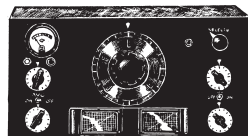


THE COMMUNICATIONS RECEIVER



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The RCA Radiomarine Corporation Model AR 8506B Liberty Ship and Victory Ship Receiver

By Gene Garrison

We are indebted to author Garrison for bringing this significant World War II era receiver to our attention. This receiver was part of the RMCA 4U radio console, the pride of the Radiomarine Corporation division of RCA. It is an interesting story about a radio that played a very important role in a critical time, when it was touch-and-go as to whether the Allies would prevail. W.F.

The RCA Radiomarine Corporation developed a 4U (4 units) radio system about 1940. The system included four independent receivers and three transmitters, all mounted in a single console. See the feature article "Liberty Ships and Victory Ships" elsewhere in this issue. One of the receivers included was the AR-8506-B.

According to its instruction manual (1), "The model AR-8506-B is a five band intermediate and high frequency radio receiver designed for service aboard ships or in land stations. This receiver was approved on February 6th, 1943, by the Federal Communications Commission for compliance with Subsection 8.130(b) as capable of being used and operated on board ships of the United States within the limitations regarding the radiation of energy imposed by Subsection 8.130(b)."

During World War II, the German Navy was highly successful in locating and attacking Allied convoys. It was claimed that their direction finding equipment was sensitive enough to detect radiations from regenerative receivers on board ships up to 100 miles distant. Locating a reference to the FCC Regulations of the era may detail the requirements of Subsection 8.130(b).

Design characteristics of the AR-8506-B

- A ten tube superheterodyne circuit, with a triple stage 1700 kHz intermediate frequency, covering the following bands: 85-220 kHz, 210-550 kHz, 1.9-5.4 MHz, 5.2-12 MHz, 11.5-25 MHz.

- Tube complement as follows: 6SG7 RF Am-

plifier, 6SG7 Mixer, 6J5 HF Oscillator, 6SG7 (3) 1st, 2nd and 3rd IF Amplifiers, 6SQ7 Detector, AVC, and 1st Audio Amplifier, 25L6/GT Audio Output, 25Z6 Rectifier, 6J5 BFO. A G-10 one-watt neon regulator bulb is used to provide a regulated voltage source for the oscillator. (The glow from this bulb also provides a front panel "power on" indicator.)

- Built to comply with F.C.C. Subsection 8.130(b), which limited radiation to 400 microwatts—thus reducing the vulnerability of the local oscillator signals of shipboard receivers to enemy radio direction finding.

- In order to provide a high degree of shielding, the AR-8506-B cabinet has no ventilation louvers. The steel front panel is copper-plated on

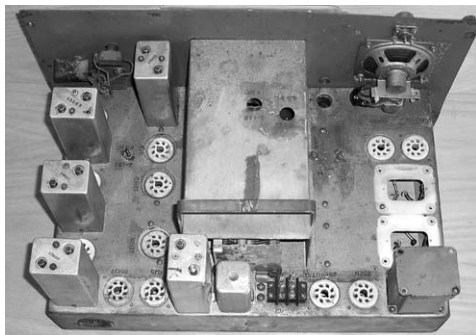


Front panel of the AR-8506-B prior to restoration.

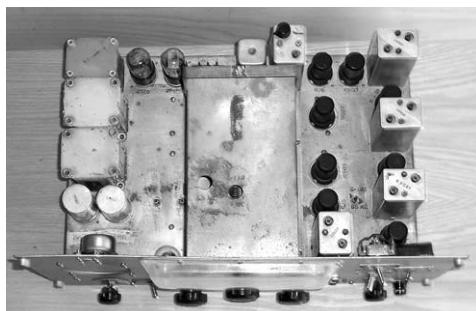
both sides and the steel cabinet is copper-plated on the inside. The RF oscillator and band switching sections, beneath the chassis, are shielded by steel covers. Other than the two headphone jacks, there are only two openings in the cabinet; one for the twist-lock power connector, and the other for the antenna lead.

- An accessory, the RM-8 Line Filter Unit, reduced radiation into the power source.

- This receiver input operates on 115 volts AC or DC, but was designed primarily for use DC shipboard power mains. It has no power transformer, the tube filaments being connected in series across the input voltage. When operated on AC, high voltage (B+) is obtained via a 25Z6 rectifier. Operation on 230 volts AC or DC was possible using an accessory RM-9 Resistor Unit



In this pre-restoration shot of the chassis a few components have already been removed for special treatment.



The AR-8506-B chassis after restoration.

(300 ohms, 75 watts).

- The antenna connection, located on a terminal strip on the rear of the chassis, accommodates a balanced doublet antenna. The band switch connects the doublet antenna as a “T” antenna to ground on Band 1 (85 - 220 kHz) and Band 2 (210 - 550 kHz), and as a doublet antenna on Bands 3 through 5.

- The weight of the receiver, in its cabinet, is 63 pounds.

The construction of this receiver is similar to that of the commercial and amateur receivers of the late 1930s and early 1940s. The manufacture of these sets for the merchant marine fleet may not have had the same priority on the use of resources as did the military sets of the World War II period.

But this was absolutely a quality product. These radios were built for the greatest maritime/wartime need our nation has ever experienced. Cost was probably not an issue, but production time was critical, with intense pressure on parts suppliers, who in turn were laboring under material shortages. This may be one reason that the front panel is not overly attractive, with some operating conveniences lacking. The radio is rugged, well built, and—as men-

tioned—is well shielded and not exactly a lightweight.

Another indication of quality manufacture is the long-term calibration stability. The “as-found” calibration of this set was precise, requiring no tweaking.

Its design is not as compact or as rugged as the tactical military sets (i.e., BC 342, BC 348, etc.) of that time. However, it is perhaps unfair to compare the construction of this marine radio to that of a tactical receiver such as the BC-348 or the BC-342. The radio room of a ship, unless under attack, is a far more forgiving environment.

There is no front panel BFO pitch control, dial lighting, antenna trimmer, calibrator, crystal filter, dial lock, standby switch, or signal strength meter. There is no engraving on the front panel. Controls are identified by labels made from an early form of plastic. The labels are attached with small screws. Economy in design and speed in manufacturing may have been production goals.

Though there is no BFO control on the front panel, there is a trimmer knob on the top of the BFO coil can. (*One can speculate on the reasons for this, but the concept is found in numerous receivers of the late 1930s. W.F.*)

Restoring an AR-8506-B

The receiver to be restored was AR-8506-B, Serial Number 2636, with a date of manufacture of October, 1944. The two plug-in power supply electrolytic capacitors were leaky, and the audio output transformer primary winding was open. The front panel was bent, and the paint was cracked. The major restoration efforts included a thorough cleaning of the chassis, rebuilding the electrolytics, and rebuilding the audio output transformer.

Cleaning of the chassis was done by covering
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Here the radio is buttoned up in its cabinet, shock-mounted on a baseboard and ready for display.

1. Use solder with low rosin content, such as Kester #24-6337-8817.

2. Be sure the soldering iron is well up to temperature before using so that most of the flux is vaporized. Mine is adjustable, and I use it between 750 and 800°F for this type of connection.

3. Pre-tin all materials before making the final solder connection. After tinning, clean all residue from the item before making the final connection.

4. Many of the old insulated wires have a residue from the rubber undercoating which makes them very difficult to tin. I have found by careful use of a small amount of non-corrosive soldering paste they can be easily tinned. Be careful that the fabric outer insulation doesn't wick up the soldering paste because it will discolor the fabric.

5. When the final solder joint is completed, clean with a suitable solvent being sure to cover surrounding areas to prevent splatters. Post-It note sheets are ideal for covering panels etc.

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Here is a great restoration fix from John Kaetz, Jr. (Bessemer, AL):

During restoration of a Gloritone 99A, a condition sounding like "silver migration disease" became apparent. It only occurred occasionally so it took a good deal of time to pin it down to the output IF transformer. It didn't respond to the limited things that could be done to repair it. The IF transformer was a 262 kHz unit, close-coupled and single-tuned, appearing to be alternate-layer wound. The can was 2 inches tall by two inches square—not exactly an off-the-shelf item.

Remembering that auto radios frequently use 262.5 kHz IFs and having a few junkers around, I found an old 12 volt B+ tube type containing a couple of ¾" units mounted on the PC board.

One was removed, checked and looked good. The height was exactly the same as the old IF can but otherwise posed a challenge to mount in an acceptable manner.

I found a piece of ½" wide by 0.05" thick steel strip, cut a piece 2⅝" long, and drilled a hole at each end to match the mounting holes in the chassis for the old IF can. I then drilled a hole in the center large enough to pass an alignment tool through for the hex-hole tuning slugs and two small ones on each side of the center hole ¼" apart for the mounting ears.

I filed the edges a bit to get more clearance for the terminals, then stuck the ears through their holes and soldered them in place, thus securing the can to the strip. The terminals straddled the steel strip, hanging off each side. The assembly was placed over the holes in the chassis from underneath to get a bit of headroom in the old can, and then the old can was bolted over the whole thing. From the top it looked just like it did from the factory. I didn't even have to drill a hole in the top of the old can for alignment, being able to pass the tool all the way through the bottom slug from underneath the chassis to tune the top slug.

I then wired it up, being careful to use the proper connections previously sketched, did a touch-up alignment and it worked perfectly. In fact, overall performance was better than the old one when the old one wasn't breaking down. The replacement, not being close-coupled, has better selectivity.

This method would work for a variety of different situations and the mounting base could utilize perfbord that might be more easily worked to fit different transformers or mounting situations. It might not even be necessary to ground the new can because it is inside the old one, which is grounded. 

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all the air transformers and IF cans with plastic sandwich bags and masking tape, then washing with "Simple Green" and a scrub brush. No attempt was made to restore the steel chassis' finish to an "as new" condition, as that step would have required removal of all components.

The electrolytic cans were cut open using a jeweler's saw and the internal capacitors replaced with new components. Being aluminum, the cans could not be soldered back onto their bases. Instead, they were re-fastened with epoxy cement.

The case of the faulty Kenyon audio trans-

former was opened so that the defective transformer core could be removed. It was replaced in the case with an equivalent miniature Stancor unit. Also, one of the "bathtub" paper capacitors was replaced with a new (old stock) component.

After the technical issues were successfully resolved, the front panel paint was stripped, and the panel and the cabinet were repainted. I matched the original color, which I term "Radiomarine Blue." In some RMCA gear a gray color was used. (*I have seen other RMCA receivers with the blue color used by the author. W.F.*)