



The ICOM IC-R70 Receiver

by Don Moman

First, the basics: It's fully synthesized down to a very precise 10 Hz resolution and covers 100 kHz to 30 MHz with digital readout to .1 kHz. It has the latest in up-conversion front end technology with a high level double balanced mixer circuit to provide excellent strong signal handling capability. Has top quality crystal IF filters (9 MHz) in the AM/SSB/CW modes to provide bandwidths of 6 kHz in AM, 2.3 in SSB or CW and 500 Hz in CW. Shape factor is excellent on all of the filters (in spite of what the specs say for the AM filter), and by my measurements (crude but basically accurate) both the AM and SSB filters had better than 1.5:1 shape factors. With the aid of the Pass Band Tuning (hereafter PBT) control these widths can be further reduced. A notch filter is available to reject interfering carriers etc. Other useful controls include: a two width noise blanker switch, two speed AGC with an off position, RF gain and a squelch control. Although the FM reception mode capability is an option, the squelch circuit functions on AM/SSB as well, a nice feature for utility DX'ing.

Power requirements are the usual 117 VAC with the capability to run on 200/220/235 VAC if some internal reworking of the transformer is done. An optional DC connector is available as an option to allow 12 vdc operation. Current draw is normally 780 mA at 12 vdc. The lights and display may be dimmed but not turned off.

A coaxial (SO-239) style connector is used as the antenna input (covers the entire tuning range) and a spring type connector is provided for a low frequency (below 1600 kHz) antenna. This may be set to switch in automatically, ideal for a ECB loop. Some may prefer to mount a coaxial connector in place of the spring type.

Tuning the R-70 to a desired frequency is done by pushing the UP/DOWN buttons until the proper MHz number is displayed; then using the VFO knob, one selects kHz. Tuning rate may be in 10 or 100 Hz steps or 1 kHz; these are also push button selected. Two working memories are available in the form of A/B VFO's. Basically you always have instant access to one other frequency in the other VFO at any time. As soon as you engage the other frequency then the first one becomes stored. Although one would always like more, the A/B system works well. Because each memory is fully tuneable, the system is preferred over the store only system of the FRG-7700 and NRD-515 (the NCM-515 controller overcomes this drawback on the NRD).

Changing bands on the R-70 is less convenient than other sets--the UP/DOWN buttons pause at each ham band frequency (to think perhaps?) and generally are less convenient than the rotary selector found on the FRG-7700 and other sets. Since a conventional VFO is not used, one may tune past the edge of each band without fear of physical binding (such as is encountered on the R-7). Unlike the NRD-515 which automatically changes the MHz digit as you tune by, the R-70 merely wraps around and you wind up at the other end of the band. This wrap around effect does not occur exactly at 000.0 which leads to some confusion when tuning signals on exact multiples of 1 MHz. However you quickly learn to recognize what is going on.

The memory system is erased when the set is unplugged, but you may decide (via a rear panel switch) whether the data is to be erased when you turn off the power switch. Similarly, data may be saved when on battery operation, but at the expense of added current draw. Since there are only two memories to lose, this is normally a small factor, however for absentee recording, such a feature is needed.

Since the R-70 was announced, much discussion has revolved around the AM selectivity or lack of it. It's rated at 6 kHz (18 kHz at -60 dB, but my measurements say quite a bit less; more like 8.7 kHz), but is variable down to 2.7 kHz via the PBT control. That's what the manual says! PBT will only, in my tests, narrow the bandwidth down to about 4. kHz and skirts are not that sharp because an inexpensive 6 kHz ceramic is used in the AM PBT filter. In actual tests on the SWBC bands, the PBT control did very well, especially if the QRM was only on one sideband. The PBT only narrows the BW if the control is set near one extreme or the other and no reduction in QRM is possible if the interference is occurring on both sides of the desired signal. Perhaps figure 1, taken from the manual will explain how the PBT works. The SSB filter is not available in the AM mode, so one must use exalted carrier selectable sideband (ECSS) tuning to get narrow AM performance. Fortunately, ECSS tuning on the R-70 is very easy and works well. Equally fortunately, it appears quite possible to use the SSB PBT filter (ceramic, good quality--about 2.7 kHz in place of the wide 6 kHz AM PBT filter. The filter is quite similar to the narrow filter used in the FRG-7700 and R-1000. The modification is quite simple and requires a minimum of parts--two diodes! The modification significantly improves AM reception in heavy QRM and allows the PBT control to position the filter virtually anywhere in the pass band, thus allowing maximum audio recovery. Full details on the mod are available from myself for an SASE at Shortwave Horizons, 6815 12 Ave., Edmonton, AB T6K 3J6.

Utility and Ham DXers will enjoy the 2.3 kHz SSB filter (adjustable to less than 500 Hz in PBT) and the standard equipment 500 Hz CW filter. An optional FL-63 250 Hz CW filter is available, as well as a FL-44 SSB filter. When the above mod is performed, the FL-44 should provide even better AM PBT performance, although I have not tested this yet. At \$105 I doubt that the improvement would justify the expense.

The notch filter is a useful circuit that is rated at 30 dB; I have found the notch to give over 60 dB of attenuation, which is good--and considerably more than the notch on my Drake R-7. In AM, the notch will only cover one half of the passband which reduces its otherwise fine capabilities.

Sensitivity on all bands is very good. With the preamp engaged, minimum discernible signal measured -140 dBm (14 MHz SSB). The preamp is made inoperative on frequencies below 1600 kHz so MW sensitivity is somewhat reduced. However it is a simple matter to modify the preamp control circuitry to allow operation on all bands.

Strong signal handling characteristics are notably better than other sets in this price range, thanks to the high level double balanced mixer stage. In my own tests, on MW, the R-70 consistently bettered the Drake R-7, although the difference was very small. Tests consisted of connecting each receiver to a random wire through a stepped, variable attenuator, and then seeing how much attenuation was needed to reduce IMD products to the level of inaudibility. On a variety of local "problem" frequencies the R-70 was able to withstand from 10-20 dB more signal (depending on exact frequency) than the R-7, before IMD products became noticeable. At the same time, the R-7 was about 0-6 dB more sensitive than the R-70--so one must reduce the R-70's initial advantage by this amount. The preamp on the R-70 has slightly reduced gain at the lower MW frequencies (drops off in the LW band) which accounts for its slightly lower gain than the R-7.

The S meter is very good--large, well lighted, easy to read black on a yellow background. And it is accurate too--S9 is 50 uV and linearity is likewise very good.

The noise blanker has two response "widths", selectable from the front panel. This allows for optimum blanking of both narrow pulse type noise and of wider pulses--such as those of the infamous Russian "woodpecker". In actual use, the blanker performed well, better than the stock blankers I've encountered in Yaesu, Kenwood, and JRC sets, mainly due to extra width control design.

FM reception was not tested, as I didn't have the FM option installed. As FM signals are scarce on the SW bands--pretty well limited to the high end of the 10m ham band--it's not a feature many will find useful. Its main use is that one could use VHF/UHF converters (like the Yaesu FRV-7700) to extend the set's basic HF coverage.

If by now, you've gotten the impression I like the IC-R70, you're right! Side by side tests with the R-7 in a variety of DX situations have shown both sets to be very close in performance. Since the R-7 is over twice the cost of the IC-R70, you can see what would be the most cost effective choice; you'd have a hard time convincing me that the R-7 is worth even a dollar more than the R70. Compared to the JRC NRD-515 with its 96 channel capability and key pad controller options, the R70 is no match with its dual VFO system and rather slow UP/DOWN system. However the extra price of the well-equipped NRD-515 is considerable.

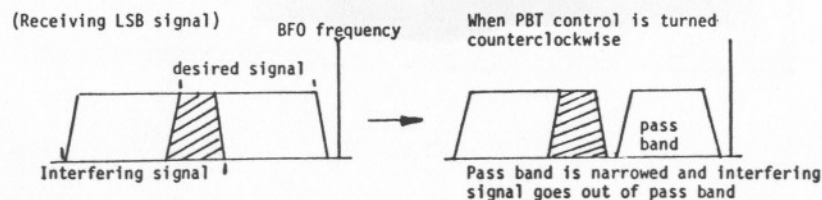
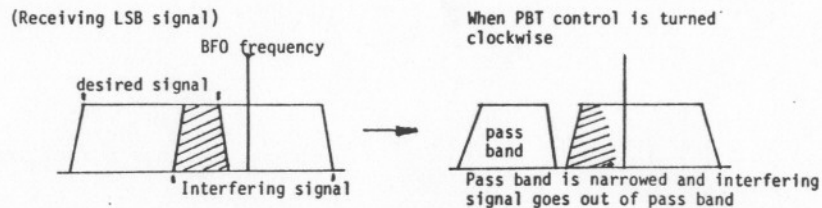


FIGURE ONE



R44-2-2

R44-2-2

R44-2
---The ICOM R-70 general coverage receiver has made its appearance. This receiver which apparently is in the \$750 range seems to have a great variety of features. They claim a good dynamic range and sensitivity (not quite R-7 quality though), and the front of the receiver is a mass of switches and controls---AGC fast/slow/off, selectable attenuator or preamplifier, 4 IF filters (the AM one doesn't look so good...6 kHz at -6db and 18 kHz at -60db), good stability, readout to .1 kHz, various methods of tuning, passband tuning (PBT), receiver incremental tuning (RIT), squelch, noise blanker, notch filter etc. etc. Sounds too good to be true, and perhaps it is, (have heard that IF filter skirts deteriorate when PBT is used) but would sure like to hear from someone who has used it. Ask your ICOM dealer for a brochure. Thanks to Ralph Sanserino and Ben Peters for this info.