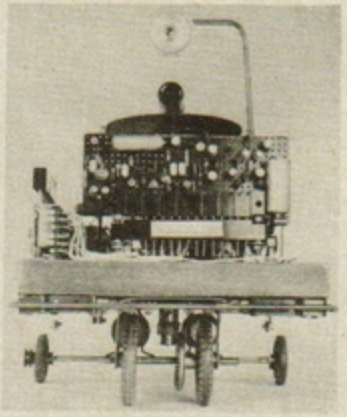
CYCLOPS



PART FOUR

by

L. C. Galitz

In this fourth article describing the construction of Cyclops, the basic reflex and motor circuitry are dealt with.

FIG. 17 SHOWS THE COMPONENT LAYOUT ON THE main chassis. First, the Veroboard edge connector, the three relays, the two batteries, the power supply socket and the switches are mounted. Also, the touch sensors are attached to the underside of the chassis, and details of these are given in Fig. 18(a) and (b). Two microswitches are screwed to each corner, and metal bumper bars are attached between the microswitches on each side. If the microswitches have metal operating levers the metal bars may be soldered to these. Should the microswitches have operating buttons only, then the bars are supported by a loop of wire at each switch, this loop being soldered to one of the contact tags or secured in any other convenient manner. Pieces of Sellotape wrapped round the bars prevent them sliding out of the wire loops. All the microswitches are wired in parallel, and one wire from them passes through hole 1 in the chassis (see Fig. 17) and the other through hole 3. The Veroboard edge connector is screwed into position, using two spacing pillars to keep the tags clear of the chassis, and the main switch, S1-S4, is secured down by means of two of the holes in the switch metalwork. If there is no way of screwing the switch down, or if independent switches are used, then a separate panel must be made up. In the prototype part of the chassis was cut away as shown in Fig. 19, to accommodate the projecting sections of the switch. Also, S5 was secured directly to the main switch.

MOUNTING BRACKETS

A Perspex bracket was made up to mount relays RLB and RLC, this being illustrated in Fig. 20(a). Another Perspex bracket, shown in Fig. 20(b), was employed for mounting the power supply socket. A special bracket, consisting of a Meccano part 6a bent to shape, was used for mounting relay RLA, this being shown in Fig. 20(c). A Ripmax Tank Clip is fitted under the chassis, as in Fig. 20(d), and secures the Deac battery, BY1. Leave sufficient space for a second Deac battery of the same type, which will be fitted later. The photograph of the chassis underside which accompanied Part 2 of this series shows both batteries in position. A clamp for accumulator BY2 is shown in Fig. 21. Finally, a 2-way connector block having screw terminals is mounted near BY2 in order to take the accumulator leads.

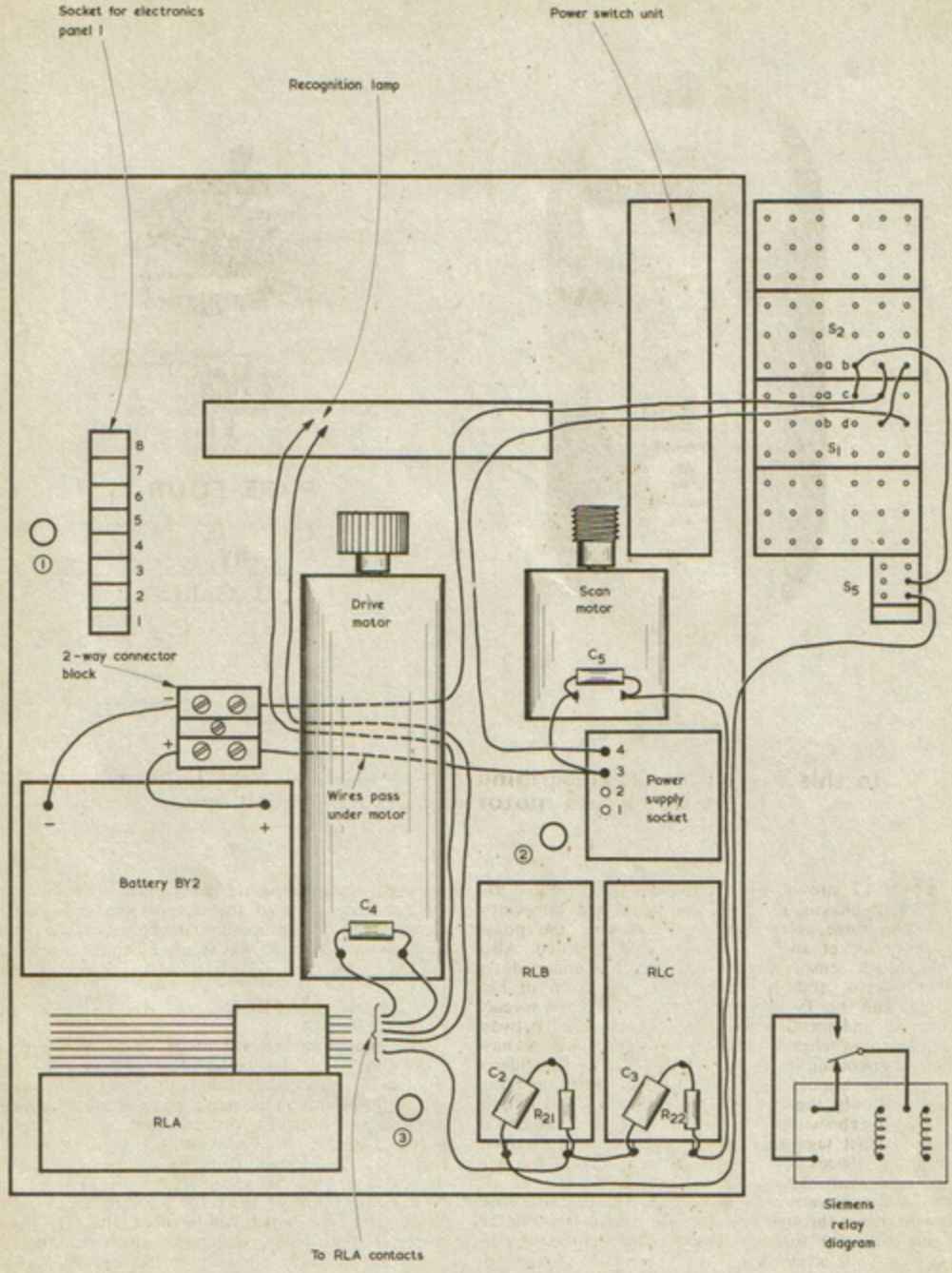


Fig. 17. Component layout and motor wiring above the chassis

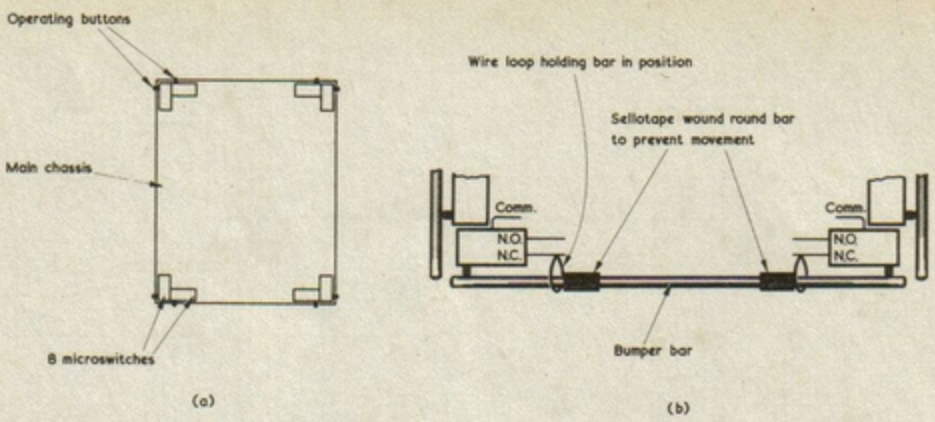
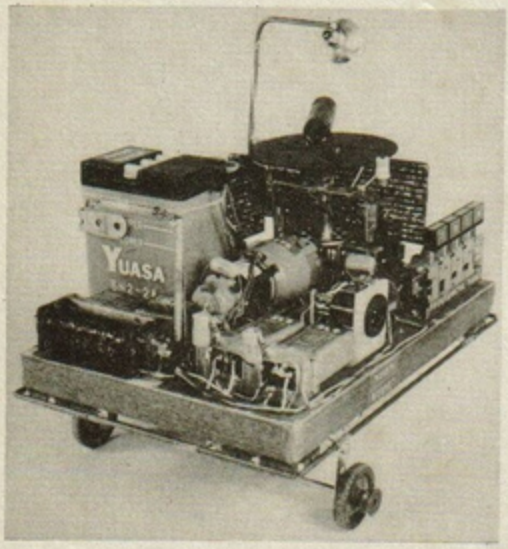


Fig. 18 (a). How the touch sensor microswitches are positioned under the main chassis (b). If the microswitches have operating buttons, the bumper bars may be held in position in the manner shown here



A rear view of Cyclops in completed form. The device mounted on a pillar behind BY2 is a dry reed switch. This is added for the extra circuits which will be described in the next two articles. The Veroboard panel at the front will also be discussed in the next two issues

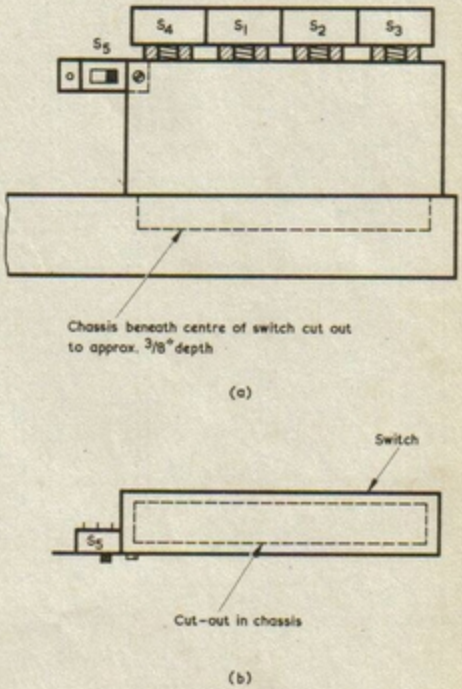


Fig. 19. Side view (a) and top view (b), showing how the chassis is cut out to take the main switch assembly

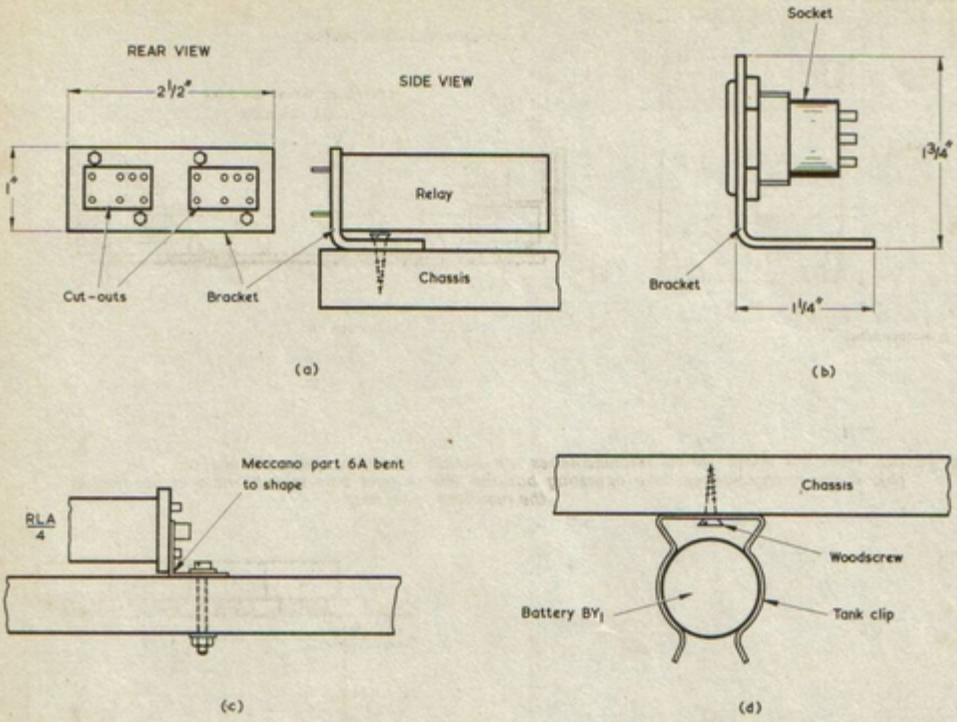


Fig. 20 (a). The Perspex bracket on which relays RLB and RLC are mounted
(b). The power socket is also mounted on a Perspex bracket
(c). A Meccano part is used for securing relay RLA
(d). The Deac battery is secured to the chassis underside by a Ripmax Tank Clip

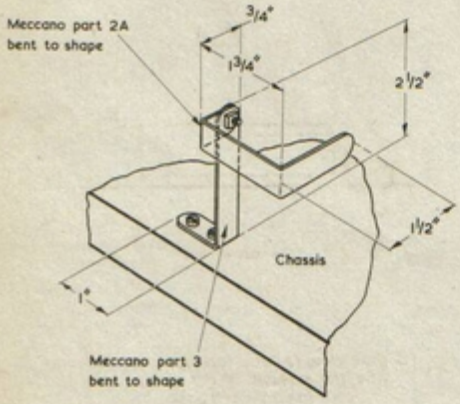


Fig. 21. The clamp which holds accumulator BY2 in position

PHOTOCELL ASSEMBLY

The ORP12 photocell is mounted in a tube whose diameter, approximately ½ in., provides a snug fit. In the prototype the tube was made of glass painted matt black on the inside and the outside. The front end of the tube was left clear whilst the back, after suitable lengths of insulated wire had been soldered to the ORP12 lead-outs, was sealed with sealing wax and then painted black, the leads passing through the sealing wax. Alternatively, a metal tube could be used, this being sealed off at one end and painted matt black on the inside. In either case the length of the tube should be about 2 in. The tube may be secured to the large gear wheel by means of a clamp or by any other convenient means. As was described in Part 2, the leads from the photocell are wired to the jack socket underneath the eye assembly.

The recognition light assembly consists of a Meccano coupling, part 63, screwed to the eye unit support, as in Fig. 22(a) and (b). This holds a brass rod bent into the shape shown, the lamp being soldered at the other end. A reflector taken from a torch is mounted behind the lamp and is secured by adhesive. This method of

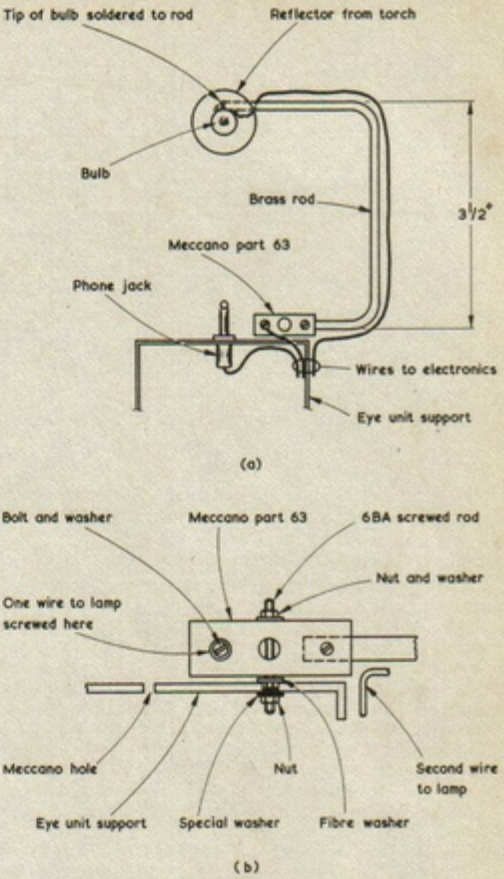


Fig. 22 (a). The recognition lamp assembly (b). Detail showing how the Meccano coupling is secured to the eye unit support. The 'special washer' is of the type employed for mounting power transistors when these are insulated from the heat sink

mounting has the disadvantage that replacement of the lamp, should it burn out, is a little fiddling, and some constructors may prefer to devise a combination of bulb holder and reflector which enables the bulb to be screwed in or out in the normal manner. The Meccano coupling has to be insulated from the eye unit support, and this was accomplished in the prototype by using insulating washers, as shown in Fig. 22(b). This insulation is of considerable importance because if, when the learn circuits are added later, there is a short-circuit between the lamp circuit and the eye unit support, damage would result to both power supplies and circuitry. Some constructors may prefer to use a

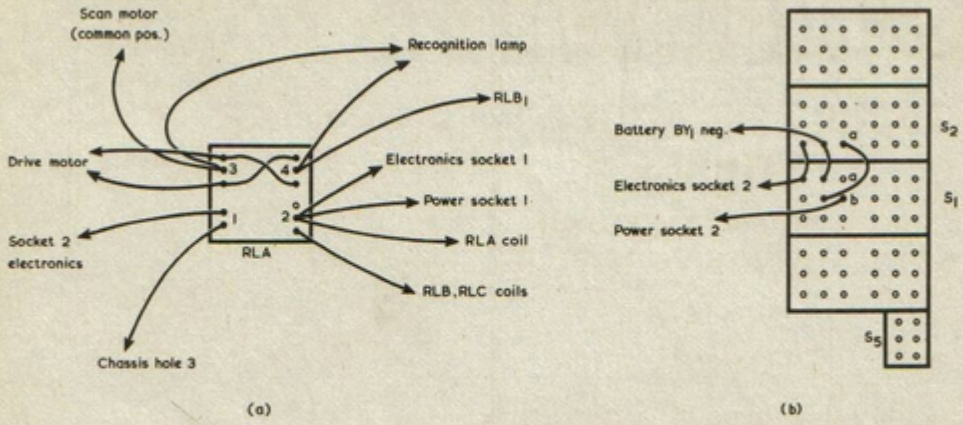


Fig. 23 (a). Connections to the contacts of relay RLA
(b). Wiring to switches S1 (a) and (b) and to S2 (a)

different and more positive method of insulating the lamp rod from the eye unit support, incorporating, say, a bracket made of insulating material.

At this stage, wiring up can commence. The motor wiring is illustrated in Fig. 17. The reflex circuit wiring should be carried out by following the circuit diagram, Fig. 14, which was published last month. In Fig. 14 the numbers 1 to 8 alongside the dotted line correspond to the same numbers on the edge socket shown in Fig. 17. The lead from the microswitches which passes through hole 1 connects to tag 6 of the edge socket, and that which passes through hole 3 connects to relay contact set RLA1. The wires from battery BY1 pass through hole 2. Figs. 23(a) and (b) give details of the wiring at relay RLA and at switches S1(b), S1(a) and S2(a).

The eye unit support is connected to tag 2 of the Veroboard socket, thereby automatically providing one of the connections to the photocell jack plug. The tip of the jack plug connects to tag 3 of the Veroboard socket. The Meccano coupling mounted on top of the eye support unit, and electrically isolated from it, takes one of the wires connecting to the bulb. The other wire to the bulb passes up the brass rod and is connected to its remaining terminal. All wiring should be kept well clear of mechanical moving parts.

TESTING AND SETTING UP

Firstly, the insulation between the recognition light assembly and the eye support unit, if it is of the type employed in the prototype, should be carefully checked. If this check proves satisfactory, the sliders of VR1, VR2 and VR3 should all be set at the bottom (positive) ends of their tracks, and the power should be applied. Then, Cyclops should be placed 1 ft. away from a suitable light source and VR2 adjusted so that relay RLB cuts in. The lamp should then be moved away, and RLB should cut out before the lamp is more than about 1 ft. 3 in. away. VR1 should be set at maximum unless the ambient light conditions are such that relay RLC cuts in; in which case VR1 should be set to the maximum possible before this happens. Cyclops is really a nocturnal animal, and he is happiest when his habitat is in pitch darkness apart from the lights he is required to 'feed' on. VR3 is set to a position such that relays RLB and RLC cut out when a lamp is held about 1 in. from his eye.

At this stage, TR1, R1 and D1 are mounted on the Veroboard panel. Also, a capacitor should be soldered in the C1 position which has a value such that relay RLA operates for a period of duration equal to the time that the front drive unit takes to rotate through 180°. In the author's case this value was 50μF.

In order to achieve maximum drive efficiency, the horizontal contrate wheel, i.e. the one above the chassis, should rotate in the *opposite* direction to that in which the eye unit and front drive unit rotate. Then, the very slight rotational motion imparted to the front wheels by the scanning system is in the same direction as the main drive power under normal conditions.

If the motors are connected with the requisite polarity, Cyclops will now exhibit basic reflexes. He will speculate for light and, upon finding it, will home into the source and then 'feed' on it. He will also avoid obstacles and, when confronted with his reflection in a mirror, will execute a highly personalised version of the tango!

In the next article, the Conditioned Reflex in animals will be discussed, and constructional details of a Conditioned Reflex for Cyclops will be given.

(To be continued)

CYCLOPS SERIES

For the benefit of new readers we can still supply a limited number of copies of July, August and September issues containing the first 3 parts of this series. Price 20p each, plus 10p post for the 3 issues.