

COMPARING THE DRAKE R-8 AND THE JRC NRD-535D

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Since major new top-of-the-line communications receivers are only introduced one or two times a decade by most manufacturers, it was probably unfortunate for all concerned that the two current king-of-the-hill receivers were introduced almost simultaneously in the spring of 1991. Strangely, no one has ever published an in-depth IN-USE direct comparison of these two fine receivers. This project and article are an attempt to bridge that gap.

The Drake R-8 was a success almost as soon as it entered the market. According to informal comments made by Drake executives, the initial sales volume of the R-8 was much larger than they had anticipated. They planned for the receiver to be a strong contender in the mid-priced ranks of communications receivers and they succeeded beyond their dreams. This success in the North American market was probably due to several factors. The first and foremost was that the R-8 delivers great value for its under \$1000 price position; a second factor mentioned by many reviewers and happy owners alike is the sparkling clear audio. Most tube gear aficionados value the R-8 audio as being the most clear, most intelligible and nearest to "tube audio" of any modern digital-dialed receiver. Die-hard tube-type DXers like Jerry Berg (HQ-180) and Pat Martin (SP-600 on MW) bit the bullet and went to solid state as soon as they tried an R-8. The last major factor in the success of the R-8 in the US market has never been discussed in print: it is an American success story. Many senior American DXers have long felt badly about the demise of Hallicrafters, National, and Hammarlund, while many of these same DXers enjoyed the latest miracle box from the Far East as their personal receiver. Thus, more than a few American DXers were overjoyed at the chance to buy the latest hot receiver and simultaneously support one of the last vestiges of the American electronics industry.

It may also be true that the early success of the R-8 was partly due to both developmental and marketing errors on the part of Japanese Radio Company. The NRD-535D was introduced to North America before the variable Bandwidth Control accessory was available. The NRD-535D, like the 525 before it, had very poor AGC action. Also, the truly wonderful synchronous AM detection with selectable sideband was mis-named the "ECSS" control. The latter was probably a foolish marketing strategy that has really confused potential customers. ECSS as the term has developed in the DXing community refers to receiving AM signals in single sideband mode (product detector) exalting the carrier with the receiver's internal BFO.

For all of these reasons and more, the Drake R-8 is a resounding American success story and the NRD-535D languishes in the doldrums of the North American SWBC DX market. In the last two years, "conventional wisdom" around many hobby gatherings has been that the R-8 is simply a better radio than the much more expensive NRD-535D. That opinion is so strongly held in some quarters that I am somewhat reluctant to write an article which dares to differ with that conventional wisdom.

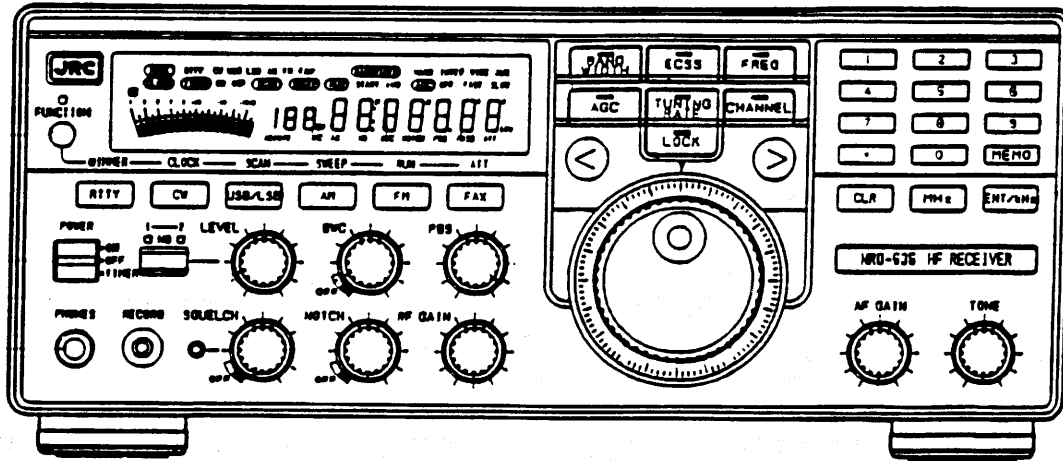
PROVENANCE

I neither own or intend to purchase either of these two fine receivers. Thus, I have neither pride of purchase nor romantic involvement with either one. My own NRD-525, though a flawed design that I'm still angry about, has been modified enough that I find it to be "as much receiver as I need." My NRD-525 review should put to rest any concerns related to positive bias toward JRC on my part. (Refer to "Waste Gunner on a 525," *Proceedings 1988*.) If there is any bias in my view of these receivers, it would be toward the Drake unit.

PROCEDURE

I was able to borrow both an NRD-535D and an R-8 from Bill Bowers for the tests discussed in this article. I used them intensively for ten days in both dawn and evening Tropical Band and MW DXing sessions. I sought out the most difficult or weak signals and attempted to ID and take detailed logs. The antennas used were a variety of Beverages and an active whip (Dymek DA-100). Both receivers were fed signals simultaneously through a low-loss antenna splitter. The handiest test device that I used for this project was a home-brew switchable audio patch cord. This was wired so that both receiver could be plugged into the same 8" low impedance external speaker simultaneously. A DPST switch in the patch cord allowed me to switch instantaneously from one receiver to the other. If the audio gain of the two receivers was carefully matched, and both receivers were carefully tuned to the same signal, flipping the audio switch only changed the quality of the audio coming from the speaker.

In practice, I started with one receiver, optimized reception of the test signal, flipped the audio switch and optimized reception of the same signal with the second receiver. Then it was back and forth with the audio switch, tweaking each receiver as I went. At some point, no further improvements could be made. I then listened for at least 10 minutes to both speech and music, taking notes as I went. This is the fairest kind of non-numerical, in-use DXer's test that I could construct.



INITIAL IMPRESSIONS: ERGONOMICS

JRC NRD-535D

When I began this project, I expected the 535D to be a slightly repackaged 525 with 1990s "jelly bean" curves rather than the crisp 80s look of the 525. I was pretty sure that the 525's well known and serious problems with audio hiss, AGC, selectivity and ergonomics would still be there, albeit in a prettier package. I had heard rumors that the 535D's AGC was awful and I knew from pictures JRC had failed to replace its artificial gas display S-meter with a real electromechanical one.

I was pleasantly surprised by the NRD-535D. The ergonomics are outstanding! In fact, the 535D is easier to operate than any other major receiver that I have ever used. Whether ease of operation is important to you probably depends on your DXing style. Some people are very active at the controls, tweaking for quite a while in different modes and band widths before settling down to listen. Other folks tend to "know" the proper settings and are less active. If you are an active tweaker, the NRD-535D is the radio for you.

Since this is not a review of the 535D, I'll not belabor the ergonomics point. One example will serve: control of mode of reception. If you want AM mode, hit the AM button; if you want SSB, hit USB/LSB button once for USB, hit it again for LSB; if you want to try synchronous detection, hit the "ECSS" button once for synchronous AM locked to the upper sideband, hit again and you are in synchro-AM on the lower side of the signal. To say it another way, it is possible to invoke the mode of choice by hitting ONE button without carouseling through ANY OTHER mode. Absolutely wonderful.

One final point: when special functions like Notch, variable Band Width Control, Noise Blanking, Passband Tuning, etc. are invoked, warning lights appear either on the control itself or the display. The opportunities for operator error are vastly reduced as compared to the 525 or, especially, the R-8.

DRAKE R-8

From a DXer's point of view, the R-8 is an ergonomics nightmare. True, it is possible to "learn" the R-8, but even so, the large amount of carouseling required is time consuming, frustrating and fraught with possible error. So many important functions have to be carouselled or "shift" carouselled (the Notch, for heaven's sake!) that highly active DXing is a button-pushing nightmare. Period. The too narrow spacing between the main tuning knob and the Band Width and Mode buttons has been thoroughly discussed elsewhere; suffice to say that this design flaw has been known to cause even veteran R-8 jockeys to swear and shake their fists in the direction of Ohio.

Before we get angry at the Boyz from Miamisburg, we should look at the ergonomics and budget problem from their point of view. They were designing a general use (listener's) receiver for the upper middle price portion of the market for relatively unsophisticated users. Hence, they used a near minimum number of controls and, originally,

configured the software so that the "appropriate" band width was automatically switched in when the operator changed reception mode. Ignoring the frequency keypad buttons, Drake designers allow us to control a complex receiver with only seven buttons and three sets of dual concentric knobs. JRC designers, working with almost twice the parts budget, deployed 7 knobs and 13 buttons to control the same set of functions. In my opinion both groups of designers did an excellent job and achieved their project design goals. The two receivers were designed for different price ranges and different types of users.

We are truly fortunate that Drake designed such an excellent "listener's" radio that it has proven to be a formidable DX machine for a quite reasonable price. *From a DXer's point of view* though, the vote for ease of operation has to fall squarely to the NRD-535D. Bravo JRC!

INITIAL IMPRESSIONS: DXING

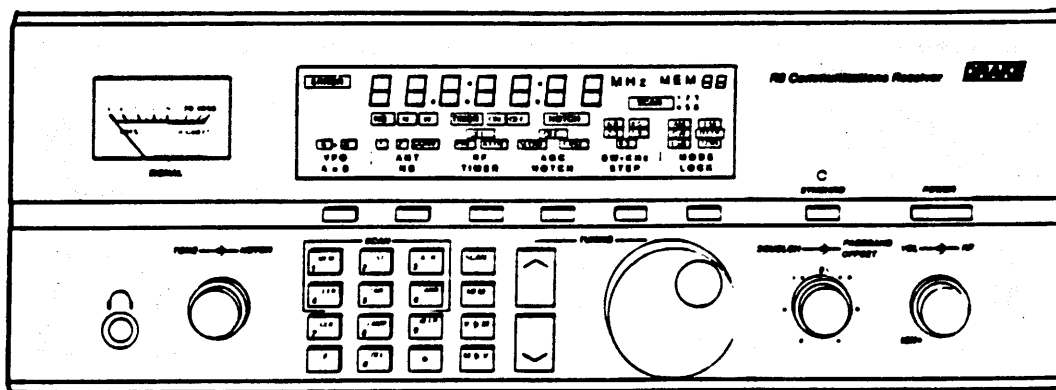
JRC NRD-535D

My initial impressions at SWBC DXing with the 535D were somewhat negative. Although the controls were very easy to use, and selectivity and sensitivity seemed to be very acceptable, the AM audio in the Intermediate IF (2.0 kHz) position was very muffled. The same was also true in "ECSS" synchronous AM with the intermediate filter. True ECSS reception (using USB or LSB product detection for an AM signal) was not really much of an improvement. Trying to DX with the Wide IF filter (6.0 kHz) was impossible, though the audio did seem much clearer.

The 535D's so-called "ECSS" function, actually AM synchronous detection with selectable sideband, is the most effective and easiest to use of any of the synchronous detection systems that I have used. The 535D's synchro AM detector locks on at much lower signal levels than the R-8, holds lock well and works great.

AGC action is very poor, at least from an SWBC DXer's point of view. The attack time in AGC Fast is very aggressive and the release time is EXTREMELY slow in both Fast and Slow AGC settings. Any fast noise blip (a static crash, an arcing light switch in the house, etc.) causes the AGC to reduce the gain to near minimum. It then takes nearly forever to recover. Essentially even a single strong noise will deafen the receiver for over a second!

So, the initial impressions of the NRD 535D are mixed: superb ergonomics, excellent synchro AM detection, extremely poor AGC design and inappropriate IF bandwidths. The latter two doomed the NRD 535D (as initially introduced) as an SWBC DXer's receiver.



DRAKE R-8

This comparison test simply confirmed what the marketplace has shown in recent years: the R-8 is a fine DXer's receiver. The sparkling audio is a real aid in understanding program details and ID's under difficult receiving conditions. The middle three IF filter settings are very useful in DXing (4.0 and 2.3 in AM or 2.3 and 1.8 in ECSS) and ECSS mode is both easy to use and very productive with the R-8.

The R-8's synchronous AM detection was a disappointment. I found it very cranky to use in anything but ideal conditions when trying to detect relatively weak signals; QRM confused it badly and fading of a weak signal could cause it to hunt and grumble. A number of R-8 owner/DXers report similar experiences. Others however, find the R-8 version of synchronous detection quite useful as a DX tool. The difference here may lie in the DXer's personal style and references, or it may lie in variations in manufacturing, or both. In any case, I did not find the R-8's synchronous

detection useful while DXing. It's AGC design, along with the rest of the electronic design of the receiver seems superb. The R-8 is a wonderful general use or listener's radio and, almost inadvertently, an excellent DX rig...all for less than \$1000. Bravo and well done!

THE REST OF THE STORY

The first NRD 535D I used for a couple of days in 1991, was an early North American unit without the Variable Bandwidth Control. My experience then was just as described above. For the first three days of the 1994 test, I continued to work with the 535D as described. Even though Bill's (the owner's) relatively new 535D came with the Variable Bandwidth, I did not find that much-ballyhooed control of much use. However, the more I used the two receivers during the formal comparison, tweaking controls and flipping back and forth, the better I got at maximizing the performance of the 535D. The synchronous AM, selectable sideband detector is a true wonder! In quiet conditions (necessary because of the awful AGC), reception of tough signals was *better* with the 535D in most cases, except for the blasted muffled audio!

I'm ashamed to admit it, but it took me until the fourth day of intensive DXing to even think of trying DX signals with the 535D in IF Wide selectivity and with the Variable Bandwidth narrowed from 6 to about 4 or 3 kHz. *What a difference!* Suddenly, the much maligned audio of the 535D became *excellent*. It sparkles; it sounds like tube audio; it is even better (yes) than the R-8...Yes! Frankly, I feel like an absolute fool to not have tried this earlier. I can only plead that I have never met a hobbyist who DXed in the WIDE selectivity position. In truth, the Variable Bandwidth function allows you to maximize the relationship between current noise conditions and audio response. Since the high frequency audio elements of speech are essential to understanding, the BWC control is the finest new DXing tool that I have used since ECSS became fashionable 10 years ago.

Frankly, I am shocked that so little (nothing?) has been published in the hobby press about JRC's new Variable Bandwidth Control! It is true that the first NRD-535s sold in the U.S. did not have the BWC cards installed; it is also true that the first version of the BWC card did not work in the AM Wide position. However, the NRD-535D has been configured like the one I tested for at least a couple of years. This Bandwidth Control is *revolutionary*. I'm also shocked that neither JRC nor major dealers have featured this new and unique feature more heavily in their advertising.

The same day that I discovered the Wide Setting/BWC control combination, I performed a five minute modification to the AGC of the 535D, a modification published in several places which recently describes adding one resistor to the IF AMP board to significantly reduce AGC decay time. (The article is reproduced at the end of this discussion). This easy modification (though it is not factory approved and voids the warranty) cured the AGC problems in near miraculous fashion. Now, I find both Fast and Slow AGC settings very useful DX settings.

With the "discovery" of the Wide IF/BWC control combination and the corrected AGC circuit, the 535D became like a new receiver. Almost instantly, the A/B DXing comparisons showed the 535D performing noticeably more effectively than the R-8 in almost every difficult situation.

Since David Clark is known as a receiver guru as well as a legendary DXer with the R-8 and the HQ-180, I gave him a call to see if he knew any R-8 operating strategies that I didn't know. Sure enough, David has discovered that operating R-8's in ECSS/LSB allowed the Passband Tuning to rotate through almost all of the upper sideband as well as the lower one. The same is not true when operating in ESCC/USB! From then on, I always tried the ESCC/LSB setting with Passband control rotated to USB when tweaking the R-8 in the A/B comparisons.

FINAL COMPARISONS:

USABLE SENSITIVITY ("HEAR-ABILITY")

This criteria combines technical sensitivity and audio quality to judge how well an extremely weak DX signal may be heard and understood with a receiver. My best test signals for usable sensitivity were Radio Myanmar (Burma) on 4725 kHz during dawn enhancement and 4712.6 R. Abaroa, Riberalta, Bolivia in the local evening. When I performed these tests, both transmitters were very well modulated but the audio level of each was at or just below the general level of the background noise. On two different days with each signal and over dozens of comparisons, I could hear and understand more of the programming on the 535D. The differences were relatively small but I considered them significant. The best settings for the R-8 were ECSS/LSB rotated to the USB side in 2.3 IF. The best setting for the 535D were Synchro AM, USB, detection in WIDE IF, with the BWC control at about 3 kHz.

USABLE SELECTIVITY

Again, this is my own DXer's criteria. My definition is how well can I hear and understand the AM programming of relatively weak signals under a variety of very crowded and difficult conditions. The NRD 535D proved over and over to be the better receiver under these A/B tests. It outright won about half of these tests and most of the rest were ties. The

R-8 did prove to be superior in a few situations. The control settings varied with conditions of course; with the 535D I tended to end up in synchro AM either USB or LSB with the wide IF setting narrowed various amounts with BWC; with the R-8, I usually ended up in ECSS, using the Passband shift control, the Notch and in either 2.3 or 1.8 kHz IF filters.

ONE IMPORTANT NOTE: It is not possible to operate the notch filter of the NRD-535D while the reception mode is either one of the two "ECSS" AM synchro settings. It is a shame that this is the case; however, I did not find the Notch control very necessary when DXing in AM synchronous mode, so this fault may be trivial to most DXers.

THE BOTTOM LINE

The Drake R-8 retails for about \$950 in the U.S. in 1994. The JRC NRD 535D as configured in North America (BWC standard) retails for \$1700. From a SWBC DXer's point of view, the NRD 535D with the discussed AGC mod aboard is a better radio. The overall performance advantage DXing AM signals on the Tropical Bands is however, small. Is it worth \$750? Now that I have performed these tests, I would have no difficulty whatsoever in answering that question. Buy a 535D!

AGC SPEEDUP MOD FOR THE NRD-535

from Paul Lannuier

For those who are interested, this mod was developed by Michael Cobuccio (WA1EYP) of Merrimack, NH. He found that adding a 1M ohm resistor between the positive side of C104 and the negative side of C105 of the IF Amp circuit board (CAE-227A) will speed up both Fast and Slow AGC settings. Variation in resistance will effect the decay speed, e.g. lower resistance = faster decay. (Several DXers have found 470 K ohm resistors work best. - JHB).

NOW FOR THE CAVEAT: This mod was not approved by the factory, so do it at your own risk. That said, there doesn't seem to be much risk in tacking a resistor to the (underside of this) board. Removal is easy if the effect seems undesirable to the user.