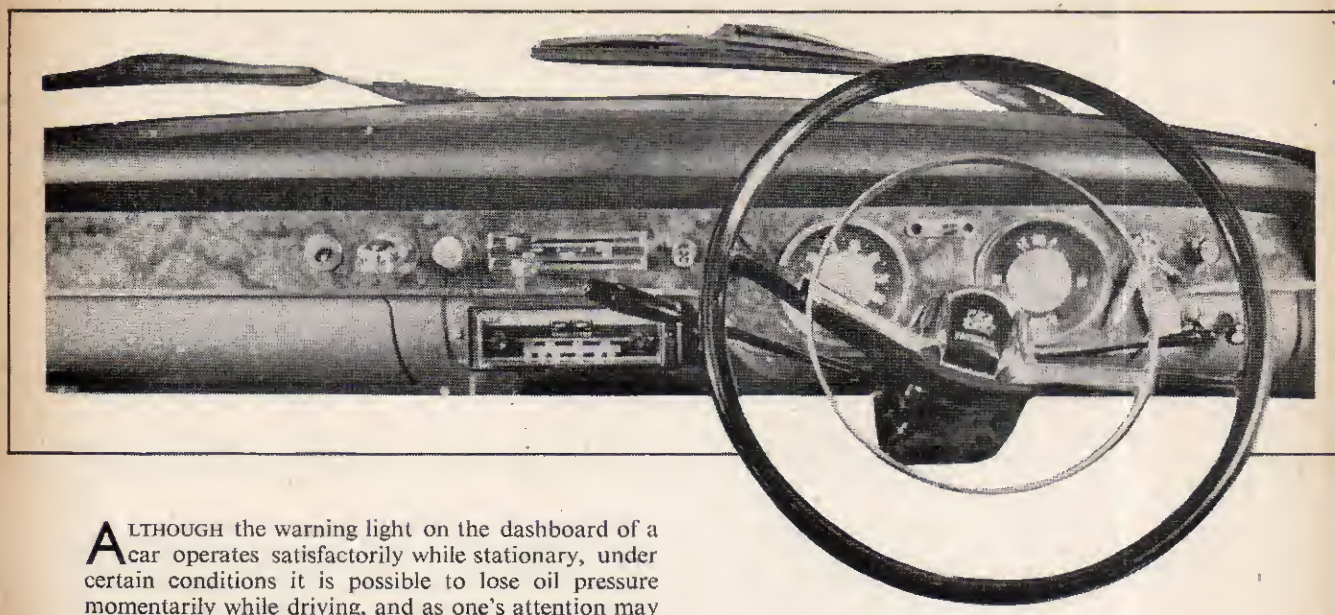


ALTHOUGH the warning light on the dashboard of a car operates satisfactorily while stationary, under certain conditions it is possible to lose oil pressure momentarily while driving, and as one's attention may be otherwise engaged, this may pass unnoticed. The simple unit described in this article will overcome this problem at a very low cost by emitting an audible tone whenever the oil pressure switch operates.

Moreover, the system can be extended, as will be seen later, to give a similar warning when the headlamps and other lamps are left on after the ignition has been switched off. No doubt readers will be able to adapt the unit to give other warnings to suit his own requirements, for example a theft alarm.

OSCILLATOR

The circuit for providing the audible signal is in the form of a modified Hartley oscillator as shown in Fig. 1. A single transistor is connected to a push-pull type output transformer (T1). The resulting fluctuations in collector current produce an oscillatory action which is controlled by the stabilising network, R1 and R2.

The frequency of oscillation is determined by the inductance of the primary winding and the value of C2. Since the transformer remains at constant inductance, the easiest way to alter the frequency would be by changing the value of C2.

The power supply for the oscillator is provided by the car battery; the values of R1, R2, and R3 should be of such a value to suit the battery voltage (see components list). Note that the battery connections to the oscillator should be arranged according to which version is required (see Figs. 2 to 5).

If the comprehensive system (shown in Fig. 5) is used the connector can be wired to provide any of the warnings shown by Figs. 2 to 5 or a combination of any two or more of these. The positive side of the oscillator is earthed to the car body through the multiway connector only if the car battery positive terminal is "earthed". The device may be used on any car, irrespective of the supply polarity, provided that the oscillator is connected the right way round, i.e. positive to positive.

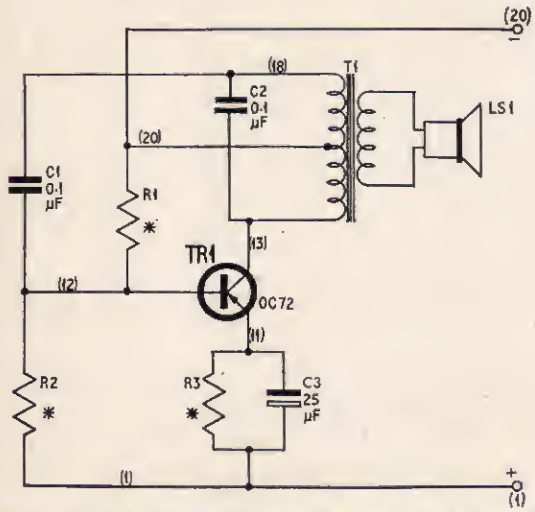


Fig. 1. Circuit diagram of the oscillator. The values of R1, R2, and R3 depend on the car battery used (see the components list.) The reference numbers on Figs. 1 to 5 correspond to the copper strips in Figs. 6 and 7 only

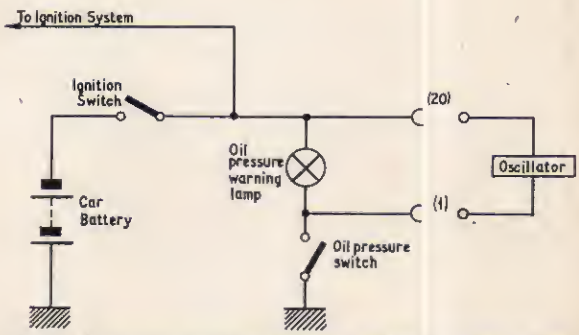
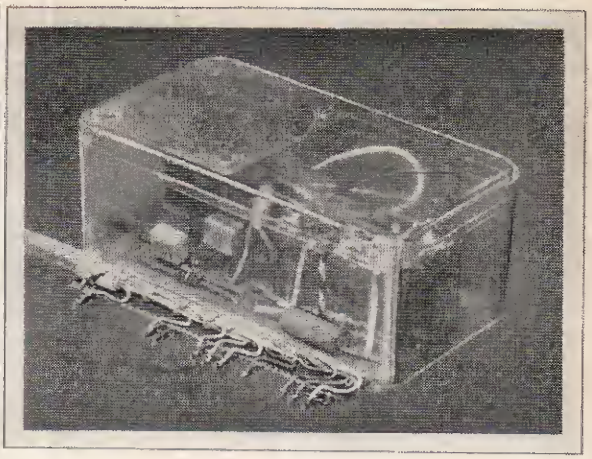


Fig. 2. Basic circuit for giving an audible warning of low oil pressure with the ignition switched on

AUDIBLE WARNING FOR YOUR CAR

BY A. J. HOLMES



OIL PRESSURE

Fig. 2 shows the basic circuit for indicating that the oil pressure is low. The oscillator is connected directly across the oil pressure warning lamp, so that the audible tone can only be switched by the automatic oil pressure switch after the ignition is turned on.

HEADLAMPS

If the driver leaves his car after the ignition is switched off, the circuit shown in Fig. 3 will let him know if he has left the headlamps on.

In this case a relay is used to disconnect the oscillator from the headlamp circuit when the ignition is switched on. When switched off the relay returns to connect the oscillator to the headlamps switch and chassis. The relay should be a type which can be operated on the car battery supply. The type MH2 relay having a resistance of 700Ω as used in the prototype will operate on 12 volts, but for 6 volts a 185 ohm version is necessary.

The dotted lines shown in Fig. 3 indicate wires used in the comprehensive system (see Fig. 5).

OIL PRESSURE AND HEADLAMPS

Fig. 4 shows the circuit combining the functions of oil pressure and headlamp warnings. Two relays are used, and an extra set of contacts (RLB1) are brought into the circuit. Either a direct "chassis" connection to the oscillator for headlamp warning, or connection via the oil pressure switch for oil pressure warning is achieved. The "normal open" contact of RLA2 is connected to the ignition switch via the multi-way connector to supply the battery negative to the oscillator in the "oil pressure" warning system. The "normal open" contact of RLA1 is connected to the oil pressure switch and lamp.

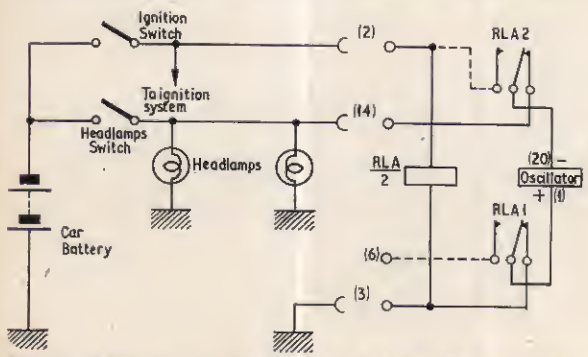


Fig. 3. Basic circuit for giving an audible warning when the headlamps have been left on after the ignition is switched off

COMPREHENSIVE SYSTEM

The two systems previously described can be combined with any number of extra systems to form an extremely flexible warning system, while the cost is still kept low. The circuit in Fig. 5 and the photograph in the heading to this article shows the prototype unit which was designed on the principles already described.

This unit can be used on comprehensive lines or may be connected to perform any of the previous functions without altering the wiring in the unit. Only the multi-way connector should be wired, according to the reader's requirements from either Figs. 3, 4, or 5.

The circuit shown in Fig. 5a enables three systems to be used to give warnings with two relays additional to the oil pressure system relay. A spare switch and relay can also be incorporated, as shown.

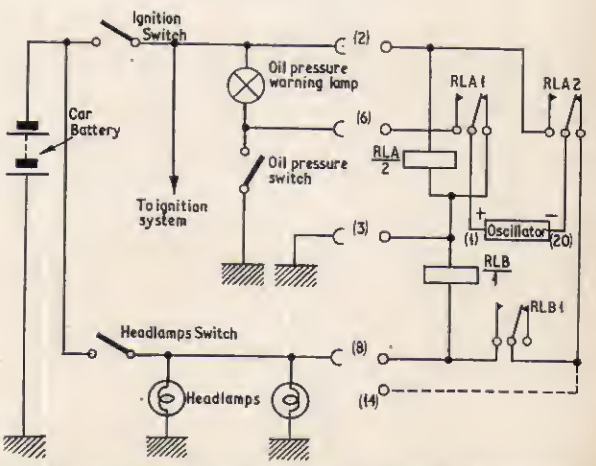


Fig. 4. Combined circuit for low oil pressure and headlamps

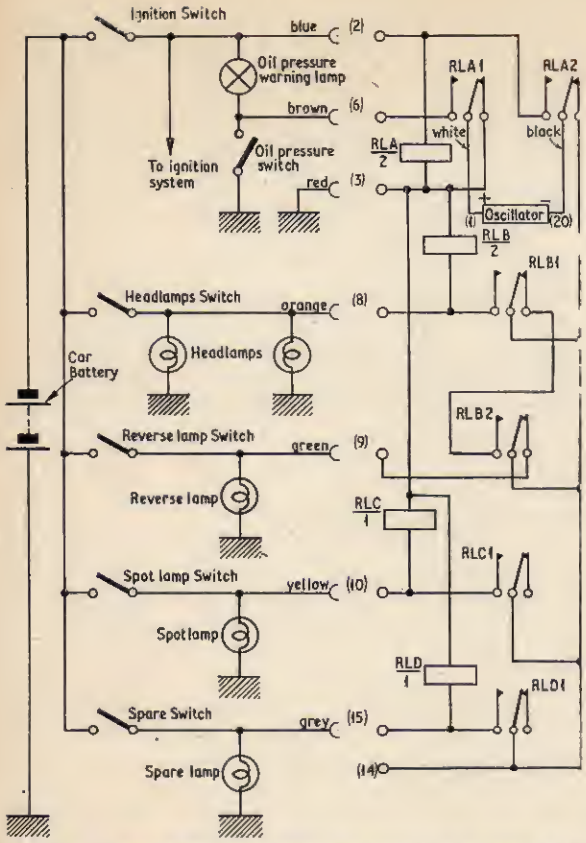


Fig. 5a. Comprehensive system incorporating additional alarms for indicating when either headlamps, reverse lamp or spot lamp are left on after the ignition is switched off. The reference numbers correspond to the copper strip numbers in Figs. 6 and 7 only

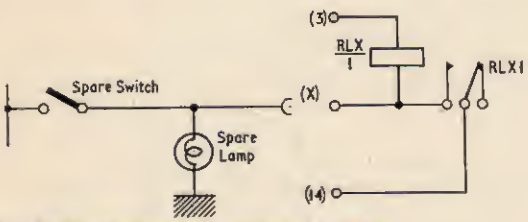


Fig. 5b. Basic circuit of an "add-on" system

The oscillator is switched either to the ignition and oil warning system or the lamps on the car, so that while the ignition is switched on no "warning" sounds can be obtained if the lamps are used in the normal way. However, if any of the lamp switches are left on when the ignition is switched off, the driver is immediately informed.

Provision is made for any extra warning system to be applied by using the lowest part of the circuit where the "spare" position is connected to terminal 15 on the multi-way connector. This can be used, for example, as an anti-theft device. The spare switch can be a microswitch attached to the door, and the spare lamp can be a flashing lamp which is conspicuous to passers-by.

Additional systems can be attached by connecting the basic circuit of Fig. 5b to terminals 3 and 14; the 'x' terminal can be one of the spare *unused* strips on the board or connected direct to an extra switch and lamp.

CONSTRUCTION

The oscillator can be assembled on either a piece of printed wiring board as in the prototype, a piece of Paxolin sheet $\frac{1}{16}$in thick, or on a printed circuit. Details for each method will be given in turn. It would also be possible to assemble it on a circular board to fit closely around the loudspeaker magnet, thus making the oscillator very small and virtually self-contained. The relays would need to be mounted separately if required.

PRINTED WIRING BOARD

The prototype version of the comprehensive system was built on a printed wiring board (available from West Hyde Developments Limited). The complete circuit including the relays can be accommodated on the board, then housed in a suitable case, for example a clear plastics sandwich box 5½in × 3in × 2½in deep. In this way the versatile unit can be used on any of the systems described previously.

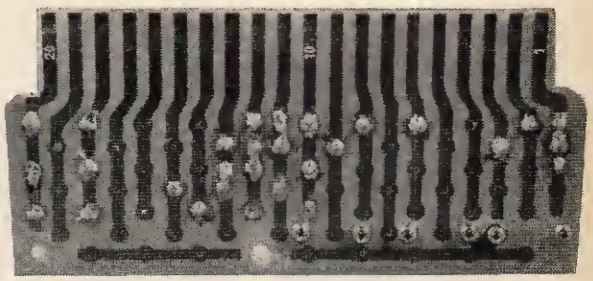


Fig. 6. Underside view of the printed wiring board showing the breaks in the copper strips and additional holes to be drilled. The reference numbers on the strips apply to those in Figs. 1 to 5 inclusive

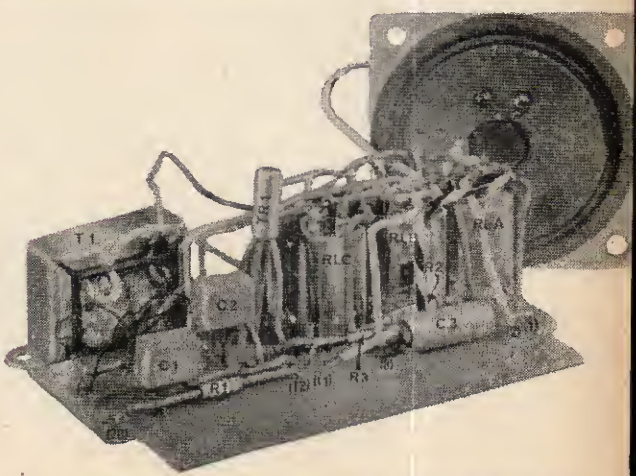


Fig. 7. Top view of the printed wiring board showing the component layout and connections. The transformer can be mounted on the board or in the plastic box

Fig. 6 shows the underside view of the board. It is necessary to drill the board as shown and cut away parts of some strips so that the relays can be mounted on the board. Some additional holes are drilled through the copper strips to take component wires; all soldered connections are shown.

It is probably best to start wiring the components for the oscillator first. The layout of components is shown in Fig. 7. The reference numbers on the strips correspond with those on the circuit diagrams in Figs. 1 to 5, so that any system can be built on this board; conversely the comprehensive system in Fig. 5 can be built for use on any other system required from Figs. 2 to 4. If the diagrams are followed carefully no difficulty should be experienced.

The transformer can be mounted on the board or if housed in the plastics box, it can be fixed to the box as shown in the photograph, so that the loudspeaker will fit in the lid.

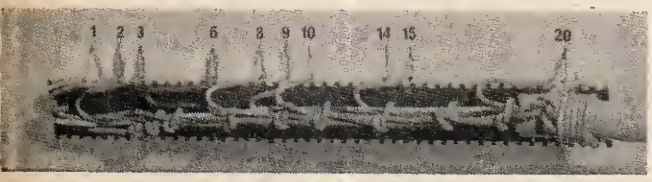


Fig. 8. Wiring the connector using multi-way cable

When complete the oscillator can be tested by temporarily connecting a dry battery (6V or 12V according to the circuit values used); positive to strip number 1 and negative to 20. If satisfactory the connector can be wired, as shown in Fig. 8, using multi-way cable with at least eight wires. To avoid undue strain on the wires the cable can be laced and anchored to the connector strip as shown.

The board is mounted in the plastics box using the two holes "A" which were drilled for the transformer. It will be necessary to cut a slot in the side of the box about ¼in wide and 4in long so that the copper strip ends protrude.

It is most important to prevent the unit coming into contact with moisture, otherwise serious damage can occur if the copper strips are short-circuited.

PINBOARD VERSION

Cut a piece of s.r.b.p. sheet $\frac{1}{16}$in thick, 2in square, and drill the holes as detailed in the diagram (Fig. 9). The two large holes are made with a number 34 or $\frac{7}{64}$in drill; the other thirteen holes are drilled with a number 56 drill to take short pieces of 18 s.w.g. copper wire. This size of wire will be found to be a fairly tight fit in the holes. It will be necessary to use a pair of pliers to insert the pieces of wire.

The pinholes are numbered in Fig. 10 for reference in the following description of wiring only and do not correspond with those on the circuit diagrams. The side of the board marked out for drilling will be referred to as the front. Cut a number of lengths of the 18 s.w.g. wire about ½in long and push these into place so that about half the wire protrudes from each side of the board; any surplus wire will be trimmed off later. Turning to the back of the board, connect pins 3, 4 and 5 together with thin wire and solder in position. Now connect pins 6 and 7, 8 and 9, and 12 and 13, as shown in Fig. 10. See the photograph in Fig. 11 for appearance at this stage.

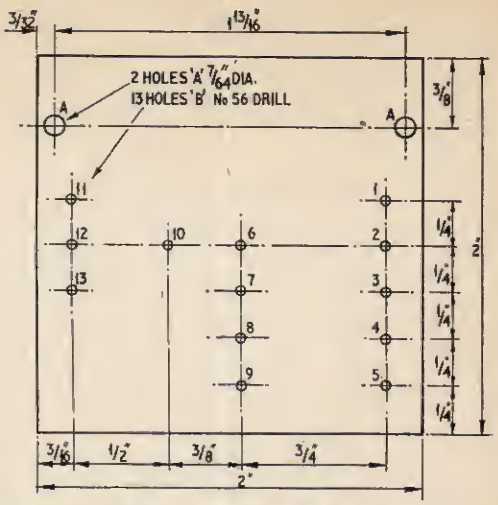


Fig. 9. The oscillator can be built on s.r.b.p. sheet. This drawing shows the drilling details of the sheet. Holes "A" number 34 drill, all others number 56 drill. The hole numbers do not correspond with those in the circuit diagrams, but are only given for the appropriate construction description

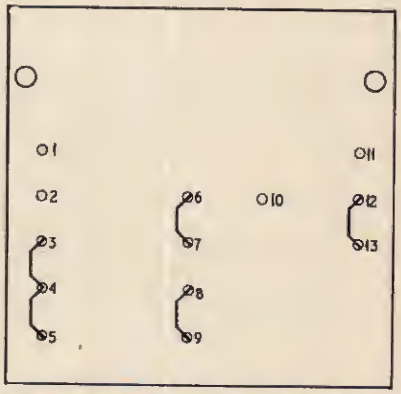


Fig. 10. Wiring the pins on the back of the s.r.b.p. board shown in Fig. 9

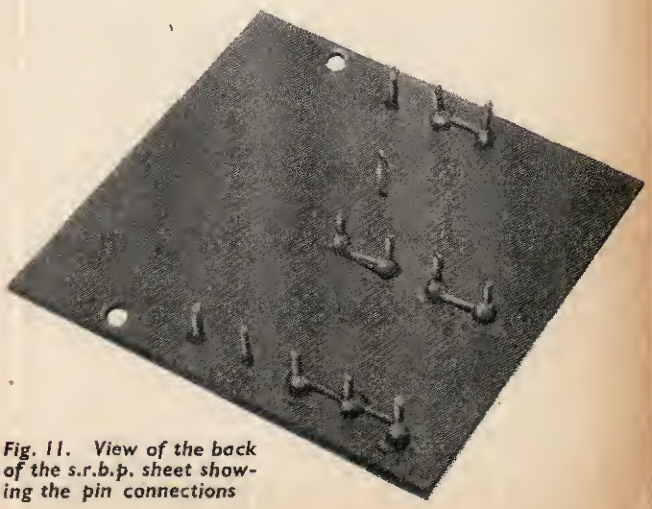


Fig. 11. View of the back of the s.r.b.p. sheet showing the pin connections

Turn the board over to the front side. Fit the transformer in position using holes A–A (see Fig. 9), with the leads on the side nearest to the pins. Solder the leads into place: the loudspeaker winding of the transformer (identified as the pair of thick enamelled wires) to pins 1 and 11; the black flexible wire is connected to pin number 2; the red wire to 10 and the blue wire to 12. These wires should be pushed well down close to the board and soldered to the pins.

Fit the resistors next, R1 to pins 2 and 6, R2 to 3 and 7, and R3 to 4 and 8. Now fit the capacitors; C1 to 10 and 12; C2 to 7 and 13; C3 positive to 5 and negative to 9. Check the circuit over very carefully for any doubtful connections before fitting the transistor. Now fit p.v.c. sleeving to the transistor wires and connect the collector to pin 10, base to 7, and emitter to 8, using a heat shunt on the leads while soldering it in position. The collector lead is the wire nearest the spot on the side of the transistor. The loudspeaker leads are connected to pins 1 and 11 on the back of the board; the battery supply leads—red for positive to 5, and black for negative to 2. Now trim off the surplus wire on the pins. Connect to the supply and check that the oscillator works (6 or 12 volt supply according to the resistors used).

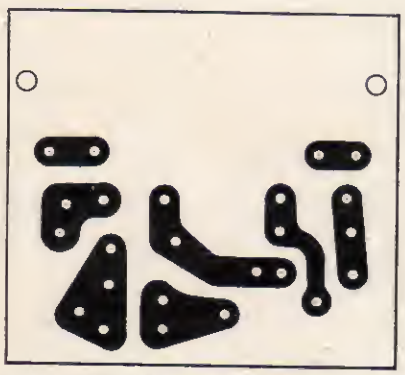


Fig. 12. Pattern for the etched printed circuit which can be used for building the oscillator only

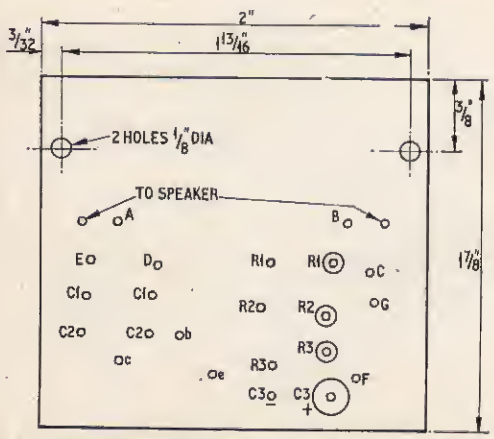


Fig. 13. Connections of the components on the etched printed circuit

COMPONENTS . . .

Resistors (6 volt version)
R1 3·3kΩ
R2 1kΩ
R3 68Ω
All ½ watt 10% carbon

Resistors (12 volt version)
R1 18kΩ
R2 4·7kΩ
R3 270Ω

Capacitors (Both versions)
C1 and C2 0·1μF plastic 250V (T.C.C. type PMX4)
C3 25μF elect. 25V (T.C.C. Elkomold type)

Transformer
T1 Push-pull output type TT5 (Repanco)

Transistor
TR1 OC72 or NKT 271

Loudspeaker
LS1 3 ohms 2½in (E.M.I. "square" type or similar)

Relays (6 volt version)
RLA, RLB, RLC,
Type MH2 185Ω

Relays (12 volt version)
Type MH2 700Ω

(All relays from Keyswitch Relays Ltd., 120-132 Cricklewood Lane, London, N.W.2)

Component Wiring Board Assemblies
Only one of the following assemblies is needed according to which method of wiring is adopted.

(a) Printed Wiring Board type B (West Hyde Developments Ltd., 30 High Street, Northwood, Middlesex.)
Multi-way connector, with ten clips (Cinch) (available from West Hyde Developments Ltd.)
Multi-core cable "standard" type 8-way (Radiospares)

(b) S.R.B.P. panel, 2in × 2in × 1/16in thick and 18 s.w.g. tinned copper wire.

(c) Printed circuit etching kit (Proops Bros.)

ETCHED PRINTED CIRCUIT

While many constructors will have already had some experience in producing small printed circuits, there are, no doubt, others who perhaps would like to try their hand at it.

A kit containing everything that is needed for the oscillator can be obtained from one of the many advertisers in this journal, for example Proops Bros. of Tottenham Court Road, London. In the kit you will find a piece of copper clad board, some abrasive powder, some paint for covering the areas you wish to keep, and some thinners for cleaning the board when you have finished.

Cut a piece of printed circuit board 2in by 1⅞in, and clean the copper thoroughly with the abrasive powder. Copy the printed circuit diagram given in Fig. 12 by placing carbon paper between the diagram and the copper. Trace the lines through direct from the page. Alternatively trace the diagram on to a piece of tracing paper and then transfer this to the copper. Paint the black areas that you are to keep with the paint supplied, wait until this has dried, and immerse the whole board

in the etching fluid. When the etching is completed, and the areas which should be clear are completely free of copper, remove from the etching fluid and wash under running water. Do not let *concentrated* etching fluid go down the sink if you have copper plumbing, or you may find expensive leaks in the waste pipe later on. Clean off the paint with the thinners supplied.

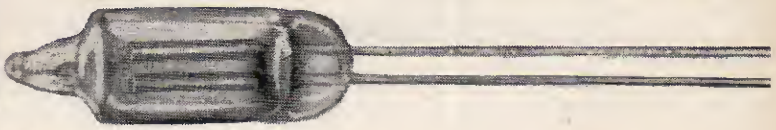
Drill the holes where indicated. The two larger holes are drilled with a number 34 drill to take the 6 B.A. screws for the transformer.

Fit the transformer into position on the plain side of the board, making sure that it is the right way round. Push the leads into the holes in the board; the loudspeaker winding is connected to the holes marked A and B; the black wire into hole C; the red wire into hole D; the blue wire into hole E.

Insert the other components as indicated in Fig. 13, putting the transistor in last. Use a heat shunt on the leads while soldering it into position.

Examine the board carefully to ensure that there are no doubtful joints or pieces of solder bridging the gaps between the copper strips. Fix the loudspeaker leads into their respective holes, as indicated, and fit the supply leads, red for positive to hole F, and black for negative to hole G. Connect to the battery supply, (6 or 12 volts according to the components used). ★

NEON NOVELTIES



THIS is the first of a series of short articles illustrating some of the many uses of neon lamps. The neons employed are all miniature wire-ended types as shown above.

Two examples which are ideally suited to these applications are those supplied by Radiospares (striking voltage 65 volts), and the Hivac type 3L general purpose neons. The latter type requires a striking voltage of 80 volts and maintaining voltage of 60 volts.

Some neon indicators have a resistor wired in series with one of the neon wires to make them suitable for mains voltages. These would normally be unsuitable for the circuits described unless the resistor is removed or short-circuited.

The series is to be divided into groups, the first group dealing with "games"; there will be three of these. Later groups will describe musical devices and instrument applications.

All circuits are simple and require only the minimum of components and technical knowledge in order to make them. Construction is left to the discretion of the readers as this will depend on their individual applications.

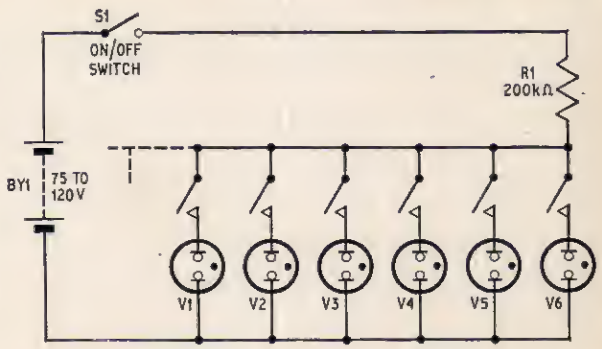
ONE PANEL GAME SWITCH

by R. Bebbington
GRAD.I.E.R.E.

READERS will no doubt be familiar with the device used on television panel games to ensure that the first player ready with the answer is identified. Each member of the panel has a switch and an associated light at his disposal which will glow if he is lucky enough to operate his switch before the other contestants. This can be done with relays but a simpler circuit using miniature neons is described.

The first player to press a switch will cause his neon lamp to glow as it draws current from the battery through the limiting resistor. Any other switch that is "made" even fractionally after this will have no effect because the voltage across the neons is now the maintaining potential of the neon that is struck. For a gas-discharge tube that has a striking voltage of say, 65 volts, this running potential may be around 55 volts, which would be too low for the others to strike. The player must of course release his switch or push-button before the quiz-master poses the next question.

Any number of neons may be used, each of these requiring its own individual switch, which can either be adjacent to it, or identified on a remote display panel.



Several alternative uses for this circuit will probably spring to mind. In miniature car racing a contact situated at the end of each track could be linked up to this circuit and would prove most useful in the event of a close finish. The result could not be in dispute with a neon lit. Perhaps not a photo-finish, but a neon-finish!