

IRCA Technical Column

editor: Nick Hall-Patch
1538 Amphion St.
Victoria, B.C.
Canada V8R 4Z6

The JRC NRD-535D as a Medium Wave Receiver

A brief description:

It's a relatively solid looking and feeling general coverage communications receiver, with digital display to 10 Hz and tuning steps down to 1 Hz, passband shift, IF notch filter, noise blanker and a bandwidth control. Stock filters are 2, 6 and 12 kHz, but the 535 with the "D" suffix also has a 1kHz IF filter as standard, as well as including the "ECSS" or synchronous AM detection option. A 20 dB front end attenuator is provided, which can be a requirement in urban areas, as the Radio Netherlands review found the radio to have a dynamic range of under 90 dB using the 2 kHz IF filter. It has 200 continuously tuneable memories which, as is pretty standard now, store mode as well as frequency information. Clock and timer are also standard, as is keypad entry, tuning knob and "up-down" tuning pushbuttons. All digital features seem easy to learn to use. There are a number of other features, but the preceding would be of most interest to the MW Dxer.

How does it work?

Initially I didn't use a random wire with the NRD-535D, as with a 50 kw station and two 10 kw ones all within three miles, all grounded in salt water and beamed at my location, it seemed that I should let the radio show off its features unimpeded by possible collapse of its front end. My antenna was a three foot square unamplified tuned box loop for most of the tests. I compared the '535 with a SONY ICF-2010 and my homebrew radio which I have tried to optimize for medium wave use (multiple-ganged front end tuning, high level mixer etc., see IRCA reprint M56). Some comments are based on an earlier all-band comparison with an AR-7030 conducted using a short random wire, and upon observations as an interested bystander on Vancouver Island's west coast using Beverage antennas.

Sensitivity and selectivity:

Essentially, the set is sensitive and selective enough for most medium wave DX, and one can take the manufacturer's specifications on faith. This is fair comment for most recent communications receivers, as the limitations for hearing MW DX are more in the set's ability to deliver a crisp readable signal in spite of sideband splatter, and in the ability of its front end to handle strong local signals. This '535 was tested in early May, so there was not much in the way of overseas signals, but generally, if the homebrew receiver could hear Japan on 774, then the '535 and even the '2010 weren't that far behind. I felt that the 2 kHz filter, in particular, delivered audio that was too bassy for easy readability in AM, and even the 6 kHz filter delivered a bassy sound. I felt that both the 2 and 6 kHz filters delivered a relatively harsh response to sideband splatter in the AM mode, and no amount of control adjustments seemed to smooth the response to splatter; even domestic channels were often more comfortable listening on the '2010 or the homebrew. In tighter situations (Japan on 774

again), the splatter was more vigorous on the '535 than on the homebrew even when using SSB on the '535.

Demodulation capabilities:

A MW DXer will naturally be interested in the exalted carrier selectable sideband (ECSS) capabilities of the radio. Unfortunately, there really weren't many occasions where ECSS helped out a difficult signal. Signals that were already readable, but bothered with adjacent channel splatter, became more pleasant to listen to using the ECSS setting, but rough signals (such as Japan on 774, or KEX-1190 next to my local on 1200) were not improved by its use. Adjusting the passband shift while using ECSS sometimes helped with LSB signals, but not often. As with AM alone, the resulting audio was somewhat bassy. Radio Netherlands preferred JRC's synchronous detector to the ESKAB PLAM add on, so I wonder if the one I tested was lacking in some way.

I found that judicious use of the 2 kHz filter, bandwidth control, passband shift, RF gain with AGC off, and SSB rather than AM detection delivered the most readable signals; this would be my preferred way of serious DXing with this radio. Using this method, the '535 was sometimes able to outshine the smooth sound of the AR7030 when receiving difficult signals. Note that it's generally agreed that the NRD-535 has better quality audio than the NRD-525 did, and good audio quality is helpful when DXing.

Signal handling ability:

I had high hopes for this set, because it has a tuned front end (varactors controlled by the microprocessor), rather than the 1 MHz and wider passband filters common in radios of this kind. I was surprised to find that even while using a tuned unamplified loop, I was able to hear my local on 1200 when tuned to 1330 (a third order product with another local on 1070). The signal wasn't strong, and was unnoticeable at night, but it was disappointing, as some effort seems to have gone into front end design. Perhaps the varactors themselves contribute to the problem, as they don't take kindly to RF voltage swings in excess of their bias voltages. As a check that this wasn't an external product, I did feed the homebrew with a random wire, and could not find any evidence of 1200 on 1330. Using a random wire and the attenuator revealed second and third order products (the one on 940 was particularly strong) on all the predicted channels on LW, MW and the tropical bands when using the '535, which wasn't too much different from the problems observed on the '2010 under the same circumstances.

In general, I didn't find this a "quiet" radio; there seemed to be a noticeable noise floor if one could get away from splatter, but I realized this had more to do with digital noise from the radio getting into the loop rather than a noisy synthesized oscillator or third order products. This belief was verified, by observing much of the same noise on the other radios when using the loop; the noise went away when the '535 was powered down. Unfortunately, the '535 needed the loop in order to work well, and the loop was only a few feet away from the radio, so the digital noise might have overridden weak spurious signals generated during the reception of strong signals.

Image rejection seems easily as good as the 70dB+ specifications. I could barely generate a slight het on 540 when tuning the loop to semi-local KONP on 1450, which is better than the homebrew and any other radios recently used.

Other observations:

It's just as well that the AGC can be switched off, because splatter peaks can leave "holes" in the audio output, in the fast setting. The slow AGC setting occasionally had the same problem, and the gaps in audio were longer. The sound is harsher with AGC off, and one has to ride the RF (actually IF) gain to compensate. AGC "pumping" could be a problem with the '535 even in the slow position. For example there were several signals on 1580 along with subaudible heterodynes, and the mix was nearly unreadable on the '535 without the AGC off, and/or the RF gain down. The AR7030 had no problems with pumping on any of its AGC settings in comparison.

The digital S-meter is quite jumpy even with slow AGC, and can make it difficult to find nulls on stations when there is any extraneous noise or splatter. I didn't find the noise blanker of much use with the power line hash which sometimes turns up on MW here; others say it is quite effective on interference on shortwave signals.

As with many modern radios, the 200 memories are a treat to use, particularly on expeditions, as one can set them to favoured DX channels, and just scan through them using the tuning knob.

Conclusions:

The NRD-535 is easy to use, and has many fine capabilities, but is not the ultimate MW receiver in spite of its automatically tuned front end. Medium wave DXing presents many challenges to the demodulation capabilities of radios, and, except for the SSB technique described above, I was not entirely happy with its abilities, in spite of the range of its controls. Admittedly, my location is a challenging one for any radio, but the NRD-535 is more expensive than most of the widely available communications receivers, so I felt that it should be judged by stricter standards.

(thanks to Victoria DXer Walt Salmaniw for the loan of his NRD-535D for the purposes of this review)

IRCA Reprints

The IRCA maintains a large file of articles which have appeared in past issues of DX Monitor. These articles cover a wide variety of topics, including: antenna theory and construction, tips for the foreign BCB DXer, how to improve your DXing skills, history of DXing and broadcasting, lists of stations by subject, construction projects and receiver modification, receiver reviews, medium wave propagation, and more. Copies are available for a nominal charge. For a list of reprints, send \$1.00 to:

**IRCA Reprints, c/o Steve Ratzlaff, 1885 E Bayshore Rd Sp 90,
E Palo Alto CA 94303.**

IRCA Stationery

Red and black masthead with the IRCA logo and name. Great for using when writing for verifications. 100 sheets, \$5.00. Order from the IRCA Bookstore, by sending \$5.00 (in US funds) to:

IRCA Bookstore, 9705 Mary N.W., Seattle, WA 98117-2334. Thank you!