

AN HRO STORY

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The complete set: coils, power unit, speaker, and receiver itself.

In late 1945 the National Company had a major problem. World War II was over and, not only did they have nothing to sell, but the military was dumping their best products on the market as surplus.

How National coped (or failed to cope) with this problem is the story of the HRO-5A. First advertised in QST in October 1934, the HRO was a huge success. When WW II broke out, National had the best communications receiver on the market. Its familiar black box and distinctive PW dial appeared in photographs of advanced amateur and commercial stations until the late 1940s.

Early in the war, National produced the RCE, the HRO-M and the HRO-MX. These units used the same glass tubes as, and were substantially identical to, their civilian counterparts, but were supplied without amateur bandspread coils. By 1944, the HRO-5 and HRO-W were in production. These receivers had metal tubes and an improved crystal filter, but were also supplied to the military without bandspread coils. In addition, HRO variants were made to Navy requirements. These included the RAS (see Paul Bohlander's article in the October 1990 OTB, Vol. 31 No. 30), RAW, and RBJ. All the Navy versions were supplied without S-meters and crystal filters, similar to the prewar HRO Jr. series.

When National offered the HRO-5A in 1946, it had to compete with all of the above receivers. Needless to say, the surplus sets were offered at significant discounts from the \$310 price of the HRO-5A. For example, the HRO-W was widely

advertised in QST and other ham magazines at \$217.

The executives of National were keenly aware of the weakness of their marketing position. In the February 1946 National column/ad in QST, S. W. Bateman tried to distance the newly released HRO-5A from its war-surplus cousins. Poor Mr. Bateman had difficulty in hiding his pride over the war-surplus HRO. The best he could do was to point out that the military HROs lacked bandspread coils, and offered to sell special sets for \$60. The fact was that the HRO-5A was basically the same receiver as was introduced

in 1934. Physically, the set was still housed in a black box with a separate power supply and plug-in coils. The operating controls were also almost the same. Only a skirted knob on the crystal filter, and short-handle toggle switches for the AVC, B+, and S meter cutoff switches, differentiated the old and new HROs.

In retrospect, the internal differences were also superficial. Tube types changed from the glass 2.5-volt originals to six-volt types and finally to six-volt metal equivalents. IF cans changed from round to square, and there were many other minor changes. As far as major technical changes were concerned, the HRO had entered a time warp. For those interested in tracking the glacial evolution of the receiver, "Dating the Early HRO" by Charles Fisher in the AWA Review Volume 4 provides much detail for prewar HROs.

When the HRO-5A was advertised in the January 1946 QST, as a "new" receiver incorporating design improvements, the hams were not fooled. They knew advertising hype when they saw it. As far as they were concerned, the HRO-5A was an HRO-W with a square S-meter and bandspread coils. National quickly released the HRO-5A1 with a series noise limiter in late 1946 and the HRO-7 in early 1947. Although the HRO-7 offered a new stabilized oscillator and a modernized cabinet, it was essentially an HRO-5. National did not really upgrade the design until the HRO-50 was released in 1950.

Although the HRO-50 and its successor the -60 were to endure until 1964, National never re-

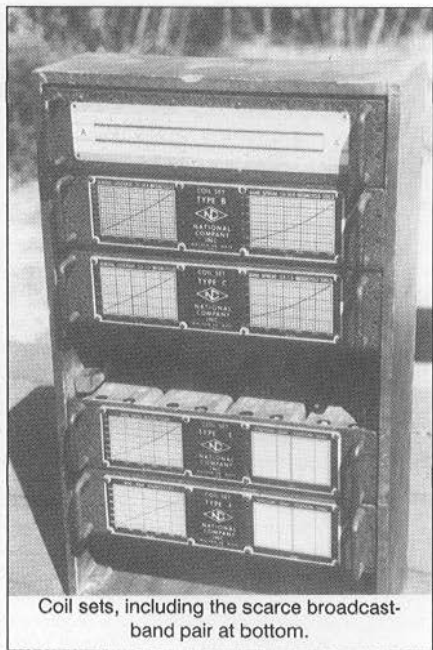
gained the technical dominance that it had in 1945. The HRO had been "cutting edge" in 1934 but was obsolete in 1945. New receiver technology offered by Collins in 1946 ultimately dominated the market. To the end, HROs still bore an unmistakable resemblance to the 1934 original. The HRO's 30-year life, which spanned dramatic changes in the art of communication-receiver design, is a testament to the genius and foresight of its designers. For the collector of communication receivers, an HRO is a prize. Because of simplicity and rugged design, it can usually be restored to good working condition. Physically it is often in good shape, having been treated as a cherished artifact of bygone days.

HROs fall into five broad categories: the pre-war models, the wartime HROs, the postwar versions, the gray-cabinet types, and the rare transistorized HRO-500 and -600. The gray models include the HRO-7 (essentially an HRO-5A), the HRO-50, and the HRO-60. The -50 and -60 include an internal power supply. The HRO-500 and -600 are totally different. Both are completely transistorized and use complex frequency-synthesis schemes to replace the plug-in coils.

HROs were often sold without a power supply. If a National power supply is available, it should be a type 697 for 6-volt tubes or a 5897 for 2.5 volts. Most HROs came with four sets of coils. Not all coil sets were bandspreadable. Regardless, the coils should be stamped with the same serial number as the set itself. Speakers for all models are rare.

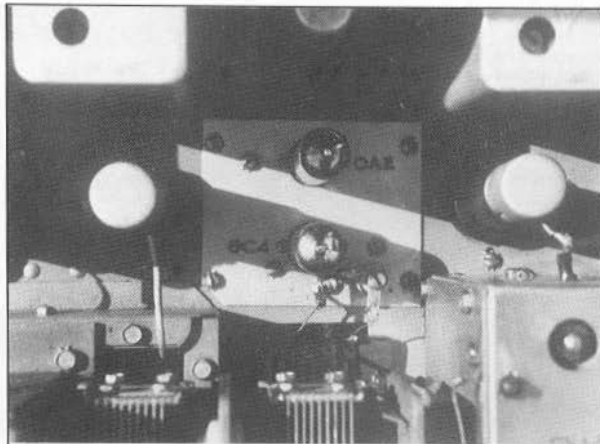
HROs of all types are in demand. As might be expected, prices for all categories have been rising, with the early versions more expensive because of rarity. Recently the later models have become more desirable. The units had outstanding audio performance and the rebirth of AM phone on the ham bands has increased interest in quality audio.

The main problem with old HROs is finding one intact. Hams loved to improve their receivers. It is not unusual to find a vintage set with new IF transformers, S-meter, noise limiter, voltage regulator, and even a product detector. Because of its slow evolution and relatively open layout, HROs were easy to upgrade. It is therefore dangerous to buy one without inspecting it. Recently I had an opportunity to explore these dangers. I was offered an opportunity to acquire two receivers "sight unseen." Naturally, I jumped at the chance. I had been told that they were complete, but upon arrival, I was not surprised that they were not as expected. One proved to be an early HRO that had been "improved" by its owner. Not only did it fail to work, but holes had been drilled in the front panel for a noise-limiter adjustment control and an on-off switch. Such receivers re-



quire complete disassembly and mechanical restoration of the front panel. A good guide in this process is the article by Bill Fizette and John Wiesner, "Restoration of the Early HRO Receiver" in the December 1983 OTB (Vol. 24 No. 3) and the June 1984 issue (Vol. 25 No. 1).

The other receiver was unusual. Its identification tag indicated that it was an HRO-5TA1, but the audio gain control and limiter control were swapped. The main tuning knob had a mirrored center like that of an HRO-7. Inside, there were two tubes in place of the 6K7 oscillator: a 6C4 and an 0A2. Where the normal 6SQ7 2nd detector tube should be, a 6H6 was located. With a sinking feeling, I opened the bottom, but was surprised to see that the receiver appeared to be absolutely unmodified. The slightly brown color of the tube shields and chassis indicated that the receiver had been fungus-proofed for military use. Stamped on the lid was the date, September 26, 1946, that the work had been done. Confirming that this was a military HRO was the Navy identification code CNA-53110 stamped on the crystal-filter housing. Unlike military HROs of the period, the coils, except for the "A" set, were bandspreadable and had the familiar HRO-5A labels. The A coil was not only bandspreadable, but had the slide-rule decal characteristic of the later model HROs. All coils were stamped with the serial number of the receiver! Checking my QSTs, I determined that this HRO was produced within



The new oscillator, compensating capacitor, and regulator tube.

the period that the HRO-5A and HRO-5A1 were advertised. Since mine was clearly unusual, I examined all of the HRO improvement articles published during the period. Finally, in the June 1949 QST, I found an article by Loren Windom, W8GZ, who described the exact steps required to update an HRO-W or earlier model to an HRO-7. In this article he describes the steps required to stabilize the oscillator, which include the following:

- Replacing the 6C6 oscillator with a 6C4-OA2 combination mounted on a subchassis.
- Modification of the coil sets, adding a temperature-compensating capacitor placed near the oscillator tube.
- Replacing the second detector with a 6H6; adding a 6H6 noise limiter and 6SJ7 first audio stage.

Because all the modifications listed had been applied to it, I was now sure that my HRO-5A1 was an HRO-7 in an HRO-5 case. However, the color of the main tuning dial troubled me. The HRO-7 had been released in the new National gray cabinet and the PW tuning dial was light gray

to match. Another advertisement, in the May 1949 QST, resolved the problem. The rack-mounted version of the HRO-7, the HRO-7C, had been supplied in a black crackle finish and the knob was black to match. My HRO was "factory stock."

Obviously, National had had the ability in early 1946 to release an HRO with significant improvements. With its highly stable oscillator and effective noise limiter, the improved HRO-5A1 might have given the Collins 75A some real competition. National's conservative move, to hold up the release of the HRO-7 until new sheet metal was ready, proved to be a costly

error. National never recovered their momentum and the rest is history.

The process that I went through to identify the HRO and study its differences illustrates the importance of caution and a good reference library. Collectors should avoid hasty actions to repair old radios. Radios were continually improved by their manufacturers. A factory "mod" is very difficult to differentiate from a quality repair-shop or "ham" modification. Collectors must learn to distinguish when restoration is unavoidable or a good cleaning will suffice. There is no question that a 50-year-old radio will have leaky capacitors and resistors that have changed value. Should the radio play "as good as new," or should it be preserved intact, leaky condensers and all, as an example of the radio manufacturer's art? I, for one, cannot answer this question. I like radios that play well, and will tinker with a set endlessly until it does. However, I try to avoid replacing parts unless they are inoperative. The fact is that a beautiful restoration will be less valuable than an original which has been cleaned and preserved intact.

THE RDG: AN UNUSUAL HRO-DERIVATIVE

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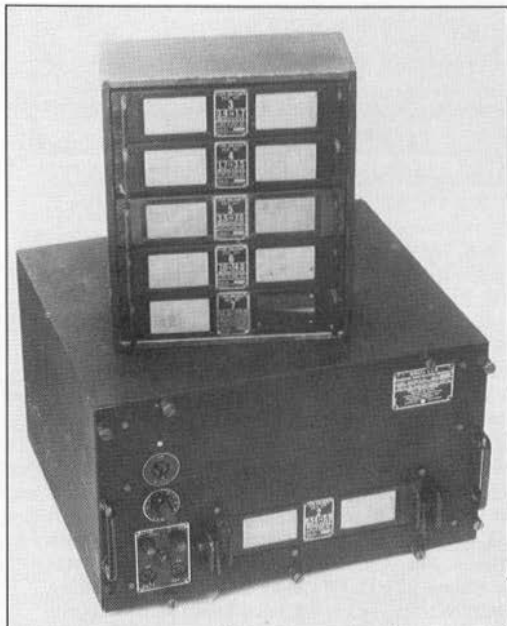
Ludwell Sibley

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A little-known offshoot of the metal-tube HRO receiver is the Navy RDG (CNA-46ADU). This set, built for spectrum-surveillance use, is intended solely to operate an external oscilloscope display. Like a panoramic adapter, the 'scope displays frequency on its horizontal sweep, and signal strength on its vertical axis, thus showing all activity in a given frequency band as a series of spikes.

A system like this is valuable for frequency-management or electronic-intelligence purposes. Once an unknown (or suspicious) signal appears, a second, conventional, receiver would be used to identify it, possibly using a separate frequency meter like the LM-series to measure its exact frequency. A direction-finder network could then be brought to bear.

The RDG is a repackaged HRO Jr., less the

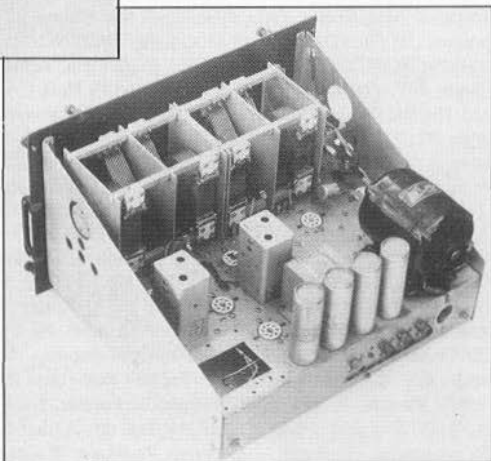


intended for a 455-kHz IF, with nameplates specifying their being part of the RDG set. Frequency ranges differ slightly from the usual for HROs: 0.54-0.9, 0.9-1.7, 1.7-3.5, 3.5-7.0, 7.0-14, and 14-29 MHz. The tuning capacitor is an unusual split-stator design with two sections in series for mechanical balance. Front-panel controls are minimal: power, motor, and plate switches, fuses, a pilot light, and an RF gain control. The set is housed in a panel-and-cabinet format 11-7/16" above the shock mounts and 16" deep. Weight is a dainty 100 pounds.

The RDG output was to be viewed on a "panoramic dual display unit, experimental model XCW." During the several months before the XCW was ready, modified Dumont 241 scopes were pressed into service.

The National drawings covering the RDG are dated June 1944. The set pictured, S/N 62, is stamped May 1, 1945. Photos: Alan Douglas.

noise limiter, AVC, and BFO, but with power supply built in. The output tube is triode-connected as a cathode follower. Because tracking of the RF stages is important in this application, it has an untuned antenna-isolator stage. A 1/20 HP synchronous motor constantly turns the tuning capacitor at 900 RPM through a worm gear. Thus the receiver sweeps its frequency band 15 times per second. With each revolution, a cam switch sends a synchronizing pulse to start the 'scope sweep. There is no provision for manual tuning. The IF stages are loaded with resistors to give a wide bandwidth of 10 to 15 kHz (6 dB down).



The RDG uses non-bandspread coilsets

