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MARCH 1968

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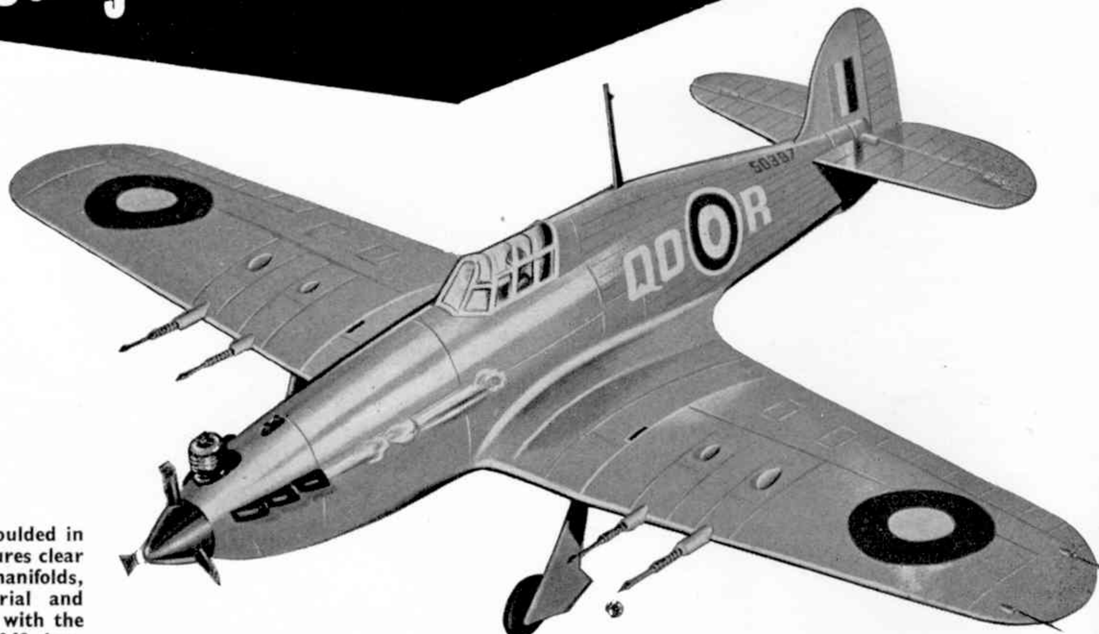

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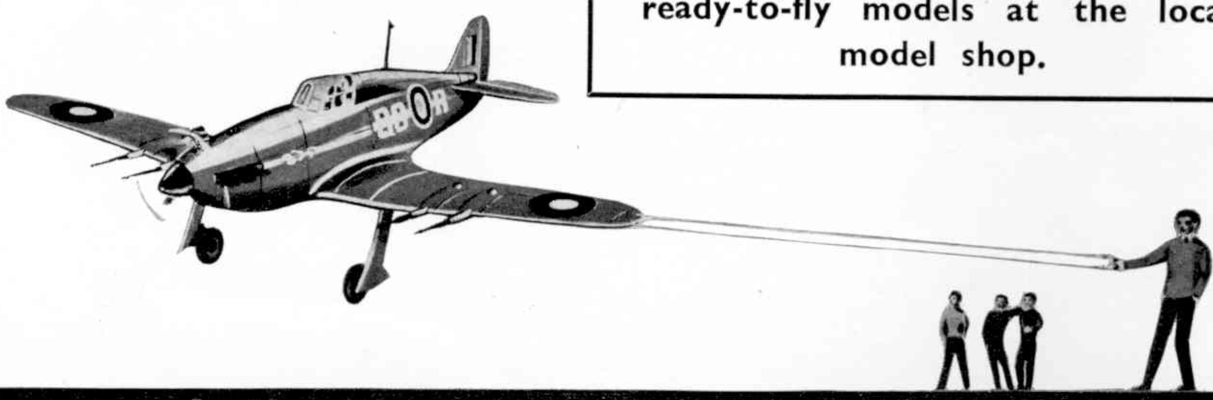

A plastic model that really FLIES!

MECCANO® Magazine

MARCH 1968 VOLUME 53 NUMBER 3

Meccano Magazine, founded 1916.

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MAP **HOBBY MAGAZINE**

FRONT COVER

An impression by Artist Laurie Bagley of the Caledonian Railway 4-2-2 No. 123 at full speed during the Railway Races of the last century, in which it worked trains between Carlisle and Aberdeen. The story of the Races appears on pages 128 and 129 of this issue.

NEXT MONTH

Full-size plans of Craig Breedlove's "Spirit of America," jet-powered, record-holding car for Jetex 50c operation, and half-size plans for an all balsa kite. Trackside Construction continues with a closed ootbridge from Plasticard—again with full-size drawings; the A.B.C. of Railways describes the track terms and usage. For full-size railway fans we visit Britain's New Railway, the 25,000 volt L.M.R. electric system. Several interesting new Meccano models and Dinky Toy news, together with a simple Radio Receiver and Home Chemistry, make this an issue you can't afford to miss. The Exhibition pictures alone will make you want to treasure this issue.

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CONTENTS

AEROMODELLER ANNUAL 1967/68

Articles include world record holder Wisniewski on Tuned Exhaust Pipes; other speed flying articles; Fuel Tanks for Control liners; Dr. Hawkins on Jap WWII Colour Schemes; Prop Carving; Woodwork for Modellers; Flexwing flying models; plus drawings of the world's models of the year, including r/c, contest and sports power, Winter Cup, slope soarers, chuck gliders, helicopters, indoor . . .

128 pages, size 8½ x 5½ in.

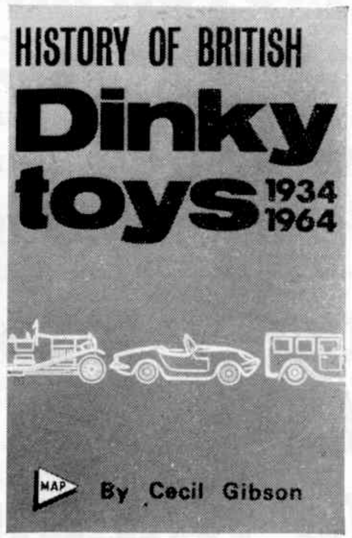
10/6

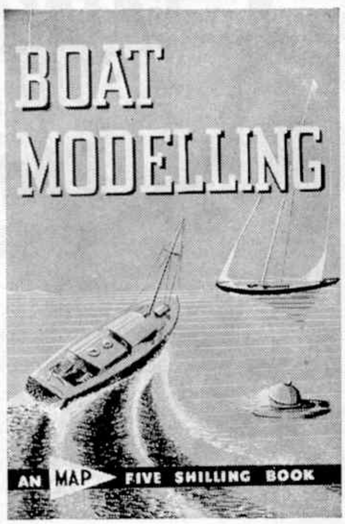
HISTORY OF BRITISH DINKY TOYS 1934-64

It contains not only a short history of the original company which produced Dinky Toys, but also a year-to-year description of the cars issued, with a fine selection of photographs devoted mainly to earlier examples, and a series of tables listing all Dinky Toys, 1934-64 in numerical order.

15/-

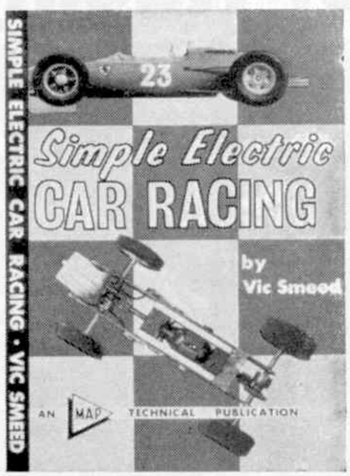
8½ x 5½ in., 152 pages. Cloth bound, gold blocked spine. Two-colour dust cover. 76 photo-illustrations.





8½ x 5½ in., 96 pages. 223 line drawings and 8 pages of art plates showing 50 photographs.

5/-



10/6

7¼ x 4¾ in., 104 pages, 65 photos, 37 line drawings. Cloth and board cover.

BOAT MODELLING

A book for the not-so-expert modeller covering every aspect of model boat work from construction through to sailing. Author Vic Smeed provides a wealth of practical assistance. Chapters include: tools and materials, hard chine hulls, round bilge hulls, superstructure fittings, finishing, I.C. engines, electric motors, hydroplanes and special models operation, radio control.

SIMPLE ELECTRIC CAR RACING

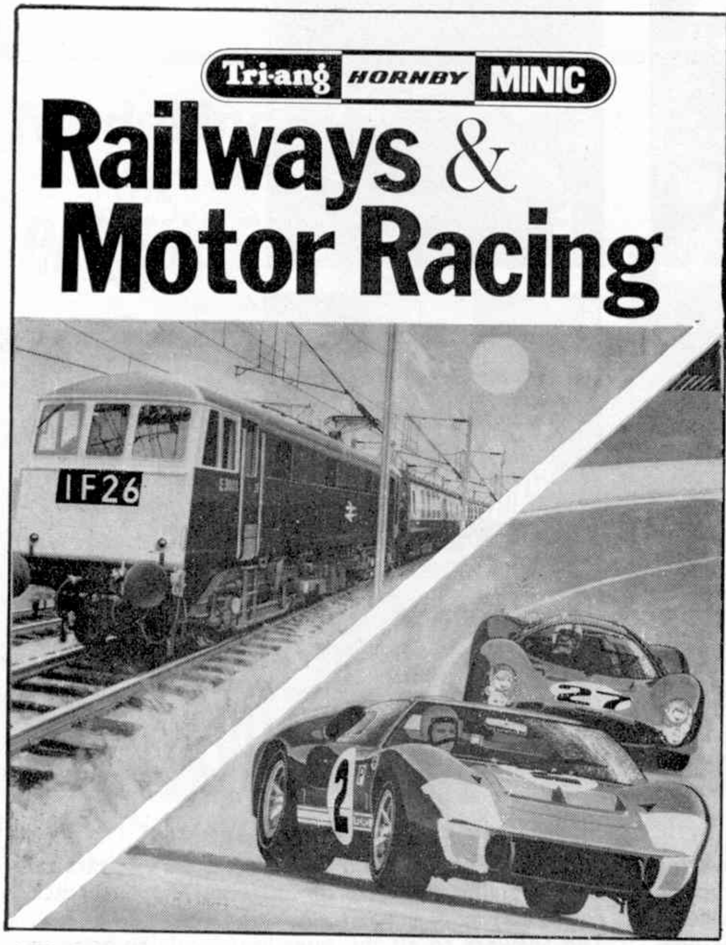
The ideal introduction to electric cars—practical survey giving the facts of successful car and track construction.

The answers to all the questions likely to arise in building cars and tracks from scratch: a great proportion of its content will also be invaluable to those who buy commercial cars and track.

WHO SAYS INTER-CITY, FREIGHTLINERS AND MOTOR RACING DON'T MIX?

Tri-ang HORNBY MINIC

This new triple name does it on the many rail, race track, rally route and motorway ideas in this



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New railway ideas like the superb new Tri-ang Hornby Inter-City and new Freightliner packs. New race track ideas like fully marked, super-fast GT cars. New rally ideas. And the way to link them all: Minic Motorail drive-on and drive-off loading ramp and car transporter. See how much you're missing on your railway system!

Items to be released at varying times throughout the year include: *new loco, new train packs, new track packs, new rolling stock, new coaches.*

Tri-ang Hornby Minic railways and motor racing

made in Great Britain by Rovex Industries Limited, Westwood, Margate, Kent

Subscription note

Subscribers to the "old" *Meccano Magazine*, published by Messrs. Thomas Skinner and Co. Ltd., which ceased publication with the July 1967 issue, who have not yet received a refund of any outstanding balance of their subscriptions, should write to the publishers at St. Alphage House, Fore Street, London E.C.2. Please give *full details* and the *expiry date* of your subscription.

Transistor warning

It has been brought to our attention that some transistor radios from Hong Kong are not such bargains after all. You may have noticed how they are very often advertised, each boasting more transistors than any other! This may well be the case, but they don't all have to work! As an example, suppose we have a 12-transistor radio; this will probably operate on five, incorporated in the circuit, and the other seven are just "*looped*" together, performing no function at all. The whole radio works, but not to the standard you would expect with 12 transistors. The Hong Kong Government have now decided to stamp out this practice, and radios on sale later in the year will not incorporate this "loop hole."

The Editor visits Fords

Whilst in Liverpool visiting the Meccano Works at Binns Road, we had the pleasure of being invited to attend a pre-release press reception at Ford's Halewood factory for the *Ford Escort* in its various guises.

With Doug McHard, Chris Jelley and Andy Gilleron (New Products Manager of Meccano), we were extremely well entertained by the Ford executives. We were pleasantly surprised with the Escort's lines and equipment, and the G.T. version is a real gem. A "works" driver rang-it-out for us on a wet and slippery road, and the road holding was little short of phenomenal. With wide "J" rim wheels and Pirelli Cinturato tyres it clung to the road on high speed bends with four adults aboard, like a limpet. With full lock on the very direct rack and pinion steering, and the accelerator fully depressed, it went round in a very tight circle, the front tyres protesting, but never for one instance losing their grip, even though the occupants of the car were hard put to remain normally seated. The Dinky *Escort* model, also in prototype form, was presented to the journalists present, and this little gem aroused as much interest as the full-size Escort. The "Super Escort" is illustrated below.

Exhibition season

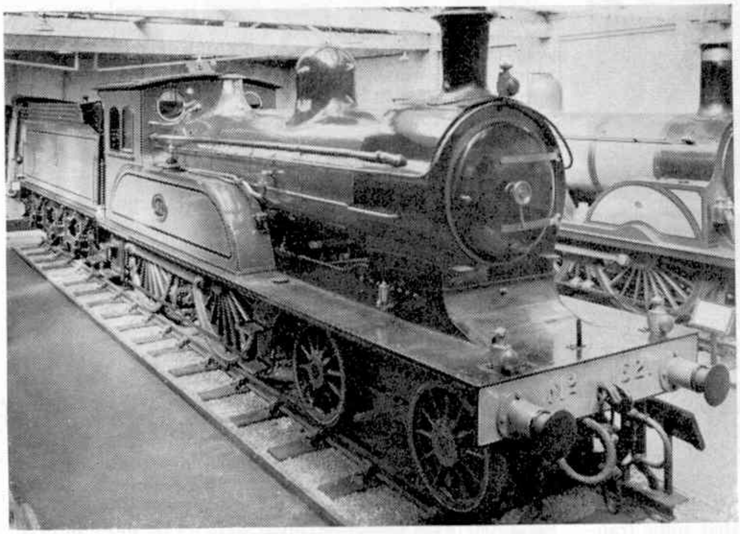
The winter always heralds the arrival of modelling exhibitions and '67-'68 was no exception.

Our first visit was to the Manchester Model Railways Society's Exhibition at the Manchester Corn Exchange. This three-day modelling bonanza with trade stands (including *Meccano Magazine* and *Model Railway News*) was very well attended and the models exhibited were nearly all first class. The most impressive layout was of "Mill Dale" in "N" gauge, narrow gauge by George Grainger of Macclesfield Model Railway Group.

The scenic work was very realistic and the bridges and walls were constructed of individual balsa blocks painted to represent stones. Next month we hope to have a picture spread showing this layout and some of the many other interesting models and layouts on display at this exhibition.

The Daily Mail Schoolboys and Girls Exhibition held at Olympia was graced with a Meccano stand, among its many other attractions. Young Meccano constructors entered a contest to construct a standard model against the clock. Each entrant of the six in each heat received a free *Meccano Magazine* and next month we hope to illustrate some of the intent expressions on the constructors' faces, as well as listing all the winners.

The Model Engineer Exhibition as Seymour Hall, sponsored and organised by Model Aeronautical Press, is just getting under way at the time of going to press, but if space permits we will endeavour to show some of the "Super Models" exhibited there, next month.



RACING TRAINS

A tale of the last century which can never happen again with our State owned railway system

The North Eastern Railway Worsdell 4-4-0 No. 1621 which performed yeoman service on the East Coast Route during the wars. These engines were very notable in their time for their large and commodious cabs, which gave the crew much more protection than was usual in those days.

ON THE evening of August 22nd, 1895, a terrific storm was raging over London. The black, cloud-hung sky was lit by occasional flashes of lightning, and the violent crashes of thunder drowned the clatter of horse-drawn cabs outside Euston station. On platform 9 a crowd of people was rapidly forming; fathers with their sons, railway enthusiasts with their like-minded friends, and journalists with their notebooks and sketch-pads, had all braved the ghastly weather with the some objective—to see the Train. Although the racing and the rivalry had been going on for a long time, somehow this crowd of oddly assorted people knew that tonight records would be broken! Under the station's iron and glass roof, the London and North Western Railway's compound locomotive No. 1309 *Adriatic* gleamed dully in the gaslight. Black paintwork reflected the pale faces of the crowd and, in the cab, brass fittings gleamed in the red glare from the open firebox door. Behind the engine, the short train of purple and white carriages looked deceptively like any other "North Western" train, except that each compartment was crammed with passengers, many betraying feelings of excitement or apprehension.

Eight o'clock

At precisely eight o'clock, the frock-coated guard, with a final glance at his moon-faced watch, blew his whistle, waved his flag and slammed the door of his van. *Adriatic* steamed past the platform ends, past the now-cheering crowd, and out over the points into the storm. The observers watched the red tail-lamp of the guard's van disappear into the blackness, as the train ascended the steep rise to Camden. Suddenly, the train had gone, all sound of it drowned by the storm. The crowd dispersed reluctantly; there was nothing left to do but go home to bed, and await the morning's papers.

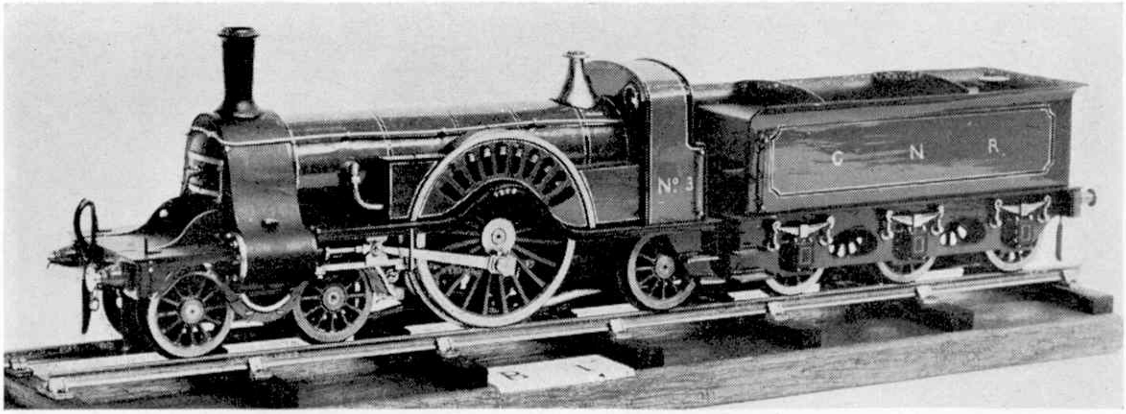
We shall leave, for a moment, our London and North Western Railway train, speeding northwards through the dark London suburbs, and examine, very briefly, the story of rivalry and intrigue which led to the Railway Races, over seventy years ago. There were, in those days, and still are today, two principal ways in which the railway traveller could reach Scotland from London: either via the West Coast Route, starting from Euston, or via the East Coast Route, from Kings Cross. Today, this means simply travelling either by a Midland Region or an Eastern Region train; in the 'nineties, when a nationalised railway system would have been unthinkable, things were a little more complicated! The London and North Western Railway, which called itself the "Premier Line" and, indeed, was the largest and richest of the British railway companies, took the West Coast train as far as Carlisle. From Carlisle northwards into Scotland, the train travelled over the tracks of the L.N.W.R.'s ally, the Caledonian Railway. The latter line's locomotives were finished in a distinctive bright blue livery—a sharp contrast to the North Western's sombre black. The East Coast Route, however, was operated by three different companies: the Great Northern Railway as far as York, the North Eastern Railway from York to Edinburgh and the North British Railway from Edinburgh to Aberdeen.

Fever pitch

When one considers the strong rivalry that existed in those days, between the various railway companies, it is not really surprising that competition between the East and West Coast companies grew to fever pitch. The two routes were well matched, the East Coast being slightly easier, with a somewhat shorter route mileage and fewer stiff gradients. Open "war" started in 1888, when the hitherto conservative and slow-running London and North Western accelerated its "Scotch Express" by a full hour. Public announcement of the speed-up was delayed until the last minute, in order to catch the rivals at Kings Cross on the wrong foot! The Great Northern soon answered, however, by cutting their time to Edinburgh from nine to eight and a half hours.

Kinnaber Junction

In a short article like this, it would be quite impossible to describe in detail the races which occurred in the years following 1888; for those who want all the details, there is an excellent book on the subject. As competition "hotted-up," so the intrigue between the rivals grew, and some of the events read like a spy story! Indeed, "spies" in the shape of administrative staff were often sent from Kings Cross to Euston, to keep their eyes and ears open for any hint of further accelerations. Of course, all this rivalry greatly ap-



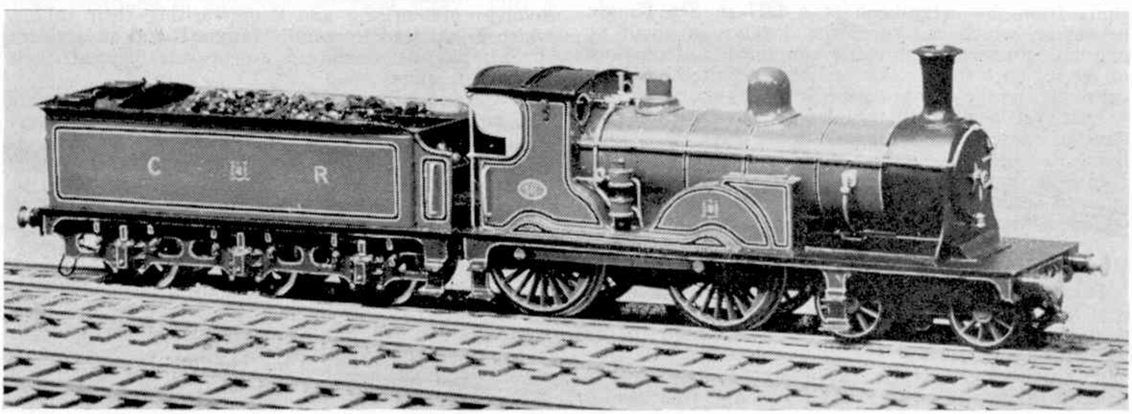
The model above represents one of the famous Great Northern Railway 4-2-2's which were used on the East Coast racing trains on the first leg of their journey from Kings Cross. These "singles" were ideal machines for fast, light trains, and one of them is also preserved at York. They were designed by James Stirling, who championed the domeless boiler design.

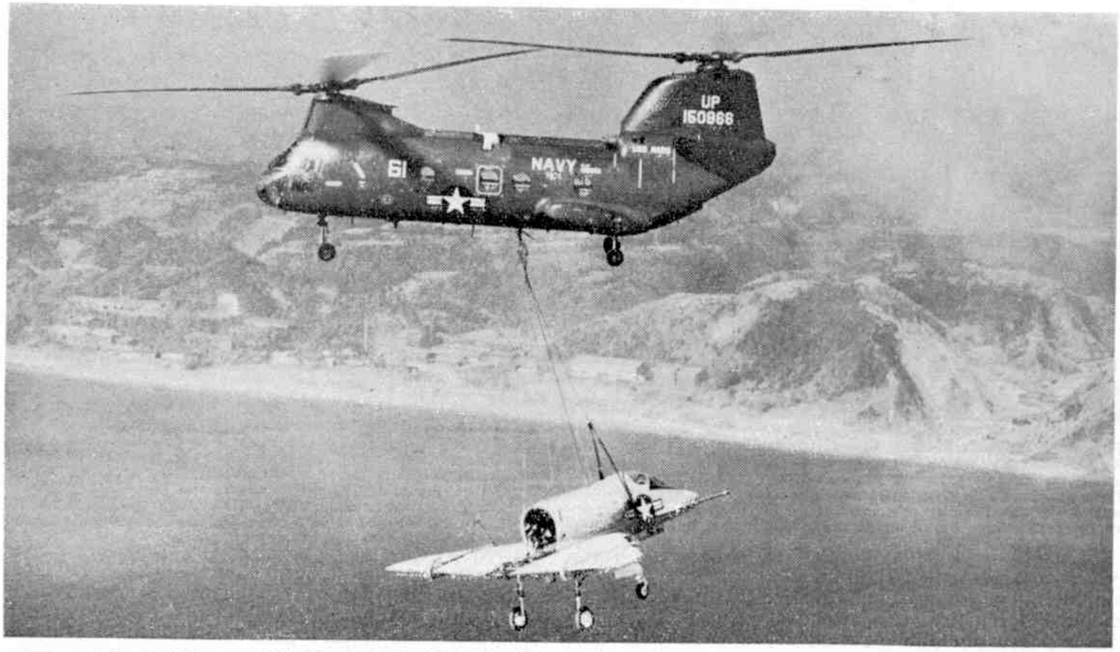
The model at the foot of the page is a Lambie 4-4-0 of the Caledonian Railway. It was one of these locomotives which took the West Coast record breaking train on the last lap of its run to Aberdeen in 1895. The livery is a fairly light "sky" blue, with much elaborate lining. Our cover picture of C.R. No. 123 gives a good idea of the Caledonian colour scheme.

pealed to a section of the public and the daily press, although many thought it a disgrace that public safety should be prejudiced for company prestige. The place very much in the public's mind during the racing was Kinnaber Junction, not far from Aberdeen. Here the East and West Coast routes joined, the remaining miles to Aberdeen being run over joint tracks, so whoever reached Kinnaber first was first into Aberdeen. The signal box at Kinnaber Junction was manned by a Caledonian (West Coast) man, and in the event of both trains being sighted at once (as they sometimes were) this individual had some quick thinking to do!

The climax of the racing came in 1895; in the August of that year the East Coast train ran the 485½ miles to Kinnaber Junction in 527½ minutes—an *average* speed of 55.2 miles per hour, but the West Coast train still reached Aberdeen first, with a tremendous average speed of 58.4 miles per hour from Euston to Aberdeen. Such performances required really slick engine changes at places like York; this operation was once performed in 2½ minutes! But the North Western/Caledonian alliance was determined to "nail" the East Coast Route once and for all, and the real climax came on the night of August 22nd/23rd, 1895. At the beginning of our story, we left the North Western compound *Adriatic* streaming north from Euston in a thunderstorm. She reached Crewe—158¼ miles from Euston—at 10.3 p.m. Here the train was taken over by the little "Jumbo" class 2-4-0 *Hardwicke*, which reached Carlisle at 12.35 a.m. By now, three hundred miles had been covered in 275½ minutes. At Carlisle, the Caledonian 4-4-0 No. 90 backed down swiftly on to the train, which left immediately to the cheers of crowds on the platform. After another two-minute stop at Perth, to change engines, the train reached Aberdeen at 4.32 a.m. 540 miles had been covered in 512 minutes—an average speed of 63.3 miles per hour! That record has never since been broken by steam power.

Many people, at the time of the "races," asked "Well, who won?" and this has never been an easy question to answer. Both sides put up some fantastic speeds, and the slick working required gave the railway companies much useful experience. Some memories of the races remain with us today: *Hardwicke*, which almost flew from Crewe to Carlisle on the night of August 22nd is, happily, preserved at the Clapham Transport Museum. North Eastern No. 1621, which was famed for its fast running from York to Edinburgh, has a home at York Railway Museum, and the famous Caledonian racing "single" No. 123 is also preserved, at the Glasgow Transport Museum.





AIR NEWS

by John W. R. Taylor

Doing things by halves

THE OLD maxim "Don't do things by halves" may be right for most situations, but, by disregarding it, U.S. naval forces engaged in the Vietnam war have saved hundreds of thousands of dollars.

Until a few months ago, every A-4 Skyhawk attack bomber which had passed through the repair centre at Sugita, Japan, had to be dismantled, shipped by barge to the naval air station at Atsugi and there reassembled for flight testing. The aircraft were sometimes out of action for 20 days after repair, which was serious since the ability of these little single-seaters to carry nearly four tons of bombs, rockets and missiles has made them some of the most potent weapons in the U.S. armoury.

Each Skyhawk is now divided into two sections, by detaching the rear fuselage and tail unit. Each half then makes the 16-mile trip from Sugita to Atsugi slung from the cargo-hook of a UH-46 Sea Knight helicopter, which can cover the distance in about 15 minutes. Reassembly is vastly simplified, and time out of service once the aircraft has been repaired has been cut to an average of four days.

Last year, the heli-lift enabled Skyhawks to put in a total of more than 1,080 additional days of combat flying than would have been possible if barges had still been utilised. As each day lost on the ground is calculated to cost the Navy about $318, the overall saving was more than $343,000.

Wide-track Wilga

Poland's PZL-104 Wilga utility aircraft has never won any prizes for sheer beauty, but it is highly practical and has been put into production in Indonesia as well as in its homeland.

The Indonesian version is known as the Gelatik (Rice Bird) and is powered by a 225 h.p. Continental 0-470 horizontally opposed engine. Latest Polish version is the Wilga 35, with a licence-built 260 h.p. Ivchenko AI-14R radial engine of Russian design and many improvements, including a wider undercarriage track to improve stability when taxying over rough ground.

The forward-inclined, L-shape legs of the new undercarriage gives the Wilga the impression of being about to leap into the air. This is no illusion, for it will take off with a full load of four people in only 120 yards, thanks to its full-span leading-edge slots and big slotted flaps. Cruising speed is 106-112 m.p.h.

The flyingest aeroplane in the world

Most modern airliners are designed to fly safely for a total of 30,000 hours before being retired or switched to less-strenuous duties. This is because every flight involves pressurising and depressurising their cabins, which might lead to metal "fatigue" and an accident if the aircraft continued to operate beyond their planned lifetime.

When the DC-3 was designed, more than 30 years ago, nobody bothered about such limitations. Pressurisation was unknown and unnecessary at the heights at which airliners then flew, and there was little likelihood of any aeroplane putting in so many flying hours that it would wear out before the time came to replace it. So people owning DC-3's have tended to keep on flying them, provided the regular, very thorough inspections show that the aircraft remain entirely airworthy.

One result of this is that there are still more DC-3's in airline service throughout the world than any other single type of airliner—well over 1,000 of them. Some of these aircraft have impressive totals of flying hours in their log-books, but none can compare with "Old 728," illustrated opposite.

Since this remarkable airliner first went into service with Eastern Air Lines in 1939, it has flown a total of more than 12 million miles, equivalent to 25 round trips to the Moon. Its present owners, North Central Airlines, retired it from scheduled service in 1966, by which time "Old 728" had logged the fantastic total of 83,032 hours, 52 minutes (well over nine years!) in the air. In 27 years, it had accumulated 260-million passenger-miles, which is like taking the whole population of New Zealand for a 40-minute flight, 21 persons at a time!

Pilots familiar with the record of this veteran DC-3 reckoned that it had undergone so much maintenance through the years that all that remained of the original aircraft was the serial number (N21728) and the shadow, but this is far from true, for about 90 per cent of the airframe is that which left the Douglas factory 29 years ago. However, "Old 728" did get through an estimated 550 main wheel tyres, 25,000 spark-plugs and 68 pairs of engines in its airline life, burning sufficient petrol in the process to run a family motor car 10,000 miles a year for 11,000 years.

Even today, this incredible aircraft is no museum piece. North Central have re-equipped it with what is probably the most luxurious cabin of any DC-3 in service and are using it as a flying laboratory to test new electronic equipment, safety aids and furnishings before they are installed in the company's latest airliners.

Half of an A-4 Skyhawk being transported by a UH-46 Sea Knight Helicopter in heading opposite, saves many thousands of dollars in Vietnam. Above top, the plushy interior of North Centrals "Old 728" DC-3 is being tested for other aircraft. Above, the Polish PZL-104 "Wilga," this aircraft can take-off in 120 yards, with four people aboard. Below, "Old 728" an ageing Douglas D.C.3 built in 1939, has flown more than 12 million miles, or 25 trips to the moon and back! In its 27 years, "Old 728" has used enough petrol to run a family motor car 10,000 miles for an estimated total of 11,000 years!

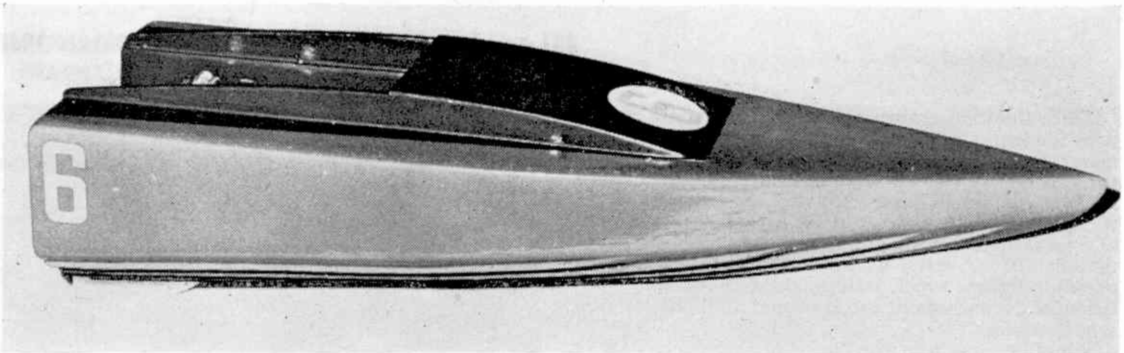
Fourteen Bells

If the El Tomcat Mk.IIIB helicopter looks a little familiar, this is not surprising, as it is basically a Bell Model 47-G2 with modifications to improve its efficiency for agricultural duties.

Standard Bells have, of course, been used for crop-spraying for nearly 20 years, but their chemical payload is restricted by the fact that their cabin is designed to carry three people. Continental Copters Inc., of Forth Worth, Texas, had the bright idea of evolving a simple modification scheme under which the original cabin is replaced by a much smaller and lighter, open-sided cab for the pilot. This reduces the aircraft's empty weight, enabling a heavier load of chemicals to be carried.

Known as the El Tomcat Mk. II, the original Continental Copters conversion flew in April 1959. Since then, the design has been steadily improved and the latest El Tomcat Mk. IIIB is probably the most efficient light aggie-copter in its class. The stubby nose houses two 600-watt landing lights. The cockpit has a filtered ventilation system to reduce the hazard of the pilot breathing in dangerous chemical spray. Fuel is contained in an aerofoil-shape tank above the engine bay, and the chemical tanks now take the form of neat, streamlined blisters fitting flush against the fuselage on each side. Normal power plant is a 235 h.p. Franklin 6V-350 engine.

Fourteen Bell 47's have been converted into Tomcats so far.



BABY DELTA

FULL SIZE PLANS AVAILABLE FROM THE EDITORIAL OFFICE

Why not build this easy to construct, semi-scale power boat racer? 12½" long for twin Jetex or Electric power.

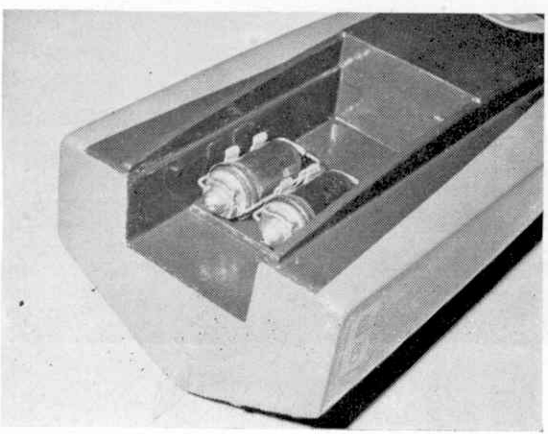
FOR THOSE of you who are used to the shape of ordinary model boats, Baby Delta must look quite revolutionary, and perhaps even wrong. Instead of a fairly blunt bow, the hull is almost arrow shaped with a pointed bow and the maximum beam well aft. In fact, it is patterned on the lines of a modern high-speed full-size power boat—the shape that wins offshore power boat races in any conditions, against any comers!

Jet powered

Since it is a *high-speed* hull, we need something lively in the way of power to push it along, so we have designed it for use with Jetex power—the bigger the Jetex unit the better! We have left the cockpit quite open, with the transom cut away for jet clearance, and it is big enough to take more than one Jetex unit side by side, if you wish. That should give you very high scale speed—and the hull is stable enough to take it, even if the water on your local pond is chopping up a bit.

Of course, if you prefer, you can adapt Baby Delta for more conventional power. That only means building in a 5 in. or 6 in. propeller tube and locating the motor between bulkheads 2 and 3. More about this later. Let's get Baby Delta built.

The twin Jetex 50C engines are a snug fit in Baby Delta. Remember these engines get very hot, so allow plenty of space between the cockpit side and the combustion chambers.



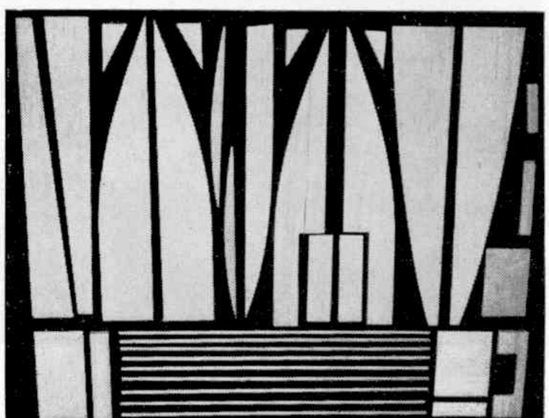
First, check the material list to see that you have all the necessary materials. Balsa wood is used throughout for the construction, except for a small piece of ply for the Jetex mount; a 16 in. length of 18 gauge brass wire for making the pulpit (you can omit this if you like, but it adds to the racy appearance); and a scrap of thin brass sheet for cutting out the rudder.

All the outline shapes of the various parts required are shown on the plan. The plan is reproduced half size here, so to make full-size patterns you must scale these drawings up to twice size. If you are working from a full-size plan (**available from Meccano Magazine offices, 13-35 Bridge Street, Hemel Hempstead, Herts; price 1/6d.**) you can trace the shapes directly, or, better still, cut out the patterns to pin or paste onto sheet balsa wood for cutting out.

Construction

You will notice that the pattern for the deck and chine shows only one half of the shape required. We suggest that you cut four of these *half* shapes and then cement them together in pairs. You can cut these economically from a 3 in. wide sheet of ¼ in. balsa. Note that the chine and deck panels are identical in outline shape, but the deck has an additional piece cut out to form the cockpit. Next cut bulkheads 1, 2 and 3

All of the parts required to construct Baby Delta. It is better to cut the parts and number them before you commence construction. Use soft, lightweight balsa for all components.



BABY DELTA

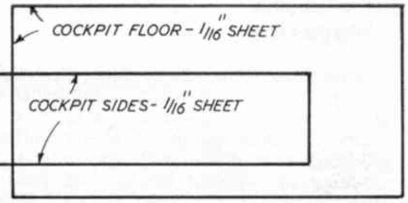
A $12\frac{1}{2}$" LONG OFFSHORE POWER BOAT RACER FOR ONE OR TWO JETEX ENGINES. SIMPLE CONSTRUCTION, CAN BE ELECTRIC MOTOR POWERED IF DESIRED.

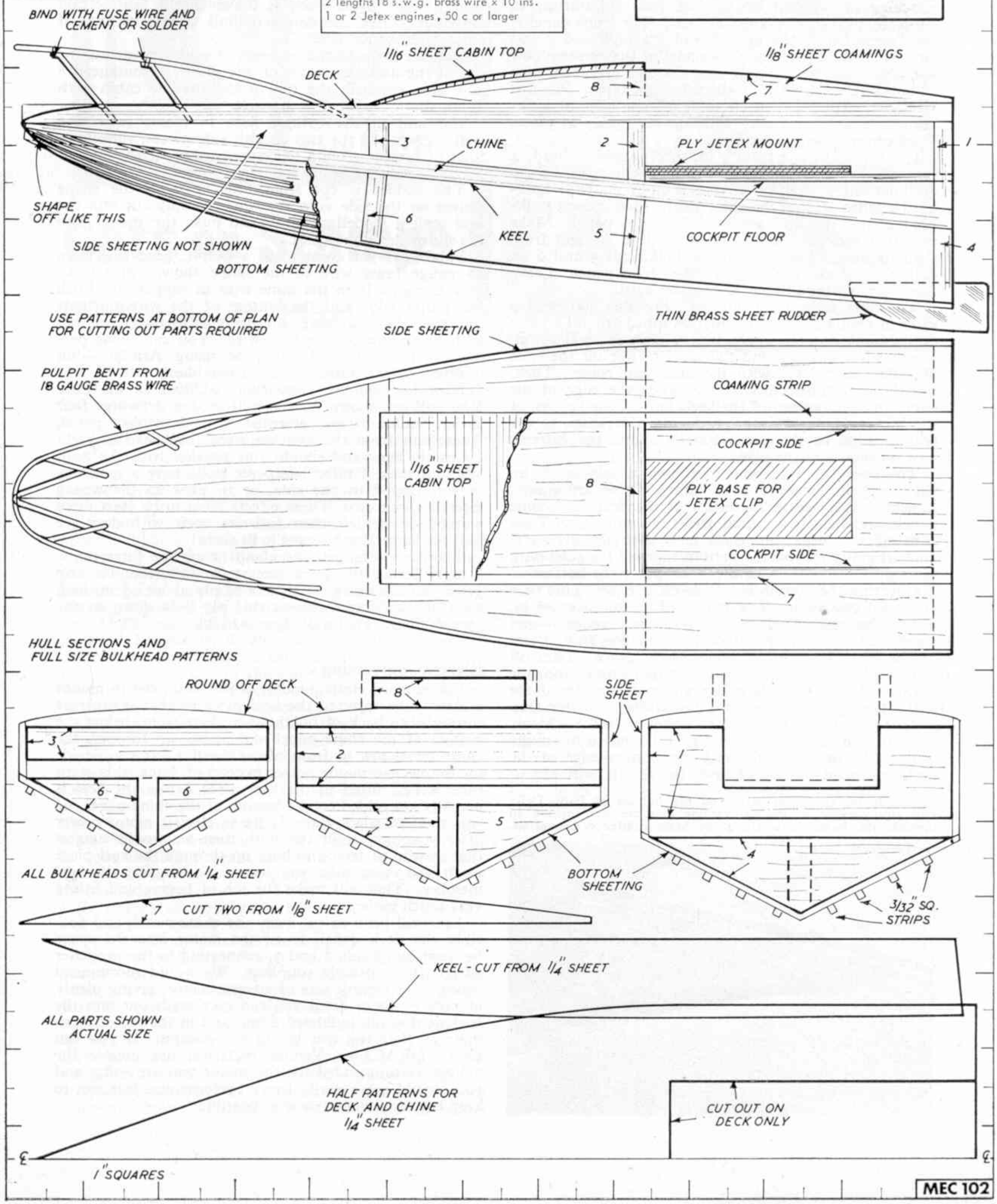
MATERIALS LIST

1 sheet	1/16"	x	3"	x	36"	med. balsa
1 sheet	3/32"	x	3"	x	36"	med. balsa
1 sheet	1/4"	x	3"	x	36"	soft balsa
4 strips	3/32"	x	3/32"	x	36"	hard balsa
1 sheet	1/8"	x	2"	x	4"	plywood

2 lengths 18 s.w.g. brass wire x 10 ins.

1 or 2 Jetex engines, 50 c or larger





MEC 102

—again from $\frac{1}{4}$ in. sheet. Note that these (and all the other parts) are assembled in the order of the numbers they have been given—1, 2, 3, etc.

Lay the deck panel on a flat surface and cement bulkhead 1 in place with the cut-out in bulkhead 1 matching the cut-out in the deck (you are starting to build the hull upside down in fact). The chine panel is then cemented to the top edge of the bulkhead 1 and directly to the tip of the deck panel at the extreme bow —but first you will have to chamfer off the bottom edge of bulkhead 1 slightly to allow for the taper. Pin this assembly in place, then chamfer off one edge of bulkheads 2 and 3 until they will slip accurately in place. Then cement them in position.

Cut the keel piece from $\frac{1}{4}$ in. sheet; also bulkheads 4 (one off), 5 (two off) and 6 (two off). Chamfer the top of bulkhead 4 slightly so that it lines up with bulkhead 1 when laid on the chine panel, then cement bulkhead 4 and the keel piece to the chine panel. Make sure that you get the keel lined up dead straight from stem to stern. Then cement on bulkheads 5 and 6 on each side of the keel, and to the chine panel. Leave this assembly for an hour or so to set hard.

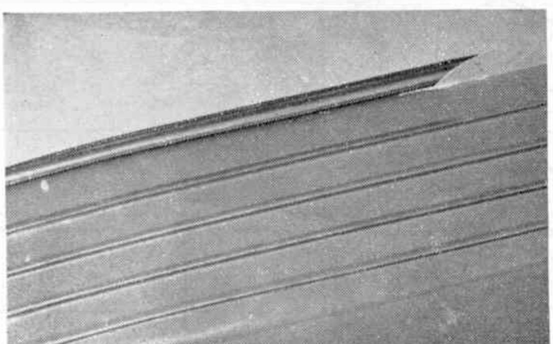
The next stage is fairing off. For this you need a piece of medium fine sandpaper wrapped around a piece of balsa block or a spare length of 3 in. wide $\frac{1}{4}$ in. sheet. First sand around the sides to fair off the ends of bulkhead 3 level with the deck and chine. Then, using the sanding block laid between the edge of the chine and the bottom of the keel, fair off the bottom of the hull along its length, producing a V shape to the bottom edge of the keel. Finally shape the extreme bow, as shown on the plan.

To cover the sides you need two panels of $\frac{1}{16}$ in. balsa $13\frac{1}{2}$ in. long by 2 in. wide. These are simply cemented in place to the edges of the deck and chine panels and held in position with pins until set. Then trim off surplus $\frac{1}{16}$ in. sheet level with the deck and chine. Finally fair off the bottom edges of the sides with sandpaper to conform to the V shape of the bottom.

Covering the bottom is a little bit trickier. This time you need two 13 in. long panels of $\frac{1}{16}$ in. sheet $2\frac{1}{2}$ in. wide. Pin one panel in place—do not cement—and check that it fits snugly all along the chine and bottom of the keel. If satisfied, cement it in place. Trim off any overlap when set—the tricky part being to trim the bottom edge in a straight line along the length of the keel. You will have to use a modelling knife for this.

Now *lay* the other bottom panel in place. Mark, roughly, the line to which it has to be cut to fit snugly against the other panel along the bottom edge of the keel, and trim to this. Check for fit. It will almost certainly need further trimming, so do this until you are satisfied with the fit obtained. Then you can cement this second bottom panel in place.

The 3/32 in. sq. spray strips on the bottom of Baby Delta hull run parallel to the centre line and are not tapered in towards the bow. Note the sheet brass rudder cemented in.



Once more use the sanding block to smooth off the hull sheeting, and any other rough spots. At the same time, round off the deck as shown in the hull section drawings. Give the complete hull a coat or two of clear dope at this stage.

Cut the two coaming pieces 7 and cement to the top of the deck, as shown on the plan. Fit bulkhead 8 and then cover in the top of the shallow cabin with $\frac{1}{16}$ in. sheet.

Cut and fit the cockpit floor in place, cementing well. Then add the two cockpit side pieces, running a fillet of cement around the bottom edges of the cockpit floor to produce a really watertight joint.

The rudder is cut from thin brass to the shape shown on the side view drawing. Simply cut into the keel with a modelling knife and push the rudder into the slit made by the knife.

Finally, if you want to fit a pulpit, bend this from 18 gauge brass wire to the shape shown; also make four uprights from the same wire to support it. Push the pulpit ends and the bottom of the wire uprights into the deck and secure the uprights to the pulpit rail with a binding of fine fuse wire. You can make permanent joints by soldering, or using Araldite—but ordinary balsa cement will do, if you like.

Now for one very important addition to the hull. You will see shown on the hull section drawings four $\frac{3}{32}$ in. square strips cemented to each bottom panel. These run from the extreme stern (bulkhead 4) right up to the bow and should run *parallel* with the hull. Without these " rails " deep-vee hulls have a tendency to run tipped to one side, or to bank in the wrong direction in turns. These effects seem to be even more marked on models than full-size craft with deep-vee hull sections. Don't forget to fit them!

There is nothing tricky about fitting the Jetex units. Simply secure the Jetex mount (to suit whatever size Jetex you are using) to a piece of ply about $2\frac{3}{4}$ in. long by 1 in. wide and cement this ply base down to the cockpit floor. That's all there is to it!

Electric conversion

For inboard electric motor power you need to mount a stern tube through the keel piece so that it emerges through the back of bulkhead 4 about $\frac{1}{2}$ in. below the bottom of the chine panel and passes up through the chine panel just in front of bulkhead 2. If you decide to use electric motor power instead of Jetex, this stern tube is best fitted to the keel piece *before* the keel is actually assembled on the bottom of the chine panel. If you want to adapt Baby Delta to electric motor power *after* you have built the hull, then we would suggest that instead of trying to bore up through the keel piece to fit the stern tube you locate it *alongside* the keel member. This will make the job of boring and fitting very much easier.

You will have to cut away the chine panel, and possibly the deck panel, to fit the motor into the space between bulkheads 2 and 3, connecting to the propeller shaft with a flexible coupling. We would recommend fitting a reasonable size of electric motor, giving plenty of power. Once fitted you can take leads out into the cockpit through bulkhead 2 and seal in the motor completely. Batteries can lay in the cockpit. If you can afford DEACs or Venner batteries, use *double* the voltage recommended for the motor you are using and you should get a really lively performance, but aim to keep battery *weight* as low as possible.

Cats on Stamps

by James A. Mackay

IT IS strange to think that the domestic cat, probably the commonest and most familiar of animals throughout the world, was the least represented on stamps until three years ago. You would have been hard put to it to find more than a dozen examples of *Felis domestica*—to give it its scientific name—and in every case you would have had to look closely to find the cat tucked away in a corner of the design.

One of the earliest cat stamps was an airmail issued by Spain in 1930 to commemorate the solo trans-atlantic flight of Colonel Charles Lindbergh in 1927. The stamp portrays Lindbergh and shows his mono-plane *Spirit of St. Louis* beside the Statue of Liberty. In the bottom right-hand corner of the stamp, however, is a tiny black kitten—Lindbergh's companion and mascot. Cuba celebrated the golden jubilee of the Young Helpers' League by issuing a stamp in 1957 which depicted a boy fondling a cat. A boy holding a kitten was featured on one of the stamps in the Dutch Child Welfare set of 1952. Luxembourg showed a cat on one of the Animal Protection stamps of 1961.

Cats in folklore have also been represented on stamps. In 1959 Hungary issued a series of stamps depicting various fairy-tale characters. The 30f. stamp showed the Sleeping Beauty—and, peeping round the foot of the bed, you will see a black cat. The following year Hungary issued a second fairy-tale series and this time Puss-in-Boots himself appeared on the 60f. stamp. West Germany issued a set of Child Welfare stamps in 1961 depicting scenes from the tale of Hansel and Gretel. Two of the stamps, the 10pf. and 20pf., show the wicked witch and her black cat. Belgium's anti-T.B. stamps of 1959 featured various local festivals and carnival scenes; the 3fr. depicted the town jester of Ypres in fancy-dress and holding a cat.

One or two "strays" may be found on stamps depicting works of art. East Germany issued a set of stamps in 1959 showing famous paintings in the Dresden Art Gallery. The 10pf. stamp featured Gabriel Metsu's "Portrait of a Needlewoman" and her cat appears beside her in the picture. Belgium's 1960 anti-T.B. set featured various arts and crafts, and the top value, devoted to ceramics, showed a porcelain cat.

Most of the types of domestic cat now in existence today are descended from the African wild-cat which the Egyptians succeeded in taming five thousand years ago. Cats were imported into Italy from Egypt by Phoenician traders and the Romans took cats with them wherever their empire spread. A Roman terra-cotta figure of a cat appeared on one of the stamps in the Dutch Cultural Welfare series of 1962.

These were about all the cat stamps that could be assembled by 1964, but in that year Poland brought out a magnificent set of ten large stamps featuring various types of European, Siamese and Persian cats. This was the sequel to a popular set featuring dogs, released the previous year, and it was also very well received by collectors. This encouraged Roumania and the Kingdom of Yemen to produce colourful cat sets in 1965. The Roumanian series consisted of eight multicoloured pictorials showing a wide variety of animals. They ranged from a tabby (5b.) and a ginger tom (10b.) to the more exotic White Persian (40b.) and the haughty Siamese (1l.35), kittens at play, with a shoe (55b.) and a ball of wool (60b.) show that cats are cats, no matter which side of the Iron Curtain they live on. The Yemeni series depicted three different kinds of Persian cat—the Black, the Cream and the Silver Tabby, as well as the Tortoiseshell, the Red Tabby and the Seal-Point Siamese. The latest series exclusively devoted to cats also hails from Arabia. On November 2nd last year the Arab sheikhdom of Fujeira issued a set of seven stamps featuring a Seal-Point Siamese, a Red Tabby, a Tortoiseshell, a Long-Haired Black, a Silver Tabby, a Chinchilla and a Maine Coon.

Holland's Cultural Welfare set of 1964 depicted three kittens on the 12c. stamp. Albania released a set of stamps in February 1966 depicting various farmyard animals and a cat was featured on the 50q. stamp. Later in the same year Albania followed this up with a set of seven stamps devoted to various kinds of cat. Four of the stamps showed Persian cats, while the remaining three featured a tabby, a kitten and a Siamese respectively.

Finally, mention must be made of the stamp issued in 1965 by Yugoslavia to mark Children's Week. It was designed by a schoolgirl, Miss D. Grbic, and showed a black cat, sitting up and giving that arch look which only cats know how to give.

Simple Home Chemistry

WHAT METAL IS IT?

"Boffin" concludes this section of Chemical Identification started last month

A VAST number of powdered, crystalline and "solid" substances are compounds of *metals*. Also, many metallic salts dissolve in water and so you can have solutions which are, in effect, partly composed of metals. In many cases metals can be "recovered" direct from such solutions as solids. In other cases, getting back to the basic metal can be extremely difficult.

Here is a very simple experiment to demonstrate *metal* recovery. All you need is some copper sulphate crystals, a beaker or jam jar, and an ordinary penknife. Add about a teaspoonful of copper sulphate to a cupful of water in the beaker and stir until completely dissolved. It does not matter if you still have some crystals remaining undissolved. The main thing is to make up a nice strong solution which will be blue in colour.

Into this solution dip the blade of a penknife, and hold it submerged. If the knife blade is greasy, clean it first with a little detergent. In a matter of a minute or so the part of the knife blade immersed in the copper sulphate solution will turn copper coloured. The iron of the blade has, in fact, reacted with the copper sulphate solution to deposit out pure copper on the blade—a true copper plating, in fact.

Now try another experiment with the remaining copper sulphate solution. Drop a teaspoonful of zinc dust into the solution and stir. Once again the copper will be displaced as the zinc is dissolved. The solution will lose its colour and red particles of copper will be deposited out on the bottom of the beaker.

There are several ways in which the "metal" content of a powder or solid can be identified directly. One of the simplest is to pick up a scrap of powder, crystal, or solid and hold it in a clear gas flame. If the flame turns bright yellow, the powder contains the metal sodium (try common salt, which is a compound of sodium and chlorine). Now try a crystal of copper sulphate held in the flame. This will colour it blue or blue-green. If you have a strontium salt in your stock of chemicals (such as strontium nitrate), this will colour the flame crimson red.

Other metallic salts will also produce characteristic colours when heated in a flame. The effect is weaker than any of the three above though, and may be masked by yellow discoloration if a sodium salt is present as an impurity. In case you want to check, here are the metals whose salts will produce a coloured flame in addition to those already mentioned: Barium compounds—a yellow-green flame; boron compounds (e.g. boracic acid)—a green flame; calcium compounds (e.g. chloride of lime)—a dull red flame; lead compounds (e.g. red lead)—a weak blue flame; potassium compounds (e.g. potassium nitrate)—a weak violet flame (almost always masked by the flame from sodium impurities); zinc compounds (e.g. zinc oxide)—a weak green flame.

To extend the range to tests for other metals, the *borax bead* test should be used. For this you need some ordinary borax powder and a piece of iron wire which is bent into a loop at one end about one eighth of an inch in diameter (no larger). Since you need to heat the wire, bind it with thin wire to a suitable handle for holding, such as a short length of dowel.

Pour a little borax on to a tin lid or an asbestos mat. Heat the loop end of the iron wire in a gas flame until it is red hot, then dip it into the borax. Carry the borax you have picked up on the loop back into the flame and heat until it melts into a uniform bead. If necessary, dip back into the borax powder again to pick up more borax until you have built up a bead of reasonable size.

Now put just a pinch of the compound you wish to test on the asbestos mat and, whilst the bead is still hot, touch the compound so that just a small particle is picked up on the bead. Carry the bead back into the flame and heat strongly. If the compound is that of any of the six metals listed below it will cause the bead to turn a distinct, bright colour, positively identifying the metal concerned.

There is one important point, though. With several of the metals the colour given to the bead will depend on which part of the gas flame the bead is heated in. If heated by the *tip* of the flame, the flame is said to be *oxidising*. If the bead is held in the *middle* of the flame, then the flame is said to be *reducing*. You can check this by trying two test beads and a copper compound (e.g. copper sulphate again) heated in the two different parts of the flame. In the *oxidising* flame the bead will turn blue, and in the *reducing* flame the bead will turn red.

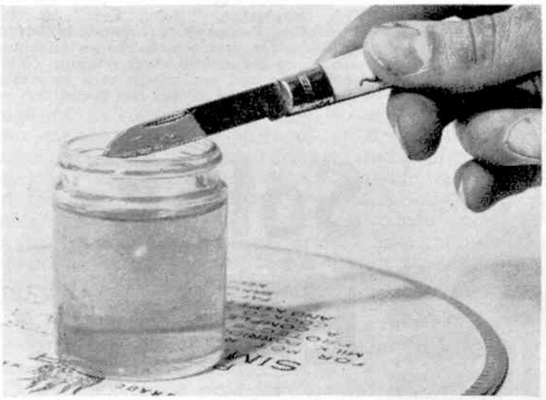
Here is a complete check list for metals you can identify by the borax bead test.

Metal (compounds)	Colour of bead when heated in Oxidizing flame	Reducing flame
Cobalt	deep blue	deep blue
Copper	blue	red
Chromium	green	green
Iron	yellow	green or yellowish green
Manganese	reddish brown	colourless
Nickel	reddish brown	opaque grey

Do you see a way of distinguishing between a manganese salt and a nickel salt by the borax bead test? Both heated in the oxidising flame will give a reddish-brown colour to the bead. If the test is repeated with the bead heated in the reducing flame, the bead will be colourless if manganese is present, but will turn grey if nickel is present.

Of course, for each test you must make a new borax bead. Just tap the old bead off the wire whilst it is still hot and start again.

For a further series of tests on metals we need a charcoal block and a blowpipe. A small hollow is scooped out of the surface of the charcoal block and a little of the substance to be tested put in the hollow. The blowpipe is then used, together with the gas flame, to direct a very hot flame on to the substance, but be sure to position the blowpipe so that the heating is done with the *tip* of the flame (i.e. an oxidising flame).



Heating will produce a residue around the small hollow in the charcoal block, the following results observed identifying the various metals listed.

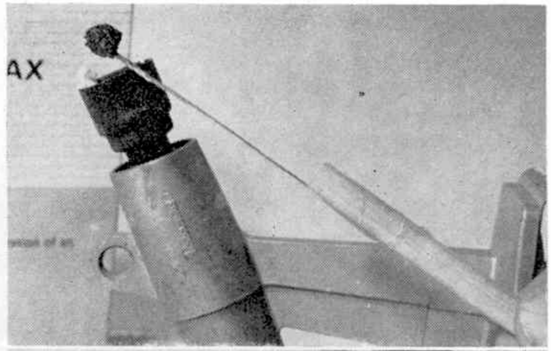
Residue	Metal identified
White and dispersed, with a smell of garlic	Arsenic
White, not dispersed	Antimony
Dark orange, lighter orange when cool	Bismuth
Dark yellow, yellow when cold	Lead
Dark yellow, yellow-white or white when cold	Tin
Yellow, white when cold	Zinc

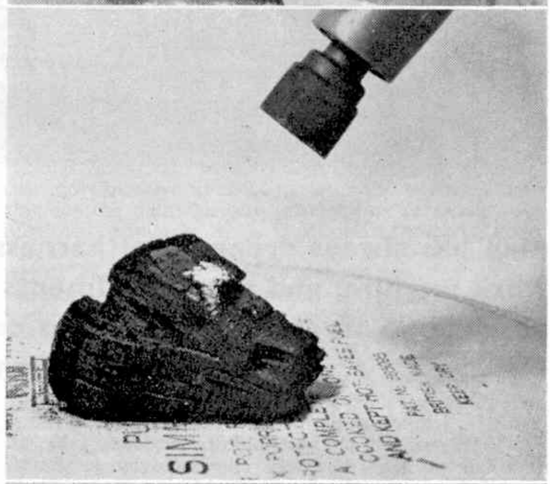
In case of doubt, or with no identifiable results, moisten the residue with cobalt nitrate and reheat strongly.

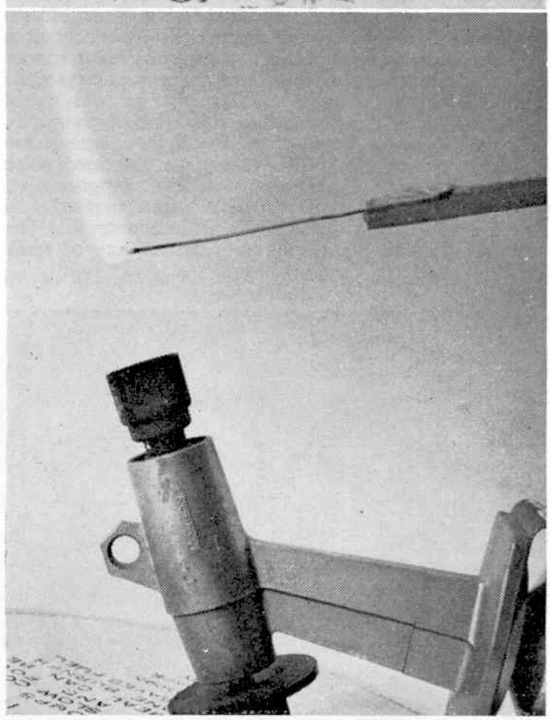
Colour of residue	Metal identified
Dirty green	Antimony
Blue-green	Tin
Grass-green	Zinc
Pink	Magnesium
Blue and powdery	Aluminium

Now here is a positive method of identifying lead, tin, or silver. Scoop out another hollow in the charcoal block, mix the substance with a little powdered sodium carbonate and heat with the tip of the blowpipe flame. In the case of salts of any of the three metals mentioned, the end result will be a metallic bead of that metal formed in the hollow. You can identify *lead* by the fact that the bead is soft and will mark paper if rubbed across it. A tin bead will also be soft, but whiter in colour and will not mark paper. A silver bead will also be soft and malleable, but will blacken if moistened and then rubbed on some sulphur. Remember to let these metallic beads cool right down before you try to handle them!

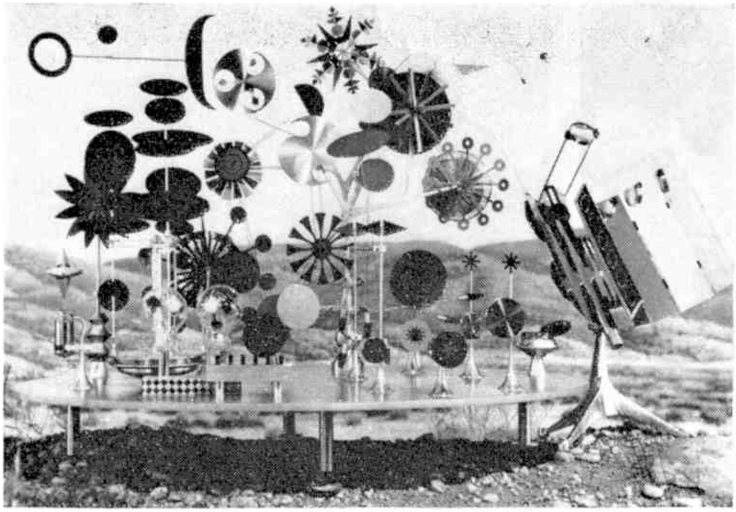
Other metal salts heated with sodium carbonate in the same manner will produce different results: bismuth compounds will give a brittle white bead; copper compounds will give a spongy red mass; iron compounds will give a grey mass which is attracted by a magnet.







Above, a simple method of Copper plating. A steel knife blade dipped into copper sulphate solution will become coated with a thin layer of Copper. Top right, forming a Borax bead, by dipping a wire loop into Borax powder and heating with a blow-torch flame. Centre, testing metals with a flame. The charcoal used is the type sold for barbecue fuel. Note how the heated powder or crystals change in colour. Right, a simple test for presence of metals in salts, etc., is to heat a little of the substance in a gas flame. Certain metals can be identified by the colour they give to they flame. See table on opposite page for colour information when flame heated and metal compounds.



This imaginative "Solar Toy" by the Aluminium Company of America is driven by the sun's rays which charge selenium cells in an aluminium sheet reflector. The wheels spin and crankshafts turn to create a display of motion and sound.

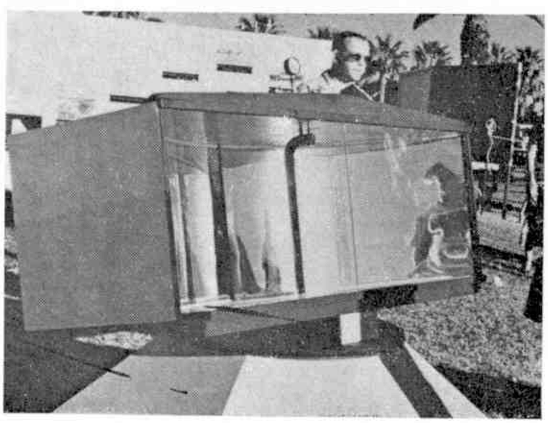
Solar Energy

by H. McDougall

Man has always dreamed of harnessing the enormous heat of the sun to work for him, and the experiments reported here show that this is now possible. A large number of uses can be made of the sun's great power, from the distillation of water to cooking.

IF THE power of the sun could be exploited fully, all water shortages could be eliminated by desalinisation of the oceans, the deserts could be made to bloom, and most forms of power now used would become obsolete. Contrivances aimed at harnessing solar energy now intrigue inventors in almost every country in the world.

On the completely arid Greek island of Symi, 25 miles northwest of Rhodes, an American company has erected the world's first commercially operated solar distillation plant. Glass, or plastic film, supported on an aluminium structure, forms a solar-operated still that evaporates salt water and then condenses it. The still has become the towns' principal source of fresh water.



Solar furnace, such as the one installed at Mount Louis in the French Pyrennees, employ mirrors focused to a specific point to generate intense heat uncontaminated by any kind of fossil fuel.

Solar energy can also be used for refrigeration—a natural application because it is required most where the sun is hottest.

At the University of Florida, experiments now being conducted are aimed at using solar energy to provide air-conditioning. The hotter the sun, the greater the flow of cooling air that would be produced.

The potential heat gain from the sun can be calculated by digital computers, but a sound basic knowledge of the effects produced by the sun is the first essential and the Canadian National Research Council has become a primary source of this knowledge.

The Meteorological Branch of the Canadian Department of Transport publishes the measured values of solar radiation falling on horizontal surfaces at about twenty stations spread across Canada. This information relates only to radiation coming directly from the sun and radiation diffused by the atmosphere. To calculate total insolation (solar radiation received) the information must be complemented by simultaneous measurement of the direct solar beam. This measurement is taken at the National Radiation Centre at Scarborough, Ontario, and is used throughout the world.

Canadians are taking a more positive role in solar research by operating the Brace Research Institute of McGill University, St. James, Barbados. An entire

A solar engine is driven by the sun's rays condensed by this large reflector, designed by Jack Hedger of Lakeside, California, U.S.A.

laboratory is devoted to the exploration of solar and wind energy in countries where fossil fuels are non-existent or expensive.

Activities at the laboratory include development of instruments for measuring daily values of solar radiation, investigations of methods of drying fruit and vegetables using sun-heated air, and studies of potential uses of solar distillation to produce potable water. One of the projects under development is a solar-powered stove for boiling foods. Many successful portable cookers have already been devised using umbrella-shaped reflecting surfaces to concentrate the sun's rays at the point where the food is placed but, although technically successful, they require some skill to operate. They must be moved about every 15 minutes to keep the collector pointing at the sun, and this also involves moving the cooking pot.

To eliminate the need for constant adjustment and focusing, a task which cannot be taught to primitive peoples without considerable effort, the Brace Institute has developed a cooker that will operate unattended, although only during those parts of the day when the sun is nearing its zenith. In Barbados, it begins to operate by 9 a.m. but cannot be used after 3 p.m.

The cooker uses a solar collector with a simple reflective surface made from household aluminium foil glued to curved hardboard. Solar radiation is reflected on to a finned tube at the focus. One end of the tube is sealed. The other end leads upward to a double-boiler type of cooking pot.

When water in the tube reaches boiling point, bubbles rise in a continuous stream to the cooking pot. The water surrounding the inner pot never quite boils, so cooking is slower than it would be in a saucepan over a hot flame. But various foods such as potatoes, yams and beans have been cooked satisfactorily and there appears to be no technical reason why the cooker would not prove useful to peasants in India and other underdeveloped countries.

Solar energy provides the obvious solution to the problems of generating power in space, or on the surface of the moon and other planets. At Denver, Colorado, a large concentrator is already being used to provide heat for various types of power unit being considered for space use. It is operated as part of a programme to devise power systems capable of developing 15 to 75 kilowatts in space.

Solar cells made from selenium or silicon can be used to tap the sun's energy. Light falling on the cell generates a minute amount of electricity. Almost all satellites use solar cells to power their radio transmitters.

A square yard of flat land receives about 1,000 watts of power from direct sunlight. Covered with modern solar cells, this would yield a constant 150 watts of electrical energy—sufficient to power a television receiver.

Telephone companies employ solar cells to power booster amplifiers on long-distance lines; coastal services use them to power flashing lamps on channel buoys. An Emergency Call System installed on portions of the Los Angeles Freeway uses solar-powered radio transmitters to enable motorists to communicate with police headquarters.

The amount of power generated depends solely on the number of cells used. As an experiment, one U.S. company assembled 10,640 cells onto a 26 square foot panel and used them to charge batteries powering an electric automobile.

An elementary solar cell is in use in "electric eye" movie cameras. Sunlight falling on the cell generates sufficient power to adjust the diaphragm of the camera.

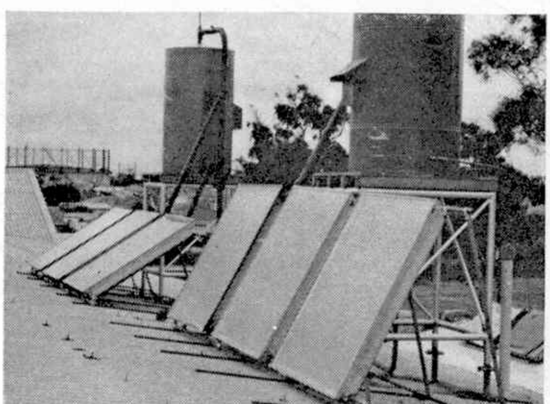
Solar distillation of sea-water, although practical, is still too expensive in most parts of the world. Financing for the plant already in operation in Greece was furnished primarily by a U.S. philanthropist. Daily output is only about one gallon per day per ten square feet of solar-operated surface and the high cost of such installations would prevent their use in many parts of the world where they are most needed.

Solar refrigeration and air conditioning hold greater promise. Australia, which must make living conditions comfortable to attract people to the arid areas away from the coast, is taking a particularly active interest in this phase of solar energy experimentation.

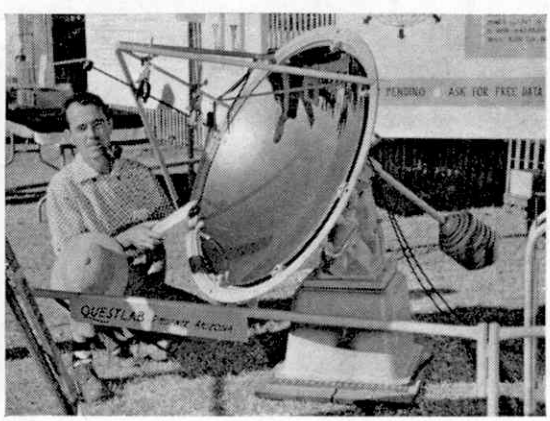
Solar-powered water heaters for domestic use are already employed in many parts of the world but they cannot, as yet, compete on an industrial scale with large, efficient oil-fired heaters. Solar-powered air heaters used for drying and other agricultural uses have already proven successful but the season during which they can be used is too short to justify the capital outlay required for efficient installations.

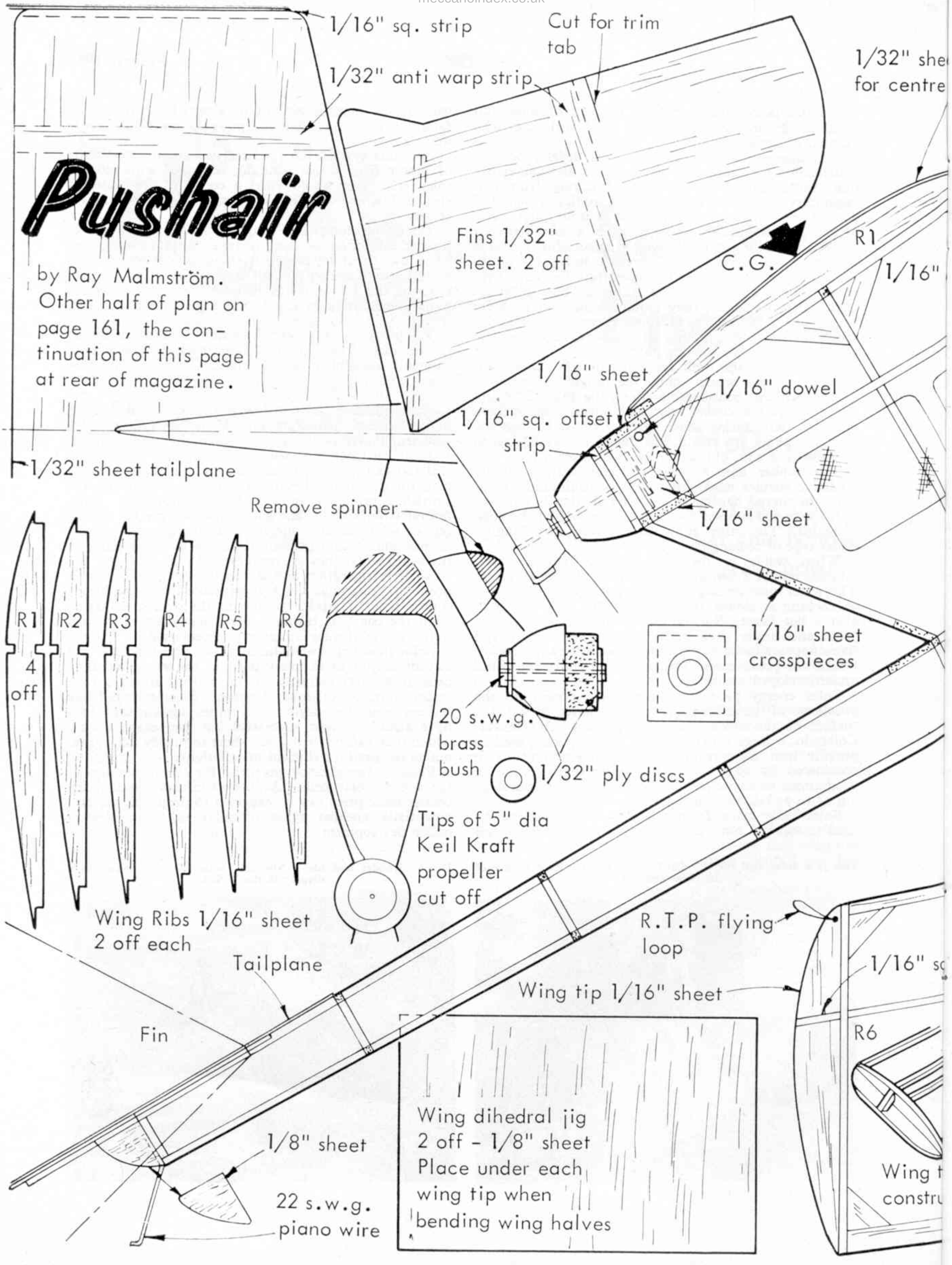
Possibly the greatest potential for the future lies in the use of solar cells. As the quantities required increase, their price can be expected to drop. Newer and potentially cheaper types of solar cells are already under development.

This is a solar still for the distillation of water fixed to a roof in New Zealand.

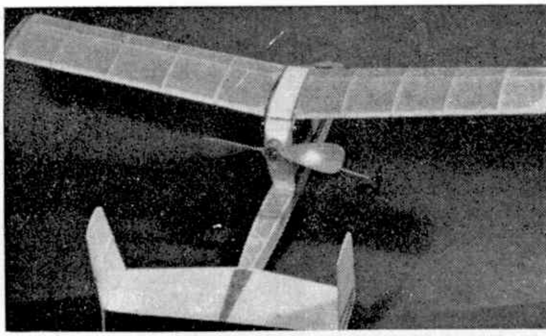


Dr. V. Rhodes and his "Novoid" solar powered engine at a display in the U.S.A.

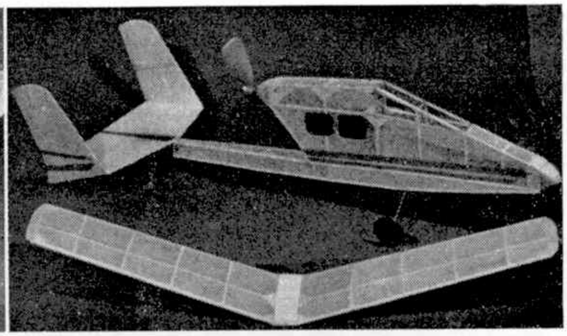




Pushair
by Ray Malmström.
Other half of plan on page 161, the continuation of this page at rear of magazine.
1/16" sq. strip
Cut for trim tab
1/32" anti warp strip
1/32" she
for centre
Fins 1/32" sheet. 2 off
C.G.
R1
1/16"
1/16" sheet
1/16" dowel
1/16" sq. offset strip
1/32" sheet tailplane
Remove spinner
1/16" sheet
R1
R2
R3
R4
R5
R6
4 off
1/16" sheet crosspieces
20 s.w.g. brass bush
1/32" ply discs
Tips of 5" dia Keil Kraft propeller cut off
Wing Ribs 1/16" sheet 2 off each
R.T.P. flying loop
Tailplane
1/16" sq
Wing tip 1/16" sheet
R6
Fin
Wing dihedral jig 2 off – 1/8" sheet Place under each wing tip when bending wing halves
1/8" sheet
22 s.w.g. piano wire
Wing t
constru



Pushair completed. Note how the model is pushed along by the propeller rather than pulled along in the conventional manner. Do not forget to trim the propeller blade tips.



The finished model disassembled. The wing is retained by rubber bands looped over dowel rods. Decorate your Pushair with coloured tissue strips instead of colour dope.

Your full size free plan PUSHAIR

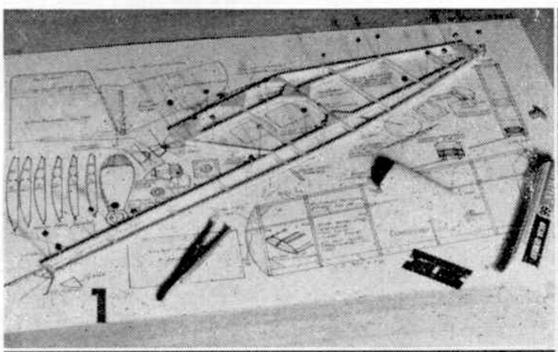
A 15½" wingspan rubber powered free-flight pusher layout model specially developed for Meccano Magazine readers by Ray Malmström. Follow the step by step photo building instructions for the correct building sequence. Flying notes and more photos on page overleaf.

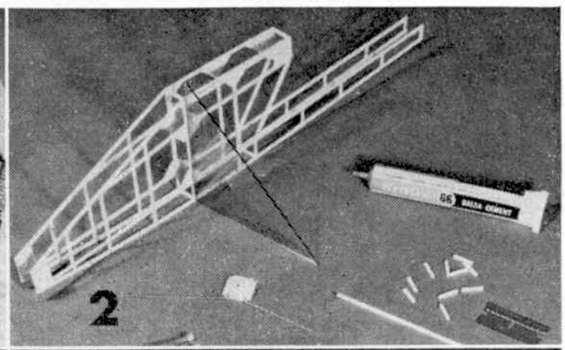
1 Rub a candle over plan of fuselage and build fuselage sides on top of each other. When dry remove from plan and separate " carefully " with a sharp single edge razor blade, being careful not to cut into the wood.

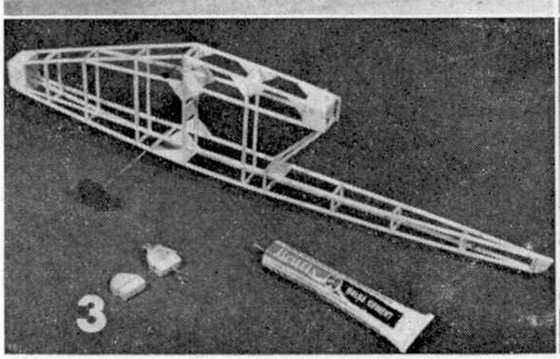
2 Join sides with centre top and bottom cross pieces first. Check that they are square then add rmaining cross pieces. Bend undercarriage wire to shape, fasten to mount with tape and cement for a firm joint.

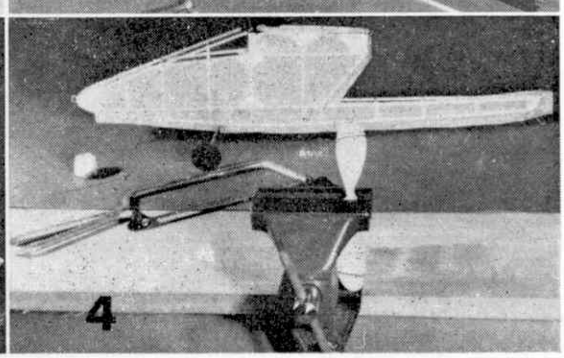
3 Cover cabin with very thin celluloid sheet. Hold in place with pins until set. Cut nose block in two and form wire hook. Cut groove in one half for wire then recement together making sure the wire is free.

4 Cover fuselage with lightweight tissue. Trim off excess with a razor blade. Remove spinner portion of 5 in. dia. Keil Kraft propeller, hold in vice and cut off tips, sand smooth and balance well.









THERE ARE a lot of aeromodellers who think that models which are different, out-of-the-rut, or unusual (pushers, canards, deltas, etc.), are more difficult to trim and fly than the run-of-the-mill, " wing on top, prop at the front " type. This attitude, besides being quite *untrue*, results in the hobby being far less exciting, imaginative and forward-looking than it could be. In aeromodelling, as in so many other worthwhile activities, variety is (or should be) the very spice of life. If you are one of those who like a little spice in your aeromodelling, spend a few hours on this little job. *Pushair*, built and powered according to the plan, should need no flight trimming at all to obtain a satisfactory flight. Even our conventionally minded brothers cannot do better than that!

The full-size plan and photo-stages will give you all the information you need. The usual advice, of course, applies: build accurately, avoid warps and balance carefully.

Flying notes

As always, choose a calm day and soft grass for first tests (though with a pusher you are hardly ever likely to break a propeller!). With motor unwound, launches from shoulder height (a gentle push forward; avoid any tendency to throw the model) should produce a straight glide of up to 25 ft. before touch-down. Satisfactory? Good. Now wind on about 250 turns (80 turns approximately on a 3 : 1 geared winder). Remember to wind the propeller in an *anti*-clockwise direction—you have a pusher on your hands! A gentle climb, a short cruise and a good glide should result. If all has gone well—and it should—you can steadily step up the turns, on well-lubricated rubber, to 850 (the rubber will take it!). Here, incidentally, a tip. When the motor has been wound by a winder, add 50-75 turns *by hand* before launching. The hand turns give you that extra " zip " for a good climb. O.K.? Duration? Well, on a 16 in. loop of $\frac{1}{8}$ in. strip, it isn't in the Wakefield Contest class, that's for sure. Flights of 25 seconds are common, rock-steady with three-pointer landings when the surface is smooth. Our best flight to date is 32 seconds. You can probably beat this—it shouldn't be difficult. As a bonus, *Pushair* flies very well round-the-pole indoors—something new for those indoor winter club meets.

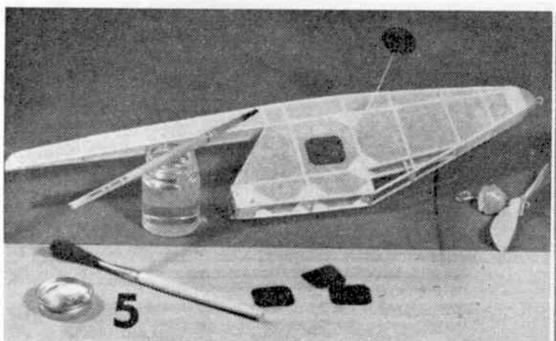
Finally, a couple of suggestions for the adventurous. Why not scale up *Pushair* by half to 24 in. span? (Fit a 6 in. diameter propeller, preferably a wide-blade, free-wheeling job). Performance should be most rewarding. Secondly, if you really want to go places, how about beefing construction a little (keeping span to 24 in.), and fitting the great little Cox .010 engine—it will run backwards quite easily. Well, it's an idea! Put a little spice in your aeromodelling!

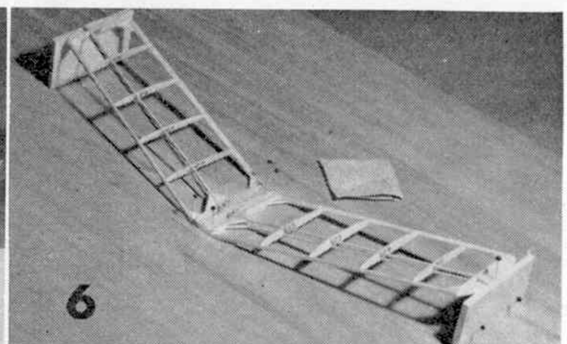
5 **Water shrink fuselage covering; when dry apply one coat of clear dope. Dope black tissue windows in place. Bend propeller drive shaft, assemble as plan and apply clear dope to it, rubbing down until smooth.**

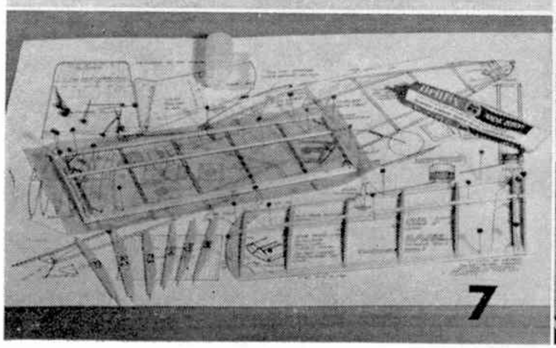
6 **Cement wing panels together. Cut " V " slots in spars, crack wing panels upwards and pin the tips to dihedral jigs as shown. Now cement all gussets in position. Sand leading and trailing edges to section shown on plan.**

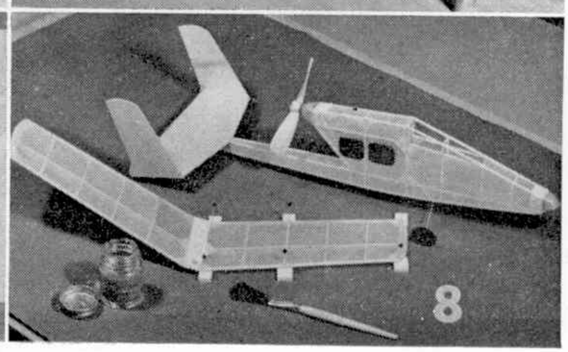
7 **Trace wing panel from plan. Reverse this tracing and build starboard wing panel over it. Wax plan and build port wing directly over plan. Do not add gussets at this stage, as the wing still has to be " bent."**

8 **Cover wing. Add 1/32 in. sheet over centre section, water shrink tissue then dope. Pin one wing panel at a time to board and use small balsa blocks as shown. This stops warps when clear doping the structure.**









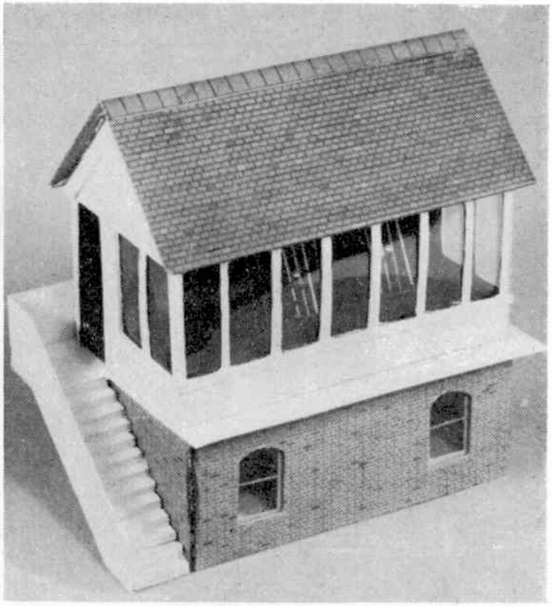
00 Gauge Trackside Construction

BUILDING A SIMPLE SIGNAL BOX

HAVING COMPLETED our small country station (see last month), we thought that the next most important structure to build would be a signal box. The materials we used are card, balsa and brick paper, and the constructional techniques used are exactly the same as for the station. As you can see from the full-size drawings, the signal box is fairly typical of many which can still be seen on the British railway system, but we must point out that the design is entirely "free-lance"; in other words, it is designed to look *typical* and does not faithfully follow any particular existing signal box. The drawings, therefore, are only meant as a guide; there is no reason why you should not make your own "mods" on our design.

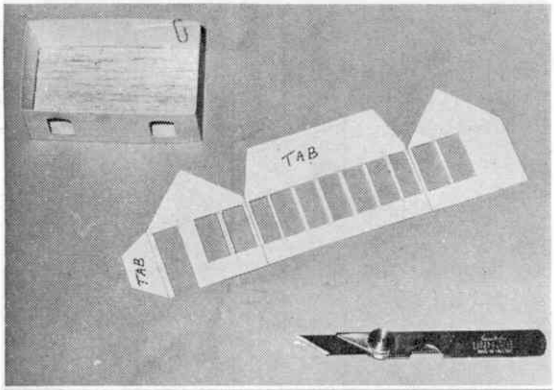
The base of the signal box is of brick construction, with the upper "cabin" part of timber, and the roof is tiled. This is probably the most common form of construction, although some boxes are all brick, and others all timber. As you can see from the photographs, our model is made, basically, in two halves, the lower "brick" section, and the upper "timber" section. The lower part is made first, all four walls being cut from the card in the form of one single strip, with the corners scored with a craft knife and bent round later. Don't forget to cut out the window apertures before assembling into "box" form. It is often easier to cut windows, doors and similar openings *before* cutting the main part from the sheet of card; this way, there is a much larger area of card to hold still while you cut out the fiddly bits. Always remember to provide tabs for gluing; these can be seen clearly in the photographs.

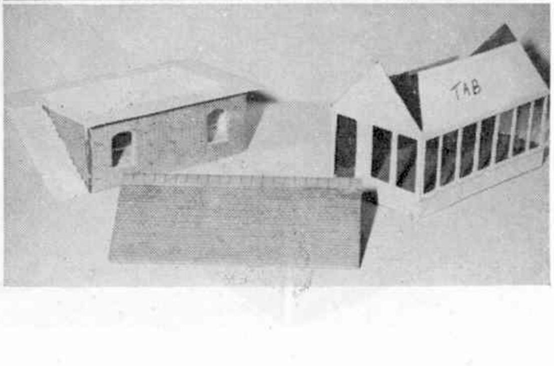
A rectangle of $\frac{3}{4}$ in. balsa sheet is next cut to fit exactly inside the card "box" of the signal box base (see picture). This really stiffens the structure, and keeps the angles of the corners "right." Do not glue the base in place, though, until you have covered the card with brick paper. You will notice from the pictures that between the upper and lower sections of the box, there is a kind of gallery or "catwalk" which runs along the front of the main windows; this is to make the window cleaner's life a little easier. On some lines, the catwalk was provided with a handrail, but

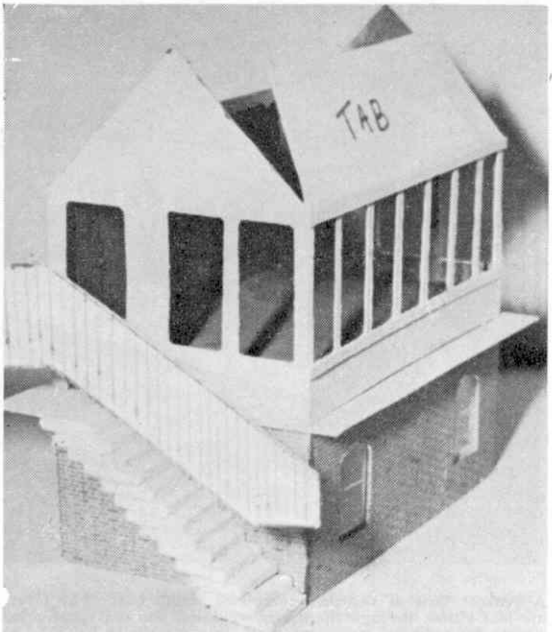


A general view of the near-completed signal box. The levers are just visible through the upper windows, and are represented simply by ordinary steel pins stuck into a strip of balsa. The "catwalk" below the windows is an extension of the cabin floor, and the roof is finished with tile paper.

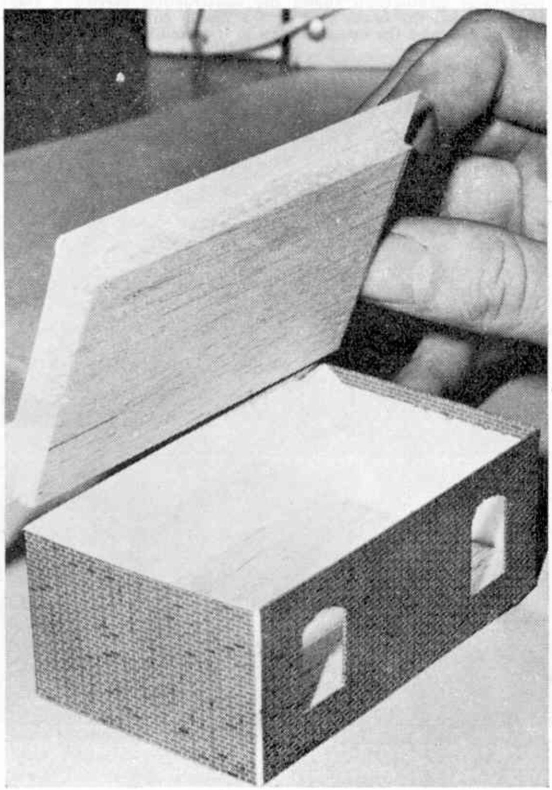
The picture immediately below shows the lower part of the cabin assembled, with the upper part still "in the flat." The lowermost photograph shows the construction carried a stage further, with the lower part of the model complete with staircase and the upper section in its assembled state.







The staircase is made from small pieces of balsa sheet stuck together slightly offset, as the picture shows. The handrail is simply cut from card, with the planks scribed on. In this picture the handrail is being held above its final position for clarity.



many signal boxes (including ours) have none. The provision or not of a handrail depended on the height of the structure, or perhaps on the availability of window cleaners! The catwalk on our signal box is merely an extension of the floor of the upper part, and is just a piece of card cut to shape, with a small projection from one corner which will become the staircase "landing." This piece of card is glued to another rectangle of ¼ in. sheet balsa, exactly the same size as the piece which forms the base of the signal box. In this way, the floor of the upper part of the box neatly "plugs" into the lower part (see picture). The resulting "box" is surprisingly strong.

The upper part of the model is made in exactly the same way as the lower part, only a little more care is needed in the cutting out of the big windows—it is all too easy to cut right through the thin dividing pillars. The photograph shows quite clearly what the upper part looks like in "the flat." Planking is represented by scribing lines on to the card with a small screwdriver, and this gives a reasonably realistic effect. If you like the "planks" to stand out more, however, it is a good idea to rule the lines on the card with a ball-point pen. If the coat of paint you apply is not too thick (and it shouldn't be) these lines will show through. We used both methods at once, and scribed lightly first, filling in with Biro later. The general effect is quite convincing, but it is a good idea to experiment first on odd scraps of card until you find a method to your liking. The ultimate method of planking, of course, is to cut out individual planks, and stick them on one by one. We intend to try it one day!

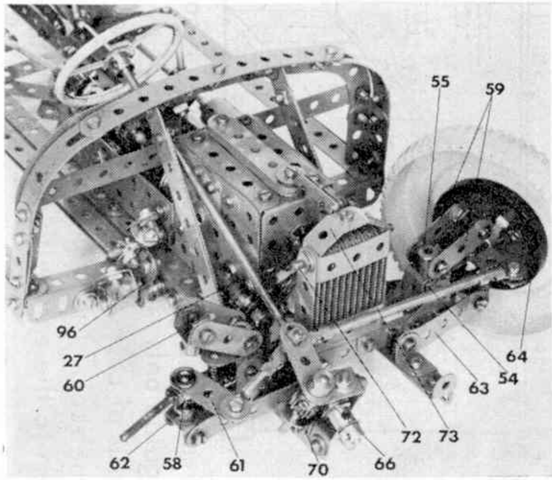
The upper part of the box is glued to yet another ¼ in. sheet balsa base. Now you can stand one half on top of the other, and see the complete model taking shape. The roof is card, covered with red tile paper, but there are other things to do before we stick it on. The first thing is to glaze the windows with thin celluloid sheet, carefully cut to size and fixed inside the window openings with the *minimum possible* cement. Now, as the windows are so large, it is really worth while doing something about the interior. The best way to start is to paint the inside of the walls and floor a dark brown—this improves the view from the outside enormously. However, as the main function of the signal box is to provide accommodation for the lever frame itself, the box could never look truly realistic without a row of shiny steel levers visible through the windows. Our answer to this problem was very simple, as the photograph reveals! The lever frame is simply a row of pins stuck in a strip of balsa, and glued to the signal box floor. Although the pins we used are considerably over scale, and would need a signalman at least ten scale feet tall to operate them, the general effect is very realistic when viewed through the windows.

The outside staircase is made up from small squares of $\frac{1}{16}$ in. balsa sheet, each stuck to it partner slightly offset (see picture). The handrail is of card. This really completes the basic signal box, although the possibilities of super detailing are endless. The interior could be made complete with coke stove, lamps, block instruments on a shelf, track diagram, table and chair, signalmen, etc. One thing we have not yet added to our model is the name board, because we cannot think of a suitable name. Has anyone any ideas?

Left: A piece of ¼ in. balsa sheet is stuck to the underside of the floor of the upper structure. This forms a lid, which fits snugly into the lower part of the signal box. For a permanent join apply cement to the inside of the signal box's lower part.

FULL SIZE PLAN FOR AN "OO" SCALE SIGNAL BOX

This simple signal box is not based upon any particular prototype, but is typical of many structures which can still be seen all over the country. The full size drawings are meant as a guide only; they do not give constructional details, which are shown in the photographs. Construction is of card, reinforced with balsa. Brick paper is used on the lower half of the building, and tile paper for the roof. The upper part of the signal box is of "boarded" construction; the "boards" are simply scribed on to the card with a small screwdriver.



Special Display Model

MECCANO MOTOR CHASSIS

by Spanner

For this detailed view of the steering mechanism the front off-side wheel has been removed, while Large Fork Piece 60 has been disconnected from its vertical Rod.

EVERY MONTH we try to give readers an advanced Meccano model to study and I don't mind admitting that this can prove pretty difficult at times. Take it from me, good advanced models are hard to find! We believe however that we have overcome the problem—not only for this issue, but also for the next—thanks to the detailed Motor Chassis featured here. It covers two months, by the way, because we do not have sufficient space in one issue to deal with the whole model. I will therefore describe as much as possible, here, and finish the description next month.

Many years of experience have shown that a motor chassis, including genuine working detail such as a gear box, clutch, differential, etc., is among the most popular subjects for advanced builders and so I am confident that the model will be well received. It was actually built exclusively for display purposes, mounted on a wooden plinth and driven by chain from an electric motor hidden inside the plinth. The effect was excellent.

Chassis

Dealing first with the chassis framework, two longitudinal members are each built up from a 12½ in. Angle Girder 1, extended eleven holes by a 12½ in. Strip 2. Girders 1 are connected by a 2½ in. Strip 3 and a cross arrangement 4, obtained from four 2 in. Strips bolted to two 1 in. Corner Brackets, as shown, while Strips 2 are joined by a 2½ × 1 in. Double Angle Strip, to which a 7½ in. Angle Girder 5, overlayed by a 7½ in. Strip, is bolted.

Two rectangular arrangements are now each produced from two 2½ in. Angle Girders 6 and two 7½ in. Angle Girders 7, a 1 in. Corner Bracket being used at one corner; then the completed arrangements are fixed to the longitudinal chassis members in the positions shown, the inner 7½ in. Girders first overlayed by 7½ in. Strips. Bolted to each outside Girder 7 are a 7½ in. Strip 8 and a 2½ in. Strip 9, the latter extended by a Formed Slotted Strip 10. Strips 10 at each side are joined by a 5½ in. Strip 11. A 1½ in. Angle Girder, extended by a 2½ in. Stepped Curved Strip 12, is bolted to the inside of each Strip 9, then Curved Strips 12 are joined by a 7½ in. Curved Strip 13, attached to the centre of Strip 11 by an Angle Bracket, and by a compound 7½ in. strip 14, built up from two 4½ in. Strips. Two 5 in. supports, bolted one to each Angle Girder 1, are obtained from two 4½ in. Strips and are attached to Curved Strip 13 by Angle Brackets.

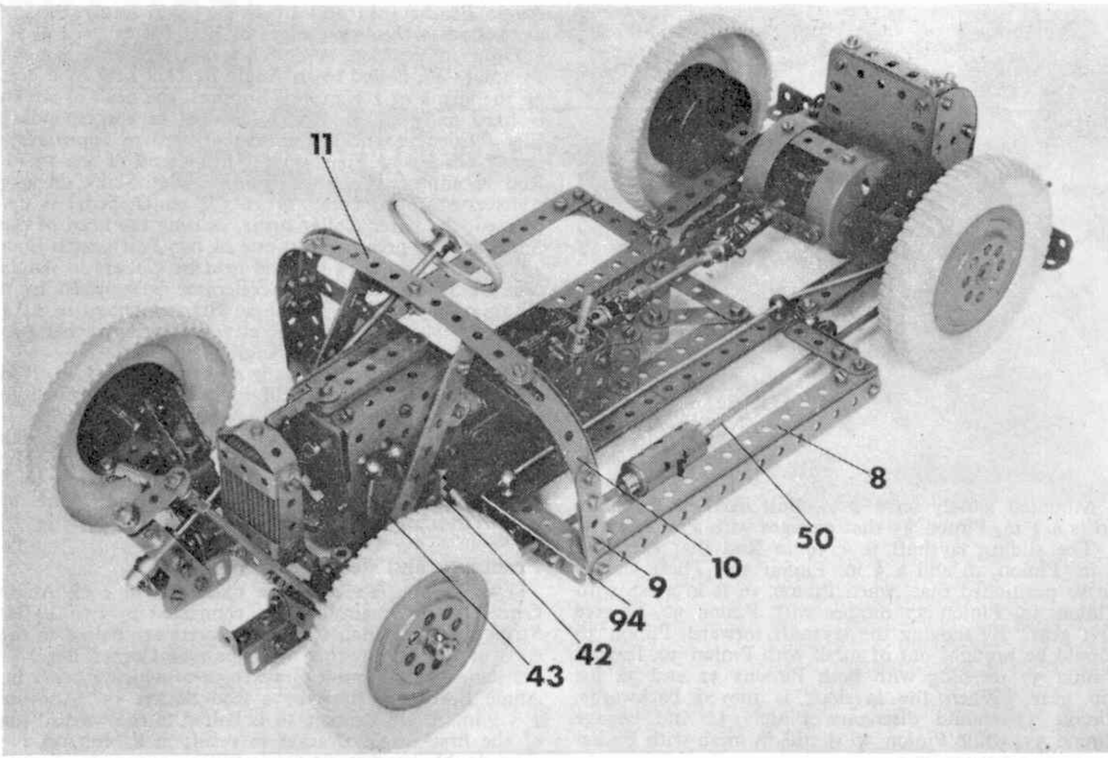
"Engine," clutch and gear box

As the model was designed solely for display purposes, a realistic-looking, but none-the-less imitation, engine was mocked-up from standard Meccano parts. Two 2½ × 1½ in. Flanged Plates 15 are connected by two 2½ in. Angle Girders 16 and six 2½ in. Strips 17, placed one on top of the other. Bolted to the vertical flanges of the Angle Girders are two 2½ × 2½ in. Flat Plates 18, secured to the Flanged Plates by Angle Brackets. The Bolts fixing the rear Angle Brackets to the corresponding Flanged Plate also fix two 3½ × ½ in. Double Angle Strips 19 to the Flanged Plate. Bolted to the other, free, lugs of these Double Angle Strips, but spaced from them by three Washers and a Fishplate 20 on the shank of one securing Bolt and by three Washers on the shank of the other Bolt, is a 1½ in. Flat Girder 21, overlayed by a 1½ in. Strip. A 3½ in. Flat Girder 22 is bolted to the body of each Double Angle Strip.

Journalled in Flanged Plates 15 is a 3½ in. Rod, held in place by a Collar and a ½ in. Pulley with Boss. Two Three-way Rod Connectors 23 are mounted on this Rod and are clamped against the Pulley, by a Collar, to represent the fan. Also journalled in the Flanged Plates is a 3½ in. Rod, carrying a 1 in. Sprocket Wheel 24 and held in place by a 1 in. Pulley 25 and a 1 in. Pulley with Rubber Ring 26.

Attached to off-side Flat Plate 18 is a Coupling 27, in which a 1½ in. Rod is fixed. Loose on this Rod and spaced from the Coupling by two Washers is a ½ in. Pulley with Boss, held by a Collar. A 6 in. Driving Band is passed around this pulley as well as around Pulley 25 and the "fan."

In line with the Rod carrying Pulley 25 but journalled in 1½ × ½ in. Double Angle Strip 28, overlayed by a 1½ in. Flat Girder, and bolted, along with a 1 × ½ in. Angle Bracket at each side to Double Angle Strips 19 is a 2 in. Rod on the forward end of which a Collar is fixed by two Set Screws. Loose on the Rod is a 1⅛ in. Flanged Wheel 29 with four Bolts held by Nuts in its face. When this Flanged Wheel is pressed against the Rubber Ring, the shanks of the four Bolts should engage with the Set Screws in the Collar, disengaging when the Flanged Wheel is with-

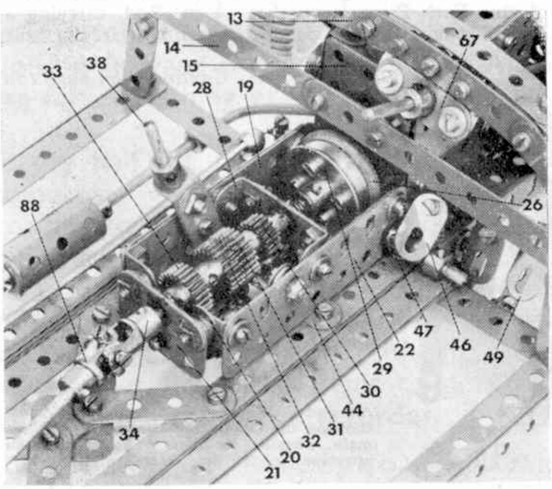


Originally built as a special display model, this Meccano Motor Chassis incorporates all the major features of a real-life motor chassis: steering, suspension, clutch, gear box and differential.

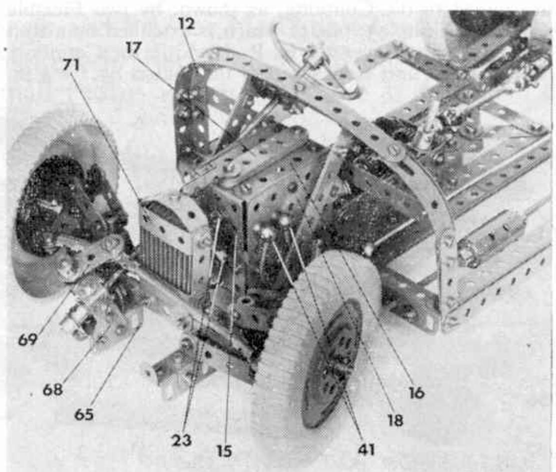
drawn. A Compression Spring on the Rod, between the Flanged Wheel and Double Angle Strip 28, keeps the Wheel in constant contact with the Rubber Ring.

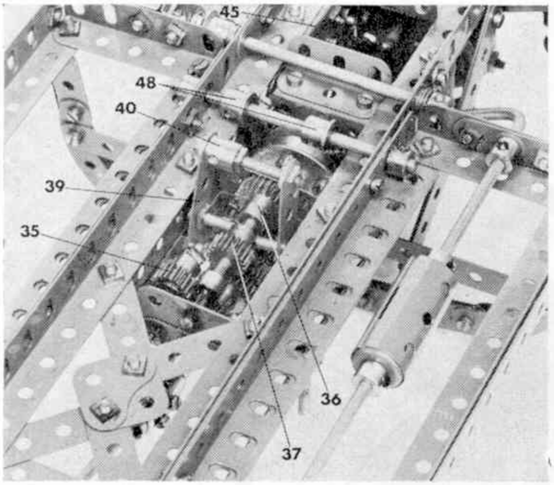
Also mounted on the 2 in. Rod, inside Double Angle Strip 28, is a ½ in. Pinion 30 and a ¾ in. Pinion 31, the latter so positioned that the end of the Rod is inserted in only half the bore of the Pinion. Inserted in the remaining half of its bore is another 2 in. Rod, journalled in Flat Girder 21, that carries two ¾ in. Pinions 32 and 33, plus a Universal Coupling 34.

A close-up view of the clutch and gear box, the latter giving one reverse and two forward speeds. The highly simple clutch operates extremely well despite its uncomplicated nature.



In this close-up view of the front of the model, construction of the simulated " engine " and radiator-grille is clearly shown.





Mounted loosely on a ¾ in. Bolt fixed in Fishplate 20 is a ½ in. Pinion 35 that engages with Pinion 33.

The sliding layshaft is a 3½ in Rod that carries a ¾ in. Pinion 36 and a ½ in. Pinion 37. These should be so positioned that, when Pinion 36 is in mesh with Pinion 30, Pinion 37 meshes with Pinion 32, to give first gear. By moving the layshaft forward, Pinion 36 should be brought out of mesh with Pinion 30, leaving Pinion 37 meshing with both Pinions 31 and 32 for top gear. When the layshaft is moved backwards, Pinion 37 should disengage Pinion 32 and engage Pinion 35, while Pinion 36 is still in mesh with Pinion 30, to give reverse gear.

A gear-change lever is provided by a 1 in. Rod 38, held in a Rod Socket attached to the short lug of a 1 × ½ in. Angle Bracket, lock-nutted to one Flat Girder 22 and extended three holes by a 2½ in. Strip. Another 2½ in. Strip 39 is lock-nutted to the other Flat Girder 22, then its lower end is connected to the first Strip by a 1 in. Screwed Rod in a Threaded Boss 40, fixed to Strip 39. Half-inch Bolts held by Nuts in the 1½ in. Strips engage between Pinions 36 and 37.

Before the engine and gearbox unit is fitted to the chassis an imitation exhaust manifold is added. Two Handrail Supports 41 and a Coupling 42 are fixed to left-hand Flat Plate 18, then the Handrail Supports are joined to the Coupling, as shown, by two Flexible Coupling Units 43, one of which is extended by a Rod Connector fitted over a 1 in. Rod held in the Coupling. The finished unit is attached to the chassis by 1 × ½ in. Angle Brackets 44 and by two 1½ in. Angle Girders 45, bolted to the lower edges of Flat Plates 18.

Once in position, a clutch pedal is supplied by a Fishplate 46, bolted to an Angle Bracket held by a Nut on the shank of a Handrail Support, the head of which is fixed on a 1½ in. Rod journalled in corresponding Flat Girder 22 and a Collar 47 bolted to appropriate Angle Girder 7. Fixed on the inside end of the 1½ in. Rod is another Collar carrying a Set Screw in one transverse tapped bore. When the clutch pedal is depressed, the latter Collar turns, causing the head of the Set Screw to press against one of two Pawls with Boss 48, mounted on a 3½ in. Rod held by Collars in Angle Girders 1. An imitation accelerator is supplied by a Fishplate 49 fixed to an Angle Bracket bolted to a 1½ in. Strip which is, in turn, attached by a further two Angle Brackets to near-by Angle Girder 6.

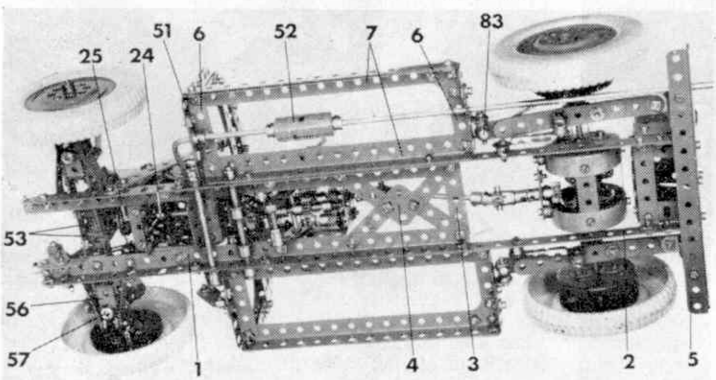
An exhaust system is built up from an 11½ in. Rod 50, bent to shape and held in a Crank 51 bolted to appropriate Angle Girder 6. Mounted on this Rod is a silencer represented by two Chimney Adaptors, each held by two Collars, joined by a Sleeve Piece 52. The Rod is extended rearwards, via a Rod Connector, by a 4½ in. Rod on the end of which another Rod Connector is fixed to represent the tail pipe.

Front axle and steering arrangement

Two Double Brackets are fixed one to each Angle Girder 1, and their lugs are connected by two 4½ in. Strips 53. One inch Corner Brackets are bolted to the ends of the Strips, then each pair of Corner Brackets are joined by a Double Bracket 54 to which a 1 × 1 in. Angle Bracket is fixed by a Rod Socket 55. Another 1 × 1 in. Angle Bracket 56 is bolted to the vertical lug of the first Angle Bracket to result in a built-up 1 × 1 in. double bracket, its lugs pointing outwards. Journalled in these lugs is a 1½ in. Rod, held in place by a Collar 57 beneath the lower lug and by a Short Coupling above it. Above the Short Coupling but below the upper lug of the double bracket are, in order, a Fishplate 58, a Washer and a Compression Spring. Note that the Rod passes through the elongated hole of the Fishplate.

Two Bolts, on each of which a 1½ in. Strip 59 is loosely held by a Nut, are screwed into opposite tapped bores of Rod Socket 55. The Nuts will allow the Bolts to be fixed tight in the bores while still allowing movement of the 1½ in. Strips, the free ends of which are lock-nutted to a Large Fork Piece 60. Fixed in the boss of this Fork Piece is another 1½ in. Rod, carrying a loose Crank 61, which passes through the circular hole

Continued on page 160



Another view of the gear box as seen from beneath shown at the head of this page. The correct adjustment of Pinion 35 is critical and may take a little time to get just right.

An underside view, at left, of the model showing the layout and construction of the main chassis members. Pay particular attention to the two rectangular "box" members.

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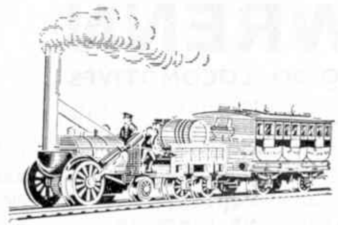
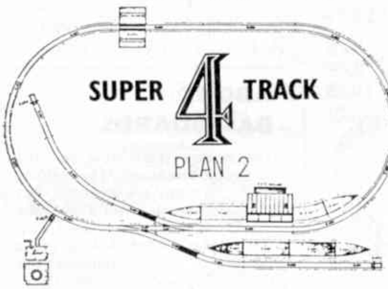


R.346 STEPHENSON'S 'ROCKET' TRAIN

THE BEATTIE SHOPS ALWAYS CARRY VERY LARGE STOCKS OF THE POPULAR TRIANG-HORNBY RAILWAY SYSTEMS SO THAT THEY CAN SUPPLY VISITORS WITH WHAT THEY NEED TO GET THE BEST OUT OF THEIR MODEL RAILWAYS. SUPPLIES ARE SOMETIMES DIFFICULT DUE TO PRODUCTION PROBLEMS BUT IF IT IS AVAILABLE BEATTIES NORMALLY HAVE IT AND YOU CAN ORDER WHAT YOU WANT FROM OUR SOUTHGATE MAIL ORDER DEPARTMENT TO BE SENT ANYWHERE IN THE WORLD.



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by S.N. Beattie

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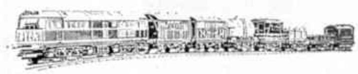

SELECTED TRAIN SETS

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RS52	BLUE PULLMAN	110/-
RS 9	INTER-CITY EXPRESS	129/-
RS24	PICK-UP GOODS	66/6
R346	STEPHENSONS ROCKET	48/9

SEND FOR THE SUPER-4 PLAN BOOK - 4'- POST 9D

WANTED FOR CASH

To maintain good stocks at our wonderful secondhand shops at 112, High Holborn and 10, Broadway, Southgate, N.14, we need a continuous flow of good equipment. This is a chance to turn unwanted toys, etc., into cash, or to buy things you want at an advantageous price.

We pay from **1/-** upwards for Dinkys and Corgis and **9d.** for Matchbox toys in good condition. We want any amount of TRI-ANG SUPER-4 TRACK and will pay up to half list price for everything except double curves, small radius which we value at **6d.** each only.

We pay half list price for current TRI-ANG HORNBY locomotives, WRENN "OO" locomotives in tip-top condition, and a fair price for HORNBY 2 and 3-rail locomotives according to condition. We do not want old Trix locomotives, and we only take Hornby 3-rail track IN PART EXCHANGE.

Send us what you have to sell or exchange, we do not give valuations without seeing the goods. The "BEATTIE EXCHANGE" free for large stamped envelope explains how you can use your unwanted items to get Trains — Cars — Boats and Meccano or even a Transistor radio or tape recorder.

WRENN

HO/OO LOCOMOTIVES

These locomotives like the old Hornby Dublo models are made to the highest standard.

Triang couplings are fitted but there is a hornby type set in each box.

4-6-0 CARDIFF CASTLE	Price £5.17.0.
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2-8-0 8F FREIGHT	Price £6. 2.0.

n gauge

"LIMA" N GAUGE by WRENN has changed the whole pattern of "miniature railway modelling". At first it was only the specialist who turned to "N" gauge but the low price of "LIMA" N with the Britsh type sets has altered every thing and at the moment it is not clear where "N" gauge is going.

LIMA comes from Italy and the prices must go up at the turn of the year but we hope to be able to keep present prices until 15th Jany.

GOODS SET	80/-
PASSENGER SET	80/-

PLAYCRAFT INTRODUCE "009"

009 is NARROW GAUGE OO and the first complete system was EGGERBAHN. Now we have the narrow gauge by PLAYCRAFT at most attractive prices.

GOODS SET with track 59/6

PASSENGER SET do 72/6

Spares prices etc for S.A.E.

Unfortunately Playcraft Railways are made in France and their prices must rise soon. We hope to maintain these prices until 28th February

PLAYCRAFT BUILDING KITS OO/HO

PLAYCRAFT BUILDING KITS ARE EASY TO MAKE-UP AND MOST ATTRACTIVE. THE COST IS LOW. TRY A SELECTION AND MAKE YOUR LAYOUT LIVE.

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B343 Cafe	4/-
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B382 Girder Bridge	4/-
B384 Stone Bridge	4/-
B383 Curved Bridge	4/-
B393 Thatched Cottage	4/-
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B344 House and Garage	6/-
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B390 House and Shop	6/-
B301 Yard and Crane	7/6
B370 Bletchley Station	7/6
B303 Office Block	16/-
B305 Hopper Loader	16/-
B321 Operational Water Mill	16/-
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PLAYCRAFT ROLLING STOCK IS FITTED WITH HORNBY-TYPE COUPLINGS & WILL RUN ON MOST 2-RAIL TRACKS.

P756 Trans-Europe Set	121/-
P836 Pacific Locomotive	73/-
P837 D6100 Diesel Loco.	52/9
P843 T.E.E. Locomotive	80/6
P852 Panoramic Rail-Car	62/9
P853 B.B. Diesel Loco	66/-
P854 C.C. Electric Loco	70/-
P654 Transporter & 6 Cars	10/4
P860 Dining Car	10/8
P861 Pullman Car	12/2
P862 Sleeping Car	10/8
P863 Channel Ferry Car	10/8
P864 T.E.E. Coach	13/8
P865 T.E.E. Luggage Car	13/2
P454 Op. Mail Set	25/2
P660 Op. Hopper Wagon Set	12/8
P663 Op. Crane Wagon Set	58/3
P686 Girder Bridge	7/7
P681 Incline Pier Kit	3/7
P728 Engine Shed—2-rail	15/9
P7205 Goods Shed & Platform	19/2

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CHANGE TO GEM TRACK!

GEM plastic-based TT & OO trackwork suits most 2 rail systems. It can be supplied for cash or in PART EXCHANGE for other types of track. See "BEATTIES EXCHANGE"

GEM "TT" TRACK	6/-
POINTS	13/-
CROSSINGS	13/-
GEM. "OO" TRACK	6/6
POINTS	14/3
RAIL JOINERS	3/6
INSUL: do	2/-
OMEGA WIRES	3

GEM FLEXIBLE FENCING 48" coil TT & OO 4/-

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TT 5/-
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suitable for all points requiring a 3/16" throw

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Here is a British type loco for the MARKLIN collector & a powerful 2-rail D.C. model for the ordinary British railroader.

Fine control at slow speeds, low centre of gravity for safe, fast running & the usual MARKLIN power factor.

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MARKLIN AC model	130/-
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Send S.A.E. for new MARKLIN PRICE LIST.

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The modern track must be fixed to a good baseboard. The realistic plastic sections are excellent but they soon break down if you take the track to pieces a few times. Get a plan like PLAN 5, get a Beatiboard for a baseboard and fix your track permanently so that the electricity will flow smoothly and your Trains will run without trouble.

BEATIBOARDS:

4 ft. x 2 ft. 8 in.	27/6
6 ft. x 4 ft.	60/-
8 ft. x 4 ft.	80/-

Delivery charge in England 20/-.
TRESTLE KITS each (Post 5/-) 30/-.

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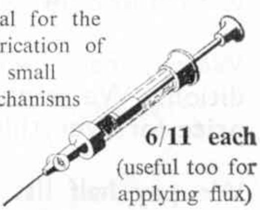
Ideal for the lubrication of all small mechanisms



6/11 each

(useful too for applying flux)

GEM GROUND SIGNALS OO

half disc or semaphore 6/6 each

SAVE MONEY AT BEATTIES

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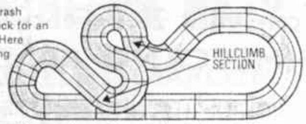
THE FANTASTIC MR 205 MONTE CARLO SET

Hand controllers, crash barriers, enough track for an 18ft 11ins. layout Here is a new and thrilling Airfix motor racing outfit—a master-piece of modelling



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1/32nd scale with new slimline motor kit 45/-

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B.R.M. & FERRARI

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billing boats

Building model boats has been a favourite hobby for many, many years but since we have had the benefit of beautiful wooden kits by BILLING and other continental manufacturers, the hobby has grown enormously.

Most people start with the "GINNA" the famous North Sea Cutter which was known as the M.F.V - Motor Fishing Vessel during the war and used for every conceivable purpose from fishing to fire fighting.

Boat building is a skilled operation. You have to read plans and take infinite time and patience to get the sort of result that is a permanent pleasure.

NORTH SEA CUTTER	60/6
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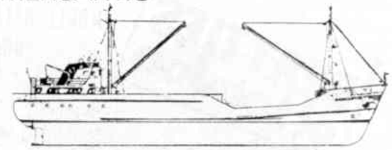
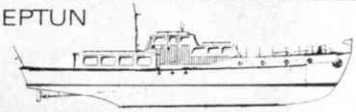
BILLING FITTINGS are superb. Sometimes the fitting kits are more costly that the boat kits but you get value for money. Holborn stock all the BILLING FITTINGS & they can be ordered by post.

BILLING BOATS have been increased in price, but we will accept orders as above up to 28th February from MECCANO READERS

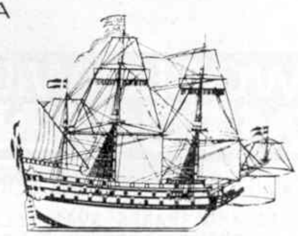
MERCANTIC



NEPTUN

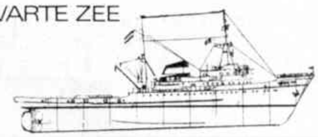


VASA



SANTA MARIA

ZWARTE ZEE



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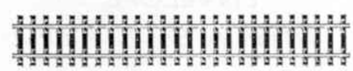
FARISH FORMOWAY TRACK



FORMOWAY TRACK Truly flexible without stress or distortion. Can be laid without cutting or preparation. Rails and sleepers exactly match Formoway pointwork. Per yard 5/11d.

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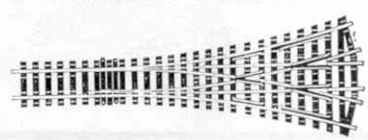

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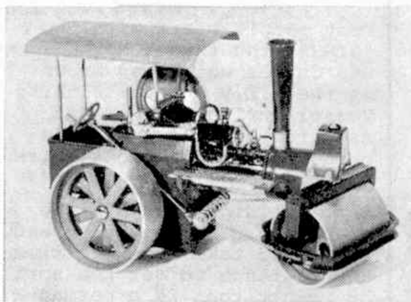

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3	108/3
Marine M.E.1	56/3
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Steam Roller	99/9
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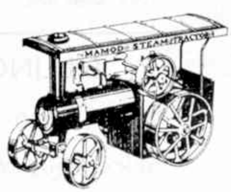
Power Hammer	9/11
Power Press	9/11
Lineshaft	17/11
Driving Band	11



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109	AAA Gun	2/6
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162	do	2/6
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171	T. Destroyer	2/6
172	T. Leopard	2/6
173	T Destroyer	2/6
174	German Tk	2/6
175	do	2/6
176	Assault G	2/6
177	do	2/6
178	M4 Tractor	2/6
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202	Sherman	2/6
203	Scout Car	1/11
205	Destroyer	2/6
207	Med: Tank	2/6
208	AA Gun M42	2/6
209	Carrier	2/6
210	Mortar Car.	2/6
211	Carrier	2/3
212	do	2/3
213	do	2/3
214	do	1/11
215	Ambulance	1/11
216	Observation	1/11
217	Mortar Car.	1/11
218	Tents etc:	1/6
219	Bridge Lay:	4/9
220	Med: Tank	2/6
221	Med: Tank	2/6
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ADD 3d. in 1/- to PRICES SHOWN

send large stamped & addressed envelope for FREE illustrated Price List & Order form. We stock the range at all shops.

HOLBORN—SOUTHGATE—MANCHESTER

KINDLY MENTION "MECCANO MAZAGINE" WHEN REPLYING TO ADVERTISEMENTS

GREAT ENGINEERS No. 2

GUGLIELMO MARCONI (1874-1937)

by A. W. Neal

Marconi early in his momentous career in 1896 with some early experiment.

Photo Courtesy: The Marconi Company Ltd.

MARCONI WAS born at Bologna and was the second son of an Italian country gentleman. His mother, Annie Jameson, was from Wexford, Ireland. He was privately educated and in his youth took a keen interest in physical and electrical science. He began laboratory experiments at his father's estate at Pontecchio in 1895, and succeeded in sending wireless signals over a distance of half a mile.

In 1896 he brought his apparatus to England and during that year was granted the first patent for a system of wireless telegraphy. The following year he demonstrated his system in London, on Salisbury Plain and across the Bristol Channel. In that year he also formed The Wireless Telegraph & Signal Company. In the same year (1897) he was showing the Italian Government how signals could be sent over a distance of twelve miles. About this time he erected permanent wireless stations on the Isle of Wight, at Bournemouth, and later at Poole, Dorset.

In 1900 he was granted a patent for "tuned or syntonic telegraphy," and twelve months later transmitted the first wireless signals across the Atlantic from Poldhu, Cornwall, to St. John's, Newfoundland. By 1902 he was transmitting complete messages to Poldhu from Glace Bay, Nova Scotia, and later Cape Cod, Massachusetts. He continued to develop his system until he was, in 1914, commissioned in the Italian Army, from which he was transferred to the Navy. During his service he continued his experiments with short wave radio. After further tests by his collaborators in England, he conducted a series of trials between his experimental apparatus at Poldhu and his yacht *Elettra* cruising in the Atlantic and Mediterranean. These operations lead to the beam system for long-distance communication. In 1926 the first beam station was opened linking England and Canada.

In 1931 Marconi began research into still shorter waves, these investigations resulting in the first microwave radio telephone links between the Vatican City and the Pope's residence at Castel Gandolf. In 1934 he was demonstrating his microwave beacon for the navigation of ships at sea, and he demonstrated the principal of radar, the future of which he had foreseen in 1922.

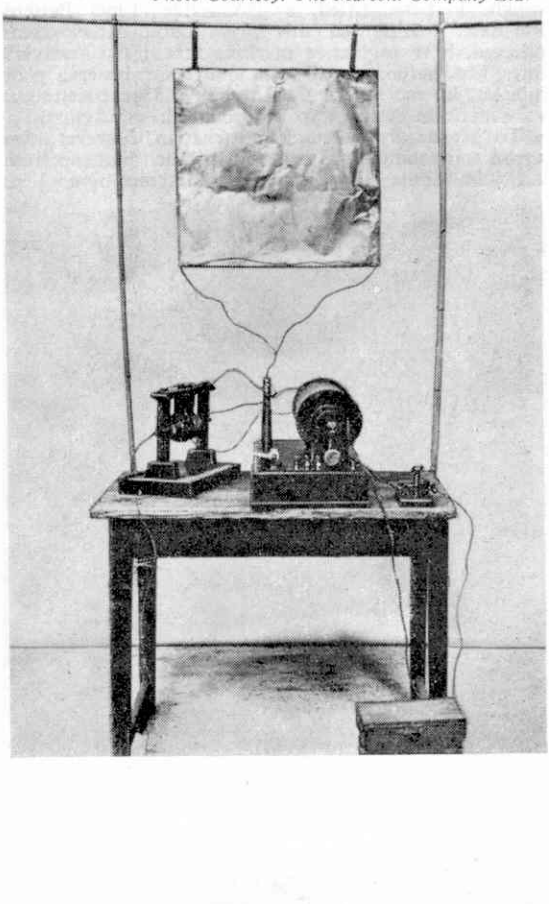
The Wireless Telegraph & Signal Company Ltd. which he established in 1897 was renamed Marconi's Wireless Telegraph Company Limited and in 1963 was renamed The Marconi Company Limited, the title under which it trades today.

Marconi's death came on July 20th, 1937, in Rome.

Guglielmo Marconi was not the inventor of wireless, since the scientific theories were known and instruments were used by many famous men working in this field. Marconi was the first to put these theories and instruments to use for the specific purpose of developing a new means of communication. His was the first practical wireless system, and radio as it is used now had its beginnings in his early apparatus. It would be more correct to say that Marconi was the "father" of wireless.

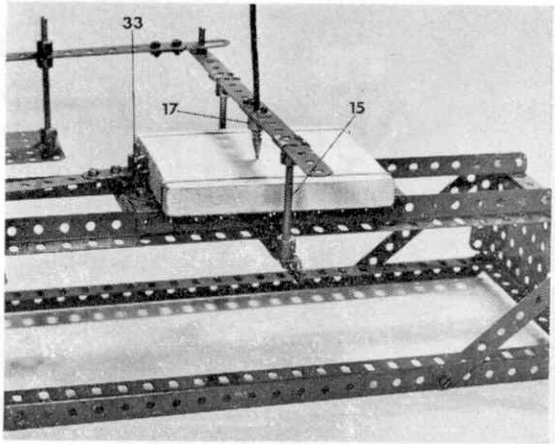
A replica of Marconi's first wireless transmitter which he used in Italy in 1895, showing spark gap (left), induction coil and sheet copper aerial.

Photo Courtesy: The Marconi Company Ltd.



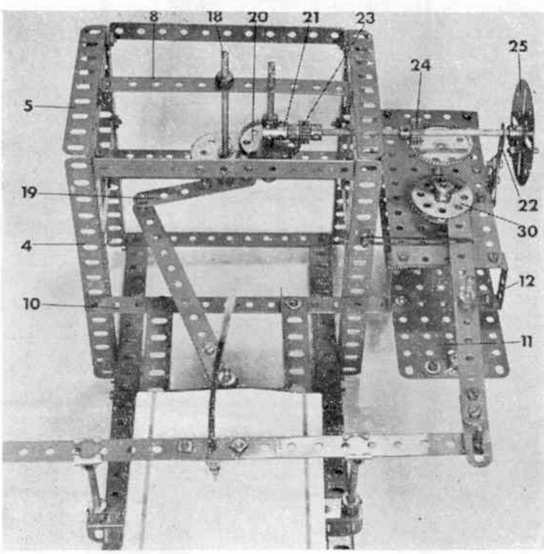
VARIABLE LINE PATTERN MACHINE

Another in the Meccanograph machine series by SPANNER



IN MECCANO Magazine over the years we have featured various types of designing machines. These have included straight-forward "Meccanographs," producing completely circular patterns, and even a more complicated "Spiralograph" where the chosen pattern spirals to the centre of the material on which it is being drawn. Thanks to Mr. H. Revvar we are now able to expand the series with an interesting model which I have titled a "Variable Line Pattern Machine." Although this may sound rather complicated, it is, in fact, a machine that draws "wavy" lines, but, before you dismiss it as being beneath your interest, let me say that with skill and practice, some very intricate designs can be produced.

To get down to actual construction, however, two 17 in. compound angle girders 1 are each built up from a 12½ in. Angle Girder extended nine holes by a 5½ in. Angle Girder; then the compound girders are connected at one end by a 5½ in. Angle Girder 2 and at the other by a 5½ × 2½ in. Flanged Plate 3.



Bolted to each Girder 1, as shown, are two 7½ in. Angle Girders 4, joined at the top by a 4½ in. Angle Girder 5 and, six holes down, by a 4½ in. Strip 6. The centres of Girder 5 and Strip 6 at one side are joined by a 3 in. Strip 7, Girders 5 at each side then being connected by a 5½ × ½ in. Double Angle Strip 8 while Strips 6 are connected by another, similar, Double Angle Strip 9

Bolted between opposite Girders 4 at each side are two 5½ × ½ in. Double Angle Strips and two 9½ in. Angle Girders 10 which project a distance of six holes in one direction only. Attached to the projecting part of these Girders is a 7½ × 2½ in. compound flat plate 11, obtained from two 4½ × 2½ in. Flat Plates. The Bolts securing the plate to the Angle Girders also fix in place four 1½ × ½ in. Double Angle Strips 12, the upper lugs of which provide anchoring points for a 5½ × 2½ in. Flat Plate 13. Inside Angle Girder 10 is joined to Flanged Plate 3 by two 12½ in. Angle Girders 14, bracing between the Plate and Girders being supplied by two 4½ in. Strips.

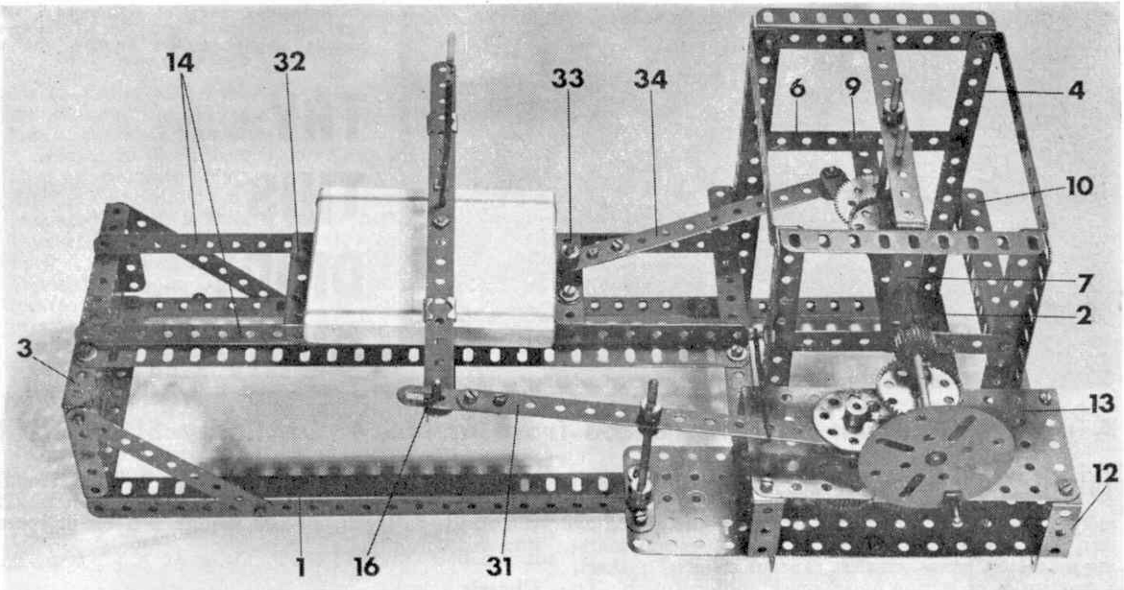
Having dealt with the general framework, we now come to the pen arm mounting. A 5½ in. Angle Girder is fixed to Girders 14, through their fourteenth holes, by ⅜ in. Bolts, two Washers on the shank of each Bolt serving as spacers between the Girders. Two Rod Sockets, carrying 2½ in. Rods 15, are fixed one in each end hole of the 5½ in. Girder, then a Slide Piece is mounted on the top of each Rod. Held in these Slide Pieces is a 9½ in. Strip in one end hole of which a Threaded Pin 16 is fixed and to the underside of which is bolted a Double Arm Crank 17, its boss coinciding with the eleventh hole in the Strip, counting from the Threaded Pin end.

Gearing and drive

As this model is hand-driven, we are saved any complications involved in fitting a motor, but a fairly detailed gearing system must still be included to convert the single input drive to the two output movements, one controlling the work-table and the other the pen arm. A 4 in. Rod 18, carrying a 60-teeth Gear is journalled in Double Angle Strips 8 and 9, being held by a Collar and a Double Arm Crank extended by a 3 in. Strip 19. The Gear Wheel meshes with a $\frac{7}{16}$ in. Pinion on a 3½ in. Rod also journalled in Double Angle Strips 8 and 9 and carrying, in addition to the Pinion, a 1½ in. Contrate Wheel 20 and a Short Coupling 21, the latter loose on the Rod, but prevented from rising up it by a Collar.

Free in the longitudinal bore of the Short Coupling is a 5½ in. Rod journalled in one Strip 7 and a 2 in. Strip 22 attached to Flat Plate 13 by a Trunnion. Mounted on the Rod are a ½ in. Pinion 23 in mesh with Contrate 20, a Collar against Strip 7, a ¾ in. Pinion 24 and a Faceplate 25 in which a Threaded Pin is fixed

Above, a close-up view of the pen arm and work table. Spanner used a ball-point refill for the pen which was kept in contact with the work table by a Compression Spring. Left, the "business" end of the machine showing the general layout of the gearing and drive mechanism. Note the Driving Band which keeps the pen arm connecting strip located between Bush Wheels 30.



to serve as a handle. Pinion 24 meshes with another $1\frac{1}{2}$ in. Contrate Wheel on a $3\frac{1}{2}$ in. Rod held by a Collar in Flat Plates 11 and 13. Also mounted on this Rod, between the Plates, are a 50-teeth Gear Wheel 26 and a 1 in. Gear 27, the former engaging with a $\frac{3}{4}$ in. Pinion 28 and the latter with another 1 in. Gear 29, both on a 3 in. Rod, at the top of which two 8-hole Bush Wheels 30 are secured. Note that both Gears 26 and 27 cannot be used to transmit the drive at the same time. One must be loose on its Rod while the other is fixed in mesh. The design of the pattern will, of course, vary according to which Gear is in use.

Engaging between Bush Wheels 30 is a $7\frac{1}{2}$ in. Strip 31, extended by a 2 in. Slotted Strip and pivotally held by Collars on a 3 in. Rod mounted in the boss of a Double Arm Crank bolted to compound flat plate 11. Threaded Pin 16 engages in the slot of the Slotted Strip. Bolts are inserted in the holes in the faces of Bush Wheels 30 and Strip 31 is held against these by the tensioning action of a $2\frac{1}{2}$ in. Driving Band slipped over both the Strip and a $\frac{3}{8}$ in. Bolt held by Nuts in nearby Girder 4. Alterations in the movement of the pen arm are effected by changing the number and positions of the Bolts in Bush Wheels 30.

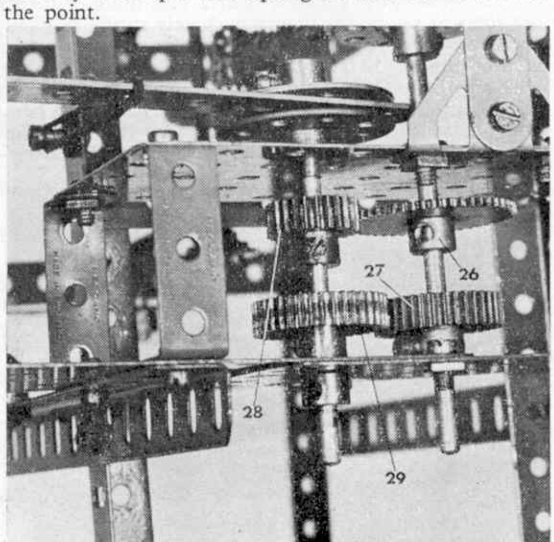
PARTS REQUIRED

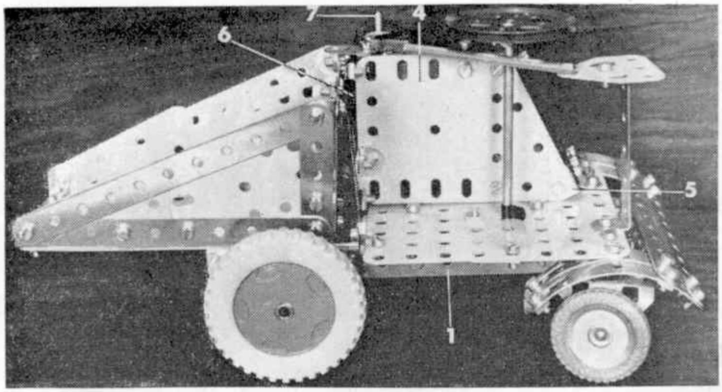
1	—	1a	2	—	17	2	—	50
1	—	1b	2	—	18b	2	—	52
1	—	2	2	—	24	2	—	53a
4	—	2a	2	—	25	1	—	55a
2	—	4	1	—	26	9	—	59
1	—	6	1	—	26c	4	—	62b
4	—	8	1	—	27	1	—	63d
2	—	8a	1	—	27a	1	—	70
4	—	8b	2	—	28	1	—	109
4	—	9	2	—	31	3	—	111c
2	—	9a	70	—	37a	3	—	115
1	—	14a	62	—	37b	4	—	125
1	—	15b	30	—	38	1	—	126
2	—	16	4	—	48	2	—	179
2	—	16b	4	—	48d	1		186

Above, a general view of the completed Variable Line Pattern Machine for producing " wavyline " designs. Right, a close-up view showing the gearing transferring the drive to the pen arm oscillator cam. Note that Gear 27 must be left free on its rod when Gear 26 is in mesh with Pinion 28, and vice versa.

We are now left with the work-table which consists of a block of wood approximately $4\frac{1}{2}$ in. long by $3\frac{3}{4}$ in. wide by $\frac{1}{2}$ in. thick, to the underside of which a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate 32 is fixed with small wood screws. The Flanged Plate slides on the vertical flanges of Angle Girders 14, four guides being provided by four Reversed Angle Brackets beneath the Plate. Bolted to the top of the Flanged Plate, at one end, is a Double Arm Crank in the boss of which a 1 in. Rod 33 is held. This Rod is connected to a Threaded Pin fixed in the end of Strip 19 by a 6 in. compound strip 34, obtained from a $1\frac{1}{2}$ in. and a $5\frac{1}{2}$ in. Strip, Collars holding the strip in place.

Finally, the marking instrument (we used a ball-point pen refill) is carried loose in the boss of Double Arm Crank 17, the point being held against the work-table by a Compression Spring between the Crank and the point.





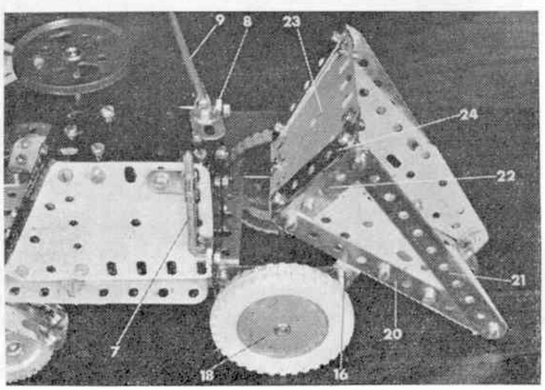
An interesting model of a Dumper Truck built with Meccano Outfit No. 4. Features include simple working steering and a tipping hopper.

TRY THIS DIDDY DUMPER

A model that can be constructed from a No. 4 Outfit by SPANNER

BUILDING SITES—you either like 'em or loath 'em! To some people a building site means nothing more than an ugly, unfinished structure surrounded by dirt, mud, and sprawling piles of junk. It means snarling machines, bangs, crashes, raucous shouts; in short, a maelstrom of jarring noise, muck and confusion. To other people, however, a building site means something altogether different. They see a place of mystery, activity and fascination. What's going on behind that high protective fence surrounding the site? Exactly what are they building? How far have they advanced? They see people scurrying about their allotted tasks; wagons coming and going with material; cranes and excavators hauling and dumping; in short they see the fascinating sight of men and machines turning what might have been an empty plot into what may turn out to be a soaring great wonder of civil engineering!

Whichever way you look at them, there's no getting away from the fact that building sites contain a wealth of material for the Meccano modeller on the look-out for subjects to reproduce. Just reflect for a moment on the enormous variety of equipment to be found on a typical site. Tower cranes, compressor units, bulldozers, excavators, concrete-mixers and dumper trucks are some of the things that immediately spring to mind, and each one of them lends itself ideally to reproduction in Meccano—almost as though it were designed for the job! Much as I would like to, I am quite unable to feature an example of every such type of machine here, but I have plenty of room for one of them. Which one? Obviously the small or, to use a currently favourable term, "diddy" (with apologies to Ken Dodd) Dumper illustrated in the accompanying pictures. If you decide to try it, all you require is a bit of spare time and Outfit No. 4.



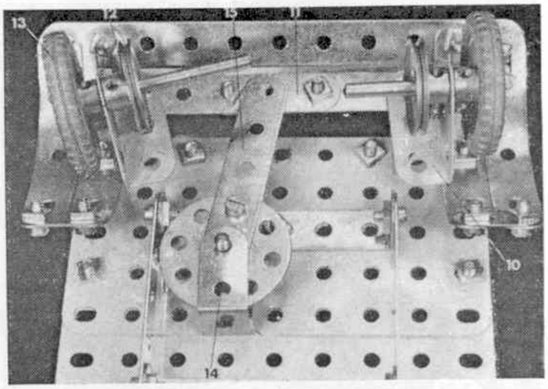
Chassis

It is best to begin construction with the chassis. Two $5\frac{1}{2}$ in. Strips 1 are connected by three $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 2, to the foremost two of which is bolted a $4\frac{1}{2} \times 4$ in. compound flat plate 3 obtained from two $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plates overlapped two holes. Before going any further, however, the engine housing should be added, being difficult to fit at a later stage. Each side of the housing consists of a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 4, extended by a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Triangular Flexible Plate, and the sides are joined by a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 5, to which are bolted two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Plastic Plates, themselves joined by an Obtuse Angle Bracket. Fixed by one flange to the front end of the upper Plate is a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plate to which a $4\frac{1}{2} \times 2\frac{1}{2}$ in. compound plastic plate 6 is bolted. Obtained from two $2\frac{1}{2} \times 2\frac{1}{2}$ in. Plastic Plates, this compound plate is also attached to Flexible Plates 4 by Angle Brackets. An exhaust pipe is represented by a 2 in. Rod 7 carried in a right-angled Rod and Strip Connector bolted to one Plate 4.

Before fixing the completed housing in place, it is advisable to fit the catch which will later hold the hopper in the travelling position. It consists of a Rod and Strip Connector 8, extended by a Fishplate, lock-nutted to the upper $2\frac{1}{2} \times 1\frac{1}{2}$ in. Plastic Plate. A $3\frac{1}{2}$ in. Rod 9 is held in the Rod and Strip Connector. When this has been done, the housing is fixed to compound flat plate 3 by an Obtuse Angle Bracket, bolted to Double Angle Strip 5, and the lower flange of the above-mentioned $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plate, compound plastic plate 6 also being connected to compound flat plate 3, in this case by an ordinary Angle Bracket.

At this stage, the steering system can be added to the model. Two Double Brackets are bolted to the underside of compound plate 3, then a Trunnion 10 is lock-nutted to the free lugs of each of these. The Trunnions are connected by a compound $3\frac{1}{2}$ in. strip 11, built up from two $2\frac{1}{2}$ in. Strips, which is lock-nutted in position. Journalled in the apex holes of one Trunnion is a 2 in. Rod carrying a 1 in. Pulley 12 and

In this view of the Dumper, the hopper is shown in the "dumping" position. The hopper is held in the travelling position by a lever operated from the cab.



A close-up view of the simple steering arrangement controlled by a 2½ in. Strip bolted to a Bush Wheel on the lower end of the steering column.

a 1 in. Pulley with Motor Tyre 13, while similar parts are mounted on a 1½ in. Rod journalled in the apex hole of the other Trunnion.

Serving as the steering column is a 4 in. Rod journalled in compound plate 3 and in a 1 × 1 in. Double Bracket 14 bolted to the underside of the plate. Mounted on the Rod between the lugs of this Double Bracket is an 8-hole Bush Wheel, a Spring Clip being fixed on the Rod above the plate. Bolted to the Bush Wheel is a 2½ in. Strip 15, the other end of which is located between the shanks of two Bolts held by Nuts in compound strip 11. The steering wheel is represented by a 2 in. Pulley.

At the rear of the chassis, a 2½ in. Stepped Curved Strip 16 is attached to each Strip 1, being held in position at the back by a 3½ in. Rod 17, fixed by Spring Clips. This Rod will later form the hopper pivot. Journalled in the centre holes of Curved Strips 16 is a 4 in. Rod on the ends of which 2½ in. Road Wheels 18 are mounted.

Turning now to the hopper, this is built up from two 4½ × 2½ in. Flexible Plates overlapped eight holes to form a 5 × 2½ in. compound plate 19. Bolted to the rear end of this is a 2½ × ½ in. Double Angle Strip to each lug of which is fixed a 2½ × 1½ in. Triangular Flexible Plate edged by a 5½ in. Strip 20 and a compound 5 in. strip 21 obtained from a 3½ in. and a 2½ in. Strip. Strips 20 and 21 are then joined by a 2½ in. Strip 22 and the intervening space is filled in by a 2½ × 1½ in. Flexible Plate.

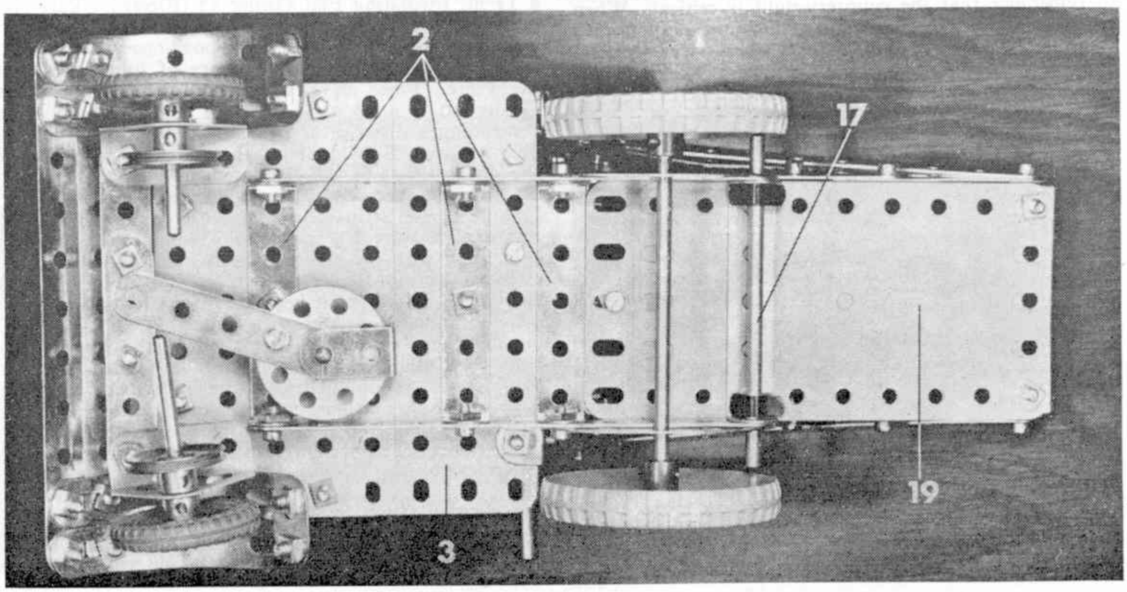
The back of the hopper consists of a 2½ × 2½ in. Flexible Plate 23 attached to Strip 21 at each side by an Angle Bracket and to Strip 20 by an Angle Bracket extended by a Fishplate, at the same time fixing a 2½ in. Strip 24 in position. A 2½ × ½ in. Double Angle Strip is bolted to the underside of Plate 19, this then being mounted on Rod 17.

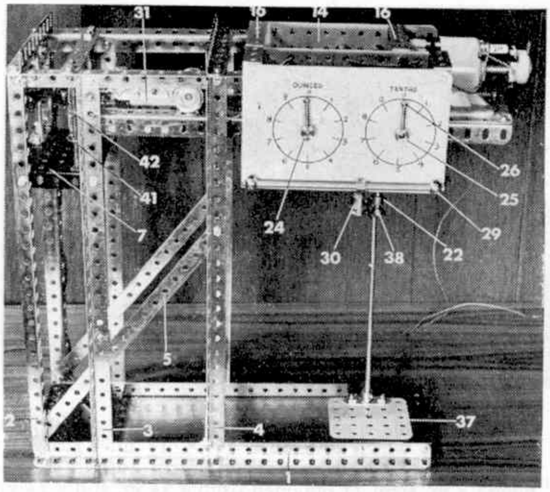
Finally, front mudguards are each provided by two Formed Slotted Strips 25, connected by a Fishplate, the inside Strip being bolted to compound flat plate 3. Both mudguards are then joined by two 5½ in. Strips 26, as shown, and a seat is obtained from a Flat Trunnion 27, attached to compound plate 3 by a 2½ × ½ in. Double Angle Strip.

PARTS REQUIRED

6—2	4—22	2—126
2—3	1—24	1—126a
9—5	3—35	2—142c
5—10	94—37a	2—187
2—11	84—37b	2—188
1—11a	3—38	3—190
10—12	1—48	2—191
2—12c	6—48a	2—194
2—15b	1—51	2—194a
2—16	2—53a	1—212
1—17	3—90a	1—212a
1—18a	6—111c	4—215
1—20a	1—125	4—221

An underside view of the Dumper showing the layout of the chassis. Note that the rearmost 2½ x ½ in. Double Angle Strip is not bolted to the main chassis members.





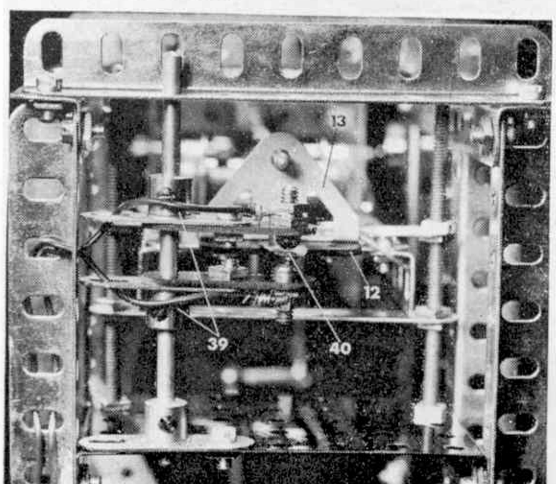
Among the Model Builders with SPANNER

A Weighing Machine with a Self-Balancing Steelyard by Ron Fail

Designed by Mr. Ron Fail of Bedford, this amazingly accurate Weighing Machine has the unique feature of a self-balancing steelyard or "weighbeam." The self-balancing action is controlled by a Power Drive Unit.

TRADITION HAS it that "Among the Model-Builders" be devoted to several items supplied by, or of interest to, readers. Traditions, however, can be broken from time to time, and this month I intend to do just that by devoting the entire article to one complete model designed by a reader, Mr. Ron Fail of Bedford. The model in question is a Weighing Machine; not an unusual Meccano subject in itself, but unique in this case in having a self-balancing steelyard ! The steelyard, of course, is the balancing arm that carries the object to be weighed as well as the movable counterweight.

Mr. Fail is an extremely capable modeller who has the proven ability not only to design new models, but to design new models that are realistically useful. Already we have featured a superb Self-winding Clock produced by him and, having myself built his Weighing Machine, I can guarantee that its technical excellence is well up to standard. The model, in fact, gives a highly accurate reading once the exact weight of the counterweight has been determined, but it is important to remember that the counterweight is critical. When building the model, incidentally, study the photographs to see where elongated holes and where circular holes are used in the Girders.



Mainframe

To get down to business, the mainframe is built up from two 3½ × 2½ in. Flanged Plates joined by two 12½ in. Angle Girders 1. Another three 12½ in. Angle Girders 2, 3 and 4 are then bolted to each Girder 1 through its first, fifth and twelfth holes respectively, then a 9½ in. Strip 5 is fixed, as shown, between Girders 2 and 4 for bracing purposes. At the top, Girders 2, 3 and 4 are connected by a 9½ in. Angle Girder 6.

Bolted to Girders 2 and 3 at each side is a third 3½ × 2½ in. Flanged Plate 7, the securing Bolts passing through the seventh holes from the tops of the Girders while Girders 6 are joined by two 4½ in. Angle Girders 8 and a 4½ in. Strip 9. Girders 4 at each side are braced by a 9½ in. Strip, as shown.

Mainframe

The steelyard or weighbeam is the most complicated section of the model. Two 12½ in. Angle Girders 10 are connected at one end by a 2½ × 2½ in. Flat Plate 11 and, at the other by a 2½ in. Strip to which are bolted a 1½ in. Insulating Flat Girder 12 (Electrikit Part No. 508) and a Trunnion 13. Now fixed to one Girder 10 is a 5½ × 2½ in. Flat Plate 14, so positioned that the end of the Girder protrudes a distance of four holes past the Plate. Fixed in a similar position on the other Girder 10 is a 5½ × 3½ in. Flat Plate 15, the Plate protruding a distance of two holes beneath the Girder. The securing Bolts in both these Plates should be at the upper limits of the elongated holes in the Girders. The Plates, themselves, are joined by two 2½ × ½ in. Double Angle Strips 16. Another Double Angle Strip 17 is also bolted between the Flat Plates, one lug coinciding with the centre hole in Plate 14.

Journalled in Plates 14 and 15 is a 4 in. Rod 18 carrying a ½ in. Pinion between the Plates and another ½ in. Pininon 19, as well as a 50-teeth Gear Wheel 20, outside Plate 15. Also journalled in the Plates, and held by Collars, is a 3 in. Rod, on which a Short Coupling 21 is mounted. A large Fork Piece, carrying a 3½ in. Rod 22 in its boss, is pivotally attached to the Short Coupling by a 1 in. Rod fixed in one of its transverse bores. The weight pan will later be connected to Rod 22.

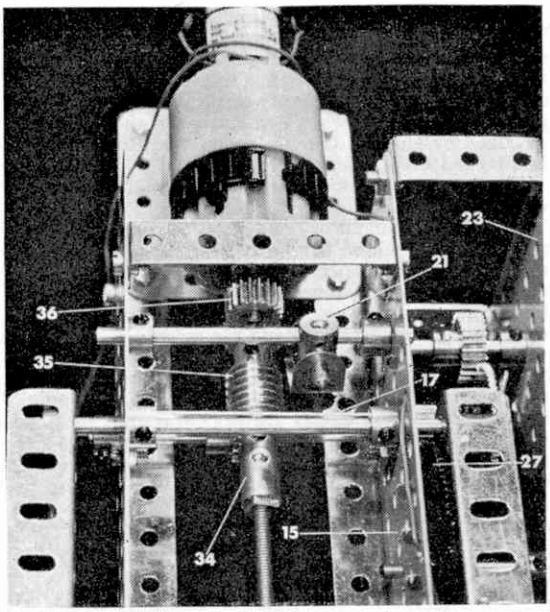
The electrical system fitted to the model is extremely simple, as this picture shows. Besides the spacing of the contacts, the only essential thing to remember is that the Contact Screws must be isolated from the metal parts of the model. This is done by fixing them to 1½ in. Insulating Strips.

At this stage, however, a second $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plate 23 is attached to Plate 15 by four $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips, one at each corner. Mounted in these two Plates are two 2 in. Rods 24 and 25, both held in place by two Collars fixed one each side of Plate 23, each Collar carrying a $\frac{3}{4}$ in. Bolt 26 in one tapped bore. The Bolt in the outside Collar will serve as a pointer, while that on the inside is to counterweight it and so must point in an exactly opposite direction. In addition to the Collars, Rod 24 carries a $2\frac{1}{2}$ in. Gear Wheel 27, in mesh with Pinion 19, while Rod 25 carries a $\frac{3}{4}$ in. Pinion 28, in mesh with Gear Wheel 20. Note, incidentally, that the lower Double Angle Strips are fixed to Plate 23, not by Bolts, but by Handrail Supports 29. Mounted in these is a $5\frac{1}{2}$ in. Rod carrying a Collar to which a $\frac{1}{2}$ in. Pulley 30 is attached by a Pivot Bolt to form a zero adjusting weight. The Collar must be able to slide on the Rod.

Next we have the travelling counterweight which consists of eleven $1\frac{1}{2}$ in. Strips and four $1\frac{1}{2} \times 1\frac{1}{2}$ in. Flat Plates 31, bolted between two $2\frac{1}{2}$ in. Strips. Journalled in one end of these $2\frac{1}{2}$ in. Strips is a $1\frac{1}{2}$ in. Rod carrying two $\frac{3}{4}$ in. Flanged Wheels 32, each spaced from its Strip by two Washers. Journalled in the other end of the $2\frac{1}{2}$ in. Strips is a 1 in. Rod carrying a Coupling 33, the Rod passing through the lower smooth bore of the Coupling. Screwed into the upper tapped bore of the Coupling is an 8 in. Screwed Rod extended, via a Threaded Coupling 34, by a 2 in. Rod. This is journalled in Double Angle Strip 17, while the Screwed Rod is journalled in the apex hole of Trunnion 13. Flanged Wheels 32, of course, run on Angle Girders 10.

Mounted on the 2 in. Rod are a Worm 35 and a $\frac{1}{2}$ in. Pinion, the former in mesh with the Pinion between Plates 14 and 15 on Rod 18. The latter, on the other hand, is meshed with a $\frac{1}{2}$ in. Pinion 36 on the output shaft of a Power Drive Unit, bolted in the centre of Flat Plate 11. The 12 : 1 ratio should be in use.

The weight pan is provided by a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 37 to which a Double Arm Crank is bolted. Fixed in the boss of this Crank is a $6\frac{1}{2}$ in. Rod, to the top of which a Handrail Coupling 38 is secured. Another Handrail Coupling is mounted on the lower end of Rod 22, then the two are joined by a $1\frac{1}{2}$ in. Rod.

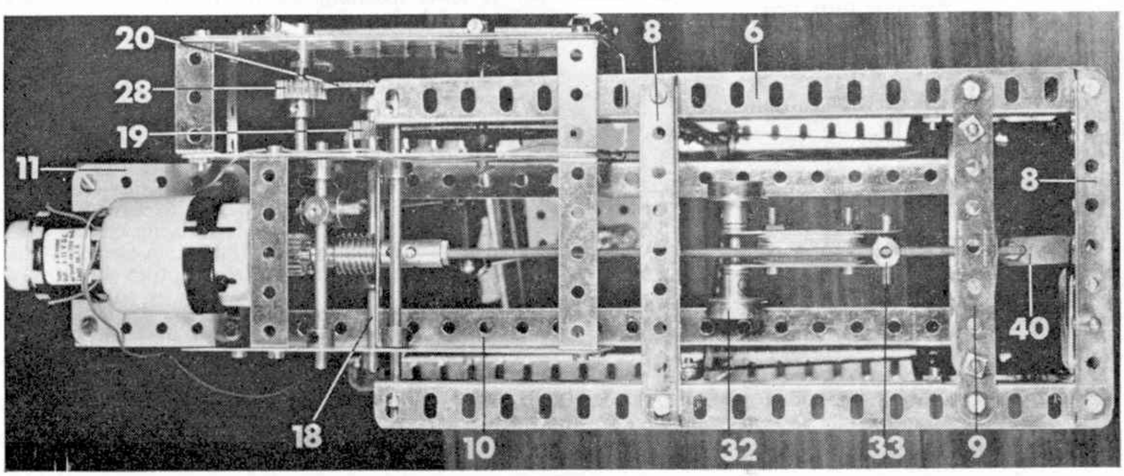


In this close-up view of the motor mounting, the method of transferring the drive both to the travelling counterweight and the weight indicators is clearly shown.

Electrics

You will have realised that the self-balancing action of the model is controlled by the Power Drive Unit, for which an electrical contact system is required. This, I am pleased to say, is not complicated. A $3\frac{1}{2}$ in. Rod is mounted in a Double Arm Crank bolted to Flanged Plate 7. Fixed on the Rod are another two Double Arm Cranks 39, each extended one hole by a $1\frac{1}{2}$ in. Insulating Strip (Electrikit Part No. 503), to which a Contact Screw (Electrikit Part No. 543) is attached. Located between the Contact Screws is a 1 in. Wiper Arm 40 (Electrikit Part No. 531) which is bolted to Insulating Flat Girder 12.

A plan view of the Weighing Machine showing the layout and construction of the steelyard as well as its position in relation to the mainframe.



Double Arm Cranks 39 are adjusted so that the Wiper Arm has a vertical movement of only 1/64 in. each way from the balanced position, while the actual steelyard should be allowed a movement of no more than $\frac{1}{16}$ in. each way. Stops to prevent further movement are provided by a $3\frac{1}{2}$ in. Strip 41 and Fishplates 42, fixed by Nuts on two $3\frac{1}{2}$ in. Screwed Rods mounted in Flanged Plate 7 and Strip 9.

To operate the model, two batteries of at least $4\frac{1}{2}$ volts each are required. (I used Ever Ready 126's.) The positive terminal of one battery is connected to the negative terminal of the other and to either of these terminals is also connected one of the motor leads. The other motor lead is conected to Wiper Arm 40, while the remaining battery terminals are connected, one each, to the Contact Screws in the model.

Finally, a scale is prepared from cardboard and attached to Flat Plate 23, Rods 24 and 25 protruding through holes made in the cardboard. Calibration is not difficult. Two circles are drawn around the holes though which the rods will protrude, then each of these circles is marked into ten equal parts and numbered 0-9. With the scale in place, the dial for Rod 24 indicates ounces and that for Rod 25, tenths of ounces.

PARTS REQUIRED

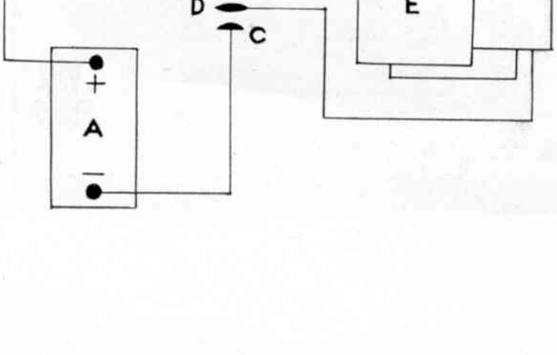
2—1a	2—20b	1—63c
2—1b	1—23a	1—70
2—2a	1—25	2—72
1—3	3—26	4—74
3—5	1—27	1—79
11—6a	1—27c	2—80a
10—8	1—32	6—111
2—8a	75—37a	1—111c
2—9a	96—37b	1—116
2—10	9—38	1—126
1—14	2—38d	1—128
1—14a	4—48	2—136
1—15a	3—48a	2—136a
2—15b	2—52a	1—147b
1—16	3—53	2—503
3—17	12—59	1—508
2—18a	3—62b	1—531
2—18b	1—63	2—543

1 Power Drive Unit

In operation, Mr. Fail's Weighing Machine is amazingly sensitive. As I have already said, however, the counterweight is critical and, while the unit as described will give pretty accurate results, you will probably find it necessary to add one or two Bolts to get the weight exactly right. You will know when this is so, of course, when the dials show the correct reading for a known weight placed in the pan. If you do not have a commercially-produced "known" weight, then use British silver coins. Five shillings worth equal one ounce !

A last word now about the zero adjusting weight. Assuming the main counterweight is correct, you may find, after weighing something, that the scale pointers do not return exactly to zero, owing to backlash in the gears. This is where the zero adjusting weight comes in as it enables the pointers to be easily re-set before anything else is weighed.

WIRING DIAGRAM: A—$4\frac{1}{2}$ volt batteries. B—upper Contact Screw. C—Lower Contact Screw. D—Wiper Arm. E—Power Drive Unit.



Special Display Model

MECCANO MOTOR CHASSIS

Continued from page 146

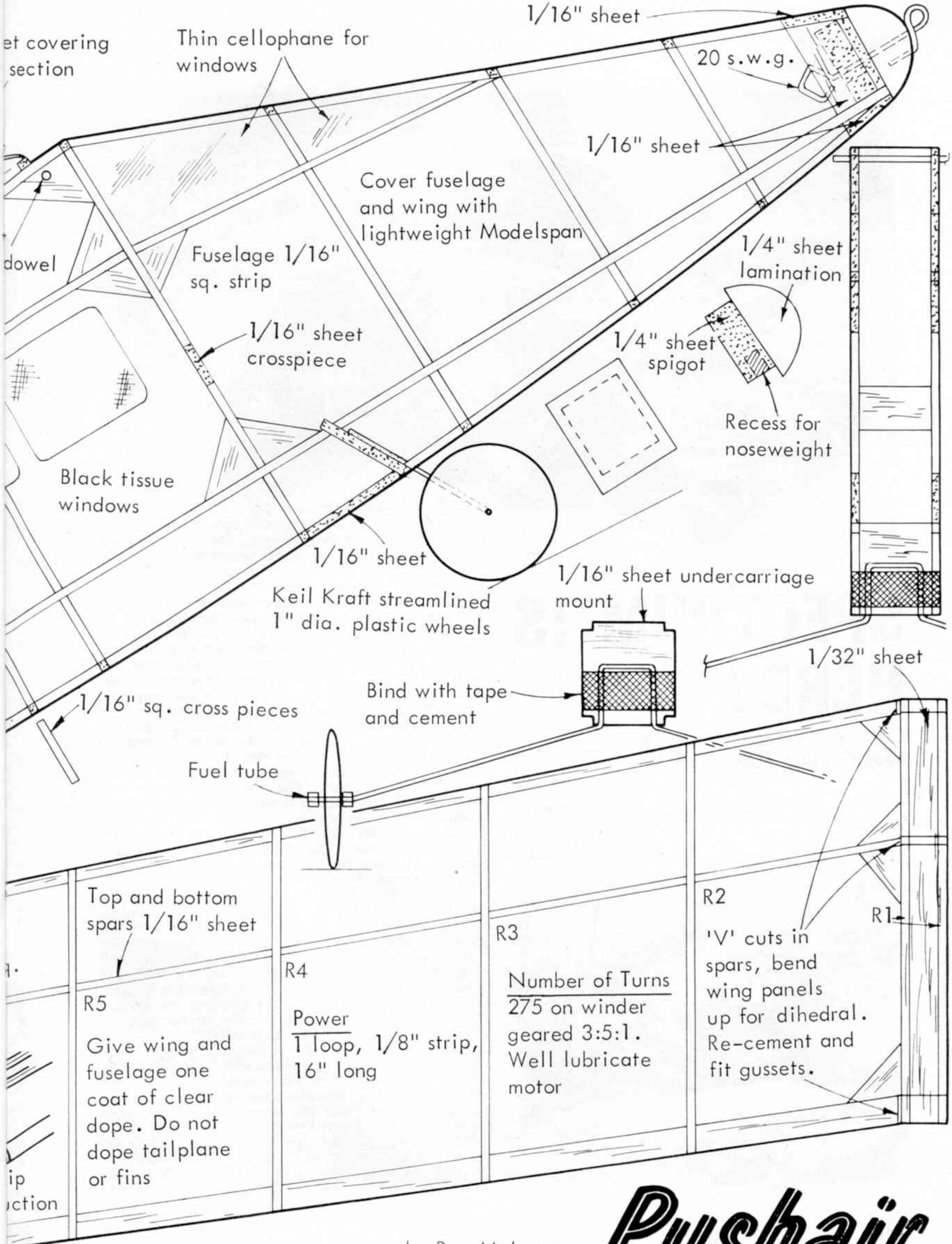
in Fishplate 58 and into the boss of another Large Fork Piece 62. Lock-nutted to the lugs of the latter Fork Piece are two shaped $2\frac{1}{2}$ in. Strips 63, attached to Girder 1 by one right-hand and one left-hand Corner Angle Bracket. A Long Threaded Pin is screwed into one tapped bore in the boss of Crank 61 and on this is loosely mounted a $4\frac{1}{4}$ in. Road Wheel to which a Wheel Flange 64 is bolted. A Collar holds the Road Wheel in place. Note that the Threaded Pin must not grip the Rod in the boss of Crank 61 and is prevented from doing so by adding an extra Bolt to the Pin.

To the front end of the right-hand Girder 1 a $1\frac{1}{2}$ in. Angle Girder 65 is fixed, the front securing Bolt also fixing a right-hand Corner Angle Bracket in place. The upper lug of this Bracket is bent forward slightly to provide one bearing for an 8 in. Rod which serves as the steering column and which carries a Worm 66. The other bearing for the Rod is provided by a $1\frac{1}{2}$ in. Strip 67, attached to Curved Strip 13 by Obtuse Angle Brackets. Collars hold the Rod in place.

Bolted to Angle Girder 65 is a 1 in. Triangular Plate, extended by a $1\frac{1}{2}$ in. Strip 68, to the top of which a $1 \times \frac{1}{2}$ in. Angle Bracket overlayed by a Fishplate is secured. Journalled in this Angle Bracket/Fishplate is a 2 in. Rod, held in place by a Crank 69 and a $\frac{7}{16}$ in. Pinion 70, the latter in mesh with Worm 66. A lower mounting for the Rod is provided by a Collar attached to Angle Girder 1 by a Bolt passed through the Girder and into one transverse tapped bore of the Collar. Lock-nutted to the arm of Crank 69 are two Rod and Strip Connectors which are connected to further Rod and Strip Connectors, lock-nutted to Cranks 61, by a 1 in. Rod and a 4 in. Rod respectively.

A radiator is now built up from two $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 71, the lugs of which are joined by two 2 in. Strips held by two 2 in. Screwed Rods 72. Mounted on these Rods are eleven 2 in. Strips, each spaced from the next by two Washers. A shaped $2\frac{1}{2}$ in. Strip 73 is added to the top as shown, then the finished radiator is attached to front Strip 53 by one left-hand and one right-hand Corner Angle Bracket. Two Rod and Strip Connectors joined by a 1 in. Rod represent a water hose running between the top of the radiator and the engine.

NEXT MONTH: We conclude the Motor Chassis with constructional details of the rear axle, differential and working brake.



by Ray Malmström

Pushair

SPECTRUM IS HERE!

Chris Jelley reports on the new Captain Scarlet S.P.V.

Above: Captain Scarlet automatically descends from his Spectrum Pursuit Vehicle, with its rear half tracks down. This model fires a rocket and the radio aerials retract. Below, just a finger touch releases the rocket hatch and a further push fires the rubber-tipped rocket. This model has every action feature you could imagine. Here the aerials are extended.

"CLOUDBASE TO all Spectrum personnel. Mysteron agent heading south down highway 15. Captain Scarlet in hot pursuit!" No, this is not a transcript of a police message, printed here by mistake, but, as followers of the highly successful television series "Captain Scarlet and the Mysterons" will recognise, it is just the sort of message that might be transmitted from the headquarters of "Spectrum," the world security organisation featured in this imaginative TV. programme. I made up the announcement, of course, but, if Captain Scarlet was chasing a Mysteron agent, the chances are he would be driving a "Spectrum Pursuit Vehicle." (The Mysterons, by the way, are a race of alien beings from another planet determined to destroy the earth.)

What, you may ask, has all this got to do with *Meccano Magazine*? The answer you will have already guessed—Meccano have produced a Dinky Toy model of a Spectrum Pursuit Vehicle, under licence for Century 21 Toys Ltd. It is a very large toy—more than 6 in. long by $2\frac{3}{4}$ in. wide by $2\frac{1}{8}$ in. high—and its striking colour-scheme of pale metallic blue with soft white ramming cushion at the front is enough to make it stand out in a crowd. The effect is strengthened by white "SPV" identification letters on the sides and front of the model together with the Spectrum insignia of a black-edged gold "S" superimposed on concentric violet, indigo, blue, green, yellow, orange and red rings—the colours of the spectrum, in fact!

Impressive as all these features are, though, they pale into insignificance immediately the model is studied at close quarters. It's packed with so many action features that I hardly know where to begin my description, so probably the easiest course is to follow the order in which I found the features.

Firstly I was puzzled by a set of four small caterpillar tracks tucked up behind the ten road wheels at an angle of about 45 degrees. There seemed little reason for these, unless they were to give the S.P.V.

the initial push up very steep hills! Understanding soon came, however, when I discovered that all four tracks clicked down to ground level as a complete unit so as to help the vehicle over difficult terrain.

Next I tried turning a small wheel protruding part way through the roof of the model, towards the rear, and a pair of black radio aerials, previously lying along the roof, jumped into an upright position. "Very novel," I thought, but I received my greatest surprise when I pressed a little silver fin in the top of the casting—a large hatch in the side of the model shot outwards and, believe it or not, a moulded seat carrying a miniature "Captain Scarlet" swung down to ground level! And, as if this wasn't enough, the tiny figure actually looks like the indestructible Captain, being "dressed" in a black uniform with red hat, tunic and boots. Quite remarkable! To "reload," the seat is simply folded into the "up" position, remembering that it *must* be upright, and the hatch on its extending arm is snapped back into the body casting.

So far, all my discoveries had been made as I "fiddled" with the model in my hands. Now, I put it down to test for springing. Imagine my surprise when, as I pressed down on the front, another hatch above the nose sprang open to reveal an aggressive-looking, rubber-tipped rocket primed for action. I pressed down harder and the rocket was away, propelled by a powerful little spring. Talk about play-value!

The two entirely independent actions of the hatch opening and the rocket firing intrigued me, so I investigated, to find that they were triggered by the front axles, the first operating the hatch and the second the rocket. With this system it is of course possible to open the hatch without necessarily firing the rocket automatically, which to the best of my knowledge is a unique feature. In fact, I have no hesitation in saying that the Spectrum Pursuit Vehicle, as a whole, is unique. Remember the Sales No.—104.

FORD ESCORT FOR DINKY

A new release from both Ford and Dinky that is up to the minute

SECRECY HAS hung over the Halewood plant of the Ford Motor Company like a cloak for some years now—a cloak designed not to hide any unlawful activities, but to guard the secrets of a striking new car in process of design and production. This same cloak of secrecy has reached out to envelop the works of Meccano Ltd. in Liverpool. Why? Because, thanks to the confidence of Fords, Meccano have been preparing the tools and dies for a Dinky Toy model of the new car, and this long before anybody outside the Ford Company, and many people inside it, had any knowledge of what was in the air!

For Meccano to be able to produce a Dinky Toy, they need detailed information on shape, features, etc., of the original vehicle. Fords supplied this information far in advance of the release of the real car and Meccano have asked me to express their sincere gratitude for the confidence placed in them.

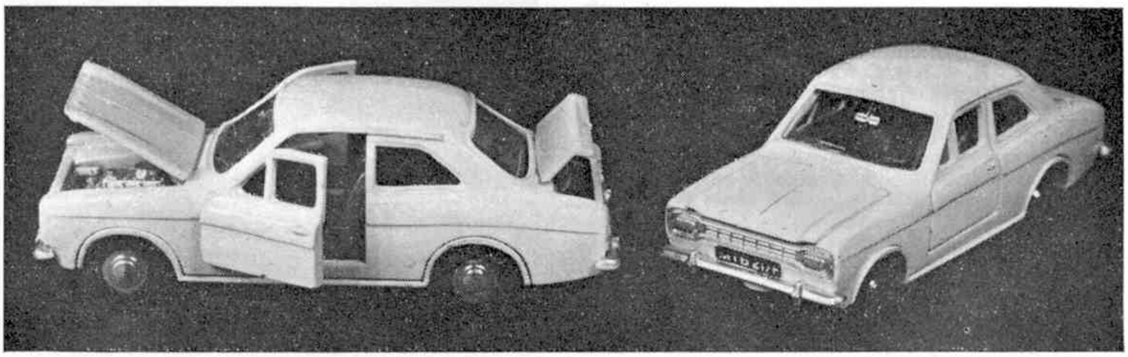
Mind you, they have taken great pains not to abuse this confidence. No more than a handful of top executives in the Company knew what the model in preparation was based on. To everybody else, it was known only as "Dinky Model X," which, I am sure you will agree, gives nothing away!

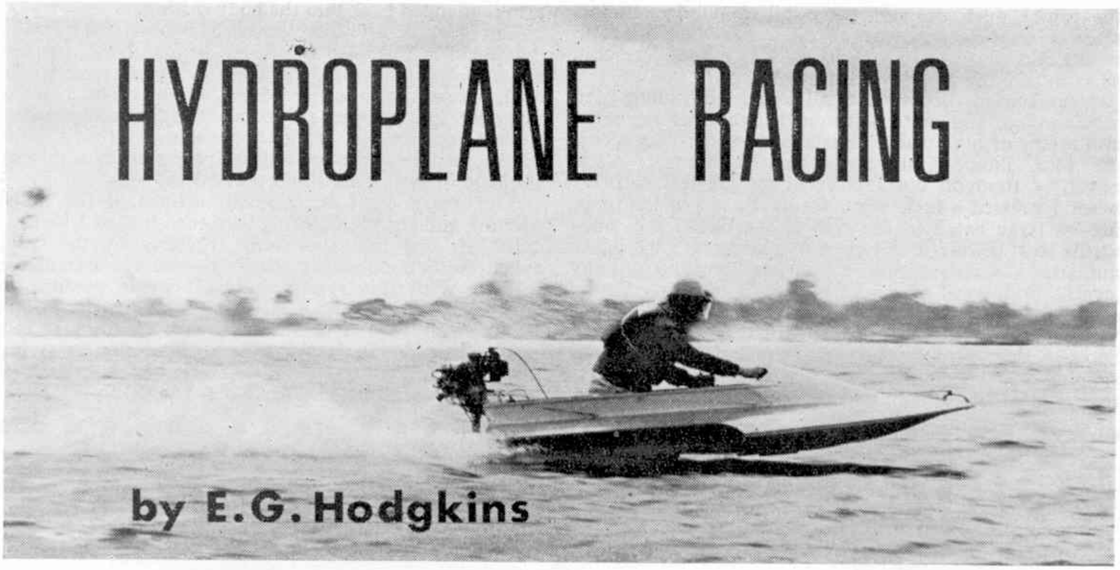
When this magazine first appears on the bookstalls, the new Ford, as well as the Dinky, will just be on sale, and so you will know the subject of all past secrecy—the Ford Escort, designed as the successor to the top-selling Ford Anglia. I had the privilege of seeing and travelling in the Escort at a pre-release Press Show, held at Halewood shortly before Christmas, and I now have no hesitation in predicting an even greater success for it than for the famous Anglia.

Besides the normal De Luxe car, the Escort will be available in Super, GT and Lotus-engined versions. Unfortunately, no technical specifications for any of these have been released at the time of writing, but the GT model I travelled in gave a pretty impressive performance, despite carrying four adults.

If I was pleased with the real car, everybody I spoke to at Fords was delighted with the Dinky Toy model, Sales No. 168. An excellent reproduction of the original, it is fitted with two wide-opening doors, plus opening bonnet and boot, detailed engine, windows, seats, steering wheel and number plates. The front seats tip forward as they do on a conventional two-door car. In addition, rear-view mirror and windscreen wiper representations appear on the windscreen.

Finish is in pale blue gloss with red interior, silver bumpers and radiator grille and silver-plated base. Actually the baseplate is so designed to follow the contours of the body casting that it gives the effect of a silver-plated trim strip on the body. It's really very striking!





HYDROPLANE RACING

by E. G. Hodgkins

OF THE many forms of high-speed racing performed in this country, probably the least known is Hydroplane racing. This sport is for those with sufficient capital to build or buy a perfectly smooth hull powered by a very highly tuned two-stroke engine with a tiny propeller.

The first requirement for this sport is a large expanse of smooth water. Such a spot is the large gravel pit at South Cerney, Glos., where the Bristol Hydroplane Racing Club hold regular meetings. All the illustrations to this article were taken during race meetings organised by the Bristol Club.

A Hydroplane has a flat hull with two "sponsons"—blades for keeping the craft on a straight course—projecting below the water. The driver kneels in the cockpit behind a steering wheel, a position which is far from comfortable when the craft is jumping from one wavelet to the next at high speed. To quote one man who was given a ride, it was "like driving a high-speed car with solid tyres over a frozen, ploughed field pursued by wailing banshees." Nevertheless, he is reported to have thoroughly enjoyed his ride, so this is probably an exaggeration.

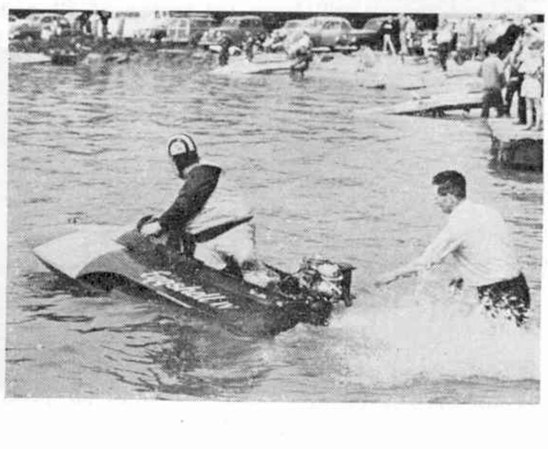
The engine, tuned to run at peak speeds of up to 10,000 r.p.m. for most of the time during racing, will propel the hull over the surface at speeds of anything up to 60 m.p.h. There are several classes of craft, depending on engine capacity. The main classes are: Class A for engines up to 250 c.c.; Class B for engines up to 350 c.c.; Class C for engines up to 500 c.c.; Class F for engines up to 850 c.c.; Class X for engines up to 1,000 c.c.

The smaller engines generally have two cylinders while the bigger ones may have four or six. The sight of a Class X hull smoothly sweeping past a group of smaller craft, all going "flat out," is an exhilarating experience.

To avoid the need for running a large number of races for individual classes, a handicap system is generally operated. A competition consists of a series of, say, three heats, all craft taking part in each heat. Between heats the handicaps are amended accordingly to the results of the previous heat. Points are awarded for the positions in each heat and the eventual winner is the competitor having the highest number of points overall.

Races are started in the following sequence: First, a gun is fired five minutes before the start. The minutes are then counted down on a giant board on the bank while the hydroplanes are started and taken out to the "milling area," where they cruise around waiting for the "off." At one minute to the start, a huge clock on the bank is started to tick off the last 60 seconds. At "time" a second gun is fired, the clock continuing to rotate, and each driver then leaves the "milling area" to pass the start at the time laid down by his handicap. These handicaps may be of anything up to one minute and it is not unusual for the smaller craft to be well into their second lap before everyone is in the race.

At South Cerney, each lap is about four-fifths of a mile long and the Class X craft lap in about 50 seconds. Each heat consists of six laps. If the handicap system is working properly—and barring breakdowns—all craft should be in the last lap together. Hence the finish generally turns out to be very tense and exciting.



Junior Electronics

Improving your Photo-switch

by R. H. Warring

THE SENSITIVITY of the photo-switch described in last month's issue can be greatly improved by the addition of another transistor to provide amplification, plus a second sensitivity control (potentiometer). This will enable your photo-switch to be adjusted to operate at very low light levels as well as when a very bright light is directed at it. This has the advantage that it can be adjusted to work on "evening daylight" as well as bright lighting.

The method of working is exactly the same. The unit is initially adjusted so that the relay just pulls in with the normal level of illumination reaching the photo-transistor via the opening in the case. Any reduction in level of this illumination causes the relay to drop out and connects the three-volt batteries directly to the external connections to operate an alarm bell or three-volt bulb.

You may find it necessary to reposition the relay slightly in order to accommodate the second potentiometer in the case. The second transistor, however, can easily be mounted on the $2\frac{1}{2}$ in. x 1 in. x $\frac{1}{4}$ in. balsa strip, when connection is completed as shown in Fig. 1. Note that this is quite a different circuit to that of the original photo-switch—i.e., the whole unit needs completely rewiring. Use the circuit diagram of Fig. 2 as an additional check that you have made these connections correctly as, if you reverse the polarity of the PP3 battery supply to the transistors, for example, you could ruin them. The pencell connections are exactly as before.

Additional components required: one Mullard OC 201 transistor and one 0-20 kilohm potentiometer.

Adjustment

With PP3 battery pack connected, cover the light opening and adjust the 5 kilohm potentiometer control until the relay just pulls in. Then back off the adjustment, i.e. increase the resistance of the potentiometer for about a quarter-turn past the position where the relay drops out again.

Now uncover the light opening and adjust the 20 kilohm potentiometer for the relay to just pull in at the level of illumination to be used. Adjustment to different levels of illumination can be made with the 20 kilohm potentiometer without further adjustment of the 5 kilohm potentiometer, unless the battery voltage falls off appreciably.

FIG. 3

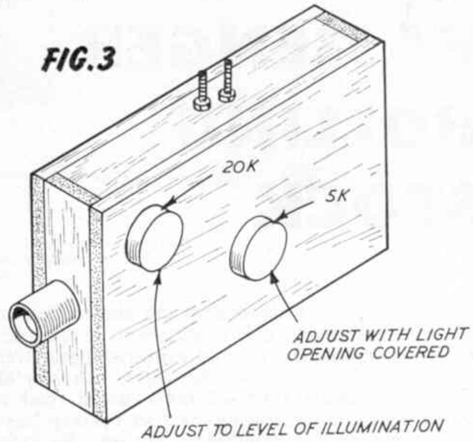


FIG. 2

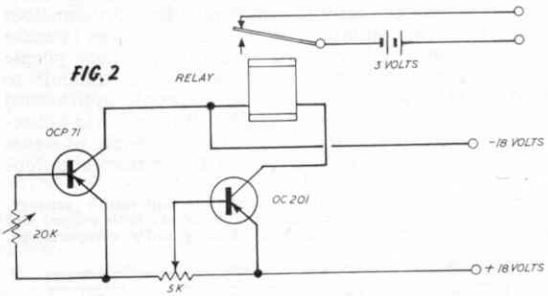
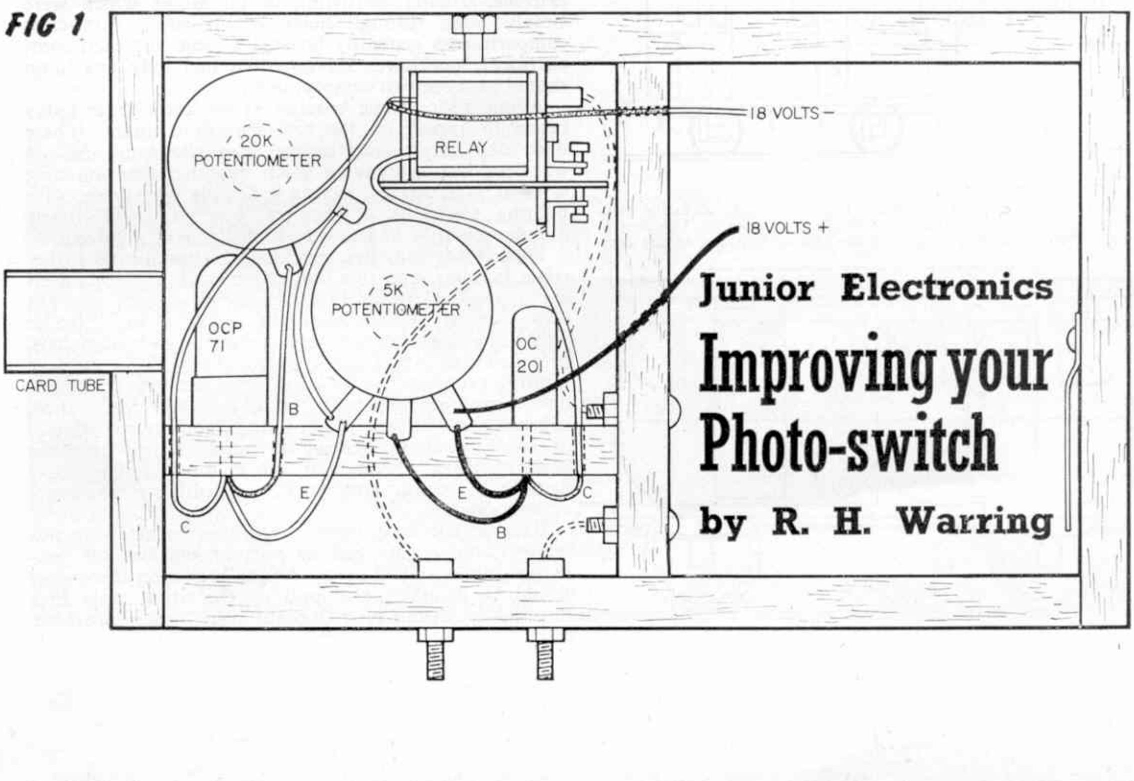


FIG 1

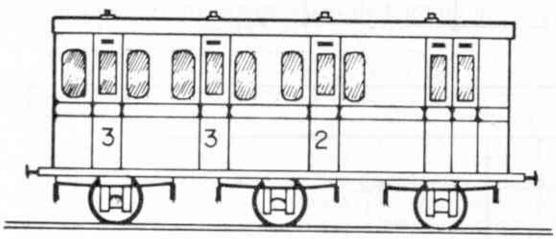


ABC of Model Railways Part 3

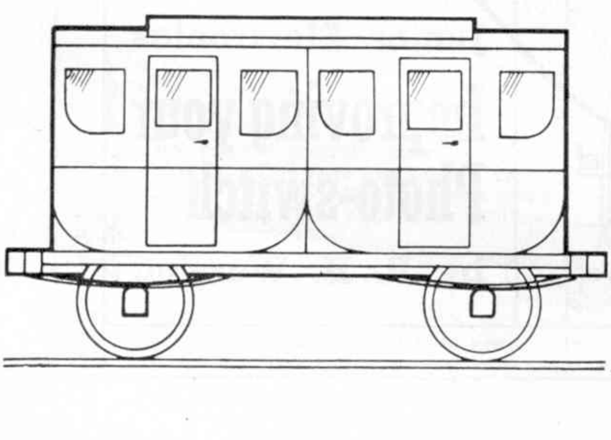
PASSENGER ROLLING STOCK

IN ORDER to fully understand the modern railway passenger coach, it is necessary to take a peep back into the very earliest days of railways themselves. The terms " coach " and " carriage " are both very old, and applied to certain types of horse-drawn road vehicles long before the coming of the first railway line in the early years of the nineteenth century. Back in those days, the pioneer railway companies found themselves faced with two definite problems; the first was to make the trains go at all, and the second to persuade people to travel upon them! These days, it is difficult to imagine the fear with which some people approached the new-fangled railway trains, but it is easier to understand when it is realised that, until the coming of steam rail traction, man could travel no faster than a galloping horse. Then, almost overnight, there were trains which could travel thirty or even forty miles in one hour! It is little wonder, really, that many were very uneasy about travelling by railway. The railway companies thought that the best way to combat this mixture of fear and ignorance in their potential customers was to make the vehicles in which they were to travel *look* as much like the familiar road coaches (or " carriages ") as possible. Thus, the very first railway coaches used on lines like the London and Birmingham Railway and the Liverpool and Manchester Railway looked exactly like slightly enlarged " stage coaches," rather like those vehicles that are familiar to us through the medium of Wild West films. These coaches were very short, with one central door in each side, and carried six or eight people, facing each other across a gangway running across the vehicle. A luggage rack was usually provided on the roof (shades of the modern motorist's roof rack) and the windows in the sides were usually of the " three-cornered " type (see drawing). It should be mentioned that coaches such as these were usually only provided for first-class passengers—second and third-class travellers had to put up with far worse things, usually with no roof at all, and often without seats!

A typical six-wheeled coach of the late nineteenth century. The vehicle is a " brake composite," as it has both second and third-class accommodation and its own guard's compartment.



A very early railway carriage. The vehicle is virtually two " stage coaches " mounted on a single underframe. The three-cornered windows and roof rack are typical features of the era.



As passenger traffic on the early railways grew, the little " stage-coach " vehicles were found to be too small; too many individual vehicles had to be attached to each train. The logical answer to the problem was to provide longer coaches and these took the form of *two* little " stage-coaches " mounted on a single underframe. Unwittingly, the well-known British " compartment " coach had been invented.

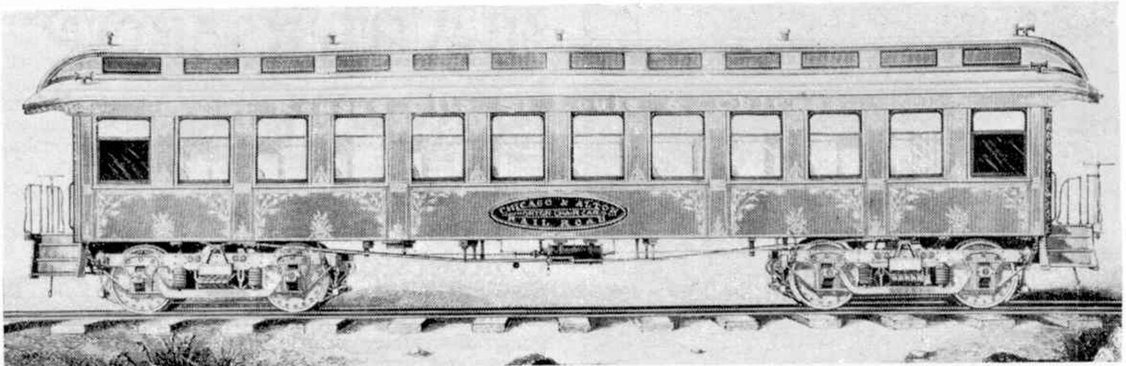
As time progressed, the two-compartment coach grew to three and even more compartments and the " stage-coach " look gradually disappeared. Longer vehicles needed extra wheels to carry their weight and provide steady running on curves. Usually one extra axle was added, midway between the other pair (see drawing) and the six-wheeled coach in this form was the most common type of vehicle found on British express trains between the years 1870-1890.

Coach lighting was, for many years, crude in the extreme, usually consisting of oil lamps which were simply fitted through holes in the roof. First-class compartments generally boasted a lamp for each compartment, but lower classes often had only one lamp shared between two compartments.

About 1880, bogie coaches as we know them today began to appear on the best main-line trains. These were not only much longer than the four and six wheelers, but also gave a much smoother ride and were safer at high speeds, having a flexible wheelbase. Gas lighting made its appearance, but was not entirely popular because of the very high fire risk involved.

During the 'nineties, corridor coaches started to become familiar, and this innovation made the restaurant car a practical proposition for the first time, and put lavatories within reach of the entire train. Electric lighting, using accumulators and belt-driven dynamos, provided a safe and satisfactory answer to the carriage lighting problem. At the turn of the century, the main-line coach, as we know it, had arrived. Since then, coaches have become much longer, and construction is of steel nowadays instead of wood. Third-class has been abolished throughout the country, leaving only first and second, and greatly simplifying passenger accommodation.

Back in the early days, continuous brakes were unknown; the engine had its own brakes, but the passenger carriages had none. As the brakes on the engine would be insufficient to pull up the whole train in a respectable distance, a " brake van " was provided,



An American Pullman Car of the 1860's. Bogie coaches made their appearance in the United States many years before they were common in Britain.

usually at the end of the train. This vehicle, as the name suggests, was a van equipped with a screw brake, which was worked by the guard. Luggage space was also provided in the brake-van, and sometimes a couple of passenger compartments as well. The term "brake-van" has stuck and it is still in use today for the guard's compartment of a modern coach, although it has really lost its true meaning.

We have briefly traced the history of the railway coach, and seen that the modern, all-steel vehicle is a direct descendent of the little vehicles of the 1830's, and even of the horse-drawn road coaches of the eighteenth century. Now we shall look at some of the terms applied to railway passenger rolling-stock, which often mystify newcomers to the railway and model railway hobbies.

Any coach which provides accommodation for more than one class of passenger is called a *composite.* Thus, a vehicle with both first and second class compartments is a *1st/2nd composite.* If the same coach included a guard's (or "brake") compartment, then it would be termed a *1st/2nd brake* composite. It must be remembered that the word *composite* only applies where more than one *class* of compartment is used in the same vehicle; therefore, a brake coach with, say, only second class accommodation is called simply a *brake second.*

Many modern coaches are designed without any compartments, as such, at all. There are no internal bulkheads, and a gangway runs between the seats, centrally, from one end of the coach to the other. Such vehicles are called *open* coaches, and most modern suburban coaches are built to this pattern.

Queen Victoria's Royal Saloon, built by the London and North Western Railway, on its way by road to an exhibition. It is over 60 feet long.

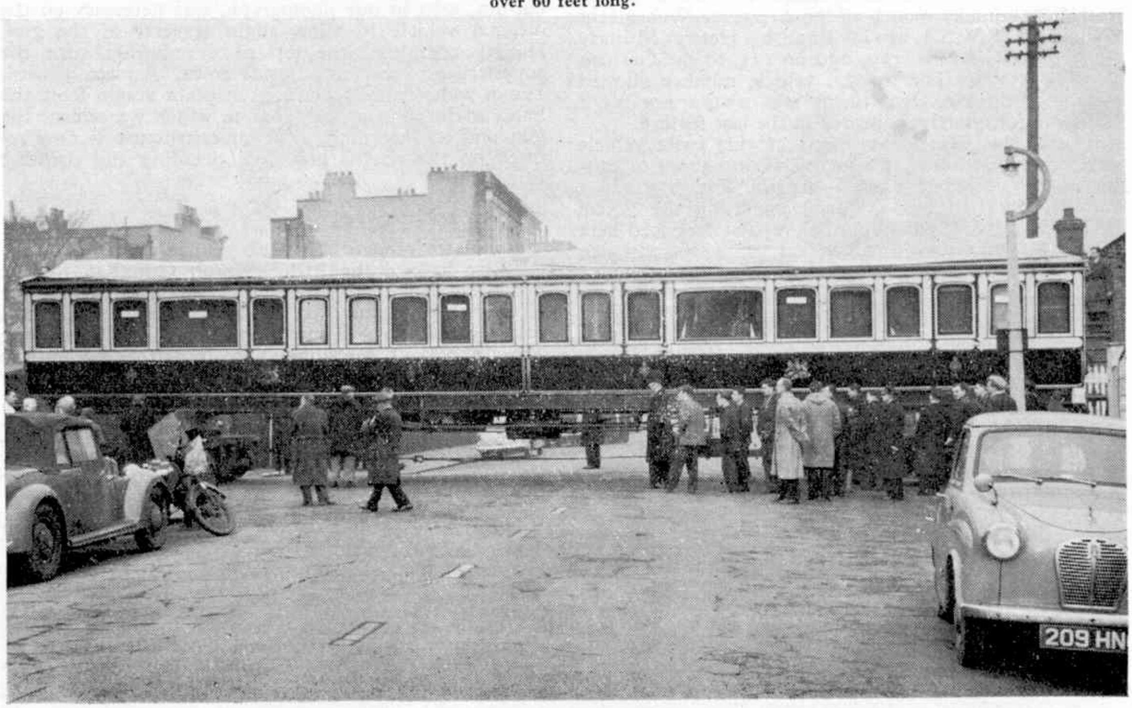
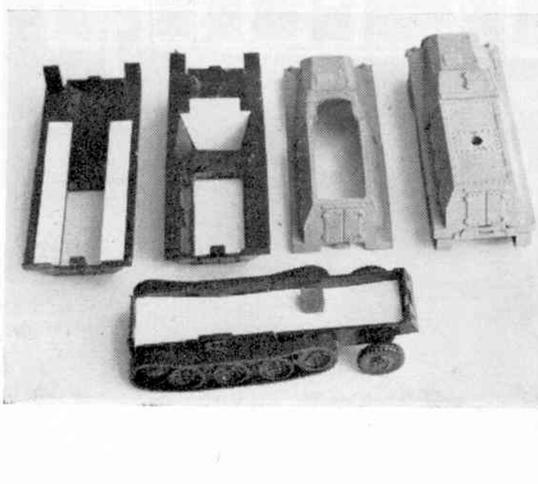


TABLE TOP BATTLES

Semi-Tracked Carrier Conversion by H.L.D.

THE FIRST part of this feature appeared last May in the previous Meccano Magazine, and dealt with the basic vehicle of the Panzer Grenadier Units Sd Kfz, the 251/1 medium Semi-Tracked Carrier. The May issue also described a quick conversion of the ROCO Minitanks model of the Schwerer Wehrmacht Schlepper (S.W.S.) or in English, Heavy Military Carrier, ROCO Nos. 129, 130 or 131, to the German Sd Kfz 251/1. The Special vehicle number allotted by the Ordnance Department was 251/1 not 25/1 which, unfortunately, appeared in the last feature.

Twenty-two separate versions of this basic vehicle were constructed, and this month we are about to construct the very last model—the Sd Kfz 251/22, a Panzerjaeger (Antitank vehicle) mounting the 7.5cm PAK 40 Antitank gun. Another version described here is the Sd Kfz 251/9 which carried a short 7.5cm Cannon, and was one of the first German self-propelled guns. Both these vehicles were attached to Panzer Grenadier Companies during 1944, in a ratio of about one to every four standard Troop Carriers. The 251/9 served in a general support role and the 251/22 as the main Antitank defence vehicle of these companies.



The Sd Kfz 251/22

The first thing we need is the complete gun and floor assembly from the Airfix Sd Kfz 234 Armoured Car Kit (Part Nos. 1 to 6). Assemble these as instructed for the Airfix Armoured car. The floor is then carefully trimmed away, leaving just a 12mm base for the gun mounting.

This is exactly the same as for the standard Sd Kfz 251/1 described in the May issue of Meccano Magazine. Just to recap for those who may have forgotten: we discard the swivelling equipment from the basic ROCO model and cut away the roof plates to give an open-top compartment. The remainder of the work required is to fill any gaps in the hull and detail the model. For the 251/22 we cut a further section from the roof of the driver's cab—this can be patterned from the part No. 17 of the Airfix Armoured car kit. This cut-out, seen in our photograph, was necessary on the original vehicle to allow slight traverse of the gun. Having completed the top plate removals, turn the superstructure assembly upside down. A piece of card, 12mm wide, is now cemented in place 20mm from the back, so forming a bridge on to which we cement the gun and its mounting. The superstructure is now refitted on the chassis and final detailing and painting carried out.

The Sd Kfz 251/9

Again we prepare the basic vehicle as before. This time we look to the Airfix Assault Gun Kit, for the necessary additional parts. We use Part No. 55, the base of the gun and No. 56, the gun mounting. Carefully cut the pivot points from No. 56 and into these we clip No. 55 the gun. Now from the roof of the driver's cab on our semi-track, we cut a slot 7mm wide and 7mm deep. On either side of this slot we cement the pivot points of the gun. Front armour was extended upwards and we duplicate this with pieces of card 4mm high and 4mm wide, cemented on either side of the roof in front of the gun. This armour was tapered backwards on the sides.

Our prototype photograph shows a Sd Kfz 251/9 during action in Russia in the 1941 campaign. Our

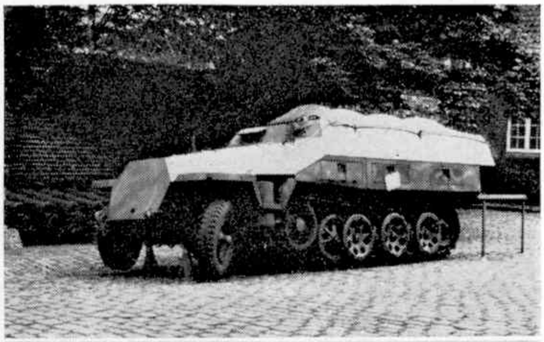
Above top, the finished product, our ROCO model converted to an Sd Kfz 251/9. Airfix figures are used, those in snow capes being converted from Arabs. Centre, our Sd Kfz 251/22 in action during the winter. At left, the basic conversion steps. From right to left, we have the unmodified ROCO model; the superstructure with top plates removed; the bulkhead filled behind the engine; new track covers/seats and finally a new floor fitted to the chassis.

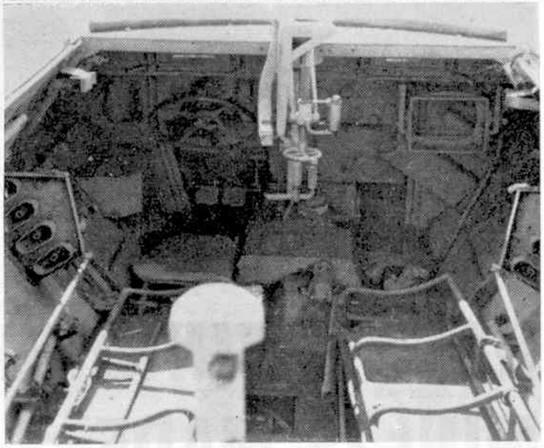
model, however, more closely resembles the version that appeared in 1943. The necessary performance figures for Battle-Gamers are: the road speed of the 251/9 was unaffected, so this can be taken as being about 30 m.p.h.; the 251/22 was somewhat overloaded thus reducing its speed to 25 m.p.h. The armour protection is only proof against small arms, machine gun fire and the blast and shrapnel caused by high explosive artillery fire.

Scoring and firepower

The 7.5cm PAK 40 is the same as the standard German 75mm guns used in the Assault guns; the short 7.5cm does not have the same penetration power when used against armoured vehicles, but serves as an equal weapon when used for the high explosive artillery.

As you will remember, the suggested battle rule is that a gun can only take three shots at any one target. Both these vehicles described here cannot traverse their guns fully, so they can only engage one target per move. Indicate your target before firing. The dice indicates a hit or miss—above the score of six a hit, and below a six a miss, when using two dice. All 75mm (7.5cm) guns and larger have a high explosive capability. Their damage circle diameter is similar to that of the 25 pounder or 105mm Howitzer, i.e. one inch. Again indicate your target, and let the dice decide the success of the shot. Above four, a complete hit; three, blast damage only; below three, a miss (one dice only for this). Unless otherwise specified, the range of such weapons, including that of our Sd Kfz 251/9, is 14 in.





Top right, the original basic Sd Kfz 251, described in May 1967 Meccano Magazine, which we simulate with the ROCO S.W.S. suitably modified. Centre, for the detail modeller—a view of the interior of an Sd Kfz 251. Below, an Sd Kfz 251/9 in action in Russia during 1941. Note the simple camouflage technique.

HOW THE MONTE CARLO RALLY WINNING MINI IS MADE

John Stanley explains the BMC method of converting a small domestic family saloon car into an International Rally winner second to none

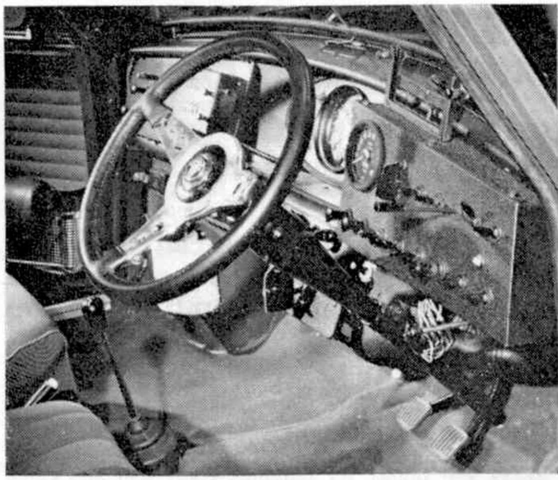
IMAGINE A deep misty forest of pine trees. It is early morning and only the musical chatter of the birds relieves the damp silence. Then, quietly at first, building into a great roar, we first hear and then see the arrival of Britain's most successful and famous International Rally car. It is, of course, the British Motor Corporation Mini Cooper S, and such forests are as much its natural habitat as they are to the birds. These tiny scarlet and white cars hurtle quite safely over rough mountain tracks at 80 m.p.h. in snow, ice and rain, where most Land-Rovers fear to tread. Not that the Mini, or ADO 15 as it is known in the designers' world, was ever built with such speeds or treatment in mind. Far from it; it was the brain-child of designer Alex Issigonis who produced the car primarily as a family vehicle. All of the development that has gone into producing the Mini Cooper and Mini Cooper S has been carried out by the twelve skilled mechanics who work in the BMC Competitions Department under the eye of the Competition Manager. During the course of a sporting year, these twelve men are responsible for building six "works" cars each, a total of 72 for use by the leading BMC team drivers, like Paddy Hopkirk and the "Flying Finns" Rauno Aaltonen and Timo Makinen.

Since the establishment of Competition Department back in 1955, it has been very successfully developed. The present Competition Manager is Peter Browning and his Department has the most consistent and successful Rally team in the world, and has now collected more International victories than all the other British teams put together. The Mini's personal score of major Internationals is in excess of 25 and each victory represents eight weeks of planning and construction, behind the scenes.

The empty body shells are brought into the Competition Department from the ordinary production lines and two skilled mechanics transform them into 100 m.p.h. Rally machines. The Cooper S has twin petrol tanks which hold 11 gallons and the fuel lines, wiring and suspension fluid pipes are taken through the inside of the car rather than along underneath, where they could be torn off on the very rough mountain tracks. The suspension is the same as the Cooper S but differs from the standard Minis and Coopers, inasmuch that small displacers are fitted into the hydrolastic piping, to prevent violent surging of the fluid every time the car hits a bump at high speed. Harder linings and disc pads are fitted to the brakes, which have a hydraulic servo to help lessen the effort needed to stop the car at these high speeds, and a set of lightweight magnesium alloy wide-rim wheels are fitted. These are far lighter than the standard steel wheels and let much more cooling air through to the brakes. With Rauno Aaltonen and Timo Makinen using a left-foot braking technique, the brakes get very hot on a Rally, and at night the front wheel discs actually glow with the heat. BMC mechanics are ready at checkpoints with buckets of water to help cool them off. A strong sump guard to protect the bottom of the engine completes the chassis/body section.

The engine is the well-proven 1,275 c.c. unit with each cylinder bored out by 0.020 in. to give total capacity of 1,293 c.c. for the four cylinders, which develop 90 b.h.p. at the driving wheels with the engine turning at 7,200 r.p.m. The cylinder head is polished and reworked, putting the compression ratio up to 12 : 1 and large $1\frac{1}{2}$ in. SU carburettors are installed on a

The winning Mini of Timo Makinen and Rauno Aaltonen is seen at the start of a "Monte" in our heading photograph. At left, the Makinen-Aaltonen Mini at speed complete with roof rack and spare wheel aloft.



Above left, the reworked interior looks very akin to a jet air-liner cockpit with a maze of instruments and switches. Some of these cars are even equipped with computers to work out average speeds needed. Right, the revised lighting layout really does turn night into day. Note the retaining clips on the headlamps and winkers.

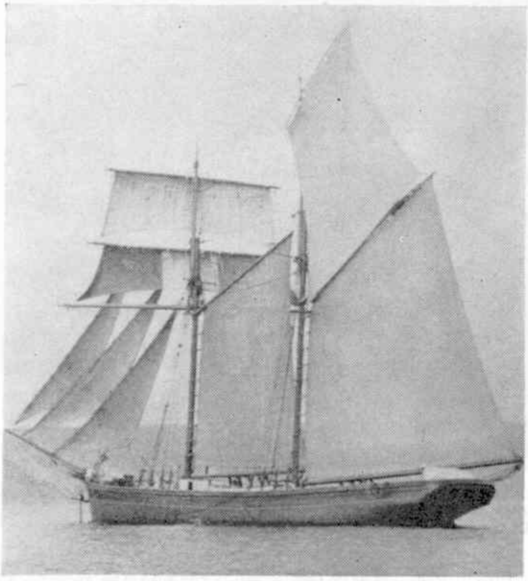
special manifold. An alternator replaces the more usual dynamo, a four-blade fan replaces the standard 16-bladed version and the final drive ratio is 4:1 instead of the standard 3:1. Close ratio, spur cut gears are fitted to the gearbox and this completes the engine modifications.

The inside of the car looks like the cockpit of a modern aircraft, with special gripping, lightweight seats for the driver and navigator; complete set of dials and switches; the full navigational equipment and all the chrome surfaces painted matt black to prevent tiring glare. The noise when rallying is so great that the crew have radio intercom wired between their two helmets so that the navigator can give directions to the driver without having to shout. Fuse boxes are mounted in front of the navigator so a burnt-out fuse can be repaired instantly, without wasting any time by getting out of the car.

Fibre glass wheel arches are added to the bodywork to cover the wide-rim magnesium alloy wheels, and heavy duty mud flaps are carried in front to stop mud flying over the headlights and the electrically heated windscreen. Four powerful Lucas spot and fog lights provide complete vision at night; studded snow tyres keep the car racing over slippery surfaces and four spare wheels and tyres are carried on the back seat and in the boot.

This, then, is the composition of a Monte Carlo Rally winning Mini like those which have beaten the world for the last few years. Mind you, if you built one just like it, no one's going to promise you the kind of success of these famous "works" cars. Sheer skill and a tremendous pride in the workmanship ensures that each mechanic does every little job as perfectly as possible, as just one loose nut and bolt can cause a breakdown and subsequent lower placing in the Rally.

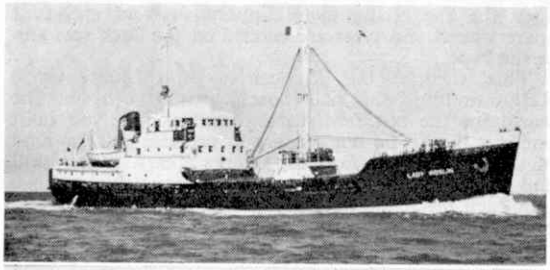
Left, skilled B.M.C. mechanics prepare each "works" rally car individually from a standard body shell obtained from the production lines. Each mechanic builds six cars per year. Right, the revised seating is far more relaxing than the normal Mini "perched" position. These seats, tailored to the driver, greatly reduced fatigue.

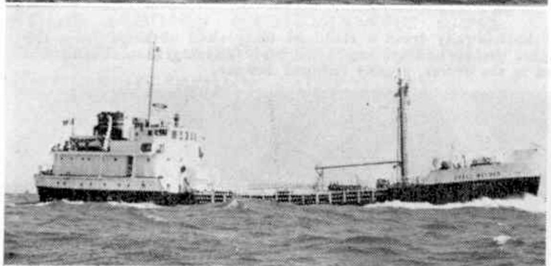


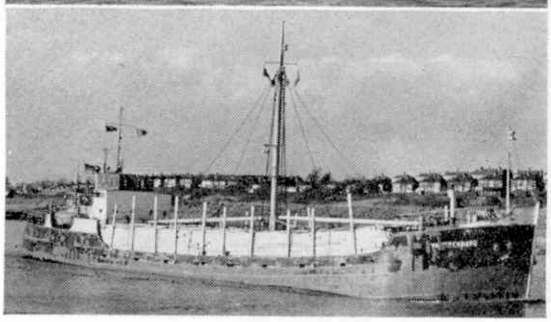
THE COASTAL TRADE

For the past one hundred years the small coastwise ships have served the needs of an expanding Nation

by John Mannering







TOWARDS THE close of the nineteenth century, when the huge population explosion had brought about an increased demand for the basic commodities of life, coastal shipping was fully stretched to supply the needs of the fast growing seaside towns and ports. Bricks and timber for building, corn, coal and china clay were some of the principal goods carried by hundreds of vessels round our coasts. They were nearly all sailing vessels. Two and three-masted schooners, brigs, barges and smart little barquentines, carried cargoes ranging from 80 to 250 tons, into every creek and harbour in the British Isles, and near Continental ports.

Where there were no harbours, ships were run bodily onto the shore, their cargoes discharged and a quick get-away made before the weather deteriorated.

It was the golden age of coastal sail, when the ships were built and manned by local communities, often owned by their skippers or a small group of people who understood the sea. It was a tough, specialised activity which flourished on the great expansion of Victorian prosperity.

Often as many as 200 vessels would be waiting weatherbound in sheltered anchorages such as the Downs of Yarmouth Roads, and when a fair wind set in the great fleet would hoist sail and depart for their destination in the west of England, in distant Welsh ports or in wild Irish estuaries.

They lent a beauty to the seascapes of Britain, which has been preserved for us in the works of many great artists, and opportunities to see their work in museums and art galleries should never be missed; for they tell us of a way of life which has gone, but which helped to produce much that we enjoy today.

The changing conditions of the early years of this century; the havoc of the first World War and above all, the perfection of the diesel marine engine, drove these attractive ships from the sea, so that by the mid-20's there was only a handful left. The coastal trade had been captured by the faster, more reliable and more profitable motor ship. Unaffected by calms and less at the mercy of adverse weather, a power-driven vessel could perhaps make 20 or more voyages a year as against maybe only 12 or 15 by a sailing ship.

In the days of sail the only specialisation of the

At left, top to bottom. The old "Top Sail Schooner" in our heading, seen approaching the Cornish Coast is a fine example from many hundreds of similar vessels used by the coasting trade in the last century. "Lady Roslin" is a 698 tonner with a 5-cylinder oil engine, giving 850 h.p. She belongs to I.C.I. and carries chemicals and new materials. "Shell Welder" of 569 tons is a smart coastal tanker for delivering oil to small ports round the coast. "Trotzenburg" built in 1932 must have sailed many hundreds of miles in her long life; here she is bringing a cargo of timber up the Avon to Bristol. Powered by one oil engine of 320 h.p., she has a speed of 8 knots.

vessels was between those which carried "dirty" cargoes, coal, fertilisers, etc., and those which were reserved for corn, timber, foodstuffs—"clean" cargoes. In effect it meant that the newer, better conditioned ships carried the clean cargoes, and the older, possibly leaky and less reliable ships had to be content with the less attractive freights.

It was the survival of the fittest.

To some extent this continued into the era of the motor coaster. But gradually it was found that certain cargoes were best carried in ships of special design. So although we have long since lost the beauty of sail, we have gained the absorbing interest in watching the development of the coastal cargo carriers to suit the needs of mid-twentieth century commerce.

In matters mechanical, specialisation will always come into its own; and the suitability of a ship to carry a certain cargo, the ease with which she can be loaded and unloaded, the most advantageous dimensions having regard to the ports she will use, the locks and docks to be negotiated, and above all the ease and economy with which she can maintain a satisfactory speed are the many conflicting factors to be studied by the successful naval architect.

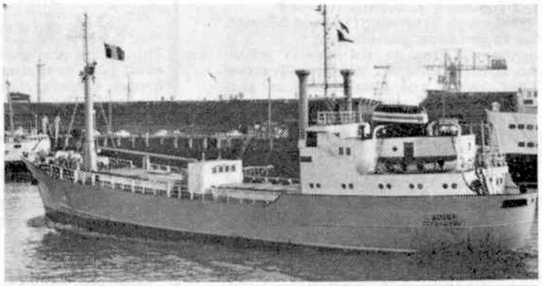
As we stand on a wind-swept headland or walk the shores of a busy estuary leading to a great port, watching the procession of ships passing before us, there is infinite interest in identifying their purpose and nationality.

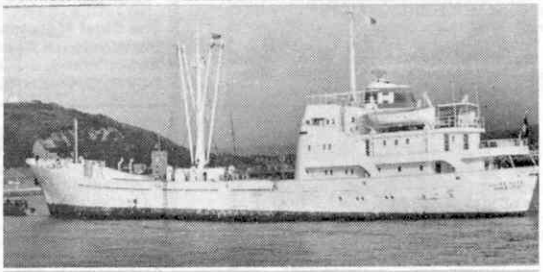
We are so close to Europe that the coastal trade has become to a large extent international, and small vessels from Holland, France, Belgium, Germany and the Scandinavian countries carry on a brisk trade across the North Sea and the English Channel and also carry cargoes on our own coasts.

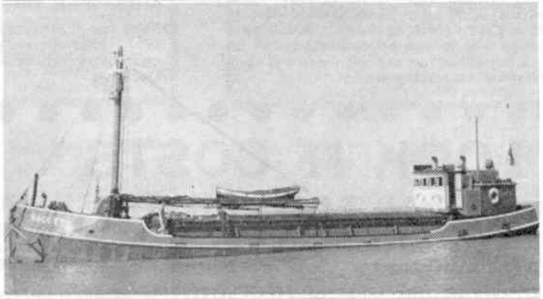
Coasters have increased in tonnage over the years, and there is no precise figure beyond which a ship ceases to be a coaster. From the point of view of classification a coaster is a vessel which primarily earns her living carrying coastal cargoes or runs the short sea routes to the Continent. Perhaps round about 500 to 750 tons is the usual size, for anything above that will find many ports are barred to her. In very specialised trades, such as the carrying of oil, coastal tankers may go as large as 2,000 G.R.T.

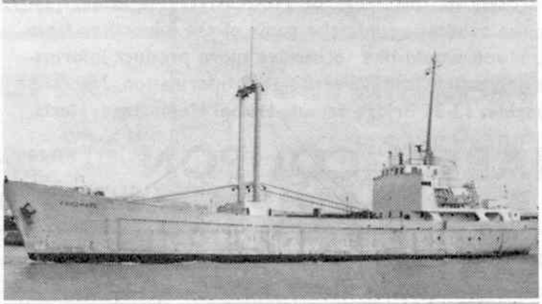
Although they are among the humbler vessels plying the seas, they fill a very important role, for the carriage of bulk goods by water is still infinitely cheaper than by road or rail. The skippers and crews of these vessels know our coasts by heart. Every bay and headland is as familiar to them as their "own back yard," and although they now have all the modern aids to navigations, radar, radio direction finders, electronic depth gauges, and ship to shore telephone, it is still their infinite hard-won knowledge gained through years of experience which comes to their aid on a stormy night off the Northumberland coast when a north-east gale attempts to put them ashore.

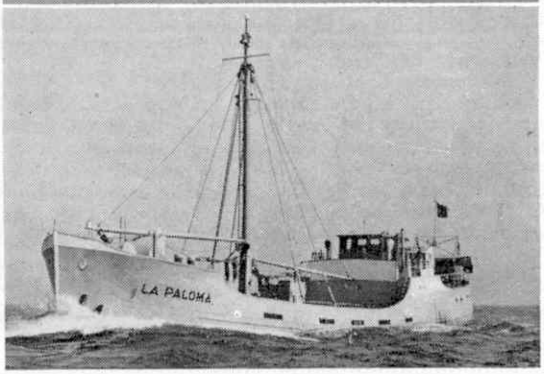
No doubt many of the crews are descendants of those tough sailormen who manned the barges and brigs of previous generations; the sea is in their blood and they serve us well.











At right, top to bottom. "Adler" of 300 tons is specially fitted as a cattle carrier, built in 1957. "Luise Horn" a modern German coaster of 887 tons is powered by a 1,600 h.p., 6-cylinder oil engine. She has comfortable accommodation and her white paint gives her an almost yacht-like appearance. "Success" of 169 tons, built originally as a sailing ketch in 1903, now has an oil engine, and was still trading in the early 'sixties. "Frigomare" is a modern refrigerated vessel of 298 tons, built in 1964, now registered at Oslo. "La Paloma" is a typical Continental coaster of 20 years ago. Such vessels would probably be family manned.

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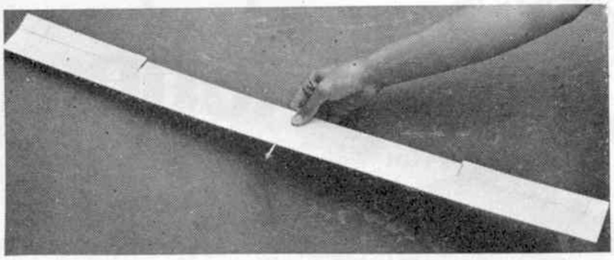

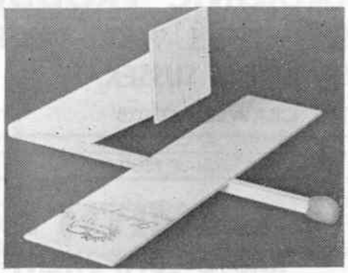

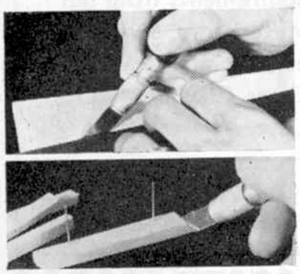

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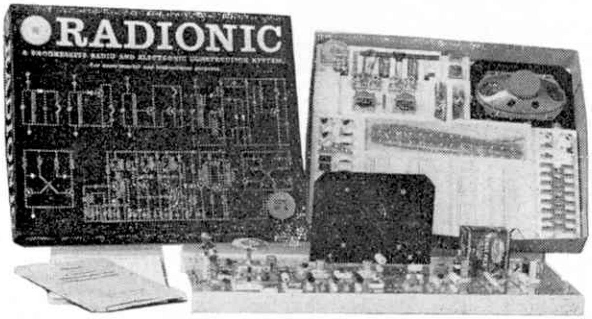

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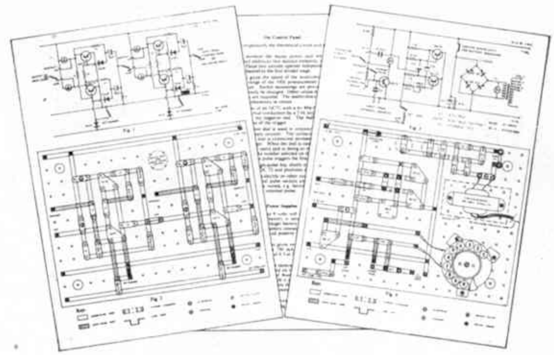

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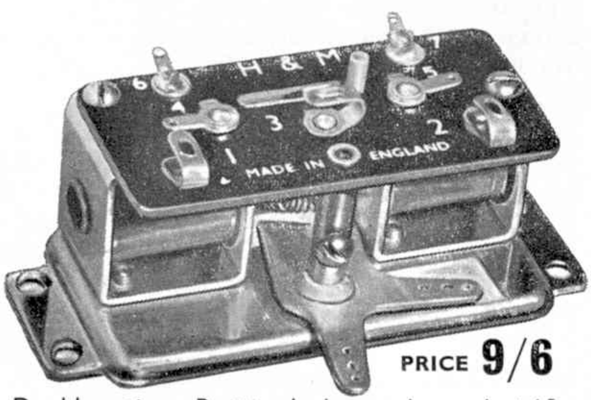

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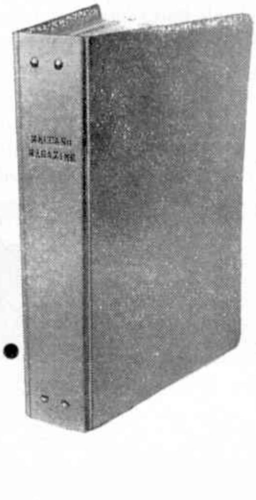

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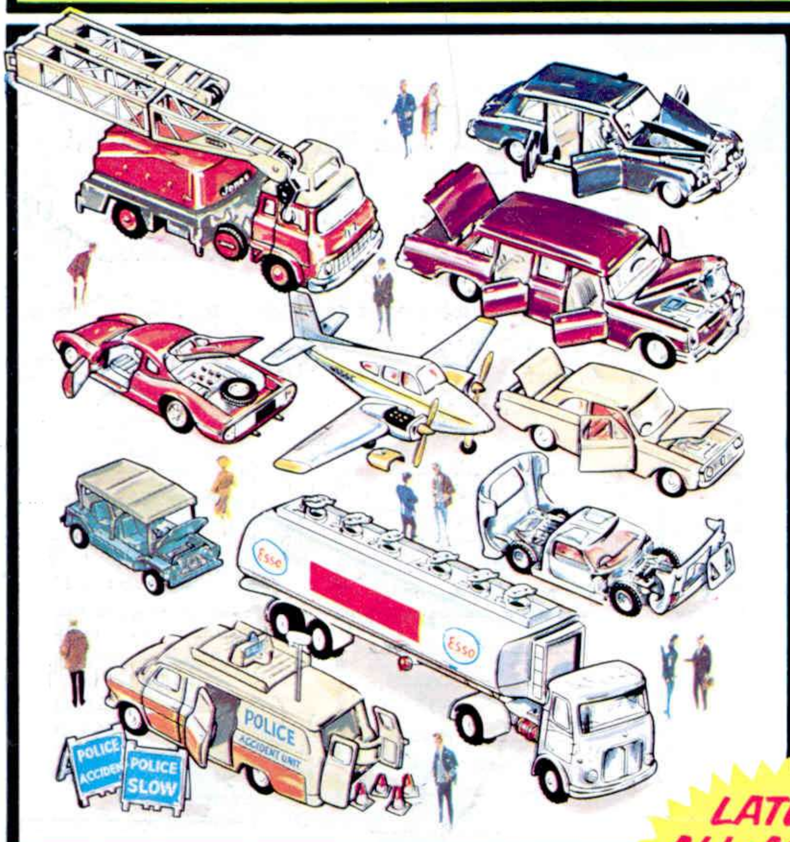

2 ALL–ACTION MODELS FROM

THUNDERBIRDS

THUNDERBIRD 2 WITH THUNDERBIRD 4.

Sensational 2 in 1 special from DINKY - Thunderbird 2 has spring-released telescopic legs - Pod contains Thunderbird 4 for solo flights to high adventure. Superb details. Model No. 101. Overall Length 5⅝".

LADY PENELOPE'S ROCKET-FIRING FAB 1.

Fires 5 Rockets (hinged radiator conceals big block-buster, and there are 4 pursuit rockets). Sliding cockpit canopy - Lady Penelope and Parker - Jewelled multiple head-lights - Super finish - Plated details. Model No. 100 Length 5¾".

LATEST ALL-ACTION SPECIALS!

die-cast in superb detail

A THRILLING MODEL FROM CAPTAIN SCARLET

GREAT NEW TV SERIES

SPECTRUM PURSUIT VEHICLE.

Front hatch opens to fire rocket. Hinged moveable rear track. Retractable twin aerials. Side hatch opens and seat automatically lowers Captain Scarlet to ground. Model No. 104. Length 6$\frac{5}{16}$".

DYNAMIC ACTION FEATURES

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