"Gazistor"

GAS TUBER & TRANSISTOR R/C RECEIVER

Take one XFG-1 or RK 61, add one CK722 transistor and you've a very sensitive, very stable job for radio controlling

By

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Author Bliss, a licensed radio amateur who holds call letters K2IQL, is 34 and works as a senior process engineer at the Corning, N. Y., Glass Works. Mr. Bliss served in Navy 3½ years, is married, has a son W.E.B., Jr., 9. An active member of the Elmira-Corning "Flying Sparks" R/C club, Wells says his modeling career has been pretty much a local one, although he has won several times in speed and radio events in the Buffalo-Rochester-Ithaca area. Wells was bitten by the aviation bug in 1935, soloed in the '42 C.P.T.P. program, flew Cubs and Stearmans. At Leroy, N. Y., airport races where he assisted. Bliss met such famous pilots as Jimmy Mattern, Harold Neuman, others.

■ Here is a receiver that will eliminate relay adjustments entirely. The receiver differs from the conventional single gas-tuber in that it uses a transistor as a second stage, which idles at low current, the latter rising with signal.

The first tube can be either an XFG-1 or a "long life" RK61. If you want to utilize one of the older RK61's, you'll need a lower L/C ratio (less turns of wire in L and more capacity across it) and the idling current will be higher. The receiver is very sensitive, and seems to be more stable than other gas tubers; a single XFG-1 was used for a full flying season, with only a slight increase of idling current as it aged.

Various makes of "PNP" junction transistors have been tried, with much the same results; one thing noticed, though, is that all transistors are different. The circuit shown should do for most of them, but adjustments for every individual transistor are easy to make. In any case, the lowest plate current change that has been had was 2.3 ma., with the average around 4 ma. The base is shown here in full-size drawing.

By following the steps listed below you can wire the receiver up in the quickest possible time: **1.** After base has been drilled and eyelets installed, wind coil and connect 6.8 mmf. condenser across the lugs. Mount coil, flea clips and 25K pot. on chassis. **2.** Solder wire to transistor flea clip 3 (the group of 3 clips in center of chassis) and run to eyelet 3. **3.** Connect 2700 ohm resistor from eyelet 3 to center lug of 25K pot. and solder latter. **4.** Run the .04 condenser from outside lug of pot. to transistor flea clip 2. **5.** Solder B plus lead to eyelet 3. **6.** Solder 390K resistor to transistor flea clip 2 and run other end to eyelet 2. **7.** Solder 1" length of wire to trans. flea clip 1. **8.** Solder same length of wire to tube flea clip 2—other end goes to eyelet 2. **9.** Run 2.7 meg. resistor from tube flea clip 3 to eyelet 2. **10.** Connect one end of RFC to outside lug of 25K pot.—run other end to tube flea clip 1.

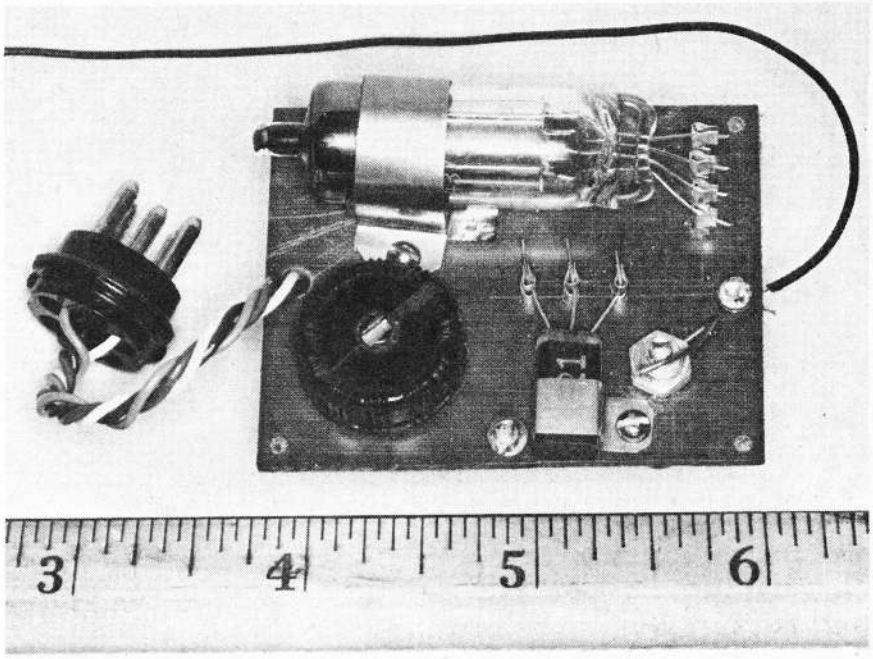
11. Solder ends of 47 mmf. condenser to tube flea clip 1 and to lug of L farthest from chassis. **12.** Solder one end of 100 mmf. condenser to tube flea clip 3—bend other lead around lower lug of L. **13.** Solder 10 mmf. condenser from lower coil lug to eyelet 1. **14.** Mount relay as shown and solder wire from transistor flea clip 1 to the inner coil lug. **15.** Solder one end of .01 mf. condenser to outside pot. lug—run other end to eyelet 2. **16.** Solder short length hookup wire to other relay coil lug, run other end through eyelet 2. **17.** Solder piece of hookup wire in eyelet 2, wrap other end around ground lug of relay (center lug

on contact end). **18.** Solder A plus-B minus lead to relay center lug. **19.** Solder A minus lead to tube flea clip 4, and another lead to top relay contact (latter for connection to escapement). **20.** Solder an 18-24" length of wire in eyelet 1, for antenna.

The battery and escapement leads may be twisted together and run through a hole in the chassis (not shown on drawing) to help keep them from being pulled loose. If the above steps were carefully followed, your receiver is ready for test.

Place the tube V in its clips (be sure the red dot on tube is nearest clip #1) and apply voltages, with a low resistance test meter of 0-5 ma. in the B plus lead. Vary the 25K pot. till the meter indicates about .5 ma., then turn on your transmitter and adjust the slug in the coil until the meter drops to .1 ma. or less. If you can get this current drop as the transmitter is keyed, it is time to put the transistor in its clips (*always* open the receiver switch before plugging the transistor in or out).

Since individual transistors vary so much it is impossible to predict the exact results, but upon turning on the switch you should get a meter reading of from 1-3 ma. Adjust the pot. for the lowest reading—it should be from .8-1.5 ma. Upon keying the transmitter, this should increase to 3-5 ma, depending upon the particular CK722 in use. If you can't cut the idling current (no signal on) to 1.5 ma., the next step is to increase the 390 K resistor to 470K; it was found necessary to go up to 820K in one case. Of course, as you increase R2, a check of signal-on current should be made, to note to what value the current jumps. If the idling current is within the range mentioned, and you want to get a greater current increase with signal, you can reduce the 390K resistor a bit.



You can get a better idea of the action of the pot. by referring to graph; the upper line represents meter reading, with the point marked "dip" at about .8 ma. As you go toward higher resistance the meter reading will increase very unsteadily, but toward lower resistance you will get a smooth increase in current. Best pot. setting is just past the dip, toward the steady current side. If you are using the newer "long life" RK61 and find you can't get high enough idle current (on the tube alone), replace the 6.8 mmf. condenser with a 10 mmf. unit and retune the slug. This will cause the tube to draw more plate current. Be certain to install a DPST switch in the plane; unless both B plus and B minus leads are opened, there will be a steady transistor current which will run the battery down.

I hope this receiver will bring you as many hours of enjoyable flying as it has me, and at this point I would like to thank Louis Gauss for his unlimited electronic help in getting the receiver perfected, and to thank Charley Spear for his photographic abilities that have made this article possible. The pictures should help make things clear.

Parts required: 6.8 mmf. cond., CRL type TCZ; 10, 47, 100 mmf. condensers, CRL type BC; .01 mf. cond., CRL type DD; .04 mf. condenser, Aerovox type P83Z. RFC—National R33, 100 microhenry. 25K pot., CRL type B16; all other resistors ½W carbon. One gas tube, per text; one Raytheon CK722 transistor. Base board, 3 eyelets, 7 flea clips.