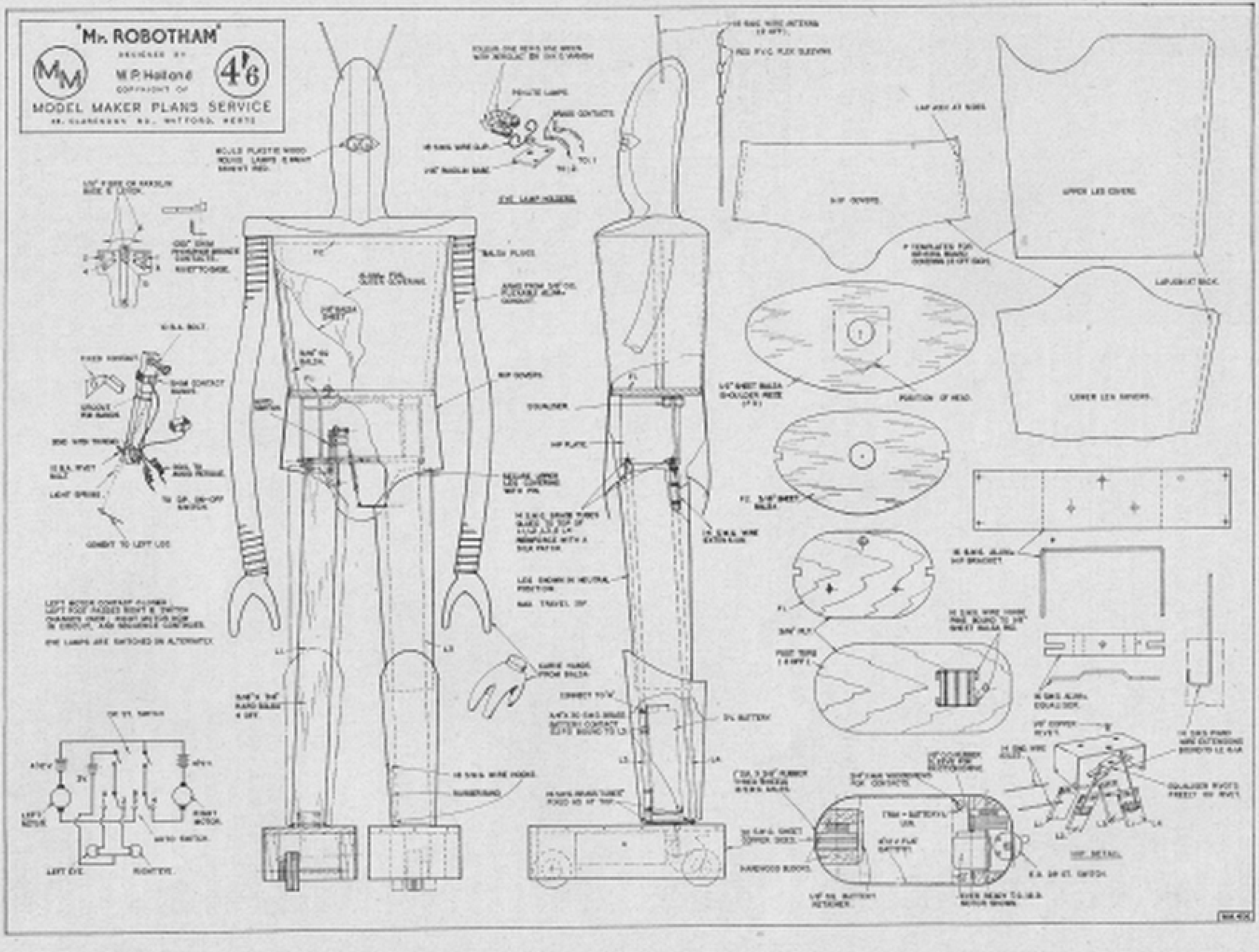
MODEL MAKER

Christmas Number

DECEMBER
1955

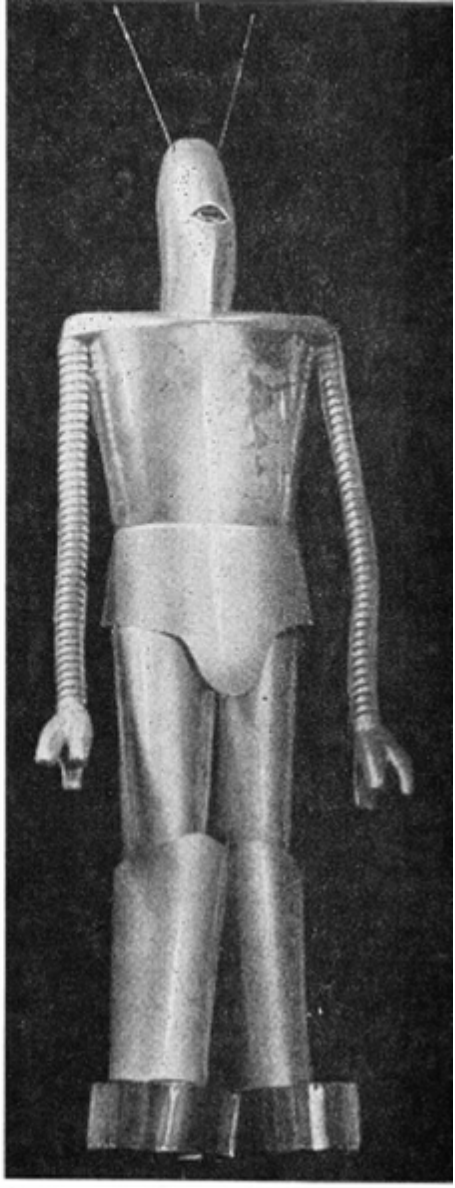
OCEAN RACING YAWL "CARIBBEE"
A NEW ELECTRIC CAR TRACK
OLD TIME ROLLING STOCK
BOAT RADIO CONTROL
MEET MR. ROBOTHAM
WISHBONE SCHOONER
MODEL SOLDIERS
PRIZE GALLEONS
"MGA" DESCRIBED

2/-


"Mr. ROBOTHAM"
MM
4/6
MODEL MAKER PLANS SERVICE
BRASS CONTACTS
EYE LAMP HOLDERS
BALSA PLUGS
HIP COVERS
UPPER LEG COVERS
LOWER LEG COVERS
POSITION OF HEAD
LAP JOINT BACK
HIP DETAIL
HARDWOOD BLOCKS
LEFT MOTOR
RIGHT MOTOR
LEFT EYE

MEET MR. ROBOTHAM

A GENERAL PURPOSE ROBOT By PETER HOLLAND



THE Editor's door opened and a small figure entered with a relentless measured tread, feet purring softly, and his one eye flashing alternately red and green. . . .

This seemingly unusual state of affairs was, of course, quite natural; Mr. Robotham, the "gent" in question, was yet another piece of machinery from Pete Holland's workshop.

Here is your choice to build a real robot—an excellent inhabitant for any self-respecting planet! With the festive season approaching, his first job will be to distribute the smaller parcels on Christmas Day, as has been the occupation of robots of more mature vintage in the designer's home.

Commence by making the feet; 3/16 in. hard balsa or ply tops with hardwood bearing supports carrying 16 s.w.g. piano wire axles fore and aft. Wheels are any rubber-tyred types 1 in. dia., two to each foot, the rear ones driven via a $\frac{1}{8}$ in. dia. rubber friction sleeve on each motor (Ever Ready T.G.18 or similar). A $4\frac{1}{2}$V. flat battery fits between the motor and front wheel and makes contact on woodscrews in the top. One foot contains a DP/ST switch. 30 s.w.g. sheet copper sides to the feet are secured by soldering the ends at the heel and small pins around the top.

The legs are twin pairs of levers (bones if you like) 3/16 in. × $\frac{7}{8}$ in. hard balsa, brass tubes being secured each end with silk patches cemented on. Two 16 s.w.g. hinge pins bound to a piece of $\frac{1}{8}$ in. sheet locate in lower tubes; 14 s.w.g. piano wire rods through the upper tubes are carried on a 16 s.w.g. aluminium hip plate. We now have the means of keeping the feet and hips parallel. However, Mr. Robotham will not stand up without an "equaliser" to maintain the trunk in exactly the half-way position between leg movements. This is simply a 14 s.w.g. piano wire lever extension of the rear leg "bone" which locates in the slotted ends of an aluminium cross lever centrally pivoted on the hip plate.

At this stage make the automatic switch as per plan, 1/16 in. paxolin base and lever with shim phosphor bronze contacts. Cement to right leg as shown and connect lever to hook on left leg via a spring so that as the left leg moves forward, contact is suddenly changed to the right motor; right foot moves past left foot again and contact is transferred to left motor. Adjust carefully for even steps; use the additional set of contacts for eye lamps.

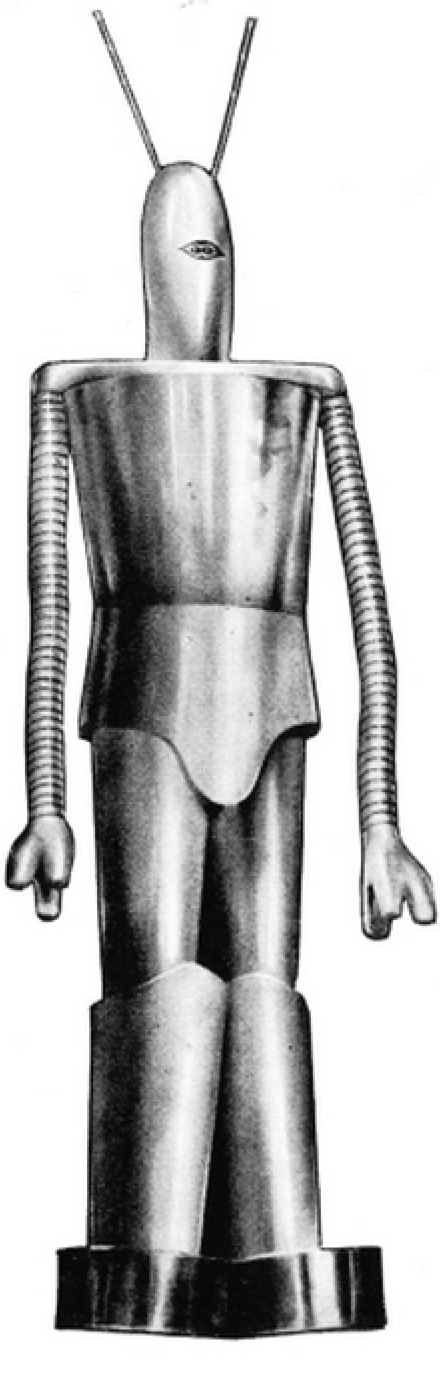
Complete all wiring at this stage—positive motor battery contact to motor, negative to switch, thence to auto switch blade, fixed contact to motor. Repeat for other foot. A separate No. 8 battery carried in one leg on thin brass contact brackets is connected positive to common of eye bulbs and negative via switch to auto switch blade. Fixed contact to left eye lamp, other fixed contact to right eye lamp.

The rest of the model is very straightforward and needs no special description . . . balsa sheet torso, balsa head and shoulders, flexible aluminium conduit for arms (obtainable at electrical engineers), balsa hands, and hip and leg covering of bristol board. A metallic paint is a must, and with trunk finished with aluminium foil, and polished copper boots, Mr. Robotham puts Teddy Boys to shame!

Meet The Robotham Family

★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★

THE EDITOR DESCRIBES SOME RADIO CONTROL SYSTEMS IN HIS ROBOTS



READERS interest in the ambulatory field may have been aroused by the article on "Rainbow" which appeared in our December 1961 issue. This little chap, it will be remembered, is propelled by a motorised trolly and no balance problems were present. The more sophisticated "Kunibert" appeared in May 1965 issue. The Robotham family was developed from the author's original Mr. Robotham mid. 1958 (see December 1958 *Model Maker*) and took several different forms and sizes.

Radio control was an addition rather than a primary consideration. The first robot to receive "the treatment" was a 4 ft. high twice size version of the original gentleman who appeared as M.M. Plans Service No. MM406. All versions operate on the same principle of parallelogram leg linkage and automatically switched, motorised feet; the "Free running" arrangement employs an automatic switch system which starts and stops the foot motors alternately. This switching is controlled by the angle of the legs so that when the right foot moves forward to maximum "stride" the power is switched to the left foot which proceeds in the same manner. Fig. 1.

The early robots were simple walking machines and no more, the eyes flashed in time with the leg movement, but apart from this they were devoid of any special mechanisms. In fact, a pair of legs alone with no other form of "superstructure" have been seen striding or shuffeling around the workshop. A request to put the large version on films and television instigated the application of radio control for walking, steering and triggering a hand writing mechanism. This latter piece of gimmickry was developed for the purpose of signing robotic autographs at the Schoolboys Exhibition. We will deal with the various control functions separately.

Radio Link.

A simple transistor single channel relay receiver is still employed, the relay operating a motorised sequential switching mechanism for controlling the main drive motors. A quick blip contact on this unit switched the writing motor via an additional rubber driven escapement. For normal walking operation a double pulser was used in conjuction with a home built ground based transmitter. The pulses were transmitted evenly for straight walking and *alternate* pulses longer for turn. Naturally, when pulsing ceased all motors were in the off position and the short blip pulse was of insufficient duration to switch the driving motors. It was not feasible to pass the heavy motor current through the relay in order to eliminate a brief connection with these motors at this selected position.

Admittedly, it was possible for the motorised escapement to get out of phase with the transmitter, resulting in the commencement of a turn as the foot last moved, restarted. In such circumstances it was only necessary to interrupt the signal for a short *off blip* to re-synchronise.

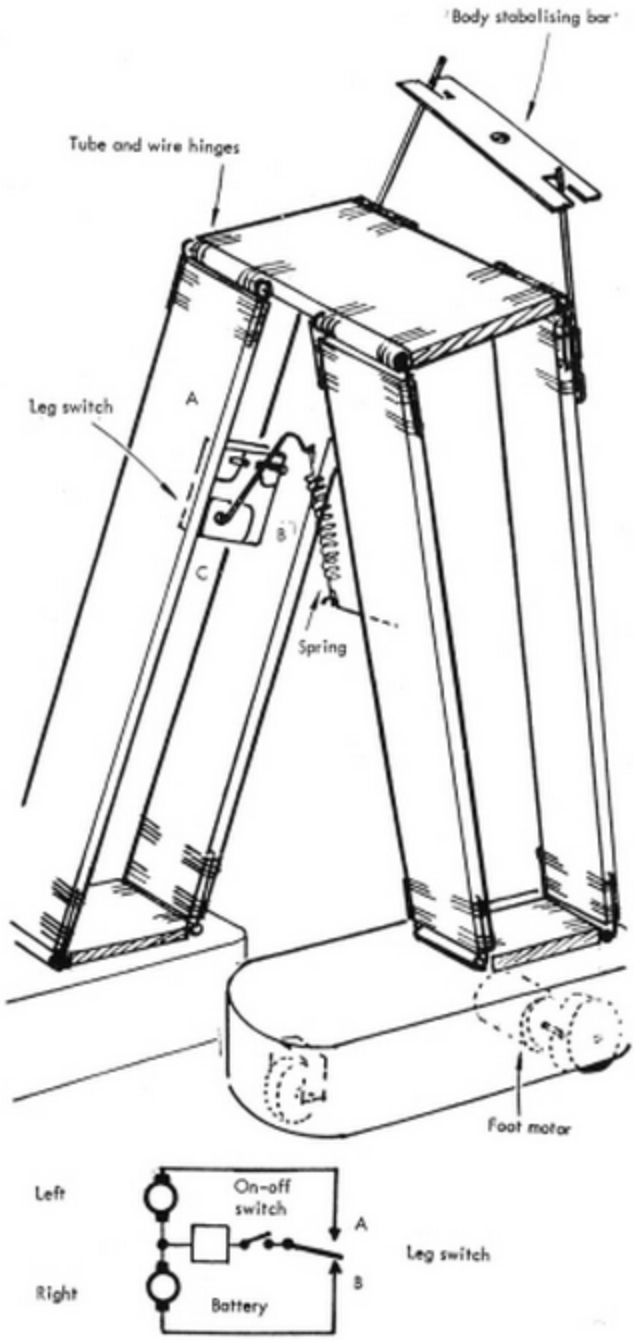


FIG. 1

Left: The original Mr. Robotham stands about 2 feet high and although he looks like a piece of professional "Tin bashing", is in fact only thin card and Balsa covered with metalised paper and silver blue paint. Arms are aluminium flexible Breeze used for wire protection. Eyes are a side mounted model railway two aspect signal light unit.

Motorised Switcher.

The Switcher is a simple 2 position, 2 neutral switching device driven by a T.G. 18 geared 7 to 1 and operating a cam which closed the leg and hand circuits in turn via contacts from a government surplus relay. An additional set of contacts operated from the same cam switched the eye lamps alternately giving an indication of which foot was about to move. See Fig. 2.

Main Drive Units.

A Taycol Torpedo motor drives a 1½ in. diameter rubber tyred wheel via a 40-1 worm reduction gear. An additional plastic wheel is fitted in the toe, this allows the toe to skid sideways when turning, but provides sufficient directional control when walking in a straight line. A similar unit is used in each foot together with two cycle lamp batteries for the main driving power supply.

Writing Mechanism.

In order to simplify the mechanical design, this particular robot was christened "Rob" and after the drawing of many graphs a set of cams were built up which produce a combined movement of the thumb, first finger and little finger of the right hand. It will be seen from the sketch in Fig. 3 show this system of levers, cam followers and cams formed the letters. In operation, the hand is placed on the paper to be autographed so that a small spike in the lower surface of the little finger is pressed into and holds the paper steady. As soon as the motor (a T.G. 18) is triggered via the rubber driven escapement it rotates the cams one cycle, whereupon a limit switch breaks the circuit. A ballpoint pen refill is fitted inside a tube soldered to the first finger, the thumb merely following its motion. A combination of movements; horizontal, provided by moving the whole hand left to right about

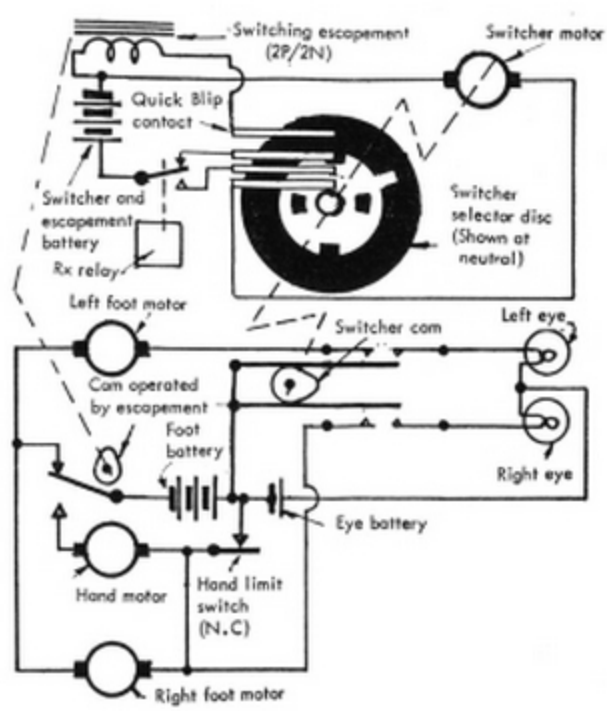
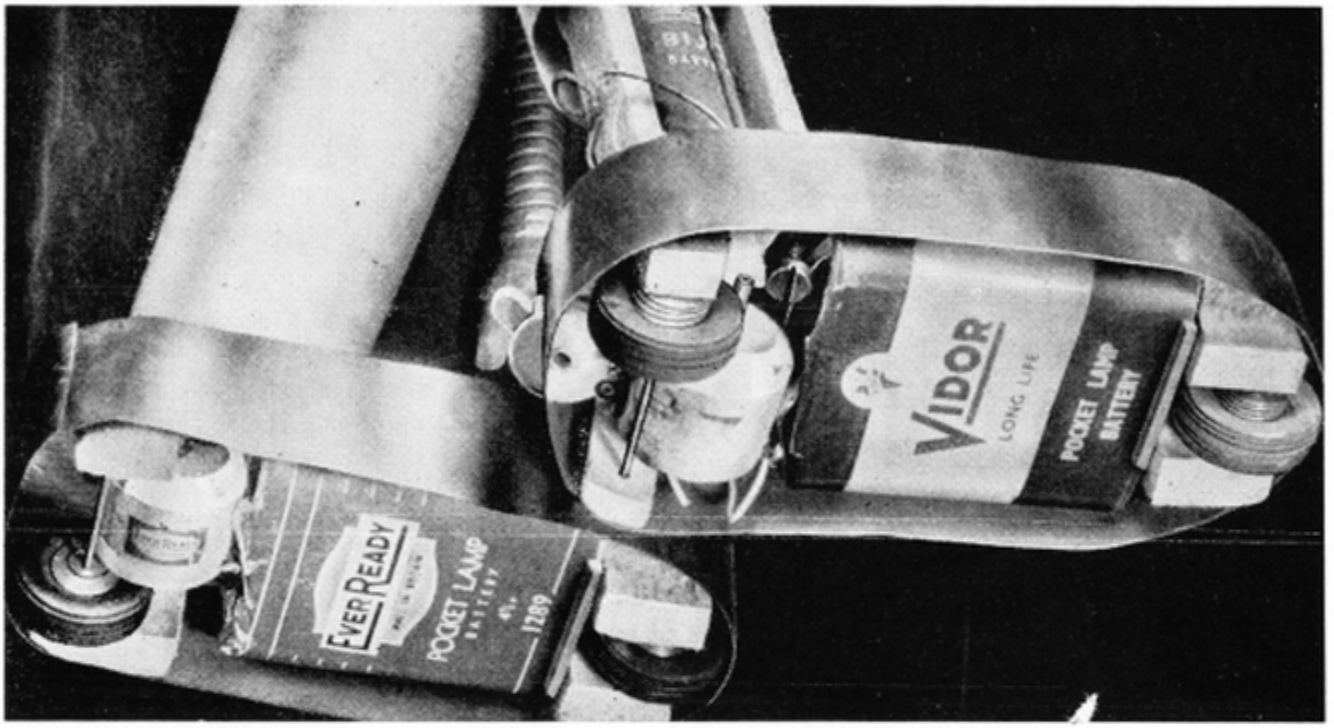


FIG. 2



Underside view of the feet showing the Ever Ready T.G. 18.B Motors driving the rear wheels by means of friction, aided by rubber sleeve on armature shaft. R/C version carries receiver and own batteries in one foot, dry batteries in the other foot.

the spike fulcium in the end of the little finger, and vertically by extending and retracting the thumb and first finger. Fig. 4 shows the resultant signature.

In his youth "Rob" was not equipped with radio and various additional mechanisms were fitted to provide special effects including a time switch to operate an arm raising servo which was employed to doff his hat for a comedy sequence in an earlier film. Even at the present moment the writing hand has to be manually lifted and placed on any material to be inscribed, but occasional modifications and improvements are carried out so we may yet see the radio link employed to this end.

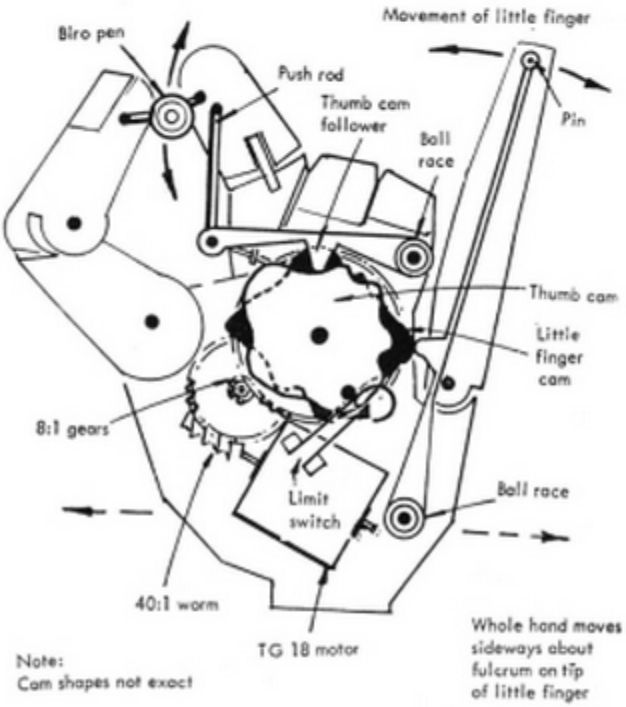
Simplified Versions.

The smaller, MM Plans Service size, Robothams are just large enough to take sub-miniature receivers. One of these is equipped with a normal single pulse system which gives movement of the left foot on signal and the right foot on no-signal give a sharp left or right "about turn" or pirouette. A humorous little

(Continued on page 557)

FIG. 4

FIG. 3



relays are released by the NC of the Rx relay which operates the horns.

Instead of using double-pole Rx relays, the "unlatching" part of the circuit could, of course, equally well be wired up using contacts B2, C2 and D2 in lieu of 2b, 3b and 4b, with only the loss of "Astern" releasing the "Top Speed" relay.

The "gimmick" channel referred to was made available by the tone-omission fail-safe circuit (G.G. Short's "Four From Three"—R.C.M. & E. Feb. '63) which I strongly recommend to any multi-modeller who has not yet tried it. Not only is it an excellent safeguard against going out of range but it can be used all the time as a "Stop" channel, so releasing a channel for other purposes.

Some people object on principle to the quick and easy practice of tapping accumulators to get different speeds and/or servo functions, on the grounds that it discharges the cells unevenly. This, of course, is strictly true, but I still maintain that it hardly matters at all with lead-acids, where you can carry on charging until all the cells "come up". With Venners, if the odd cell reaches the limit of 2.1 volts before its neighbours, it's quite easy to clip a small bulb across it, until the others have had their full charge. I have a panel fitted with small 2.5 volt bulbs wired to croc. clips, and about once a month I discharge my Venners—one bulb across each cell—right down to zero, so that they all start level again. (Incidentally, the manufacturers say that this gentle run-down is good for the cells, after they have undergone high rates of discharge.) However, another solution to this tapping question has now been evolved by a friend of mine, John Adye, who has worked out a very successful system where intermediate speeds are obtained by passing the full voltage to the motor, through various sizes of car bulbs, which do not present the same problems of heat dissipation as would resistances. With a Taycol Double Super motor driven by two banks of six Venner H705's in parallel (approx. 11 volts) he uses a 50 watt, a 36 watt, a 24 watt and two 6 watts in parallel. These values would need to be varied according to the motor used and the available voltage, of course, and combinations of two bulbs might be needed in some cases in order to get just the right speed, but some space could be saved by the use of double-filament bulbs such as the 21w./6w. stop/tail light and the 50w./36w. headlamp bulb.

One interesting (and possibly useful?) effect of this system is that when the motor is first switched to one of these intermediate speeds it gives a brief surge of power, due to the low initial resistance of the bulb filament when cold, and then settles down to the chosen speed as the filament heats up. My electrically-driven land-model is often reluctant to move off on a low voltage, and this brief initial burst of power may be just the thing to get it rolling every time, when manoeuvering at low speed in a confined space.

DELTAS for R/C

(*Continued from page* 479)

value without doing a wind tunnel test. The model would have to be tried. Improvement, if any, would manifest itself mainly on a slow speed glide, by giving lower drag and hence a better glide angle.

The narrow deltas are not the best for modelling except from an interest point of view. It should have thin wing section along the lines of a flat plate. We may have trouble with a rather accentuated 'dutch-roll' and a steep glide angle.

Most deltas can get themselves into trouble some time or other if we try to get by with rudder only control. Aileron would be better as there is not the same screening effect at high incidence that there is with rudder.

For those of us who still wish to make deltas the emphasis should lie on an excellent surface finish, and although we have seen certain deltas performing spectacularly at pylon race meetings, the well designed conventional layout model will out-point it any day.

ROBOTHAM

(*Continued from page* 554)

shuffle is accomplished by raising the pulse rate.

In the earlier Robothams, an insensitive receiver was employed in order to obviate interference trouble; "ye olde" soft valve circuit and a relay as used in the R/C Metropolitan (R.C.M. & E. April 1961). The receiver was mounted in the left foot together with its own batteries and the driving motor battery in the right foot. Free running Robothams normally carry one driving battery in each foot, so the operating duration of the radio version is somewhat less. No provision is made for a stop control, although an extra high pulse rate might give the required control via additional relays.

R/C as applied to robots and weird animals can provide a humorous sideline to the normal applications of fairly standard equipment. A pleasant change from the heartburn sometimes associated with the attempt to control some air- or water-borne "missile".

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