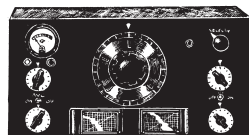


THE COMMUNICATIONS RECEIVER



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A World-War II National HRO

Introduction

In 1934 the National Company of Malden, MA created what was to become one of the most famous of communications receivers, the HRO. Introduced in October of 1934, it survived in one form or another for some 30 years, with who-knows how many thousands being manufactured and sold. For several years, and through several variations and modifications, they still bore a remarkable resemblance to the original. The HRO-W, which is the subject of this column, was one such.

So why the interest in just another HRO? Let's see if I can make the case. The -W model was designed in 1944, along with the HRO-5, to US Army Signal Corps JAN AWS (Joint Army Navy American War Specifications) specs. This particular set, Serial No. K329, has a label with a 1945 contract date and a Signal Corps acceptance stamp (SC7091P) located in three places: the cabinet outside, the chassis, and on one of the IF transformers.

The complete package consists of the receiver, a matched National #697 power supply, the nine matched coil sets in wood boxes, a loud-

speaker, and a manual. Uniquely, the original nine matched coil sets were still with the radio, as established by the K329 serial number stamped on each. The frequency range was a remarkable 50 kHz to 30 MHz, continuous coverage. While this was common practice with National military HROs, as for example the Navy RAS, what is unusual is finding the original complete set of coils with the receiver.

This is the first HRO-W model that the writer has seen in some 15 years of working with these sets. Perhaps not too many were produced, once it was established in 1945 that the war was almost over.

Another unique design feature of this radio is that it showed characteristics that were closer to the 1946 post-war HRO-5A than to previous non-military models. Noteworthy is the revised coil chart, consisting of a single engraved metal plate, which replaced the two individual chart frames with their paper charts and celluloid masks. Also, the coils were supplied without bandspread ranges (a feature typically for amateur operation) as this set was strictly for military use. It is probable that National, in gearing up for

the peacetime market, simply made a label change to the HRO-5 and -W sets, and marketed them as the HRO-5A in 1946. (A later version, the -5A1, had a noise limiter installed.)

The sub-chassis wiring and components were of a very high quality, no doubt due to the upgraded demands of the military after several years of using these radios under wartime conditions. After the wiring was complete, the chassis was subjected to the infamous anti-fungal protective spray treatment.

By agreement with the owner, the object of this re-



The complete HRO-W package described in the text.

pair/restoration was to make the radio work with as little modification as possible. It is deemed an interesting historical artifact, built to the highest standards of the day, and the decision was that it should be maintained that way so that future owners can benefit from inspecting an original item.

The Restoration Work

There was considerable storage debris inside the cabinet, so the shroud was removed and the chassis cleaned. The PW dial was very stiff, so the gearbox cap was removed and the old grease was replaced along with a liberal application of WD-40. At the same time the dial was disassembled and cleaned and the main knob was buffed to a high gloss with polishing compound and a cloth wheel. It was reassembled following the standard procedure for PW dials.

Usually the by-pass capacitors in a radio this old are bad, almost without exception. However, when I checked four of them, including the audio-coupling capacitor, all were found to be as good as modern high-quality units. Needless to say, I was delighted, as I saved several hours of work as well as honoring one of the goals of the job. Next, all tubes were checked on a military mutual-conductance (a TV-7/U) and all were found to be good. It appears they were all original items, as they carried the JAN designation. All shields and other original parts were in place; nothing was missing.

However, when the set was fired up with a good doghouse power supply (see "A Structured Approach to Fixing up Those Nice Old Radios" in this issue), the audio was terribly distorted. The fault was found to be in the cathode electrolytic for the 6SQ7 first audio tube, which was a dead short. To be safe, both of the set's cathode electrolytics were replaced, along with the first audio cathode resistor. The originals were disconnected and left in place.

Now all nine coil sets were checked to verify that the windings were intact and had not been blown out, as by a lightning surge. They were good, and were performance peaked at selected frequencies, one for each coil set. The owner was given instructions on how to make each coil set track across the dial. A surplus BC-221 or LM frequency can be used for this job (for all frequencies above 125 kc), but the procedure does involve considerable work and time.



A close-up of the label on the receiver.

The National speaker shown in the photo was somewhat "bassy" for communications work, although the owner reported he was quite pleased with it. A small modern communications speaker was adapted by mounting an output transformer inside, and it seemed to be easier to listen to. (NOTE: In contrast to the Navy RAS version of the HRO, the Signal Corps set followed the original design by incorporating the output transformer inside the speaker cabinet. If an HRO is used without this output transformer, the audio output tube must be removed to prevent burnout.)

Performance of the Restored Set

Typical of HRO receivers, this one is designed for use with a matched antenna system; a random short wire will not work very well at all. With the 6K7 front end, the sensitivity is about 3 μ V, not very good at all by today's standards. In fact, when comparing this with a cheap consumer radio of the period, the perception might be that the "cheapie" was more sensitive. In the absence of a good, tuned outdoor antenna system, the set might work better if an active antenna is used. If any reader has had experience along this line, we would like to hear of it.

Another experiment might be to try improving the audio quality by feeding a hi-fi audio amplifier, from the headphone jack. (NOTE: If you do this, be sure to unplug the 6V6 audio output tube; without an audio output transformer, it will self-destruct.) We have not tried this as yet.

This particular radio was a rare find, essentially original and in excellent condition. And in spite of its obvious shortcomings, it is a quality communications receiver that should continue to work for years, essentially trouble-free. ☐