RAYTHEON CK722 TRANSISTOR APPLICATION

"A Radio Control Circuit"

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With the development of the RK61 thyratron, Raytheon made a tube available to radio control hobbyists, which would operate reliably with a very simple superregenerative circuit. This tube has seen rather extensive use in the radio control field. The useful life of the tube is governed principally by the amount of plate current drawn during operation. This indicates the desirability of a D.C. Amplifier following the RK61 circuit, permitting the thyratron to idle at a lower value of plate current and yet retain sufficient relay current change for reliable operation. Several such circuits have been developed in the past using vacuum tubes. These circuits increase considerably the size of the radio control receiver and require increased battery weight due to the filament current requirements of two tubes.

The CK722 transistor seemed a very logical choice for a much improved D.C. Amplifier which would overcome these disadvantages. Exhibiting a current gain on the order of ten, it would permit the RK61 to idle with a plate current of less than 0.5 ma.

The next task was to apply the CK722 to the basic RK61 circuit with a minimum of additional components, for such a receiver when used in a model plane or boat must be compact and require a minimum of batteries.

The final circuit is shown in figure 1 and requires only the addition of one electrical component other than the CK722, to the basic circuit. The base of the transistor is connected through R_2 to the plate circuit of the RK61 and the emitter is returned to B+, resulting in the plate current of the RK61 serving as bias current for the transistor.

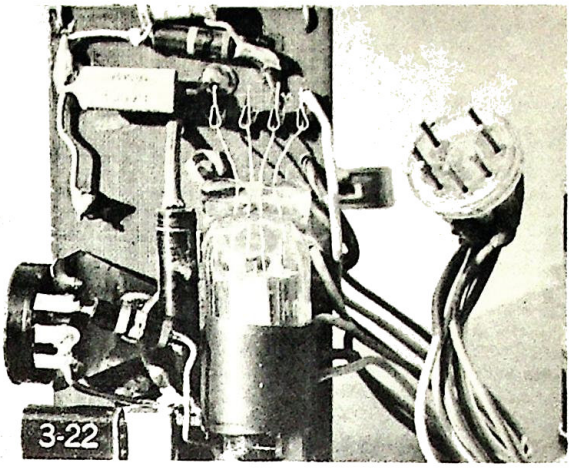
The relay is located in the collector circuit and is returned to the mid-point of the two 22½ volt batteries, thereby supplying the necessary negative potential for the collector. It is necessary that Ry_1 have a resistance of at least 5000 ohms in order that collector current of the transistor be held below its maximum rated value. J_1 facilitates metering this circuit for tuning and relay adjustment. Adjustment of R_2 results in a reduction of the RK61 plate current such that its idling value is on the order of 0.4 ma.

The CK722, exhibiting a current gain on the order of ten, produces a collector current, under these circumstances, of approximately 4.4 ma. Upon receipt of a signal the plate current of the RK61 drops to 0.1 ma and the transistor collector current is now down in the vicinity of 1.4 ma.

We now have a current change available for

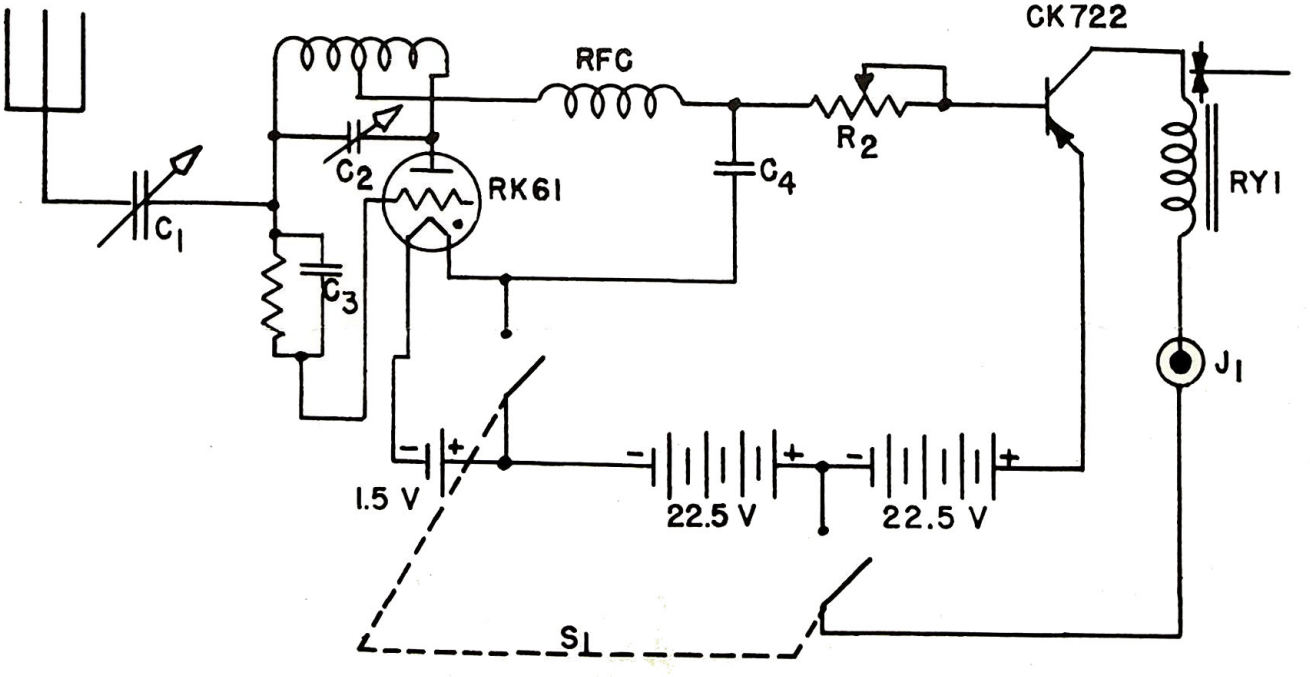
relay operation which varies from 4.4 ma (signal off) to 1.4 ma (signal on), a difference of 3 ma.

This compares with a current difference of 1.4 ma for the RK61 circuit alone. The idling current of the RK61 has been reduced from 1.5 ma to 0.4 ma which will extend its useful life many times. In order to accomplish this it is only necessary to add the CK722 transistor and R_2 to the basic RK61 circuit.



PARTS LIST

C_1—4-30 mmf ceramic trimmer capacitor
C_2—18 mmf ceramic capacitor
C_3—100 mmf ceramic capacitor
C_4—.05 mf 200V paper capacitor
R_1—3 megohm ½ watt
R_2—25,000 ohm subminiature pot.
L_1—8 turns #14 wire ½ inch dia. ¾ inch long-tapped 2½ turns from plate end. (6 meter band)
J_1—subminiature phone jack
Ry_1—5000 ohm sensitive relay
RFC—3/16" dia. ⅝ long form wound full #36 wire close spaced
S_1—D.P. S.T. Switch



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