

BUILD OUR M.M. REMOTE-CONTROLLED TANK

It works and steers just like the real thing—the only snag is that once you've built it, you won't want to dismantle it again! In operation it is uncannily realistic

MODELS that can be controlled from some distance away by a hand-held control box seem to be all the rage these days, and I must admit that the fun you can have with such 'remote control' models is enormous. I was particularly fascinated by a small tank, built from a plastic kit, which I saw at an exhibition in London at the beginning of the year, and on one occasion described it to our chief model-builder. A few weeks later, he presented me with an absolutely fabulous Meccano Tank, working on the same principle as the little model, and I just couldn't resist featuring it in these pages. I hope you like it as much as I do!

The only problem connected with the model lies in its authenticity. As you probably know,

a full-size tank is powered by two engines, each driving one of the tracks. In the same way the model is powered by two Emebo Motors, so it does prove rather expensive but, if you do have the Motors and parts available, it's really worth building.

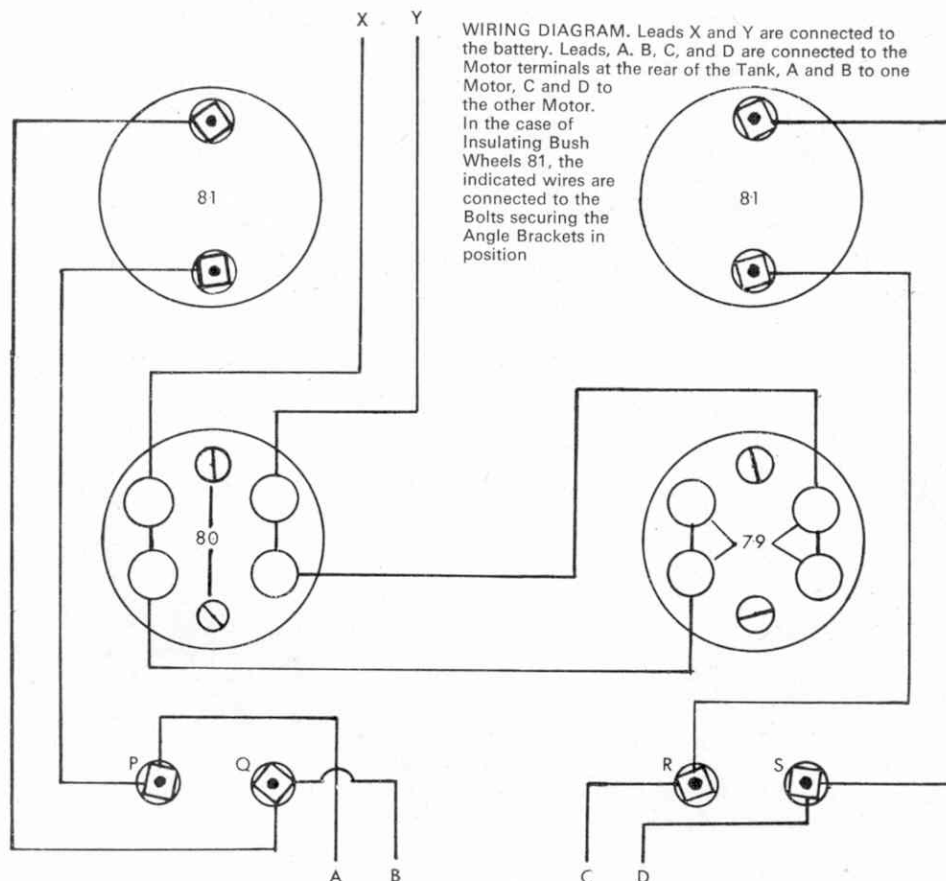
Because of the two Motors, each driving through its own gear box, the tank can be made to perform all the travelling manoeuvres of its real-life counterpart. With both Motors running together, it can be made to move in a straight line forwards or backwards. By operating only one Motor, it can be turned, and by running one Motor forward and the other backwards at the same time, it can be made to turn in its own length. Alternatively, if both Motors are run together in the same direction, with one being stopped intermittently for very short periods, the tank will make gentle turns while travelling forwards or backwards.

For instructional purposes, I have split the model into separate parts for easy identification, as follows:

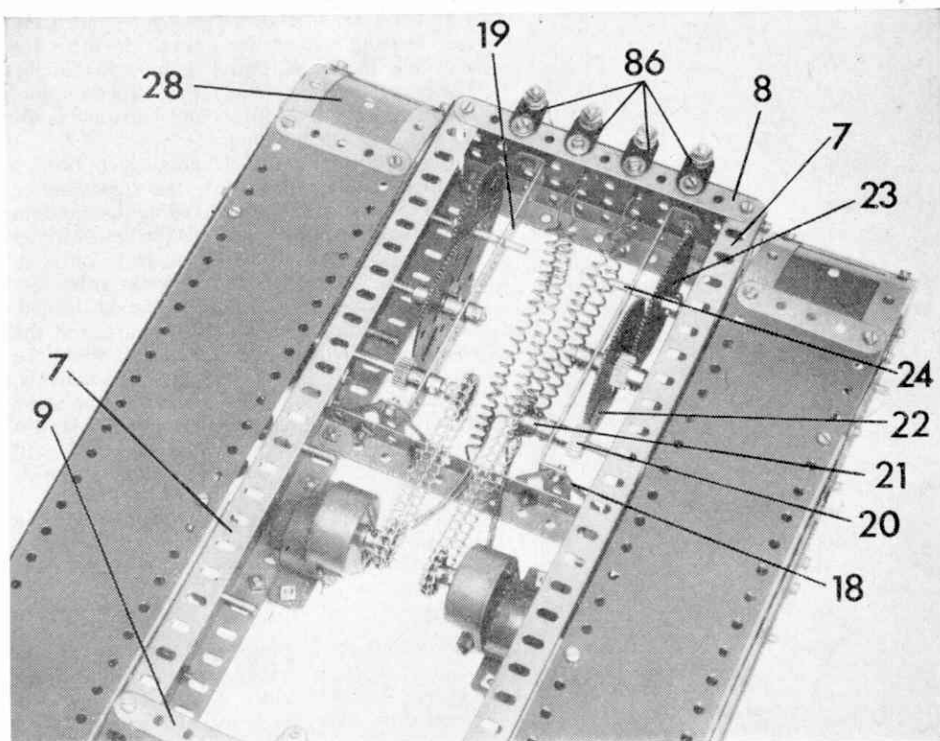
Body

A rectangle is built up from two 12½ in. Angle Girders 1, joined by two 5½ in. Angle Girders 2 and 3 and a 5½ in. Strip 4, at the same time fixing a 5½ in. by 2½ in. Flexible Plate 5 in position. Note that Angle Girder 3 is positioned 11 holes from Angle Girder 2. A 2½ in. Flat Girder 6 is bolted to each Girder 1, as shown.

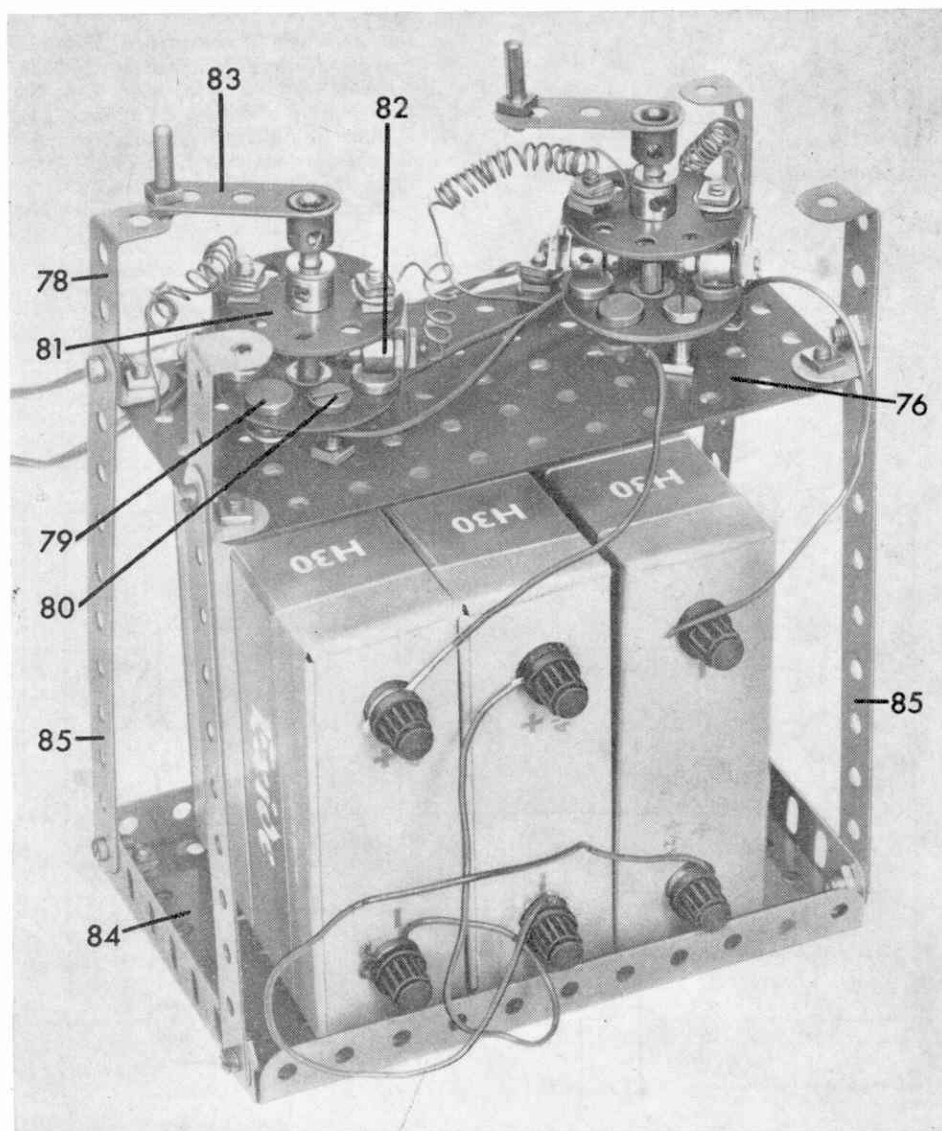
Another rectangle is constructed from two 12½ in. Angle Girders 7, joined by a 5½ in. Angle Girder 8 and a 5½ in. Strip 9, at the same time bolting a second 5½ in. by 2½ in. Flexible Plate 10 in place. The two rectangles are now joined at one side, by a 2½ in. Triangular Plate 11, a 2½ in. Strip 12, and a 2½ in. by 2½ in. Flat Plate 13. At the other side, the



WIRING DIAGRAM. Leads X and Y are connected to the battery. Leads A, B, C, and D are connected to the Motor terminals at the rear of the Tank, A and B to one Motor, C and D to the other Motor. In the case of Insulating Bush Wheels 81, the indicated wires are connected to the Bolts securing the Angle Brackets in position



Above: a close-up view of the motors and gearboxes. Below: the control box, from which the $5\frac{1}{2}$ in. by $3\frac{1}{2}$ in. Flat Plate has been removed for clarity. An alternative 'push-button' control box will be described next month



rectangles are joined by another $2\frac{1}{2}$ in. Triangular Plate 14 and a $5\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Flat Plate 15. A second $5\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Flat Plate is bolted in place at the back, while Flexible Plates 5 and 10 are brought together at the front and fixed to a $5\frac{1}{2}$ in. Angle Girder 16, which is attached to Triangular Plates 11 and 14 by Angle Brackets. Strip 12 is connected to Flat Plate 13 by a $3\frac{1}{2}$ in. Strip 17.

Both gear boxes are identical. Two Flat Trunnions 18 are bolted to Angle Girders 3, then each Flat Trunnion is connected through its apex hole to the Flat Plate at the rear by a $5\frac{1}{2}$ in. by $\frac{1}{2}$ in. Double Angle Strip 19. Journalled in the second hole of the Double Angle Strip and the corresponding hole of Strip 17 is a 3 in. Rod carrying a $\frac{1}{2}$ in. Pinion 20, a Collar, and a $\frac{1}{2}$ in. Sprocket Wheel 21. In mesh with Pinion 20 is a $2\frac{1}{2}$ in. Gear Wheel 22, on a $2\frac{1}{2}$ in. Rod, held in place by a Collar. Also fixed on the Rod is a second $\frac{1}{2}$ in. Pinion in mesh with a second $2\frac{1}{2}$ in. Gear Wheel 23 on a 5 in. Rod 24, which protrudes approximately 3 in. through Flat Plate 13. An Emebo Motor, with a $\frac{1}{2}$ in. Sprocket Wheel fixed on its output shaft, is bolted to each Flat Girder 6. The Sprocket Wheel is connected to Sprocket Wheel 21 by Chain.

Track covers and tracks

As in the case of the gear boxes, both sets of track covers and tracks are similarly built, therefore it is necessary to describe only one of them. Angle Girder 7 is extended seven holes by a $7\frac{1}{2}$ in. Angle Girder, to the side flange of which a Flat Trunnion 25 is bolted. A compound $16\frac{1}{2}$ in. by $2\frac{1}{2}$ in. strip plate is now built up from a $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Flexible Plate 26, a $12\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Strip Plate 27 and a $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Curved Plate 28, edged by two $2\frac{1}{2}$ in. Strips and two Formed Slotted Strips. When complete, it is bolted to the upper flange of the $7\frac{1}{2}$ in. Angle Girder, being attached to Flat Plate 15 at the rear by an Angle Bracket.

A compound 15 in. angle girder is obtained from a $12\frac{1}{2}$ in. and a 3 in. Angle Girder and is bolted to the outside edge of the compound strip plate. Bolted, in turn, to the vertical flange of this compound girder are two $1\frac{1}{2}$ in. Corner Brackets 29 and 30, two $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Triangular Flexible Plates 31, a $9\frac{1}{2}$ in. by $2\frac{1}{2}$ in. Strip Plate 32 and a $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plate 33. Parts numbered 31, 32 and 33 are edged by a $9\frac{1}{2}$ in. Strip 34, extended by a $2\frac{1}{2}$ in. Strip. Plate 32 is connected to the body by two $2\frac{1}{2}$ in. by $\frac{1}{2}$ in. Double Angle Strips 35, the outside lugs of which are spaced from the Plate by three Washers on the shanks of $\frac{1}{2}$ in. Bolts. At the front a $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. Flexible Plate 36 is connected to Plate 26 by Obtuse Angle Brackets, at the same time fixing a $2\frac{1}{2}$ in. Strip in position.

If the model has been correctly built up to this stage, Rod 24 should protrude through one of the holes in Corner Bracket 30. Before securing the Corner Bracket, therefore, two $1\frac{1}{2}$ in. Sprocket Wheels 37 and two Collars must be fixed on the Rod, the Collars serving to hold the Rod in place. Also held in place by Collars is a $3\frac{1}{2}$ in. Rod, journalled in Corner Bracket 29 and Flat Trunnion 25, and carrying another two $1\frac{1}{2}$ in. Sprocket Wheels 38. Another four $3\frac{1}{2}$ in. Rods 39, each carrying two 1 in. Sprocket Wheels, are journalled in Girder 1 and Strip 34, Collars holding them in place.

The creeper tracks themselves are now built up. Two lengths of Sprocket Chain, each with 185 links are arranged side by side on a

flat surface with approximately 1 in. separating them. A 1½ in. Strip is attached to the third link of each chain by passing a small paper fastener through both the Strip and the link and then by bending each lug of the paper fastener over the side of the link. The lugs must be bent tightly around the link, otherwise they might catch on the Sprocket Wheel in the tank itself. In fact, it is a good idea to cut the lugs of the paper fasteners until they are only about ¾ in. long.

With the first 1½ in. Strip fixed to the third links of the Chains, another 1½ in. Strip is fixed to the ninth links, another to the fifteenth, another to the twenty-first, and so on until 30 1½ in. Strips have been attached. When completed, the tracks are passed round Sprocket Wheels 37 and 38, the Chains engaging with these Sprocket Wheels and also with the 1 in. Sprocket Wheels on Rods 39. It is essential that, with the track in place, the 1½ in. Strips are parallel to each other and at right angles to the body.

The top of the body is removable and is built up from two 9½ in. Angle Girders 40, each extended by a 3½ in. Flat Girder 41 overlapped three holes. Girders 40 are connected by a 5½ in. Angle Girder 42 and a 5½ in. Strip 43, another 5½ in. Strip 44 is attached by Double Brackets, while Flat Girders 41 are joined at the back by a 5½ in. Flat Girder attached by Angle Brackets. A 5½ in. Angle Girder is bolted to the upper edge of this Flat Girder. Fixed to this and to the Double Brackets to which Strip 44 is bolted, is a 5½ in. by 3½ in. Flat Plate 45, at the same time securing a 5½ in. by 1½ in. Flexible Plate 46 in position. Two 5½ in. by 3½ in. Flat Plates 47 are also bolted between Girders 40.

Two Angle Brackets are bolted to the lower edge of Flat Girder 45 with their lugs pointing rearwards. The completed construction can then be locked in position on the body by inserting these Angle Brackets beneath Angle Girder 8 and by screwing a ¾ in. Bolt through the centre hole of Angle Girder 42 into a Threaded Boss 48, fixed to a Fishplate bolted to the underside of Plate 10.

Turret

Turning to the turret, two Flanged Sector Plates 49 are connected by a 4½ in. by 2½ in. Flat Plate 50, to the underside of which two Threaded Bosses are fixed. Attached to the other side of these Threaded Bosses is a Ball Thrust Race Flanged Disc, to which a Double Arm Crank is bolted so that its boss lies over the centre hole of the Disc. A 4½ in. by 2½ in. Flexible Plate 51, edged at the rear by a 2½ in. Strip, is then bolted to the outside flange of each Sector Plate, at the same time fixing a 2½ in. by 2½ in. Curved Plate 52 in position. A 2½ in. Strip 53 is bolted to each Curved Plate, at the same time bolting two 3½ in. Strips between the ends of Strips 53.

At the left-hand side a 5½ in. by 1½ in. Flexible Plate 54 is bolted to Plate 51, while, at the right-hand side, a 5½ in. Angle Girder 55 and a 5½ in. by 1½ in. Flexible Plate 56, are bolted to Plate 51. Plates 54 and 56 are curved round, to be overlapped three holes and bolted to each other. Two 1½ in. Strips are fixed one to each end of Angle Girder 55, the same bolts also securing a 5½ in. by 1½ in. Flexible Plate 57 and two Angle Brackets in position. Bolted to the other ends of these 1½ in. Strips is a 5½ in. Angle Girder 58, the fixing Bolts also securing two Angle Brackets. Another two 1½ in. Strips 59 are bolted, along with another 5½ in. by 1½ in. Flexible Plate, to this Angle Girder. The 1½ in. Strips are

connected at their lower ends by a 5½ in. Strip, the holding Bolts again securing Angle Brackets. Attached to the three Angle Brackets at each end is a 1½ in. by 1½ in. Flat Plate 60.

Gun mounting and gun

Fixed to the inside of each Curved Plate 52 is a Trunnion 61, the holding Bolts passing through Strips 53. A 4½ in. Rod carrying a Coupling, fixed in its centre, is journaled in the apex hole of these Trunnions, being held in place by 1 in. fixed Pulleys with Rubber Rings. Note that the Rod passes through the end transverse smooth bore of the Coupling. Fixed in the longitudinal bore of the Coupling is an 11½ in. Rod.

A compound 2½ in. by 2½ in. Curved Plate 62 is built up from two 2½ in. by 1½ in. Flexible Plates bent to shape. The curved plate is now mounted on the 11½ in. Rod, which passes through its centre hole, and is held tight against the Coupling by a ¾ in. Flanged Wheel 63. Next, two Sleeve Pieces connected by a Chimney Adaptor are slid over the Rod and wedged tightly in the Flanged Wheel. Another ¾ in. Flanged Wheel 64 is added, followed by three Couplings. Finally a Worm is mounted on the end of the Rod.

The top of the turret is covered by two Semi-Circular Plates 65, connected by a 2½ in. by 1½ in. Flexible Plate, a 4½ in. by 2½ in. Flexible Plate 66, two 2½ in. by 1½ in. Flexible Plates 67, two 3½ in. by 1½ in. Triangular Flexible Plates 68, two Face Plates 69 and a 3½ in. by 2½ in. Flanged Plate 70. Generally speaking, the roof of the turret is attached to the sides by suitably placed Angle Brackets except in the case of Flanged Plate 70, which is bolted direct to the upper 3½ in. Strip joining Strips 53. A Rod Socket carrying a 2½ in. Rod 71 is fixed in Flexible Plate 56, while a 3½ in. Rod is held in the boss of left-hand Face Plate 69. These Rods represent radio aerials, while the hatch cover is represented by a Boiler End 72, fixed to Flanged Plate 70 by a 1½ in. Bolt.

Returning to the removable top of the body a Ball Thrust Race Toothed Disc 73 is bolted to the centre 5½ in. by 3½ in. Flat Plate. A complete Ball Cage 74 is placed in the Disc as shown, then a 2 in. Rod 75 is secured in the boss of the Double Arm Crank, bolted to the Ball Thrust Race Flanged Disc attached to the underside of the turret. Finally, the turret is placed in position, with Rod 75 being passed through the centre hole of Toothed Disc 73 and held in place beneath the 5½ in. by 3½ in. Flat Plate by a 1 in. fixed Pulley with Motor Tyre.

Control box

With the model complete, the only section left to build is the control box, but this is perhaps the most complex part of the operation. A 5½ in. by 2½ in. Insulating Flat Plate 76 is connected to a 5½ in. by 3½ in. Flat Plate 77 (this has been removed in the close-up illustration of the control box to help description) by four 1½ in. by ½ in. Double Angle Strips 78. Two forward/stop/reverse switches, one for each Motor, are now built up but, as both are similar, only one is described here.

Four Contact Studs 79 (Elektrikit Part No. 544) are mounted in a six-hole Insulating Bush Wheel, leaving two diametrically opposite holes free, then the Bush Wheel is attached to Insulating Plate 76 by two Pivot Bolts 80, passed through these holes.

Two Angle Brackets are attached to an

eight-hole Insulating Bush Wheel 81 through diametrically opposite holes. A ½ in. Bolt, carrying a loose Collar 82 on its shank is lock-nutted in the free lug of each of these Angle Brackets, then the Bush Wheel is fixed, beneath Plate 77, on a 2½ in. Rod passed through the boss of the six-hole Insulating Bush and journaled in Plates 76 and 77, being held in place by a Crank 83 above Plate 77. A Threaded Pin is fixed in the Crank for a handle.

Two washers are placed on the Rod between the six-hole Bush Wheel and Plate 76 so as to keep the Bush Wheel against the heads of the Pivot Bolts. Beneath Plate 76, a Tension Spring is placed on the Rod, followed by a Collar. This tends to pull the Rod downwards, thus holding Collars 82 against Contact Studs 79. Note that the eight-hole Insulating Bush Wheel 81 must be fixed on the Rod, but the Rod must be free to turn in the six-hole Insulating Bush Wheel. When finished, a second identical arrangement is constructed.

A box for holding the batteries is obtained from a 5½ in. by 3½ in. Flat Plate 84, edged by two 5½ in. and two 3½ in. Angle Girders. The 3½ in. Girders are connected to Double Angle Strips 78 by 5½ in. Strips 85. Incidentally, four ½ in. Bolts are fixed by Nuts in Flat Plate 77 to provide 'stops' for the handles.

Wiring

Great care must be taken with the wiring of the control box, but, before starting on this job, take each of the four leads from the two Emebo Motors in the Tank to special terminals at the back of the Tank. These terminals are obtained by bolting four Insulating Fishplates 86 to Angle Girder 8, and by using Nuts and Washers on ½ in. Bolts for the contact screws. Returning to the control box, four terminals, P, Q, R and S (see wiring diagram), are provided, in two sets of two, by Nuts and Washers on ½ in. Bolts fixed in Insulating Plate 76.

Wiring of the control box can now begin. Rather than describe it, however, which might prove confusing, I have included a wiring diagram. This, as I think you will agree, is far easier to follow than written text. With the wiring completed, you will find that the 'off' position results when Collars 82 are in contact with Pivot Bolts 80.

Parts required

2 of No. 1a	2 of No. 48d	1 of No. 142c
8 of No. 2	5 of No. 52a	1 of No. 147b
3 of No. 3	1 of No. 53	2 of No. 155
13 of No. 5	1 of No. 53a	1 of No. 162a
64 of No. 6a	2 of No. 54	2 of No. 163
6 of No. 8	34 of No. 59	1 of No. 164
2 of No. 8a	2 of No. 62	1 of No. 168
2 of No. 8b	1 of No. 62b	1 of No. 179
10 of No. 9	4 of No. 63	9 of No. 188
2 of No. 9b	3 of No. 64	5 of No. 189
2 of No. 9c	2 of No. 70	2 of No. 190
2 of No. 10	2 of No. 72	3 of No. 191
2 of No. 11	2 of No. 74	2 of No. 192
28 of No. 12	2 of No. 76	2 of No. 196
4 of No. 12c	4 of No. 94	2 of No. 197
1 of No. 13	8 of No. 95a	4 of No. 200
2 of No. 15	16 of No. 96	2 of No. 214
11 of No. 16	4 of No. 96a	4 of No. 215
4 of No. 16a	1 of No. 103	4 of No. 223
4 of No. 16b	2 of No. 103d	2 of No. 224
2 of No. 20b	2 of No. 103f	1 of No. 510
3 of No. 22	2 of No. 109	4 of No. 513
4 of No. 26	12 of No. 111a	2 of No. 514
4 of No. 27c	8 of No. 111c	2 of No. 516
1 of No. 32	1 of No. 111d	8 of No. 544
301 of No. 37a	2 of No. 115	2 of Emebo
272 of No. 37b	2 of No. 120b	Motors
94 of No. 38	2 of No. 126	120 Paper
4 of No. 48	4 of No. 126a	Fasteners
4 of No. 48a	4 of No. 133	