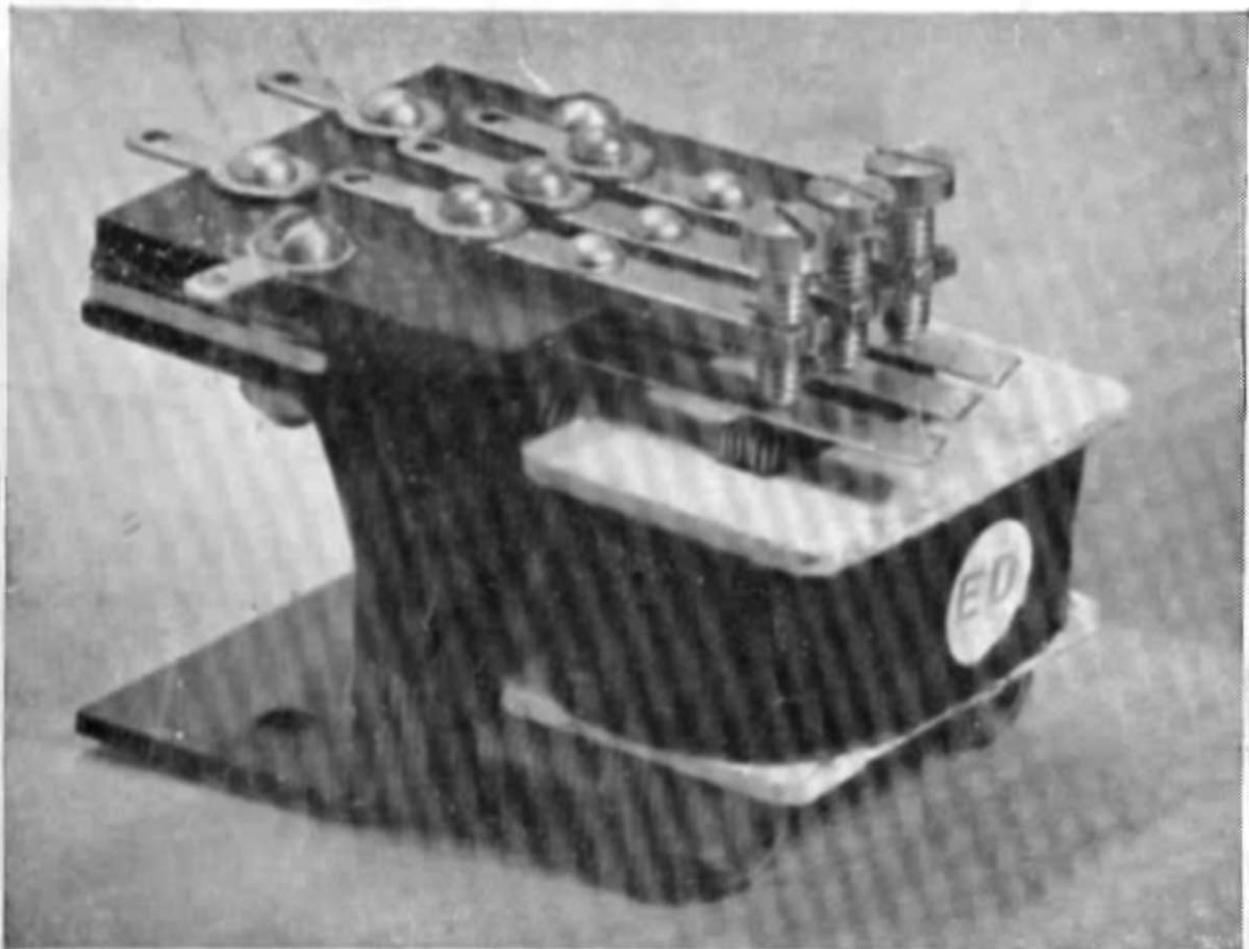


ED

Three & Six Reed Relay



Electronic Developments (Surrey) Ltd.

ISLAND FARM ROAD, WEST MOLESEY

SURREY, ENGLAND

Telephone : Molesey 6037-6038

Foreword

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In view of popular demand for Radio Control equipment which will enable the user to operate independently, more than one control, Electronic Developments Ltd. have pioneered this system of tuned reeds.

Long and exhaustive practical tests, culminating in the first crossings of the English Channel in September, 1951, with a model boat, and September, 1954, with a model plane, have proved in advance the reliability and ease of control of this system. There is a growing conviction amongst all of those concerned with models, that the tuned reed system is the final answer for accurate multiple control. One cannot say it compares with the radio control systems, in fact there exists no other system, which can be compared with it.

Successes in competitions have amply proved to modellers that for realistic and fingertip control, E.D. Reed Systems lead the way and the world.

Our electronic engineers have spent years of development work up to its present day standards, not only because of its versatility, but also because it is a foundation for things to come in industrial, as well as model applications.



*The only firm in the world to manufacture Models, Model
Power Units and Remote Control Units*

E.D. Three & Six Reed Relay

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The Reed Units are supplied in two versions, a three and a six. Suggested circuits are given for both Transmitter and Receiver. Reed frequencies 240, Cps, 270, 300, 330, 360, 390 Cps, and the 3 Reed uses the lower range. Minimum starting voltage 2.5 volts R.M.S. Minimum signal input 40 milliwatts. Weight: 3 Reed, 2 ozs.; 6 Reed, 2 ozs.

Transmitter

A simple layout is given in Fig. 1. A circuit diagram in Fig. 2. It is important that all leads in the DCC90 valve circuit should be kept as short as possible, and that the coil is mechanically rigid and well clear of other components. All components should be rigidly mounted on a 16 swg aluminium chassis. All external battery and other leads should be cabled and make their exit well away from the H.F. coil and valve circuit. On no account should the R.F. chokes be positioned in the field (same axial direction) of the H.F. coil.

No difficulty will be experienced with components which may vary up to 20% of the values given. However the type of modulation transformer T used, even if of the ratio given, will determine the current drawn by DL92 valve. This should be limited to 10 M/A with frequency adjusting potentiometers R8, 9, 10, 11 in the midway position. R8 is included so that the required range of

frequencies may be chosen. The Transformer T should be such that the iron core is kept down to a minimum size, so that the DL92 valve will be kept well within its ratings.

With all values as given, the RC. band frequency of 26.96 to 27.28 Mc/s will be found with the tuning condenser C5 about three-quarters turned in. After the transmitter is finally boxed in working condition and with the normal 8 foot length of vertical aerial fitted, it should be finally adjusted to the centre of the RC. band. In the absence of an accurately adjusted frequency meter, this should be done by a competent radio engineer possessing the necessary equipment.

For a final test after completely wiring up and checking that all connections are correct, plug in the DCC90 valve only, and with a milliamperemeter in the H.T. + lead, switch on. With C5 in a three-quarters turned in position (adjustment should be made with a non-metallic tool, a sharpened piece of hardwood dowel, etc.), and without aerial, the meter should read between 15 and 25 Ma. An absorption tester consisting of an ordinary 3.5 volt torch bulb soldered onto a two turn loop of wire should now be brought to about $\frac{1}{4}$ inch of one end of the H.F. coil, with the bulb loop in the same axis. The bulb should glow with a reasonable brightness, indicating that a strong H.F. current is flowing in the coil circuit. At the same time it will be noticed that the H.T. current will rise by 5 to 10 Ma. It should be noted that when completed, and the Transmitter loaded with full aerials of 8ft. 6in. that an approximate increase of 5 Ma should be observed.

Now remove the DCC90 and insert the DL92 in the appropriate socket. With any one of the switches of the control box operated a current of 10 Ma should be obtained and a modulation note should be clearly heard with the ear close to the transformer itself. Note,

however, that the circuit will only oscillate if the transformer leads are connected in the correct sense, that is, primary inner lead to the anode, and secondary outer lead to the grid condenser C1.

Transformer connections are usually marked or the leads are visible as beginnings and ends of windings. If in doubt, connect the H.T. + lead to a lower battery voltage about 40 to 60 volts, and reverse the primary connections to find the connection which gives the lowest current and an audible note. On no account use full voltage with the wrong connection, or the current will rise to over 40 Ma and the valve will break down within a short time.

With a note now audible, a variation of the controlled potentiometer will vary the note from a low value (potentiometer full resistance) to a high note (potentiometer turned to zero resistance).

The control box should be wired up as indicated. The switches S2, 3, 4, should be chosen according to control requirements. For example, a double lever switch for two channel steering and a pushbutton for auxiliary controls, or three pushbuttons, etc. It will be seen that as well as making the appropriate frequency control potentiometer, the H.T. to the screen of the DL92 is made. Therefore a well insulated double pole switch of positive making contacts is required here.

Receiver

The circuit Fig. 3 is the type generally used for the lightest type of receiver requiring only small capacity batteries and mainly used for model planes.

The tuning coil and condenser L and C1 are in this case a standard low loss dust iron cored former and a 10 pf fixed condenser. However, any normal coil and variable tuning condenser may be used. As coil formers of various obtainable types vary in size and core, the following figures are only approximate and may have to be slightly changed to tune to the RC band.

Dust iron cored coil.

- L. $\frac{1}{2}$ in. dia., 13 turns 22 swg., slightly spaced turns, centre tapped.
- C. 10 pf.

Air cored coil and variable tuning condenser.

- L. $\frac{5}{8}$ in. dia., 15 turns, 22 swg., slightly spaced turns.
- C. 30 pf. trimmer.

For some particular purposes the receiver may be assembled on one panel, and the reed unit and relays on another. This may be of advantage for some types of models and will reduce weight and bulk of the assemblies. Where possible miniature sizes of condensers and resistors should be used. The heavier components should be well anchored to prevent them from shifting or pulling on the wiring. The three relays shown are the E.D. polarised type, but providing that they have between 3000 to 5000 ohm resistance and will pull in at 1.5 Ma, any other type can be used.

Operation

For ease of tuning and adjustment of the control frequencies a simple tester consisting of three torch bulbs and a battery should be used and connected by a four pin plug and socket as shown in Flg. 4.

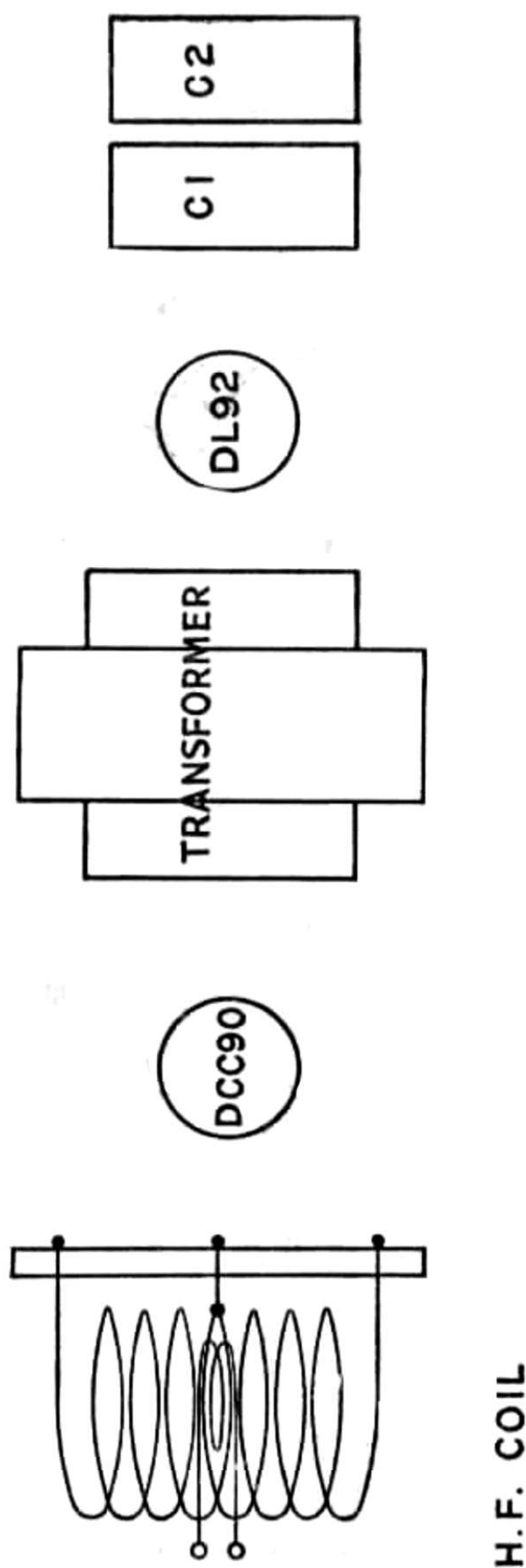
Switch on both transmitter and receiver. If within a few yards for preliminary testing, disconnect the transmitter aerial. Operate the first transmitter channel and tune the receiver until a loud note is heard in the phones, which should be connected in parallel with the reed coil. Disconnect the phones and adjust the corresponding frequency trimmer of the control box until the longest reed vibrates visibly and audibly. The same procedure should be followed with channels two and three (adjusting the corresponding trimmers), which will tune to the centre and shortest of reeds. This exact sequence of reeds and controls can, of course, be changed according to individual requirements.

Finally an accurate adjustment of receiver and channel frequency tuning should be made at a reasonable distance of not less than 15 yards from the transmitter with full aerial. The three bulbs, which may be coloured, will enable this to be done without any difficulty. Once carefully adjusted and providing that both transmitter and receiver aerial are not altered, there is no necessity for any further tuning. A general check should be made that all controls are functioning before releasing the model.

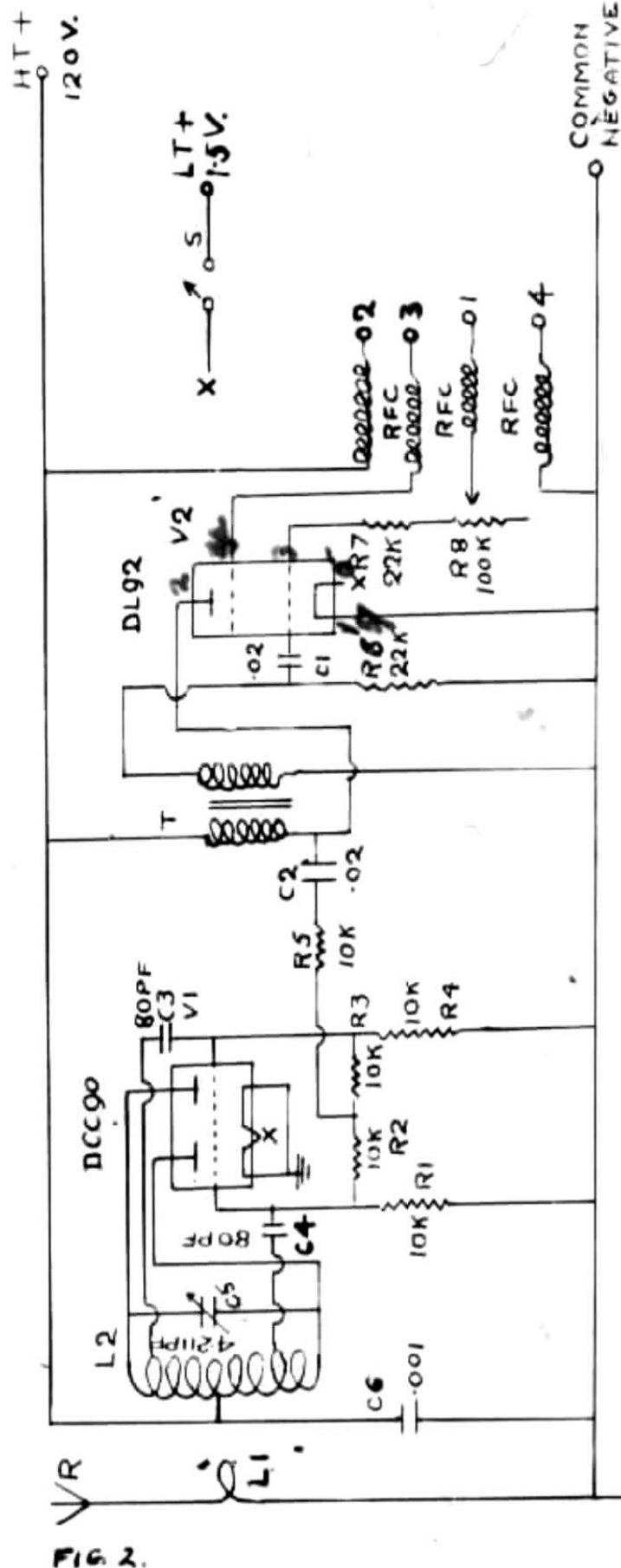
Variation of channel frequencies will only occur if the H.T. transmitter voltage is changed, or with an old battery which drops radically during use. This should be replaced when it is lower than 100 volts, tested when switched on and operated.

The output from the three relays may be used in various ways according to the control requirements of the model. Two basic examples are shown in Figs. 7A and 7B.

Fig. 1.

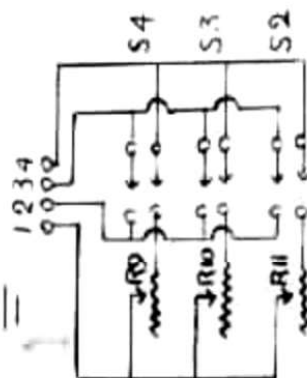


ALTERATION TO VALVE CONNECTIONS—Anode Connections DCC90 to be reversed



FOR THE 6 REED UNIT A FURTHER THREE CONTROLS SHOULD BE PARALLELED TO THE CONTROL BOX CIRCUIT

<p>R1 } 10K ½WATT</p> <p>R2 } 10K ½WATT</p> <p>R3 } 10K ½WATT</p> <p>R4 } 10K ½WATT</p> <p>R5 } 10K ½WATT</p> <p>R6 } 22K ½WATT</p> <p>R7 } 22K ½WATT</p> <p>R8 } 100K POTENTIOMETERS</p> <p>R9 } 100K POTENTIOMETERS</p> <p>R10 } 100K POTENTIOMETERS</p> <p>R11 } 100K POTENTIOMETERS</p> <p>C1 } .02</p> <p>C2 } .02</p>	<p>C3 } 80PF</p> <p>C4 } 80PF</p> <p>C5 } 30PF TRIMMER</p> <p>C6 } .001</p> <p>V1 DCC90</p> <p>V2 DL92</p> <p>S ON/OFF SWITCH</p> <p>T 1:3 LF TRANSFORMER</p>	<p>L2 8 TURNS 1" DIA 1/6 S.W.G. SPACED TO GIVE LENGTH OF 1 1/4"</p> <p>L1 ONE TURN 3/4" DIA TO FIT IN EXACT CENTRE</p> <p>KEYING CHOKES 25 TURNS 32 S.C.C. WOUND ON 1/2 FORMER</p>
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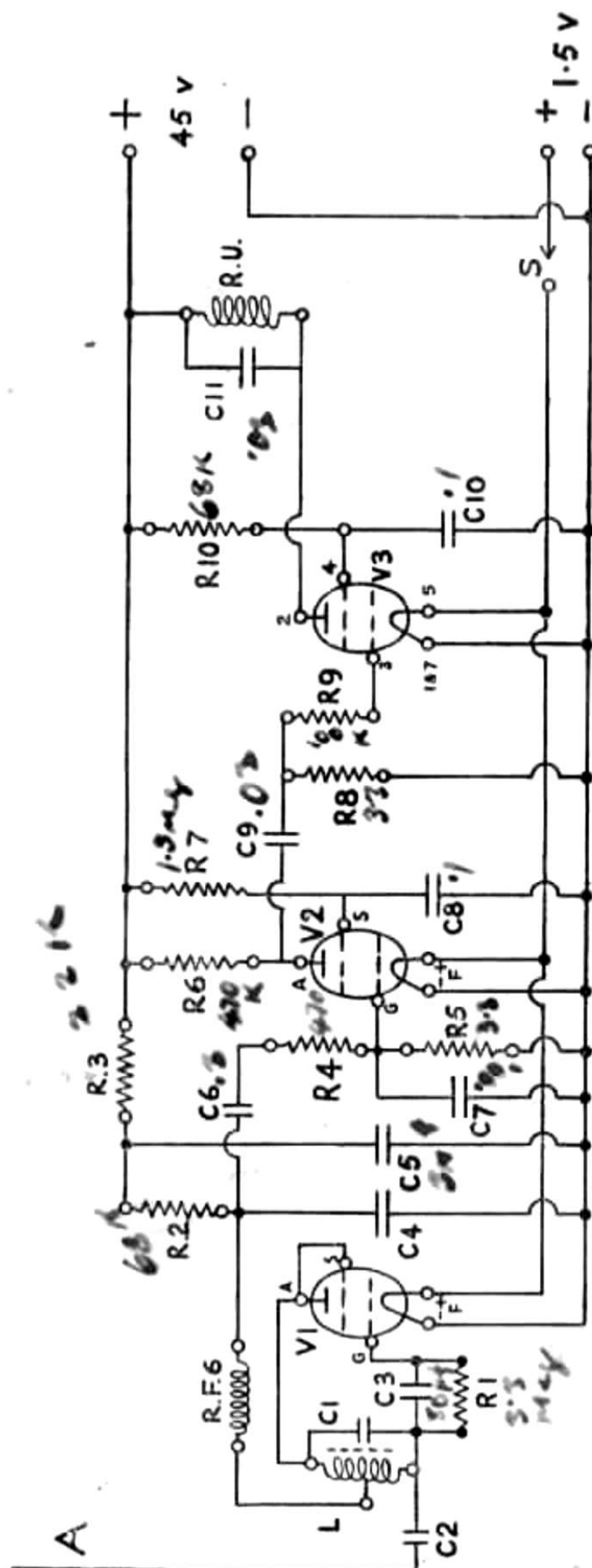
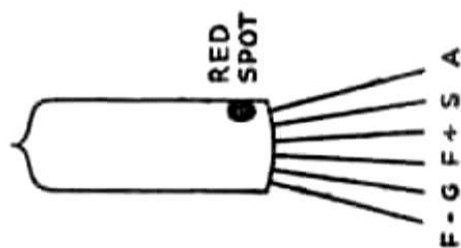


Fig. 3.



V1 & V2 CONNECTIONS

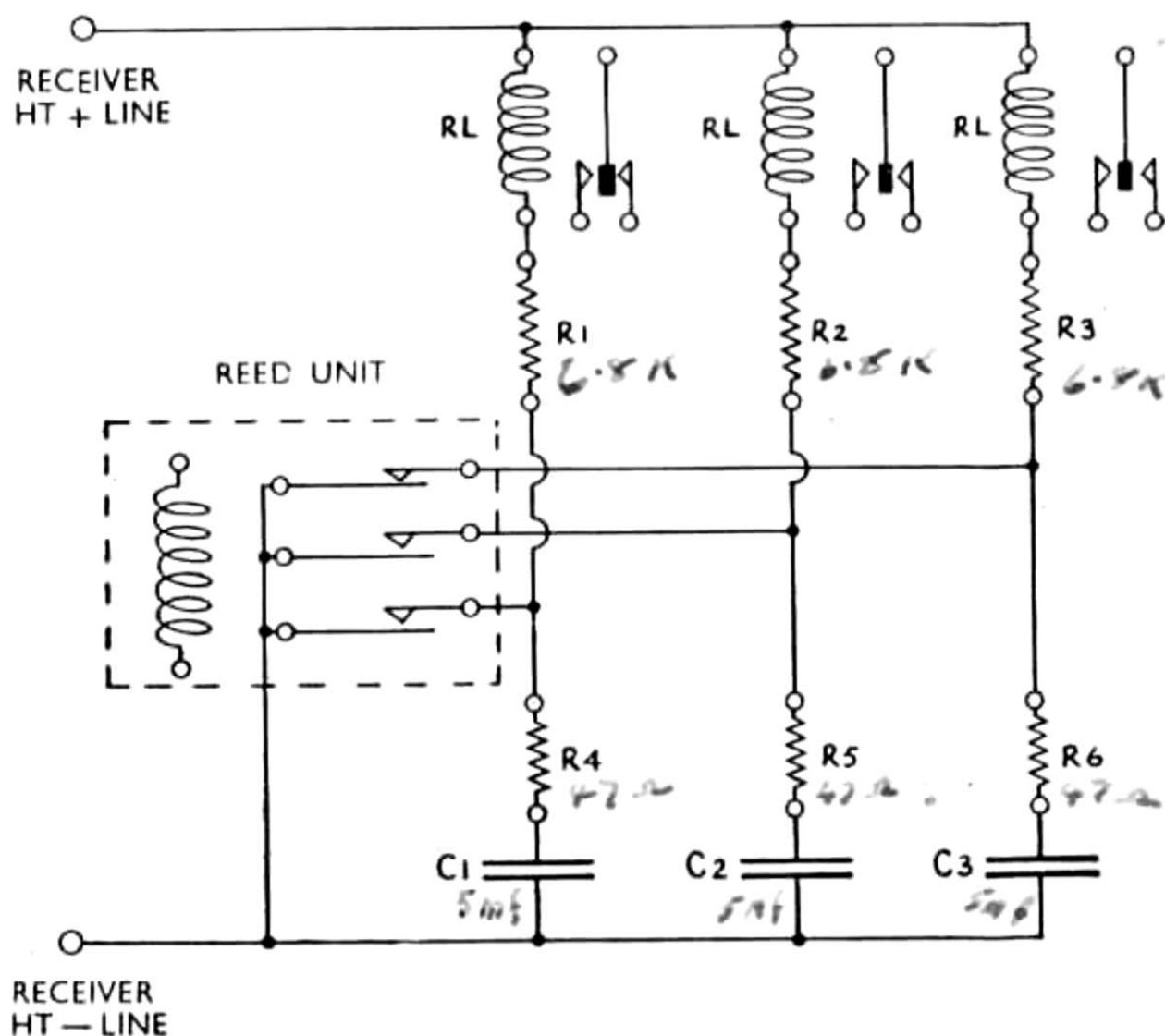
L AND C1 SEE TEXT
R.F.C. REED "UNIT"
R.U. REED "UNIT"
V1, V2 MULLARD DL66
V3. MULLARD DL92
S. ON/OFF SWITCH

R1, R5, R8, 3.3MEG.
R2, R10. 68K
R3. 22K
R4, R6. 470K
R7. 15MEG.
R9. 100K

C2. 5 PF
C3. 80 PF
C4. .005 M.F.D.
C5. 3 M.F.D. 100V
C6. 03 M.F.D.
C9. 03 M.F.D.
C7. .001 M.F.D.
C8. .1 M.F.D.
C10. .1 M.F.D.
C11. 0.03 M.F.D.

For the 6 reed unit, the relay/resistor/condenser lines should be added in parallel.

REED AND RELAY CIRCUIT



R1, R2, R3	6,800 OHM
R4, R5, R6	47 OHM
C1, C2, C3	5 MFD PICOPACK
RL ED POLARISED RELAY OR STANDARD RELAY	

Fig. 3. (Contd.)

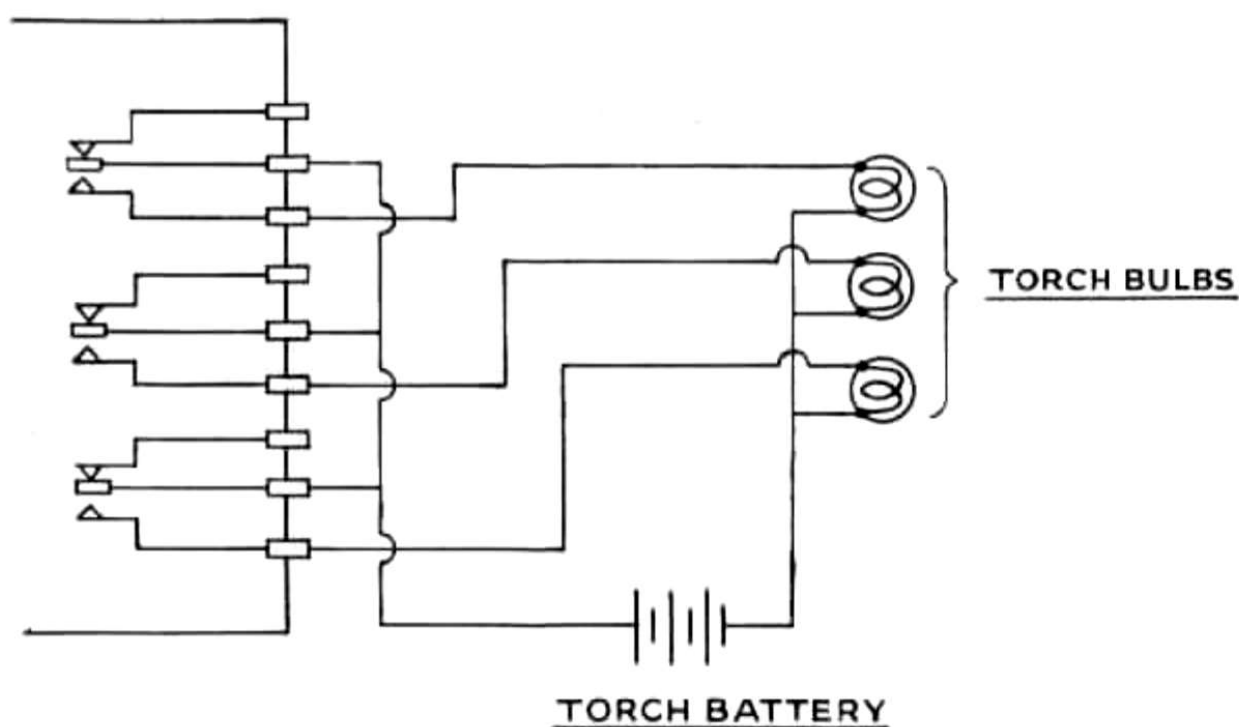
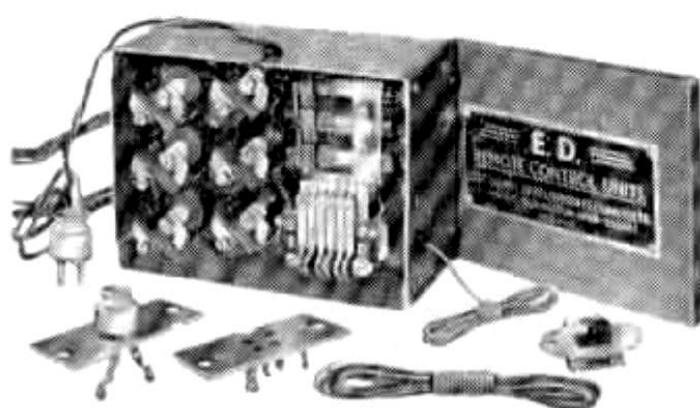
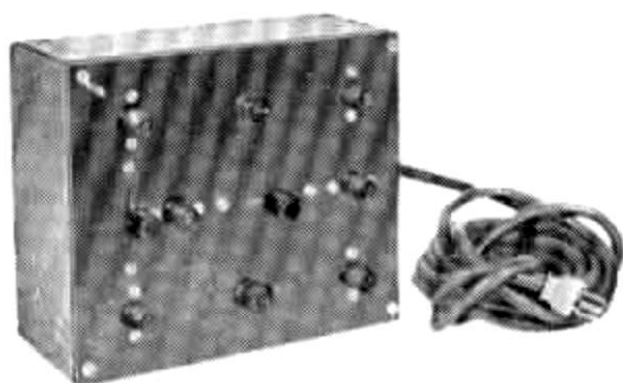


Fig. 4.

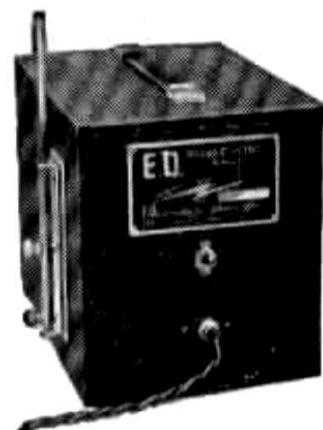
E.D. Mk. V "EVEREST" MULTIPLE RADIO CONTROL UNIT



Receiver



Control Box



Transmitter

Fig. 5.

E.D. "TRANSITROL" RADIO CONTROL RECEIVER

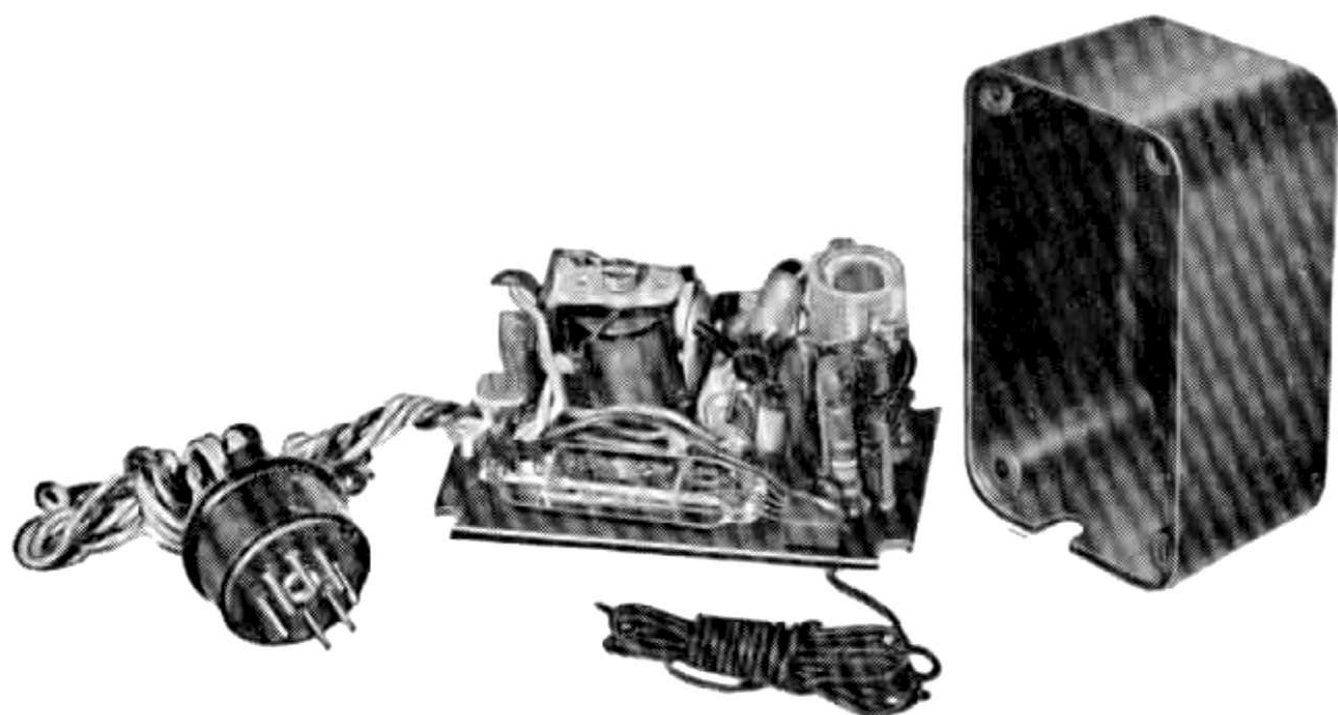


Fig. 6.

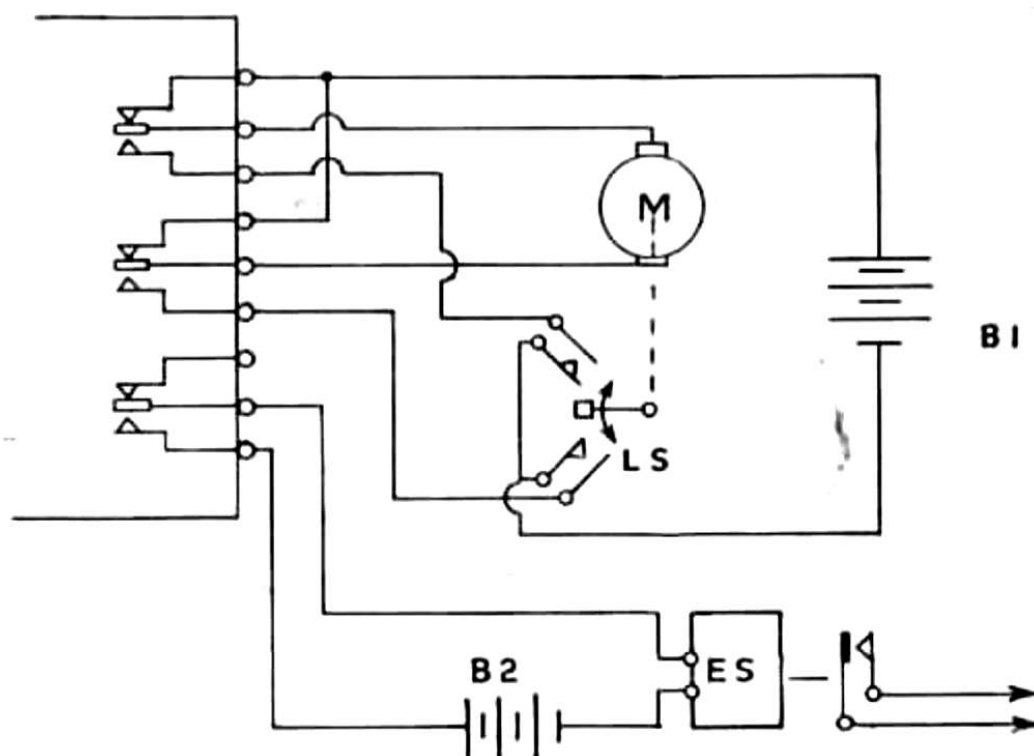
STOP PRESS

For the Beginner—

First Transistorised Single Channel Receiver

— Send for Illustrated Leaflet

Fig. 7A.



M. Rudder motor.

LS. Limit switches operated from motor drive to rudder to open and stop motor at extreme rudder positions.

ES. Escapement operated switch for ignition engine speed control. Can also be electric motor geared to rotate timing lever. For boats ES can be a multi contact ratchet switch for electric propulsion motor and further controls.

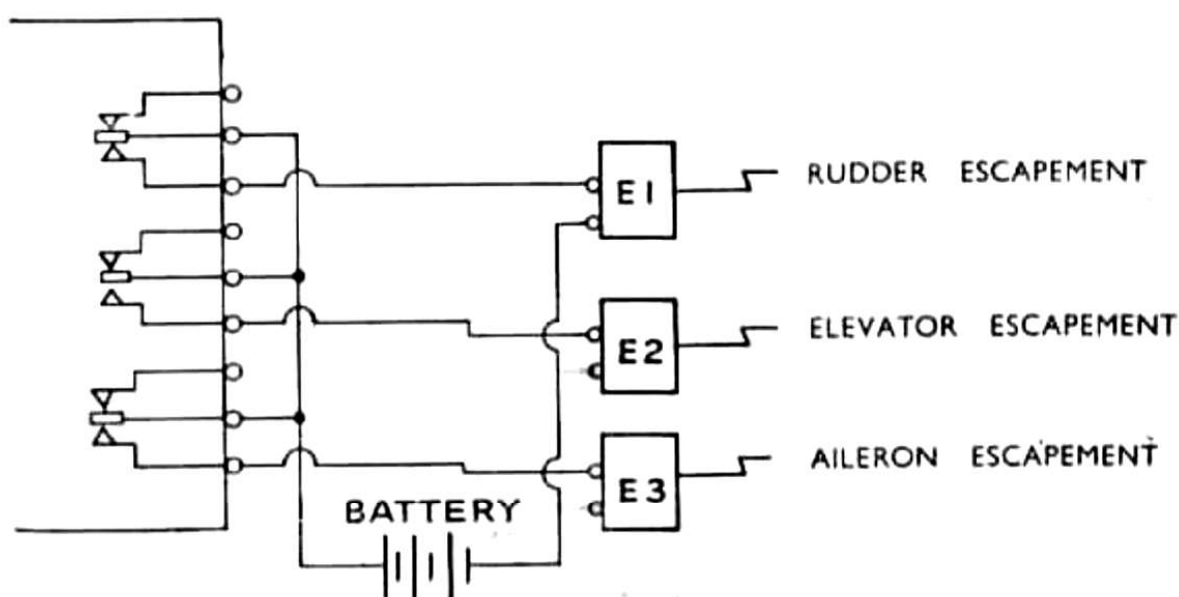
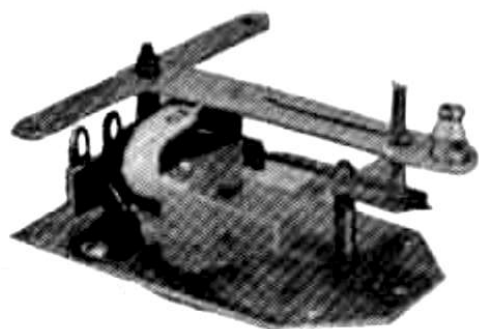


Fig. 7B.

*For use in conjunction with our Radio
Control Units*



**Mark I.
Escapement
(Clockwork)**



**Mark III.
Escapement
(Current Saving Type)**

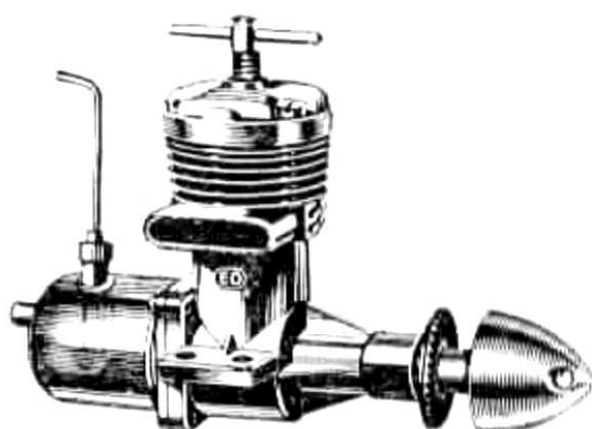


**Compact
Escapement**

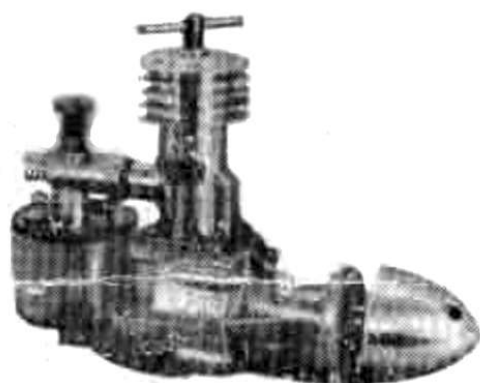
*If your model needs a power unit, there
is one in the E.D. Range*



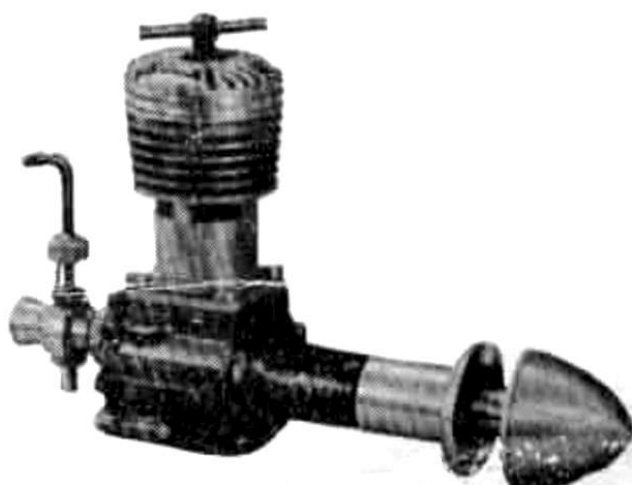
Mk. III. 2-46 c.c.



Mk. I (2) Bee



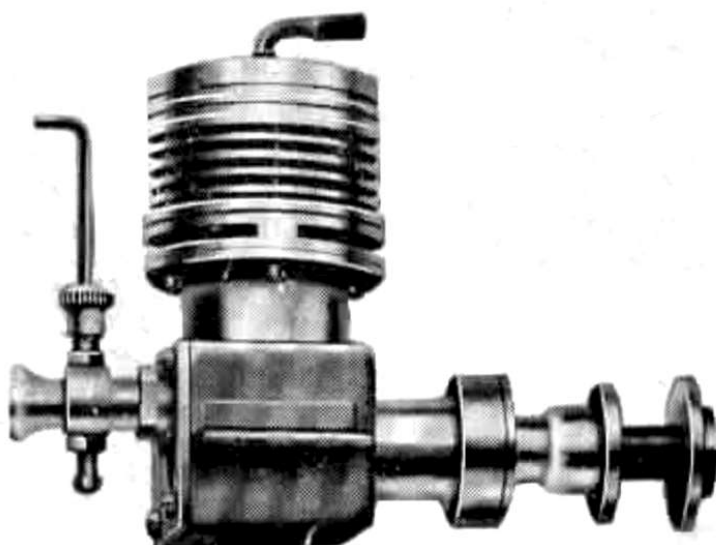
Mk. II. C/S 2 c.c.



Mk. I. 3-46 c.c.



BABY 46



Miles 5 c.c.