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KENWOOD R-5000

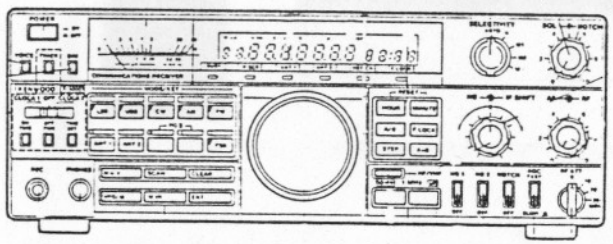
by Don Moman

The R-5000 is essentially the receiver portion of the popular TS-440 transceiver, which is a somewhat improved version of the TS-430 transceiver. Since I once owned a 430 and always thought it had an excellent receiver section, there was little doubt in my mind that the R-5000 would also be an excellent receiver. Now that I've played with one for a few weeks, I'd have to agree with myself!

This test report is based on several weeks of actual use, in a variety of DX situations and conditions. I also use an ICOM R-71 and a Sony ICF-2010, so there are frequent comparisons made with these models. You can't judge a receiver entirely on its test bench results, as one can get carried away about potential shortcomings that rarely, if ever show up in real life listening situations. Still it is very handy to have some yardsticks by which we can compare the various technical standards met by various sets. I don't possess all the fancy test gear needed for true lab quality measurements, but at least I can make a few valid comparisons of some of the more important RF characteristics.

Unfortunately, Kenwood has chosen to include few technical details, no schematic or even a block diagram, in the manual that comes with the set, so it's difficult to make comments on some of the design aspects. I know it is only a dual conversion design compared to the triple conversion system used in the TS-440. IF frequencies are 50.1125 mhz and 8.83 mhz with all selectivity filters at the 2nd IF. That's not to say it's inferior to the 440, the extra conversions are usually just for convenience in implementing features like IF shift/PBT, notch etc. The ICOM R71 is quadruple conversion! Also with fewer conversions, you have less local oscillator signals to worry about, with the resultant less chance of mixing products showing up in the receivers' output.

FRONT PANEL



Basic coverage is from 100 khz to 30 mhz, with the low end actually usable to near 30 khz. Sensitivity does drop off under 100 khz but WWVB on 60 khz is easily heard here, along with the various RTTY signals that abound in this range. The typical KENWOOD blue gas discharge display indicates frequency to the nearest 10 hz, which is one more digit than is found on most equipment. The display also indicates VFO usage, memory channel number and one (or none) of the two 24 hour clocks, all at the same time. This may sound like a lot of information on one small display, but the time and channel numbers use half height digits so there isn't much chance of confusing them with the actual frequency. The display is easily read in nearly all ambient light conditions, other than direct sunlight. For direct viewing in sunlight, a liquid crystal display, such as is found in the Sony ICF 2010 or the Yaesu FRG-8800, is the only way to go!

The R-5000 offers several different tuning methods. You have the choice of using the tuning knob, which offers a variety of steps and tuning rates, depending on which mode has been selected. The minimum step is 10 hz and no RIT function is provided. The VFO knob lacks any sort of a finger indentation, convenient for quickly spinning across the bands. The rates are summarized in this table, from the operator's manual. The tuning speeds and steps are acceptable but I didn't find them to be as well chosen as they are on the ICOM R71. For SSB, 10khz per revolution is rather fast for fine tuning (the R71 is 2 khz/rev) and 50 khz is rather slow if you want to get across the bands in a hurry (the R71 is 200 khz/rev in its higher speed position). UP / DOWN pushbuttons are convenient to quickly change the MHZ settings in 1 MHZ increments. The R-5000 also has keypad entry, however using it is a bit of a chore rather than a convenience, especially when one is used to the uncomplicated system used in the SONY ICF-2010, or to a slightly lesser degree, the ICOM R-71. As I'm right handed, I find the location of the keypad in center left front panel to be less than optimum, lefties may like it better! The keys are in arranged in a non-standard 2 x 5 arrangement, and to make it worse, the numbers are a poorly contrasting black on grey. Reading them from a distance is most difficult! To enter frequencies under 10 mhz, you must first key <ENTER> then the leading zero(s) (2 if under 1 mhz, 3 under 100 khz) then the actual digits. Trailing zeroes need not be entered, pressing <ENTER> again will fill them in automatically. If you choose to enter all of them (down to the 10 hz digit) then the frequency will be "entered" upon keying in the last zero. The whole procedure involves more key punching than is needed or desired, especially since the ICF 2010 requires no leading zeros at all, and only one press of the ENTER key (they call it EXECUTE). Since I personally tend to use the keypad a lot, I find the system on R-5000 to be a major annoyance. Perhaps I'll get used to it, or become left handed, or both but I'll never like it!

Frequency Step

Mode / STEP key	AM		USB/LSB/ CW/FSK		FM	
	OFF	ON	OFF	ON	OFF	ON
Frequency step	1kHz	100Hz	10Hz	100Hz	5kHz	2.5kHz
One revolution of TUNING knob	20kHz	50kHz	10kHz	50kHz	100kHz	50kHz

When a 10 Hz or 100 Hz frequency step is selected rapid tuning is possible by rotaing the TUNING knob quickly.
When the TUNING knob is rotated at about 3 revolutions a second a geometric increase in the tuning step occurs, that corresponds to the speed of dial rotation.

The R-5000 has 100 memories that also store mode and antenna information. The 100 channels can be scrolled with the <M-IN> function, the contents of the memories are displayed but the radio remains on its original frequency for the purpose of finding a suitable unused position with which to store the current frequency. Pressing <M IN> a second time will store it, pressing <CLEAR> will get you back out without changing anything. This system works well and I find it very convenient. In the memory channel mode, all memories can be scanned manually with the tuning knob or the UP/DOWN keys by using the <VFO/M> function or you key in the channel number from the keypad. All memories are fixed (you can't even change mode or antenna selection!) and to tune up or down from the channel you must transfer the memory contents into the VFO (either A or B, whichever was last selected) by using the <M - V> function. The system used in the R71 is more versatile since all memories are completely tuneable.

A variety of scanning modes are also available. MEMORY scan will stop on a channel only if a signal is present (level determined by squelch control setting) in the AM or FM modes. Apparently there is a way that you can change from a 5 second time operated pause to a carrier operated scan. The manual hints at it but gives no details, other than to consult your KENWOOD dealer! However in any of the SSB modes, the scanning will pause for 5 seconds regardless of whether a signal is present or not! This is handy enough for

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most situations but I'd still prefer to be able to select whether it should stop or not. Perhaps there is a switch that isn't mentioned in the manual. Temporarily unwanted channels can be locked out of the scan range (use the <CLEAR> function while in the memory mode). The 100 channels are divided into 10 groups of 10, and you can also choose to scan any or all of these groups.

PROGRAM Scan will scan from channel 8 to 9 in the current channel group you have selected. This means you can have up to 10 ranges programmed using channels 18-19, 28-29 etc. This may sound rather complex but in practice it works well. Scan speed can be changed by the <STEP> function.

As I hinted at earlier, the R-5000 has two clocks, either one of which can be displayed continuously, even if the radio is turned off. Sorry, seconds are not displayed. A single timer function is connected to CLOCK 1 and NO/NC relay contacts are provided on the rear panel. Clock and timer are set using the conventional HOUR/MINUTE pushbuttons, an outdated and inconvenient system when compared to the SONY ICF 2010, which uses the tuning knob to set time, both forwards and backwards. How many times have you gone past one digit, and mentally cursed having to go around all the way again! Well, be prepared to do it again on the R-5000. The Sony has more flexibility here as well, in that you can set four "events" which allow you to set both the time and frequency (memory channel).

All memory and clock functions are backed up by a rechargeable NiCad battery. If AC power is removed, the battery will enable the memory contents to be retained for 10 days. The battery takes 6 hours to fully recharge, and is done so automatically when the set is plugged into AC power. Unlike the ICOM R-71, the operating system is not lost if the back up battery fails. My only hesitation is the use of NiCad cells, as they are pretty fussy in their old age. I wouldn't be surprised if the non-rechargeable lithium cell in the ICOM R-71 outlasts the NiCad system! However, it's still easier to replace any battery than have to send your radio (or the RAM board) back for re-programming.

Dual noise blanker circuits are provided, along with a level control. NB1 is intended for short duration pulse noise, such as automobile ignition noise, while NB2 is for the "woodpecker". Both can be used simultaneously. In only a few comparisons with the R71, which has two blankers (you can only use one at a time), I found the R71 had a very slight edge when used on the woodpecker. Both seemed approximately equal on other types of noises. As with the R71, setting the blanker level too low on the R-5000 can cause large amounts of distortion. Two AGC time constants are provided, SLOW is far too slow and FAST is acceptable but on the fast side. The speeds provided in the ICOM R-71 are just about right, plus you can turn the AGC off and regulate the gain manually with the RF Gain control. The R-5000 has an RF gain but no AGC off position. The S meter in the R-5000 reacts to modulation peaks, making it very hard to take valid S meter comparisons when the meter is bouncing all over the place. In addition the meter is dimly lit and much harder to read than the much larger and well lit meter on the R-71. The top end of the scale is rather crowded, evan though S meter calibration is pretty good. The 0/10/20/30 db attenuator checked out to be very accurate.

The notch filter is an audio type only, but the few times I needed to use it, it worked well. In theory, an IF notch (as found on the R-71) is preferred but in many cases the end result is the same. The IF shift circuitry functions only in the SSB modes, not in AM or FM. It worked well the few times I tried it, and interfering SSB signals could usually be put "over the edge" to a point where they were no longer a nuisance. The IF shift system used in the R71 works in AM, by both shifting and narrowing the pass band, a distinct advantage over the R-5000. For the serious DXer, the lack of IF shift in AM shouldn't be that much of a limitation, since one can go into the SSB mode where the IF shift functions. Incidentally, the USB/LSB switching method used in the R-5000 requires NO RETUNING, a large advantage over the system used in the R-71. For me, that feature alone almost makes up for the not so easy to use key pad!

Two antennas can be selected and assigned to a frequency stored in the memory, from the front panel. Real panel antenna connections include a conventional SO-239 coax input for <ANT 1> and wire terminals for <ANT 2> where you can choose between 50 or 500 ohm input. I don't think too much of the cheap wire connectors - heck, they aren't even spring loaded!

The R-5000 will accept a variety of AC voltages - 120, 220 or 240 volts. These are selected by rotating a selector switch on the rear panel. 12 volt DC operation is possible with the DCK-2 option. Current draw is about 1.4 amps, just slightly more than the R-71.

Options include a integral VHF converter ($289) that covers 108-174 mhz, an IF-232C interface ($99) for computer control using a standard RS-232C input, an IC-10 Interface kit designed to mount internally and provide level translation for the IF-232C option, and a VS-1 voice synthesizer unit for $75. All filters are $115 each. Other than some of the filters, I haven't tested any other of the options. One should note that for the price of the VHF converter, one could purchase a separate scanner that would have wider coverage and not interfere with anything. Agreeably, the R-5000 converter offers SSB reception on 2 meters, primarily of interest to hams who use SSB for long haul terrestial contacts as well as working the various amateur satellites.

PERFORMANCE RESULTS

The first thing one notices about the R-5000 is that the darn thing beeps at you when you press many of the buttons. It even announces the first letter of the mode you've just selected - in CW, of all things! Thanks but no thanks. I don't appreciate having the thing beep back all the time. Hopefully there is a switch somewhere to turn that function off or at least reduce the volume.

Test and actual listening comparisons between the R-5000 and the ICOM R-71 showed that both have excellent RF characteristics, and there is little audible difference. On SW frequencies, my version of the MDS test (using the ear to detect the minimum signal input (AM 30% mod) that I could still detect a 400 to 1000 hz modulation change) showed it could detect signals around the .06 uv level, very comparable to the R71. On MW, the usual 20 db attenuator is hard wired into the input so sensitivity is less than optimum for the serious MWDXer with a quiet location. Not having a schematic, I haven't found the way to bypass it yet! It shouldn't be too hard to defeat when I actually get my hands on a schematic. Again, actual tests showed the R-5000 was a good MW receiver but couldn't quite keep up to my ICOM R-71 (modified for better MW sensitivity by removing the built-in attenuator and allowing the preamp to function) on the really weak signals. However, when the R-5000 is modified it should have a slight edge in sensitivity. Sensitivity on longwave is reduced by only 10db, giving very good results on some of the European longwave signals that sometimes can be heard here. A separate 500 khz low pass filter is provided for LW, thus reducing potentially overloading MW signals before they reach the mixer. The longwave band was generally free from MW overload: only one strong combination of locals produced a quite strong signal on 190 khz, on the R-71 the same product is hardly detectable, thanks to its slightly better dynamic range.

Dynamic range or lack thereof, can make sensitivity work against you. Using rough measurements, the R-5000 was measured to have about a 99 db dynamic range (50 khz spacing, at center of MW band). In the same test the ICOM R-71 showed 104 db, and the SONY ICF 2010 was 86 db. The bigger the number, the better. These numbers are not "absolutes" and are not intended to be quoted as such, or compared to what the manufacturers or other reviewers state. However, they do show that the R71 has a slight edge in this very important category. It was interesting to note that the ICF 2010 showed very respectable figures in this test, better than some of the better receivers just a few years ago!

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Selectivity on the R-5000 is provided by crystal filters at the 8.83 mhz second IF. The shape factor of the stock 6 khz AM filter is rather dismal, being 6 khz wide at -6db, but 24 khz at -60 db! Needless to say, the optional YK-88A-1 filter is highly recommended. It has the same width at -6 db but the -60 db skirts are improved to a measured 10.2 khz. The supplied SSB filter is much better, giving values of 2.5 khz and 4.9 khz at -6/-60 db. These figures are good but less than measured in ICOM R-71, which uses cascaded filters at 9mhz and 455 khz, as standard. The comparable bandwidth in the R-71 measured 2.4 khz at -6 but only 3.1 khz at -60 db. The optional 1.8 SSB filter wasn't available for testing.I did install the 270hz CW filter, which seemed to be a good performer, but I could still detect a significant amount of signal leakage around it. Aftermarket filters are available from firms such as International Radio, although not tested personally, they should offer better shape factors than the factory filters. The selectivity switching is well designed, allowing any filter in any mode to be selected manually, or in <AUTO> the best filter for that mode will be engaged. Selectivity options are detailed in the accompanying table, again from the R-5000 manual.

OPTIONAL FILTER COMBINATION	SELECTIVITY SWITCH POSITION	MODE KEY					
		USB	LSB	CW	FSK	AM	FM
–	AUTO	2.4 kHz				6 kHz*	
N : None M1 : None	N	2.4 kHz					12 kHz
	M1						
	M2						
	W	6 kHz*					
N : None M1 : YK-88SN	AUTO	2.4 kHz		1.8 kHz		6 kHz*	
	N	1.8 kHz					12 kHz
	M1						
	M2	2.4 kHz					
	W	6 kHz*					
N : YK-88C M1 : None	AUTO	2.4 kHz		500 Hz		6 kHz*	
	N	500 Hz					12 kHz
	M1						
	M2	2.4 kHz					
	W	6 kHz*					
N : YK-88CN M1 : None	AUTO	2.4 kHz		270 Hz		6 kHz*	
	N	270 Hz					12 kHz
	M1						
	M2	2.4 kHz					
	W	6 kHz*					
N : YK-88C and M1 : YK-88SN	AUTO	2.4 kHz		500 Hz		6 kHz*	
	N	500 Hz					12 kHz
	M1	1.8 kHz					
	M2	2.4 kHz					
	W	6 kHz*					
N : YK-88CN and M1 : YK-88SN	AUTO	2.4 kHz		270 Hz		6 kHz*	
	N	270 Hz					12 kHz
	M1	1.8 kHz					
	M2	2.4 kHz					
	W	6 kHz*					
N : YK-88CN and M1 : YK-88C	AUTO	2.4 kHz		270 Hz		6 kHz*	
	N	270 Hz					12 kHz
	M1	500 Hz					
	M2	2.4 kHz					
	W	6 kHz*					

*: When the YK-88A-1 Crystal Filter is installed in the filter for W position, selectivity will not be changed, but the shape factor will be improved

With the antenna disconnected, very few spurious signals could be noted. Weak harmonics could be heard every 500 khz, from 9 mhz up to about 15 mhz, except for the multiples of 9 mhz at 18 and 27 mhz. Other than a weak signal at the 8830 khz IF, which didn't move the S meter, the R-5000 has a very clean and birdie free tuning range. This especially important in LW and MW, where the presence of a weak "het" can mean some foreign broadcaster's signal is starting to fade in. In comparison, on lower frequencies, the R-71 has some weak interference birdies from the display.

The R-5000 has the usual built in, top facing speaker which provides quite decent sound. As to be expected, an external speaker would improve things. The front panel tape output is a standard high level signal, designed to work into the "line" or "aux" input on a tape recorder or stereo amplifier. If your cassette only has a "MIC" level input, you'll need to purchase or build an attenuating patch cord. The high level output is somewhat stronger than the R71 provides, which was on the weak side for some systems.

Overall, the R-5000 is a high quality receiver that offers a good combination of features and performance at a competitive price. In Canada, the list price is in the $1200 range. While slightly inferior to the ICOM R-71 in some areas, in actual listening there isn't much difference. To choose between the two, you have to decide which features are most important to you. Some of these features are implemented very well, others could be done better. Now, where's that switch to turn off that blasted beeper? .....

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A MW DXer's view of the Kenwood R-5000

Don Moman's Kenwood R-5000 review (soon to be printed/already been printed in this illustrious journal) tells you virtually everything you need to know about this new receiver. However, I thought I might add a few words from the MW DXer's viewpoint, as I was fortunate enough to be able to put Don's R-5000 to a MW-only listening test.

First of all, there is that automatic attenuation on MW which is common to many modern day sets. In a really quiet situation, this attenuation may make it impossible to hear very weak signals, but in comparing the R-5000 with an ICOM IC-R71 with Shortwave Horizon's preamp modification, there was little advantage to the R71's extra gain during the period that I listened. Overload from really strong local signals can occur, but any overload noted was also apparent on the R71.

There are a couple of fairly major problems with this set when DXing the AM BCB however. First, the S-meter is rather poorly set up. An S-meter is supposed to indicate the strength of the carrier of the received signal, but the meter on the R-5000 shows modulation peaks of the signal superimposed on the carrier strength; that is, the meter jumps around, following the audio strength of a signal, regardless of AGC setting. It's not particularly good for spotting nulls when using a loop or a phasing unit because it's hard to identify your antenna's deepest null of the signal when the meter is fluctuating anyway.

Secondly, if you set up the R-5000 to listen in the AM mode (this set had already been modified with the improved 6 kHz filter), then neither AGC speed is really appropriate to trying to dig out DX in the splatter sodden conditions of the MW band. Even though Don found the fast AGC a tad too quick for general listening, I found that it was still hung up by BCB splatter peaks in most situation. So, in general DX affected by splatter is rough to copy in the AM setting, whether you choose the narrow or wide IF selectivity. However, switching to "USB" or "LSB" presents quite a different picture, although you must zero beat your desired signal with the set's fixed BFO (popularly known as ECSS tuning, more accurately as "non-synchronous heterodyne detection").Often, the splatter laden signal was considerably cleaner using USB/LSB. In this mode signal improvement does not seem overly dependent on choice of IF filter, so perhaps different AGC speeds are automatically chosen in sideband modes. Whatever it is, USB/LSB can certainly make a difference. The ability to select upper or lower sideband with a push of a button is a big plus to the DXer, as the sideband with least interference can be chosen at once without any retuning. I suspect I would DX almost entirely in sideband mode if I used this set. One quirk to note is that audio output level is higher in the AM mode compared with the USB/LSB mode, which may lead to ringing ears if you switch from sideband to AM.

Other than that, I can only reiterate Don's findings. The possibility of separating mode from the choice of IF filters is a plus for the DXer, but would be more helpful if the AM mode was more useable in tight situations. The "notch" seems to work fine even if it is AF rather than IF, but that keyboard is a real pain with its left-handed location and all the button punching necessary to enter a frequency.

The R-5000 is not a set to be spurned entirely by the MW DXer, but something needs to be done about the S-meter and those AGC constants. A separate keyboard in lieu of the stock one would be nice especially if all those leading zeros could be eliminated in the process. Myself, I'm going back to work on my homebrew receiver, hi. ---NHP

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The Lowe HF125 General Coverage Receiver

This English entry into the receiver market looks deceptively simple, but it seems to include quite a number of features in its 255 x 100 x 200 mm (WxHxD) frame. It covers 30 kHz-30 MHz using a digital display accurate to 1 kHz, and receives AM/USB/LSB/CW with 4 selectable IF filter bandwidths from 2.5 to 10 kHz, as well as a 400 Hz audio filter for CW. Also in its stock form are 30 memories, accessible via the tuning knob and shown on the