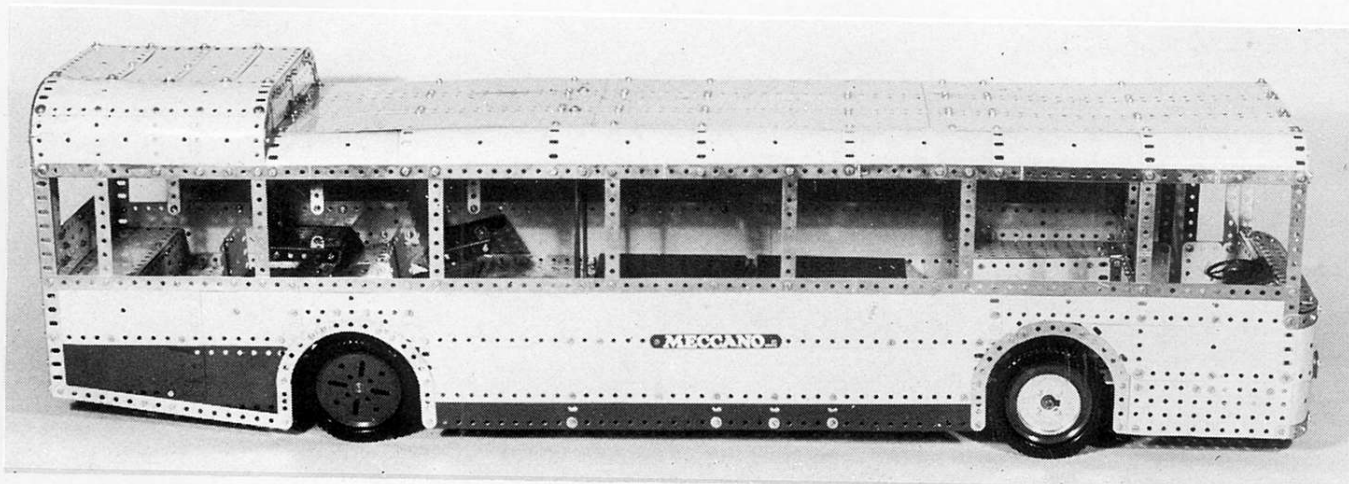


# LEYLAND NATIONAL SINGLE-DECK BUS

Part 2 of a new No.10 model designed  
and built by ROGER WALLIS



## BODYWORK

From the rear door pillar backwards, each side of the bodywork is similarly built up from a  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate, a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Triangular Flexible Plate and a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Triangular Flexible Plate around the front wheel arch, with Strip Plates and a lower banding of  $1\frac{1}{2}$ " wide Flexible Plates of various lengths, these overlaid by Plastic Plates to give a colour variation between the two wheel arches. A  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate and two  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Triangular Flexible Plates edge the top of the rear wheel arch, while the rear section of the side is enclosed by a rectangle formed by three  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates and one half of a Hinged Flat Plate 44, all appropriately overlapped. The two lower Plates are overlaid by a  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Plastic Plate 45 and a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Plastic Plate 46, Plate 45 extending one hole beneath Plate 46. The lower edges of the Plates are edged by a

$5\frac{1}{2}$ " and a  $3\frac{1}{2}$ " Strip angled as shown to give the correct outline. The rear wheel arch is edged by two 2" Strips and three  $2\frac{1}{2}$ " Curved Strips, the three latter Strips joined by Fish-plates.

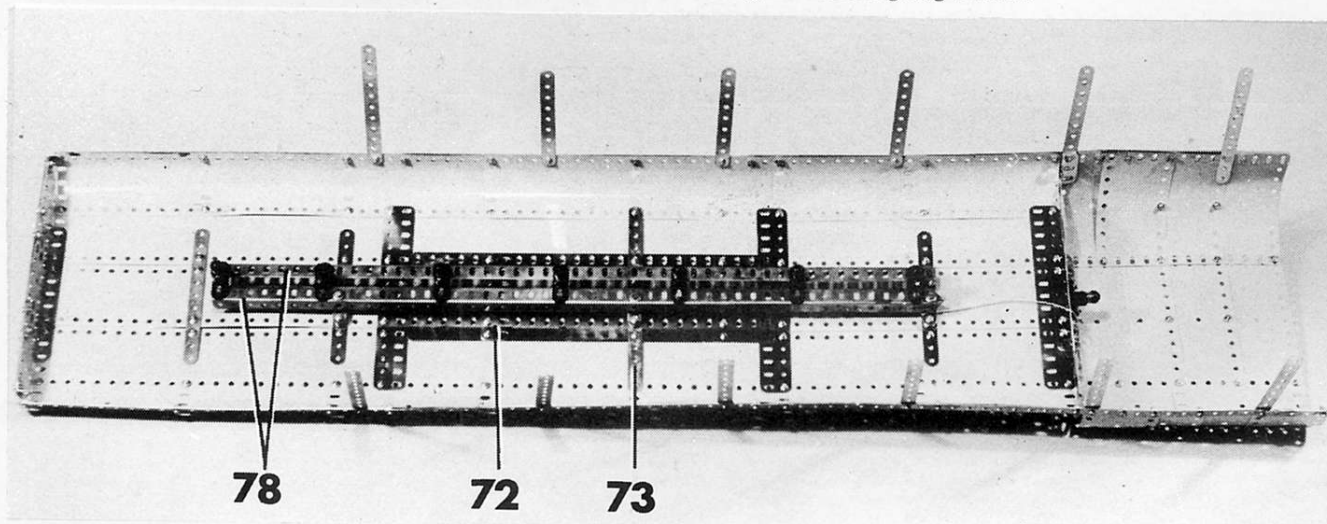
The front wheel arch is similarly edged, with the exception of the vertical front component. At the left-hand side of the model this is a  $2\frac{1}{2}$ " Flat Girder and, at the right-hand side, a  $2\frac{1}{2}$ " Strip. The upper edges of the side plates are overlaid along their full length by three  $12\frac{1}{2}$ " Strips with a  $2\frac{1}{2}$ " Strip at the rear.

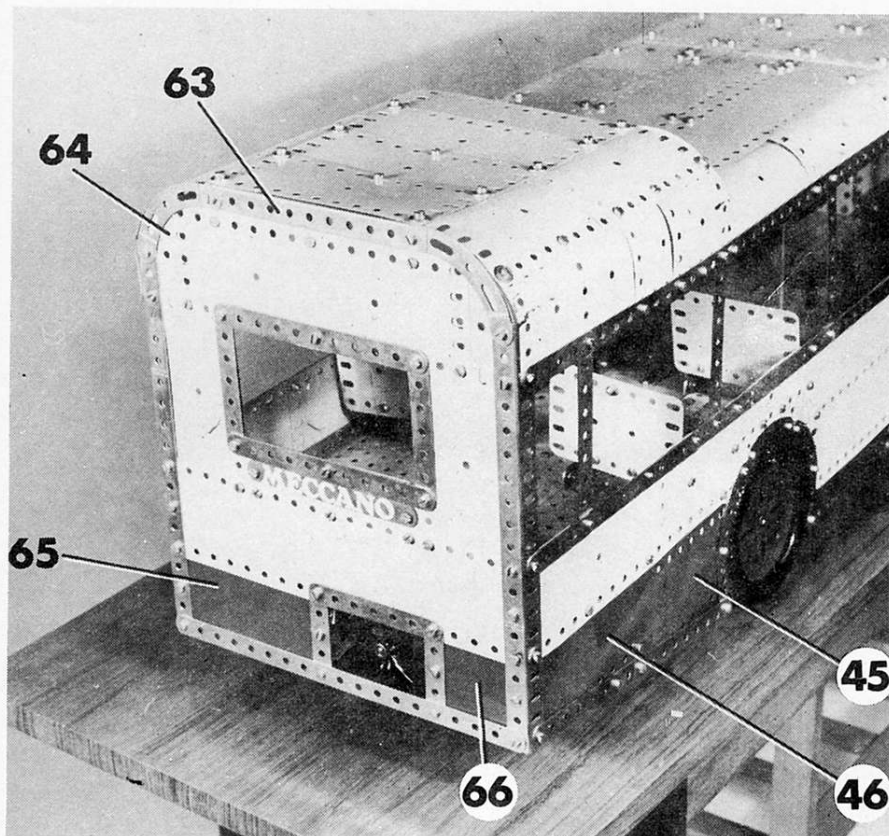
The sides this far built can now be attached to the chassis by bolting them to the  $7\frac{1}{2}$ " Angle Girder edging the rear Flat Plates of the floor and to the  $18\frac{1}{2}$ " Angle Girders bolted to the outer edges of the central Flat Plates of the floor. Once this has been done, the lower edge of each side is overlaid, on the inside, by a  $19\frac{1}{2}$ " compound flat girder 47 built up from a  $12\frac{1}{2}$ " and a  $9\frac{1}{2}$ " Flat Girder. This Flat Girder rides over the lower edge of the vertical flange

of the  $18\frac{1}{2}$ " Angle Girder, although it is not actually bolted to it.

Inside the bus, the left-hand front wheel arch is encased by a vertical  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate 48 at the front and a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate, extended three holes upwards by a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate 49, at the rear. The equivalent of Plate 48 in the right-hand wheel arch is a  $3\frac{1}{2}$ " x  $3\frac{1}{2}$ " compound flexible plate supported by two overlapping  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates. The sides of both wheel arches are each enclosed by a horizontal  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate 50, this Plate being edged outside along the top by a  $5\frac{1}{2}$ " Angle Girder. The left-hand side Plate only is also edged along the bottom by a  $5\frac{1}{2}$ " Strip, this Strip projecting one hole forwards beyond the edge of the Plate. Bolted vertically to the end of the Strip is a  $2\frac{1}{2}$ " Strip, the upper end of which is bolted to the lug of a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip 51 secured to the side of the model. The lower rear corner of each Plate 50 is attached to the back Flat Plate

A general underside view of the roof showing the interior lighting fittings.





A close-up view of the rear of the model. Note that the darker-shaded plates are plastic plates overlaying stronger flexible plates for visual effect.

of the wheel arch by a 1" x 1" Angle Bracket. The top of the arch is encased by a 5 1/2" x 2 1/2" Flat Plate 52 bolted to the 5 1/2" Angle Girder just mentioned. The rear edge of the Plate is connected by a 2 1/2" Angle Girder to the Flat Plate at the back of the wheel arch.

Dealing now with the right-hand side of the model only, a 3 1/2" Angle Girder 53 is bolted to the chassis member and fixed to the outer end of this Girder is a vertical 9 1/2" Angle Girder 54, the securing Bolt passing through the fourth hole of the vertical Girder. The lower end of the Girder is connected to the 2 1/2" Strip of the wheel arch by a Fishplate and the side panelling is then completed by a 5 1/2" Flat Plate, a 5 1/2" x 2 1/2" Flexible Plate and a 5 1/2" x 1 1/2" Flexible Plate, the latter edged along the front by a 1 1/2" Strip and along the top by the 12 1/2" Strip edging the rest of the side panels. The forward edges of the Plates are bolted to a 9 1/2" Strip 55 forming the front window pillar, then another six window pillars are provided at each side by a 5 1/2" Strip, three 4 1/2" Strips and two more 5 1/2" Strips, the latter at the rear and projecting two holes higher than the others to provide strengtheners for the raised rear portion of the roof.

Along the left-hand side of the model, similar window frame uprights are provided, but instead of the bodywork being enclosed forward of the front wheel arch, a space for the access doorway is left clear. The doorway is edged by a vertical 9 1/2" Strip 56 and a 9 1/2" Angle Girder 56A bolted to the ends of a 5 1/2" Strip overlaying the vertical flange of a 4 1/2" Angle Girder 57 secured to the outer edge of the access step Flat Plate by two Adaptors for Screwed Rod. These Adaptors serve as the lower hinge pivots for the twin doors, each of which is built up from two 7 1/2" Strips connected at the top by a Girder Bracket 58 and further connected by a 2" Angle Girder at the bottom and a 2" Strip seven holes up, at the same time fixing two 3 1/2" x 2" Triangular Flexible Plates in place to provide door panelling. The Adaptor for Screwed Rod locates in the inner end hole of the 2" Angle Girder where it is held in place by a Spring Clip when the doors are mounted in position. However, the doors should not be fitted at this stage.

The front bodywork is supplied by four over-

lapping 4 1/2" x 2 1/2" Flexible Plates extended outwards and backwards by two 2 1/2" x 2 1/2" Flexible Plates at each side, these curved gently to shape. The Plates are edged at top and bottom by a 7 1/2" Strip extended at each end by a 2" Strip, the latter also curved to shape and bolted to Strip 55 or forward Strip 56 as appropriate. A 5 1/2" Strip 59 is bolted to the front Plates for decoration, while two headlamps are each provided by a 1" loose Pulley overlaid by a 3/4" Washer. Bolted to the centre of the upper 7 1/2" Strip edging the front panelling is a 5 1/2" Strip 60 curved gently backwards

to serve as the windscreen divider.

A sill behind the windscreen is built up from a 7 1/2" Flat Girder 61 extended at each end by a 2 1/2" Stepped Curved Strip and attached to the front panelling by Angle Brackets. The Flat Girder partially overlays, though is not attached to, a 9 1/2" Strip attached to Strips 55 and 56 by Angle Brackets. Attached in turn to this Strip by further Angle Brackets is a 9 1/2" x 2 1/2" Strip Plate 62 extended downwards at the left-hand side by a 2 1/2" x 1 1/2" Flexible Plate which is also bolted to the vertical flange of the 9 1/2" Angle Girder bolted to the front ends of the floor 12 1/2" Strips.

Turning to the rear of the model, two rigid corner posts are provided by vertical 9 1/2" Angle Girders bolted to the rear ends of the side panelling. The upper ends of the Girders are connected by two 3 1/2" Stepped Curved Strips joined by a 5 1/2" Angle Girder 63, then the back is enclosed by, working from the top downwards, two overlapping 4 1/2" x 2 1/2" Flexible Plates extended outwards at each end by a Semi-circular Plate 64 with, below them, two vertical 4 1/2" x 2 1/2" Flexible Plates and, below again, a 9 1/2" x 2 1/2" Strip Plate, a 4 1/2" x 2 1/2" Flexible Plate, completely overlaid by a 4 1/2" x 2 1/2" Plastic Plate 65, and 2 1/2" x 2 1/2" Flexible Plate, this also completely overlaid by a 2 1/2" x 2 1/2" Plastic Plate 66. Between Plates 65 and 66 there is a gap serving as an air vent for the fan and this is edged by a 3 1/2" Strip, two 2 1/2" Strips and a 9 1/2" Strip, the last bolted between the lower ends of the corner Angle Girders. The rear window is edged by two 5 1/2" Strips and two 3 1/2" Strips, the resulting gap between the lower Strip and the 9 1/2" Strip Plate being enclosed by two 2 1/2" x 1 1/2" Flexible Plates.

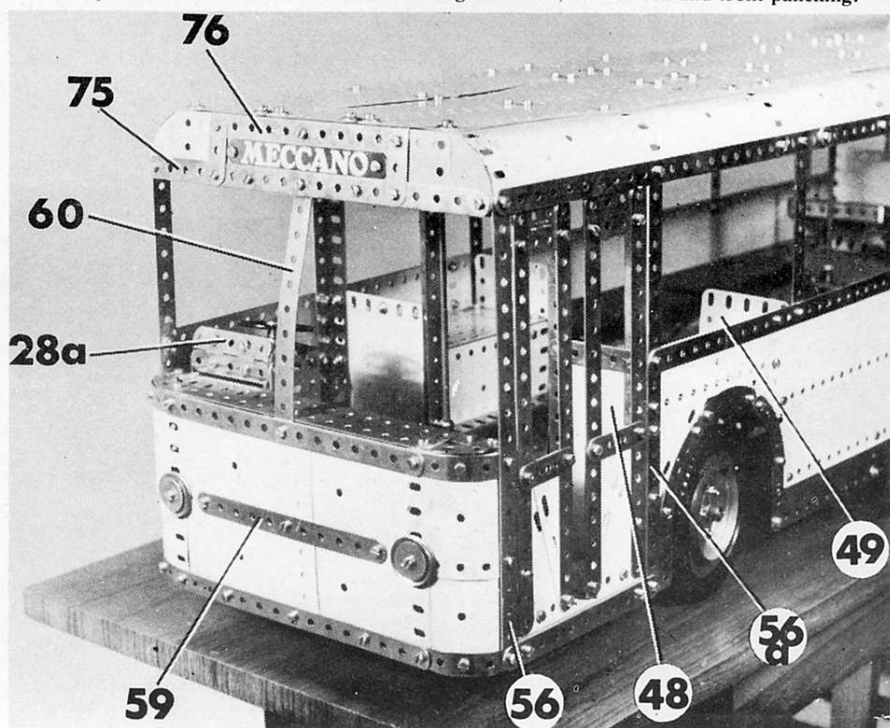
The upper edge of the back is attached to Angle Girder 63 by a 5 1/2" Flat Girder.

#### SEATING

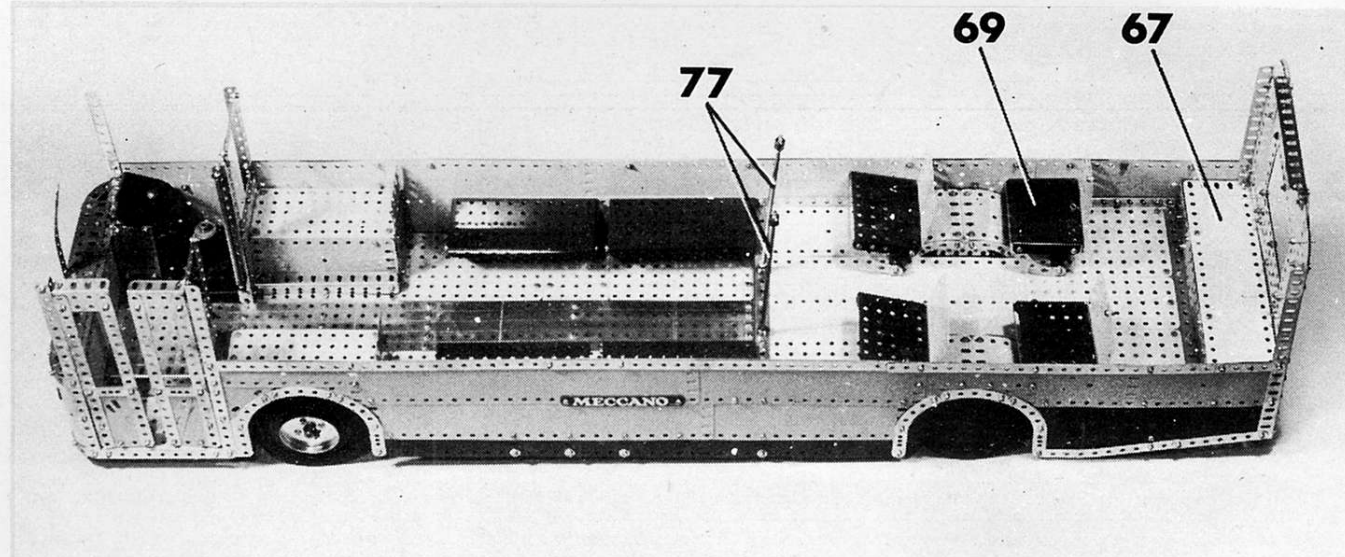
Before building and fitting the roof, the internal seating should be completed. The rear seat is provided by a 9 1/2" x 2 1/2" Strip Plate 67 attached to the back of the body by Angle Brackets and enclosed at the front by a 9 1/2" x 1 1/2" compound strip plate built up from a 5 1/2" x 1 1/2" and two 2 1/2" x 1 1/2" Flexible Plates bolted to the vertical flange of Angle Girder 16. The compound plate is attached to Plate 67 by a 5 1/2" Angle Girder 68.

Still in the rear, or raised, section of the model, all additional seats are each provided by a 3 1/2" x 2 1/2" Flanged Plate 69 between the corners of the flanges of which two 3 1/2" x 1 1/2"

A close-up view of the front of the model showing the doors, windscreen and front panelling.







A view of the model with the roof removed to show the interior seating layout.

Double Angle Strips are bolted, the outer forward fixing Bolt at the same time securing the Plate to the side of the model. The inner forward fixing Bolt also holds a  $2\frac{1}{2}$ " Stepped Curved Strip in place, this Strip being attached to the floor by a  $1\frac{1}{2}$ " Angle Bracket. In the case of two of the seats, a seat back is provided by a  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate, while in the other two cases, two overlapping  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates serve the same purpose.

In the forward compartment, four larger, inward-facing seats are each provided by a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate bolted to the side and braced at the front corners by  $2\frac{1}{2}$ " Strips angled backwards and attached to the floor by Angle Brackets.

The driver's seat is provided by a Sleeve Piece attached to the floor by a Chimney Adaptor and topped by a  $\frac{3}{4}$ " Flanged Wheel. Behind the seat, Plate 48 is edged along the top by a  $3\frac{1}{2}$ " Strip and extended upwards by a  $7\frac{1}{2}$ " Angle Girder 70, the upper end of which is extended, via a  $1\frac{1}{2}$ " Corner Bracket and a  $3\frac{1}{2}$ " Strip, to the top of Angle Girder 54. Attached to Angle Girder 70 is handrail supplied by a  $6\frac{1}{2}$ " Rod held in Handrail Supports. At the other side of the model Plate 48 is edged by a  $2\frac{1}{2}$ " Strip and extended upwards by a  $7\frac{1}{2}$ " Strip which is attached to the upper end of Angle Girder 56A by another  $2\frac{1}{2}$ " Strip.

At both sides of the model a footrest for the seat provided by the front wheel arch casing is supplied by a  $5\frac{1}{2}$ " Angle Girder 71 attached to Plate 50 by Double Brackets at each end of the Girder.

## ROOF

At last the roof can now be built, but, because internal lighting is attached to the underside, this should be built separately and attached to the model when substantially completed. The roof may be described as having two parts, a main section and a raised rear section. The main section, 35" long, is built up from nine  $12\frac{1}{2}$ " x  $2\frac{1}{2}$ " Strip Plates arranged in threes, side by side, with curved roof edges supplied by  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates. Note that, towards the rear end of the section the roof angles downwards very slightly and this is achieved by taking full advantage of elongated holes and slight 'play' in the circular holes. Underside bracing is provided by two longitudinal  $12\frac{1}{2}$ " Flat Girders, three transverse  $7\frac{1}{2}$ " Flat Girders, a  $3\frac{1}{2}$ " Flat Girder 72, the  $5\frac{1}{2}$ " Strips and a  $7\frac{1}{2}$ " Strip 73, all arranged as shown. Note particularly that one of the  $7\frac{1}{2}$ " Flat Girders is situated at the rear end of the roof section and Bolts fixing it in place also secure a  $4\frac{1}{2}$ " Angle Girder to the back of the section. Bolted to the vertical flange of this Angle Girder is a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate, extended four holes outwards at each end by a  $3\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flat Plate 73. Each Plate 73 is itself extended outwards by a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Triangular Flexible Plate 74.

The outer upper edges of Plates 73 and 74 are edged by a  $5\frac{1}{2}$ " Angle Girder extended at each end by a  $3\frac{1}{2}$ " Stepped Curved Strip. The outer end of the Curved Strip is attached to the outer corner of Triangular Plate 74 and at the same time is bolted to the upper end of a  $1\frac{1}{2}$ " Angle Girder which will later be secured to one of the side window uprights.

The rear raised section of the roof is then enclosed by four central  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates, suitably overlapped, extended outwards at one side by four overlapping  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates and, at the other side, by two longitudinal  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates themselves extended by four  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates. The outer plates are of course all curved to shape to round off the edge of the roof. The rear plates of the roof are bolted to Angle Girder 63.

## LIGHTING

As the designer used his original model for demonstration purposes, he included an internal lighting system which makes use of some electrical components not included in the No. 10 Set. Modellers who do not wish to include the lighting may now finish the model by edging the roof along its entire length by suitable Perforated Strips, at the same time bolting the roof to the upper ends of the side window uprights. Note that the Bolt fixing the left-hand front corner of the roof to Strip 56 also holds an Angle Bracket and a left-hand Corner Angle Bracket in place. The spare lug of the Corner Angle Bracket serves as the upper pivot point for the front door, a  $\frac{3}{8}$ " Bolt held by a Nut in the inner end hole of Girder Bracket 58 of the door locating in the hole in the Corner Angle Bracket lug. A  $\frac{3}{8}$ " Bolt held by a Nut in the Girder Bracket of the other door locates in the hole of an ordinary Angle Bracket bolted to the top of Angle Girder 56A.

Bolted between the ordinary Angle Bracket at the top of Strip 56 and Strip 55 at the other side is a  $9\frac{1}{2}$ " Strip 75, the securing Bolts also holding two Semi-circular Plates in position, one at each side. The space between the Plates is enclosed by three  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plates bolted to Strip 75 and edged along the top by a  $5\frac{1}{2}$ " Angle Girder 76. Bolted between each end of this Angle Girder and Strip 75 is a  $1\frac{1}{2}$ " Strip, the resulting box representing the route indicator panel. A Meccano nameplate makes a good substitute for a route indicator! The front end of the roof is bolted to the horizontal flange of Angle Girder 76.

Inside the model, two roof supports 77 are each provided by an 8" Rod located by a Collar in a hole in the  $9\frac{1}{2}$ " Girder edging the front of the raised portion of the floor. The upper end of the Rod is fixed in a Rod Socket secured to the roof.

For those modellers who do have the equipment and wish to include lighting, a support-frame is built up from two  $24\frac{1}{2}$ " Angle Girders

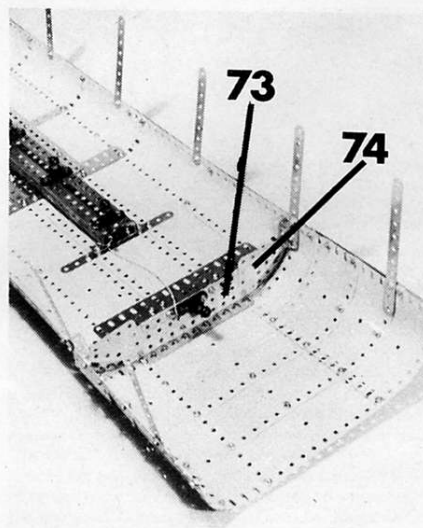
78 attached to two  $2\frac{1}{2}$ " Strips which are themselves secured to two of the  $5\frac{1}{2}$ " Strips bracing the underside of the roof, but note that they are held away from the roof by two Washers and a Nut on the shank of each Bolt. Note also that one Girder 78 is attached to the Strips by Insulating Spacers to electrically isolate it, while the other is attached by Angle Brackets on Bolts packed appropriately with Washers.

Bolted to Angle Girders 78 are seven Lampholders, with lamps, while another Lampholder is attached to the vertical flange of the Angle Girder to which Plates 73 are bolted. Note that one terminal of this Lampholder must be earthed by bolting it direct to the metal of the model, while the other terminal must be insulated. This can be achieved by using a non-Meccano nylon Bolt or a thin 6 B.A. Bolt fitted with an insulating washer. The insulated terminal is connected by a length of insulated wire to insulate Angle Girder 78.

Another length of insulated wire is taken from any point on the insulated Angle Girder, is run down one of the rod roof supports 77 and taken to a  $2\frac{1}{2}$ " Insulating Flat Girder 79 bolted towards the rear end of the left-hand chassis member. One of the fixing Bolts serves as the other terminal for the lighting circuit. Insulated wires from the two Power Drive Units are taken to separate insulated terminals added to the Insulating Flat Girder and this finally completes the model.

See the contents list of the No. 10 Set for the Parts Required list for this model.

An underside view of the rear of the roof in close-up.



# 'LITTLE JOE' AND

Designed by Dr. Keith Cameron

WITHOUT a doubt one of the most 'natural' Meccano Exhibition models I've seen to date, is this immediately eye-catching 'fun' orientated miniature railway system designed by advanced Meccano modeller Dr. Keith Cameron of Florida, USA. The locomotive, affectionately termed 'Little Joe' by its creator, is motivated by a 6-12 volt Motor With Gearbox, powered by four 'AA' size batteries concealed within its boiler.

The locomotive can be run independently or

on its purpose-built obstacle course railway, 'Tricky Track', views of which appear opposite.

This obstacle course consists of a rolling bridge, a pair of hinged lift bridges and two reversing loops with switches, all incorporated into a track built largely of Flanged Sector Plates, in fact, 68 Flanged Sector Plates are used! Having seen this fine model in use, I can certainly vouch for its crowd-pulling ability!

Although the construction of the 'Little Joe' locomotive has been described below, this has

not been attempted in the case of the obstacle course railway due to its very large size and complex construction. In fact, many pages of the Meccano Magazine would have to be devoted to this one model alone, if every aspect of construction were to be adequately described. The photographs do, however, give a very good idea of the salient features and convey an accurate impression of the operation of this very novel display model. Look out for it at Meccano Exhibitions everywhere!

## 'LITTLE JOE'—the 'Go-Anywhere' Loco

Construction should be straightforward, following the lettered drawings which are:

- (A) Side elevation (right)
- (B) End elevation (front)
- (C) End elevation (rear)
- (D) Plan view
- (E) Underneath plan view
- (F) Boiler unit removed (rear view)

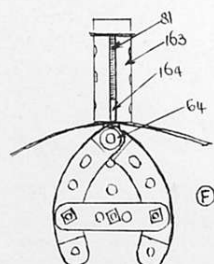
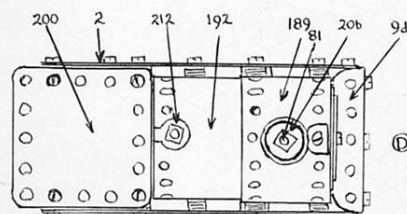
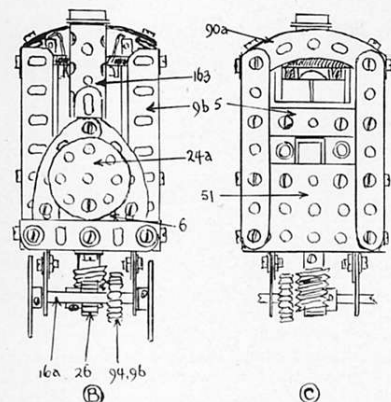
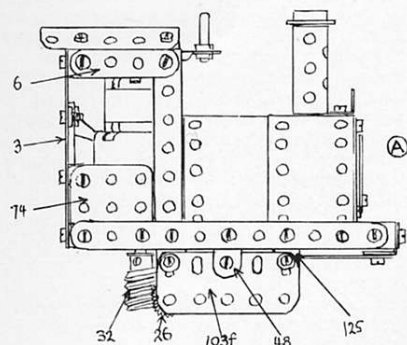
The underframe carrying the wheels consists of two 2½" Flat Girders and this is attached to the main structure of the locomotive by four Reversed Angle Brackets. The choice of wheels depends largely on the type of surface on which the locomotive will run; for general use, four 1" Pulleys with Tyres will grip almost anything, but for use with the 'Tricky Track', the front wheels must be a pair of Bush Wheels and the rear wheels a pair of 1¼" Gear Wheels.

The 4½" Perforated Strip, labelled 2a in drawing E, performs the important function of preventing slippage between the Worm Gear on the motor output shaft and the 2" Pinion on the rear axle, when under load. The rear hole of this 4½" Strip is passed over the output shaft of the Power Drive Motor, (M5), and is held by an

Angle Bracket, bolted to its forward hole and centre hole of the front 2½" Angle Girder. Adjustment can then be made to ensure good meshing of the Worm with the ½" Pinion.

The front and rear axles are connected by Sprocket Chain and this arrangement promotes improved traction. The reversing switch on the motor is extended by a Threaded Pin bolted to a Rod and Strip Connector. The 5½" x 2½" and 5½" x 1½" Flexible Plates comprising the boiler are connected by a 2" Threaded Rod, the lock-nut of which secures a Sleeve Adaptor.

A Sleeve Piece is slid over this, forming a chimney, and a ¾" Flanged Wheel completes this, being held on the 2" Screwed Rod by a further Nut. 'H' in drawing E depicts a battery holder, for the four 'AA' batteries, bolted to the 1½" x 1½" Double Angle Strip. The boiler is held in position by its own springiness, on three pairs of 3/8ths" Bolts as shown in drawing D. Thus, the boiler can easily be removed at any time. The boiler front consists of two 2½" Stepped Curved Strips, a 5-hole 2" Strip and a Wheel Disc, the whole being held in place by a Threaded Boss secured to the inside top forward edge of the boiler.



'Little Joe'

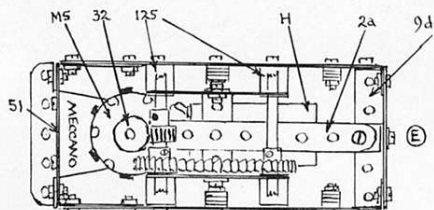
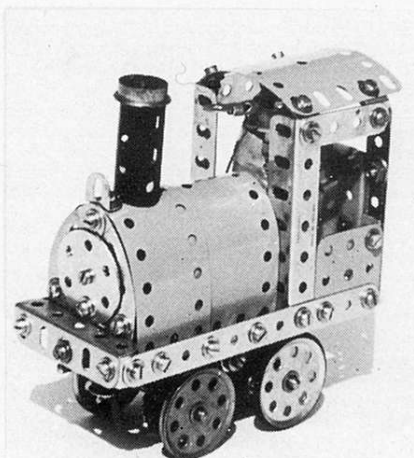


Fig. 5: The star of the show, 'Little Joe'! Its considerable power allows fine performance over a wide range of surfaces, the obstacle course railway is by no means necessary to enjoy the fun given by this little model. Why not experiment with rolling stock, double combinations, railway tracks, the possibilities are endless!

### PARTS LIST

2 of 2	1 of 74
1 of 2a	1 of 81
2 of 3	3 of 90a
1 of 5	18 cm 94
3 of 6	2 of 96
2 of 9b	2 of 103f
1 of 9d	6 of 111c
5 of 12	1 of 115
4 of 12c	4 of 125
2 of 16a	4 of 142c
1 of 20b	1 of 163
4 of 22	1 of 164
1 of 24a	1 of 189
1 of 26	1 of 192
1 of 32	1 of 200
49 of 37	1 of 212
6 of 37a	1 x 6-12 Volt Motor
32 of 38	with Gearbox
1 of 48	Wire, batteries,
1 of 51	battery holder,
1 of 64	sockets.



# 'TWO FROM FOUR'

TWO entirely new models built from the current series No. 4 Meccano Outfit, designed, constructed and described by Dr. Keith Cameron of Florida, U.S.A.

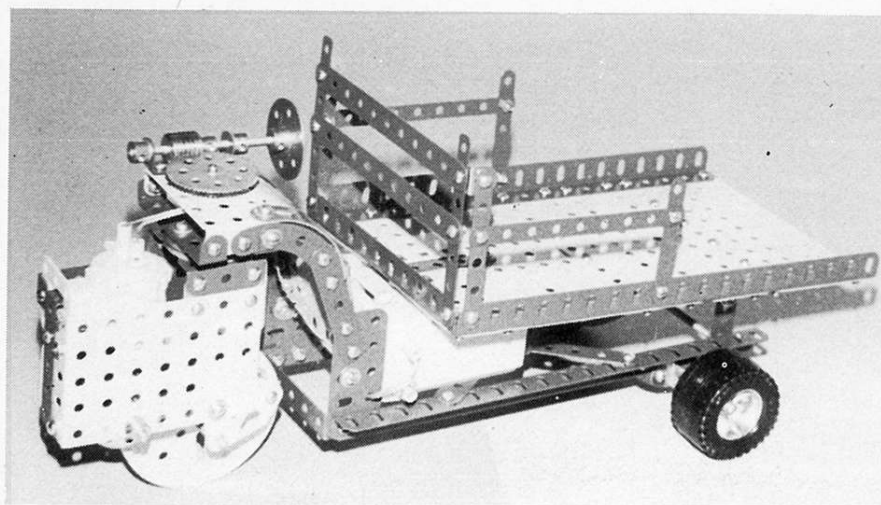
## TIPPING MOTOCART

THIS model closely follows the lines of the 1950 Dinky Toy No. 27g. In a similar manner to the prototype, it is powered by a drive to the large single front wheel, which is steered by an operator standing on the chassis. This is connected to the steering head by a 'swan neck'. The model is self-contained, the motor deriving its power from a battery box on the frame, under the tipping body.

### FRONT WHEEL UNIT

A 4.5 volt motor, (Junior Power Drive Unit Mk. II), with a  $\frac{1}{2}$ " Pinion on its drive shaft, is bolted to the inner face of the upper two holes of the front flange of a  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate, spaced by a washer on each Bolt. A vertical  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip is also bolted to the motor base plate and lies parallel to the flange, its upper lug contained within the cavity of the motor base plate. This Double Angle Strip is also affixed, below, to the flange of the plate by a 1" Corner Bracket, (not shown in some illustrations). A lower Bolt secures a  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip by its front lug, its rear lug being bolted to the rear flange of the plate by a Bolt that also passes through the centre hole of a Double Bracket.

Flat Trunnions are fixed to the lugs of the Double Bracket and, these are further secured by means of Bolts passed through their formed holes to the  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip in



LEFT-hand view of completed model.

the case of one, and to the  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate on the other; in such a way that a 3" Pulley on a  $\frac{1}{2}$ " Axle Rod journaled through the apex holes just clears a  $2\frac{1}{2}$ " Axle Rod journaled through the third hole from the front of the Double Angle Strip. This  $2\frac{1}{2}$ " Axle Rod carries a Contrate Gear between the Flanged Plate and the Double Angle Strip, and this engages with the  $\frac{1}{2}$ " Pinion on the motor shaft. A  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip is bolted to the motor base plate, and is fixed by its rear lug to a  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flat Plate bolted to the rear flange of the  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate.

A  $1\frac{1}{2}$ " Pulley, boss down, is bolted to the centre elongated holes of two  $1\frac{1}{2}$ " Angle Girders, using washers to ensure that the bolt shanks do not project beyond the Nuts on the upper surface of the  $1\frac{1}{2}$ " Pulley. The  $1\frac{1}{2}$ " Angle Girders are fixed by means of four Fish-plates to the Double Angle Strip and the Flanged Plate. A  $2\frac{1}{2}$ " Axle Rod is then fixed using two Grubscrews in the boss of the  $1\frac{1}{2}$ " Pulley, position the Pulley so the Grubscrews are accessible.

The large front wheel is represented by a 3"

Pulley on a  $1\frac{1}{2}$ " Axle Rod, secured by a Collar and spaced by three Washers, in the apex holes of the two Flat Trunnions. This is driven by a 6" Driving Band in its groove and this is passed over the  $2\frac{1}{2}$ " Axle Rod carrying the Contrate Gear, powered by the  $\frac{1}{2}$ " Pinion on the motor shaft. The gearing can then be concealed by a  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flat Plate passed over the  $2\frac{1}{2}$ " Axle Rod and secured by means of a lock-nutted  $\frac{3}{4}$ " Bolt to the forward hole of the lower  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip.

### STEERING HEAD

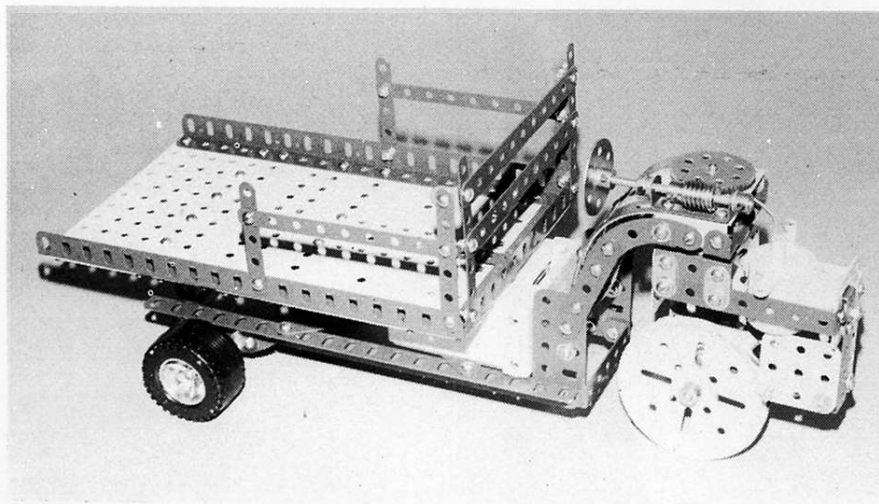
This comprises a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plate, to the flanges of which are bolted two  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips. A  $1\frac{1}{2}$ " Pulley, boss up, is affixed to the centre holes of these two Double Angle Strips in the manner previously described, ie using Washers for spacing purposes. To the flanges are also affixed, two  $2\frac{1}{2}$ " Stepped Curved Strips, by their end two holes, and to the upper surface of the plate is bolted a  $1\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip.

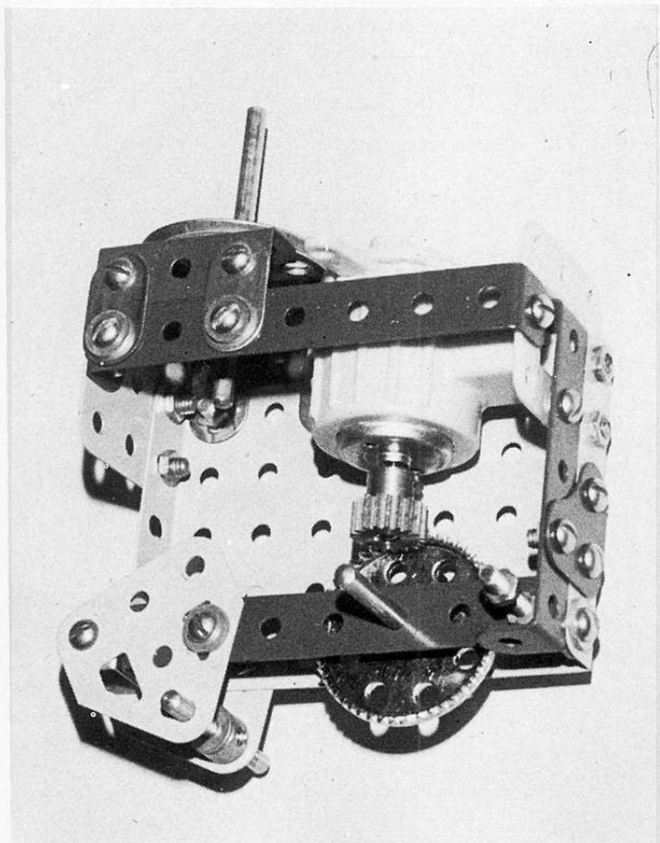
This holds a 3" Axle Rod, journaled through its lugs, and carrying a Worm Gear, two Collars, spacing Washers and a Bush Wheel. To the rear upper surface of the  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plate are secured two Formed Slotted Strips, bracing a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Plastic Flexible Plate, down and to the rear. These are extended below by another  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate edged by two  $2\frac{1}{2}$ " Perforated Strips and, above, by a  $2\frac{1}{2}$ " Narrow Strip, the securing Bolts of which also hold  $\frac{1}{2}$ " x  $\frac{1}{2}$ " Angle Brackets.

These Brackets are affixed to the lower holes of the two  $2\frac{1}{2}$ " Stepped Curved Strips, which are lengthened by  $2\frac{1}{2}$ " Perforated Strips bolted at an angle to the two upper slotted holes of  $2\frac{1}{2}$ " Flat Girders, secured below to the  $9\frac{1}{2}$ " Angle Girders forming the main chassis members. A  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip is used to provide bracing between the forward holes of the two  $9\frac{1}{2}$ " Angle Girders at this point.

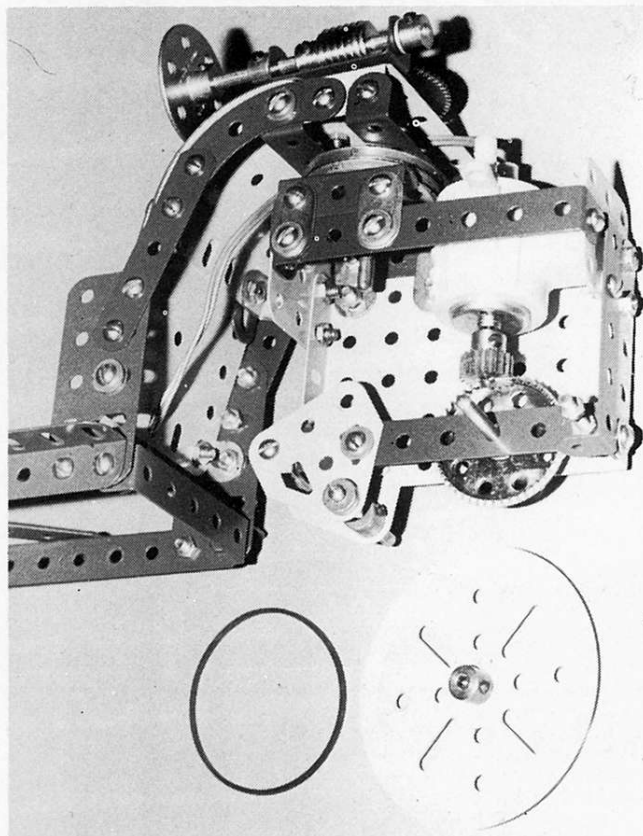
The  $2\frac{1}{2}$ " Axle Rod, held in the boss of the front wheel unit  $1\frac{1}{2}$ " Pulley, is passed through the central hole of the  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plate and the  $1\frac{1}{2}$ " Pulley affixed to it. A 57t Gear Wheel is then attached by using two grubscrews, this engages with the Worm Gear on the steering shaft.

GENERAL view of the right hand side of the Tipping Motocart. Note that the tipping body rests on the battery box.





CLOSE-up of the motor drive unit showing careful positioning of two Flat Trunnions.



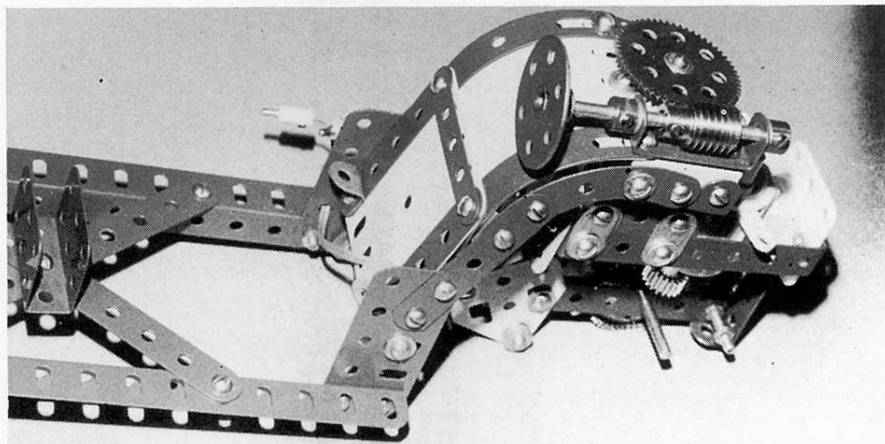
DRIVE unit and 'swan neck'. The 3" Pulley is shown separately to avoid obstruction of detail.

#### THE FRAME

The two 9½" Angle Girders comprising the main frame chassis members are braced by two 5½" Perforated Strips, crossed over. The road wheels are free to revolve on the shanks of two 1⅞" Bolts, lock-nutted to the centre holes of two Double Bent Strips, themselves held by two 2½" Stepped Curved Strips bolted to the rear of the frame, their rear holes secured by lock-nuts on a crosswise 3" Screwed Rod. A Channel Bearing is bolted to the point at which the two 5½" Perforated Strips cross.

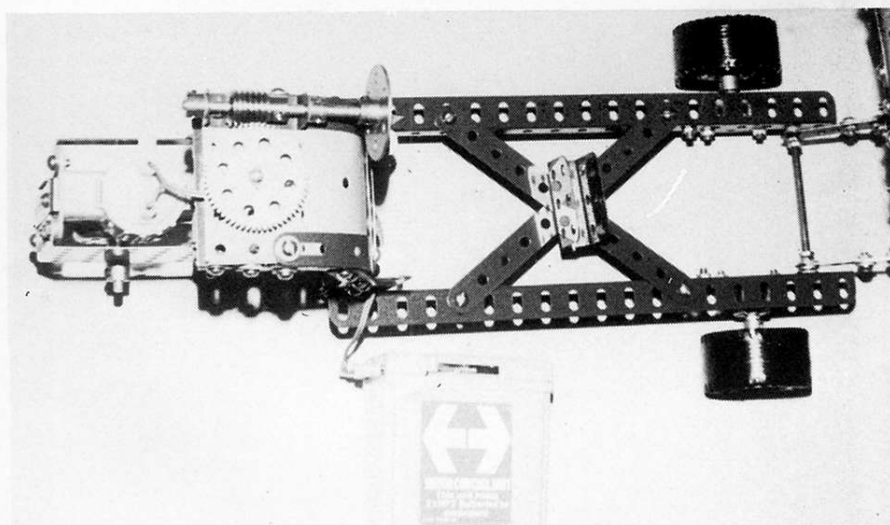
#### THE TIPPING BODY

The floor of this consists of, (from front to rear), two 2½" x 1½" Plastic Flexible Plates, two 3½" x 2½" Flexible Plates, (between these, a further 2½" x 1½" Flexible Plate), two



DETAIL view of rear of 'swan neck', note arrangement of steering column.

VIEW from above with tipping body raised. The battery box fits in between the Channel Bearing supported on the crossed 5½" Strips, and the rear of the 'swan neck'.



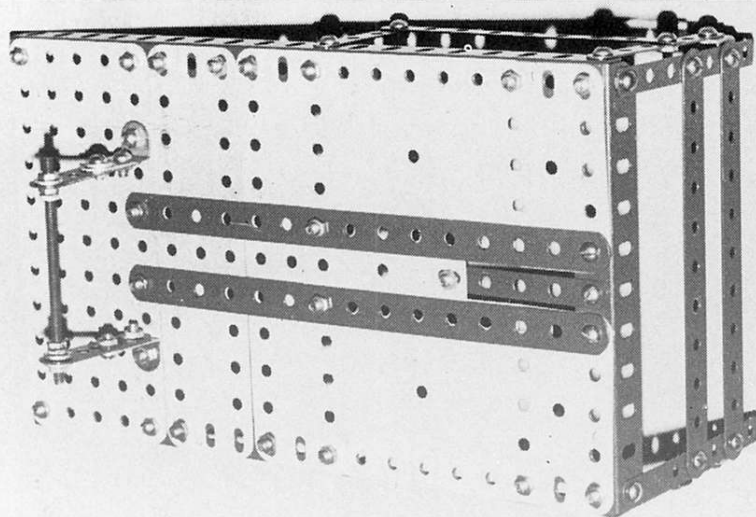
5½" x 1½" Flexible Plates, and a 5½" x 2½" Flat Plate, lined up as shown and braced on either side and in front by two 9½" Angle Girders and one 5½" Angle Girder respectively. Two 7½" Perforated Strips are employed to brace the underside of floor, and a 2½" Narrow Strip partly fills the gap between the four forward Flexible Plates.

Two 2" Perforated Strips, fixed by two 1" x ½" Angle Brackets to the underside forward holes of the 5½" x 2½" Flat Plate, pivot by their lower holes on the 3" Screwed Rod connecting the rear of the two 9½" Angle Girder chassis members. Side and front framing for the tipping body is made up from 2½", 3", 3½" and 4½" Narrow Strips, two 5½" Perforated Strips and two ½" x ½" Angle Brackets.

#### OPERATION

A Battery Box will fit snugly between the Channel Bearing and the two 2½" Flat Girders on the chassis frame. Two wires connect the motor and Battery Box, these can be passed under the steering head.



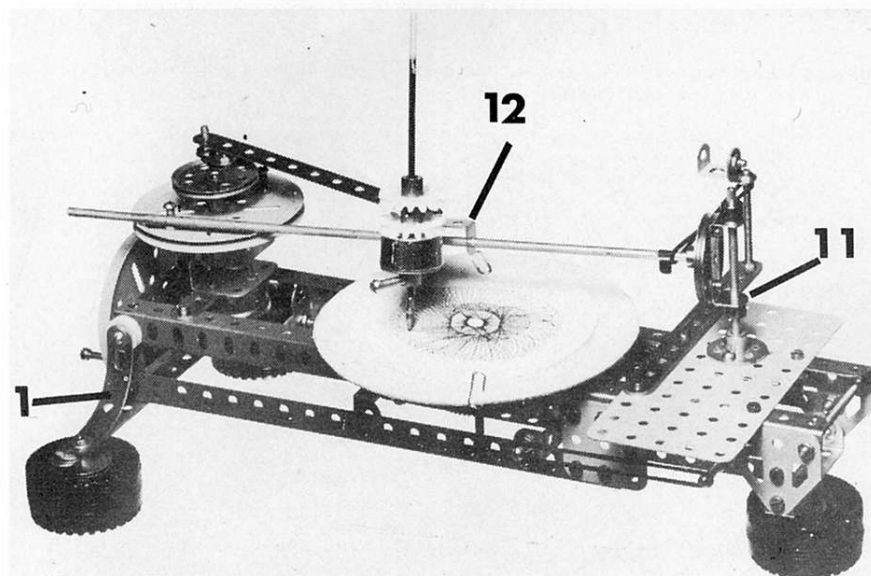


THE underside of the tipping body.

**PARTS REQUIRED:**

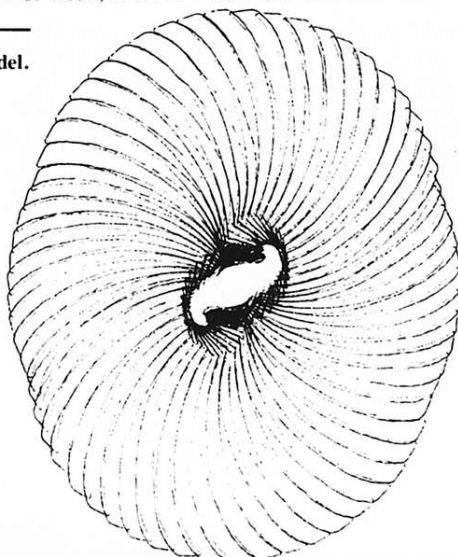
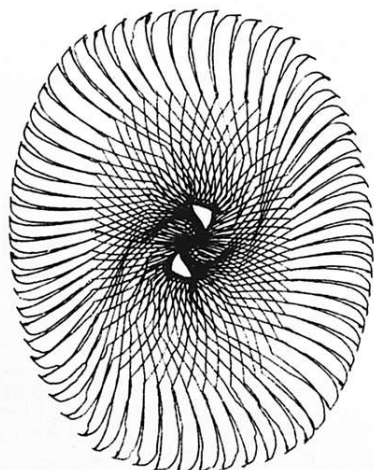
2 of No. 1B	1 of No. 53
4 of No. 2	4 of No. 59
4 of No. 5	1 of No. 70
2 of No. 6	2 of No. 74
4 of No. 8A	1 of No. 80C
1 of No. 9	4 of No. 90A
2 of No. 9F	2 of No. 103F
4 of No. 10	1 of No. 111
1 of No. 11	8 of No. 111A
6 of No. 12	2 of No. 111D
2 of No. 12B	2 of No. 126A
2 of No. 16A	1 of No. 133A
1 of No. 16B	1 of No. 160
1 of No. 18A	1 of No. 186A
1 of No. 19B	2 of No. 189
2 of No. 21	2 of No. 190A
1 of No. 24B	3 of No. 194
1 of No. 26	2 of No. 194A
1 of No. 27A	2 of No. 215
1 of No. 28	4 of No. 235
1 of No. 32	2 of No. 235A
110 of No. 37B	2 of No. 235B
125 of No. 37C	2 of No. 235D
36 of No. 38	4 of No. 611
2 of No. 45	1 of No. 618
1 of No. 48	1 of No. 11053
4 of No. 48A	1 of No. 136 24
2 of No. 48B	2 of No. 187C
1 of No. 51	1 motor and accessories

# MECCANOGRAPH



A GENERAL view of Dr. Cameron's Meccanograph, built from the current series No. 4 outfit, plus a 5" diameter design table made of thick card or wood, and two rubber bands.

SOME of the fine designs produced on this model.



THIS machine produces a wide range of designs mostly resembling flowers. It requires a designing table which is easily made from 1/4" plywood, although thick card was substituted for photographic expediency in the illustrations. Two rubber bands and ball-point pen refills are also necessary.

## THE FRAME

This is composed of four 9 1/2" Angle Girders bolted at one end to a 2 1/2" x 1 1/2" Flanged Plate. All four Girders are secured to the flanges by their elongated holes, using a Washer in between for spacing purposes. The upper two Girders are held by 1/2" Bolts that first pass through a Washer, then the end slot of a 3" Formed Slotted Strip 1, and a 1/2" Pulley, remembering the Washer for spacing purposes between the 9 1/2" Angle Girder and the 2 1/2" x 1 1/2" Flanged Plate.

A 7 1/2" Perforated Strip 2, is then fixed to the end round holes of the lower two 9 1/2" Angle Girders, extending five holes either side. Two 'feet' for the Meccanograph are formed, each in the following manner. A 1 1/8" Bolt is passed up in succession through a Road Wheel Centre, a hard Plastic Tyre, a 1" Pulley, the next to the

