

the ARC-5 repackaged



Fig. 1. The **Commercial Look** for inexpensive surplus receivers.

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The ARC-5 receiver units are extremely handy around any ham shack. They are inexpensive, plentiful and require so little power for operation that they can be used as standby receivers, monitors for net channels, autocall service, and dozens of other purposes.

Most of us admire the neatness of commercial communications installations and their ability to stack a large quantity of the essential gear in "package" form by relay rack style of construction. More and more amateur stations are adopting this space-saving feature. The reworking of the popular ARC-5 series of receivers into the form shown here permits realization of that dream of all amateurs: a separate receiver, optimized for each band worked.

The ARC-5 units are, as originally packaged, fairly unhandy from many aspects: they clash with the decor of the shack, are difficult to hold in place while tuning, and require an external power supply. For many uses it is desirable to add another audio stage and a noise limiter. At any rate, the solution is one of repackaging.

The receiver repackaged in this case was the one which covers the .19-.55 Mc. band. Since it was to be used as a Q-5'er it was considered

very desirable to add an additional audio stage and a noise limiter so that once the i-f signal was removed from the communications receiver it did not need to be returned for either audio amplification or noise limiting. These changes are useful even if the receiver is only used as a stand-by receiver.

If you do not have available a Handbook of Maintenance Instructions for the receiver it is strongly recommended that wiring diagrams be made of all the coil sockets before the old receiver is disassembled.

Fig. 1 is the front view of the repackaged ARC-5. It is mounted back of a 3½-inch rack panel. The components are mounted on a 4x17x3-inch chassis as shown in Fig. 2. A 5x17x3-inch chassis would have been preferable in some ways but no chassis of this size was available on the local market at the time the conversion was done so we just squeezed things up a little bit more. Even so, it did not turn out to be unduly crowded.

The components of the ARC-5 were removed from the original chassis and then the chassis was cut into parts which held the coil sockets and the mounting studs for the coils. The r-f, mixer and oscillator coil sockets were removed

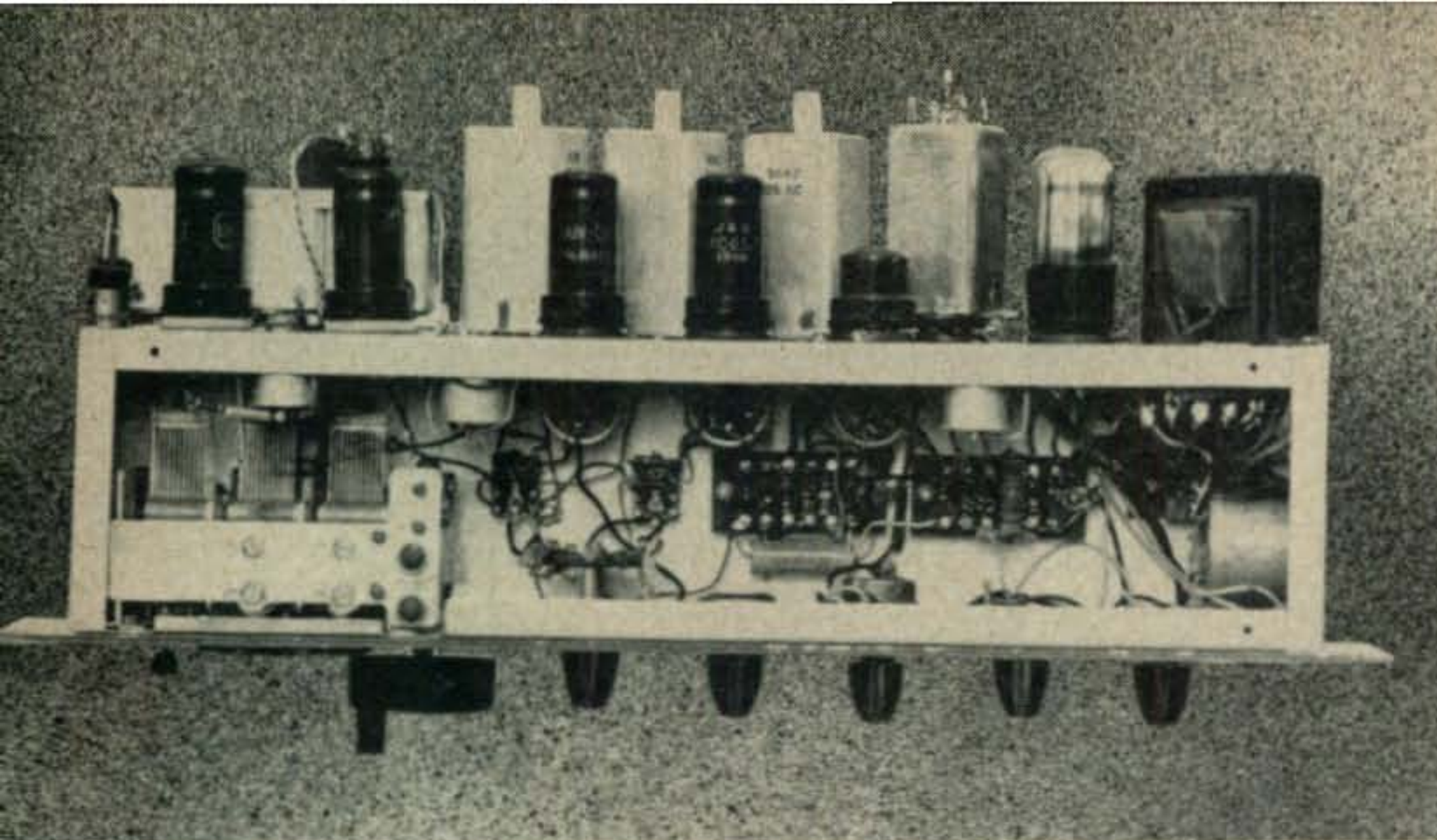


Fig. 2. Wiring under the chassis is kept simple if a parts layout like this is followed.

as a group of three and enough of the sides of the chassis was retained to allow the coils to be held by the screws, as was the case in the original instruction. Each of the i-f coil sockets was cut out along with enough of the chassis to hold the mounting studs and to permit the mounting of the socket to the chassis with four screws. An octal socket was placed next in line to hold the b-f-o coil which in the original receiver was not of plug-in construction. Fig. 3 shows the back view of the new chassis with all the coil sockets mounted.

Fig. 4 shows the back of the chassis with all the coil installed. All the coils are from the original ARC-5 except the b-f-o coil which was missing from the receiver when it was purchased.

The circuit of the receiver was revised slightly to permit operation from a 120-volt d.c. plate supply. 6 volt tubes are used in this receiver since it had already been converted to 6-volt operation; however 12 volt tubes may be used if a power transformer with a 12-volt heater winding is installed or if a 6.3-volt filament transformer is connected in series with the heater winding of the type transformer used in this conversion. The revised circuit of the receiver is given in Fig. 6. The ARC-5 components which are re-used are not numbered on the diagram, making it a simple matter to distinguish the new parts needed. Since the

second i-f amplifier operates at a fixed gain a 6SJ7 was substituted for the 6SF7 in order to save plate current. This made it necessary to get the a-v-c voltage from the second detector load resistor. This receiver was not designed for high-fidelity so there is no disadvantage to this change; however, after completing the conversion it was found that a reserve of plate current was available so the original second IF amplifier tube and the original AVC circuit could have been maintained.

The early stages of the receiver are little changed. In order to operate a 120-volt d.c. supply the screens and plates are fed from a single source, thus saving some decoupling resistors and associated by-pass capacitors. It was of course necessary to provide an RF gain control and it was also considered desirable to

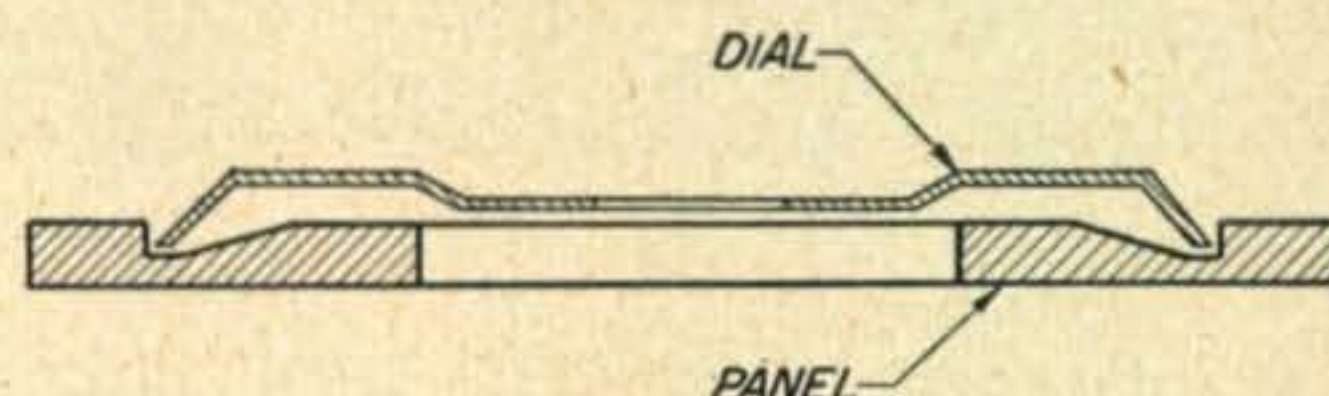
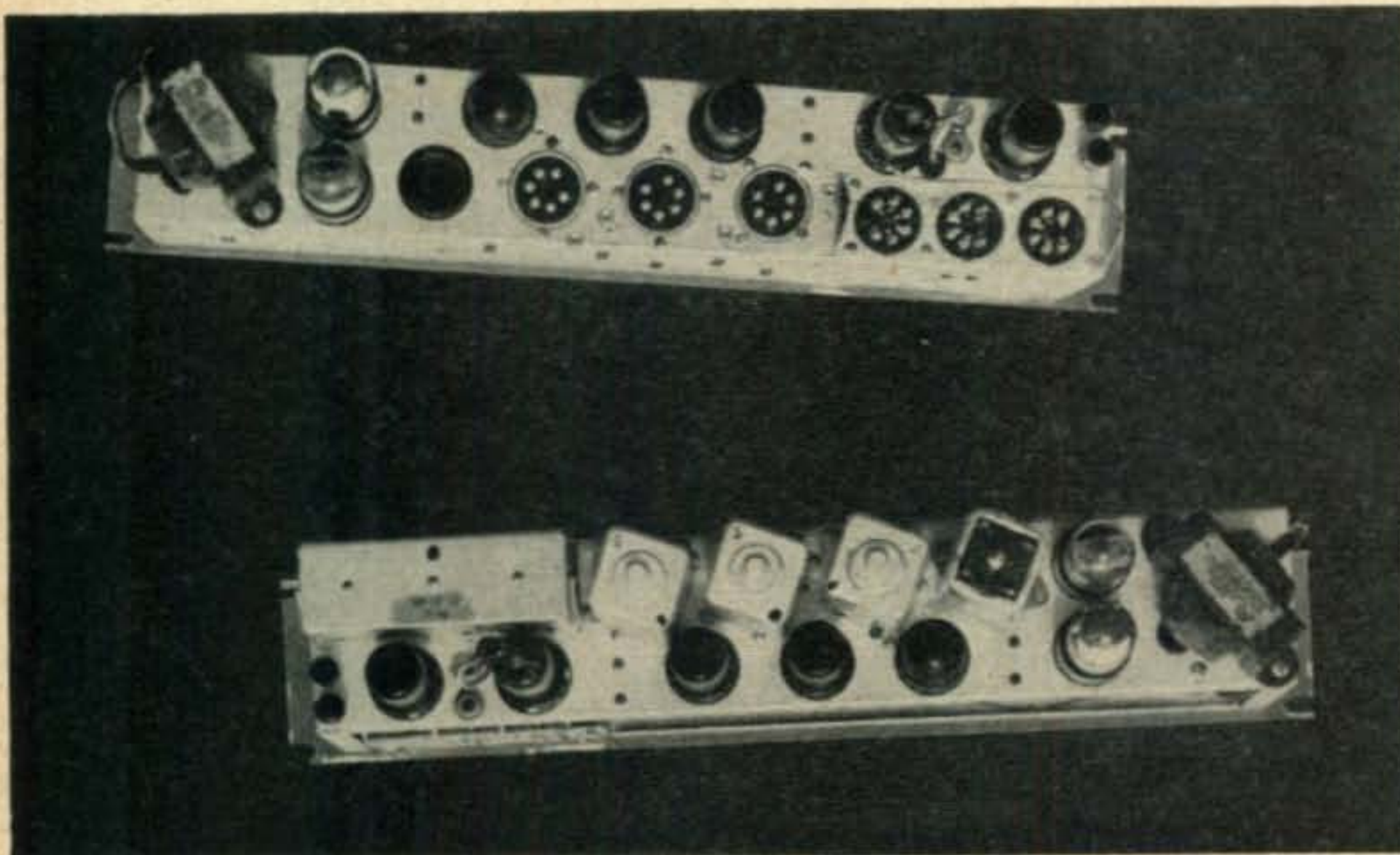


Fig. 5. Cross section of the recessed panel cut back to fit ARC-5 dial. Panel may be cut all the way through if you want to save some energy.

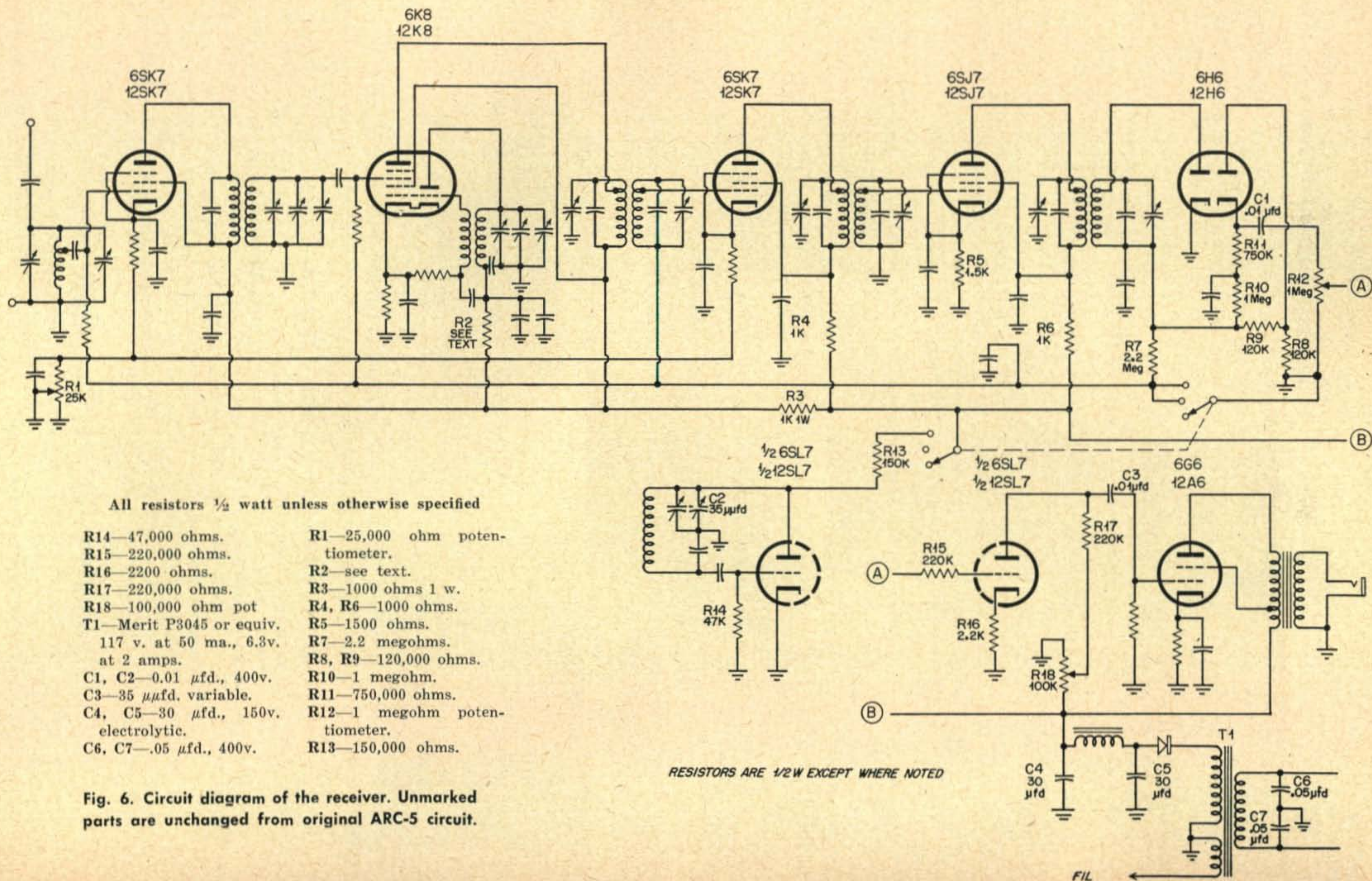
parallel the oscillator plate dropping resistor inside the coil shield with another one (R_2) across the coil socket terminals. R_2 should be half the value of the resistor inside the coil shield.

One-half a 6H6 is used for the second detector and a-v-c rectifier and the other half is used for a series noise limiter diode. A 6SL7 is used as the first a-f amplifier and the b.f.o. The plate voltage of the audio section of the

[Continued on page 16]



Figs. 3 & 4. The position of the i-f and r-f plug-in strip sockets can be seen here.



All resistors $\frac{1}{2}$ watt unless otherwise specified

- | | |
|------------------------------|----------------------|
| R14—47,000 ohms. | R1—25,000 ohm poten- |
| R15—220,000 ohms. | tiometer. |
| R16—2200 ohms. | R2—see text. |
| R17—220,000 ohms. | R3—1000 ohms 1 w. |
| R18—100,000 ohm pot | R4, R6—1000 ohms. |
| T1—Merit P3045 or equiv. | R5—1500 ohms. |
| 117 v. at 50 ma., 6.3v. | R7—2.2 megohms. |
| at 2 amps. | R8, R9—120,000 ohms. |
| C1, C2—0.01 μ fd., 400v. | R10—1 megohm. |
| C3—35 μ fd. variable. | R11—750,000 ohms. |
| C4, C5—30 μ fd., 150v. | R12—1 megohm poten- |
| electrolytic. | tiometer. |
| C6, C7—.05 μ fd., 400v. | R13—150,000 ohms. |

Fig. 6. Circuit diagram of the receiver. Unmarked parts are unchanged from original ARC-5 circuit.

K6EUS, despite the implied newness of the "K" call, has been licensed since 1937. Originally W4ELZ, then W3LWX, W1QUR, and now K6EUS. This is what happens when you are in the Navy. Prefers six and ten meters. Hamming consists more of design, construction and experimentation than anything else. Commander Bernard is now the Executive Officer of the Navy Electronics Laboratory at San Diego and a Senior Member of the I.R.E.



6SL7 is made variable so that the tube may be operated as a saturated amplifier and thus act as an additional noise limiter. A 6G6 is used as a second audio amplifier. This tube was selected for its low heater current. A 6AK6 miniature output pentode could have been used or, if 12-volt tubes are used, the original 12A6 could be used. The screen of the 6G6 is fed from the tap on the primary of the output transformer to give some inverse feedback which reduces the output impedance of this stage and limits the voltage developed across the output transformer.

The power supply is a conventional half wave rectifier system employing a small transformer of the type used in audio pre-amplifiers or television boosters.

A few tricks were resorted to in order to use the 4-inch wide chassis instead of the 5-inch wide chassis for which the design was originally planned. It was originally planned to mount the tuning capacitor about $\frac{3}{4}$ inch behind the panel with the dial to be viewed through a window in the panel. Using the 4-inch chassis it was necessary to mount the capacitor right against the panel so the chassis flange had to be cut away as shown in Fig. 2. The panel had to be machined away to allow room for the dial as shown in Fig. 5. This machine work was done with a circle cutter the tool of which was ground to a slighter angle.¹ As may be seen from Fig. 2, the by-pass capacitor directly behind the tuning capacitor had to be mounted

with its mounting studs sticking through the rear of the chassis. The antenna trimmer capacitor was mounted inside the first section of the tuning capacitor. The space there was a little crowded also so it was necessary to file off the bottom rear corners of the trimmer stator rods. Once these little mechanical details were arranged the project went forward at a good pace.

After the receiver was tuned up it was found to overload on strong stations when using avc and maximum r-f gain. An investigation showed that we were "fortunate" enough to have selected leaky 0.05 μ fd sections for both of the avc line capacitors so they were replaced with a tubular capacitor alongside one of the terminal boards. Other constructors may profit by this easily avoided mistake and reserve the leakiest capacitors for the cathode by-pass function where a leakage resistance of 2 or 3 megohms is of no importance.

As stated previously, this conversion was planned to use the original ARC-5 parts wherever possible. A relaxation of this policy would have permitted further saving of space, for instance most of the bypass capacitors could have been located directly on the tube sockets and the remaining ones could have been terminal boarded. Miniature tubes could have been substituted for the metal tubes in which case the IF transformers could have been mounted square with the chassis and moved further to the left leaving more room for the power supply components at the right hand end of the chassis.

Regardless of whether the constructor wishes to follow exactly the instructions given in this article or wishes to give a more complete or less complete treatment to his receiver, the ARC-5 need not remain an ugly duckling. Repackage it!

1. Editor's note: The use of an aluminum panel instead of steel should materially ease the job of recessing the dial into the panel. Some may consider it simpler to merely cut out a circular opening in the panel slightly larger than the dial itself.

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Dayton Hamvention April 2nd

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