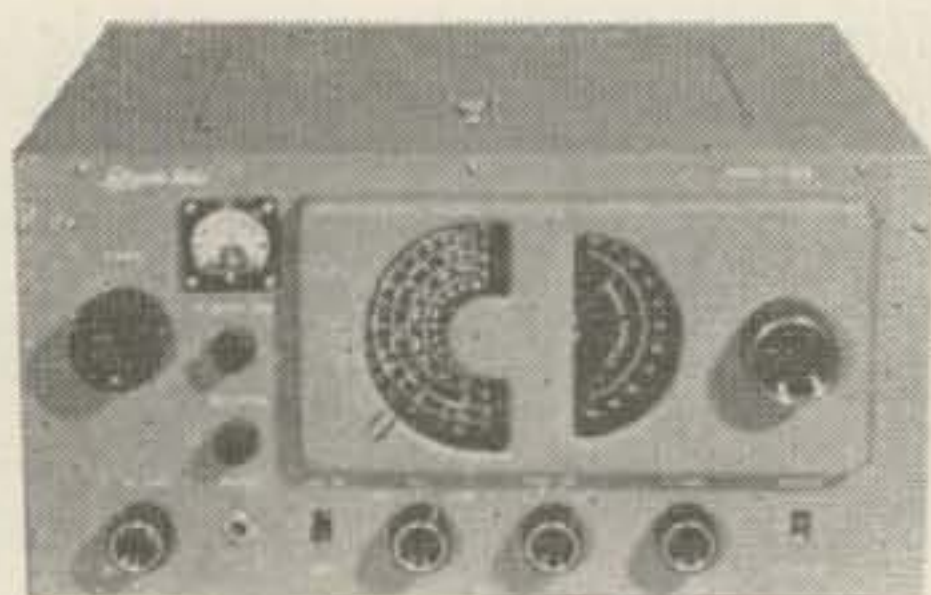




# Modifying the Lafayette KT-200 Receiver

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**I**T TAKES a pretty keen eye and plenty of "know-how" to buy a good communications receiver for under one hundred dollars. Sure, there are some sets on the market selling for much less than that amount, but most of them only qualify as toys. Low in sensitivity, wide in bandwidth, and poor in stability, these receivers serve to introduce the newcomer to shortwave radio. After that, the receiver has served its purpose, and the ham or listener is ready to "step up" to a more advanced type of receiver.

What should the "minimum communications receiver" offer the buyer? Well, it should have an rf stage to provide usable sensitivity on the 10 meter band. It should have two *if* stages to produce a reasonable degree of gain, it should have an S-meter, and it should have a voltage regulated power supply for the high frequency oscillator. In addition, it should have the usual trappings, such as a bandspread dial, beat oscillator, headphone jack, standby switch and other operating aids.

Does such a receiver exist for under one hundred dollars? The answer must be a qualified "no." The author is always waiting to be shown such a jewel, but so far the wait has been in vain. However, there have been some close contenders for this interesting bargain, and one of the best of them is the Japanese-made, KT-200 communications receiver, sold by the *Lafayette Radio Co.* of New York. This article describes simple modifications to this receiver which make it serve as a very acceptable ham receiver, or general purpose shortwave receiver.

## The KT-200 Circuit

A block diagram of the KT-200 is shown in Fig. 1. The receiver covers the 550 kc to 30 mc spectrum in four bands. It is rugged, well made, and uses good components. After several months of casual operations at W6SAI the receiver seemed sufficiently stable and sensitive to expend some additional effort in

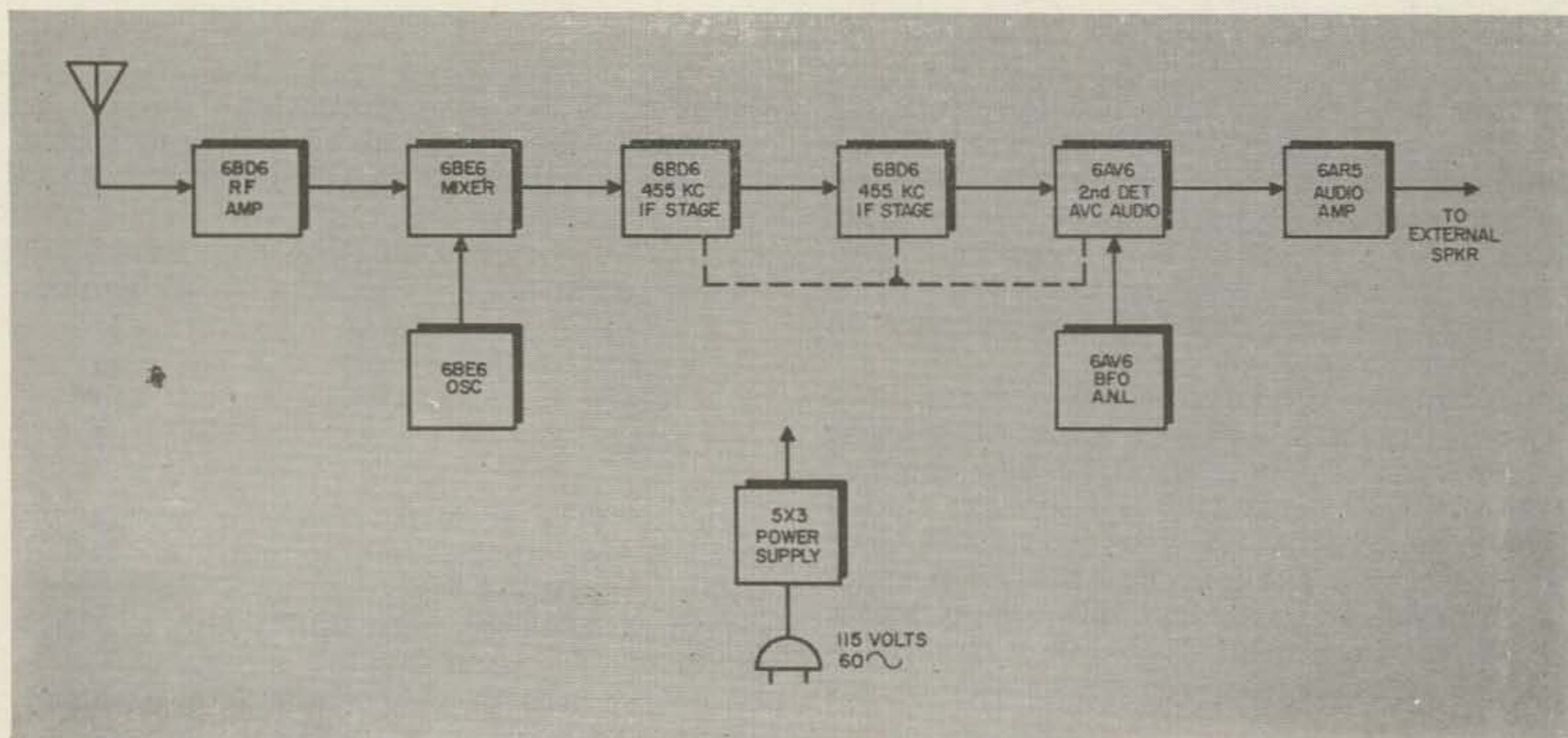


Figure 1. Block diagram of KT-200.

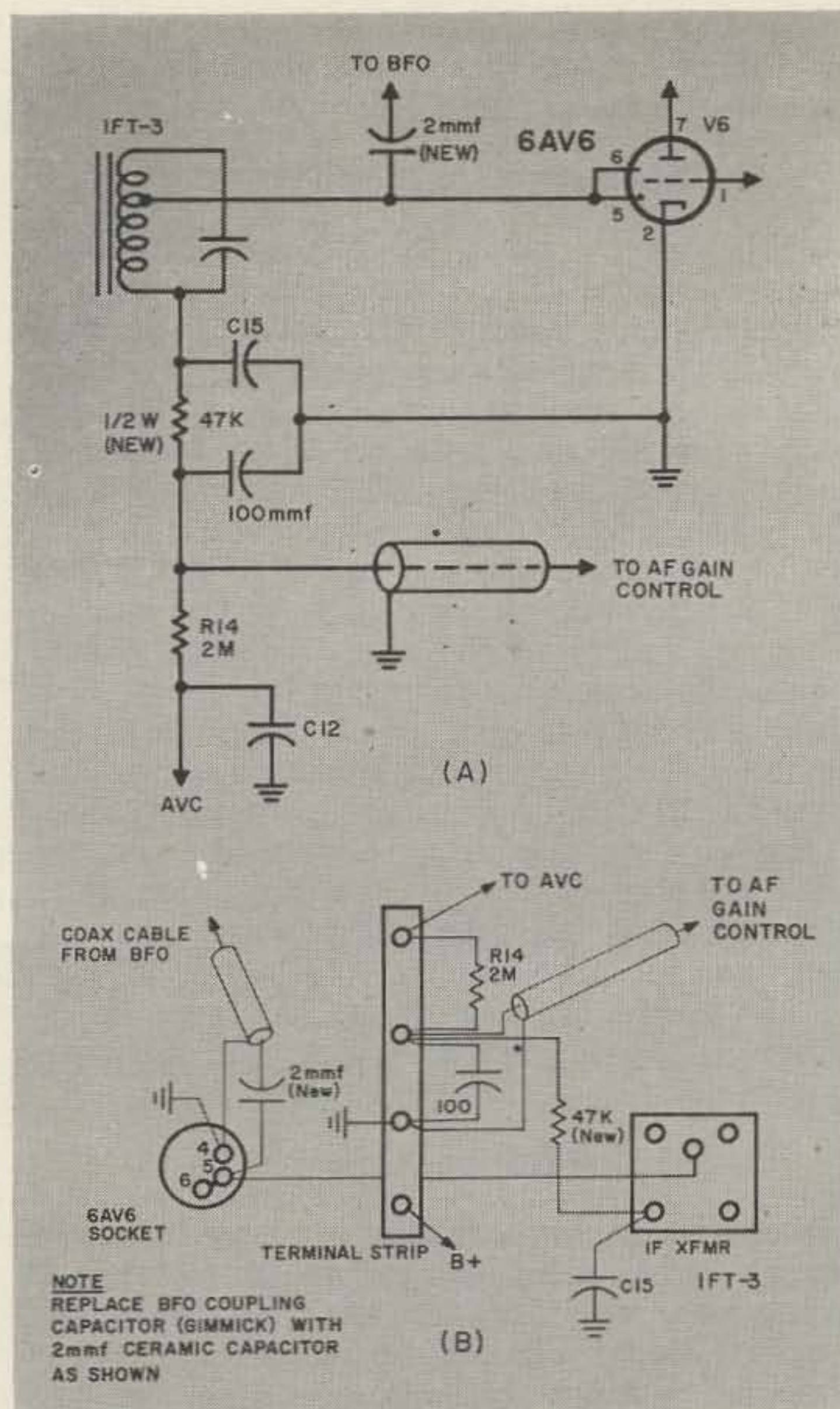


Figure 3. Revised avc circuit and parts layout, bottom view. Note: replace bfo coupling capacitor (gimmick) with 2 mmfd ceramic capacitor as shown.

making it really useable as a ham-type communications receiver. As is, the receiver seems to be fairly insensitive on 10 meters, has a tendency towards self-oscillation at the low end of the broadcast band (550 kc), and has a bad a.v.c. "pumping action" that produces an annoying frequency shift on 10 meters that varies with the strength of the incoming signal. Fortunately, these defects can be easily eliminated with a few hours work, and the modified receiver does an admirable job on all frequencies, considering its modest price. It compares favorably with other receivers falling in the \$150 price class as far as results go, and results are what count!

### Increasing Gain and Sensitivity

The use of a 6BD6 tube in the rf stage does little to enhance receiver performance. This little "bottle" is the midget equivalent of the metal 6SK7, which in itself is no "barn burner." Substituting a 6BA6 (same pin connections) for the 6BD6 (V1) will go a long way towards acceptable 10 meter performance. To make this change, it is necessary to re-

duce the cathode resistor (R2) from 300 ohms to 68 ohms, and to change the S-meter series resistor (R4) from 1500 ohms to 600 ohms. These changes are shown in Fig. 2. While you are doing this chore, you should also change the cathode resistor (R8) of the 6BE6 mixer stage from 300 ohms to 80 ohms. Finally, change the cathode resistor (R13) of the last 6BD6 if amplifier from 1000 ohms to 330 ohms. This will boost the overall gain of the receiver by a significant amount. Loosen the bolts of the mixer (V2, 6BE6) socket and slip a socket shield base and shield over the socket.

The next step is to stabilize the receiver so that it is less prone to self-oscillation. Looking at your schematic that accompanies the receiver, you'll note that there is no screen

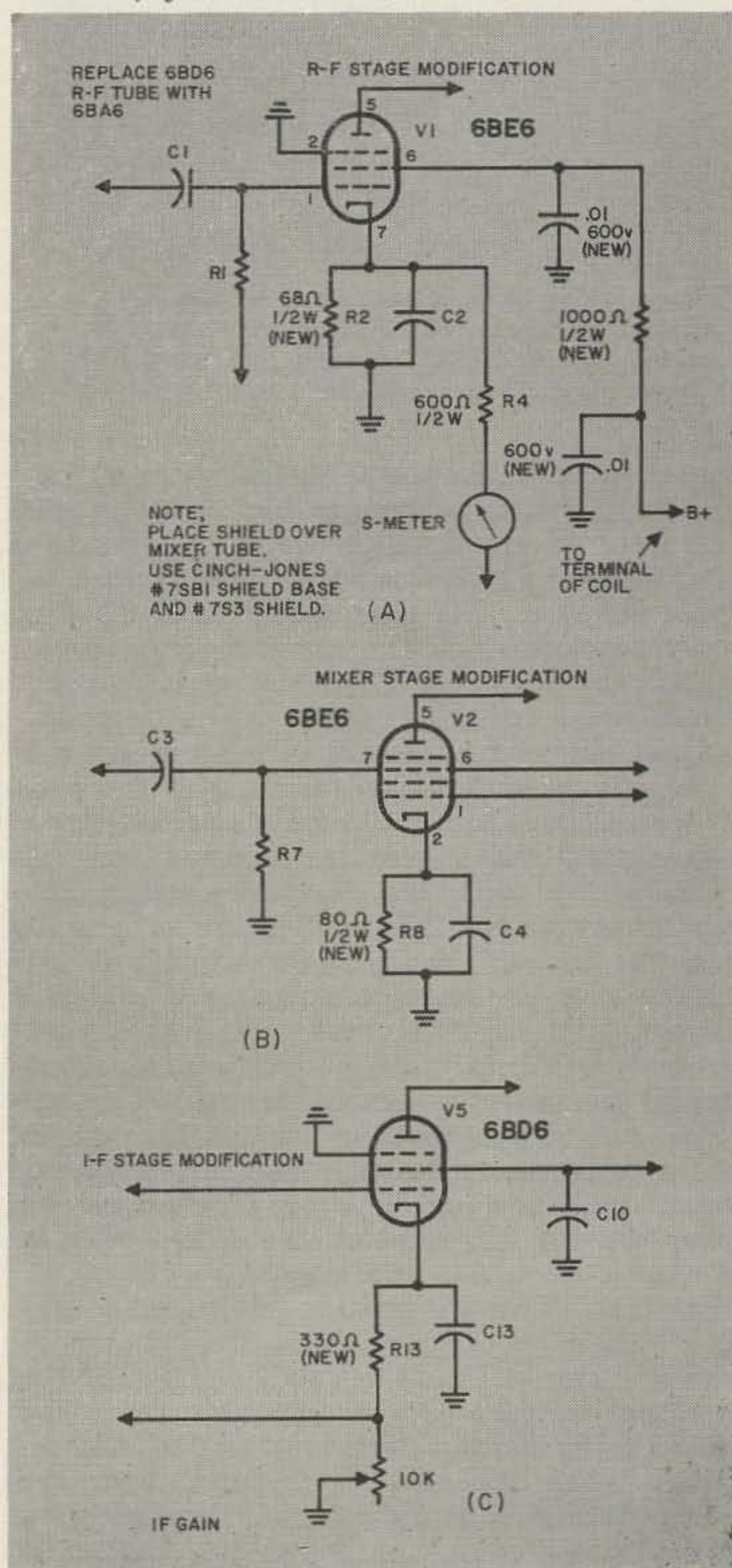


Figure 2. Circuit modifications for the KT-200 receiver.

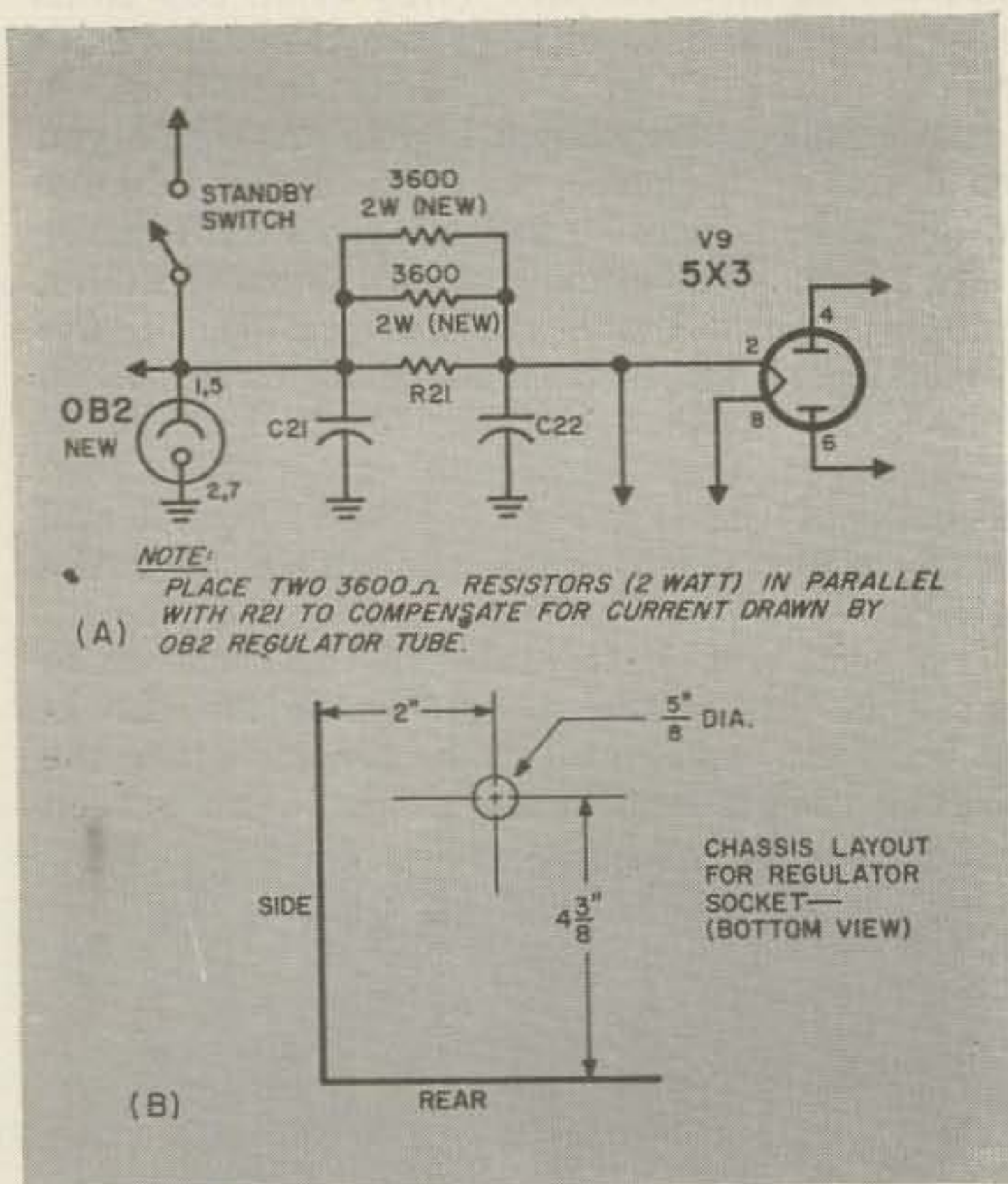


Figure 4. (a) Note: place two 3600 ohm 2 watt resistors in parallel with R21 to compensate for current drain by OB2 regulator tube. (b) Chassis layout for regulator socket, bottom view.

bypass capacitor on the 6BA6 rf stage socket (pin #6). Actually, there is one, but it is one of the power supply filter capacitors at the opposite end of the receiver that serves a double purpose. This is a bad state of affairs, to say the least, and the designer responsible for this fiasco should have his wrist slapped with a steel ruler. Examining the receiver, you will notice that a wire runs from pin #6 of the rf tube socket to a terminal of the center coil compartment. This is the screen voltage lead and should be removed and replaced with a 1000 ohm, 1/2-watt resistor. The resistor serves to isolate the screen circuit from the rest of the receiver wiring. A .01 ufd, 60v volt disc ceramic capacitor is soldered between pin #6 (screen) and pin #2 (ground) of the rf tube socket, and a second similar capacitor is placed between the opposite end of the resistor (which terminates in the coil compartment) and an adjacent ground soldering lug. The circuit changes are shown in Fig. 2. Replace the 6BD6 with a 6BA6.

The last step is to provide additional *if* signal filtering on the a.v.c. line. This change is shown in Fig. 3. As is, a small amount of the *if* output voltage is fed into the a.v.c. line and thus back into the front end of the receiver. When the receiver is tuned near the intermediate frequency (the 550 kc region) a marked instability can be noted. Additional circuit isolation is obtained by the addition of a 47,000 ohm, 1/2-watt decoupling resistor and a 100 mmfd bypass capacitor to the a.v.c. cir-

cuit. Placement of these new parts is shown in the illustration. Simple!

### Stabilizing the Oscillator

As the a.v.c. action takes place, the bias fluctuates on the rf and *if* stages, causing the plate current of these tubes to vary. The simple resistance-capacitance power supply filter produces a corresponding voltage change which wreaks havoc with the high frequency oscillator section of the 6BE6 mixer tube. An OB2 regulator tube, installed as shown in Fig. 4 will cure this annoying fault. A small hole for the tube socket is punched in the chassis as shown, and two holes are drilled to accommodate the socket mounting bolts. Easy now, you don't want to get metal filings into the variable tuning capacitor! Wire the socket and shunt the 2000 ohm voltage dropping resistor in the power supply to compensate for the added current drawn by the regulator tube. You will know the tube is operating properly when you observe the purple glow between the electrodes. This glow will change in intensity as the *if* gain control is varied, which is normal.

### Additional Hints

Does the tuning of this (or any other receiver) seem a bit jumpy at 10 meters? If so, place a wee drop or two of TV "turret cleaner" liquid on the bearings of the two variable tuning capacitors. Also, minute changes in tension of the rotor bearings located at the rear of the capacitor gang may work wonders. If the bearing is too tight, the rotor tends to turn in little increments, or jumps, producing a nervous, erratic tuning effect. Too loose, the bearing produces a sloppy effect that varies when the receiver is subjected to vibration.

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### High Voltage Insulation For Meters

Often the home constructor will go to some trouble to submount a meter because of the high voltage danger. One cause of this danger is the zero-adjustment screw which is sometimes connected to the meter circuit. This is generally a slotted rivet arrangement with an off-center projection. This projection is arranged to shift the anchor point of one of the centering springs. If the meter is disassembled, it is possible to put a piece of spaghetti on the projection and insulate it from the circuit. Then, if the insulation from the movement to the case is sufficient for the voltage to be used, the meter may be mounted normally with no danger. When it can be used, this method will save a lot of trouble.

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