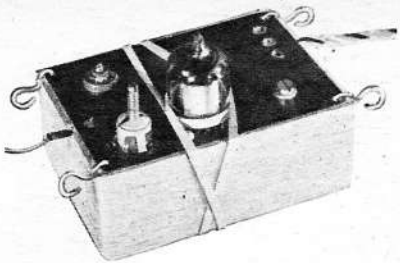

BUILDING STEPS For the Beginner

McEntee's Simple/Single Hard Tube Receiver

(Detailed construction notes on 1-tuber—schematic in July issue)

1. Connect socket to terminal 7 (viewed from bottom) to battery lug 1; solder both ends.

2. Connect socket terminal 5 to battery lug 2, but do not solder either end.

3. Turn L2 so the green and black terminals face C1. Run a wire covered with spaghetti from the black terminal of L2 to outer terminal of C1, and on down to antenna lug. Do not solder C1 terminal yet.

4. Connect one end of C2 to socket terminal 3 (do not solder), and run the other end through the green lug on L2 (solder), then down to the inner lug of C1 (solder).

5. Connect R between socket terminals 3 and 5; solder both ends.

6. Run lead from upper terminal of L1, through socket terminals 2 and 4; solder all three points.

7. Connect RFC from blue terminal on L2 to outer lug on C1, and bend wire around to reach lower lug on L1. Solder all three points.

8. Connect ¾" length of wire to lug on relay nearest aluminum base (this is the armature connection), and 1¼" length to the red-painted lug. Mount relay on chassis, turning red and black lugs downward if needed, to clear tube socket support and receiver bottom cover.

9. Connect red lug on L2 (do not solder) to black painted lug on relay (solder).

10. Run C3 from red lug on L2 to battery lug 2. Solder both ends.

11. Connect red lug on relay to battery lug 3, and armature lug to battery terminal lug 2. Solder.

12. Check all connections made, and solder any joints previously missed.

13. Connect 2 ft. flexible wire to antenna lug.

Connections to batteries may now be made, and the set fired up. A meter of 0-3 ma. is ideal for this receiver, but either 0-2 or 0-5 will do. It should be noted most carefully that, although the 3S4 is a double filament tube, and most circuits require that both halves of the filament be connected in parallel for 1.5 V. use, we utilize only half the filament, thus cutting A current drain down to 50 ma.

Turn on the receiver and check the current drain; if it is lower than about 1.5 ma., unscrew C1 turn screw clockwise (as you look at it from the tube tip side of the chassis) till the plate current jumps upward. It should read between 1.75 and 2.1 ma., depending upon the condition of the batteries and the tube used. Note the point of rotation where the current just jumps up from a low value, to the higher value. This is the most sensitive spot, but the screw should be given another half turn in the same direction, to reach a stable operating point.

Needless to say, if the plate current was high when you first turned on the receiver, the screw in C1 should be rotated the opposite way, till the current just dropped, then backed up a half turn. The plate current change point is very abrupt—you won't have any doubt when you reach it.

Now set up a transmitter nearby, with no antenna, and a lamp bulb load, turn it on, and adjust the core of L1 till you get the greatest drop. That's all there is to it! Of course, adjustments made on the bench, and with the transmitter nearby, are only temporary. You will have to make final adjustment of both sensitivity and tuning in the receiver, after the set is mounted in your plane, the antenna attached as it will be used, and you can get several hundred yards away from the transmitter.

No more than 2 ft. of antenna should be used. You can mount it vertical or any other way you desire, but—as with any other R/C receiver antenna—it should not closely parallel metal rudder pushrods or other metal parts of the plane. A vertical piece of music wire is the simplest antenna (bend a loop in the free end, so you won't get poked in the eye with it!)

The two-foot antenna we have specified will do the job, if there is not a long lead from the receiver to the antenna itself (remember, the entire length of wire from the end of L1 to the tip should be figured in). If you have a metal pushrod to the rudder, or the escapement is located in the tail of the ship, with resultant long leads to it, it might be necessary to use an antenna series condenser. This may be a fixed ceramic unit of about 10mmf. value—there is no necessity to use a variable condenser here. Need for such a condenser will be shown by the fact that the padder must be screwed up very tight, to get the plate current drop.

The "antenna" on your plane is not only

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the part that sticks up above the fuselage—it is *all* metal parts in the plane that are tied to the receiver. If you find hand-capacity effect troublesome, the 10 mmf. series condenser will greatly reduce this also.

The relay we used in the original receiver is of the polarized type, and *must* be connected into the circuit as we specify in the wiring steps. Due to the values of idling current, and the amount of current change with signal, many other makes of relays may be used, including some of the cheaper surplus types—if they are around 4000 ohms resistance. We set the relay to pull in at 1.5 ma., and release at 1 ma.

The simplest way to do this is to connect the B battery and plate meter to the receiver as you would for normal use. Remove the tube from the socket for safety, then connect a variable resistor of 50,000 ohms or more from the red lug on L2 to B minus. Turn the screw contact, against which the armature rests when the receiver is turned off, till the relay will pull in—or operate—at 1.5 ma. Then turn the other contact till it will drop out at 1 ma., as the current is reduced.

We have tried out this receiver with many different makes of 3S4 tubes; some of them proved to be more sensitive than others, but all were quite workable—including some used surplus 3S4's. The tube specified in the parts list has been found entirely satisfactory.

As a measure of protection against handling, and to keep dirt out of the relay and other parts, a bottom cover of 1/16" balsa was made. It is held on with a rubber band, and adds practically no weight. Incidentally the receiver shown—less cover and battery leads, but with tube—weighs about 3.5 oz. It has been operated over a half mile on the ground, from a 3A4 transmitter. With a normal tube and fresh batteries, the idling current, as stated previously, should be around 1.8 to 2 ma. With a strong signal this will drop to .75 ma. or less. Even a weak signal will drop the current to about the same value.

During the distance checks, we got tired walking after one half mile, so do not know just what the maximum range might be but it is farther than you can see what your plane is doing, that's for sure!