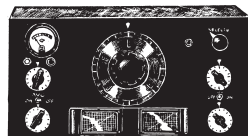


THE COMMUNICATIONS RECEIVER



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The Kaar Engineering Company Type KE23AT

Though the Kaar Engineering Co. was a major player in the communications field in the 1930s through the 1960s, it was little known to radio amateurs. My chance acquisition of a wartime Kaar communications receiver at the 2006 AWA Conference led to a search for information on both the company and its products. Fortunately I had the assistance of a fellow historian, Tom Laszynski, K8JRM, who was able to provide some background information.

Kaar Engineering was founded in 1936 by John Kaar, who was deep into the early California radio scene. He had worked at Remler along with such notables as E.M. Sargent, Frank Jones, and Byron "By" Goodman (later W1DX of ARRL fame.)

Over the years Kaar Engineering turned out a wide variety of radio products. In 1961, the firm celebrated its 25th anniversary. However, the company was purchased in the early 1960s by Canadian Marconi, who ran it under the Kaar name until the late 1960s, after which it eventually lost its identity.

Products included CB radios, Conelrad receivers, military radios, radio telephones, test equipment, mobile radios and marine radar, among other categories. The Models KE23A and -AT seem to have the most coverage in *Riders*, and I know of one restoration of a model 25E special communications receiver.

Riders index lists the Model 23 plus two marine radios, while Sams lists eight CB radios. Overall there is not much general name exposure in the common reference sources other than *Riders* and *Sams*. There is little on no advertising in either *QST* or *Radio*, two prominent journals of the day.

The Models KE23A and 23AT (the difference seems to be in the use of a universal power transformer and mechanical bandspread in the -AT version) are general-coverage communications receivers covering 500 kHz to 42 MHz. Power options reflect military wartime thinking in 1944. First, the set would accept AC input ranging from 100-230 V in five steps. Second there was provision for operation from a 6-volt car

battery plus a vibrator pack. Conversion from AC to DC was done simply by unplugging an internally-connected 24" power cable from the back apron and plugging it into the emergency source.

The radio was supplied originally with a matching speaker, the 8", 4-ohm model PK23ST. Both the manual and speaker were missing when I bought the receiver, but fortunately the manual was reprinted in Rider's Volume 15. The drawing dates the radio at 11/1/44, with revisions on 12/8/44. Besides the usual knobs and switches, this receiver has ANL, a three-position tone control, and a squelch circuit (not usually found in this type of receiver.) The set uses nine octal tubes, plus two NE-48 neon bulbs in the oscillator circuit. There is no crystal filter.

This is a quality-built receiver, using quality components. The engineering appears to be carefully thought out. The single-knob tuning is weighted and totally gear-driven, with a 1:100 tuning ratio. The only string used is for the vertical pointer on the 4 1/4" slide-rule dial scale. There is a 0-100 logging scale on the round center dial.

The tube sockets are all Isolantite, and the IF transformers used were the relatively recent permeability-tuned types. The back apron has three ceramic antenna connections, plus an alignment jack hooked into the AVC line. There are also provisions for both 4- and 500-ohm outputs as well as receiver muting for break-in use with a transmitter. The receiver sensitivity is listed at 1-5 microvolts up to 16 MHz, and 3-15 microvolts on the high band.

The original GE signal strength meter is still in place, with a Kaar Engineering label on the face. A brass label, riveted to the center top of the panel, states this is a Type KE23AT, Serial 1001. Here's an interesting question; does "1001" indicate that this is the first receiver of a production run?

The condition of this receiver, as purchased, showed that it had had extensive service work done, including repainting of the panel and cabinet. The original Peerless power transformer

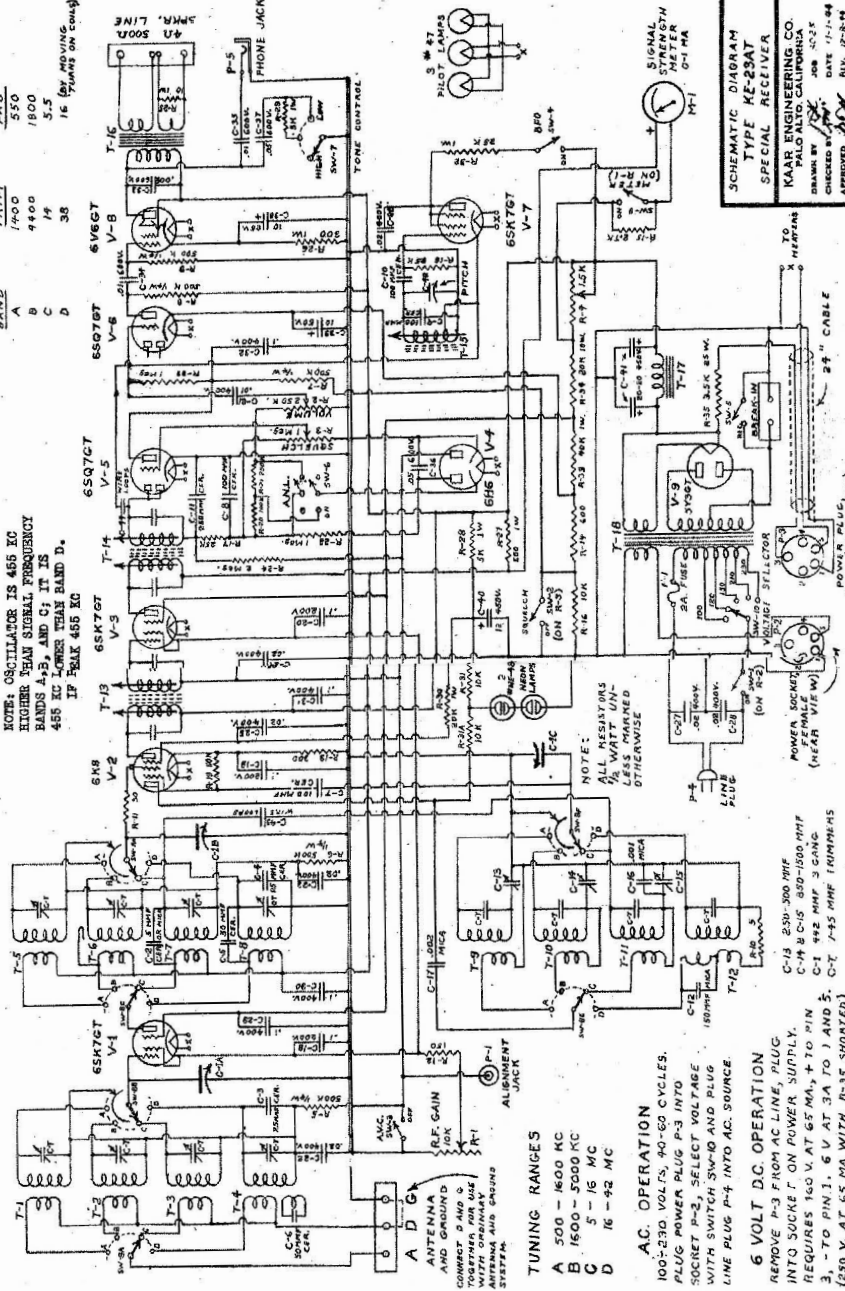
ALIGNMENT DATA

BAND	TRIM	PAD
A	1400	550
B	4900	1800
C	14	5.5
D	38	16

16 (for moving
tuning on cond)

KAAR ENGINEERING CO.

NOTE: OSCILLATOR IS 455 KC
HIGHER THAN SIGNAL FREQUENCY
RANGES A-B, AND C; IT IS
455 KC LOWER THAN BAND D.
IF PEAK 455 KC



SCHEMATIC DIAGRAM
TYPE KE-23AT
SPECIAL RECEIVER

KAAR ENGINEERING CO.
PALO ALTO, CALIFORNIA
DRAWN BY: [Signature]
CHECKED BY: [Signature]
DATE: 11-1-44
APPROVED: [Signature]

Schematic of the Kaar KE23AT Special Receiver.



Front panel of the KE23AT is neat and utilitarian.

had been replaced. From the looks of the area around the power and audio circuits, the transformer appeared to have burned out. In the process of replacing the power transformer, other components were removed, mainly the

power-supply parts for conversion from AC to the DC emergency power. The dial pointer was damaged, and some recapping had been done, including filters. The RF and IF sections appeared to be undisturbed.

This is an interesting communications receiver, a bit off the beaten path. There is a Kaar set in the AWA Museum, but at this writing we don't have the model number. Plans are to go over this radio and do what is needed to make it work, more or less as it did originally. The results will be re-

ported in a future column.

And if anyone has any information on either this receiver or the Kaar Engineering Co., please contact me at w2dgb@ptd.net, or by phone at 570-629-0637.

BREADBOARDING, continued from page 62

Reader Mail

Speaking of mail from readers, here's a quote from an e-mail received from Jim Wood of Brea, CA about the "D Cell Power" Breadboarding column that appeared in the last issue—rap:

"Very good article and a fine way to obviate B batteries without a mains connection. You should be able to get a bit better efficiency, maybe, using a higher frequency with the proper magnetics. Years ago I made a 50kHz dc/dc inverter for a homemade condenser microphone and got nearly 90% out of it.

A good source for small quantities of ferrites is Amidon Corp. They are in Costa Mesa, CA, not far from where I live. They are a distributor of Ferrite cores and similar things, and sell to hams and experimenters with no specific minimum.

Keep up the articles, I look forward to the Breadboarding section."

a form of hypothecation tax to fund public broadcasting, thus allowing public broadcasters to transmit programmes without, or with only supplemental, funding from radio and television commercials.

The television licence was originally known as a radio licence, and was used to fund public radio broadcasting. With the arrival of television some countries created a separate additional television licence, while others simply increased the radio licence fee to cover the additional cost of TV broadcasting, changing the licence's name from "radio licence" to "TV licence" or "receiver licence". Today most countries fund public radio broadcasting from the same licence fee that is used for television, although a few still have separate radio licences, or apply a lower or no fee at all for consumers who only have a radio. Some countries also have different fees for users with colour or monochrome TV. Many give discounts for elderly and/or disabled consumers.

(2) Published by Sunrise Press, Nov 1986, ISBN: 0951144804, paperback, 244 pages. Also available hardbound.

(3) <http://www.jacmusic.com/accesories/Tube-Glue/tube-glue-.html>

(4) D.K. Owens, "Substitutes for the WD-11", *Old Timer's Bulletin*, Vol. 44, No. 3 (August 2003)

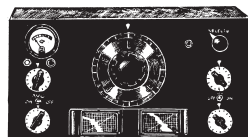
REFERENCES:

(1) From British receiver licensing:

http://en.wikipedia.org/wiki/Television_licence:

A television licence (or more correctly broadcast receiver licence, as it usually also pays for public radio) is an official licence required in many countries for all owners of television (and sometimes also radio) receivers. It is

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More on the Kaar Engineering Receiver

In the last issue we presented the Kaar Model KE23AT receiver and some interesting comments were received. One reader in upstate New York sent us a picture of a Kaar transmitter, and a reader in Portland, Oregon wrote about his own Kaar KE23AT, serial number 900, which was working.

He noted that he also had a Model -23A, which was a considerably scaled-down version of the -AT. He offered that the -AT model could well be a military contract model. The cabinet had some markings that suggested it and the components were of superior quality. He also sent a picture of another Kaar transmitter, a Model 10Z from 1938.

Fellow historian Tom Laszynski, K8JRM, also sent me Kaar-related material gleaned from a book on the west-coast electronics industry, but it was too general and didn't contribute significantly to what I covered in Part 1.

Here we finish our own review, including the restoration and repair needed to bring receiver to working condition. For those readers who desire more detail, the manual will be found in *Riders* Volume 15. The schematic was included in my last column.

The electrical repair presented some interesting problems. On close examination, signs of poor service work were present, with blobs and gobs of solder on several connections. These were methodically cleaned out and redone. All tubes were checked with a good tube checker, and missing hardware supplied.

Several of the infamous plastic-encased "Black Beauty" capacitors were replaced without even checking them. Experience has shown these to be either bad or about to fail. Otherwise the set had been recapped with reliable "orange drops."

The dial pointer had been incorrectly installed and had to be removed, straightened, bent to the correct S-shape, painted, and replaced. The primary selector switch for the power transformer was missing, and since the replacement transformer didn't have the multiple taps that the original had, a cover plate for the switch site was fabricated and installed.

The various switches in sets this old usually need some attention. For example, resistance of the ON-OFF switch attached to the volume control was much too high. Instead of replacing it, I drilled a small hole in the bottom and squirted in some contact cleaner. After cycling the action some 30 times, the resistance dropped to an acceptable level.

Unfortunately the unusual circuit components for the emergency-power function had also been removed when the original burned-out transformer was replaced. These are unique, and no attempt was made to locate replacements.

One significant change bears mentioning. Note on the diagram that C27 and C28, AC bypasses in the power transformer primary, are listed as 0.02 μ F at 400 V. Modern practice recognizes that the best treatment is to replace such capacitors with a smaller value but with a much

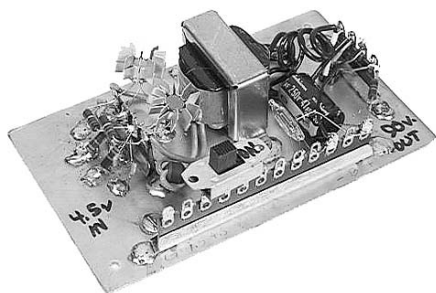
(continued on page 35)



Front and rear views of the Kaar K23AT with cabinet removed.



We don't know what took a piece out of the corner of Dick's Philco 39-71. However, the \$4.00 eBay acquisition made an excellent test bed for the "D-Cell Power" scheme.



The power inverter circuit.

sign. I hit on the idea of four cells - two D cells in parallel for the filaments boosted by two more cells in series to drive the inverter with 4.5 volts. From the junk box, I took a four-cell battery holder and rewired it accordingly.

Starting with the basic inverter circuit and the same 6-volt filament transformer described in the October 2006 column, I first tried driving a pair of medium-power NPN silicon transistors with a DC supply set at 3.0 volts. When you try bread-boarding this, you'll find that changing the values of the two resistors cross-connected between the collectors and bases controls the output power.

The best that could be done was about 60 volts into a 10K load resistor, and that was by using 1K resistors. The next series of tests was at 4.5 volts input and the same transistors, but with small heat sinks added (after blowing a pair of 2N2477s). This got me to 90 volts easily, and that meant 9 milliamps into the load resistor, just what's needed to feed the Philco portable. Figure 2 is the schematic of the final version.

You'll notice an emitter degeneration resistor of 1.2 ohms, giving a bit of protection to the transistors during startup. When you build one of these, you'll arrive at the final values for the drive resistors (560 ohms in my schematic) by noting that the circuit starts with the transistors in class A and quickly settles into the normal state, with the transistors saturating on alternate half-cycles. Reducing the drive resistor values will make the inverter start faster but will also reduce its efficiency.

The above circuit takes 0.42 amps at 4.5 volts, and gives 91.2 volts across the 10 K load, so the efficiency is 44%, not bad for any power supply. The 3.3K resistors protect against thermal runaway, just in case. And the capacitors from base to ground reduce switching spikes and the resulting noise in the radio receiver. You can also tweak the output just a bit by changing the 100 ohm resistor at the output. This rig should run most any early portable that takes a 1.5 volt A supply.

As to battery drain, the paralleled cells are delivering 330 ma each when the set is on, while the two series cells are working at 420 ma. It would have been nice if all cells were equally loaded. An alkaline D cell is supposed to be good for 15000 ma-hours; so a fresh set should run my radio for $(15000 / 420) =$ about 36 hours of intermittent use. But I think I'll stick to my Radio Shack DX-440 for emergency listening!

REFERENCES

1. Dick Parks, "D Cell Power," *AWA Journal*, Vol. 47, #4, October 2006, p. 39
2. Nostalgia Air website, www.nostalgiaair.org

COMMUNICATIONS RECEIVER, *continued from page 33*

higher voltage rating. In this receiver, I installed 0.005 uF @ 1200 volt disc ceramics.

The three filter capacitors, C 40, and the dual C41, which had been replaced during a previous service, were disconnected and reformed. They appeared to be just fine. And therein hangs a tale. When I fired the receiver up for the initial smoke test, I was greeted with a blaring 60-cycle roar. I didn't think it could be the filters. After all, I had

reformed them; they were replacements, not the originals; and they looked good.

I even went so far as to disconnect the transformer and clip-lead another into the circuit. No luck—the roar persisted. I checked the distinctive audio output transformer; it appeared to be working correctly. Then I tried substituting B+ from an external bench power supply, and everything quieted down.