

R64-3-1

The Drake R8: Initial Impressions

Richard Eckman, 9 Still Harbor Ct., Hampton, VA 23669

Introduction

I finally did it: I called up Drake on July 1 and ordered the R8. Despite being told that it would likely take 10 days to ship (they're apparently getting a lot of orders as a result of recent ads in QST and other magazines), it was shipped on the July 2 and received on July 5.

This highly non-technical review is a slightly edited version of one that I posted to the world-wide USENET computer network bulletin board "rec.radio.shortwave."

First Impressions

I immediately connected the R-8 to about a 10-foot length of wire strung in the shack (admittedly not a terrific antenna arrangement) and sat it next to my JRC NRD-525. It appears to be reasonably easy to operate and the manual is okay, if a bit too brief at times. It doesn't compare with the outstanding manuals produced for the Hammarlund HQ-180A or R-390A.

The first thing that became apparent is that it is not possible to display the frequency to finer than 100 Hz when in AM mode. This is utterly unacceptable. The fact is that you're tuning in 10 Hz increments and when you switch to USB or LSB (where the full frequency is displayed) you can be well off where you thought you were tuned. Also, every time that you change mode (from, for example, AM to USB or whatever) the AGC, bandwidth, and tuning step are reset to Drake's 'default' settings, regardless of what you had previously entered. You may then reset them to what you really wanted, but this is a major pain.

I found both of these problems extremely annoying. It's clear that they could be solved with a couple of easy software fixes if Drake were so inclined.

Synchronous Detection

When it's locked, it's easily as good as a Sony ICF-2010, though I didn't have an opportunity to compare it side-by-side with my friend's 2010. The real problem is that it can take a very long time for the internal carrier to lock with the received one. You can hear the whistle 'homing in'. I found that this can be hastened by depressing the sync button several times - not exactly stellar engineering! Whether this is unique to my set remains to be seen. Also, when using passband tuning (PBT) while in sync mode, the sync is lost when you turn the knob quickly and, again, it takes a few seconds to re-sync on the received signal.

Once, the sync is locked, it does indeed work very well. The difference on weak/fade signals is very noticeable.

Sensitivity

I have no lab instruments, so all I could do was tune in some very weak stations on both the Drake and the NRD-525 and see what the difference was. With the preamp on, the Drake did do somewhat better than the NRD on very weak signals (like a few out-of-band Chinese domestic stations this morning). So, the edge goes to Drake.

Selectivity/PBT

Drake's published specs on their filters are not that exceptional. Shape factors appear to be about 1:2 (6 and 60 db down) which isn't that good. However, in a comparison with the NRD (with stock 6 and 2 kHz filters and a Collins 3.8 kHz mechanical filter), the edge goes to Drake under tough signal conditions. Combined with a dramatically better PBT than the NRD, the Drake did a significantly better job on a signal on 15171 kHz this morning (presumably Tahiti in French?) which had a tough heterodyne and lots of 15170/15175 QRM.

Audio

No comparison! The Drake is far better than the very poor, hissy audio produced by the NRD-525. The internal speaker is quite good. A Minimus-7 connected externally sounds a bit better. The tone control is reasonably effective.

Keypad/Ergonomics

The buttons look nicer than those on the NRD, but it's difficult to get good contact on them. The logic of entering a frequency is far inferior than that of the NRD. There's also no 'clear' key - a major drawback.

The menu operation is definitely an acquired taste. The tuning knob is not as nice as the NRD's and it's too small and close to other buttons. Also, it's too easy to hit the knob and deactivate the sync mode unintentionally.

The tuning steps are not as flexible as the NRD and the display has got some real problems (as described above) with regard to frequency resolution in AM mode.

Frequency Accuracy

Zero beating to WWV on 15 MHz showed that the display was about 30 Hz off of nominal 15.0000 MHz. This is not nearly as good as the rock solid accuracy on the NRD.

MW Performance

This is the first solid state unit that I can connect my two-foot amplified Sanserino loop antenna to without serious overload problems. This perhaps means that the dynamic range is better than that of the NRD. The published specs, at least, seem to confirm this. Conditions last night on MW were terrible - typical summer thunderstorm static and little in the way of high-latitude paths open. However, I was able to get a carrier on 684 kHz, likely from Sevilla at around 0400 UT. It's going to take a lot more time (and better conditions) to see how well this unit works on MW. The preamp cannot be enabled below 1.8 MHz (revised from the original 5 MHz published figure).

S-meter

Again, no comparison. Drake's analog S-meter really works, unlike the totally unusable digital meter on the NRD.

Other comments

There seem to be rogue whistles that appear randomly on received stations which manifest themselves as increasing or decreasing in tone. Kind of like the sync locking slowly, but this is with the sync OFF. This is most evident on strong signals (in AM mode), but also shows up when tuning around in USB/LSB modes with no signal present. Apparently, this is some internally-generated carrier sweeping across the HF region. This isn't particularly the mark of a \$1000 receiver: This apparently is unique to my sample (see below).

The instruction manual contained a complete description of the RS-232 interface and commands. It should be trivial for anyone with a PC to write some programs to control this radio. I understand from another DXer's comments on the bulletin board that Drake has not quite finished implementing all of the logic for the RS-232 interface. An updated ROM will supposedly be available in August.

R64-3-2

Summary

After just a few hours of tests, this unit has a lot of plusses, and unfortunately, a number of annoying minuses. It will be interesting to see some real lab measurements of this unit from Larry Magne's RDI.

I spoke with Drake customer service on July 8. The person whom I spoke with basically agreed that he thought that the frequency display problem was unfortunate and he had made that opinion known to engineering in the past. He did give me the name of a contact in the Drake engineering department to write to (Steve Koogler). He did say that this was a software issue and, presumably, it could be corrected easily if Drake decided to do so. The same goes for the unfortunate return to Drake-defined defaults when changing mode. I was told that the 'rogue' whistle problem is definitely not normal. The customer service person recommended that I return it for repair.

I decided, however, to return the receiver for a refund under Drake's 15-day money back guarantee. This was a difficult decision to make, but I felt that their were simply too many little problems that caused the receiver to operate far less effectively than its potential. I wrote a detailed letter to the head of Drake engineering asking for his reply to my concerns. I do hope that Drake decides to correct some of them. If they do, I would seriously consider revising my opinions on what could have been a truly excellent receiver.

THE DRAKE R8:



- 100-300000 KHz (0.1-30 MHz)
 - AM, LSB, USB, CW, RTTY, FM
 - < 1 µV 0.1-1.5 MHz
 - < 0.5 µV 1.5-30 MHz
 - < 0.25 µV 50-30 MHz with preamplifier
 - < 3.0 µV 0.1-1.5 MHz
 - < 1.5 µV 1.5-30 MHz
 - < 0.8 µV 50-30 MHz with preamplifier
 - < 0.5 µV 1.5-30 MHz
 - < ± 10 ppm, -10° to 50°C
 - < ± 100 Hz, -10° to 50°C
 - 6 KHz @ -6db, < 12 KHz @ -60db
 - 4 KHz @ -6db, < 8 KHz @ -60db
 - 2.3 KHz @ -6db, < 4.5 KHz @ -60db
 - 1.8 KHz @ -6db, < 3.6 KHz @ -60db
 - 500 Hz @ -6db, < 1.5 KHz @ -60db
 - 12 KHz @ -6db, < 25 KHz @ -60db
 - > 95db
 - > 60db @ 100 KHz to 1.5 MHz
 - > 80db @ 1.5 to 30 MHz
 - > 80db, 45 MHz
 - > 100db, 50 KHz
 - > 90db 1.5-30 MHz @ 20 KHz spacing
 - > +5dbm @ 20 KHz spacing
 - > -20dbm @ 5 KHz spacing
 - 45 MHz
 - 50 KHz
 - Threshold: 0.8 µV
 - Attack Time: 1 ms
 - Release Time: SLOW: 2 Sec
 - FAST: 300 ms
 - < 4db change in audio output for 100db input change @ AGC threshold
 - 50 ohms unbalanced
 - 50 or 500 ohms unbalanced
 - 40db min Depth (500-5000 Hz)
 - 2.5W, 4 ohms, @ < 10% distortion
 - 300 mV, 4.7 Kohms.
 - 300 mV, 4.7 Kohms.
 - < ± 2 seconds/minth
 - 100/200/200/240 VAC, ± 10%
 - 50 or 60 Hz, 42 Watts nominal
 - 11-16 VDC @ 2 A
 - 10° to 50° Celsius
 - 13 lbs (5.9 Kgs)
 - 13.8" W x 13" D x 5 1/2" H
- Frequency Range
 - Mode
 - Sensitivity: SSB, CW (10db S+N/N)
 - AM (10db S+N/N)
 - FM (12db SINAD)
 - Frequency Stability
 - Frequency Accuracy
 - Selectivity: AM, LSB, USB, RTTY, CW modes
 - FM mode only
 - Ultimate Selectivity
 - Image Rejection
 - IF Rejection
 - Dynamic Range
 - Intercept Point
 - 1st IF
 - 2nd IF
 - AGC Performance
 - Antenna 1, Converter Inputs
 - Antenna 2, Input
 - Notch Filter Attenuation
 - External Speaker Output
 - Recorder Output
 - Demodulator Output
 - Clock Accuracy
 - AC Power Requirements
 - DC Power Requirements
 - Operating Temperature
 - Weight
 - Size

Drake R8 Receiver: Promising Or Fatally Flawed?

Dallas Lankford
September 14, 1991

What should have been an enjoyable experience, trying out my new Drake R8 receiver, has turned into a giant headache.

After placing a phone order with Drake on August 30, I waited patiently for the R8 to arrive. I should have become suspicious when it did not show up a few days after Labor Day. But I did not. And again I should have become suspicious when I found a Fed Ex notice of attempted delivery at my home on September 11. There is no Fed Ex office in Ruston, so it was either take time off from work and drive the 70 mile round trip to the Fed Ex office in Monroe, or take time off from work and wait for Fed Ex at home. I did the latter. When Fed Ex delivered the R8 about 10:30 on the morning of September 12 I should have taken a close look at the Fed Ex label on the box, but again I did not. When one orders a product from a company, one expects the product to be delivered directly to one. Only later as I was repacking the R8 to ship it back to Drake did I discover that "my" R8 had been shipped to someone in California, and that that someone had shipped it to me. Clearly there is something terribly wrong in Drake's shipping department and with the procedures they follow. There is no way anyone in their right mind would accept delivery on a \$1000 piece of equipment from a third party when it was supposed to be shipped directly from Drake to the customer. As yet Drake has not explained how this unacceptable situation came about.

Since I had not yet noticed that "my" R8 had been in the hands of an unknown person or unknown persons in California, my evaluation of the R8 started on a promising note. I connected an amplified ferrite rod loop antenna and checked out the daytime MW band. No digital circuit or display noise! At least none unless you brought the loop within a few inches of the display. It seemed to be a winner for MW listeners. Actually I should mention that at first I thought previous reviews were wrong in this regard because I got quite a lot of display noise with the ferrite rod loop powered from an AC power supply. But when I switched over to a battery, all the display noise went away. Apparently some display noise couples through the power cords when using an AC power supply to power an amplified loop.

Next I switched over to my 2 foot balun loop. Gain was a bit low using the R8 50 ohm antenna input, so I switched over to the 500 ohm antenna input and found that gain was fine. This is not the fault of the R8. The U-310 amp gain for the circuit of my balun loop depends on the load it sees. I do wish that Drake had used an SO-239 or BNC connector for their 500 ohm antenna input instead of the quick release push-in terminals. I had to use a BNC to binding post adapter and two short lengths of wire to connect the loop coax output to the R8. But on the other hand, at least all of my high dynamic range loop amps will work directly with the R8.

After satisfying myself that the R8 emits little or no display noise in the MW band, I changed over to my noise reducing inverted L antenna to tune up and down the MW band looking for any anomalies. Right away I found one: a curious bagpipe-like het around 1590 KHz. What was it? Was it being emitted by the R8 and being picked up by the inverted L antenna, or was it due to some other cause. A quick check with an R-390A showed that it was not being emitted from the R8. Closer examination of the het on the R8 revealed it to be an image of my super local KRUS on 1490 KHz. Ugh! The image was actually about 1592 KHz, which indicated that the R8 50 KHz IF was not properly aligned. Next I connected a signal generator to the R8 and measured the image rejection at 700 KHz (image at 802 KHz) and at 1300 KHz (image at 1402 KHz). In both cases the image rejection was about 52 dB. Thus "my" R8 failed to meet Drake's image rejection spec of greater than 60 dB below 1.5 MHz.

I phoned the Drake people and was told that the problem was probably a defective 45 MHz crystal filter, and that they would be glad to have me return the R8 and fix the problem and return it to me. At first I agreed, but later changed my mind (as you will understand when you read the following). In my opinion Drake has the wrong policy with regard to defective equipment.

I had purchased this R8 because of the 15 day money back guarantee. But what should one do when one discovers a serious problem with the R8 during the first hour of use? There is no way a customer should have to play "Fix It" with the Drake service department. A defective receiver should be replaced immediately by Drake, at no expense to the purchaser, and the 15 day money back policy started over with the second receiver.

Oh well, I thought, I'll play around with the R8 the rest of the day before I box it up and return it to Drake to be fixed. Next I decided to measure the image rejection above 1.5 MHz. Drake's spec for that is greater than 80 dB. I got 52 dB again. Disgusting! So I called them again to report this problem. They seemed to think that again it was the 45 MHz crystal filter. Hmm. I don't understand how a single problem, such as a defective 45 MHz crystal filter, can cause two wildly different departures from Drake's specs. Perhaps if Drake had provided a schematic with the R8 I could figure it out. That is another thing I don't like about these early R8 receivers. You don't get a schematic. Does that mean that the design is not fixed yet?

Anyway, I pressed onward with my evaluation of this ill R8. Maybe the dynamic range would be OK, thought I to myself. No such luck. The dynamic range measured 88 dB, at least 3 dB below Drake's spec of greater than 90 dB. Well, what about the 3rd order intercepts? The 20 KHz spacing 3rd order intercept almost made it at +5 dBm (Drake says greater than +5 dBm), but the narrow (5 KHz spacing) 3rd order intercept could not be measured because of synthesizer phase noise. A bad situation was getting progressively worse.

I tried out the notch filter, but it did not seem to work at all with on-the-air hats. I switched over to two signal generators and generated a stable well-defined hat with the two signal generators to see if I could get any insight into the notch filter problem. It appeared that the notch on "my" R8 was so narrow that it notched only an extremely narrow range of the hat spectrum, and so it would not significantly reduce the hat. All it did was change the tone of the hat.

Oops. This story is getting out of order, which is, I suppose, appropriate for the "out of order" R8 I was sent. While I was measuring the SW image rejection, I was tapping the side of the case with my finger (I was annoyed). Accidentally I tapped one of the case mounting screws and noticed that it was loose. I inspected the other case mounting screws and discovered to my surprise that they all were loose. Even worse, one of them had been "roughed up" or "gorilla-ed" as I like to describe this kind of abuse. Someone had been inside "my" R8 and that someone did not know how to use a Phillips head screw driver correctly!!! My annoyance went up another order of magnitude.

What next? I decided to try out some headphones. The front panel headphone jack was defective. It was difficult to insert the headphone plug completely, and the headphone plug did not make positive contact with the headphone jack. The headphone jacks on the R8 (there are two of them, one on the front panel and one on the rear panel for an external speaker) are apparently plastic encapsulated PC board mounted variety, not the old fashioned (and sturdy) type. Had someone damaged the headphone jack, or was it merely defective? I don't know. The rear headphone jack also seemed defective. Audio output from the front panel headphone jack seemed inadequate. Audio output from the rear headphone jack (for an external speaker) was adequate. Perhaps this R8 has a defective audio amplifier.

Could anything else be wrong? Yep. On strong AM signals there was an annoying "click" as the 1 KHz digit changed.

And "my" R8 was afflicted with the same "rogue het" that afflicted Richard Eckman's R8. (Could Drake have sent me Richard Eckman's reject without fixing it?) On strong AM signals (I didn't check SSB or CW) there was a weak but very definite het which varied in frequency and amplitude. The rogue het was much more apparent when I used an unmodulated RF source, i.e., a signal generator.

To confirm that the problems I experienced with "my" R8 are not common to all R8 receivers, I phoned a well-known DXer who owns an R8. Although

he could not confirm that his R8 met Drake's specs, he had not observed any symptoms of substandard image rejection. His R8 did not have a rogue het, or defective headphone jacks, or annoying click when the 1 KHz digit changed in AM mode, or gorilla-ed case mounting screw, or defective notch filter, and his R8 was not shipped to him from a third party.

There is absolutely no excuse for a \$1000 receiver to have so many problems. Many of these problems could be detected in a few minutes with some very simple tests by a competent technician sitting at the end of the production line. It appears that Drake doesn't test their R8 receivers at all. Or if they do, then either their test equipment is defective, or their technician is incompetent.

What can an R8 owner do if he thinks he may have a defective R8? If he has an R8 with a defective headphone jack, or a rogue het, or an annoying 1 KHz click in AM mode, or a notch filter that doesn't work, or gorilla-ed case mounting screws, then it is obvious that he has a problem and he should send it back to the Drake service department to be fixed. If he thinks he has image problems, he should try to verify it. One does not need a precision signal generator to measure the image specs. Just about any old signal generator will do. The R8 S-meter is reasonably linear in the sense that each S-unit up to S-9 corresponds to about 6 dB, and signal strength above S-9 is read in dB. I used a precision signal generator, and also precision 10:1 (20 dB) sealed attenuators to doubly confirm that the R8 S-meter is (or should be if it is operating correctly) accurate. Pick some frequency, say 2.000 MHz, adjust the signal generator to give a 40 dB over S-9 reading, and then tune the R8 to about 2.100 MHz. You should observe an image. If the image is not about S-2 or less, then you probably have a defective 45 MHz crystal filter or whatever the problem is which causes substandard image rejection. (At least Drake told me that the image spec failure indicates that the 45 MHz filter is defective. But since, according to Drake, the front end is varicap diode tuned, the image spec failure could also be due to front end tracking error, or perhaps some other cause.) Although measuring the dynamic range and 3rd order intercepts is not difficult, it requires two precision signal generators, and so is beyond the capabilities of most hobbyists.

I should add that the simple image test I described above will not give accurate results if your R8 S-meter is inaccurate. Here is a simple test which will give you some indication that your S-meter is OK. With an 80 foot inverted L antenna, 65 foot horizontal section about 20 feet above the ground or higher, and a 15 foot bare wire lead-in (no coax), at midday you should get about S-0 reading on a quiet day around 10 MHz with no signal tuned, just background noise. Unfortunately, in urban areas you may get several S-units of man-made noise. Then at night you should get about 60 dB readings from a few super-strong 6 Mhz (49 meter band) or 9 MHz (31 meter band) SW AM broadcasters. If you use a considerably longer antenna, or a different antenna, this simple S-meter test will not be reliable.

My advice to prospective R8 purchasers is caveat emptor, i.e., let the buyer beware. Most customers will not have an electronics laboratory in their home, like I do, and most will not have access to and ability to use the test equipment at an electrical engineering laboratory, like I do. If Drake offers to send me another R8 for evaluation on their 15 day money back guarantee policy, I will probably take them up on their offer. It is really a pity that they sent me a lemon, a fatally flawed R8.