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SOME THOUGHTS ON THE YAESU FRG-100
BY RANDY STEWART

First, a disclaimer: I am not particularly "technically" inclined; I have no test equipment; therefore, I am not in a position to give you a comprehensive breakdown on the FRG-100's circuit features and specs. Also, space precludes going into a long, detailed description of the rig's operating procedures. For that, I recommend reading the various published reviews mentioned below. I just wanted to pass along some impressions of this radio gained after several months of nearly daily use on both MW and SW, with some limited LW listening (limited by my local noise problems, and the fact that my Sanserino loop only tunes down to about 480 kHz).

"TOO GOOD TO BE TRUE!!" I'm sure we've all uttered (and muttered) that many times in response to advance publicity for the "next great communications receiver" to hit the market. The Yaesu FRG-100 is no exception in inspiring a healthy skepticism. Here, for around $600 (latest *list price* $661) is a high-performance "entry level" communications rx offering AM/CW/SSB and (optional) NBFM, with 50 kHz-30 MHz coverage; *three* IF bandwidths (nominally 6, 4 and 2.4 kHz), noise blanker, adjustable (but *non-defeatable*) AGC, two attenuators (but *no RF gain* control); two clocks; timers and other full programming functions; 50 tunable memories; frequency display down to 10 Hz in sideband mode, etc. And all this in a compact 9.5 x 11 x 4.25" box. "They've gotta be kidding!"

They weren't kidding. Now, *no* receiver is "perfect," and the FRG-100 is no exception; it has engendered a certain amount of controversy in the hobby press. The initial published review that I saw, in the 1993 World Radio-TV Handbook, was full of praise but also suggested the bandwidths out-of-the-box were rather wider than the nominal figures. Larry Magne, in Monitoring Times May 1993, didn't just *suggest* as much; he *pounced*, complaining bitterly about the "dreadful" bandwidths ... the 6 kHz filter actually measured *7.6;* worse, the 4-kHz "AM Narrow" filter was more like *6.9!* The SSB filter was fine, but of course muffled the audio in AM mode. Magne expanded on his criticisms in a long review published in the 1994 Passport to World Band Radio (though he eventually gave the rig 3 1/2 stars out of five!). He noted that several distributors were offering aftermarket IF-filter mods, but seemed dubious that Yaesu itself would ever do anything about the problem.

Enter the ARRL's resident SWL Dave Newkirk, whose review in the January 1994 QST is highly recommended reading for anyone interested in this radio. Newkirk's response to Larry Magne was "Eh? Can we be talking about the same radio?" Newkirk noted that Yaesu *had* indeed improved the 4-kHz filter in later production runs... Magne eventually reported the same in Febuary 1994 Monitoring Times, even offering a "tip of the hat" to Yaesu for "cleaning up the problem." Now, this all came to light *after* my wife had ordered *my* FRG-100 for Christmas last December, and I had her get me EEB's "High-Performance Mod" package consisting of a Collins 6-kHz mechanical filter and a heavy-duty 15-pole 4 kHz ceramic. For $699 (including full bench test and "burn-in") it still seemed like a really good deal. Of course, this means I *cannot* comment on the "stock" 6 & 4 kc filters. But at any rate, Yaesu did listen to the initial complaints and respond.

I was attracted to this radio precisely because of its mouthwatering combination of reasonable price and multitude of features. Yes, I would've liked a Drake R-8, but I (and my wife, hi!) couldn't justify the additional $270 cost for the Drake features lacking on the little Yaesu: synchronous detection, a keypad, notch filter, etc.

So... I've kept you waiting long enough. *Do I like the FRG-100?* Yes, very much. Is it a worthy performer on medium wave? Yes... but you do need a good loop or other high-performance antenna. Here are some general observations. It's a fairly complex rig, and the small size is no doubt responsible for the front-panel pushbuttons all performing multiple functions (many of which are "Power-Up", i.e. you hold down a certain key while pressing the "On" button). Luckily, the manual is extremely well-written, and there's even a plastic command-function card for quick'n'easy reference--it slips into a holder on the rig's bottom cover. Learning all the important functions is pretty easy, but you can always refer to the manual or the card if you forget. There's no keypad, but I don't miss it (never had a radio with one, anyway!): the 50 memory positions can serve as a sort of quick "band-switching" system by programming band ends/key frequencies etc., so you can move around the MW and SW bands very quickly for checking parallels etc. The memories are tunable, so you can dial up a frequency from memory and start tuning from there. There are numerous scanning features (memory, band, priority and channel-group), but I personally have no use for them. The nominal IF bandwidths for each mode are changeable--you can use the SSB filter in AM mode or the wider AM filters in sideband. The VFO is rock-solid stable. Image rejection seems very good. Headphone output is nominally 8 ohms, but it drives my higher-impedence Sennheiser stereophones moderately well. The built-in top-panel speaker is pretty wimpy, as is usually the case these days; I use an old Radio Shack Minimus 0.5 outboard speaker. There's also a tape output jack on the back, along with both spring-clip and coax antenna connections. One strange thing in the microprocessor: the display shows "2.7" rather than "2.4" when you switch in the SSB IF filter. The manual even mentions it--but doesn't explain *why*. No matter, since the filter actually does measure closer to 2.7 kHz anyway!

The 10-Hz tuning step in sideband mode isn't always quite tight enough to allow one to listen to AM signals in "ECSS" mode (or whatever you wish to call it--"non-synchronous heterodyne detection"?!) using the 4 or 6-kc filters--not without at least a couple of "zero-beat" pulses per second. As I said, there's no synchronous detection. However, it's smashingly effective using the 2.4 (.7?) kHz bw. But then, even in AM wide mode this radio *ain't* "hi-fi." Yaesu has *ruthlessly* rolled off the audio highs--I'd estimate 4 to 5 kHz is the *absolute* top end.

MINOR ANNOYANCES: No RF gain control, though the two attenuators (-6 and -12 db) can be used singly or in tandem to give you three levels of attenuation (the third one being -18, of course). You can't switch off the AGC--there's "SLOW" or "FAST", but you can't defeat it. The AGC-attack response times seem pretty good, though. I really do miss having a notch filter... selectable-sideband *won't* always get you away from hets in really crowded situations on SW (i.e. where there are several stations less than 4 or 5 kc apart).

For the most part, selectable-sideband is great for DXing. For instance, on MW I can cleanly separate the Colombian on 1100.3 from 1100 domestics in USB (it's audible virtually every night). And when the Saudi on 1521 was booming in here earlier this year, it was nothing but a loud 1-kc het obliterating 1520 in AM mode; in USB I got clean, readable (if slightly muddy) audio most of the time. There's no built-in preamp in the FRG-100, but sensitivity is really hot on SW and *almost* as good onMW--certainly hotter than my Realistic TRF. I live in an electrically noisy area so I can't make *extremely* fine distinctions in weak-signal reception, at least on SW with a random-length wire. But my amplified Sanserino box loop provides all the gain I'll probably ever need on MW (and, needless to say, does wonders for the local electrical QRM!). The loop and the FRG-100 make a pretty potent combination on MW. The receiver does well with splits, even really close ones--at least, if the domestic and the "split" are fairly close in signal strength.

The one *moderate to major gripe* I have is the FRG-100's mediocre *DYNAMIC RANGE*. Newkirk's QST review mentioned this, too: weak signals closely adjacent to very strong ones are very often obliterated... not so much by sideband splatter as by a sort of superimposed *hiss* on the weaker signal (due, according to Newkirk, to frequency-synthesizer phase noise). Then again, Newkirk felt this was to be expected "in this price class". Frankly, it may somewhat limit the FRG-100's usefulness in chasing foreign splits on the BCB for some DXers... but this is a pretty iffy proposition for those of us in the interior of North America anyway (just ask John Bryant or Shawn Axelrod!)... TAs & TPs need to be pretty bloody strong to be readable at all this far inland--i.e. anything more than just a BFO-detectable carrier--and it doesn't happen very often! And anyway, this is less of a problem when trying to log domestic DX next to locals... you need to be able to get at least a shallow *null* on the local, but DX is well readable adjacent to megablaster locals; selectable-sideband is a must. (Before getting the FRG-100, it had been years since I'd been able to log KSIS-1050 Sedalia MO due to local KLSM-1060. It's easily readable in USB on the FRG-100.) And with the nominal 5-kc separation of SW stations, coupled with their (usually) less than local-like signals, it's not a big problem on shortwave.

One other rather strange thing I've noticed since getting the Sanserino loop: if I switch in the FRG-100's attenuators, I get all kinds of spurious/intermod signals and hand-capacitance problems with the loop... but *not* if the receiver's attenuators are off. So I have to take my chances with front-end overload on super-strong MW signals; luckily, it doesn't seem to be a big problem. Ralph (or other technically-minded folks)--can you think of any reason for this happening?

BOTTOM LINE: I'm extremely pleased with the FRG-100's performance for the price. Okay, it may not perform like an R-390, HQ-180... or an R-8. But vacuum-tube boat anchors are often highly maintenence-intensive beasts... and the R-8 was simply out of my price range. Yaesu has come up with a very worthy successor to their affordable "workhorse" rig of years ago, the FRG-7 ...and with a tremendous amount of advanced "modern" conveniences, and excellent-to-superb performance in many categories. In fact, the 100 significantly outdistances the FRG-8800--and for less money.

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THE YAESU FRG-100 — by Don Momam

The FRG-100 is the latest in a long line of "frog" receivers from Yaesu and is long overdue considering that their only other receiver, the FRG-8800, has been around for quite a few years. I think the FRG-8800 was outdated and outclassed by better products from Kenwood and ICOM as soon as it was introduced, so it will be interesting to see how this new set compares with the current competition, specifically the ICOM R72. (The R72 was reviewed in the November 7, 1992 DXM.) It's not a completely fair comparison since the R72 has a US list of $1145 (discounted to $695 by one major US dealer) compared to US $639 (discounted to $550) for the FRG-100. Both sets are very similar in size and features, with the exception of keypad entry system only available on the R72. Both have optional FM boards, CW filters and high stability oscillators. Only ICOM has a speech synthesizer option, and only the Yaesu has the RS232 computer interface - it's built in on the ICOM.

The FRG-100 covers 50 to 30,000 khz with the usual modes and filter bandwidths. Flipping from AM to SSB is just a matter of touching the appropriate button, as is toggling between upper and lower sideband. No need to retune, and no need to shift through a carousel type arrangement to get forth and back between the various modes. Narrowband FM is an option, but FM on HF is reasonably scarce, mainly limited to some 10 meter ham activity and some radio/TV studio links in the 26 MHz range.

Filters

I found the 6 and 4 khz AM bandwidths to be so similar it was hard to tell whether there really were two different filters! The first thing I would do is install a "real" 4 khz filter - Sony part number 1-527-569-00. Although I haven't actually done the mod, the Sony filter is the exact size and I'm sure the pinouts are the same.

This filter is made by Murata but can be obtained more easily from Sony. It is the "narrow" filter used in the 2010 and others and is very useful since it is an exact replacement for the overly wide AM filters found in many Kenwood, ICOM and Yaesu receivers and transceivers. It's unlikely that this filter would fail in the original sets, so I'm sure we're confusing Sony's repair statistics.

Fortunately, the FRG-100 default bandwidths in each mode can be specified so one can enable the 2.4 khz SSB filter for use in AM narrow. The SSB filter is a better quality Murata type CFJ455K, and using it for AM makes the FRG-100 virtually identical to the R72, with both having very broad filters in WIDE and both destroying much of the audio in NARROW.

Features

Both sets have the usual memory channel features, with the R72 having 99 memories compared to 50 for the Yaesu. Both have programmable band edge memories plus versatile scanning features. The FRG-100 has many of its features selectable from the front panel by using the "set" and "select" functions, while in the R72 some of the features can be modified by switches on the rear of the set. On the FRG-100, one can even perform a sort on the memory channels and arrange them by ascending frequency! BFO offsets are adjustable and the master oscillator can be fine tuned to calibrate your set against a known frequency standard signal like WWV.

The frequency display and S meter are large, well lighted and easy to read, and readout is to 10 Hz. The slow tuning speed (5 kHz/rev) is comparable to the R-72's 3 kHz/rev and makes for easy tuning in this mode.

The rear panel contain similar features to the R72 - high impedance as well as 50 ohm antenna inputs, a tape output, recorder activation relay connection, 12 VDC input as well as computer control connections. Yaesu uses an external 12 volt power pack while ICOM has the more conventional built in AC supply with a removable AC cord in addition to a 12 VDC input.

Performance

I've used the R72 for some time and have been quite pleased with its overall performance. After the Yaesu arrived, conditions were so terrible that it was hard to give it a fair listening test. On weak signals both gave similar results, with perhaps a slight edge going to the R72, as its audio seemed slightly crisper and sharper. Neither set has a synchronous detector but both provide much better audio in the narrow bandwidth mode when the SSB function is engaged.

However, the FRG-100 has such incredibly slow AGC on AM (even in the fast position) that, after tuning across a strong signal, you have to wait a significant time before you can hear weaker signals again. Lightning crashes, or any of the various pops and crackles common on the SW bands cause the same problem. It's so annoying to tune through a band with such a slow AGC that I wouldn't consider owning this set, just for that reason. Technically, the AGC time constant should be easy enough to speed up, once you determine which resistance needs to be adjusted in the RC time constant network.

Interestingly, this set appears to have good signal handling capabilities; even on MW and LW there is not much evidence of overloading by local broadcast stations. Wish I could say as much for my FRT-1000 general coverage transceiver, which is supposed to have quite good signal handling specs. The radio doesn't use an RF preamplifier for any of its bands, uses an 8 dB attenuator for MW and a 500 kHz low pass filter for longwave which may help explain its relatively good strong signal performance.

Overall

There are many features I like about the FRG-100 and its performance is adequate, but the slow AGC in AM is such a handicap that it overshadows all the otherwise good features. Perhaps this is a problem unique to my particular set. You can easily check this out by tuning to a strong MW signal, then quickly tuning off channel. I can count nearly 5 seconds before the S meter returns to zero!

The lack of a keypad for frequency input might be a drawback for some people, but aftermarket plug-in keypads will almost certainly fill this gap. With a better 4 kHz filter and quicker AGC this would be a good set, especially considering the price.