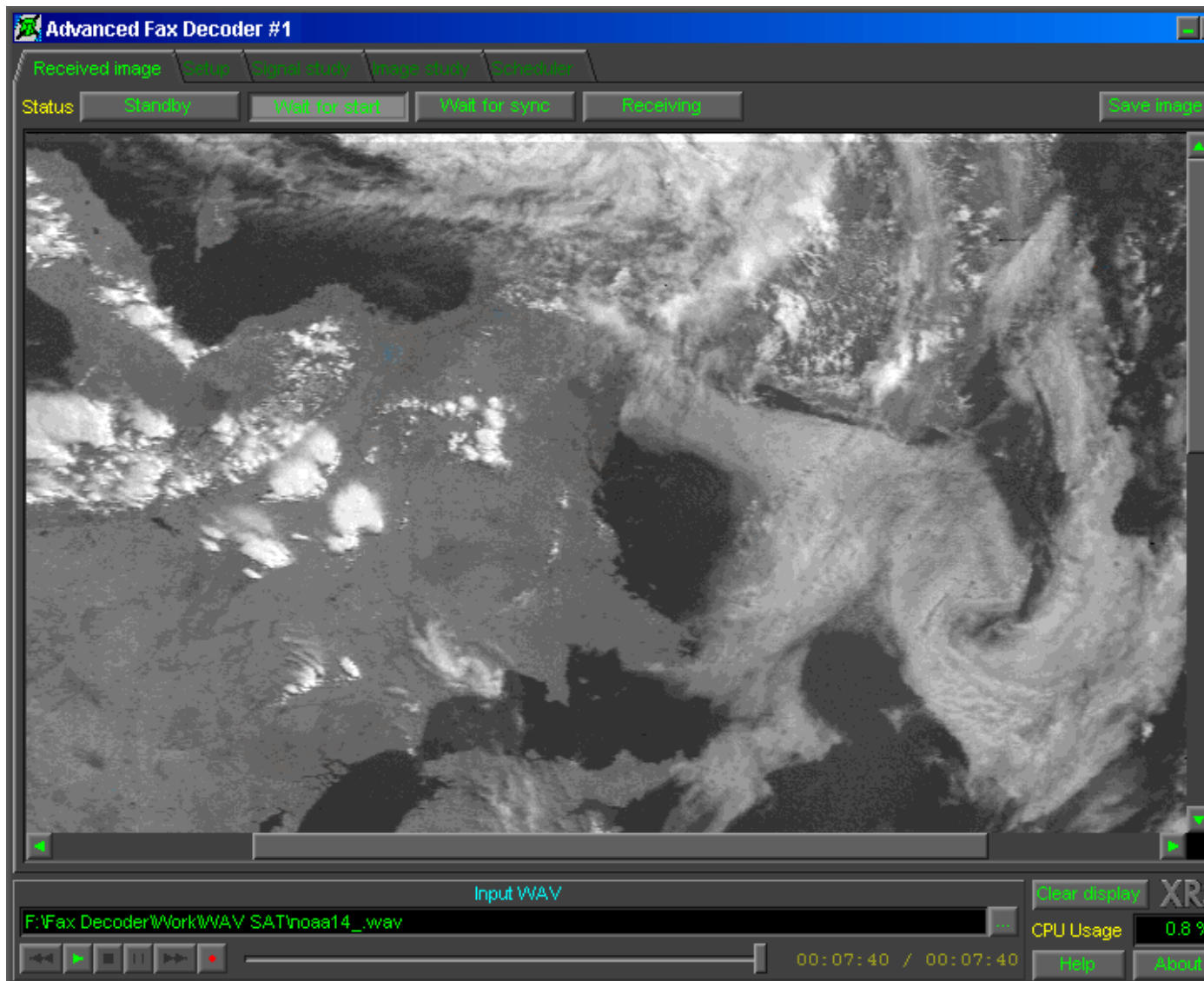
1. Advanced FAX Module (WEFAX and HF Fax) with a scheduler
2. Advanced NAVTEX Decoder with a scheduler
3. Advanced Packet Radio Decoder
4. Advanced ACARS Decoder with a code database
5. Advanced Signalling Decoder (CTCSS and DTMF) with alarms
6. Advanced Signal Classifier
7. Advanced Audio Oscilloscope and Spectrum Analyzer with waterfall spectra
8. Advanced Signal Conditioner with numerous user-defined filters
9. Advanced Audio Recorder with pitch shift and speed control



Advanced audio signaling decoder CTCSS and DTMF screen

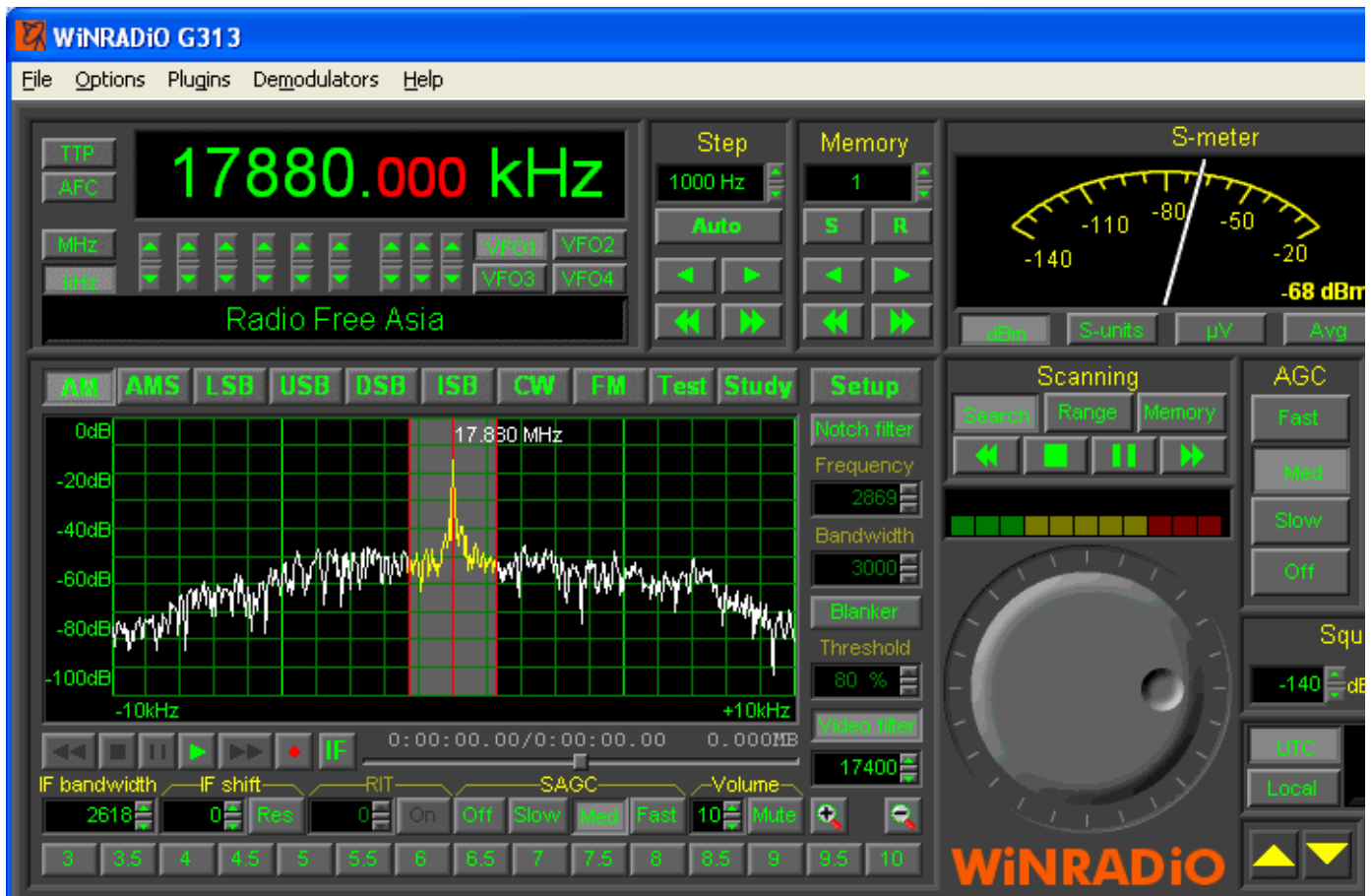


Advanced audio signaling FAX setup screen



Advanced audio signaling FAX screen showing a typical FAX image.

## Winradio WR-G313i



\$949

Phenomenal signal processing capabilities. Goes down to 9kHz. Improved over old version. Real-time spectrum display. PCI card plugs inside computer. Must use external antenna to avoid interference. See Shortwave Magazine review of G303i.

The sensitivity of  $0.07 \mu\text{V}$  for CW and  $0.9 \mu\text{V}$  for AM at 30% mod. makes it comparable to the most sensitive conventional receivers. A 180 MHz option is \$249.95 and raises upper frequency limit to 180MHz.

Winradio WR-G313i US\$999.95 new march 2004 Overview

The WinRADIO WR-G313i receiver is a software-defined high-performance HF receiver (9 kHz to 30 MHz, optionally extendable to 180 MHz) on a PCI card.

There are numerous demodulation modes, variable IF bandwidth 1 Hz to 15 kHz (with 1 Hz step size), a 20 kHz wide real-time spectrum analyzer with 16 Hz resolution, noise blanker and notch filter. The built-in recorder can record demodulated audio as well as the IF signal, making it possible to "re-receive" the same signal again and again with different IF filter bandwidths, notch filter, noise blanking or demodulator settings, to arrive at the best possible reception of weak or interference-prone transmissions.

In addition to the real-time narrow-band spectrum analyzer, there is also a wide-band spectrum analyzer which contains additional professional instrumentation facilities: the ability to display minimum and maximum spectrum sweeps, search for peaks, average spectra, save and print spectra, marker mode, etc.



Another useful feature, previously unavailable with receivers of this price class, is a test and measurement facility, performing measurements on the received signal including frequency accuracy, amplitude modulation depth, frequency deviation, THD (total harmonic distortion) and SINAD. An audio spectrum analyzer is also included, making it possible to observe the demodulated spectrum in real-time with a resolution of 5 Hz.

The unique research and education function makes it possible to explore interactive block diagrams of the software-defined demodulator, for each demodulation mode, and observe demodulation taking place on real-time signals using two spectrum analyzers and a vector voltmeter.

### Frequency range 9 kHz - 30 MHz(optionally 9 kHz - 180 MHz)

Receiver type DSP-based SDR with DDS-based dual-conversion superheterodyne front end  
 Frequency range 9 kHz - 30 MHz(optionally 9 kHz - 180 MHz)  
 Tuning resolution 1 Hz  
 Mode AM, AMS, LSB, USB, DSB, ISB, CW, FM  
 Image Rejection  
 1.8-7.3 MHz: 80 dB  
 7.3-30 MHz: 70 dB  
 Spurious-free dynamic range 95 dB MDS -137 dBm  
 Phase noise -148 dBc/Hz @ 100 kHz  
 Internal spurious Less than equivalent antenna input of -115 dBm  
 RSSI accuracy 2 dB  
 RSSI sensitivity -137 dBm  
 Bandwidth 1 - 15000 Hz (adjustable in 1 Hz steps)  
 Scanning speed 400 steps/s (at 1kHz steps)

Sensitivity  
 (AM/SSB/CW 10dB S/N)  
 (FM 12dB SINAD)

Mode	0.15-0.5 MHz	0.5-1.5 MHz	1.5-30 MHz
AM, AMS (30% modulation)	-103dBm(1.6µV)	-106dBm(1.1µV)	-108dBm(0.9µV)
AM, AMS (80% modulation)	-111dBm(0.63µV)	-115dBm(0.4µV)	-116dBm(0.35µV)
LSB, USB, ISB, DSB	-115dBm(0.40µV)	-118dBm(0.28µV)	-119dBm(0.25µV)
CW	-122dBm(0.18µV)	-125dBm(0.13µV)	-130dBm(0.07µV)
FM	-110dBm(0.7µV)	-113dBm(0.5µV)	-117dBm(0.32µV)

#### Note:

Below 150 kHz, the sensitivity gradually drops. Typical figures (CW) are:  
 100 kHz -113 dBm  
 50 kHz -102 dBm  
 25 kHz -98 dBm  
 10 kHz -90 dBm

#### Intermediate frequencies

IF1: 45 MHz  
 IF2: 16 kHz (variable 12-22 kHz)  
 Tuning accuracy 1 ppm (25°C ±2°C)  
 Frequency stability 0.5 ppm (0 to 60° C)  
 Antenna input 50 ohm (SMA connector)  
 Output 600 ohm line audio  
 Form factor 2/3 length PCI card  
 Interface PCI 2.2 compliant  
 Dimensions Length: 195 mm (7.68")  
 (excluding mounting bracket)  
 Height: 99 mm (3.90")  
 (excluding edge connector)  
 Thickness: 19 mm (0.75")  
 (incl. components on either side)  
 Weight 330 g (11.6 oz)

#### WR-G313i Specifications

Receiver type DDS-based dual-conversion superheterodyne with software-defined DSP-based last IF stage and demodulator  
 Frequency range 9 kHz - 30 MHz (optionally 9 kHz - 180 MHz)  
 Tuning resolution 1 Hz  
 Mode AM, AMS, LSB, USB, DSB, ISB, CW, FM  
 Image/Spurious Rejection 80 dB  
 IP3 +8 dBm @ 20kHz  
 MDS -135 dBm

Phase noise -148 dBc/Hz @ 100 kHz  
 RSSI accuracy 2 dB  
 RSSI sensitivity 0.1  $\mu$ V  
 Bandwidth 1 - 15000 Hz (adjustable in 1 Hz steps)  
 Scanning speed 40 channels/s  
 Sensitivity

(AM/SSB/CW 10dB S/N)

(FM 12dB SINAD)

From another source:

Mode	0.009-0.1 MHz	0.1-2 MHz	2-30 MHz
AM, AMS, ISB, DSB	2.0 $\mu$ V	1 $\mu$ V	0.25 $\mu$ V
LSB, USB	1.0 $\mu$ V	0.7 $\mu$ V	0.15 $\mu$ V
CW	0.5 $\mu$ V	0.2 $\mu$ V	0.07 $\mu$ V
FM	2.2 $\mu$ V	0.4 $\mu$ V	0.2 $\mu$ V

Intermediate frequencies  
 IF1: 45 MHz  
 IF2: 12 kHz  
 Frequency stability 2 ppm (0 to 60° C)  
 Antenna input 50 ohm (SMA connector)  
 Output 600 ohm line audio  
 Form factor 2/3 length PCI card  
 Interface PCI 2.2 compliant  
 Dimensions Length: 195 mm (7.68")  
 (excluding mounting bracket)  
 Height: 99 mm (3.90")  
 (excluding edge connector)  
 Thickness: 19 mm (0.75")  
 (incl. components on either side)  
 Weight 330 g (11.6 oz)

**WR-G313i Receiver Options** The following factory-fitted hardware options are available for WR-G313i receiver:

**Frequency Extension Option (G313/180)** The G313/180 option extends the frequency coverage from the standard 9kHz-30MHz to 9kHz-180MHz. This makes it possible to use this receiver for narrow-band communications in the low VHF range. The receiver's variable IF bandwidth makes this receiver particularly suitable for surveillance and monitoring of civilian and military aircraft and marine communications.

**External Reference Oscillator Input Option (G313/XR)** The G313/XR option adds an external SMA connector to the receiver board, which can be used to connect an external reference oscillator for the highest possible frequency accuracy. This external oscillator can be any frequency from 8 to 20 MHz (the user specifies this frequency via software).

**Reference Oscillator Output Option (G313/RO)** The G313/RO option adds an external SMA connector to the receiver board, which can be used to output the internal reference frequency. This is useful for situations when the receiver's own internal oscillator is to be used as a reference for other equipment, or, if an external reference is used, to provide this external reference to other receivers in a daisy-chain arrangement. If the receiver relies on its internal reference oscillator, this option will provide 16.384 MHz reference output. If an external oscillator is used, then the external oscillator frequency will be provided at this output.

**Intermediate Frequency 45 MHz Output Option (G313/IF4)** The G313/IF4 option adds an external SMA connector to the receiver board, which provides a wide-band IF output of the entire 9 kHz - 30 MHz input band, up-converted to 45 MHz (i.e. 9 kHz corresponds to 45.009 MHz, 30 MHz corresponds to 75 MHz). This makes it possible for the receiver to be used as a front-end tuner for HF monitoring systems requiring the capability of digitizing the entire HF band instantaneously; or a front-end for a spectrum analyzer, taking advantage of the receiver's excellent sensitivity and low noise-floor level.

**Intermediate Frequency 10.7 MHz Output Option (G313/IF1)** As an alternative to the previous option, the G313/IF1 option provides a wide-band IF output. The difference is that this option involves an additional internal down-converter which converts the 45 MHz IF down to 10.7 MHz.

To order a receiver with any of the above options, simply add the option code(s) to the receiver model number. For example, for a 180MHz receiver with external reference oscillator, the model number will be G313i/180/XR. Options can be mixed together (except the IF options where only one can be selected, i.e. IF1 and IF4 cannot be selected at the same time).

The WiNRADiO Digital Suite is a collection of digital signal processing modules, fully integrated with WiNRADiO receiver software. The WiNRADiO Digital Suite expands the power of your WiNRADiO receiver with numerous digital processing facilities, including weather fax, ACARS, packet radio, audio oscilloscope and spectrum analyzer, squelch-controlled recording, and many others. Suitable for the 1000, 1500 and 3000 Series of WiNRADiO receivers.

**WiNRADiO Database Manager** The WiNRADiO WorldStation Database Manager integrates with any WiNRADiO models and makes it possible to access and maintain large selections of frequencies. It comes with a ready-made database of over 300,000 frequencies world-wide. Suitable for the 1000, 1500 and 3000 Series of WiNRADiO receivers.

**WiNRADiO Trunking Option** Join the trunked radio revolution with your WiNRADiO receiver! The WiNRADiO Trunking Option includes major trunking modes; Motorola SmartNet and MPT 1327, which are the most commonly used trunking modes worldwide. The WiNRADiO Trunking Option is implemented using the XRS technology which ensures compatibility with all future XRS-capable receivers. Suitable for the 1000, 1500 and 3000 Series of WiNRADiO receivers. SmartNet is a registered trademark of Motorola Inc.

**WiNRADiO Universal FSK Decoder** The WiNRADiO Universal FSK Decoder is an extremely versatile signal decoding utility suitable for 1000, 1500 and 3000 Series of WiNRADiO receivers. The Decoder contains several powerful analysis tools, making it possible to determine transmission characteristics of an unknown signal automatically. The Decoder comes with the following basic protocols pre-installed: ARQ1000D, ARQ-E, ARQ-N, ARQ-6, ARQ6-70, ARQ6-90, ARQ6-98, ARQ-E3, Baudot, IRA (ASCII), Packet Radio, POL-ARQ, SITOR-A, SITOR-B, NAVTEX, Raw Bits, SI-ARQ and SWED-ARQ. Many other protocols can be added by modifying the numerous decoding and demodulation parameters the Universal FSK Decoder offers.

**WiNRADiO Client/Server Option** The WiNRADiO Client/Server Option makes it possible to remotely control a WiNRADiO receiver across all types of computer networks supporting the TCP/IP protocol. With the Client/Server Option installed, a WiNRADiO receiver can be controlled and listened to remotely, from anywhere in the world where a TCP/IP connection exists between the Client and the Server. There are three versions:

1. Client/Server Option 1000/1500 Series (for receivers of 1000 and 1500 series)
2. Client/Server Option 3000 Series (for receivers of 3000 series)
3. Client/Server Option 8000 Series (for multichannel systems of 8000 series)

## Winradio WR-1550i

\$499.95

internal - from www.winradio.com mar 2004

This model is intended for stationary, discreet, compact applications. No external cables are required, no external interface ports occupied, no external power supplies or extra desk space is needed. This ISA card is I/O based and does not require IRQ's.

Superseding the award-winning 1000 Series, the 1500 Series offers improved performance and additional features. These low-to-medium cost communication receivers are suitable for cost-effective VHF/UHF monitoring for professional and amateur applications. **Frequency range is 150 kHz to 1.5 GHz** (in USA, models available to general public exclude cellular frequencies 825-849 and 869-894 MHz).

## Winradio WR-1550e

Image of radio: see other Winradios. All appear the same.

Winradio WR-1550e \$549

Sensitivity is poor in LF range.

This is an external version of WR-1550i with an identical receiver and software, contained in an elegant enclosure with RS-232 interface (PCMCIA Adapter optional). Very suitable for cost-effective VHF/UHF monitoring applications in conjunction with portable computers.

This is a medium-range external receiver similar to its popular predecessor WR-1500e with improved dynamic range, spurious signal rejection and selectivity. The **frequency range is 150 kHz to 1.5 GHz** (the US version excludes cellular frequencies 825-849 and 869-894 MHz).

```
Receiver type  PLL-based triple-conversion superheterodyne
Frequency range
AM, SSB, FM-N  0.15-1500 MHz
FM-W          30-1500 MHz
Note: In some countries certain frequencies may be omitted due to government legislation.
Tuning resolution  10 Hz (USB/LSB/CW: 1Hz)
Mode             AM, SSB/CW, FM-N, FM-W
Image/Spurious Rejection  65dB typ.
Dynamic range     70dB
Signal meter linearity  ±5dB
Selectivity
SSB/CW  2.5 kHz @ 6dB
AM       6 kHz @ 6dB
FM-N    15 kHz @ 6dB
FM-W    230 kHz @ 6dB
Scanning speed
AM,SSB/CW  10 channels/s
FM-N, FM-W  50 channels/s
Sensitivity
AM/SSB/CW 10dB S/N
FM-N/FM-W 12dB SINAD

Mode      0.15-1.5 MHz  1.5-30 MHz  30-1000 MHz  1-1.5 GHz
AM        25µV       1µV         1µV          1.9µV
SSB       0.9µV       0.3µV       0.3µV        0.4µV
FMN       0.4µV       0.4µV       0.4µV        0.4µV
FMW       -         -           1.0µV        1.0µV

Intermediate frequencies
f [MHz]   IF1 [MHz]   IF2 [MHz]
0.15-399.999  556.325    58.075
400-807.999  249.125    58.075
808-1113.999 249.125    58.075
1114-1500    556.325    58.075
Mode       IF3 [MHz]
AM,SSB,FM-N  0.455
FM-W        10.7
Frequency stability  10 ppm (0 to 60° C)
Antenna input  50 ohm (BNC connector)
Audio output   0.2W (8 ohm load)
Specifications are subject to change without notice.
```

## Winradio WR-3150i-DSP

Image of radio

Winradio WR-3150i-DSP \$1375

The WiNRADiO WR-3150i-DSP receiver supersedes the highly successful WR-3100i-DSP model, introducing improved spurious signal rejection, selectivity and other hardware and software improvements. The WR-3150i-DSP receiver puts advanced radio receiver technology directly on a personal computer platform, to create a complete spectrum surveillance system. This receiver is intended for government, military, security, surveillance, media monitoring and industrial applications. The **frequency range is 150 kHz to 1.5 GHz** (for non-government customers in USA, cellular frequencies 825-849 and 869-894 MHz are excluded). The ISA card plugs into the motherboard of an IBM-compatible PC. An in-built DSP is used for audio recording and

playback and application-specific signal processing tasks can be added.

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## Winradio WR-3150e

Image of radio

Winradio WR-3150e

This model is similar to its popular predecessor WR-3100e with improved performance. This is a high-end external receiver, intended for government, military, security, surveillance, media monitoring and industrial applications. The **frequency range is 150 kHz to 1.5 GHz**. (The publicly available US version excludes cellular frequencies 825-849 and 869-894 MHz). The external unit connects to an IBM PC compatible computer via a serial interface cable (PCMCIA interface Adapter is optional). The unit has its own speaker. At the rear of the unit, there are connectors for the antenna, serial control port, PCMCIA control port, external speaker, power and a data output interface (discriminator output).

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## Winradio WR-3500i-DSP

Image of radio

Winradio WR-3500i-DSP \$2395

This internal version is intended for stationary, discreet, compact applications, system integration and professional surveillance up to 2.6 GHz. The receiver extends the frequency coverage of the WR-3150i-DSP receiver and also adds two extra IF bandwidths (6 kHz and 50 kHz for FM). These compact units are easy to integrate to multi-channel systems, and have no need for external cables, power supplies, external interface ports or extra physical space.

DSP development kit for this model is available for third-party DSP application developers.

### Frequency range AM, SSB, FM-N 0.15-2600 MHz

The ISA card plugs into the motherboard of an IBM-compatible PC.

Receiver type PLL-based triple-conversion superheterodyne

Frequency range

AM, SSB, FM-N 0.15-2600 MHz

FM-W 30-2600 MHz

Note: In some countries certain frequencies may be omitted due to government legislation.

Tuning resolution 10 Hz (USB/LSB/CW: 1Hz)

Mode AM, SSB/CW, FM-N (3), FM-W

Image/Spurious Rejection 65dB typ.

Dynamic range 85dB

Signal meter linearity  $\pm 5$ dB

Selectivity

SSB/CW 2.5 kHz @ 6dB

AM 6 kHz @ 6dB

FM-N1 6 kHz @ 6dB

FM-N2 15 kHz @ 6dB

FM-N3 50 kHz @ 6dB

FM-W 230 kHz @ 6dB

Scanning speed

AM,SSB/CW 10 channels/s

FM-N, FM-W 50 channels/s

Frequency stability 10 ppm (0 to 60° C)

Sensitivity

AM/SSB/CW 10dB S/N

FM-N/FM-W 12dB SINAD

Mode	0.5-1.5 MHz	1.5-30 MHz	30-1000 MHz	1-1.5 GHz	1.5-2.6 GHz
AM	5 $\mu$ V	1 $\mu$ V	1 $\mu$ V	1.5 $\mu$ V	3.0 $\mu$ V
SSB	0.9 $\mu$ V	0.3 $\mu$ V	0.3 $\mu$ V	0.5 $\mu$ V	1.0 $\mu$ V

FM-N1	0.9µV	0.35µV	0.35µV	0.4µV	2.0µV
FM-N2	0.9µV	0.35µV	0.35µV	2.5µV	0.4µV
FM-N3	-	-	0.35µV	2.5µV	0.4µV
FM-W	-	-	1µV	2µV	5µV

Intermediate frequencies		
f [MHz]	IF1 [MHz]	IF2 [MHz]
0.15-399.999		
2300.001-2700	556.325	58.075
400-807.999		
1892.001-2300	249.125	58.075
808-1113.999		
1586.001-1892	249.125	58.075
1114-1586	556.325	58.075
Mode	IF3 [MHz]	
AM,SSB,FM-N	0.455	
FM-W	10.7	
Antenna inputs	2 x 50 ohm (BNC and SMA connectors)	
Audio output	0.2W (8 ohm load)	

## Winradio WR-3500e

Image of radio

Winradio WR-3500e \$2395

PC-based Receivers 3000 Series with extended frequency coverage

These are medium cost communications receivers, suitable for cost-effective HF/VHF/UHF monitoring for professional applications in security, military, telecommunications and industrial applications. **Frequency range is 150 kHz to 2.6 or 4.0 GHz** (in USA, models available to general public exclude cellular frequencies 825-849 and 869-894 MHz).

This is an external model with performance identical to the WR-3500i-DSP model (but no DSP facilities), contained in an elegant enclosure with RS-232 interface (PCMCIA Adapter optional). Very suitable for cost-effective HF/VHF/UHF monitoring applications up to 2.6 GHz in conjunction with portable computers.

## Winradio WR-3700i-DSP

Image of radio

Winradio WR-3700i-DSP \$2895

The WiNRADiO WR-3700i-DSP receiver is similar to the WR-3500i-DSP receiver, complementing the popular 3000-series by extending the operating frequency as well as offering additional IF bandwidths and improved AGC control. This receiver further extends the frequency range to 4 GHz.

This receiver is intended for government, military, security, surveillance, media monitoring and industrial applications.

**The frequency range is 150 kHz to 4.0 GHz** (for non-government customers in USA, cellular frequencies 825-849 and 869-894 MHz are excluded).

The ISA card plugs into the motherboard of an IBM-compatible PC. Up to eight independently operating receivers can be controlled by a single PC - an ideal solution for high-performance multi-channel automatic monitoring systems.

There are two antenna connectors (a BNC for frequencies up to 1.5 GHz and an SMA connector for frequencies above 1.5 GHz) and a jack for an external speaker or headphone.

An in-built DSP is used for audio recording and playback and application-specific signal processing tasks can be added.

Receiver type PLL-based triple-conversion superheterodyne  
 Frequency range  
 AM, SSB, FM-N 0.15-4000 MHz  
 FM-W 30-4000 MHz  
 Note: In some countries certain frequencies may be omitted due to government legislation.  
 Tuning resolution 10 Hz (USB/LSB/CW: 1Hz)  
 Mode AM, SSB/CW, FM-N (3), FM-W  
 Image/Spurious Rejection 65dB typ.  
 Dynamic range 85dB  
 Signal meter linearity  $\pm 5$ dB  
 Selectivity  
 SSB/CW 2.5 kHz @ 6dB  
 AM 6 kHz @ 6dB  
 FM-N1 6 kHz @ 6dB  
 FM-N2 15 kHz @ 6dB  
 FM-N3 50 kHz @ 6dB  
 FM-W 230 kHz @ 6dB  
 Scanning speed  
 AM,SSB/CW 10 channels/s  
 FM-N, FM-W 50 channels/s  
 Frequency stability 10 ppm (0 to 60° C)

Sensitivity  
 [ $\mu$ V]

AM/SSB/CW 10dB S/N  
 FM-N/FM-W 12dB SINAD

Mode	0.5-1.5 MHz	1.5-30 MHz	30-1000 MHz	1-1.5 GHz	1.5- 2.6 GHz	2.6- 4.0 GHz
AM	5.0	1.0	1.0	1.5	3.0	4.0
SSB	0.9	0.3	0.3	0.5	1.0	1.5
FM-N1	0.9	0.35	0.35	0.4	2.0	3.0
FM-N2	0.9	0.35	0.35	0.4	2.5	4.0
FM-N3	-	-	0.5	1.5	3.0	4.0
FM-W	-	-	1.0	2.0	5.0	7.0

Intermed. freq.

f [MHz]	IF1 [MHz]	IF2 [MHz]
0.15-399.999		
2300.001-2899.999	556.325	58.075
400-807.999		
1892.001-2300		
2900-3307.999	249.125	58.075
808-1113.999		
1586.001-1892		
3308-3613.999	249.125	58.075
1114-1586		
3614-4000	556.325	58.075

Mode IF3 [MHz]

AM,SSB,FM-N 0.455  
 FM-W 10.7

Antenna 2 x 50 ohm (BNC and SMA connectors)

Audio 0.2 W (8 ohm load)

Software options include WiNRADiO Digital Suite, WiNRADiO Advanced Digital Suite, WiNRADiO Trunking Option, Universal FSK Decoder, and WiNRADiO Database Manager.

DSP development kit for this model is available for third-party DSP application developers.

## Winradio WR-3700e

Image of radio

Winradio WR-3700e \$2895

The WiNRADiO WR-3700e receiver is similar to the WR-3500e receiver, complementing the popular 3000-series by further extending the operating frequency to 4.0 GHz, as well as offering additional IF bandwidths and improved AGC control.

This is a high-end external receiver, intended for government, military, security, surveillance, media monitoring



and industrial applications.

**The frequency range is 150 kHz to 4.0 GHz.** (The publicly available US version excludes cellular frequencies 825-849 and 869-894 MHz).

Receiver type PLL-based triple-conversion superheterodyne  
 Frequency range  
 AM, SSB, FM-N 0.15-4000 MHz  
 FM-W 30-4000 MHz  
 Note: In some countries certain frequencies may be omitted due to government legislation.  
 Tuning resolution 10 Hz (USB/LSB/CW: 1Hz)  
 Mode AM, SSB/CW, FM-N (3), FM-W  
 Image/Spurious Rejection 65dB typ.  
 Dynamic range 85dB  
 Signal meter linearity  $\pm 5$ dB  
 Selectivity  
 SSB/CW 2.5 kHz @ 6dB  
 AM 6 kHz @ 6dB  
 FM-N1 6 kHz @ 6dB  
 FM-N2 15 kHz @ 6dB  
 FM-N3 50 kHz @ 6dB  
 FM-W 230 kHz @ 6dB  
 Scanning speed  
 AM,SSB/CW 10 channels/s  
 FM-N, FM-W 50 channels/s  
 Frequency stability 10 ppm (0 to 60° C)

Sensitivity  
 [ $\mu$ V]

AM/SSB/  
 CW  
 10dB S/N

FM-N/  
 FM-W  
 12dB  
 SINAD

Mode	0.5-1.5MHz	1.5-30MHz	30-1000MHz	1-1.5GHz	1.5-2.6GHz	2.6-4.0GHz
AM	5.0	1.0	1.0	1.5	3.0	4.0
SSB	0.9	0.3	0.3	0.5	1.0	1.5
FM-N1	0.9	0.35	0.35	0.4	2.0	3.0
FM-N2	0.9	0.35	0.35	0.4	2.5	4.0
FM-N3	-	-	0.5	1.5	3.0	4.0
FM-W	-	-	1.0	2.0	5.0	7.0

Intermed. freq.

f [MHz]	IF1 [MHz]	IF2 [MHz]
0.15-399.999		
2300.001-2899.999	556.325	58.075
400-807.999		
1892.001-2300		
2900-3307.999	249.125	58.075
808-1113.999		
1586.001-1892		
3308-3613.999	249.125	58.075
1114-1586		
3614-4000	556.325	58.075

Mode	IF3 [MHz]
AM,SSB,FM-N	0.455
FM-W	10.7

Antenna 2 x 50 ohm (BNC and SMA connectors)  
 Audio 0.2 W (8 ohm load)

Software options include WiNRADiO Digital Suite, WiNRADiO Advanced Digital Suite, WiNRADiO Trunking Option, Universal FSK Decoder, and WiNRADiO Database Manager. Hardware options include the PC-card (PCMCIA) Adapter, USB Adapter, and Portable Power Source for truly portable battery operation.

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## ANTENNAS

## LA350 Active loop antenna

AOR Active loop antennas Active Loop Antenna

The LA350 is a new short wave desk-top active loop antenna. The LA350 is supplied with the two (2) interchangeable antenna elements as standard covering 3.0 ~ 9.0 MHz and 9.0 ~ 30.0 MHz loop (12 inches diameter). The LA350 has a tuning control to peak performance and elements may be rotated to enhance reception and hull unwanted interference. The LA350 has a built-in high gain (13.5 dB) signal amplifier and has a high IP3 (+30 dBm). The LA350 is ideal to place in a suitcase for occasional traveling. Two additional bar antenna elements are available as options to further extend the operation frequency coverage.

Window Loop Antenna 3.5 - 30MHz

500LM bar element (Optional) Now you can enjoy world-wide radio and make the most of your short wave or wide-range receiver from locations that are not conducive to full-size antennas. The AOR WL500 acts like a signal "magnet" capturing and amplifying transmissions in the 3.5 - 30 MHz range. Up to 16dB of gain can be realized, using a 9 V battery or an external 12VDC power source. With a diameter of about 2 feet, the diamond-shaped antenna can hang freely or in a window. You'll be amazed as your receiver comes alive with distant signals from points around the globe. If you add the optional 500LM bar element, you can achieve enhanced low band operation. Assembly is simple. In a matter of just a few minutes, you can have a powerful antenna performing as your "window to the world!" Connection to your receiver is achieved through a standard BNC connector (provided). Disassembly is also easy, with the WL500 fitting into a compact travel bag, ready to travel wherever you go. The WL500 is an amazing development that will enhance your ability to receive and enjoy a vast world of information and entertainment. It's another quality product from AOR, The Authority On Radio.

## Wellbrook ALA 1530

Wellbrook ALA 1530	shipping		
	price	uk	overseas
Active Loop Antenna ALA 1530 (aluminium)	£129.95	£10	£25
North American Version ALA 1530 (aluminium) with psu	£129.95	n/a	£25
Active Loop Antenna ALA 1530P (polyethylene) indoor/outdoor	£129.95	£10	£25
Active Loop Antenna ALA 100 (large aperture)	£99.95	£5	£15
Active Loop Antenna LFL 1010	£160.00	£10	£25
Indoor Loop Antenna LA5030 ( Semi-rigid )	£129.95	£10	£25
LA5030 North American version with PSU	£129.95	n/a	£25
Active Loop Antenna ALA 330S (aluminium)	£189.95	£10	£25
Active Loop Antenna ALA 330S North American Version w/ PSU	£189.95	n/a	£25
ALA330 to ALA330S upgrade kit	£80.00	£10	£15
Directional Terminated Loop K9AY with 13dB amp	£289.00	£11	£15
Universal Magnetic Balun UMB T2FD	£37.95	£2	£3
Universal Magnetic Balun UMB 130	£24.95	£2	£3
Antenna Feeder Isolator AFI 5030	£24.95	£2	£3
4 way active splitter AS1030	£130.00	£5	£15

Payment - send a Sterling cheque, UK Postal Order or International Money Order for the correct amount including post & packaging, payable to Wellbrook Communications.

For more information <http://www.wellbrook.uk.com/ALA1530.html> The ALA 1530, ALA 330S as well as other receive loop antennas can be obtained from Wellbrook Communications, Wellbrook House, Brookside Road, Bransgore, Christchurch, Dorset, BH23 8NA, U.K.

Phone: 01 425 674 174, International : +44 1425 674 174 - Website: <http://www.wellbrook.uk.com/>

The Active Loop Antenna is a compact antenna primarily designed to reduce local interference. It is suited to users with restricted real estate, by providing comparable performance to conventional wire antennas.

Loop antennas have been used since the early days of radio. Their most important features are directivity and reduced susceptibility to local interference. However, most of these loop antennas had one serious drawback in that they had to be tuned in step with the receiver.

The Active Loop solves the problem of having to tune the loop by using a broadband amplifier. The loop can be mounted remotely from the receiver away from local interference, whereas traditional antennas require a lot of space and can pick-up local noise.

## BROADBAND LOOP FEATURES

1. Very low intermodulation products ensures good performance in a strong signal environment
2. Up to 30dB rejection of locally radiated noise compared to active whip and dipole antennas
3. Figure of eight directivity and deep nulls to further reduce interference.
4. Ideal for LW/MW with antenna rotator
5. Up to 60dB rejection of mains borne noise compared to active whip and dipole antennas
6. Rugged construction, 1m diameter aluminium loop, supplied with Antenna Interface and 12 volt PSU
7. Broadband, no tuning necessary or matching unit
8. No planning problems, mounted at ground level

**LOOP ANTENNA ADVANTAGES** Active antennas are necessary for several reasons: The difficulty of matching a conventional wire antenna to a 50 ohm feeder and still retaining a broadband response is not easy. At certain frequencies; conventional wire antennas can deliver excessive signal strength, leading to receiver overload. Planning regulations restrict antenna erections.

The active antenna solves the problem of impedance matching to the feeder and yet the performance is comparable with larger antennas. However, most active antennas are of the whip or dipole type and respond mainly to the electric-field. The Broadband Loop is balanced antenna and responds primarily to the magnetic-field, this ensures high rejection of nearby electric-fields. The intensity of the electric-field is usually higher than the magnetic-field when an antenna is close to interference sources such as TVs, fluorescent lamps, computers, mains wiring etc.

Therefore, by rejecting the electric-field there will be a reduction in local interference compared to other types of active and passive antennas. Interference reduction is further enhanced by the deep nulls of the 'Figure-of-Eight' directivity pattern.

## INTERMODULATION

Some active antennas generate intermodulation products which can appear as spurious signals interfering with reception. This interference or second order intermodulation is caused by non-linearity in the amplifier, producing signals which are the usually the sum and difference of strong Broadcast stations.

The second order intermodulation performance of a broadband active antenna is very important because active antennas do not have any selective circuits to reduce intermodulation. The second order intercept (IP2) point needs to be +66dBm considering the very high signal levels in Europe.

The Broadband Loop has been specifically designed to reduce intermodulation products to a minimum. The second order and the third order intercept points are typically +70dBm (IP2) and +40dBm (IP3) respectively. Thus the level of the intermodulation products are generally below the atmospheric and man made noise.

## ANTENNA DESIGN

The Loop antenna consists of a rigid aluminium loop or a semi-rigid polyethylene loop, and a balanced gain optimised broadband amplifier using low noise RF power transistors. The amplifier is encapsulated in epoxy resin and housed in a uPVC box, this ensures reliable operation in all weather conditions. The antenna provides low noise performance and large signal handling ability. Rejection of mains borne noise is accomplished by a balanced amplifier and a feeder isolation transformer in the Antenna Interface.

The ALA 2000 is designed for direct connection to the 12 volt power supply and is supplied with a 5m feeder

for the receiver.

## INSTALLATION

The ALA 1530 Loop Antenna comprises of a loop/amplifier Head Unit together with an Antenna Interface and a 12 volt regulated power supply. RG58C 50 ohm coaxial feeder cable is recommended for the antenna. The maximum feeder length is 100m. The Antenna Interface feeds the 12 volt dc power to the antenna. A 1m coax. lead connects the Antenna Interface to the receiver.

The ALA 1530 and the ALA 2000 should be positioned away from sources of interference such as fluorescent lights, TVs, computers and electrical wiring. In most cases satisfactory results can be obtained by mounting the antenna at ground level.

## TECHNICAL INFORMATION

Power consumption:  
12 volts at 120mA  
Intermodulation typically:  
With two signals of 30mV                    2nd order -87dB  
3rd order -114dB

Intercept point typically:  
2nd order +70dBm  
3rd order +40dBm  
1dB compression point: +25dBm  
Output impedance: 50 ohms, BNC Connector

## TYPICAL INSTALLATION

Active Loop Antenna Model ALA 1530  
150kHz-30MHz 1m dia. Aluminium Loop

The Wellbrook Active Loop ALA1530 long, medium and shortwave antenna.

This unique broadband magnetic antenna is only 1m diameter and rotatable to provide deep nulls to reject noise and interference. Ideal for users with small gardens... This new broadband untuned Loop antenna is the only active antenna designed specifically to reject locally radiated and mains borne noise from TVs, computers, mains wiring etc.

The Loop antenna responds primarily to the Magnetic-Field and rejects locally radiated Electric-Field noise providing far lower noise reception than active whip/dipole antennas. Compared to active whip/dipole antennas, the Loop will reduce locally radiated noise by up to 30dB and mains borne noise by up to 60dB. The ALA 1530 has 30dB nulls to further reduce interference.

It is ideal for small gardens, indoors and directional reception using an antenna rotator.

The ALA1530 offers significant advantages over the traditional tuned Loop, because the Loop can be used away from local interference. Whereas, a tuned Loop has to be positioned next to the receiver where there are high levels of local noise.

This antenna is probably the most advanced broadband active Loop antenna available to the Short Wave Listener, offering professional performance at an affordable price. The Loop antenna is supplied with an Antenna Interface and a 12 volt regulated Power Supply (UK only).

An Indoor version, the ALA 1530P with a semi-rigid Loop is also available.

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## Large Aperture Active Loop Antenna Model ALA100

50kHz to 30MHz.

The Wellbrook Large Aperture Loop ALA100 is a specialists antenna designed for the long wave and medium

wave DXer.

The antenna uses a 20m circumference thin wire loop to provide optimum S/N. The ALA 100 uses the similar interference reduction properties as the ALA1530.

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## **LF Engineering H800 Skymatch Active Antenna**

LF Engineering H800 Skymatch Active Antenna \$139.00

The H-800 Active Antenna covers the full LF/HF/VHF spectrum from 10kHz through 50 MHz. A proprietary low noise amplifier (2 wire feed) insures ample gain throughout the operating spectrum. The output impedance on the H-800 is 50-100 ohms, and is designed to match most receivers in use today. For increased reception, a 10 ft length of wire may be helically attached to the antenna. The Receiver Coupler requires two 9 volt batteries (18v) for operation. An external 120 vac/12 vdc power supply is included for continuous operation.

The sealed antenna probe consists of impedance matching electronics and amplifier which transform its internal short length wire antenna into a 100 foot "long wire" equivalent. The H-800 has very high E field sensitivity with the advantage of good BC intermodulation rejection. The H-800 is compact and totally sealed (no whip) providing the advantage of reduced EMI interference.

The antenna is omni directional allowing for various installation configurations and for use as a portable antenna. The H-800 probe is waterproof and UV resistant.

### **FEATURES**

1. 10kHz-50MHz broadband coverage (no tuner required).
2. 50 ft of RG174U with RCA connector included.
3. The antenna probe is fully sealed and does not use a whip antenna.
4. Extended ESD and RF protection.
5. Mounting clamp included.
6. Low power consumption, 10 ma typical.
7. Dual source power design: Internal 9 volt battery (x2) or external 120 vac/12 vdc supply included.
8. Includes integrated active antenna, 50 feet of RG174U w/ RCA coax lead-in, control box, and AC adaptor. Equipped with RCA jack and additional adaptors maybe required for use with receivers.

### **SPECIFICATIONS**

1. Antenna Probe Size: 26" length, 1" diameter
  2. Coupler Size: 4.19" L x 2.74" W x 1.57" H
  3. Operating Frequency: 10 kHz to 50 MHz +3dB
  4. Internal (E probe) Amp. Gain: Power Gain 30dB (1MHz)
  5. Input/Output Jacks: RCA
  6. Weatherproofing: Antenna probe tested to -2 atmospheres (-66ft)
  7. DC Power: 12-18 Volt, 10 ma, NEDA (2) or equivalent battery
  8. AC Power: (included) 120 vac/12 vdc power pack with 2.5 mm plug.
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## **Amrad Active Antenna**

Amrad makes a variety of active antennas. More information coming soon.

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## **Raven Active Antenna**

The most important parameter for an active antenna is the third-order intercept point or IP3. A higher IP3 point means less IMD. A high IP3 and low noise are to be preferred over high gain. Raven's antennas have very high IP3 points.

**Broadband Active Antennas** Active antennas are intended for applications where the size of conventional passive antenna cannot be accommodated. This is particularly true of MF and HF systems and VHF/UHF airborne, shipboard and land mobile systems.

Characteristic Impedance: 50 ohms

Signal Gain: 10dB

Polarisation: Vertical

Noise Figure: <6dB

Power Supply: 12.5Vdc

Model No:	Frequency Range	Dimensions	3rd Order IP	Current (mA)
RR6240	40kHz-60MHz	950 x 60 mm	+50dBm	100mA
RR6241	40kHz-40MHz	950 x 60mm	+55dBm	200mA
RR6245	50-2000MHz	600 x 90mm	+36dBm	120mA
RR6246	50-2000MHz	600 x 90mm	+48dBm	200mA

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## Type 101U Marine TV Antenna

This antenna lets you watch TV in your boat. It is omnidirectional so you don't even have to watch where you're sailing.

The ideal MARINE TV ANTENNA type 101U

Reception from all directions without turning

Reception of all channels 2-80

The ideal MARINE TV ANTENNA type 101U Reception from all directions without turning. Reception of all channels 2-80. Manufactured of weather proof materials Dimensions: 630 x 630 x 260 mm Weight: 2,5 kg Impedance: 70 oHm To be placed as high as possible in the ship on top of a mast with diameter max. 40 mm.

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