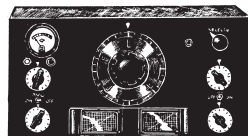


THE COMMUNICATIONS RECEIVER



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The Kaar Model 25E Marine Communications Receiver

By William B. Fizette, W2DGB, and Tom Laszynski, K8JRM

In the January and April 2007 issues of the AWA Journal, this column presented a wartime communications receiver, the KE23-AT, offered by the Kaar Engineering Co. of Palo Alto, CA. A brief history of this little known manufacturer was included, and is repeated here in a sidebar. Needless to say, Kaar was a prominent player in the West Coast electronics scene for a number of years. But, but like so many companies that owed their existence to a single individual it quickly faded from view, for several reasons, after being sold.—wbf

The Model 25E was introduced in 1946 as part of a radio-telephone installation that was marketed mainly to the West Coast fishing fleets. Ray Moore, author of several editions of *Communications Receivers*, states in his “guidelines” that a communications receiver must have a BFO, though he also notes that the guidelines are occasionally violated. That was the case with this particular communications receiver, which was designed solely for radiotelephone AM use and therefore has no BFO.

Fellow historian Tom Laszynski, K8JRM, contacted W2DGB with the information that he had a 25E, and it might make a good candidate for this column. Deciding on a joint restoration of Tom’s set and Bill’s own 25E, we set about trying to find information about the radio. After intensive and prolonged Internet searches we found that the set it is somewhat rare, only four receivers having surfaced to date.

Finding the manual/circuit diagram appeared to be virtually impossible, and AWA member



Bill Fizette’s rack-mount Kaar 25E.

Lane Upton, who once worked for Kaar, told us to forget about ever finding one.

Surprisingly, Oregon collector Hugh Miller discovered a manual with the circuit diagram in his files, had heard of our prolonged search, and kindly sent us a copy. We were considering the unpleasant option of tracing the circuit and making our own diagram when Hugh relieved us of this chore. However late in the restoration process, after discovering several discrepancies between the diagram and the actual radio, it was found that our diagram, dated 8/45, covered only serial nos. 101 to 250. The W2DGB version is #1136, and

THE KAAR ENGINEERING COMPANY

Kaar Engineering of Palo Alto, CA was founded in 1936 by John Karr, a contemporary of Bill Hewlett, David Packard, and other famous students of Professor Frederick Terman at Stanford University. After owning and operating the company for some 30 years, he sold out to Canadian Marconi about 1966-1968, continuing to operate as a division of the parent company.

Kaar manufactured a wide variety of mobile, marine

and other communications equipment, including ship-to-ship radio telephones, radios for police departments, radios for railroads, TV transmitters, amateur and CB radios, and military equipment. The plant even included a department for manufacturing crystals.

A very versatile individual indeed, John Kaar was also one of founders of the California Antique Radio Historical Society.

the K8JRM model #513. However, the basic circuit appears to be essentially the same.

The 25E receiver was offered as part of a one-piece boat radio station with the receiver and transmitter piggy-backed on top of each other, either in a single cabinet or in separate cabinets. The 25E could be teamed with the Kaar 19, 46, or 96 Series transmitters. A 19" rack cabinet version was also offered; see the illustration of W2DGB's receiver. There was also a 25G receiver, with the same basic circuit, differing only in that it did not have the tunable BC and medium-frequency bands.

The single-conversion tube line-up consists of six octal-based tubes: 6SK7-RF, 6K8-oscillator/mixer, 6SK7-IF, 6SQ7-diode detector, AVC and squelch, 6SQ7-first audio, 6V6-audio. A variety of plug-in power packs were offered to match a boat's power source, with internal connections being made automatically by the 18-pin Jones plug. Both the W2DGB and the K8JRM sets had the 117VAC transformer-operated version, with a standard 5Y3 rectifier.

This radio was designed with an absolute minimum of controls, using a channelized crystal-controlled circuit for five channels, a tunable BC band and a tunable medium-frequency band (1600-5000 kHz), covering the existing marine frequencies. There were volume, tuning and squelch controls. In the rack panel version, a switch was added to shift between the internal speaker and headphones.

Restoration

These radios received hard use in demanding and unforgiving environments, and after a few service calls due to downtime, most were probably junked. This may help explain why the writers were only able to uncover four of the Model 25E sets. The two receivers worked on by the writers had multiple problems that surfaced one after the other, but because of space limitations we will concentrate on the work done on the W2DGB rack model.

This particular 25E was replete with the infamous "black beauty" bypass and coupling capacitors, and after testing a few, their poor reputation was found to be well deserved. Along with the several filter capacitors, all were replaced by new stock, mostly disk ceramics. The cans were left in place for appearance, and the leads removed and tied into new axial electrolytics. The tubes were missing, so replacements were found and tested in a good mutual-conductance tester before installing. The bandswitch was sprayed with contact cleaner and worked back and forth to clean the various contacts.

Before the smoke test, however, a standard



Top view of Bill's radio.



Tom's 25E came in its own cabinet.

B+ line resistance test to ground was run. Something in the order of 8000 to 50,000 ohms was expected, but only 600 ohms was measured. Eventually this was traced to the B+ lead to V3, where the bottom of the tube socket was coated with black greasy dirt. Contact cleaner took care of the dirt, but at the same time a non-insulated loose wire lead was discovered. With these problems solved, the resistance was correct, and the smoke test was run.

But the set didn't work! Finally, the output transformer was replaced. Now the BC band came very alive, but with significant noise between the stronger stations. The medium-frequency "B" band (so labeled on the diagram), however, was still dead, and after considerable time the problem was traced to a corroded coil lead hidden under a solder connection on the oscillator coil form.

The "B" or medium-frequency band now worked, and the set was aligned per instructions. However the two tunable bands were still extremely noisy between stations, and the weaker ones were obscured. It was suggested that the AVC circuits be checked, and sure enough, one of the 0.0001 mfd caps was found bad. Replacing this led to a much improved performance.

One comment on aligning this particular
(continued on page 35)



Fig. 2. The cleaned resistance wire back in place on the rheostat body.

wire mounted in a fixture to hold the turns apart. The fixture was made from $\frac{1}{8}$ " brass brazing rod with a "peewee clip" soldered in place on each end.

The washing soda solution ($\frac{1}{2}$ cup sodium carbonate per gallon of water) was placed in a shallow glass baking dish and the fixture was held in position by clamping the clip lead wire holding the fixture. A sheet lead anode about $1\frac{1}{2}$ " wide $\times$ 6" long was placed in the bottom of the dish.

The current was set to 200 mA which required approximately 3V. This condition was run for 20 hours, after which the element was removed and rinsed in hot water. The wire was then dried with compressed air while being held in the fixture.

A wooden dowel was turned to the ID of the coil with a taper for the one end (this taper is a critical part of the rheostat design). The coil was mounted on the dowel and again spread out and held in place with a tack at each end on the coil. It was then brushed with a fine stainless wire wheel. The inside of the coil had to remain "as-

is" because I could not see any way to clean it.

After remounting the coil on the rheostat body, I had a reasonably nice unit for the General Radio amplifier module. Figure 2 shows the re-assembled rheostat.

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Here is another case of bad mica capacitors from John Kaetz (Bessemer, AL):

A 1948 Arvin 250-P received very poorly in spite of its 1U4 RF stage. The tubes all checked good. Feeding an IF signal into the grid of the 1R5 oscillator/mixer showed the IF stages to be functioning well, but from the grid of the RF amplifier gain was down by a factor of about 10.

The plate and screen of the RF stage are each fed via 6.8 k ohm resistors, and a voltage check showed almost no drop across them, meaning the 1U4 wasn't conducting.

A bias check was next. The voltage at pin 7 of the 1U4 was 6 volts and at pin 1 was 4.6 volts which is normal, but the control grid was only .8 volt, a net negative average of -4.5 volts at the grid which will cut this sharp cut-off pentode completely off.

AVC in this set is applied only to the RF stage and is fed via a 3.3 megohm resistor from the detector and has a .05 uF bypass. The detector side of the 3.3 meg. measured 2.89 volts and the AVC side measured .8 volt. The resistor was correct and the bypass was changed with no improvement.

Noting that the return side of the grid winding of the oscillator coil was connected to the AVC bus, the only possible current path to affect the AVC bus was from the negative voltage on the oscillator grid and only if the 50 pF Micamold capacitor coupling the grid to the coil was leaking. That is exactly what was wrong. Replacing the capacitor restored the set to good operation.

One rarely encounters leaky mica capacitors, but this is an unusual circuit. It goes to show that we should take nothing for granted. ☐

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radio. The circuit includes an alignment jack for a 10 mA meter located on the rear deck. The instructions are to tune for a *minimum* reading, not the usual maximum.

Finally, two FT-243 WWII crystals in the 80 meter amateur band were located. Using adapters, these were plugged into two of the five sockets, and the RF and antenna circuits peaked on noise. The signal generator confirmed that they were working as designed.

Some final comments. This radio is somewhat unusual in that it is a simple design, intended to be used under very tough conditions. The high serial numbers suggest that a lot of them were

produced, and Lane Upton told the writer that the Kaar factory had a work force of 135 at the time he left. So it would seem that, for a number of years, John Kaar had a very productive company with an extensive product line. However, very little advertising or promotion has turned up. Perhaps Kaar had enough orders to fill without actively marketing his products.

Our sincere thanks to all who contributed to this effort to bring an unusual radio and little-known company to your attention. We are still looking for other Kaar products as well as other Series 25 receivers. As always, comments are welcome. (w2dgb@arrl.net) ☐