The Yaesu FRG-7000

The FRG-7000 is similar in basic circuit design and specifications to the FRG-7, but has a more complex oscillator section; it is slightly bulkier than the FRG-7 but weighs about the same. Its main advantages over the FRG-7 are a digital display (which shows megahertz and kilohertz to an accuracy of one kilohertz--xx.xxx) and a digital clock/timer which can be set to local time and GMT. The accurate digital display is useful to the "split" DXer of course, but unfortunately points up the limitations in the set's selectivity. As with the FRG-7, a 6 kHz wide (at -6 dB) IF filter is used on AM which is not really good enough for splits--selectivity modification is necessary for split reception. A sharper filter is switched in for SSB reception on the FRG-7000, but cannot be used for AM without modification (available from Gilfer or Radio West, as is the 12v DC modification mentioned below).

Other differences from the FRG-7 are an on-off rather than 3 position attenuation switch, a continuous tone control rather than a switchable audio filter, and the fact that 12v DC operation requires modification of the set. Dry-cell operation is not really feasible either, limiting its use as a portable.

In terms of sensitivity and signal handling ability (or lack of it), the FRG-7000 is similar to the FRG-7 on MW; it is a slightly easier set to tune, but there is still the preselector tuning which can be a bit of a burden. Depending on your needs, the FRG-7000 may or may not be worth the extra cost over the FRG-7. A selectivity modified FRG-7 with an outboard digital display costs slightly less than a stock FRG-7000, and some consider the cheaper Kenwood R-1000 to be comparable or better than the 7000.

The Kenwood R-1000

The first impression upon seeing a Kenwood R-1000 receiver is that it is small--at 12 3/4"W x 4½"H x 8 9/16"D, it is quite a bit less bulky than a FRG-7. Its few controls are well laid out. They include band selector (each band is 1 MHz wide), RF attenuator, AF gain and tone controls, push button mode selector (AM wide, AM narrow, USB, LSB/CW), tuning knob with analog dial accurate to 10 kHz and a digital display accurate to 1 kHz, a "dimmer" switch, a noise blanker switch, plus various switches which control the digital clock and timer. An S-meter is also on the front panel. The receiver covers 200 kHz to 30 MHz--why do these receivers ignore the fact that European LW BCB goes down to 150 kHz?

A quick look at the receiver's block diagram reveals that it is quite different from the FRG-7/7000. There is no tuneable preselector; instead there are six bandpass filters which are switched in according to the MHz band chosen. An RF amplifier is followed by a balanced MOSFET mixer which upconverts the incoming signal to 48.055 MHz. Another balanced MOSFET mixer is used to bring the signal to 455 kHz where is is run through one of three ceramic filters. Before the filters is a noise blanker circuit which consists of an IF amplifier which is momentarily "switched off" when noise pulses occur, but doesn't affect received audio. The circuit is fairly conventional after the filters--IF amplifiers, detector, AGC and audio amplifiers.

Well, how does it work? Sensitivity below 2 MHz is quoted as 50 uV on AM; some have felt that this is a drawback. I didn't get to use this radio in a quiet location, but feel that 50 uV is not too insensitive for a MW receiver in most urban settings. Iden B. Rogers in an R-1000 review in The Lowdown says: "...when (the R-1000 was) compared side by side with a considerably more expensive receiver whose published sensitivity is '1 uV (S+N)/N of 10 dB', there was no perceptible difference in each receivers ability to pick up the same weak medium wave broadcast stations as judged by ear." Colin Newell's electronics class had done sensitivity tests on the R-1000 I tried and came up with 7.5 uV and 6.5 uV sensitivity using the AM narrow filter in the BCB range. So the specs might be better than you expect. The lesser sensitivity on BCB is due to an attenuator in the MW antenna input. One could improve sensitivity by bypassing this attenuator, but it would probably not be necessary (or wise) unless you were using a small unamplified loop or a very short wire antenna.

Also, you would have to be in an area with no locals to be able to remove attenuation from the MW circuit. Like other consumer grade shortwave sets, this one will not tolerate the use of an untuned antenna on BCB. Spurs from locals will crop up at numerous points below 2 mHz. The RF attenuator control is supposed to take care of this problem but doesn't really. -20 dB attenuation does reduce spurs somewhat, but the -40 dB and -60 dB reduce any DX you want to hear to inaudibility, which is no use. In fact, -60 dB leaves you hearing your locals only. Use of a good loop antenna or longwire preselector appears to clear up the problem. No local spurs were noticed here on the R-1000 when using a homebrew loop antenna, though there might have been weak ones underneath the local noise level.

Selectivity specs makes one wonder whether Kenwood designers were thinking of a hi-fi receiver when they built this. "AM Wide" selectivity is 12 kHz wide at -6 dB, and "AM Narrow" is 6 kHz wide at -6 dB. The "AM Wide" is good for listening to full-fidelity locals only, while the "AM Narrow" will get you within 10 kHz of your locals and maybe the occasional strong split. The SSB filter (2.7 kHz wide at -6 dB and with a better shape factor than the other filters) can be used for AM reception and is recommended for DX'ing. A kit can be obtained from Kenwood for this modification of the older R-1000's; the later R-1000's can be modified without a kit--see the receiver manual. After this modification, the "AM Wide" position uses the 6 kHz filter, "AM Narrow" and the SSB positions use the 2.7 kHz filter and the 12 kHz filter is bypassed. Radio West also offers mechanical filter modifications on this receiver. Incidentally, word from Rob Harrington is that stock R-1000's built after January 30, 1980 will have the 6 kHz filter in "AM Wide" and a 3 kHz filter in "AM Narrow".

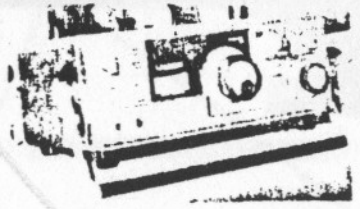
A big problem with the R-1000 has been its absurdly long AGC decay rate. A burst of splatter can blank out a weak adjacent signal for a number of seconds. The R-1000 I tried had been modified for a faster AGC decay time but, even so, splatter peaks from locals could eliminate adjacent channel signals for a good second at a time. I suspect that a way of switching the AGC off (such as Radio West offers) might be necessary for serious BCB DX.

The S-meter on the R-1000 is a pleasant surprise in its relative accuracy and resistance to "pinning". 20 dB attenuation at the antenna knocks down an S9+40 dB signal indication to S9+24 dB. Colin Newell's class found that a 225 uV signal on MW gave an S9 reading on the R-1000, while S9 on the stock FRG-7 is yielded by only 4 uV--which doesn't give you much room for finding a null on your loop.

The tone control simply tailors the audio from a bassy sound to a trebly sound and is not fantastic, but the receiver's overall audio quality is very good. The noise blanker works fine on sharply defined noise peaks, but is no good for splatter peaks or most other noise found on BCB.

The blue frequency display is accurate and easy to read, and the set is easy to tune--the band selector sets mHz and the large tuning knob sets kHz. The lack of preselector tuning makes this receiver a lot easier to use with a loop or antenna tuner than similar table radios which have preselectors. The display doubles as a digital clock when the "function" switch is set to "clock". Unfortunately, this is a 12 rather than a 24 hour; most DXers and SWLs use the 24 hour system. A timer circuit is incorporated with the clock so that the receiver can be switched on and off automatically, perhaps to allow remote DX recording.

This brings up the subject of stability. This set does drift in frequency--the specs say ±2 kHz in the first 60 minutes from the set being turned on, and ±300 Hz every 30 minutes thereafter. With the wide IF filters, this should pose no problem for AM DX'ing, but if one uses a narrow IF filter, the set may drift enough so that a DX signal will fall outside the IF passband eventually. If you're recording DX using the timer, the set might drift right off the desired signal if you're not around to reset the frequency.



Finally, the stock R-1000 can be powered by AC house current only, though at least one distributor (Radio West) offers an external DC modification for portable use (13.5 v DC at 600 ma--you'll need more than dry cells!)

Overall, the radio shows promise for MW use--I preferred it to the FRG-7000, though my experience with both radios is limited. Thanks to Jack Cain for use of the R-1000 and to Colin Newell for getting it all together. --NHP