RADIO CONTROL MONITOR

Provides a quick check on radio control transmitter function. Pocket size and self powered for ease of operation "in the field."

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THE 27MHz radio frequency (r.f.) band used for the control of models by radio, extends from 26·96MHz to 27·28MHz; transmissions for this purpose may consist of an unmodulated carrier wave, or a carrier wave which is modulated by one or more audio frequency tones. Signals which are radiated by the transmitter can be checked with a monitor.

The simple monitor described here is self powered and of compact size, so it can readily be carried out of doors, with the transmitter, model and other equipment. It allows a quick check of normal carrier-wave power and frequency, and of any audio modulation tones which may be used.

CIRCUIT

The complete circuit is shown in Fig. 1. A coil consisting of three windings, L1, L2 and L3 forms the basis of the circuit. L1 is the tuned winding, and the operating frequency is set to that of the transmitter by means of the trimmer C1. With the coil and trimmer described, the whole of the model control band is easily covered. When the transmitter and the tuned circuit (L1 and C1) are set to the same frequency, and the monitor is held in a position where it picks up sufficient r.f. (radio frequency) energy, L1 absorbs some of the power from the transmitter. The monitor has two indicating devices, operated by the power absorbed.

Winding L2 is inductively coupled to L1 and when L1 absorbs r.f. power this is induced in L2 and provides current for the small lamp LP1. Resonance between the transmitter and monitor frequencies is shown by maximum brightness of this lamp. The brightness of the lamp also shows that the transmitter is producing its normal r.f. power.

Winding L3, with the diode D1 and earpiece TL1, give audible monitoring of the tones produced by the transmitter. So the control and tone-producing circuits of the transmitter can be immediately checked, by listening with the earpiece. The diode acts as a detector to extract the audio signal from the amplitude modulated r.f. signal that the transmitter provides.

Some changes in components will not unduly affect the circuit. The earpiece TL1 can be between 35 and 250 ohms impedance, of the kind used with transistor radio receivers. It would also be quite possible to use a different wire gauge or tube size for the coil, although some experiment with the number of turns would then be necessary.

The lamp must be a low-consumption type; a 6 volt 0·04 amp bulb, as used for cycle dynamo rear lamps, is most suitable, but a 6V 0·06A could be used. Bulbs which take the smallest current will give the more sensitive indication.

CONSTRUCTIONAL DETAILS

The monitor is constructed to the details shown in Fig. 2, then inserted in a $3\frac{1}{2}$ inch long by $1\frac{1}{4}$ inch diameter paxolin tube.

A piece is 1/16 inch thick paxolin $3\frac{1}{2}$ inches long is cut to such a width that it is a tight fit inside the $1\frac{1}{4}$ inch tube. For part of its length the paxolin is further reduced in width, so that it fits tightly inside a 1 inch diameter paxolin tube. The paxolin sheet is best cut slightly oversize, and then filed to fit.

The 1 inch diameter tube that is the coil former is 1 inch long. All windings are of 24 s.w.g. enamelled copper wire, wound side by side. Drill six 1/16 inch holes in the tube as shown in Fig. 2, thread the wire through hole A, smear part of the tube with Bostik 1, or similar adhesive or cement, and wind on nine turns to form L1,

R.C. MONITOR

Approximate cost of components

£1·30 inclusive

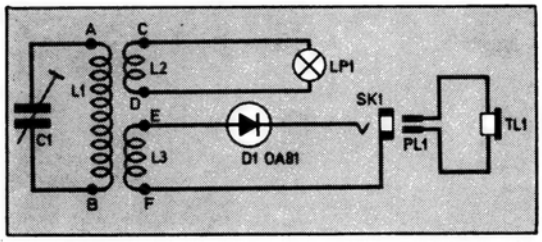

Fig. 1. Complete circuit diagram of the Radio Control Monitor.

Components....

Capacitor
C1 6—25pF ceramic trimmer

Diode
D1 OA81 **Shop Talk refers**

Lamp
LP1 6V 0·04A screw in bulb (see text)

Earpiece
TL1 35Ω to 250Ω earpiece with miniature jack plug (PL1)

Socket
SK1 Miniature jack socket to suit earpiece plug

Miscellaneous
24 s.w.g. enamelled copper wire
P.V.C. covered connecting wire
$\frac{1}{16}$ inch s.r.b.p. or paxolin board $3\frac{1}{2}$ in. x $1\frac{1}{2}$ in.
Thin paxolin $1\frac{1}{4}$in. square for end pieces (2 off)
Paxolin tube 1 in. x 1 in. diameter and $3\frac{1}{2}$ in. x $1\frac{1}{2}$ in. diameter

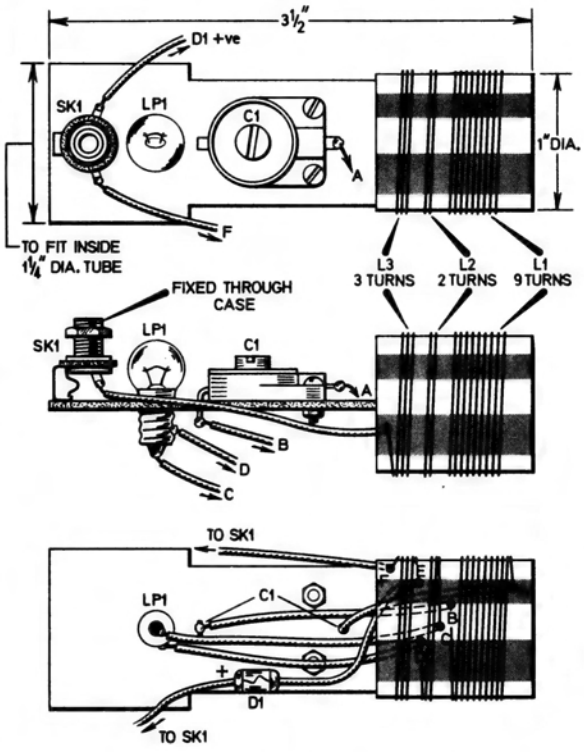

Fig. 2. Constructional details showing the complete unit without the case. The three views show the top, side and underside of the unit. SK1 is mounted through the outer case.

finishing by pulling the end through hole B. Make L2 (two turns) and L3 (three turns) the same way.

The tube is then cemented in place on the panel, with the wire ends running back (as shown in Fig. 2) identified with coloured 1mm p.v.c. sleeving. The lamp LP1, is a screw fit in a hole drilled through the panel. Leads C and D are soldered to its side and end pip. Since, with careful use, the bulb should never need replacing, this method of fixing is suitable. Two 8BA bolts hold the trimmer, and the miniature jack socket is fitted through a hole in the outer tube.

TESTING

To test the monitor, set the trimmer about half open, using a non-inductive trimming tool, and bring the monitor coil into the field of the transmitter aerial (tank) coil. Rotate the trimmer with the trimming tool to tune L1 to resonance with the transmitter; this is shown by maximum brilliance of the lamp. At the same time move the monitor away from the transmitter coil, as required, so that the bulb only glows dimly.

If the transmitter is of a type producing audio tones, plug in the earpiece, operate the transmitter, and listen for the audio signals.

Slight re-adjustment of the trimmer is necessary after the monitor has been fitted in its protective case. The tubular case has a $\frac{1}{4}$ inch hole for the jack socket, a similar hole through which to see the lamp filament, and a third smaller hole allowing the trimmer to be adjusted with a trimming tool. Both ends of the tube are closed with paxolin discs cemented on. The tubular case must not be made of metal of any type.

METHOD OF USE

The monitor is held by the jack end, and its coil brought near the power amplifier or tank coil of the model control transmitter. The trimmer is adjusted with a non-inductive trimming tool, and tuning should be quite sharp. Move the monitor slightly away from the transmitter, so that LP1 filament only just glows at the correct tuning point. This gives the sharpest resonance indication, and avoids blowing the filament.

If the transmitter is totally enclosed in such a way that the tank coil cannot be approached, a loop consisting of one or two turns of insulated wire can be placed in the aerial connection, and the monitor approached to this.

If the transmitter has variable frequency tuning, as with self-energised oscillators, a check on transmitter frequency can be made by noting that its tuning agrees with maximum brilliance of the lamp, keeping coupling loose.

Where the transmitter has tuning adjustments which govern the output power, note that these are set so that the lamp lights with its usual brightness. For tone transmitters, plug in the earpiece and listen in turn for each normal tone. Lack of any indication at all will show that the transmitter has failed. ▣

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