R31 #2-1

A Review of the Drake R-7A

Craig Healy

I bought a Drake R-7A last summer and thought I'd share some observations on it. Sensitivity is quite good- 4 microvolts for 10 db signal to noise ratio on AM. Intermodulation specification calls for 99 db dynamic range. Image rejection is greater than 80 db. Antenna input impedance is 50 ohms on all ranges but 0-.5 mHz. There it is 200 ohms. It has digital frequency readout, covers 0-30 mHz with no gaps, has a noise blanker as standard and comes with the 2.3 and .5 mHz second I.F. filters.

When I started looking for a radio to replace my R-390A, I had a few requirements in mind:

1. Performance- It's gotta be good!
2. Size- After two years of moving the R-390A to the beach house, I was determined the next radio had to be smaller than a breadbox and light enough to carry under one arm easily.
3. Power- Had to work on 12 vdc as well as house current.
4. Coverage- At least 100 kHz to 30 mHz.

The R-7A did this and more. Also, since it is built in the USA, parts and service are a snap.

After a few months of use, I'm quite happy with it. Some points:

12 volt operation is provided by a jack on the back. When operating on house current, about a half ampere of 12 vdc (13.5 volts actually) is available to power outboard gear. I power a loop amplifier with it and no increase of heat in the power supply is noticed.

Tape output- At the correct level for most HiFi equipment. Works fine with my Sony reel to reel. This level is not effected by the setting of the volume control.

Antenna selector- It can switch between three antennas and send two of these out to another receiver. By putting one antenna to "main" and a second one to "ext. rcvr" and putting the selector switch to "main/main" the splitter works as a combiner. Such as with two phased longwires....or longwire and loop, or.....

As I suspected, sensitivity is more than adequate. I use an external 35 Mhz low pass filter. There are three TV stations and an FM not too far away and I prefer not to have their signals in my radio. They caused spurs in my R-390A. A 3db pad is also used between the R-7A and the filter, mostly for properly terminating the filter in a 50 ohm load. Even with all this stuff between the radio and the antenna, external noise is still the limiting factor on weak signal reception.

Strong signal handling seems fine. My location isn't too tough, though. The three strongest signals are 65mv/m, 30 mv/m and 28 mv/m. By comparison, at one mile, a one kilowatt non-directional station will show 150-250 mv/m signal strength. Three signals less than 100 mv/m is not a hard test. A few weak internally generated signals are audible. None are a nuisance.

The radio is built with 2.3 and .5 mHz second I.F. filters. A bypass position is wired in which only uses the first I.F. filter of 8-10 kHz bandwidth. Almost HiFi in sound quality. Factory options of interest are filters of 6 or 4 kHz bandwidth. Sherwood in Denver makes a 3 kHz filter. I haven't used any of these, yet.

Notch filter- Quite effective and easy to use. There is an in-out switch control, with a knob to position the notch in the passband.

Three AGC speeds are provided, plus "off" for manual gain control only. "Slow" and "medium" are good for BCB DX. "Fast" is for code trasmission with full break-in. (QSK in ham lingo) This is what the factory said when I inquired about poor AM operation in "fast" mode.

The digital display reads out to the nearest hundred Hertz. It does jump back and forth when the frequency is about halfway between 100 Hz points. I don't find it a problem, though. Stability is great, short or long term. I leave my R-7A on continually as is my habit with some transistorized equipment. If any drift is noticed, chances are pretty good it's at the other end.

The noise blanker is pretty good, depending on what it's up against. I haven't seen a more effective one, and this has no adverse effects on a desired signal. I did have experience with a blanker on another brand of radio that caused spurs and intermodulation noise in the presence of a strong signal. This one appears to be pretty solid.

Audio- The AM mode is only fair. The audio is much cleaner and clearer in the SSB/CW mode. The internal BFO must be centered on the carrier frequency, of course. This effect is much more pronounced with weak signals. Upper or lower sideband reception can be chosen with the pass-band tuning without disturbing the main tuning. A good synchronous detector would help a lot here. It looks quite easy to add, too. I am working on a circuit, now. The internal speaker is as good as a small speaker can be in a less than optimal enclosure. An external speaker does help greatly. A headphone jack on the front seems to drive most any headphone well.

Tuning range- The top end of the BCB is a problem. The bandpass filters in the front end are arrayed so that one filter covers the BCB. This is fine except that when this filter is selected, the radio (this one at least) only tunes up to around 1545 kHz. To get the rest of the band, you must use the next bandpass filter up. This has a low end cutoff point of around 1650 kHz, and causes a noticeable decrease in signal strength from 1500-1610 kHz. Switching in the built-in preamp helps some but it still isn't great. This preamp is inactive below 1500 kHz, by the way. Example: Local station WADK-1540 is about S-7½. With the preamp, S-8½. By going over-range on the 1.0-1.5 mHz position the signal is about 10 db over S-9. This may seem like a lot of signal, but weak stations do disappear into the noise. I tried extending the range of the tuning oscillator to cover up to 1610 kHz or so. This produced a very annoying birdie around 1595 kHz. This wasn't satisfactory so another method was tried. By moving the band selector from the 1.5-2.5 mHz band back toward the 1.0-1.5 mHz position, a point was found that had the tuning oscillator in the 1.5-2.5 mHz band range working with the BCB front end filter. This was satisfactory on a temporary basis. Long term efforts will involve moving the low frequency cutoff point of the 1.5-2.5 mHz band filter to the 1.5 mHz area. This is the only annoying quirk found.

Durability seems to be fine. Good construction and parts are in evidence throughout the unit. My house was hit by lightning late this summer. The strike took out some coax connectors and an antenna loading coil. The radio only lost a small antenna input disc capacitor. No other problems were noted. A good cold water pipe ground did help, as did a "Blitz Bug" type lightning arrestor.

In conclusion, I'm very happy with the radio. Longwave performance is quite good, shortwave is excellent, and the BCB is at least as good as the R-390A. I'd still buy it if I had to do it over again.

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Twisting the dial

One of the things some KING-AM people learned a few months back, when holding "focus sessions" with soft-rock listeners, was that they were confused by programs from RKO II Radio Network. North King County listeners, at least, told KING researchers they thought of KRKO, Everett, when they heard such programs. A short time later, KING dropped the RKO II Network, returned to NBC.

In a summer visit to Beltsville, Md., where they assemble the Arbitron radio ratings, another Seattle station's manager noted two diaries with indications of listening to "RKO-AM," very close to KRKO's identifying slogan of "RKO-14."

These diary entries were credited to KING-AM in the Spring, 1982, rating book.

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AN R-7 UPDATE by Don Moman

By the time this gets into print it will have been nearly a year ago that my Drake R-7 arrived. Here are my comments and observations on the first year of the relationship

First I must mention that my R-7 has a tougher life than most--it does a lot of travelling around on DX'peditions and gets bounced around even though it's in a well padded case. But no vibration related problems have surfaced. It was recently on a winter trip where the temperature was -25°C! Yet both my Drake and another R-7 functioned perfectly, even at these extremely cold temperatures.

Not long after I wrote my original review I found the VFO knob was becoming very rough, especially when you tried to turn it rapidly. After lubricating everything that didn't need it, I finally found that a few drops of oil into the the bushing where the VFO knob goes through the front panel cured the problem. I have no complaints about the feel of the dial now.

After becoming interested in MW DX again I started to notice lots of weak heterodynes that were generated internally. Shutting off the digital display via the front panel control removed a lot of the annoying signals. Later I found that sliding the top cover back a few inches made all the noise go away. I built a wooden top for it and that is what I use now. All heterodynes, no matter how weak, are "real" ones and indicate some station on a split frequency is trying to come through. I tried different methods of shielding which improved things a lot, but were never perfect until now. I am sure the hets were not from the power supply, as noticed by others. Two reasons--these hets would really wipe out longwave but I have no problem on longwave; and these hets are not harmonics of a specific frequency (like TVI) as the power supply interference is supposed to be. The nature of the solution makes it unlikely the power supply is the culprit.

The display does create the noise and it is audible on all antennae, and even without any at all. Basically all the noise is coming from the TTL counter chips and/or the multiplexed display and is being carried back into the RF input circuit by placing the cover on the receiver (ground loops?) The wood gets rid of the problem nicely, seeing wood doesn't conduct RF too well! But the wood does make it easier for the loop to pick up noise from the R-7. As the receiver is no longer shielded, I must have the loop about 6 feet away or else I get noise pickup. No problem with a longwire, though there might be if you ran the wire over the top of the unit.

Of course, local signal pickup is also enhanced, but locals are just over S9 with no antenna (with one, they are 70-80 dB over) and are far weaker than I can null them so it's no trouble to me.

Much has been written about the heat that this receiver produces. It does get very hot--too hot to touch if you go right on the heat sink, but so far it has not caused any problems. The readout is still "right on" and I have never had any drifting problem. I have heard that high humidity may cause drifting, but that seldom is a feature of our Alberta weather!

I've done a few mods on my R-7 to improve certain physical qualities. I added BNC type RF connectors for antenna inputs, and made the AC cord removable by installing a 3-conductor plug. This is what should have been done at the factory--why have a set designed for 12-volt DX with a non-removable 117v AC cord? I also "ruggedized" the circuit boards by using RTV (Silastic--liquid rubber) to minimize a chance of a wire or component coming loose from vibration.

I am still very happy with the R-7 and although some of the features of the NRD-515 would be very nice to have I would only be gaining convenience if I was to "trade". The 515 has one major drawback for me--it is only for 117v AC, and since I do a lot of camping I need a set that runs from 12v DC.

Al Dreham (11714 SW 129 Court, Miami, FL 33186) has created an information exchange between R-7 owners and I have found his letters and comments most interesting and informative in letting us know about other owners' problems and factory answers. Drop him a line for more info. I'd also like to hear from other interested readers. Your comments and questions are always welcome. (ed. note: write to Don at 6815 12th Ave., Edmonton, Alberta, Canada T6K 3J6)

The Drake R7
by Chuck Hutton

Drake has released the R7 receiver as of late July 1979. Having obtained one immediately on a loan-to-test basis, I hope the following theory and performance review will introduce the R7 to DXers. Two basic models are available: the R7 and the R7/DR7. The R7 has analog only frequency readout and covers 10-500, 500-1000, 1000-1500, 1500-2000, 2500-3000, 3500-4000, 5000-5500, 7000-7500, 14000-14500, 21000-21500, and 28500-29000 kHz. Frequency coverage is in 500 kHz bands with generous PTO overlap of at least 125 kHz at the top and bottom of each band. The R7/DR7 has digital and analog readout and covers 0-30 MHz with no gaps. Otherwise there are no differences in performance. The word is that of mid-August Drake has not sent any R7's to dealers.

Some design features are very interesting so I will trace the signal path through the receiver in order to discuss them: (1) in the RF stage no amplification takes place unless a 10 dB gain pushbutton controlled preamp is switched in. As can be seen from the sensitivity specs presented later, the sensitivity is very good even without the preamp. It is likely that the preamp will only be needed for very weak signal DX at the top end of the HF band. The preamp is non-operative below 1.5 MHz as Drake realized the extra gain could only hurt strong signal handling. (2) input selectivity is provided by 9 broadband bandpass filters, each covering part of the 0-30 MHz spectrum. Therefore, no preselector to adjust. (3) the incoming RF signal passes immediately to a special high level double balanced diode mixer that is designed for excellent strong signal handling. (4) the first IF is at 48.05 MHz for improved image rejection. Up conversion to such a high IF is made possible by a phase-locked loop HF oscillator.

Important controls/functions include: (1) front panel diode-switched selectivity filters. A 2300 Hz filter is standard; 300, 500, 1800, 4000, and 6000 Hz filters are optional at $52. (2) passband tuning, allowing some flexibility in selectivity. (3) Receiver Incremental Tuning, for use in varying the received frequency up or down a matter of a few kilohertz. Not of great interest to MW DXers. (4) a tuneable IF notch filter for reducing heterodyne interference. (5) switchable AGC time constants for best reception of any transmission mode. (6) an "AUX PROGRAM" selector switch for choosing any of eight 500 kHz bands or crystal controlled frequencies programmed into the accessory AUX7 program board. This board allows quick switching to often-used bands, quick switching to any of up to 8 crystal controlled frequencies, or in the case of the R7, it allows reception of any eight 500 kHz bands between 0 and 30 MHz. This last option should allow the SW DXer to make good use of the R7. (7) main and alternate antenna switch with back panel connections for each. (8) a crystal calibrator emitting markers every 25 kHz. (9) on the DR7 model, the digital dial reads out to the nearest 100 Hz. (10) an impulse type noise blanker is optional. Installation is easy as Drake has included a front panel switch for the NB and also provided for easy mounting a la the SPR-4 noise blanker. (11) (11) A "store" switch for the digital dial. It freezes the display on the frequency you are tuned to, allowing you to tune away and remember where you were originally tuned to. Electronic scratch paper. (12) the digital dial may also be used as a 150 mHz frequency counter. (13) a tape out jack is provided. (14) an internal speaker is provided. (15) a front panel headphone jack. (16) can be operated off either 110/240 volt AC or 13.8 v DC.

SPECIFICATIONS

Stability: less than 100 Hz drift after temperature stabilization, even with ±10% line voltage variation. Temperature variation is not defined. No time frame is mentioned for the drift.

Digital dial accuracy: 15 ppm ±100 Hertz

Analog dial accuracy: ±1 kHz when calibrated to the nearest 25 kHz crystal marker.

Sensitivity: (SSB/CW) less than 1 uV from .01-1.5 MHz; less than .5 uV with no preamp and less than .2 uV with preamp from 1.5-30 MHz.

(AM) less than 4 uV from 0-1.5 MHz; less than 2 uV with no preamp and less than 1.2 uV with preamp from 1.5-30 MHz. MW sensitivity is continuously variable via a pot on a board inside the receiver. It could be worthwhile to mount this pot externally.

Selectivity: with stock filter, 2.3 kHz at -6 dB and 4.2 kHz at -60 dB (1.8 : 1 shape factor). Other filters have similar shape factors. Gilfer Associates and at least one other supplier offer different selectivities from what Drake can supply.

Two tone dynamic range: (signals spaced 50 kHz or more) 99 dB from 1.5-30 MHz with no preamp; 95 dB with preamp. No figures are given for 0-1.5 mHz.

Third order intermodulation intercept point: +20 dBm with no preamp; +10 dBm with preamp.

Image rejection: greater than 80 dB at all frequencies.

Audio output: 2.5 watts at less than 10% total harmonic distortion.

Ultimate selectivity: greater than 100 dB

Blocking: greater than 145 dB above noise floor.

AGC performance: less than 4 dB audio level change with 100 dB change in RF input. AGC threshold is .8 uV with preamp off and .25 uV with preamp on.

Weight: 18.4 pounds Dimensions: 13" deep x 13.6" wide x 4.6" high