

Kenwood R-1000 General Coverage Receiver

Technology has progressed to the point where a moderately priced, general-coverage receiver can offer the same performance characteristics that we've come to expect from our ham-band-only receivers. The Kenwood R-1000 is one example.

The receiver is designed to cover the frequency range of 200 kHz to 30 MHz. A VFO tunes any 1-MHz portion of spectrum in this range as selected by the BAND switch located at the bottom, right-hand corner of the panel. This switch is a 30-position rotary type with light, yet positive, detent — similar in feel to the uhf tuners on the newer TV sets. Four lighted push-button switches are used to select either the a-m or product detector and also automatically select either the a-m or product detector and also automatically select the i-f filter bandwidth. In the A-M WIDE position, a 12-kHz (at -6 dB)/25 kHz (at -50 dB) filter is switched in, and for A-M NARROW a 6-kHz (at -6 dB)/18 kHz (at -50 dB) filter is selected automatically. The USB and LSB/CW switches choose the 2.7-kHz (at -6 dB)/5 kHz (at -60 dB) filter. A cw-bandwidth filter is not provided with the unit.

The tone and volume controls are concentric, and no rf gain control is provided; rather, a four-position step attenuator (0 dB, 20 dB, 40 dB and 60 dB) is located to the right of the volume control. An i-f, diode-clipper type of noise blander is controlled by a push-button switch located under the S meter. The blander proved to be quite effective on several types of interference including automobile ignition noise, Loran and noise from light dimmers (a common source of interference when listening below the broadcast band).

The receiver is equipped with a digital readout that doubles as a clock. Either the frequency readout or time can be displayed as selected by the FUNCTION switch. The clock is a 12-hour type with indicator lights for A.M. and P.M. Two front-panel buttons, one for hours and one for minutes, allow setting the clock while listening to WWV or other time-and frequency-standard station; contrary to rumor, the clock module is *not* convertible to a 24-hour format. Additional circuitry is provided so that the clock can be programmed to turn the receiver on and off. High-impedance audio output and normally open and normally closed relay contacts are available for connection to automatic tape recorders. It is possible to record a program of interest without being present to do so.

On the rear panel are three antenna connectors, one for mw (200 kHz to 2 MHz) and two for hf (2 to 30 MHz); they are selectable with a small slide switch. A fuse, external speaker jack, line-voltage selector, remote jack and the ac receptacle are also located on the rear panel. The back of the receiver was designed so that it can fit flush against a wall or operating console. The receiver can be operated in a vertical position by resting it on the feet provided at the



Fig. 1 — Kenwood's R-1000 is a compact performer. The carrying handle also serves as a support if additional table clearance is desired.

rear of the cabinet for that purpose. The rugged carrying handle serves as a bail to prop up the front of the receiver when mounted on a horizontal surface. The speaker (located on the top cover) provides adequate sound to fill most any room.

The Circuit

The incoming signal is routed through one of six diode-switched filters. Each filter is comprised of a low-pass and high-pass filter section combined to provide a band-pass response. Good skirt selectivity and low passband ripple result from this arrangement. Output from the filter section is fed to a 3SK74 (age'd) rf amplifier. The signal is then buffered and applied to a singly balanced 3SK74 mixer to produce an i-f of 48.055 MHz. The high-frequency PLL signal provides the necessary I/O injection. Output from the first mixer is passed through a 48.055-MHz crystal filter and directly to the second mixer, also a singly balanced type. Injection for the second mixer is fixed at 47.6 MHz. The signal then encounters the noise-blanker gate and from there the diode-switched 455-kHz mechanical filters. Output from the mechanical filters is fed to two 3SK74 i-f amplifier stages and a shunt attenuator that is linked to the front-panel rf attenuator. From there, the signal is detected and applied to the audio preamplifier and output stage. BFO energy is supplied by one of two diode-switched crystal oscillators.

Operation of the PLL synthesizer is straightforward. The VFO output (in the range

of 5.545 to 4.545 MHz) is mixed with the output from the 47.6-MHz crystal oscillator. The difference frequency is selected, buffered and applied to a second mixer, along with the output from the VCO, to produce an output signal in the 6- to 35-MHz range. This signal is divided by the programmable divider (programmed by the front-panel BAND switch) and compared in the MC4044 phase detector. The output from the phase detector is filtered and fed to the four VCOs that cover the 48- to 78-MHz range. As each VCO is expected to handle only a little more than 7 MHz, clean output should be ensured. An additional mixer combines the output of the VCO with the 47.6-MHz oscillator to produce a signal at the received frequency plus the second i-f. This signal is fed to the counter/clock LSI which presumably contains a preset countdown function. The BFO frequency is not counted directly. Outputs from the counter/clock LSI control a relay for connection to a tape recorder.

Operational Observations

If a knowledgeable user were blindfolded and asked to operate an R-1000 he might think he was listening to a quality, ham-band-only receiver! It has the feel of an expensive piece of equipment. The receiver was used on a continuous basis for a period of three months and within a few feet of high-power hf transmitting equipment. Unless the received frequency was quite close to the transmitter frequency, it was as though the transmitter wasn't even on the air.

*Assistant Technical Editor

Kenwood R-1000 General Coverage Receiver

Manufacturer's Claimed Specifications

Sensitivity (S + N/N of 10 dB or more):

| | SSB | A-M |
|------------------|-------------|------------|
| 200 kHz to 2 MHz | 3 μ V | 50 μ V |
| 2 MHz to 30 MHz | 0.5 μ V | 5 μ V |

Image rejection: greater than 60 dB.

I-F rejection: greater than 70 dB.

Selectivity: *a-m wide* — 12 kHz at -6 dB,

25 kHz at -50 dB

a-m narrow — 6 kHz at -6 dB, 19 kHz at -50 dB

ssb/cw — 2.7 kHz at -6 dB, 5 kHz at -60 dB.

Frequency stability: \pm 2 kHz maximum from 1 to 60 minutes after power on. \pm 300 Hz maximum in every subsequent 30-minute period.

Power consumption: 20 watts.

Power requirements: 100, 120, 220 or 240 V ac, 50/60 Hz.

Dimensions (HWD): 4-1/2 x 12-3/4 x 8-1/2 in. (115 x 300 x 218 mm).

Weight: 12.1 lbs (5.5 kg).

Clock accuracy: \pm 15 seconds maximum per month.

Price class: \$500; BWK-1, \$3; DCK-1, \$6.

Although the receiver noise floor and IMD dynamic range were measured, these numbers cannot be compared directly with other receiver or transceiver measurements published previously. This is because the R-1000 does not contain a cw-bandwidth filter, and all other units checked had this option. Tests on the R-1000 produced the following numbers on 80 meters: noise floor, -133 dBm; blocking dynamic range could not be measured because of reciprocal mixing; IMD dynamic range measured 76 dB. On 20 meters, the following measurements were taken: noise floor, -132 dBm; blocking dynamic range again could not be measured because of reciprocal mixing, and the IMD dynamic range measured 82 dB. These numbers indicate reasonable receiver performance.

Each revolution of the VFO knob produces approximately a 50-kHz change in frequency. While this would be considered somewhat fast for a ham-band-only receiver, it is in line with what is needed for short-wave listening. This rate was not found to be uncomfortable for amateur band use.

The rf step attenuator positions are 0, 20 dB, 40 dB and 60 dB. In operation, the first 20-dB step was often too great and the 60-dB position was never found useful — even with large antenna arrays connected to the receiver. A modification, available from Kenwood, converts the 20-dB steps of the attenuator to 10-dB steps.

There were only two areas where I would register strong complaints. The first concerns the lack of a cw filter or the option for adding one. For the most part the receiver performs as well as many ham-band-only receivers; if it is to be used for ham-band reception, a cw filter is a must. Although an external cw audio filter could be added to the receiver, it would be a poor substitute for a good mechanical or crystal i-f filter.

The other complaint is with the digital-frequency readout. Although the correct frequency is indicated for a-m reception, an incorrect frequency is displayed on either upper or lower sideband. For example, on upper sideband, if a signal on 14.105 MHz is injected into the receiver, the frequency displayed on the

readout is 14.106 MHz (when the receiver is adjusted for zero beat) — 1 kHz high. On lower sideband, the display will indicate a frequency of 14.103 MHz (when the receiver is adjusted for zero beat) — 2 kHz low. This error occurs because the BFO is not counted in this frequency-readout scheme. Although this may not be a great concern to some, when used with an amateur transmitter it could result in a station operating outside a particular band if the operator relies solely on the R-1000 frequency readout.

The manual supplied with the R-1000, written in English, German, French and Spanish, is heavy on the operational aspects and light on technical topics. For the intended purpose of the receiver, the manual is more than adequate.

Addenda

An option (DCK-1) is available that provides for 12-volt dc operation of the R-1000. Early production units may benefit from an age and a-m filter bandwidth modification (BWK-1) available from Kenwood. These changes are incorporated in later production units. The a-m age time constant is thereby shortened and the 2.7 kHz filter is switched in with the MODE switch in the AM NAR position; the 12-kHz filter is then out of the circuit and the 6-kHz filter is used in the AM WIDE position.

The R-1000 has a mute circuit for use in combination with a transmitter or transceiver. By grounding pin 7 on the REMOTE terminal (Fig. 3-9 of the owner's manual), the rf stage will be muted. This information was inadvertently omitted from early manuals, but is included for units with serial numbers 0030502 and above.

This reviewer would give the R-1000 an A-, should such ratings apply to receivers. At the price some of the larger distributors are charging for this receiver (under \$400), it is well worth the money in terms of short-wave listening enjoyment and its use as an all-around test instrument. Additional information on this product can be obtained from Trio-Kenwood Communications, Inc., 1111 West Walnut St., Compton, CA 90220. — Jay Rusgrove, W1VD

HEATH IB-5281 RLC BRIDGE

□ If you're an average ham, you've got some sort of junk box, that wonderland into which you may delve to produce the much-needed part for that long-awaited project. Ah! But are you certain of the value of that capacitor, inductor or desired matching resistor? If not,

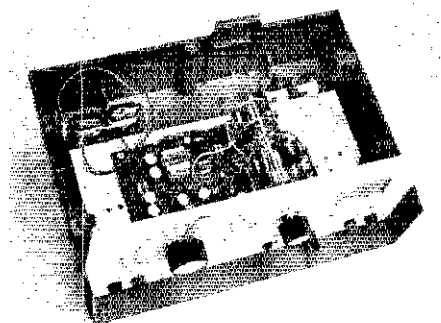


Fig. 2 — The IB-5281 RLC Bridge has compartments for two spare batteries located at the right rear of the chassis. The small vertical panel at the cabinet rear is replaced with an adapter plate when used with the external Heath power supply.

Heath IB-5281 RLC Bridge (S/N02951)

Manufacturer's Claimed Specifications

Resistance ranges: 10 Ω to 10 M Ω in three ranges.

Inductance ranges: 10 μ H to 10 H in three ranges.

Capacitance ranges: 10 pF to 10 μ F in three ranges.

External standard range: 1:1 to 10:1.

Cabinet dimensions (HWD): 5-3/4 x 11 x 7-3/4 in. (146 x 279 x 197 mm).

Price class: \$45.

then perhaps the '5281 is just the item you need.

Heath introduced the IB-5281 RLC Bridge along with five other members of the same family in their 5280 series of test instruments. Aimed primarily at the beginning hobbyist, student or service technician, they were designated to permit the assembly of a low-cost test bench.

Operational Description

The '5281 is a solid-state unit that permits you to determine unknown values of capacitance, inductance or resistance within certain limits. It operates according to the principles of the Wheatstone bridge. To permit measurement of inductance and capacitance, the bridge must use an ac voltage source. In the '5281, this is provided by a Wien bridge oscillator. The oscillator has three output frequencies — 1000 Hz, 10 kHz and 100 kHz — which allow measurement of R, L and C in three separate ranges. In addition to using internal standards for matching purposes, the bridge furnishes a means of using an external standard comparison method. This becomes useful when attempting to match accurately one or more R, L or C components to each other.

The IB-5281 may be powered either by internal 9-V batteries (two required, not furnished) or a power supply capable of providing both \pm 9 volts (such as the Heath IPA 5280-1) at less than 10 mA each. Unfortunately, Heath does not supply the external/internal power-supply selector switch, connectors or mounting plate for use with an outboard supply with the '5281 kit. As another alternative, the constructor of the bridge could build a power supply in the cabinet without too much difficulty; there's plenty of room.

Assembly and Calibration

There is no errata sheet to contend with and no problems were encountered during construction. The component quality is excellent. All resistors used are 5% tolerance, carbon-film types. As may be seen in the photograph, the majority of components are mounted on the single pc board or the multi-wafer RANGE switch. Assembly and testing of the IB-5281 took about four hours, not counting the time spent in tracing an incorrectly placed wire on the range switch (attributed to bleary 4:30 A.M. eyes!). Calibration of the bridge takes less than five minutes using a 100-ohm, 5% tolerance resistor supplied for the purpose.

An attractive blue and white plastic case is used to house the instrument. At the rear of the upper half of the unit is a small compartment which is used to store the clips, standard(s), or whatever else you feel you might need during