TRIX UNIT SYSTEM

TRICY TRIX

Electrical

ENGINEERING MANUAL

Builds Working Electrical Models

TRIX LIMITED, 11 OLD BURLINGTON STREET, LONDON, W.1

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THE TRIX PLAN

TRIX Constructor parts (of which 163 are contained in TRICY TRIX) are grouped into Units called "A," "B," "C," "D," "E," "F" and "G."

There are seven of these self-contained Units—each fulfilling a special purpose—and, together with the TRIX Electric Motor they comprise the TRIX UNIT SYSTEM.

With your TRICY TRIX Set you can build many of the models and projects described in this book. As you progress, you will wish to build larger and more ambitious models.

The TRIX complete ENGINEERING MANUAL shows you how to do it by adding one or more of the various Units enabling you to extend the range of your models almost indefinitely.

Be sure you obtain your copy of this magnificent Engineering Manual. Full details are given on page 96.

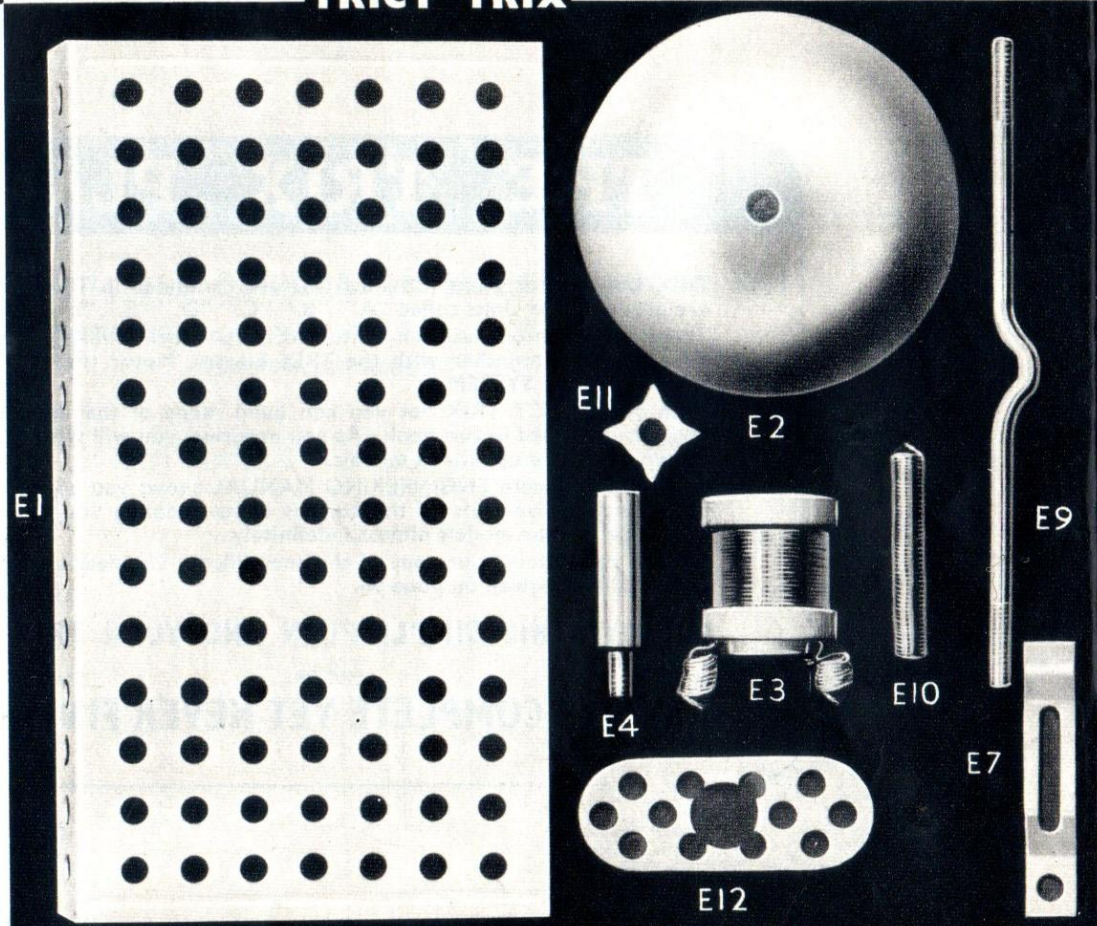
FOLLOW THIS SIMPLE PLAN AND YOUR TRIX SET

will be

ALWAYS COMPLETE YET NEVER FINISHED

Get to know them!

Each Trix part is known by a Code Number, e.g. E1, E2, etc. Study these illustrations which show all the different parts contained in your Tricy Trix Set. You will find that in the Specification Tables and Construction Details given in this book constant reference is made to parts by use of their Code Numbers.



F17
E6
F13
E5
F9
P29
C1
F5
S55
S25
W16
SPANNER
W10
E8
U2
B1
A1
N1
U1

HOW ELECTRICITY WORKS!

To make our models work, we must have some source of electrical energy or power available. Usually this will take the form of one or more "dry batteries" of the cycle or pocket torch type, because these are clean, safe and portable.

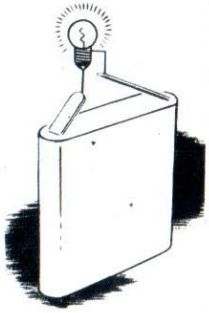


FIG. 1

Suppose we connect a flash-light bulb to the terminal strips of such a battery, as in Fig. 1, the lamp will light up, showing that electric current is flowing from the battery through the thin "filament" of the lamp, making it white hot, or incandescent.

Now think of this battery as though it were a boiler with a pressure of steam waiting to get out and do some work. In a boiler we talk of steam pressure as so many pounds to the square inch. In electricity the pressure is measured in VOLTS. When we open the regulator of our steam engine, steam will flow from the boiler at so many cubic feet per minute.

In electricity the rate at which current flows is measured in AMPERES.

In our steam engine the pipe leading from the boiler to the cylinders would be as short and straight as we could conveniently make it, so as not to offer unnecessary resistance to the flow of steam.

In electricity the resistance of a circuit to the flow of current is measured in OHMS.

The steam pipe from our boiler must not be leaky, all joints and taps must be steam-tight, or the steam will be wasted instead of doing useful work.

In electricity we must be careful that a wire carrying current to our lamp or motor is not allowed to come into bare metallic contact with other parts of the model or a *short circuit* may result—the current will find a short path back to the battery, instead of doing its job.

To prevent short circuits we use INSULATED WIRE. The steam pipe of our boiler must be joined up tight to the cylinder and so must our electric wires be firmly connected to the battery and the model they are to work. Loose contacts introduce resistance, so do greasy or dirty contacts.

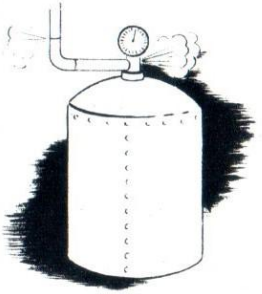


FIG. 2

When current flows along a wire it makes a magnetic field in the neighbourhood of the wire. We can prove this by holding a pocket compass near the wire or by iron filings on a sheet of paper.

If we wind the wire round in a coil it concentrates the magnetism. If we put a "core" or short bar of iron through the coil,

the iron becomes a magnet when current flows through the coil and we now have an ELECTRO-MAGNET which can be made to do all sorts of useful work. An electro-magnet ceases to attract when current ceases to flow through the coil and this ability to switch a magnet on and off at will is one of the most useful principles of electrical machinery.

FIG. 3

As you will see from the examples of bells, buzzers, induction coils and motors given in this book, we can make the electro-magnet switch on and off its own current at the right moments, thus producing a continuous motion which will go on as long as the battery supplies power to the model.

This device for switching the current on and off in rapid succession is called a MAKE-AND-BREAK. A familiar application of the automatic make-and-break is provided by the trembler of a buzzer or electric bell and the principles involved will be clearly understood when we come to build these models.

Instead of a make-and-break that vibrates backwards and forwards, we can have one which rotates with the spindle of a motor or dynamo and, in this case, the make-and-break is called a COMMUTATOR. We shall find numerous models later on fitted with commutators. Before electric current can flow and be made to do useful work there must be a continuous CIRCUIT. This means that we must be able to trace some metallic path for the current to flow from the positive pole of the battery through the lamp, electro-magnet, or other model that is to be driven, and so back again to the negative pole of the battery. If the circuit is broken anywhere along this line current will cease to flow. Supposing that we have a lamp at the top of a jib or crane. There are two ways in which we can light this lamp. One way is to have a wire from the positive pole of our battery which will lead current up to one terminal of the lamp and another wire to complete the circuit between the other lamp terminal and the negative pole of the battery. But if the framework of the crane is of metal and good electrical contact is being made at all joints, there is no reason why we should not have merely one wire to the lamp and use the frame of our crane as the return wire connecting one terminal of our battery and one terminal of our lamp to the frame.

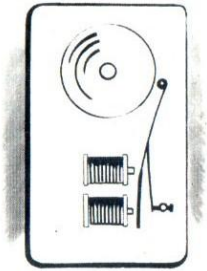
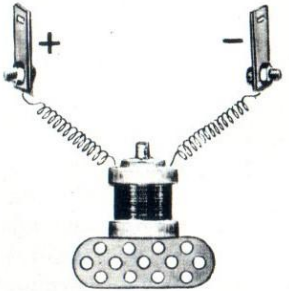


FIG. 4

In electrical engineering language this is called EARTH RETURN and one pole of the battery and one terminal of the lamp is said to be "earthed." It will be seen that in a complicated model where the one battery is called upon to perform several duties on the same model, it saves a lot of wire if we use this earth return principle. But we must always bear in mind that the earth return will only work satisfactorily so long as there is a complete and uninterrupted path for the current to return through the framework of the model.

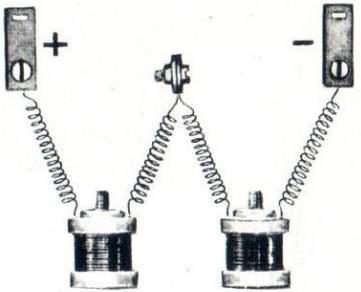
STANDARD ELECTRICAL CIRCUITS

As you work through the examples of Trix models given in this book, you will find that certain types of electrical circuits will recur. Here we give seven examples of electrical circuits and when giving you hints on how to assemble models we shall merely refer to these circuits by their numbers (e.g. SEC 7). Study these SEC's carefully, as the proper working of your models is dependent upon accurate construction, clean contacts, etc. Always adjust very carefully. For clarity, framework and base plates have been omitted from the illustrations.



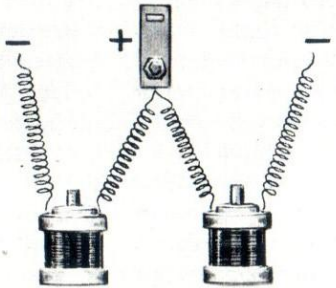
SEC 1. ELECTRO-MAGNET

Soft iron core (E4) is pushed into bobbin (E3) and brass contact springs (E6) are fixed to connect to battery. The current passing around the coil makes a magnet of the core, which attracts any TRIX or steel parts. When disconnected core loses magnetic power.



SEC 2. COILS IN SERIES

E3's connected by B1/N1 and two W10's. The E6's are connected to terminals of the battery and current passes through one coil and then through the other. The coils are said to be connected "in series." This arrangement is used in models requiring very little power.

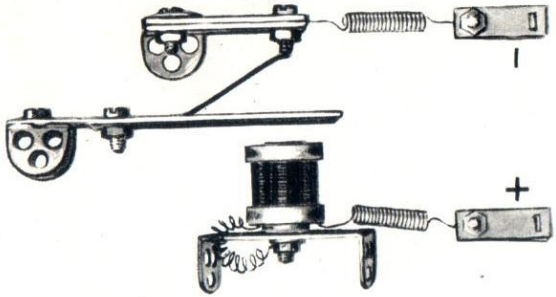


SEC 3. COILS IN PARALLEL

E3's connected by an E6. The E6 is connected to one side of the battery. The loose wires from the E3's can be joined up to framework of model, or joined together direct to the other side of battery. Coils are said to be connected "in parallel." This method of connection uses more current than when "in series," but gives more power necessary for larger models.

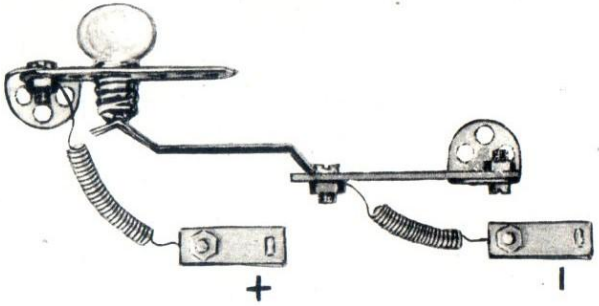
SEC 4. BATTERIES IN SERIES

Two pocket lamp batteries connected by two F5's and a B1/N1, joining the long and short ends (i.e. positive and negative). This increases the driving power for models. When using 3·5 volt pocket lamp bulbs the above method of connecting the batteries must *NOT* be used, as the voltage is too great and would burn out the lamps. In this case the batteries must be connected in parallel.



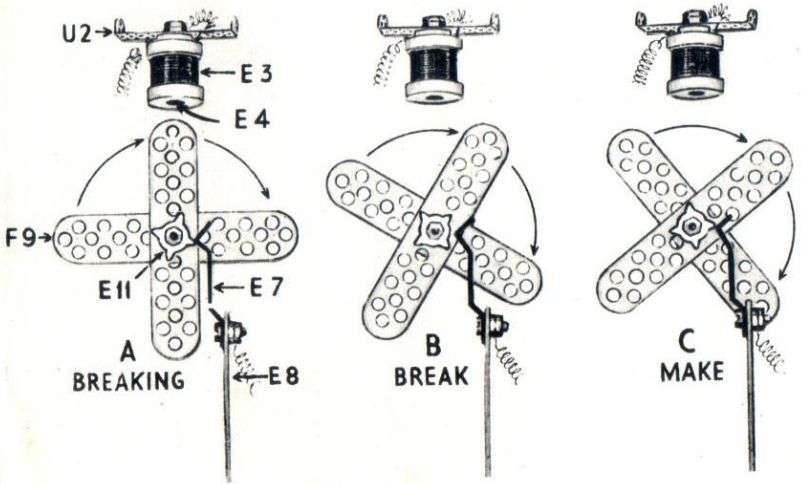
SEC 5. BELL or BUZZER CIRCUIT

Current passes from one side of the battery through E10 to B1 in E8, and along E5 (slightly bent, as shown, and bolted to an F9) to U1. The current then flows via the base through E3 to other side of battery. E4 is now a magnet and attracts F9. As the F9 moves forward, connection is severed between E5 and B1 in E8. Circuit is broken and the E4 loses its magnetism, no longer attracts F9, which returns to former position. This to and fro movement is striking action of the bell.



SEC 6. LAMP CIRCUIT

E6's connect the two E10's to the two terminals of the battery. Thus the current passes from one terminal of the battery to the E7 on the insulator E8. From here it passes to the centre contact of the lamp bulb and through the filament to E12, which is bolted to the framework, and so to the other terminal of the battery.



SEC 7. COMMUTATOR CIRCUIT

This shows how to set an E11, to make proper contact with an E7, to build and run a motor. One terminal of battery is connected to the E7 which is insulated from frame by an E8. Other terminal of battery is connected to one wire of E3 into which is inserted an E4; E4 is secured to a U2 bolted to frame. Other wire of E3 is fastened to U2. The cross of F9's on a spindle, to which is fixed the E11, revolves in a clockwise direction. Gap between F9 and E4 must be as small as possible. Insert W10's between E3 and U2 to adjust gap.

When the cross is EXACTLY in position "A" set E11 so that it just breaks contact with E7.

When the E11 and E7 are in contact (see "C") the circuit is complete and the current flows through E7 to E11, thence via the frame to U2 and through E3 back to battery. The E3/E4 is now an electro-magnet (see SEC 1) which attracts an arm of the cross. As this revolves, contact between E11 and E7 is broken (see "B"); thus the E3/E4 loses its magnetic power. However, momentum of the cross, acting as a flywheel, causes it to continue turning until position "C" is reached when the cycle of operations again takes place.

This construction and circuit clearly demonstrates the elementary principle underlying all forms of electro-magnetic motors.

SIGNS and SYMBOLS

To help you make your models work successfully we give you a wiring diagram with each model or project. These diagrams consist of a number of signs and symbols which denote certain electrical operations. The Table given below explains the meaning of these signs and symbols.

Study the Table very carefully until you know the exact meaning of each item.

+	Indicates POSITIVE terminal of battery.		Denotes a coil winding and is sign used to show bobbin E3.
—	Indicates NEGATIVE terminal of battery.		Coil with centre core fixed. E3 with E4 inserted.
	The "earth" sign. Applicable to all parts which are in metal contact with each other and allow free passage for the current. E1 is usually an "earth."		Torch bulb.
	Denotes a 2-cell battery. Multiples of batteries are shown by a number of signs joined together.		Resistance. Reduces amount of current flowing through wire.
	Lever switch for permanent "on-off" operation.		A fine line represents path of the current between Switches, Electro-magnets, Battery, etc. May be wire or metal strips.
	Press switch for temporary operation. Usually an E5 or E7.		Commutator or revolving switch made by E11.

PART ONE

WORKING ELECTRICAL MODELS

The working electrical models in this Part are a representative selection of what can be made with Trix Constructor Units.

They have been grouped to form a progressive series of illustrations of electrical principles. Simple operations such as the lighting of a lamp and the attraction of an armature to a magnet are covered; from there we go on to the conversion of electrical energy into simple reciprocating movements, and so to rotary motion as exemplified by motors, etc.

At the conclusion of each stage we show larger models that can be constructed by adding further Units to this Tricy Trix Set.

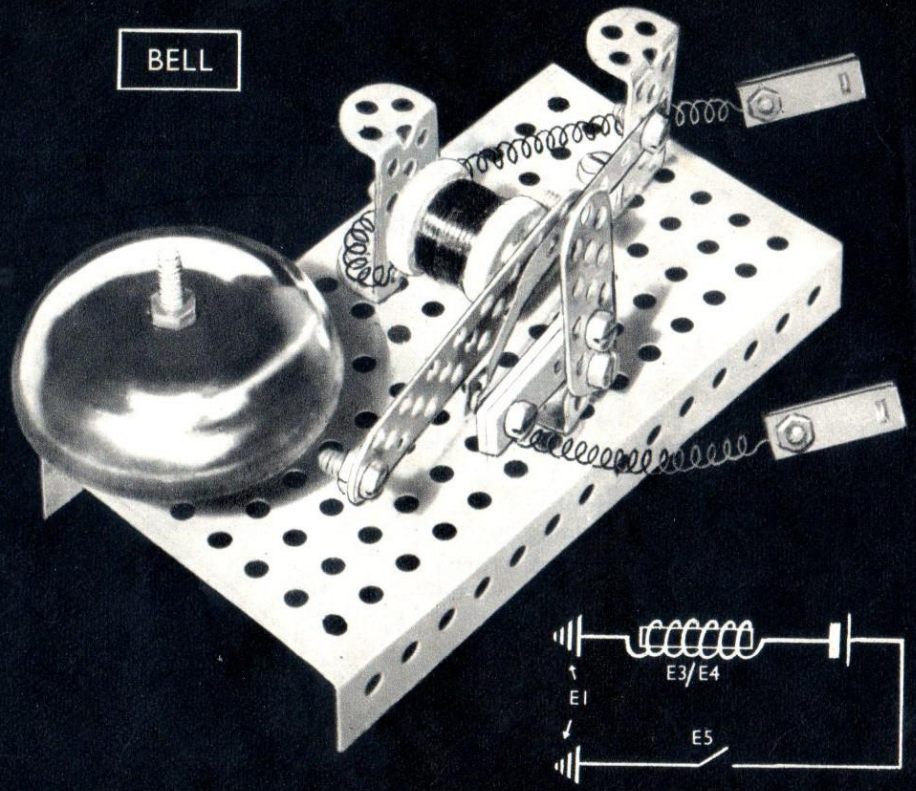
In this way the link is formed between Electrical and Mechanical Engineering and you learn how to apply the electrical principles to the models of big mechanical constructions which become possible with the progressive Trix Unit System.

SPECIFICATION			
Part No.		Part No.	
A1	1	E8	2
B1	11	E10	1
E1	1	F5	1
E2	1	F9	1
E3	1	N1	15
E4	1	S55	1
E5	1	U2	2
E6	4	W10	1

CONSTRUCTION

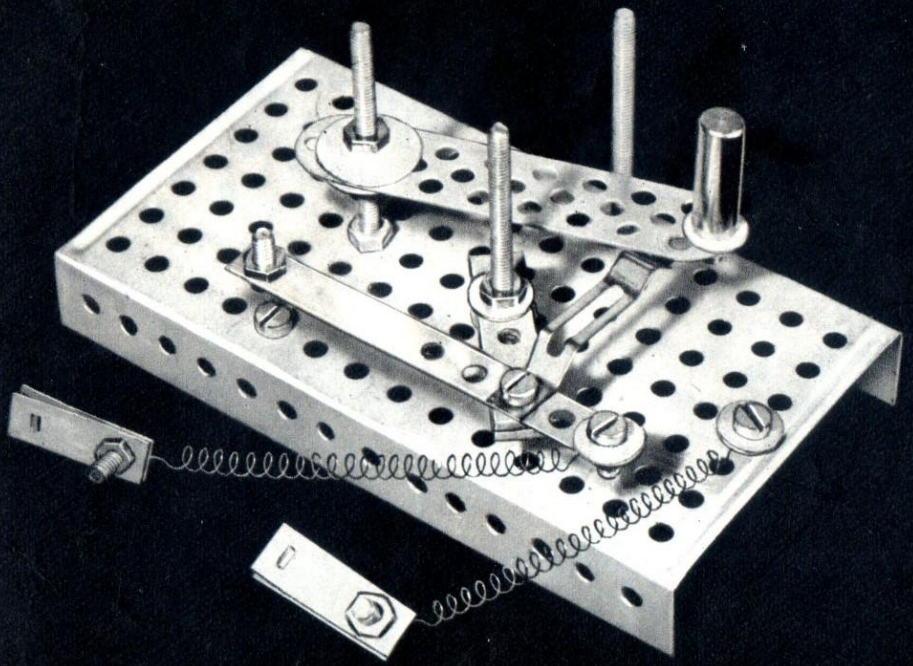
An E3 with core E4 is fixed to a U2 by N1 and W10. The U2 is bolted to base E1. Another U2 bolted to the E1 carries an E5 to which is fixed an F9 with N1/B1 in end hole. The bell E2 is fixed to E1 by an S55. Two E8's with N1/B1 in end hole are bolted to an F5 fixed to E1 by an A1. The N1/B1 touches the E5 as shown. This forms a "make and break" and wiring as in SEC 5. Connect leads to battery and bell will ring.

Be sure all electrical connections are clean and tight. Adjust very carefully.



Wiring diagram

BELL KEY AND LEVER SWITCH



SPECIFICATION			
Part No.		Part No.	
B1	7	E10	2
E1	1	F9	1
E4	1	N1	20
E5	1	S55	3
E6	4	W10	5
E7	1	W16	2
E8	2		

CONSTRUCTION

Fix three S55's to E1. One S55 carries an F9 with E4 as lever knob. F9 is free to pivot between W16's on S55. Middle S55 has two E8's fixed between W10's, well clear of E1. At end of E8's an E5 and E7 are bolted. Far end of E5 has an N1/B1. Fix another N1/B1 in E1 below. To use with Bell, join one lead of each model together and other leads to battery terminals respectively. To operate, press N1/B1 in E5 onto B1 in E1 or move lever against E7.

This switch can be used for either press-button or permanent "on-off" operations.

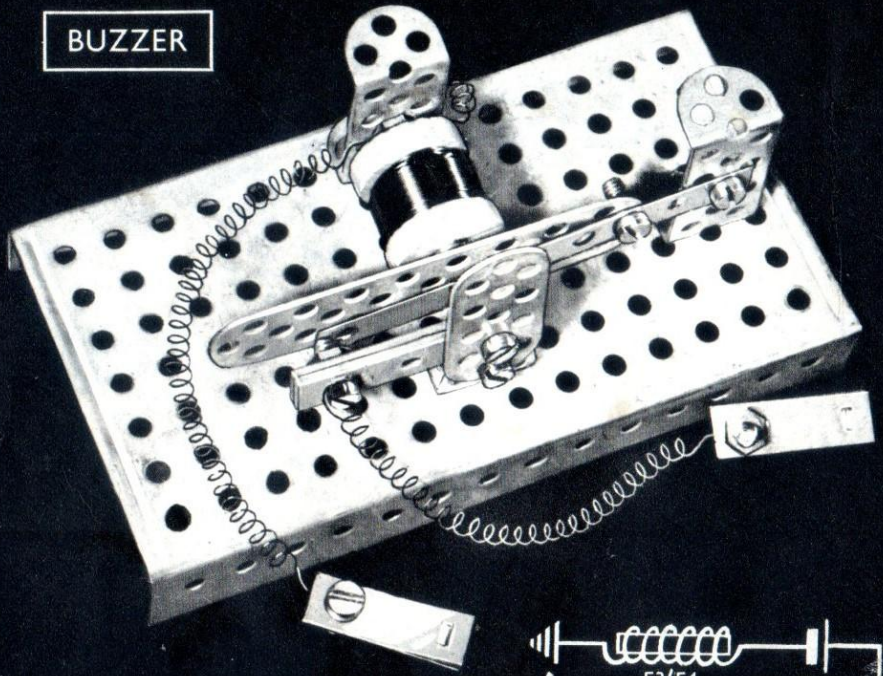
SPECIFICATION			
Part No.		Part No.	
A1	1	E8	2
B1	10	E10	1
E1	1	F5	1
E3	1	F9	1
E4	1	N1	11
E5	1	U2	2
E6	4	W10	1

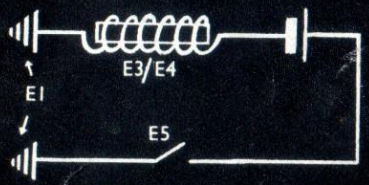
CONSTRUCTION

The construction of this model is similar to that of the Bell shown on page 12, except that the bell E2 is omitted. The illustration shown here can be used to help you build the Bell. To operate the Buzzer, wire up as in Wiring diagram. For realistic effect use the Bell Key and Lever Switch shown on page 13.

Have you sent for your copy of the TRIX complete Engineering Manual? See page 96 for full details of this magnificent instruction book.

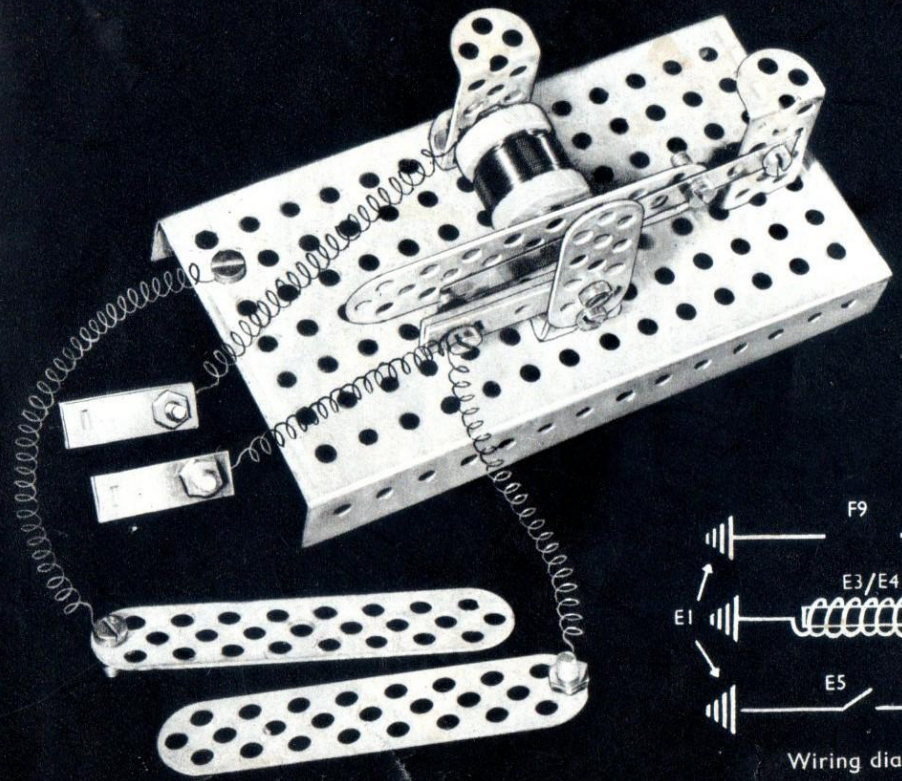
BUZZER





Wiring diagram

SHOCKING COIL APPARATUS



Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	1	E8	2
B1	13	E10	2
E1	1	F5	1
E3	1	F9	3
E4	1	N1	14
E5	1	U2	2
E6	4	W10	1

CONSTRUCTION

In addition to the standard circuit SEC 5 and the construction used in building the Buzzer model shown on page 14, two further leads are required. One of these is attached to the B1 in the E8's and the other is earthed to the base E1 as shown. The other ends of these leads are fixed to F9's which act as handles. When the current is switched on, weak but clear electric shocks can be felt in the handles, particularly if the hands are moist. This is yet another model which can be successfully operated by using the Lever Switch shown on page 13.

Be sure all electrical connections are clean and tight. Adjust very carefully.

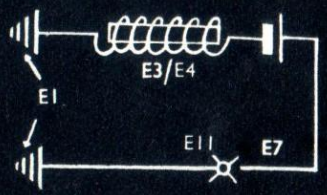
TRICY TRIX

SPECIFICATION			
Part No.		Part No.	
A1	2	E11	1
B1	12	F5	1
E1	1	F9	4
E3	1	F13	2
E4	1	N1	22
E6	4	S55	1
E7	1	U2	2
E8	2	W10	2
E10	1	W16	2

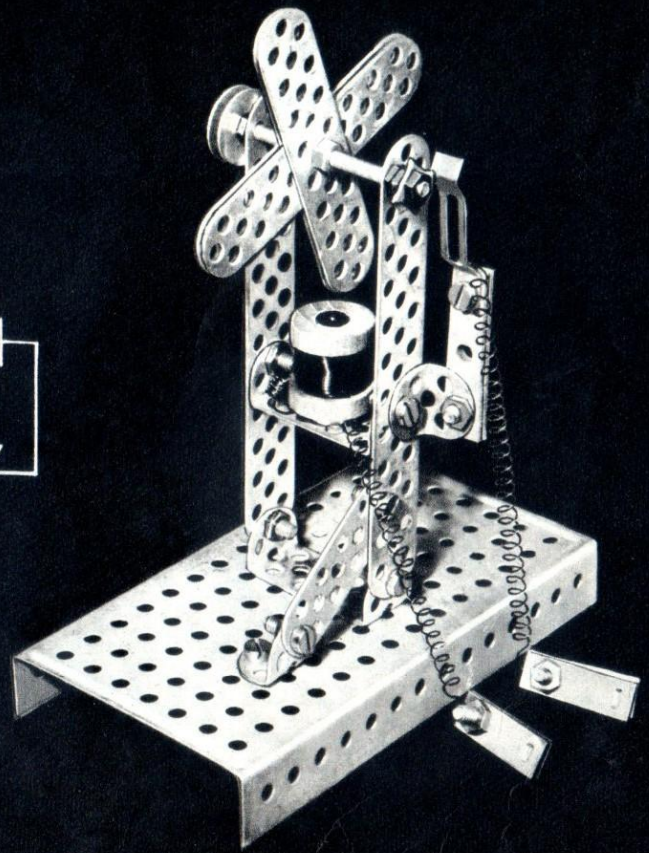
CONSTRUCTION

The framework consists of two vertical F13's attached to base E1 by a U2. Another U2 fixed to the F13's, six holes up from the base, carries an E3 and E4. Working in the top outside holes of the F13's is an S55 which carries in the centre a cross made from four F9's. Attached to one end of the S55 is a pulley made from a W10 and two W16's. At the other end of the spindle (S55) a commutator E11 is fixed. The commutator brush E7 is fixed to two E8's which in turn are attached to the F13 by an A1. The F9's, commutator E11 and brush E7 are adjusted and the model wired as described in SEC 7. Start by hand.

MOTOR

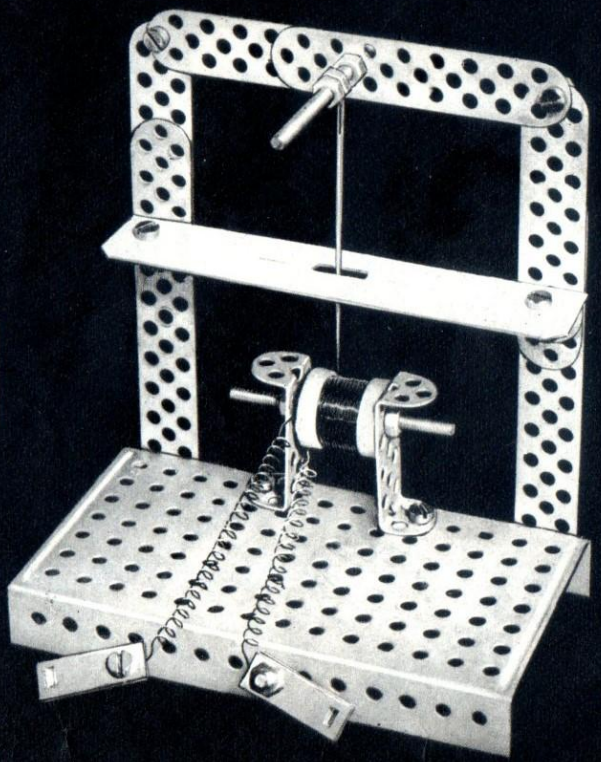


Wiring diagram



NEEDLE TELEGRAPH

Wiring diagram



SPECIFICATION			
Part No.		Part No.	
A1	2	F9	4
B1	12	F13	2
E1	1	N1	18
E3	1	S55	2
E6	4	U2	2

CONSTRUCTION

Make the frame using an E1, two F13's and four F9's as illustrated. Two A1's bolted to the uprights carry stiff paper or card with a cut out to accommodate the needle suspended from the top centre of the frame. Template, page 98. The bobbin E3 is secured between two U2's by an S55 and N1's.

The needle should be magnetised and this is done by placing the needle inside the coil and passing current through the wire. In a few moments the needle will be magnetised.

When the model is connected to a battery the needle will be attracted to one side. By reversing the leads it will be attracted to the opposite side. By using the switch given on page 70 speed of changes can be greatly increased.

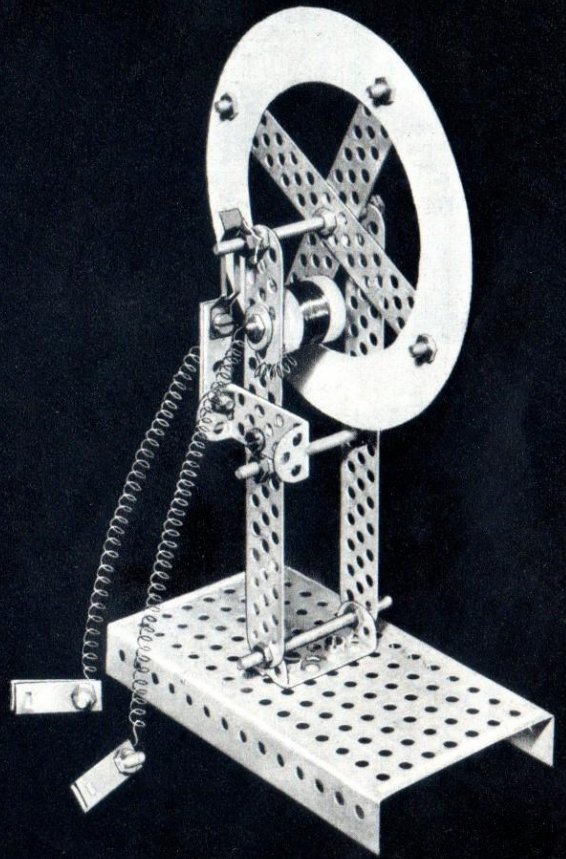
TRICY TRIX

SPECIFICATION			
Part No.		Part No.	
B1	11	E11	1
E1	1	F9	4
E3	1	F13	2
E4	1	N1	26
E6	4	S55	3
E7	1	U2	2
E8	2	W10	1
E10	1		

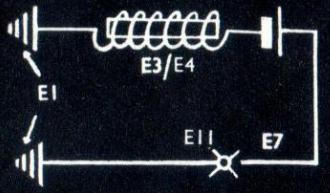
CONSTRUCTION

The framework consists of vertical F9's attached to a U2 by an S55 and braced by a further S55 as shown. An E3 with E4 inserted is fixed to one of the F9's in the fourth centre hole from the top. A cross made from F13's is fixed on an S55 which runs in the top centre holes of the F9's. The arms of the cross should just clear the end of E4. An E11 is fixed to one end of the top S55. Commutator brush, E7, is attached to E8's bolted to a U2 fixed to one F9.

Adjust carefully and wire up the model as described in SEC 7. Start by hand. Template for flywheel is given on page 98.

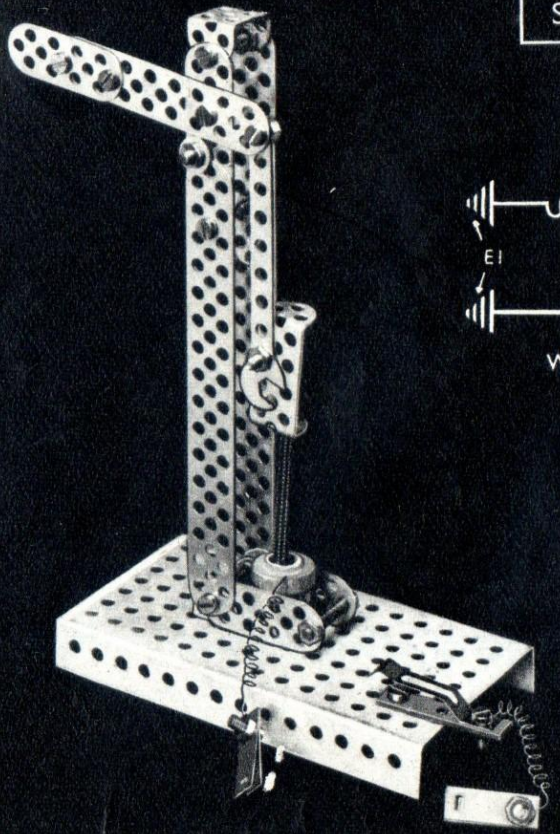


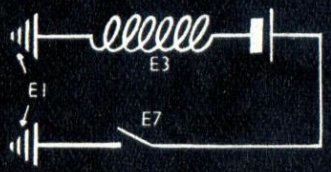
MOTOR



Wiring diagram

SIGNAL





Wiring diagram

SPECIFICATION			
Part No.		Part No.	
B1	18	F17	2
E1	1	N1	24
E3	1	S25	1
E6	4	S55	1
E7	1	U1	2
E8	1	U2	1
E10	1	W10	3
F5	3	Sp	1
F9	3		

CONSTRUCTION

Signal post made of two F17's and two F9's is fixed to base by U1. Also attached to this U1 are two F5's which with an S25 hold bobbin E3. Signal quadrant F9 and F5 is pivoted to post, the operating rod consists of an Sp, U2 and S55, one end of which dips into the bobbin. Loose joints made from a B1 and two N1's are used as pivots for signal and operating arms. A switch made from E7 bolted to E8, is fixed to base. One battery lead is connected to this E7.

One side of E3 is earthed to frame, the other going to battery. When the E7 is pressed into contact with the base, current flows through the bobbin, which attracts the S55 and so causes the signal arm to move to the off position.

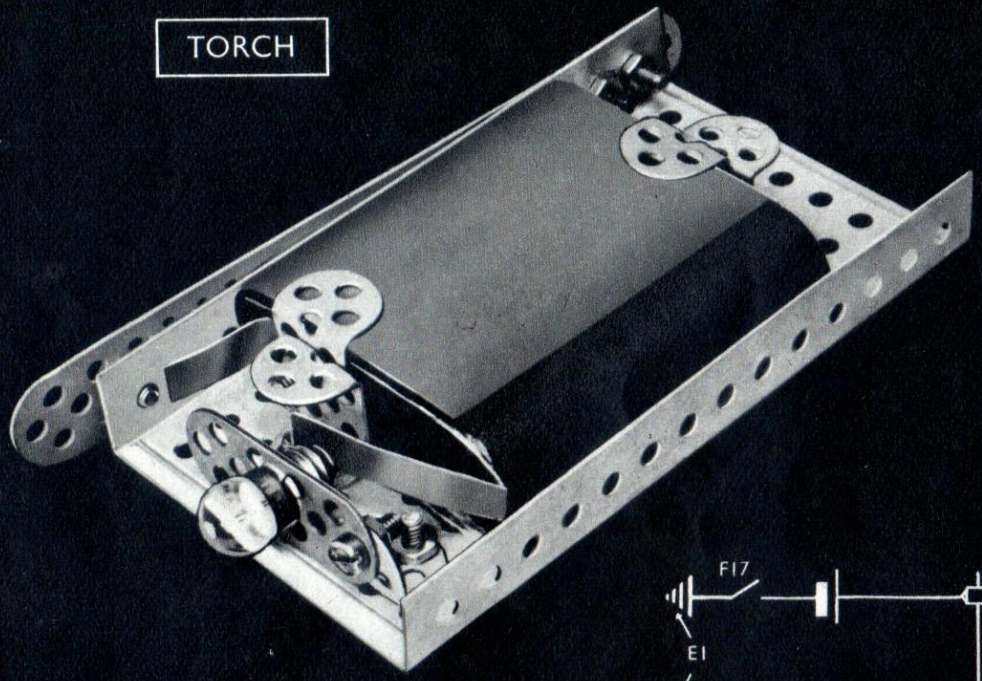
SPECIFICATION			
Part No.		Part No.	
A1	3	F17	1
B1	9	N1	9
E1	1	U1	2
E12	1		

CONSTRUCTION

Lampholder, E12, is fixed to base E1 by an A1. The 4½ volt flat battery is held in the base with A1's and U1's. The long strip of battery should press firmly against the centre contact of bulb. Switch consists of an F17 fixed to E1 and bent out slightly. An N1/B1 is fitted in F17 and passes through E1. Bend up short strip of battery so that it is just clear of the N1/B1. Press switch and bulb will light up.

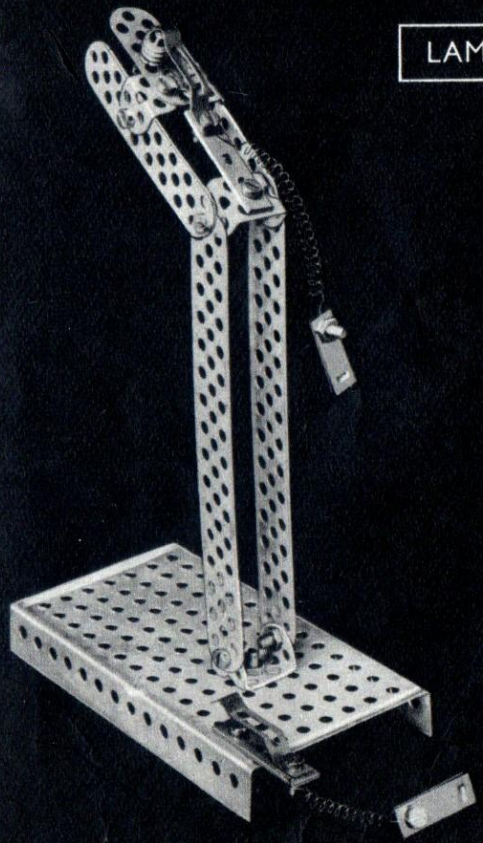
Be sure all electrical connections are clean and tight.

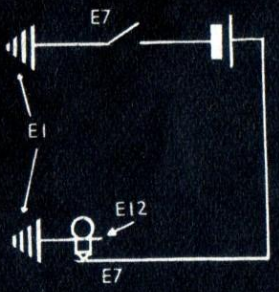
TORCH



Wiring diagram

LAMP STANDARD





Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	2	E12	1
B1	15	F9	2
E1	1	F17	2
E6	4	N1	15
E7	2	U1	2
E8	2	W10	1
E10	2		

CONSTRUCTION

The standard consists of F17's and F9's joined together and to the base, E1, by U1's. Bulb holder, E12, is fixed by A1's to the F9's, the centre contact of bulb presses against an E7 fixed to an E8 which is attached to the top U1. Battery clip (E6's) is connected to the E7 by an E10.
Switch is made from an E7 attached to an E8 (note that this fixing bolt is clear of the base). Other battery lead is connected to this bolt. Contact is made by pressing the E7 on to the B1 which secures E8 to base.

See page 96 for full details of the TRIX complete ENGINEERING MANUAL.

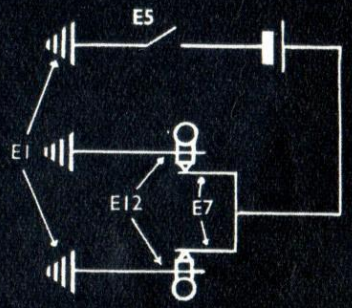
STREET LAMP STANDARD

SPECIFICATION			
Part No.		Part No.	
A1	2	E12	2
B1	17	F9	4
E1	1	F17	2
E5	1	N1	21
E6	4	S25	1
E7	2	U1	2
E8	3	W10	2
E10	2		

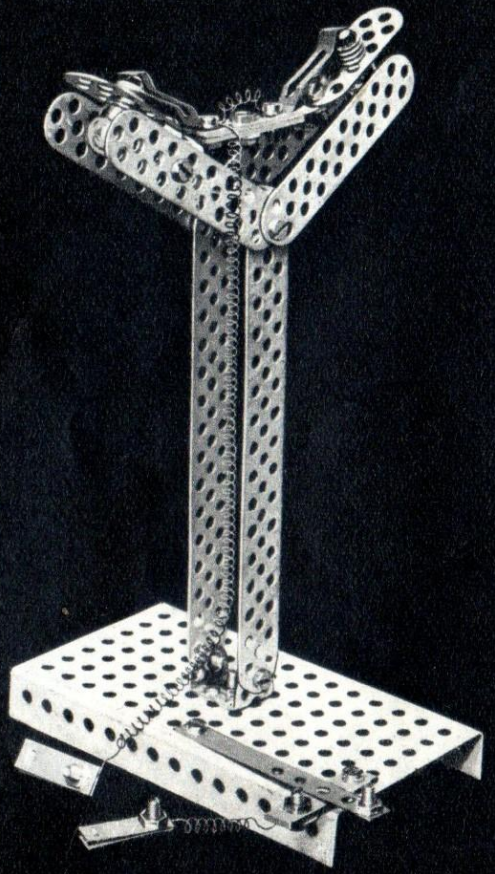
CONSTRUCTION

Lamp standard is made from two F17's fixed to base, E1, with a U1. The lamp brackets are F9's fixed to the top of F17's with another U1. Lamp holders (E12) are fixed by A1's. Contact is made to the centre contact of each bulb by an E7 fixed to one end of 2 E8's. These E8's are fixed to the top U1 by an S25. The E7's are connected by an E10 which goes to one lead of the battery.
Switch is made from an E5 loose jointed to base and sliding on an E8. The contact is made by moving the E5 so that it touches the nut and bolt fixed clear of the base on the E8. This nut-bolt is connected to the other lead of battery.

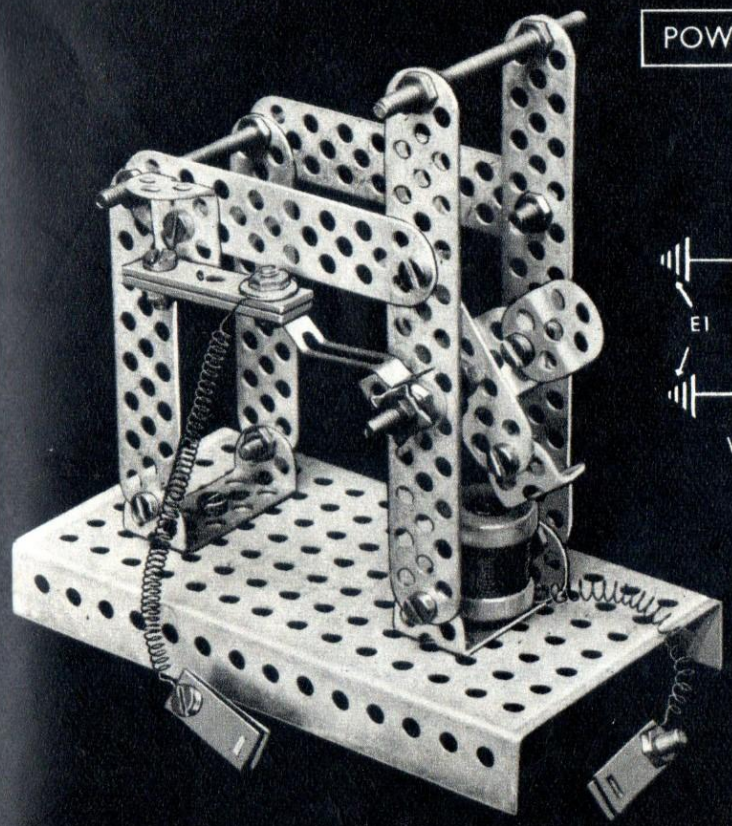
Be sure all electrical connections are clean and tight.

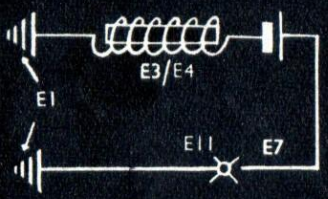


Wiring diagram



POWER MOTOR





Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	4	E11	1
B1	16	F5	2
E1	1	F9	4
E3	1	F13	2
E4	1	N1	32
E6	4	S55	3
E7	1	U1	1
E8	2	U2	2
E10	1	W10	3

CONSTRUCTION

Framework consists of vertical F13's attached to base E1 by a U2 and braced with F9's as shown. The bobbin E3 and core E4 are fixed to base through the centre hole of the U2 which holds the F13's.

The revolving armature, carried on a spindle S55, is made from crossed F5's, which carry A1's at their ends. A commutator E11 is fixed to this spindle. An E7, fixed to E8's is held to frame by a U1. Circuit as in SEC 7. Adjust carefully and wire up to battery. Spin armature to start. A suitable switch for this model is shown on page 13.

To increase the power of this motor use two batteries connected up as in SEC 4.

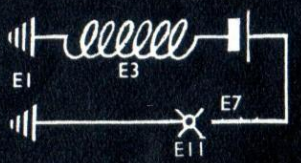
SINGLE DROP HAMMER

SPECIFICATION			
Part No.		Part No.	
A1	2	E11	1
B1	14	F9	2
E1	1	F13	2
E3	1	N1	27
E4	1	P29	2
E6	4	S55	3
E7	1	U2	2
E8	2	W10	2
E9	1	W16	1
E10	1		

CONSTRUCTION

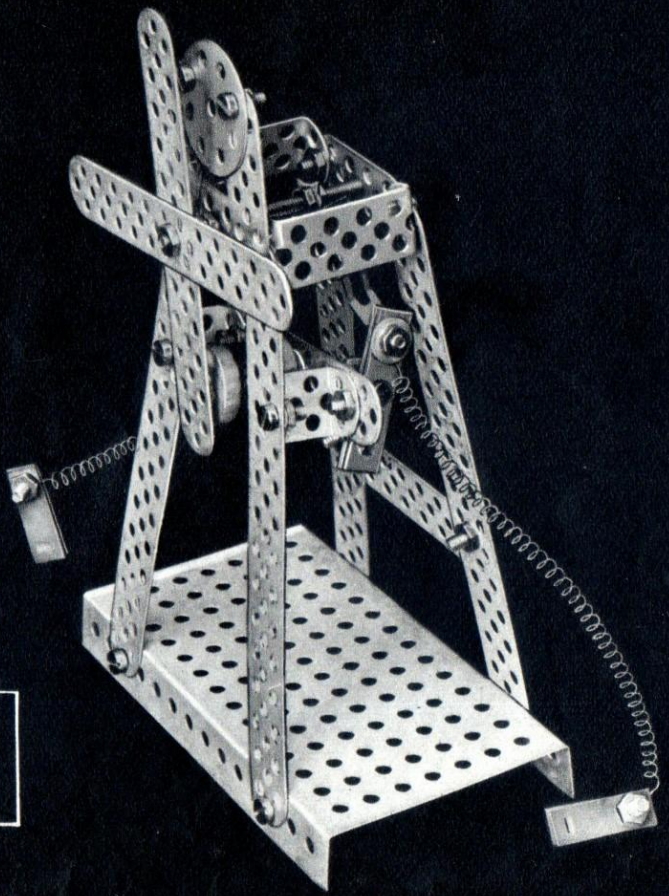
Main frame consists of two F13's cross-braced by U2's and fastened by A1's to base E1. The bobbin E3 is held in position by S55's and a P29 acting as a packing piece on the top U2 as shown. Between the P29 and E3 a piece of card is placed to prevent the E9 sticking in the bobbin. The lower U2 and centre of E3, act as guides for this E9 which carries a W16 as hammer. Two horizontal F9's carry an S55 to the centre of which an E11 is fixed. The S55 is turned by a crank made from P29 and E4. Two E8's are fixed to base and carry an E7. One battery lead goes to the E7 and the other to one lead of bobbin. Other bobbin lead is earthed.

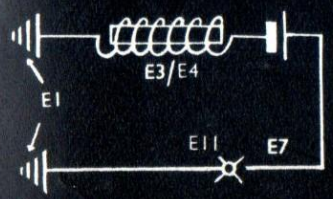
When the crank is turned the E11 makes contact with the E7 thus completing the circuit and energising the bobbin causing the E9 to be drawn up. Further turning of the crank breaks contact and the hammer will fall.



Wiring diagram

WINDMILL





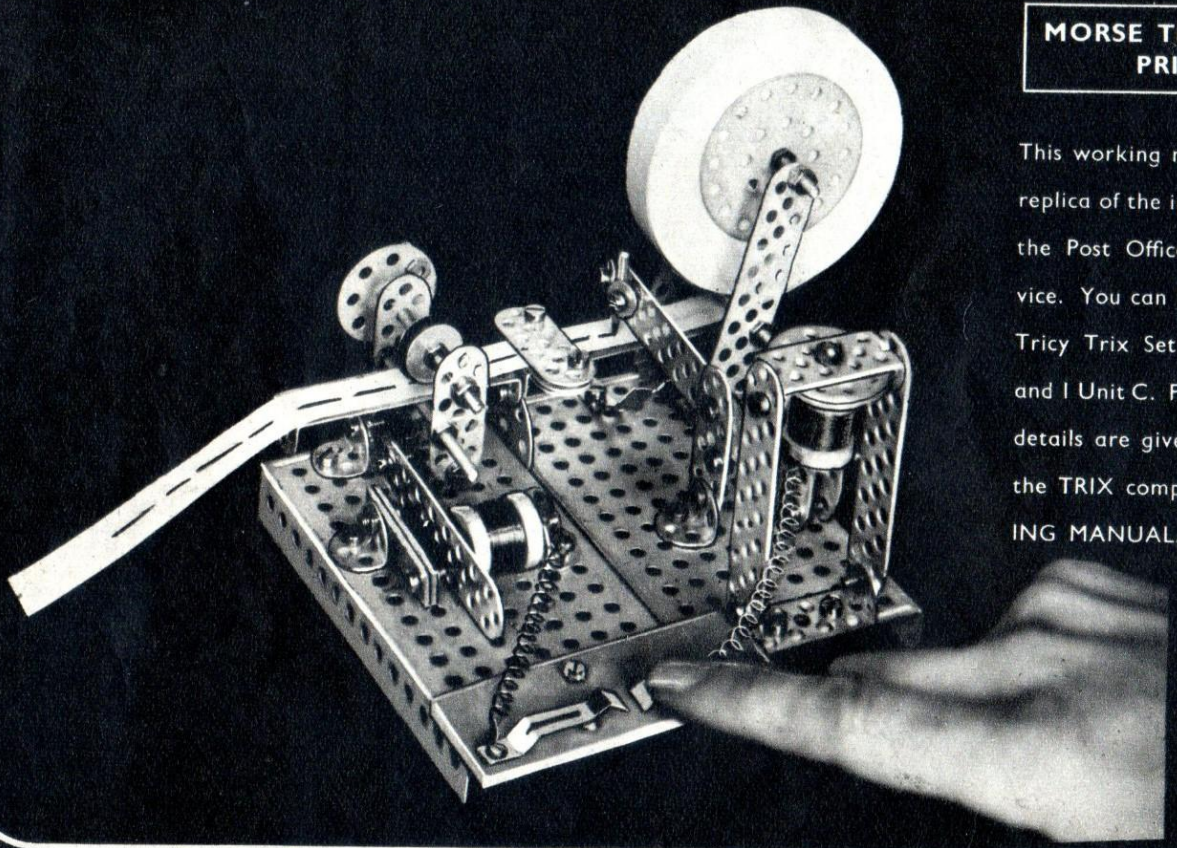
Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	1	F5	4
B1	20	F9	2
E1	1	F13	2
E3	1	F17	4
E4	1	N1	29
E6	4	P29	1
E7	1	S55	1
E8	2	U1	2
E10	1	U2	2
E11	1	W10	2

CONSTRUCTION

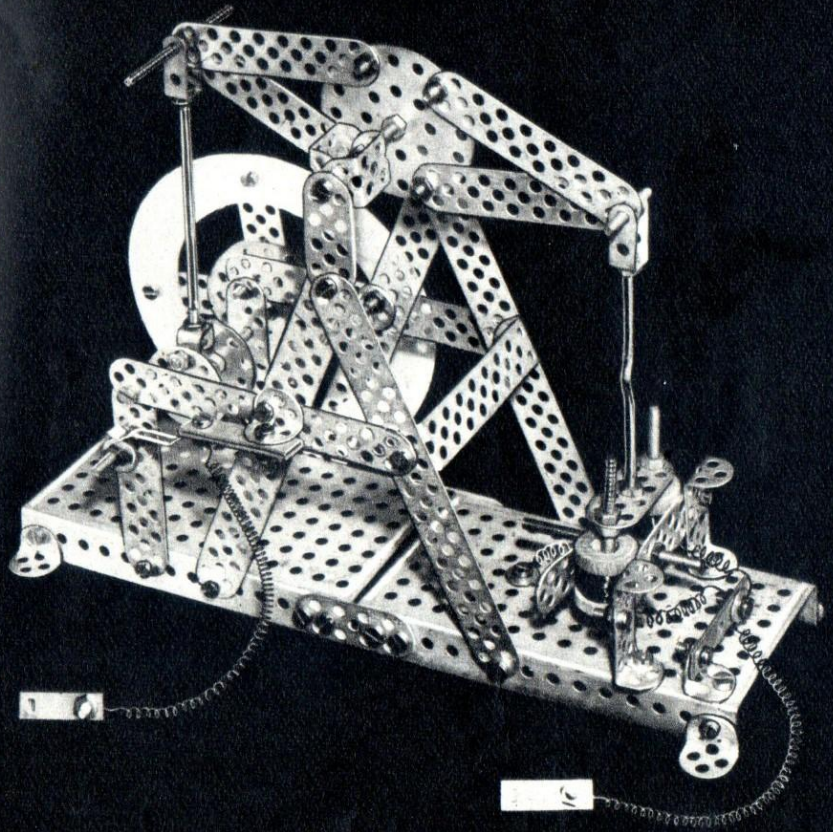
Framework consists of F17's joined at top by U2's and F5's. Sails are F13's attached to an S55 which also carries the commutator E11. The bobbin E3 and core E4 are fixed on an F9 which is attached to front F17's by U1's. The commutator brush E7 is attached to E8's which in turn is fixed to the F9 by an A1. Circuit and operation as in SEC 7. Add vanes to sails similar to those used on page 42. Start by hand.

Be sure all electrical connections are clean and tight. To increase the power of the motor driving the sails use two batteries connected up as in SEC 4.



MORSE TELEGRAPH PRINTER

This working model is a faithful replica of the instrument used in the Post Office Telegraph Service. You can build it with your Tricy Trix Set PLUS 1 Unit A and 1 Unit C. Full constructional details are given on page 85 of the TRIX complete ENGINEERING MANUAL.

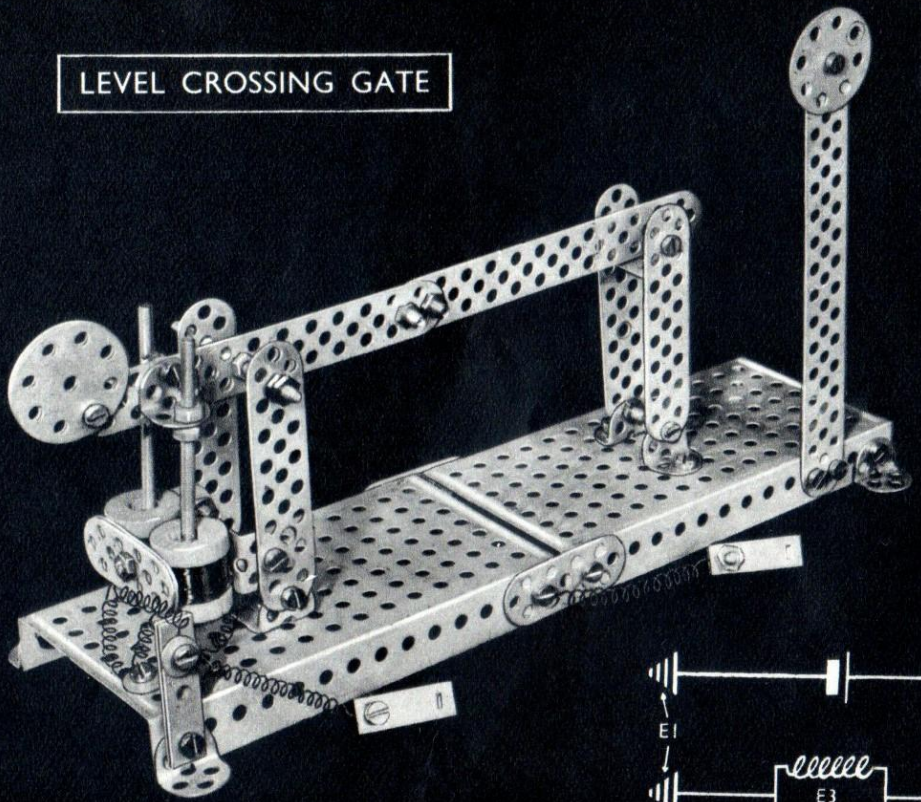


BEAM ENGINE

Here is another fine model which you can build with your Tricy Trix Set PLUS 1 Unit A and 1 Unit C. It is fully described on page 84 of the TRIX complete ENGINEERING MANUAL.

SPECIFICATION			
Part No.		Part No.	
A1	8	F13	2
B1	31	F17	1
E1	2	N1	45
E3	2	P29	3
E6	4	S25	1
E8	2	S55	3
E10	2	U1	1
F5	2	U2	2
F9	4	W10	2

LEVEL CROSSING GATE

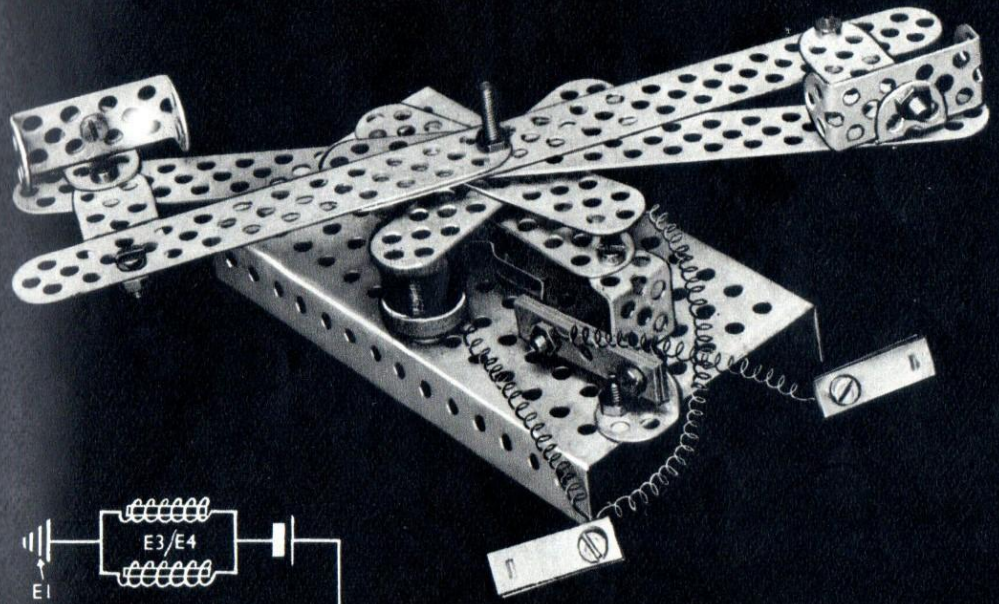


Wiring diagram

CONSTRUCTION

Gate consists of two F13's fixed to an S55 which is free to pivot in F9's bolted to U2 fixed to one E1. One end of gate rests on a U1 fixed to F9's attached to other E1 by A1's. E1's are joined by F5's. Two E3's are held between F5's by an S25 fixed to U2 bolted to F9's. S55's, attached to A1's fixed to gate, dip into the E3's. Adjust carefully the position of E3's so that S55's can be freely drawn down when current is turned on. Use W10's as packing pieces. One lead of each E3 goes to N1/B1 in E8's. This N1/B1 is joined to one battery lead. Other lead of each E3 is earthed. E1's are earthed. Wire up as in diagram using SEC 4 to give necessary power to raise gate.

CHAIR O'PLANES



Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	3	F5	2
B1	15	F9	3
E1	1	F13	2
E3	2	F17	2
E4	2	N1	25
E6	4	S55	1
E7	1	U1	2
E8	2	U2	2
E10	1	W10	3
E11	1		

CONSTRUCTION

Framework for revolving chairs is made from two F13's and F17's overlapped five holes and joined in middle by S55. This S55 acts as a pivot and works in a frame made from an F9 fixed to E1 by U1's. Lower end of S55 works in a hole of E1 and is lock-nutted underneath. Chairs are F5's and U2's attached by A1's. Just below chair framework a cross of two F9's is fixed on the S55. An E11 is also fixed on S55 just above the E1 and makes contact with an E7 attached to E8's fixed to E1 by an A1. Wire up as in diagram using SEC 7. Adjust carefully. Start by hand.

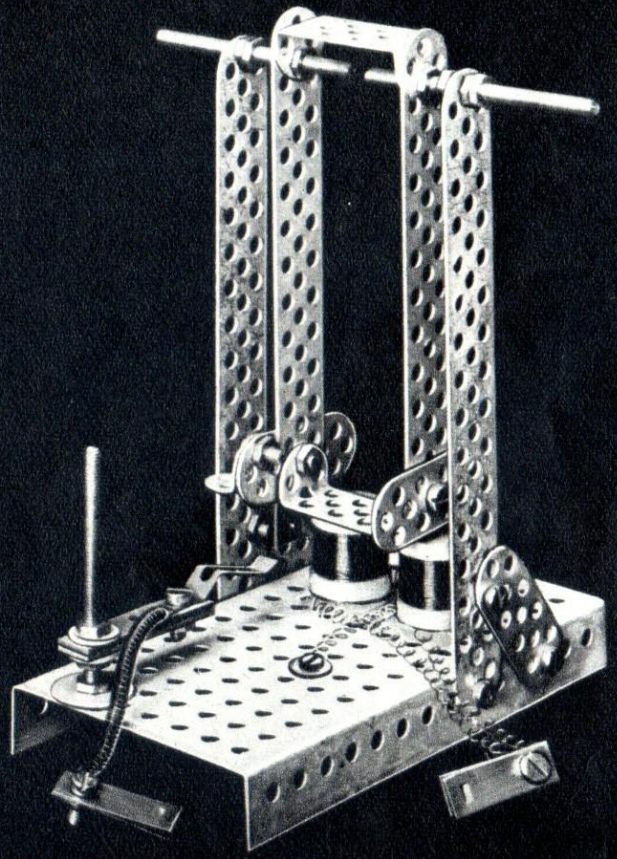
TRICY TRIX

SPECIFICATION			
Part No.		Part No.	
A1	1	F5	4
B1	13	F13	2
E1	1	F17	2
E3	2	N1	32
E4	2	S55	3
E6	5	U2	2
E7	1	W10	7
E8	2	W16	1
E10	1		

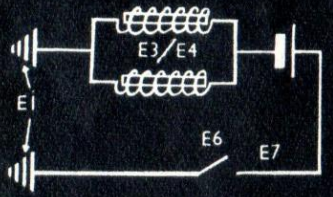
CONSTRUCTION

Uprights are F17's with F5's as braces. Swing is made of F13's, U2's and F5's. Loose joints made by locknuts on S55's allow swing to move freely. An E6 is attached to an F5 on the swing and acts as a wiping contact, with an E7 fixed to E8's as shown. Note that the E6 is loose jointed. An A1 fixed to the F5 regulates the swing. Wire up as in diagram. Start by hand. When E6 wipes against E7 circuit is closed and E3's become magnetised. This causes U2 of swing to be attracted and so E6 breaks contact with E7. Natural swing of the arms brings E6 back into contact with E7 and so repeat the operation.

Use SEC 4 to increase the power for working models except those having a bulb in circuit.

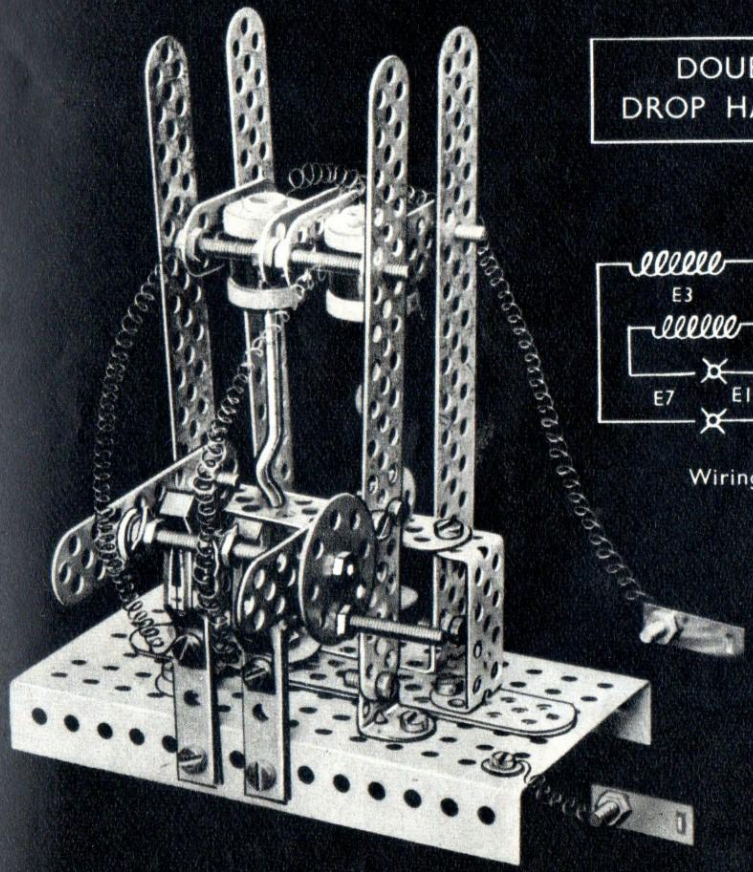


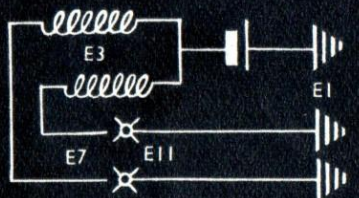
SWING



Wiring diagram

DOUBLE DROP HAMMER





Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	3	F9	3
B1	18	F13	1
E1	1	F17	4
E3	2	N1	48
E4	2	P29	1
E6	4	S25	1
E7	1	S55	4
E8	2	U1	2
E10	1	U2	1
E11	1	W10	5
F5	4		

CONSTRUCTION

Frame is four F17's fixed to E1 by A1's. The E3's are held by S55's, F5's and N1's. Note that distance between the centre of E3's is equal to four centre holes apart. Hammers are E9's and W16's working in frame made of an F9 and two U2's with two F13's beneath. Two F9's fixed at right angles to front F17's carry an S55 on which two E11's are fixed so that when one E11 touches E7 opposite to it, the other is clear of its E7. E7's are fixed to E8's. One lead from each E3 goes to E7 beneath it. Other lead goes to battery. E1 is earthed. Wire up as in diagram and adjust carefully. Turn crank slowly and current will flow through each E3 in turn causing its E9 to be drawn up.

CIRCUIT TESTER

SPECIFICATION			
Part No.		Part No.	
A1	2	E12	1
B1	8	F13	1
E1	1	N1	16
E6	3	S55	2
E8	2	W10	3

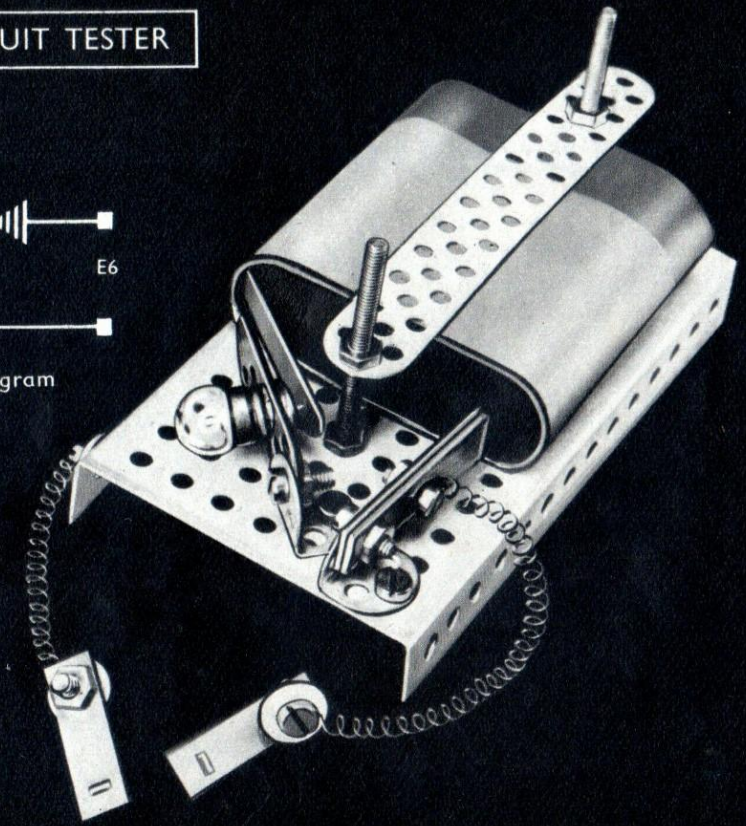
CONSTRUCTION

The battery is held to the base by two S55's and an F13. Bulb holder E12 is fixed to base E1 by an A1 so that the centre contact of the bulb presses against the long strip of battery. Short strip of battery makes contact with an E6 fixed to two E8's which in turn are fixed to an A1 bolted to base. One test lead is attached to the base, the other to the E6. To operate, fix one lead to each end of circuit to be tested. Bulb will light up if circuit is complete.

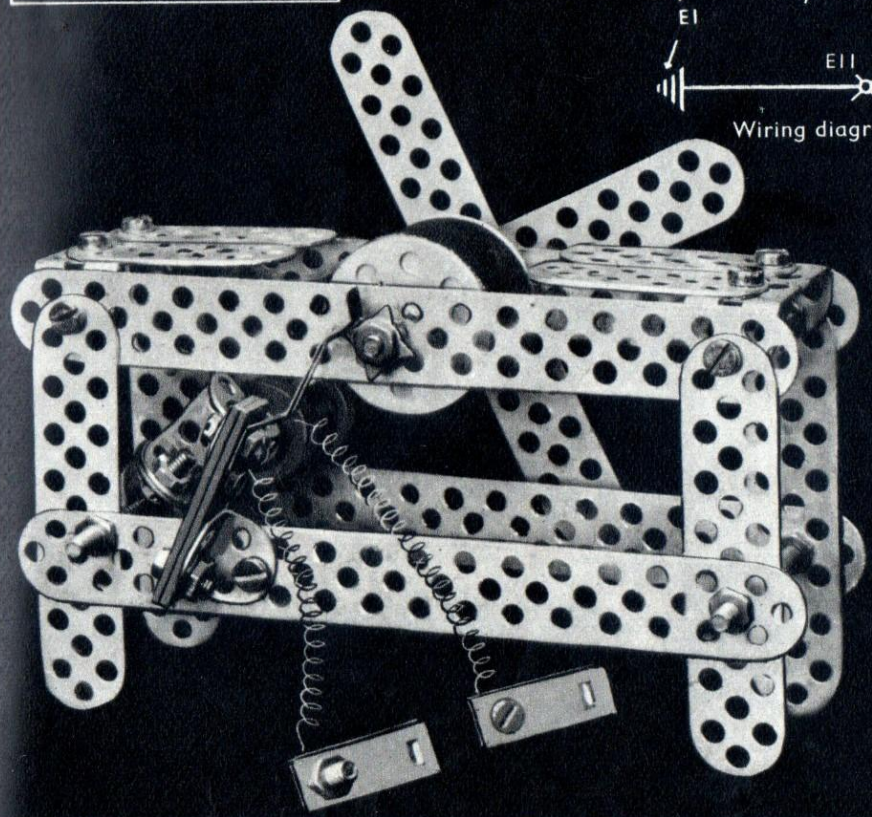
Be sure all electrical connections are clean and tight.

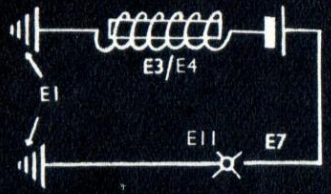
For further advice or information write to the TRIX INFORMATION BUREAU, 11, Old Burlington Street, London, W.1.

Wiring diagram



PLANING BENCH





Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	2	F9	4
B1	14	F13	2
E3	1	F17	4
E4	1	N1	34
E6	4	P29	2
E7	1	S55	3
E8	2	U1	1
E10	1	U2	2
E11	1	W10	2
F5	4		

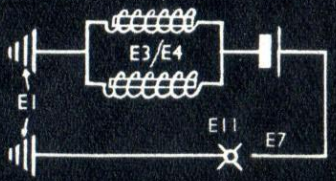
CONSTRUCTION

The frame is made up of four horizontal F17's with four vertical F9's as legs. U2's join the top and S55's the bottom. Four F5's make up the table. The planer is made of a cut down cotton reel fixed between two P29's on a shaft S55 which revolves in the centre holes of the top F17's. A cross of F13's is fixed at one end of this shaft, the other end carries a commutator E11. Bobbin E3 and core E4 are fixed to a U1 to which an A1 is bolted and attached to one of the lower S55's. The crossed F13's should clear the E4 when rotating. The commutator brush E7 is fixed to E8's which are attached to the lower F17 by an A1. One E3 lead is earthed to frame, the other goes to the battery. The commutator circuit is SEC 7. Adjust carefully and start by hand.

Use SEC 4 to increase the power of this model.

TILT HAMMER

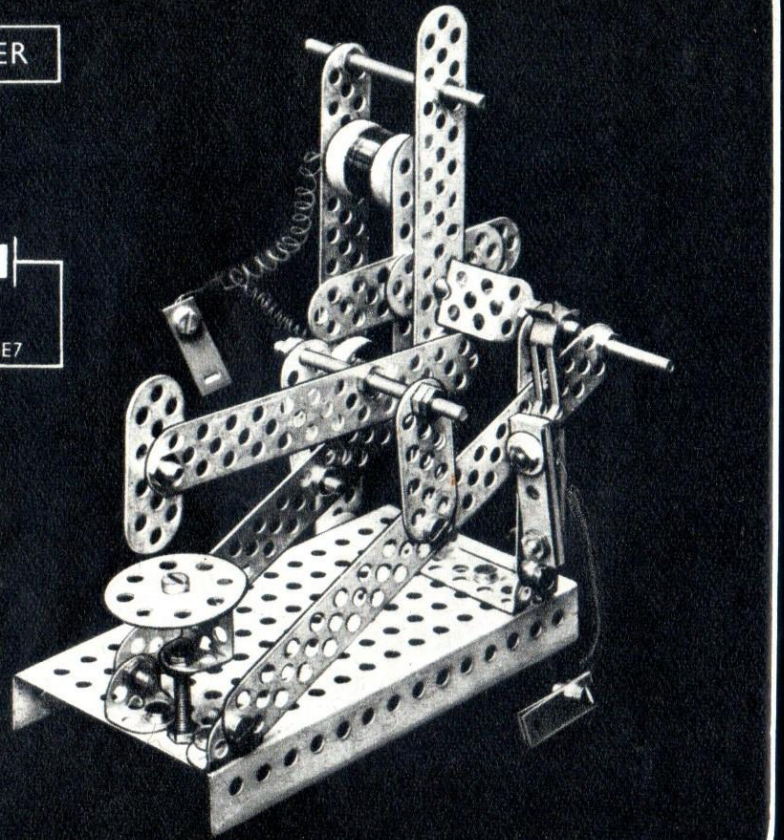
SPECIFICATION			
Part No.		Part No.	
A1	3	F9	3
B1	18	F13	1
E1	1	F17	4
E3	2	N1	48
E4	2	P29	1
E6	4	S25	1
E7	1	S55	4
E8	2	U1	2
E10	1	U2	1
E11	1	W10	5
F5	4		



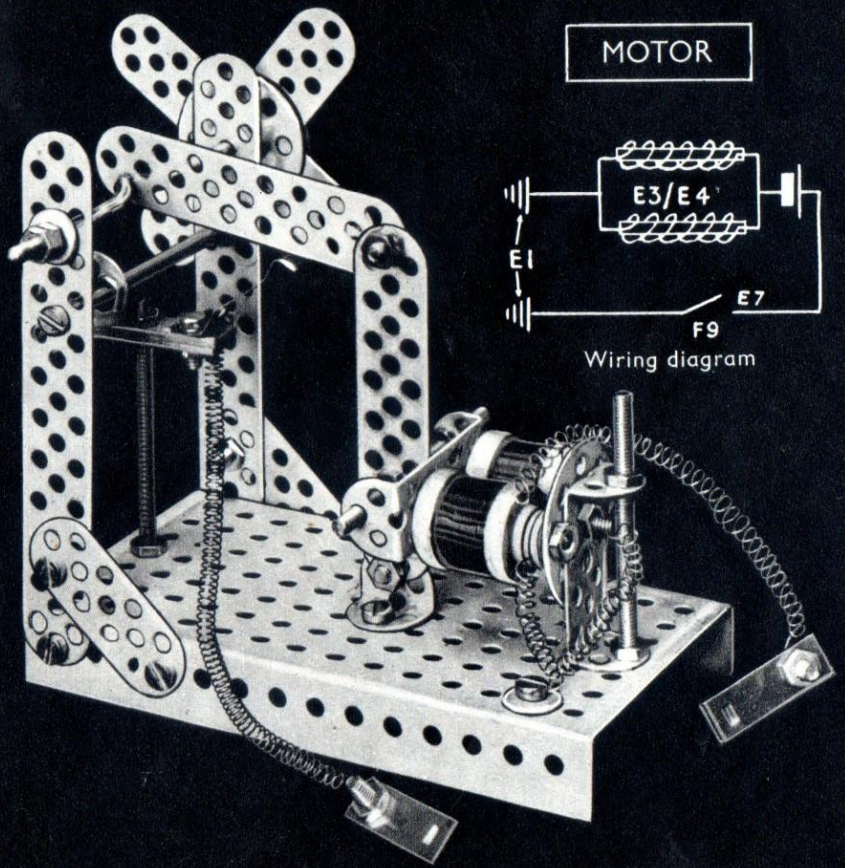
Wiring diagram

CONSTRUCTION

Sloping frame of F17's, braced at far end by S55, is fixed to E1 at front by A1's. At rear, outer F17 is fixed to F9 and inner F17 to an upright F17. F9 and upright F17 are fixed to U2 bolted to E1. An A1, carrying two E8's and E7, is fixed to F9. An S55, with U1 in centre, runs in top hole of F9 and centre hole of upright F17. S55 carries E11 at one end and cross of F9's at the other. An F5 fixed to cross opposite U1 acts as counter-weight. E3's and E4's are fixed in fourth and eleventh centre holes respectively of another F17 bolted to E1. Hammer arm, F13, is fixed to an S55 which pivots on F5's bolted to centre holes of sloping F17's. Wire up using SEC 7 and adjust carefully. Start by hand. Use SEC 4 for extra power.



TRICY TRIX



Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	1	F5	2
B1	15	F9	4
E1	1	F13	2
E3	2	N1	39
E4	2	P29	3
E6	4	S55	4
E7	1	U1	1
E8	2	U2	2
E9	1	W10	9
E10	1		

CONSTRUCTION

Frame of F13's fixed to E1 is braced by F5's and cross braced by S55 and U1. E9 runs in the F13's and carries at one end a flywheel of F9's and P29's. Other end is locknutted. An F9 runs in bend of E9 and is loose jointed to another F9 which, in turn, is loose jointed to A1 fixed to E1. E3's with E4's inserted are held to E1 by P29, U2 and S55. E7 is bolted to E8's fixed to E1 by S55. Wire up as in diagram using SEC 3 for E3's. Adjust carefully. Use SEC 4 to give extra power. Start by hand.

When E7 touches F9 circuit is complete and E3's then attract U2 causing F9 to break contact with E7. The to and fro movement of F9 causes E9 to turn. Flywheel keeps E9 spinning enabling F9 to make contact again with E7.

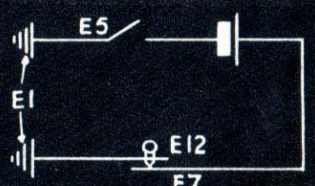
TRICY TRIX

COLOUR WHEEL

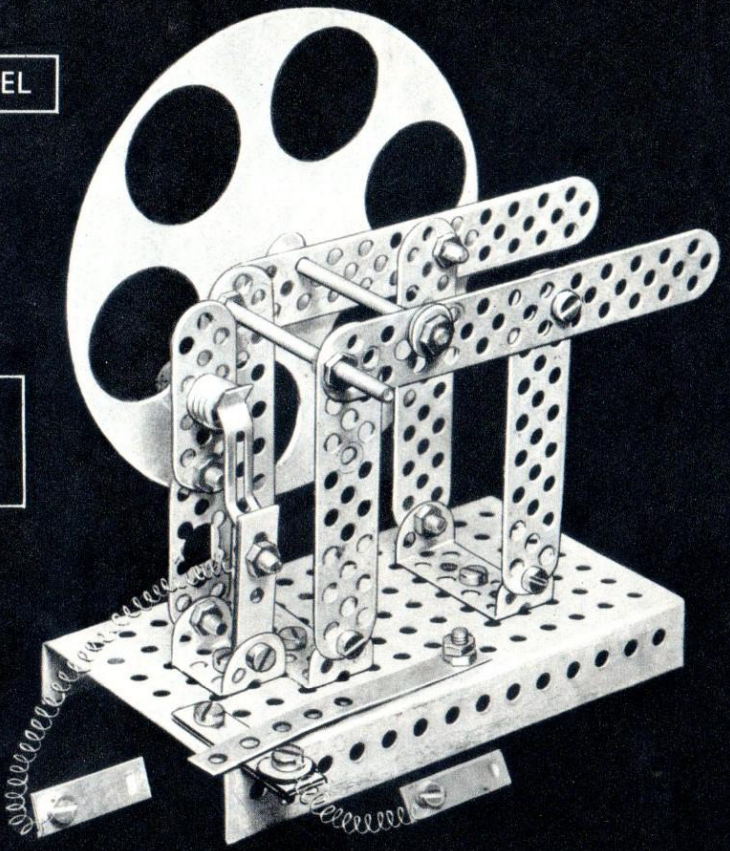
SPECIFICATION			
Part No.		Part No.	
B1	17	F9	4
E1	1	F13	2
E5	1	N1	27
E6	4	S55	2
E7	1	U1	1
E8	2	U2	2
E10	2	W10	5
E12	2		

CONSTRUCTION

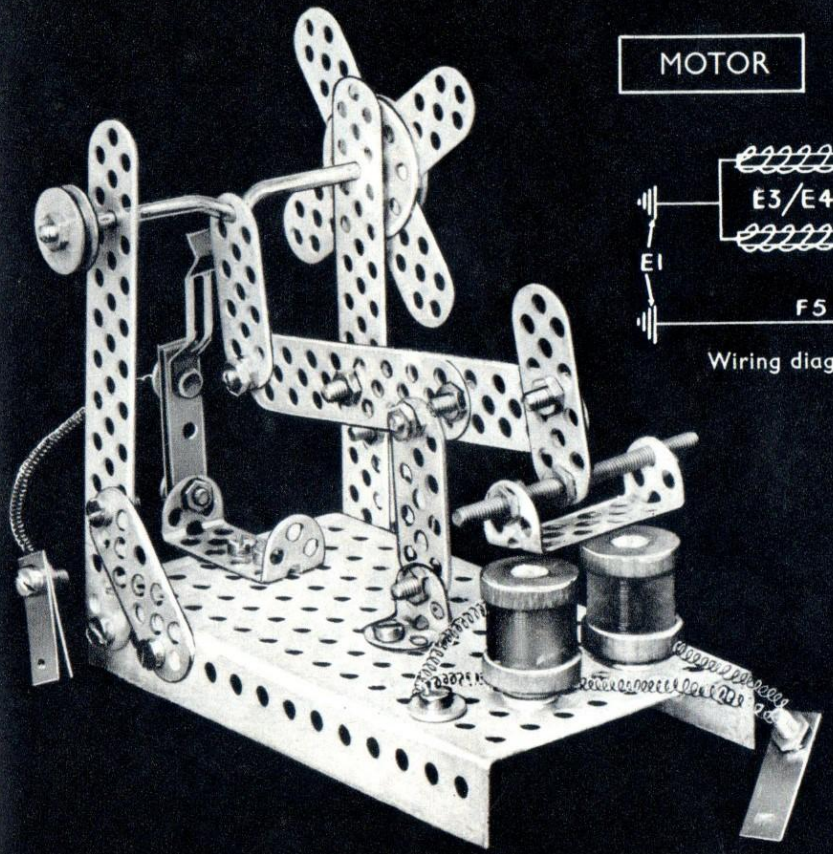
Frame made from vertical F9's and horizontal F13's is fixed to base E1 by U2's and braced at top by an S55. A cardboard disc, cut to template (page 98) with coloured cellophane stuck over the holes, is fixed to another S55 which runs in the third outside holes of F13's and is held by N1's which also fix two W10's to the spindle. These W10's are used to spin the disc. Two E12's are bolted together, one carries the bulb, the other being fixed to a U1 bolted to E1. To other side of U1 an E8 is fastened carrying an E7 which makes contact with bulb. An E5 is loose jointed to E1 and rests on an E8 also fixed to E1. At the other end of E8 an N1/B1 with W10 holds the other battery lead. To switch on, E5 is moved to touch N1/B1.



Wiring diagram



TRICY TRIX



MOTOR

Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	1	E10	1
B1	20	F5	4
C1	1	F9	4
E1	1	F13	2
E3	2	N1	32
E4	2	P29	2
E6	4	S55	1
E7	1	U2	2
E8	2	W10	9
E9	1	W16	2

CONSTRUCTION

Frame consists of two F13's mounted on E1 and braced by F5 on one side and C1 on the other. Uprights carry E9 running freely in third centre hole from top. Pulley made from W10's and W16's is fixed to one end and a flywheel (2 F9's and 2 P29's) at the other. In the crank, an F5 runs which is loose jointed to strip made from two F9's overlapped five holes. Strip is loose jointed to F5 fixed to the E1 by A1. Another F5 bolted to strip carries a U2 fixed by an S55. Two E3's and cores E4's are fixed to E1 with W10's as packing pieces. At the other end of E1 a U2 is fixed carrying two E8's with E7 attached. Wire up as in diagram using SEC 4 for extra power. Adjust carefully and start by hand. Contact is made by the F5 touching the E7 as the crank is revolved.

TRICY TRIX

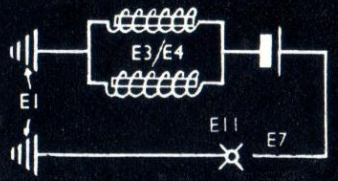
SPECIFICATION			
Part No.		Part No.	
A1	4	E11	1
B1	13	F9	2
E1	1	F13	2
E3	2	F17	2
E4	2	N1	31
E6	4	P29	4
E7	1	S55	3
E8	2	U2	1
E10	1	W10	2

CONSTRUCTION

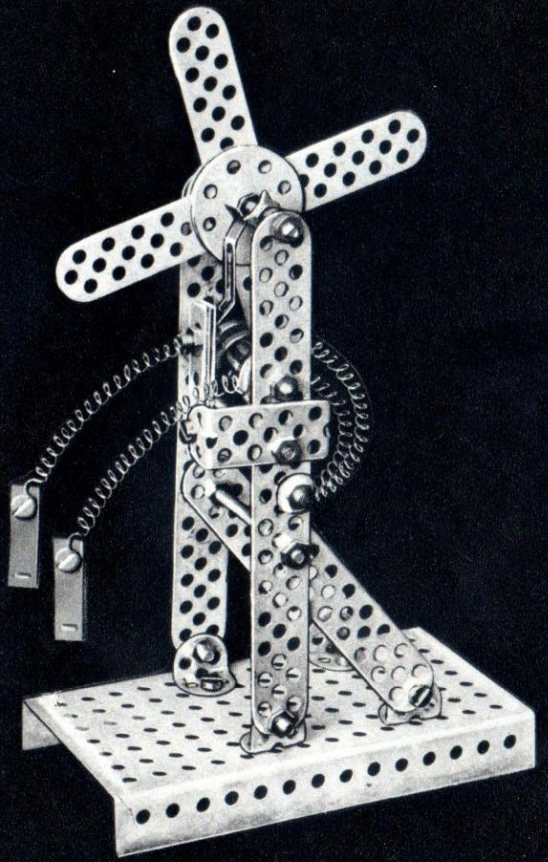
The upright frame consists of two F17's braced by F9's and fixed to base E1 by A1's. Two crossbraces of S55's are also added. An E3 with core E4 is fixed six holes from the top to each F17, so that a cross of F13's and P29's can pass between them as it revolves. This cross runs on a spindle S55 to which an E11 is also fixed. The commutator brush, E7, is held by E8's attached to a U2. Wire up as in diagram using SEC 3 for E3's, and SEC 7 for circuit. Adjust very carefully. Start by hand. Use SEC 4 to give extra power to the motor.

Be sure all electrical connections are clean and tight.

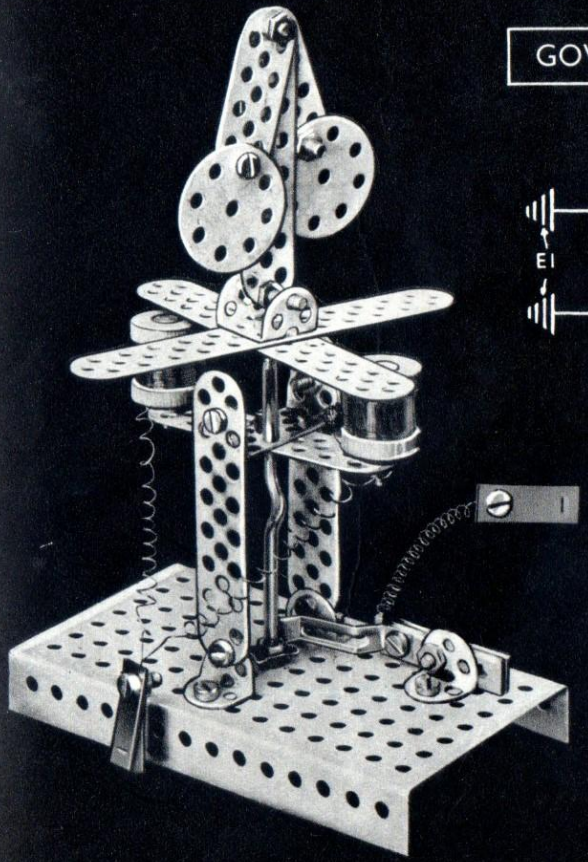
MOTOR

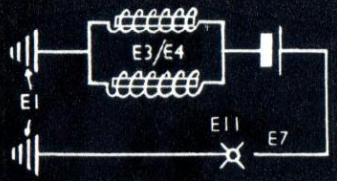


Wiring diagram



GOVERNOR





Wiring diagram

SPECIFICATION			
Part No.		Part No.	
A1	3	E11	1
B1	16	F5	2
E1	1	F9	4
E3	2	F13	2
E4	2	N1	29
E6	4	P29	2
E7	1	S25	1
E8	2	U1	1
E9	1	U2	1
E10	1	W10	2

CONSTRUCTION

Upright F9's are fixed to E1 by A1's and joined near the top by U2. At right angles to U2 an F9 is fixed carrying at each end an E3 and core E4. An E9 runs freely in the bearing formed by U2 and F9. E9 is held by locknuts under the E1 and carries an E11 also held by nuts on top of E1. Crossed F13's with U1 are fixed on the other end of E9. To this U1, an F9 is attached by an S25 and N1's. S25 is held rigid by N1's. To the other end of the F9, governor weights (F5 and P29) are loose jointed. E7 is fixed to E8's which are attached to E1 by A1. Wire up as in diagram using SEC 7. Use SEC 4 for extra power. Adjust carefully. Start by hand.

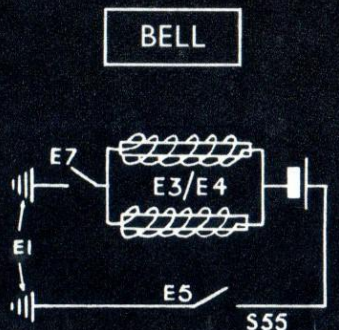
TRICY TRIX

SPECIFICATION			
Part No.		Part No.	
B1	13	F5	1
E1	1	F9	1
E2	1	F13	2
E3	2	N1	27
E4	2	S25	1
E5	1	S55	2
E6	4	U1	1
E7	1	U2	2
E8	4	W10	4
E10	1	W16	1

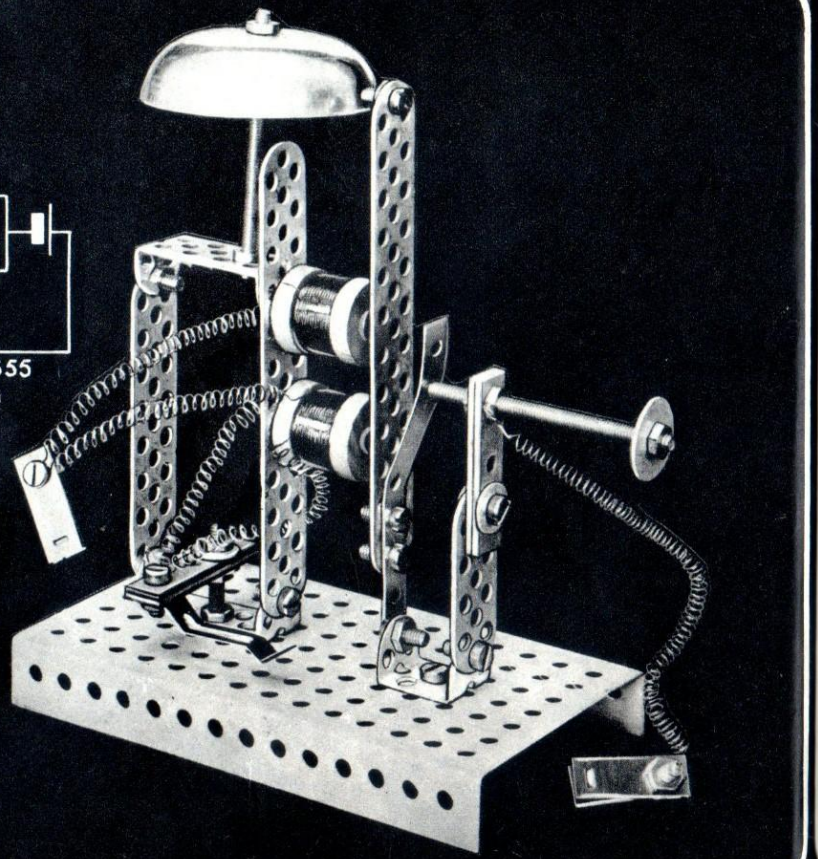
CONSTRUCTION

Frame construction is simple and can be clearly seen in the illustration. The E3's are connected as in SEC 3. E7, which acts as a switch, is fixed to two E8's which are attached to base by an S25. One lead from each E3 is fixed to this switch. Other bobbin leads go to battery. Note that the strip E5 is bent slightly so as to touch the S55 which is fixed to E8's attached to an F5. Other lead from battery is connected to this S55. When E7 is pressed to base the circuit is completed, the F13 being attracted to bobbins causing the bolt to strike the bell. The movement of F13 causes the E5 to break contact with the S55. Immediately E5 ceases to touch the S55, the circuit is broken and the striker returns to its original position.

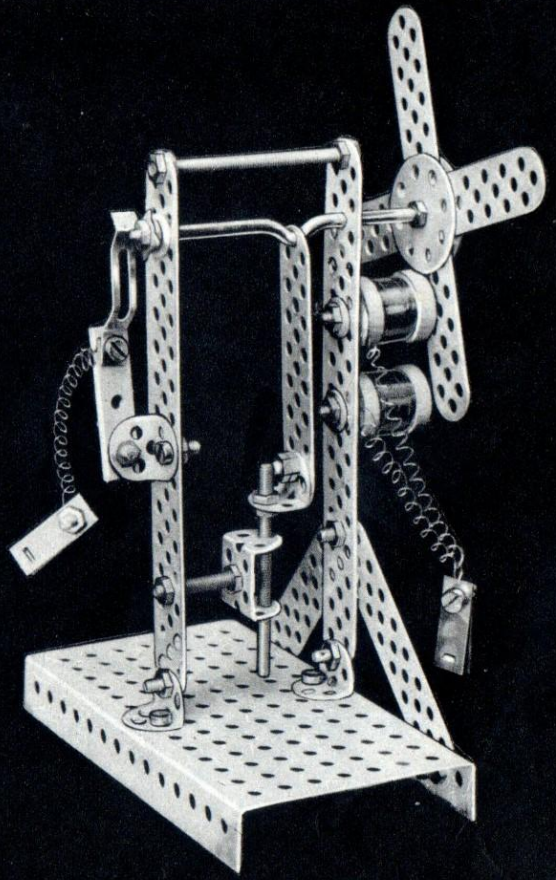
Be sure all electrical connections are clean and tight.

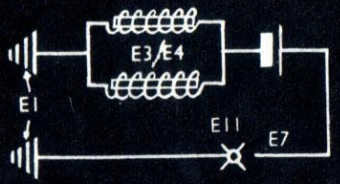


Wiring diagram



WINDPUMP





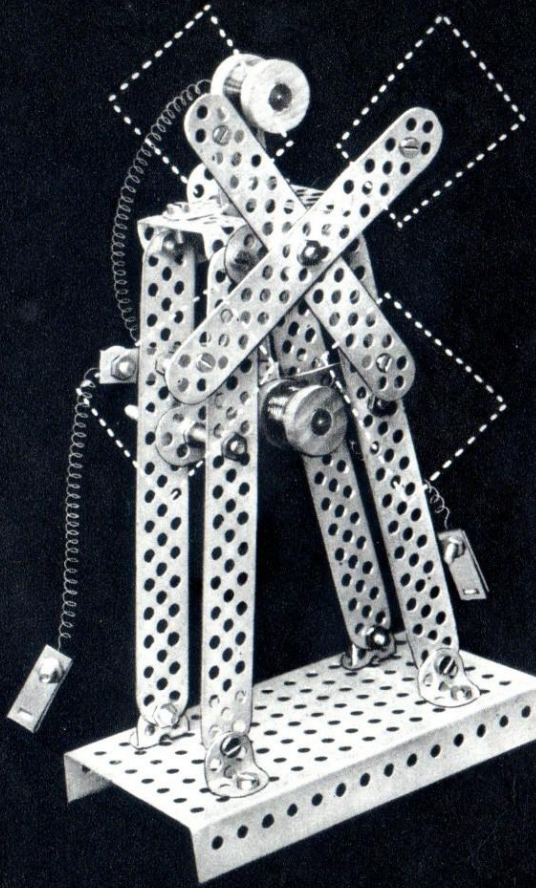
Wiring diagram

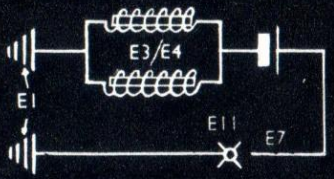
SPECIFICATION			
Part No.		Part No.	
A1	4	E11	1
B1	13	F9	3
E1	1	F13	2
E3	2	F17	2
E4	2	N1	31
E6	4	P29	2
E7	1	S25	1
E8	2	S55	2
E9	1	U1	1
E10	1	W10	3

CONSTRUCTION

Uprights of F17's fixed to E1 by A1's and braced with F9's are joined at top by S55. An E9 runs in the third centre hole from top of F17's and carries at one end an E11 and at the other, sails consisting of F13's and P29's. Pump body is represented by U1 attached to rear F17 by an S25. Pump is S55 fixed to connecting rod, F9, by A1. Note loose joint between A1 and F9. Other end of F9 works in the bend of E9. Two E3's and E4's are fixed to front F17 below E9. E7 is fixed to E8's attached to rear F17 by A1. Wire up as in diagram. Circuit is SEC 7. Adjust carefully. Start by hand. Use SEC 4 for extra power.

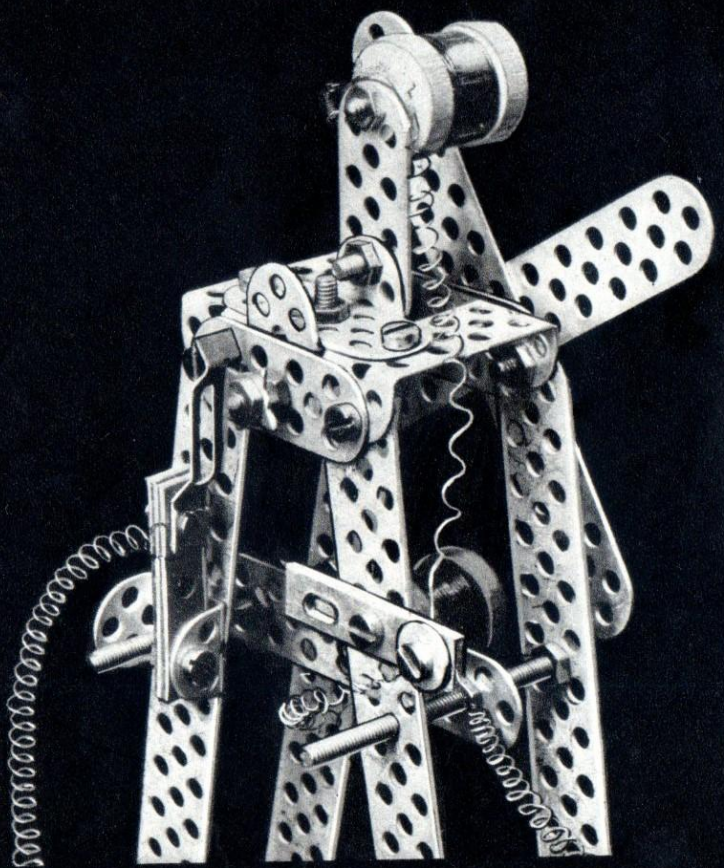
WINDMILL





Wiring diagram

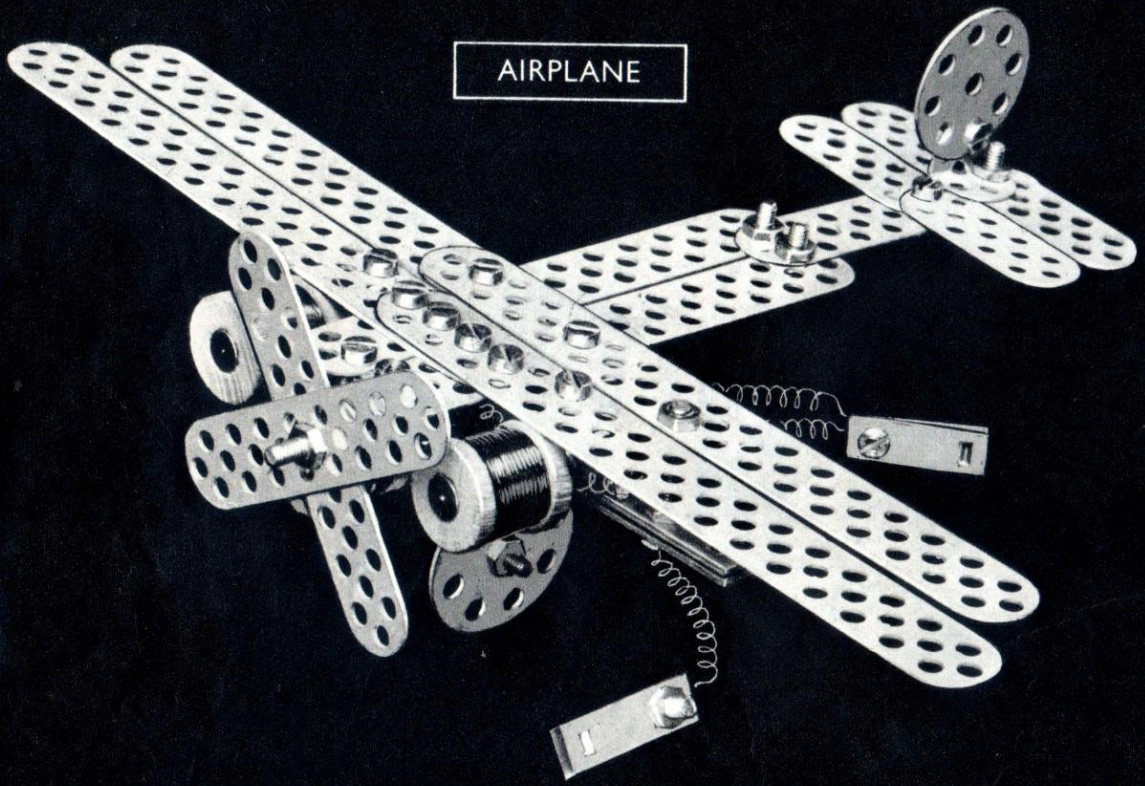
TRICY TRIX



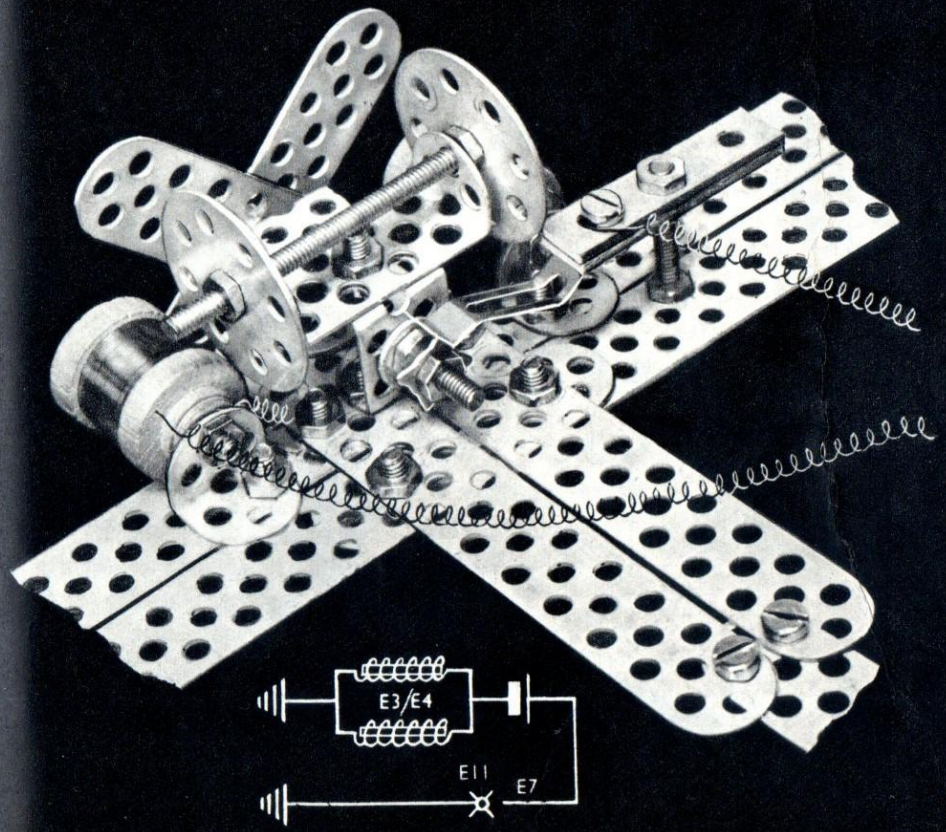
SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	E8	3	N1	46
B1	27	E10	2	S55	3
E1	1	E11	1	U1	2
E3	2	F5	4	U2	2
E4	2	F9	1	W10	6
E6	4	F13	2		
E7	1	F17	4		

CONSTRUCTION

The frame uprights are four F17's attached to base E1 by A1's, and joined at the top by F5's and U2's. An S55 works in the centre holes of these F5's, and carries at one end a commutator E11 while at the other sails of F13's are fixed. The lower bobbin and core are fixed to the middle hole of an F9 which is held in position between the F17's by two S55's. The top bobbin and core are attached to a vertical F5 which is fixed to the framework by a U1 and another F5. The E7 is fixed to two E8's which are fixed to a U1 which in turn is attached to the rear F17 by the S55 already in place. The bobbins (E3) are wired as in SEC 3 and the commutator circuit as SEC 7. To obtain more power two batteries coupled as in SEC 4 are used. Sails can be fixed as shown. Templates see page 98. Make sure that all contacts are clean and that the insulating enamel on the wire is scraped off before joining it to the battery or E6's.


AIRPLANE

TRICY TRIX



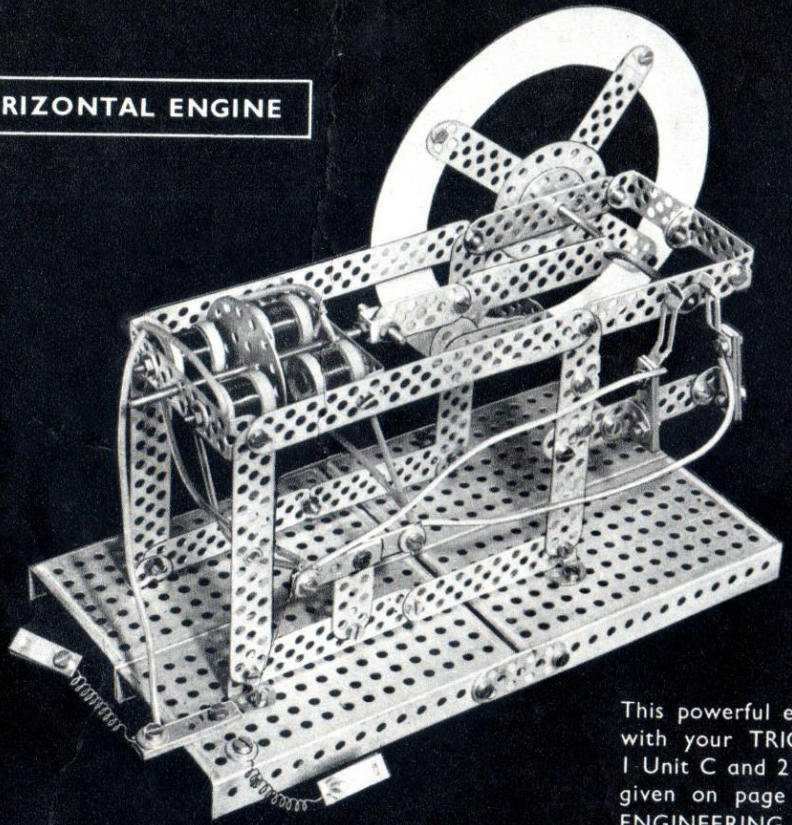
Wiring diagram

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	E10	1	P29	3
B1	18	E11	1	S25	1
E3	2	F5	4	S55	2
E4	2	F9	3	U1	2
E6	4	F13	2	U2	1
E7	1	F17	4	W10	4
E8	2	N1	36		

CONSTRUCTION

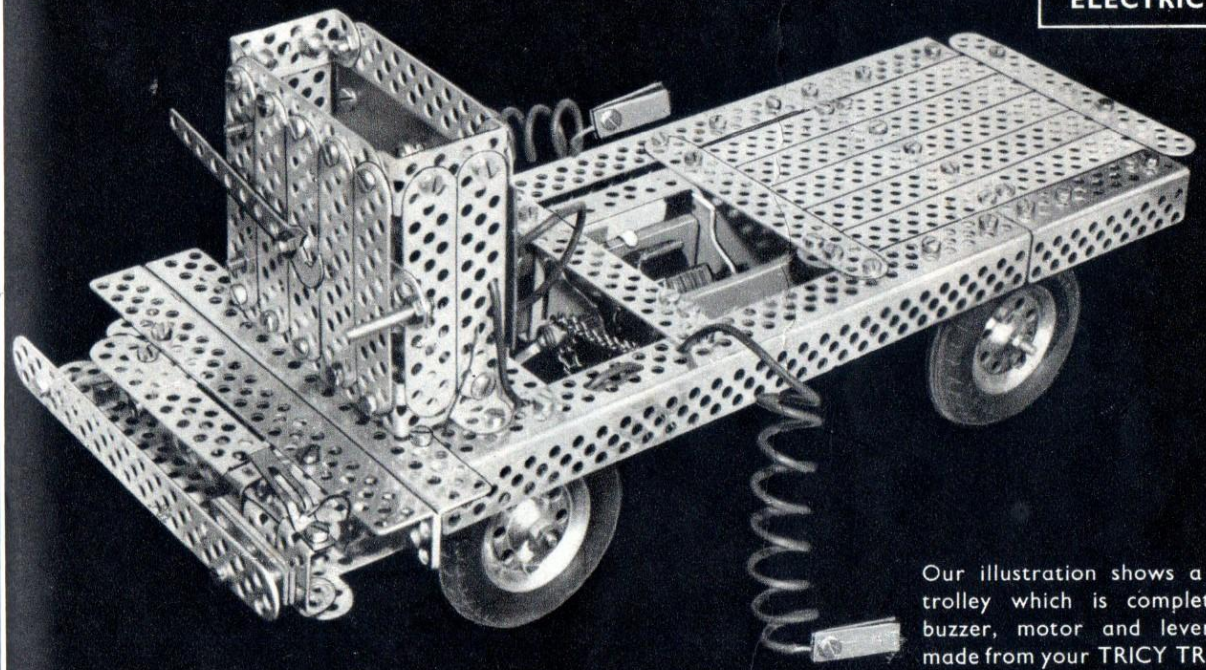
The fuselage of the model consists of two F13's lengthened at the rear with an F9 which carries the tail plane (four F5's) and rudder P29 fixed by an A1. Rear skid is an A1. Wings are four F17's. The propeller shaft (S55) runs in two U1's fixed to the underneath of fuselage and carries a four-bladed propeller (crossed F9's) at one end and at the other a commutator E11 is fixed. Attached to one of the U1's is a U2 at right angles which forms the bearings for the landing wheels which are made from two P29's with axle S55. Bobbins E3 and cores E4 are attached to the underside of wings by A1's, so that the propeller blades just clear them when revolving. An E7 is fixed to two E8's which are attached to the underside of one wing by an S25. One lead from each bobbin is earthed, the others are joined together and go to battery. Other battery connection goes to the E7 by means of coil E10 and E6's. When current is switched on and the propeller given a swing it will continue to revolve as described in SEC 7.

HORIZONTAL ENGINE



This powerful electric motor can be made with your TRICY TRIX PLUS 1 Unit A, 1 Unit C and 2 Units E. Full description is given on page 88 of the TRIX complete ENGINEERING MANUAL.

ELECTRIC TROLLEY



Our illustration shows a working electric trolley which is complete with warning buzzer, motor and lever steering. It is made from your TRICY TRIX plus 3 Units A, 1 Unit B, 2 Units C, 1 Unit D, 2 Units F, 1 Unit G and Motor 2051. For full description see page 90 of the TRIX complete ENGINEERING MANUAL.

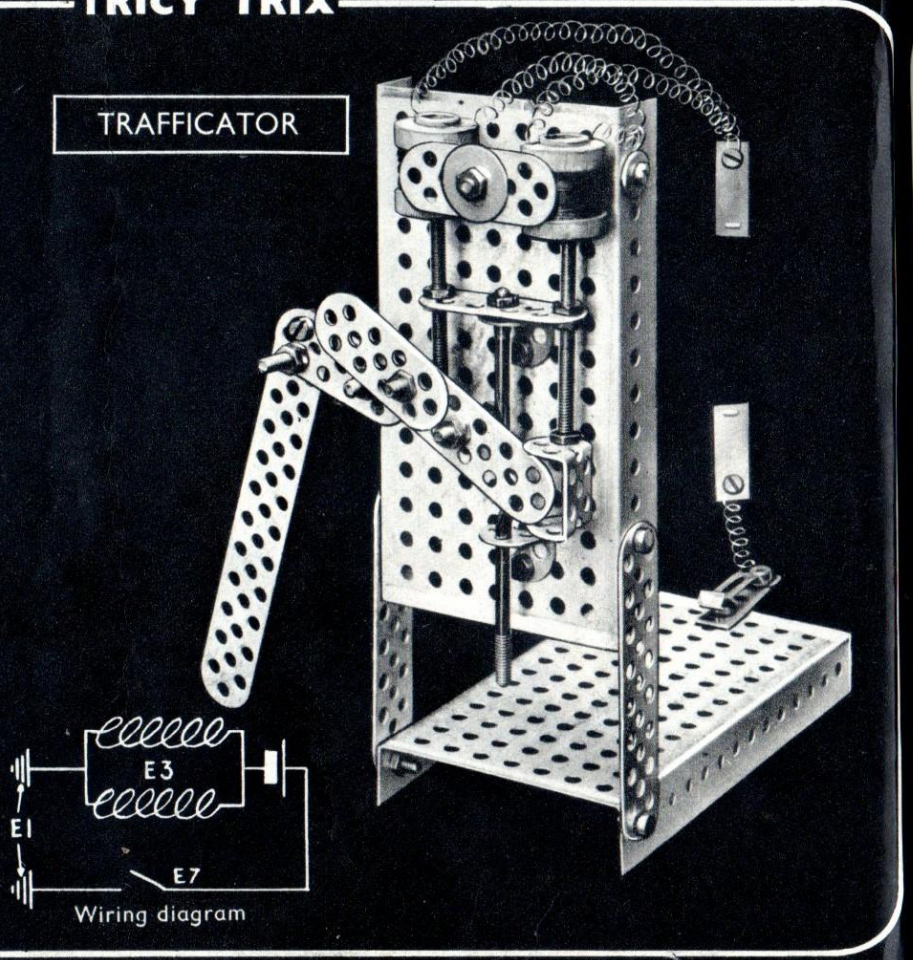
TRICY TRIX

TRAFFICATOR

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	2	E9	1	S25	2
B1	14	E10	1	S55	3
E1	2	E12	1	U1	1
E3	2	F5	4	W10	1
E6	4	F9	3	W16	1
E7	1	F13	1		
E8	1	N1	37		

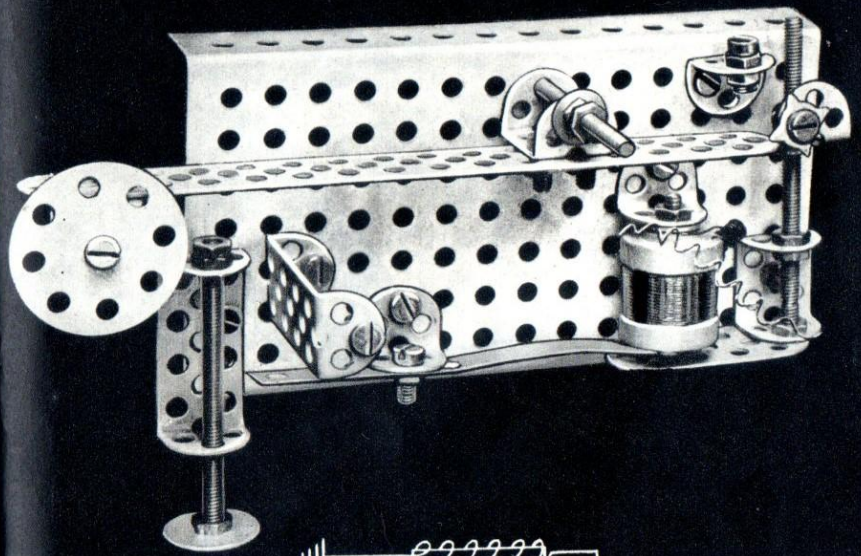
CONSTRUCTION

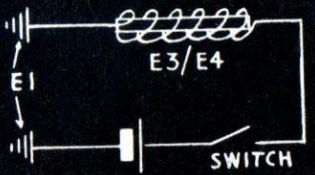
Two bobbins E3 are clamped to an E1 by an S55, E12, and W16, and spaced five centre holes apart. An E9 carrying an F5 at one end slides in two A1's, two S55's are fixed in the end holes of this F5 so that they slide into the E3's without binding. A U1 is fixed to the other end of one of these S55's. A lever F9 is pivoted in the fourth hole by an S25 fixed to the base, and rests in the U1, see illustration. An F5 is fixed to the other side of the F9 as a counterbalance weight. The direction arm consists of an F13 with an F5 fixed at one end at right angles, and pivots on an S25 which is fixed to an F5. This F5 is bolted to the base E1. The lever F9 presses against a bolt which is fixed to the F5 of the direction arm. One lead of each coil is earthed, the others go to the battery. An E8 attached to the base E1 carries an E7 to which the other battery lead is attached. When the current flows through the coils are magnetised, so attracting the S55's and raising the U1 which moves the lever F9. The other end of this lever moves downwards, striking the bolt on the F5 of the arm so raising the F13 upwards. A press switch is needed for this model and is wired up as in diagram.



Wiring diagram

INDICATOR BOARD





Wiring diagram

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	E7	1	P29	1
B1	18	E10	2	S55	3
E1	1	E11	1	U1	2
E3	1	F5	1	U2	2
E4	1	F17	1	W10	2
E5	1	N1	34	W16	1

CONSTRUCTION

A bobbin and core is fixed to base E1 by an A1. Underneath is an F5 which is pivoted to base by a U1 which carries an S55. Attached to this S55 is an A1 to which a commutator E11 is bolted as shown. This acts as a catch for the lever F17 which is pivoted towards one end by a U1 working in an S55 attached to base. On the other end of this strip a disc P29 is fixed by an A1. It will be seen that when the coil is energised momentarily the F5 is attracted so causing the commutator to release the F17 which will drop, and allowing the numbered disc to come into view. To prevent this F17 falling too far a stop is made of an A1, B1 and two N1's. To assist the return of the F5 when current is switched off, a strip E5 is used as a spring. This is attached to the base by an A1. To reset the arm (F17) a spindle S55 sliding in a U2 is fixed to base with a W16 as knob. To reset just push the spindle up until the commutator (E11) catches and holds the F17 and then allow the spindle to fall. One lead of coil is earthed, the other goes to the battery. The other battery lead goes to one side of switch. The other side being earthed to base E1.

MORSE TAPPER AND KEY

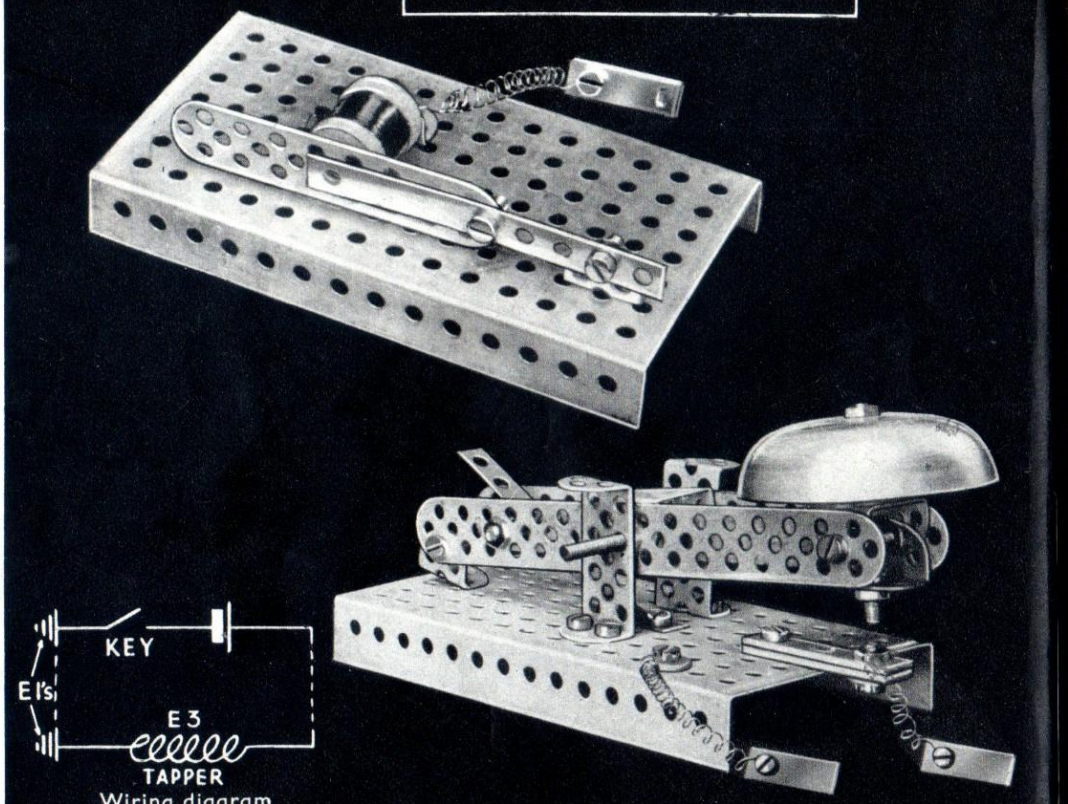
SPECIFICATION			
Part No.		Part No.	
A1	4	E10	2
B1	17	F9	1
E1	2	F17	2
E2	1	N1	30
E3	1	S25	2
E4	1	S55	1
E5	2	U1	2
E6	6	U2	2
E8	2	W10	3

CONSTRUCTION

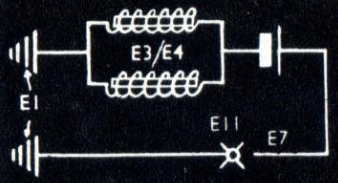
TAPPER. An E3 and E4 are fixed to E1 by A1. An F9 is bolted to E5 held to E1 by A1. F9 should be about $\frac{1}{8}$ in. away from end of E4.

KEY. Lever is two F17's spaced by U1 in centre and pivots on S55 carried in two U2's fixed to E1. Knob is E2 fixed to S25 on U1 at lever end. An A1 fixed to the U1 carries an N1/B1 which makes contact, when E2 is pressed, with an N1/B1 fixed to E8's attached to E1. An S25 spaces F17's and rests on E5 acting as return spring.

Wire up Tapper and Key as in diagram joining E1's with a wire to form a common earth.

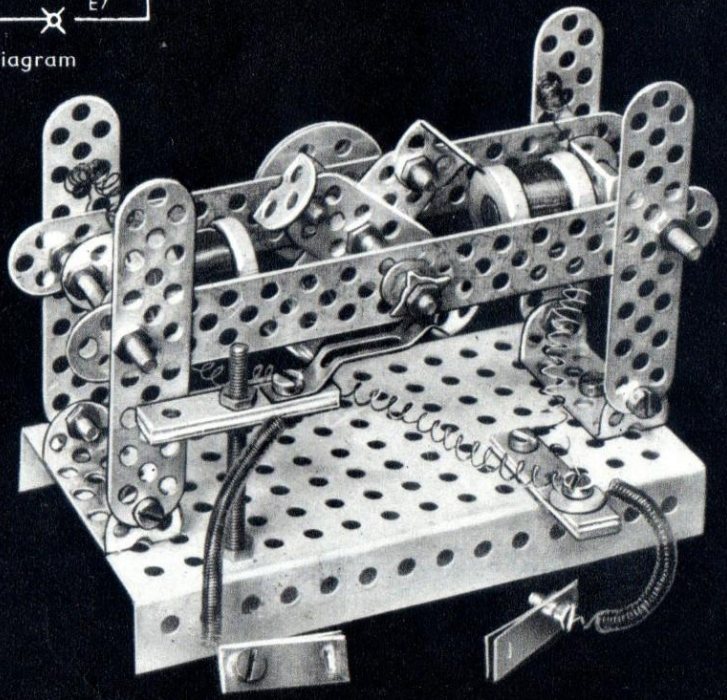


Wiring diagram



Wiring diagram

POWER MOTOR

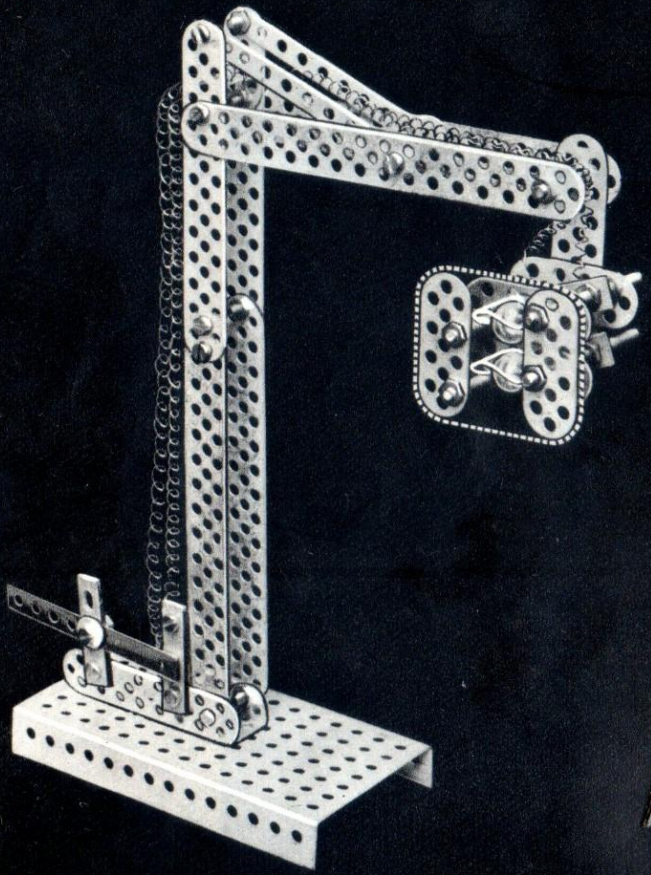


SPECIFICATION			
Part No.		Part No.	
A1	4	F5	2
B1	15	F9	4
E1	1	F17	2
E3	2	N1	40
E4	2	P29	2
E6	4	S55	4
E7	1	U1	2
E8	4	U2	2
E10	2	W10	5
E11	1	W16	1

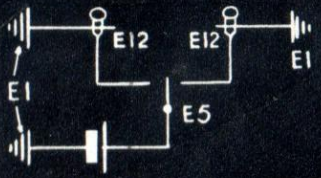
CONSTRUCTION

Frame consists of vertical F9's attached to base by U2's with horizontal F17's fixed to the F9's by S55's. These S55's carry U1's, which hold the bobbins and cores. Turning between the two bobbins is an armature, made from two F5's and four A1's, fixed on a spindle S55 running in the centre holes of the F17's. The commutator E11 is attached to one end of the S55, the other end carrying a pulley (two P29's and one W16). An E7 with two E8's are fixed to base by another S55. Circuit as in SEC 7. Start by hand.

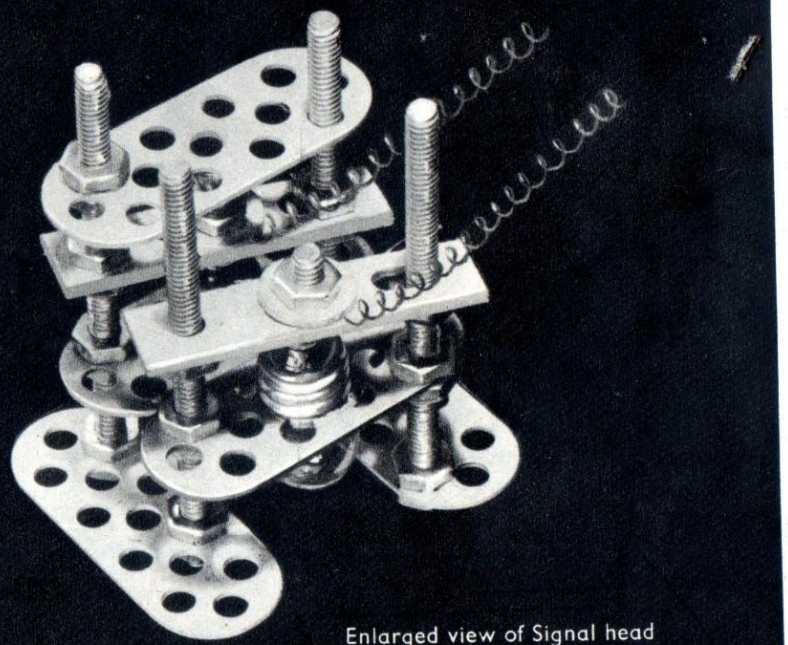
Be sure all electrical connections are clean and tight. Use SEC 4 to give extra power to motor.



COLOUR LIGHT SIGNAL



Wiring diagram



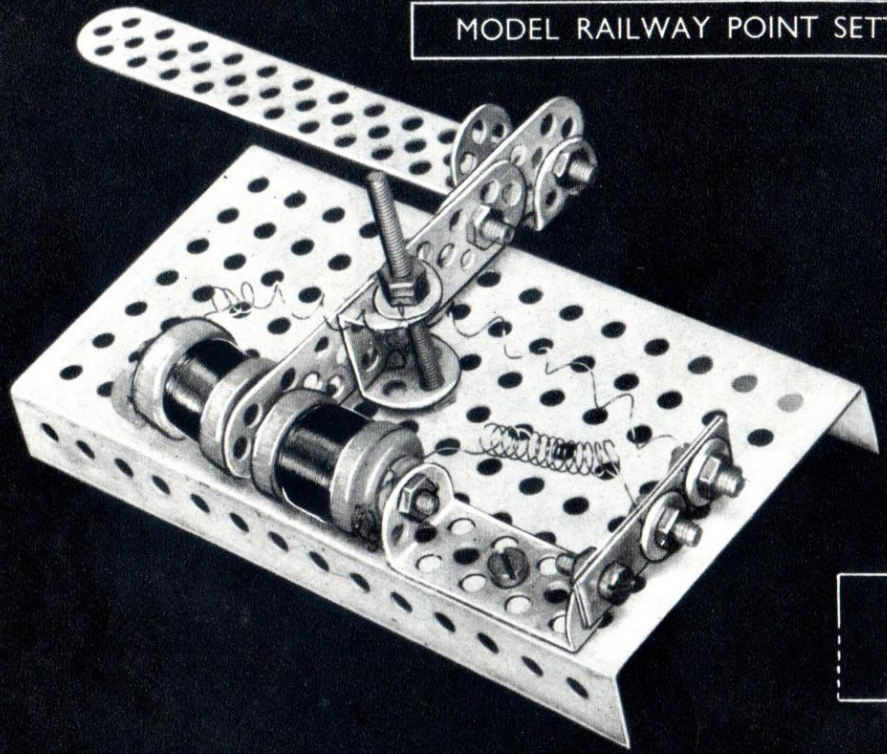
Enlarged view of Signal head

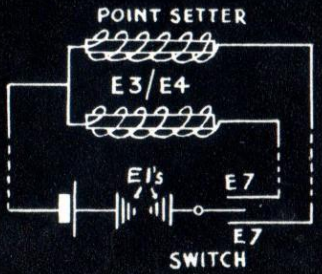
SPECIFICATION					
Part No.		Part No.		Part No.	
B1	20	F5	3	S55	4
E1	1	F9	2	U1	2
E5	1	F13	2	W10	3
E8	4	F17	4	Sp	2
E10	2	N1	48		
E12	2	S25	1		

CONSTRUCTION

The signal post is made up of two strips F17, F13 overlapped two holes and joined with U1's. The arm carrying the signal head is made of F17's braced with Sp's. The signal head as shown in inset illustration is made from two E12's placed one above the other and held by four S55's. These S55's are fixed at the front by two vertical F5's. Behind the lamp-holders two E8's are fixed to the S55's. A nut and bolt is placed in the centre hole of each E8 and presses against the centre contact of the bulb. E10's are taken from here to the switch. The signal head is fixed to the arm of the post by an F5, F9 and S25. Switch is carried on an F9 attached to the lower U1 on the base. Two vertical E8's are attached to this F9, one carries two bolts which are connected respectively to signal lamps, the other carries an E5 which is pivoted and makes contact with either of the two bolts on the other E8. One battery lead goes to the pivot bolt of the E5, the other being earthed to the base. When the E5 is in contact with one of the bolts the red bulb will light up and similarly the green will be lit when the E5 is moved to contact the other bolt. Template for signal head, see page 98. Bulbs should be either painted or coloured cellophane stuck to the back of the template. To separate the lights a paper tube should be placed around each bulb.

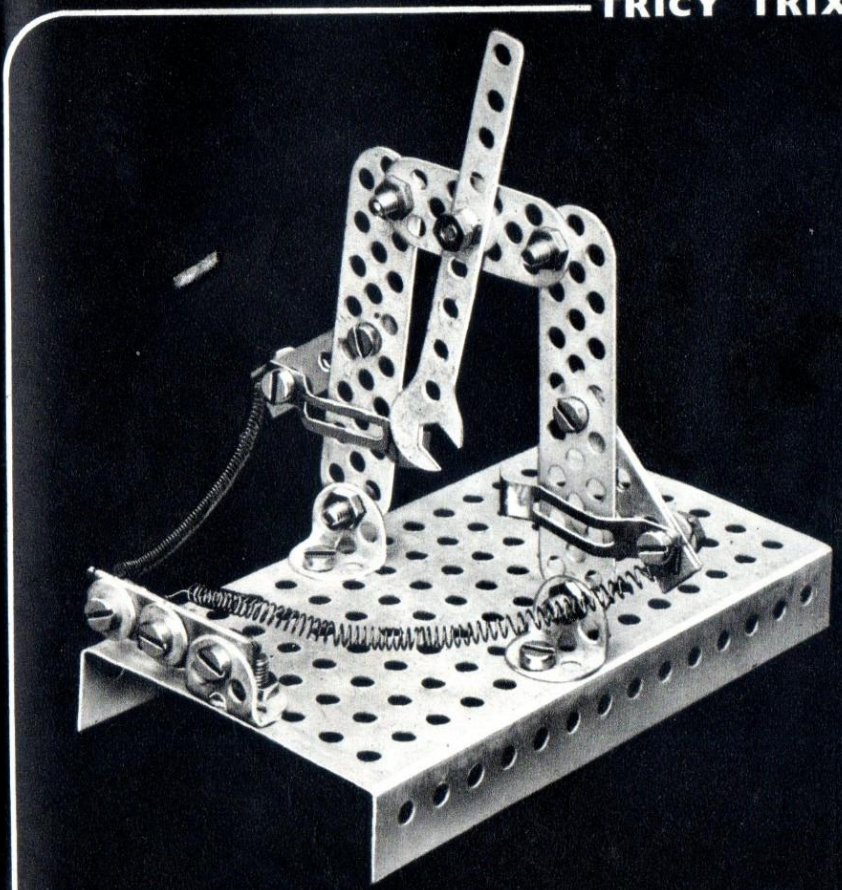
MODEL RAILWAY POINT SETTER AND LEVER





Wiring diagram

TRICY TRIX



SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	E8	4	S55	1
B1	24	E10	2	U1	2
E1	2	F5	2	U2	1
E3	2	F9	3	W10	9
E4	2	F13	1	Sp	1
E7	2	N1	34		

CONSTRUCTION

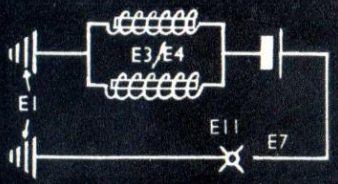
With this model it is possible to operate a model railway point by a lever placed remote from the point. Two bobbins and cores are fixed to a base E1 by an A1 and U2 respectively, so that a pivoting F9 can move between them. To the centre hole of this F9 a U1 is attached which pivots around an S55 fixed to base. The F9 is lengthened with an F5 to which a U1 is fixed. An F13 is locknutted to this U1 and is attached to the point blades. The method of joining will vary, according to the type of point rod used. If it is a thin rod this can be bent to take a bolt and bolted to the strip, or if a thin metal strip is used a hole should be drilled to take a B1. One lead of each coil is earthed and the others go respectively to a N1/B1 fixed to an E8 which is attached to the U2. The frame of the lever switch is made of two F9's joined at the top by an F5, and fixed to base by two A1's. The lever is an Sp pivoted in the centre hole of the F5, and is moved to make contact with E7's. These E7's are fixed to E8's, which in turn are attached to the F9's. Note that the E7's do not touch the F9's. The E7's are joined respectively with E10's to B1 N1's on an E8. Wires connect these bolts to the corresponding ones on the point setter. One battery lead is connected to the base of the switch, the other to the base of the point setter.

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	1	E7	1	P29	4
B1	24	E8	4	S55	2
E1	2	E10	2	U1	2
E3	2	E11	1	U2	2
E4	2	F9	3	W10	4
E5	1	F13	2		
E6	5	N1	40		

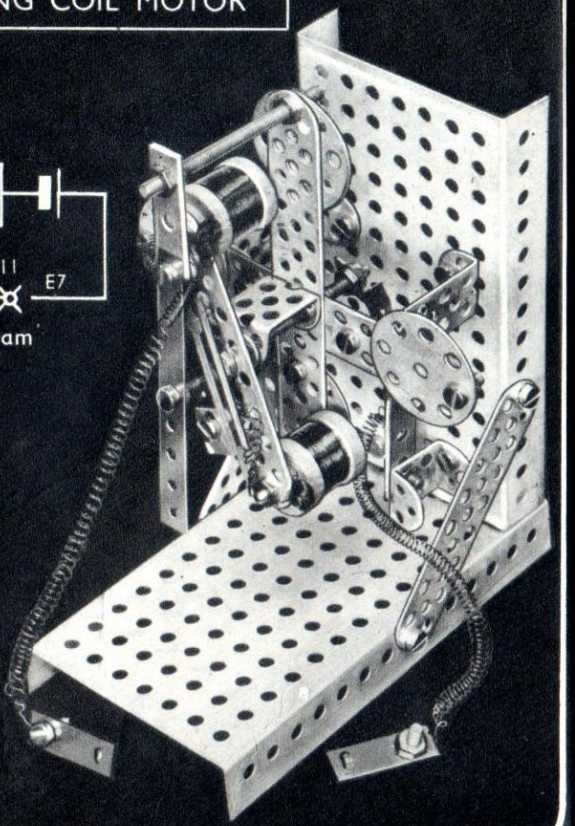
CONSTRUCTION

In this motor the bobbins rotate on a spindle instead of being fixed. Frame consists of two E1's fixed by an A1 at right angles and braced with two F9's. Two F13's are fixed together at right angles using the centre hole of one and the sixth centre hole of the other, with a U1 at the join so that an S55 can pass through the U1 and also the holes of the F13's. Note that two N1/B1's are used for this joint. This assembly is attached to the vertical E1 with two U2's. E3's and E4's are fixed in the end holes of an F9, one wire of the bobbins being earthed to the strip. An S55 is inserted through U1 and holes of the F13's, and carries a commutator at inner end. Locknuts are fixed to spindle on the inside of the U1. A W10 and N1 are now threaded on to the S55 as far as the U1, so that the spindle is held in place, but will revolve. The F9, with bobbins, is now fixed between nuts to spindle, using centre hole. Thread on another nut and tighten. An E8 (centre hole) is fixed between nuts to the spindle, noting that the spindle is flush with the last nut and does not protrude beyond. An E6 is fixed to end hole of another E8 attached to E8 on the spindle by two N1/B1's. Note extra nut between E8's. The end of S55 must not protrude into the second E8 and touch the E6, as a "short" will result. Fix other wires of E3's to E6. Fix four P29's to the F13's, the top one being fixed with an S55, the other end of which carries an E8 and E5. A nut and bolt fixed to the E5 makes contact with the E6. An E7 is fixed to E8 attached to base by a U1. E11 makes contact with E7 when the bobbins are approaching the P29's. Motor runs by the bobbins being energised and pulling themselves towards the discs P29's. This action is similar, but the converse of SEC 7, as the bobbins rotate instead of being stationary. One lead of battery is connected to the E5 and the other to the E7.

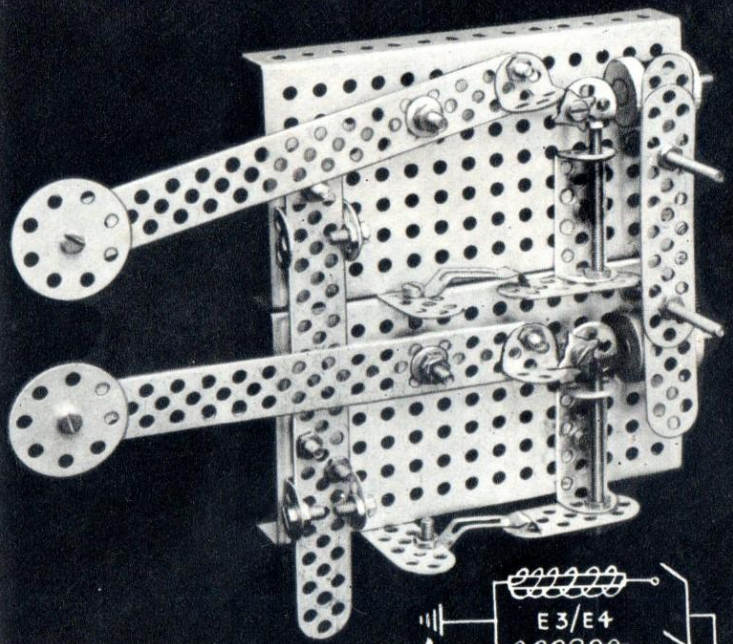
REVOLVING COIL MOTOR



Wiring diagram



INDICATOR BOARD (Double)



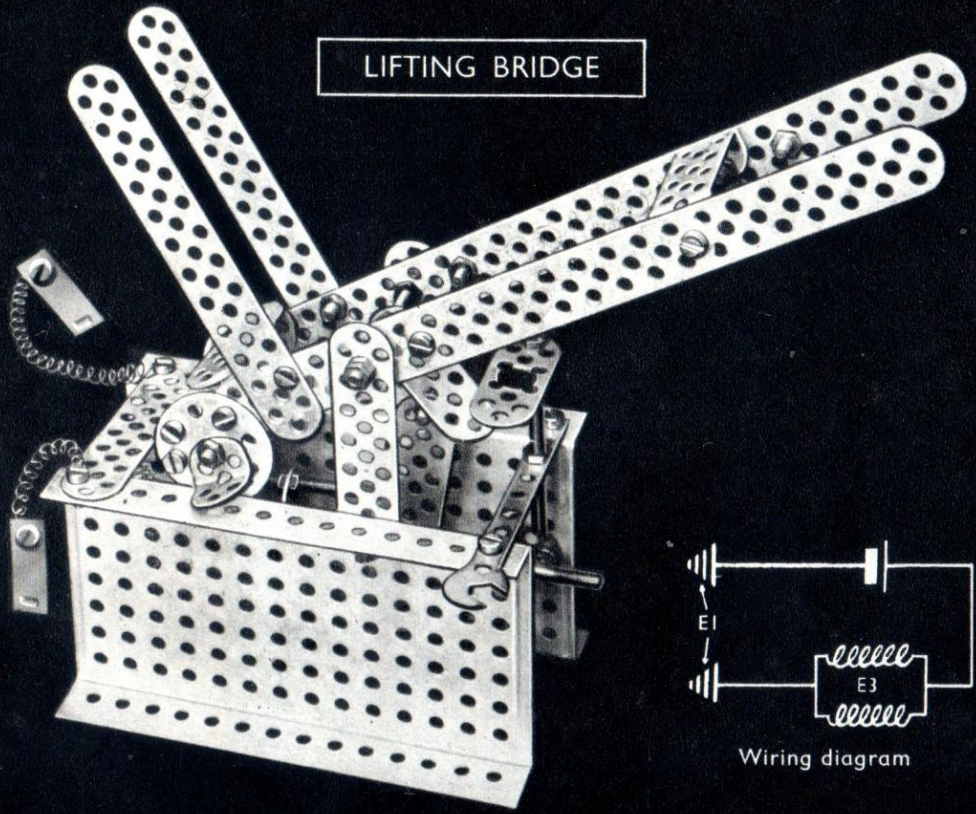
Wiring diagram

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	F5	4	S55	4
B1	22	F9	1	U1	2
E1	2	F13	1	U2	2
E3	2	F17	3	W10	3
E4	2	N1	48	W16	2
E7	2	P29	2		
E11	2	S25	2		

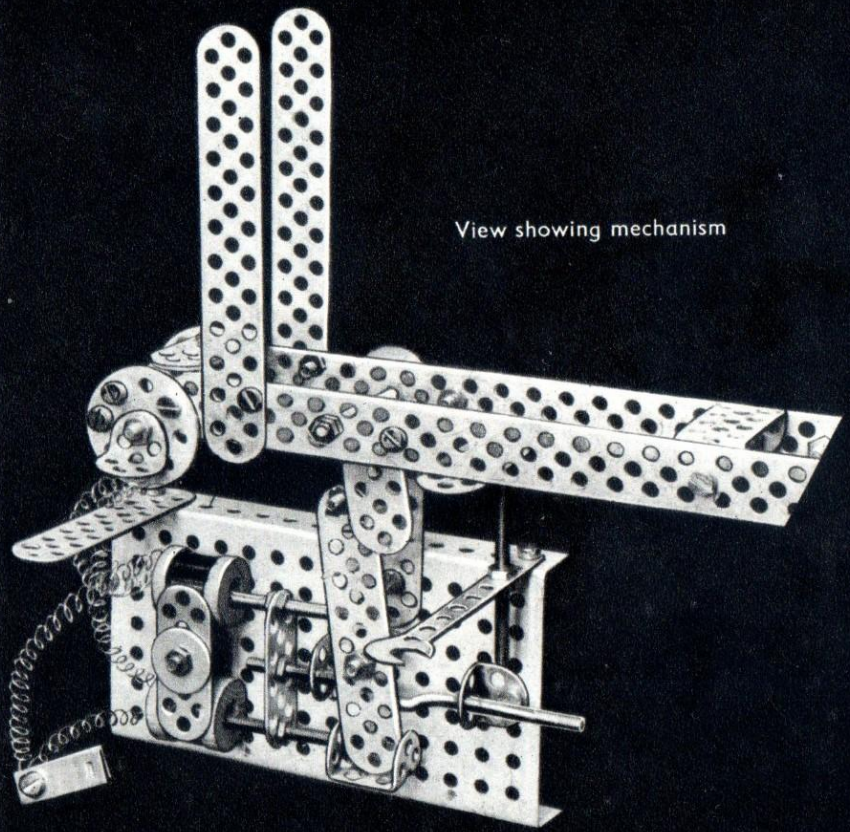
CONSTRUCTION

The bases (E1) are joined together along each side. The bobbins and coils are clamped by two strips F13 and F9 fixed to base with two S55's. A U2 carrying an S55 is pivoted to the base by locknut. Attached to the end of this S55 is an A1 to which a commutator E11 is bolted exactly as shown. An F5 is fixed to the other end of the U2 by the S55 and N1's. A lever F17 is pivoted in the 5th hole by an S25 attached to base. Note W16 under and W10 on top. Fix a P29 to one end of F17 and an A1 at the other. This A1 is held by one of the points of the E11 when in the horizontal position. When coil is energised it attracts the A1 and E11, so releasing the lever F17, which falls. To assist the return of this E11 an E7 acting as a spring is fixed to the base by an F5 and bears against the F5 which is attached to the U2. The reset mechanism is made from a vertical F17, which slides in two U1's. Note carefully the position of these two U1's. The F17 is prevented from falling out by bolts fixed in the end holes of the U1's. A bolt and nut (with nut on top) is fixed in the second end hole at the top of this F17. This bolt raises the top lever when pushed up. A bolt which raises the lower lever is fixed in the seventh side hole of the vertical F17 and another in the opposite row of holes (six from bottom) acts as a stop to prevent the F17 falling too far. See diagram for wiring, which needs press switches, as on page 67. The templates (page 98) are cut and each one fitted to the P29's with the bolt already in position.

LIFTING BRIDGE



Wiring diagram

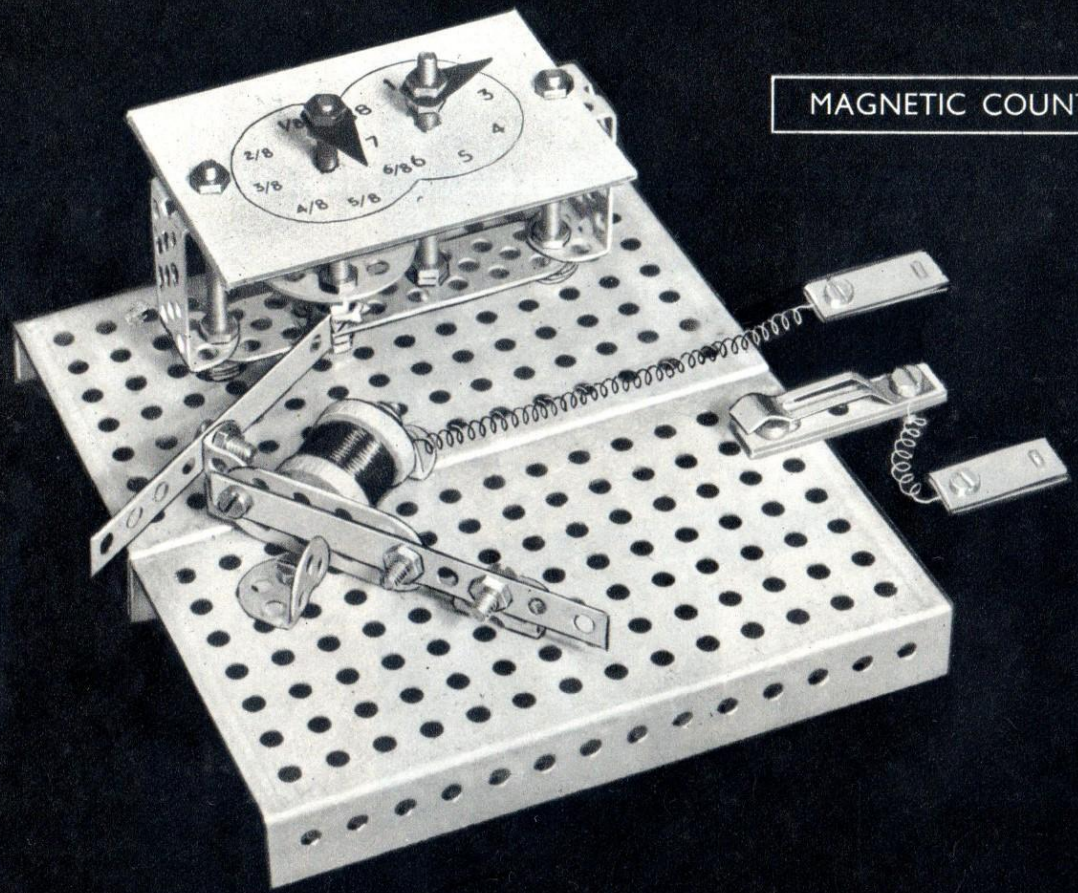


View showing mechanism

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	3	E12	2	S25	2
B1	23	F5	4	S55	4
E1	2	F9	4	U1	1
E3	2	F13	2	U2	2
E6	4	F17	4	W10	2
E9	1	N1	48	W16	1
E10	1	P29	4	Sp	1

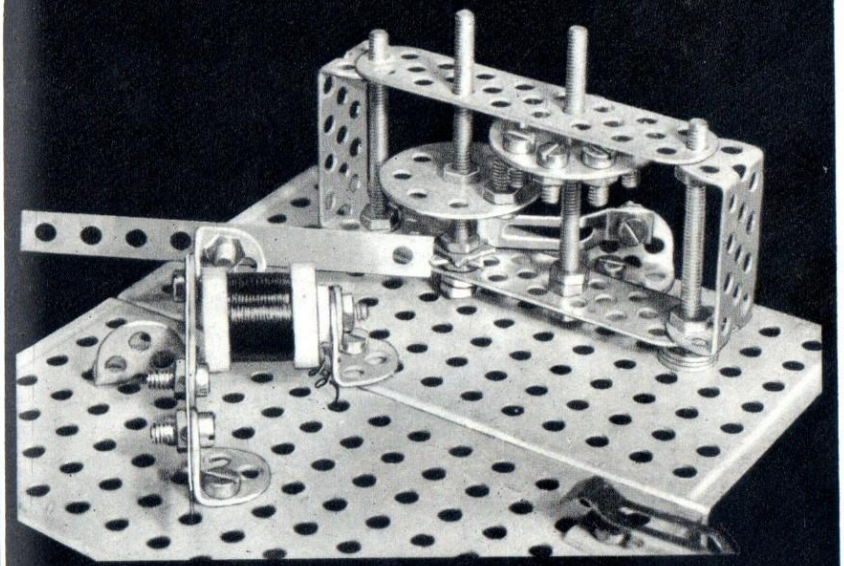
CONSTRUCTION

The lifting mechanism is built on to one of the E1's exactly as shown in the Direction Indicator Models, except that the counterbalance F5 is not used on the F9. The bridge girders are F17's overlapped 10 holes (spaced by U2's) and pivoted in the sixth hole by an S55. This spindle is held by two F9's attached to the E1's. These bases E1 are held together by an F9 and one Sp. An E12 attached by an S55 acts as a rest for the bridge when in the lowered position. Vertical F13's are fixed to the short side of bridge with P29's and B1/N1's as counterbalance weights. An A1 attached to the P29's acts as a stop when the bridge is raised. A bolt in the F9 of the actuating mechanism presses against an F5 fixed to the pivoting S55 of the bridge. Thus it will be seen that when the coils are energised the F9 is moved, so moving the F5 which turns the S55 which raises the bridge. The road can be made of card and the bridge laced with cord. Template page 98. One lead of each coil is earthed, the others being connected to battery. Other battery lead is joined to one side of switch the other switch lead is joined to base.

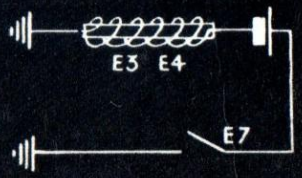


MAGNETIC COUNTER

TRICY TRIX



View showing mechanism

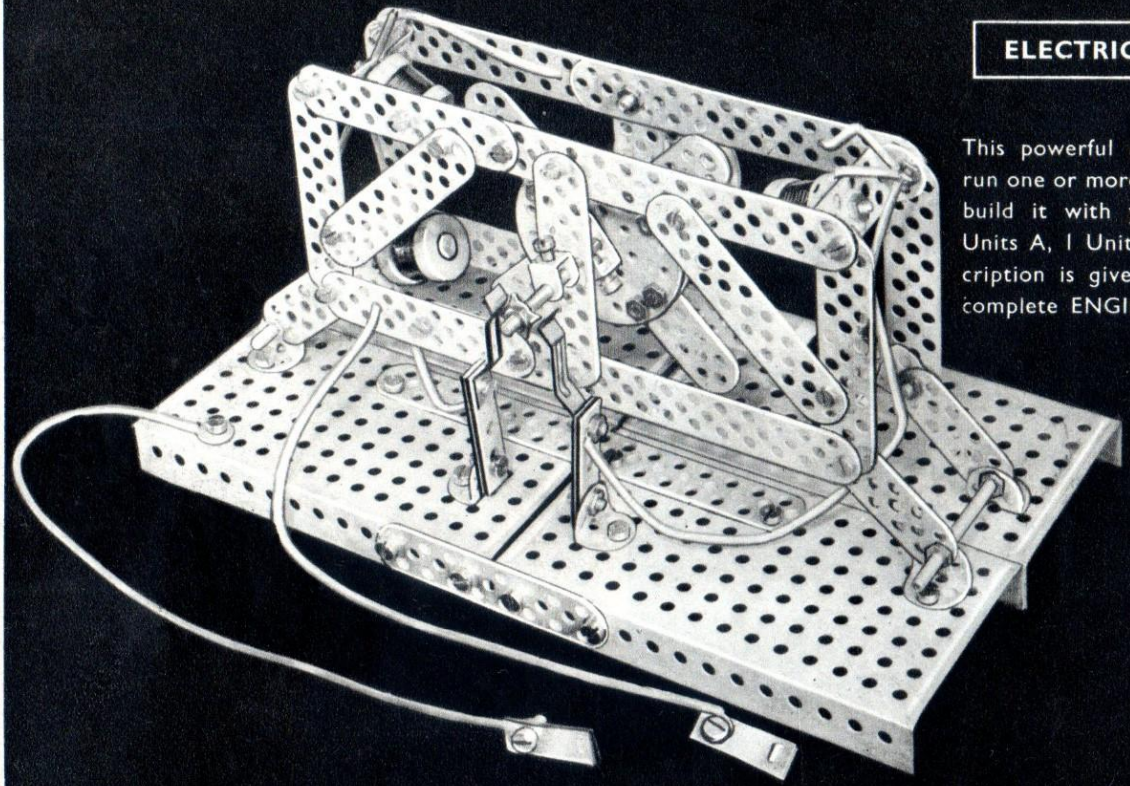


Wiring diagram

SPECIFICATION							
Part No.		Part No.		Part No.		Part No.	
A1	5	E4	1	E11	2	P29	2
B1	22	E5	2	F5	1	S55	4
E1	2	E7	2	F9	2	U2	2
E3	1	E8	1	N1	48	W10	7

CONSTRUCTION

This model counts one every time it receives an electrical impulse. Two E1's are bolted together by their sides. A frame is made of two F9's and two U2's joined by S55's. The gear assembly is made up as shown by fitting a P29 to a spindle S55 and fixing an N1/B1 as striker in one of the outside holes of the P29. This makes up the first gear which turns the second made up similarly, but has eight N1/B1's in the P29. Also fixed to the first gear spindle are two E11's so arranged to make an eight-pointed star. The gear assemblies are now fitted into the frame; the first one revolves in the third outside holes of the F9's, and the second in the sixth centre holes. The P29's are adjusted so that the bolt ends will strike each other as the shafts revolve. The shafts are held in position by locknuts. The frame complete with gears is fixed to the base E1 by the S55's which are already holding the F9's to the U2's. Three W10's are required to space the frame from the base; this is to prevent the locknuts on the ends of the spindles fouling the base. An E7 is fixed to the base by an A1 so that it notches into the star wheel (E11's) with every eighth revolution. An E3/E4 is fixed to the base by an A1. An F5 is attached to an E5 which, in turn, is fixed to the base by an A1. Note that the F5 is fixed about a $\frac{1}{16}$ in. away from the bobbin, and an A1 is bolted to the base to act as a stop. To the end of the F5 an A1 is fixed which carries a strip E5. This strip is so adjusted that when the F5 is attracted to the E3/E4 it pushes the star wheel round one eighth of a revolution. The E5 then returns to the normal position, and in so doing slides back over the star wheel, which is prevented from turning backwards by the E7. A switch made from an E8 and E7 fixed to base, is wired to the battery. Other battery lead is connected to bobbin. Every time the switch is depressed the counter records one. Fit template, page 98, and pointers noting that one pointer is fixed higher than the other, this is to allow them to overlap.



ELECTRIC MOTOR (4-coil)

This powerful motor is strong enough to run one or more models at a time. You can build it with your TRICY TRIX PLUS 2 Units A, 1 Unit C and 2 Units E. Full description is given on page 89 of the TRIX complete ENGINEERING MANUAL.

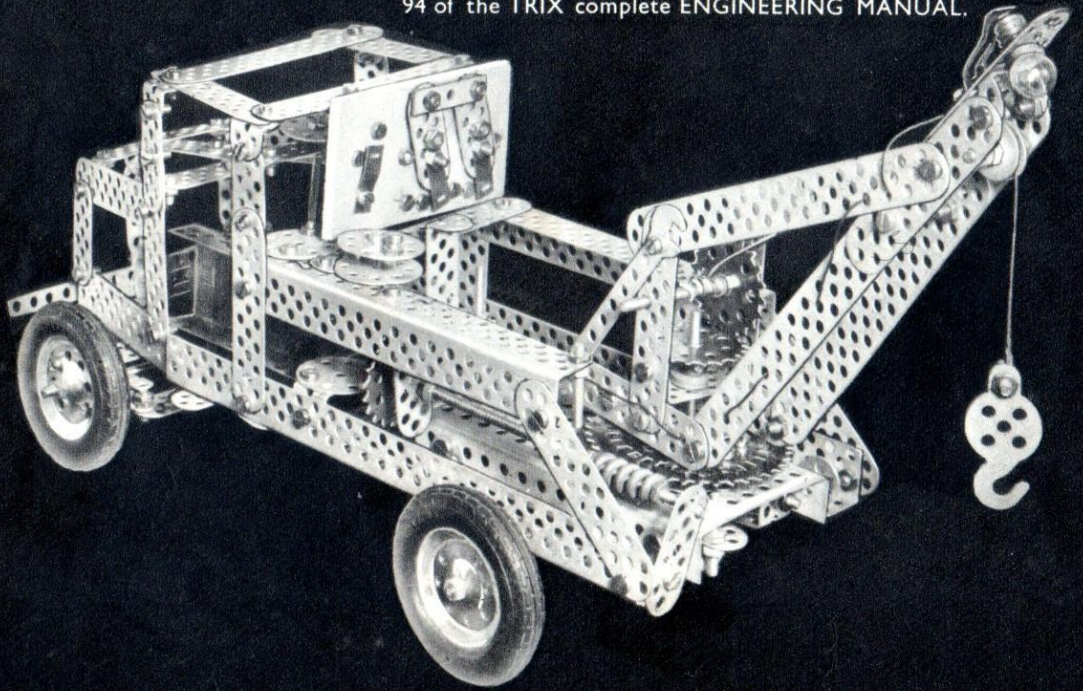
DOCKYARD CRANE

This cantilever type crane is fitted with an electro-magnetic pick-up. It can be made with your TRICY TRIX PLUS 1 Unit A, 1 Unit B, 1 Unit C, 1 Unit D, 2 Units G, Motor 2051 and 3 packets of nuts and bolts. Full details for building this fine model are given on page 92 of the TRIX complete ENGINEERING MANUAL.

TRICY TRIX PLUS

BREAKDOWN LORRY

In this model the inbuilt motor is fitted with a reversing switch so that the lorry can be driven forwards or backwards as desired. The crane swivels on its bearings and a light is fitted at the head of the jib. You can build this model with your TRICY TRIX PLUS 2 Units A, 3 Units B, 2 Units C, 1 Unit D, 2 Units F, 3 Units G, Motor 2051 and 3 packets of nuts and bolts. For full description see page 94 of the TRIX complete ENGINEERING MANUAL.



PART TWO

CONTROLLERS AND SWITCHGEAR

Among the wonders of electrical machines is the ease and precision with which they can be controlled.

Their speed and power output can be regulated by introducing into the circuit resistance to the current flow. This is done by means of a variable resistance or rheostat, one of the most common forms of electrical control. To stop or start your machine you use switches.

There is an almost infinite variety of switches, rheostats and relays employed today, and this control of machinery forms so important a part of our study of electrical engineering that we have devoted Part Two of this manual to "Controllers and Switchgear."

SWITCHES and RELAYS

We all know what switches are like. They may be of simple on and off construction like the one which you use for the lights in your room, or made for single pole—double pole or multi-pole operation, i.e. for selecting different circuits or groups of circuits, thus controlling one or more circuits by one switching operation.

Switches are usually hand-operated, but they can also be actuated by electro-magnets, which in turn may be operated from a control point miles away. This gives you remote control over your apparatus, and such switches are called RELAYS.

In Fig. 1, an electro-magnet M, is shown, which we can energise from battery B, by pressing key K. When current flows, the magnetism will attract the iron armature A.

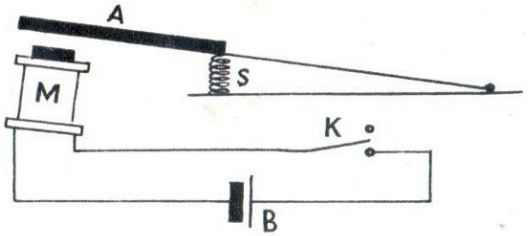


FIG. 1

Raise the key K, and the current will cease to flow. The armature will then be returned to its original position by the spring S.

Now arrange for the armature A to switch on a lamp, ring a bell or start a motor every time it is attracted, and you have a relay, (see Fig. 2) in which the original circuit controlled by the key K, is called the line circuit, while

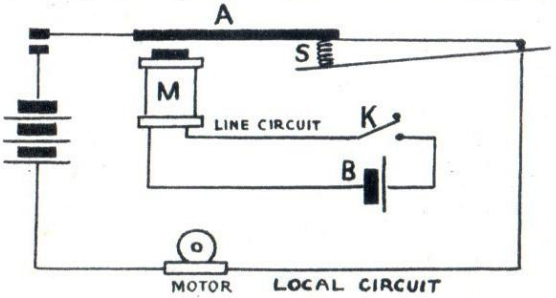


FIG. 2

the circuit containing the lamp, bell or motor is called the local circuit.

Some of the many applications in daily use incorporating relays are the self-starter of a car, the push-button control of an automatic lift, the indicators on a telephone switch-board, and pre-set alarm systems.

Even automatic traffic lights and railway colour light signals, the traffic indicators in a car and in addition, a thousand and one other installations make use of the basic switch and relay circuit in one form or another.

When you have completed the range of Tricy Trix models shown in Part Two, you will be ready to proceed with the more advanced applications in Part Three.

1. ON-OFF or SELECTOR

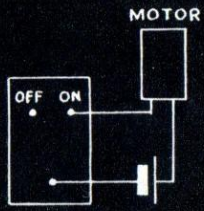
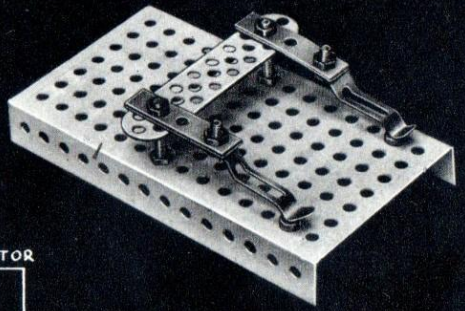
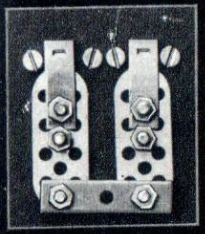


Fig. 1. Wiring diagram



4. DOUBLE IMPULSE



2. REVERSING

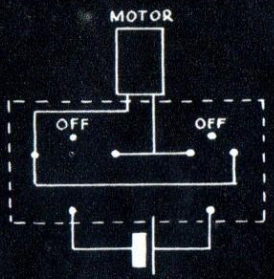
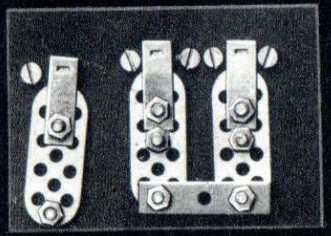


Fig. 2. Wiring diagram

SIMPLE SWITCHES



3. MULTIPLE

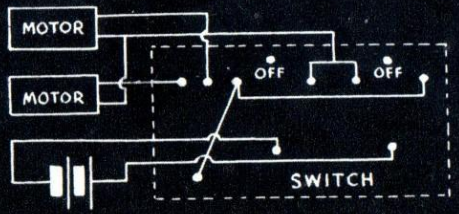


Fig. 3. Wiring diagram

SPECIFICATION									
Model	B1	E1	E6	E7	E8	F5	F9	N1	S25
1	4		1			1		5	
2	10		2		1	2		24	
3	14		3		1	3		29	
4	4	1		2	2		1	12	2

CONSTRUCTION

On-off or Selector Switch.—Drill the base with three holes as shown on lower section of template, page 98. Use No. 27 Drill and connect wires as in Fig. 1, which shows underneath side of switch base. This switch can also be used for selecting different motors (see Multiple Switch).

Reversing Switch.—Used to reverse the direction of rotation of one motor. Strip connecting the two switch blades is an E8. This ensures that both blades move together over the contacts, but insulates one blade from the other. Wire up as in Fig. 2, connecting battery leads to the S25's upon which switch-blades pivot. Strap together the extreme outside contacts and take lead to one terminal of motor. Other terminal of motor goes to strap joining the two inside contacts. Template, page 98.

Multiple Switch.—Enables either of two motors to be selected and run either forwards or backwards. It is a combination of the Selector and Reversing Switch on one baseboard. Constructional details are as before. Wire up as in Fig. 3.

Double Impulse Switch.—This switch is built on a base E1. An F9 is fixed to, but above the base by two S25's, which also fix two E8's, as shown. To the end of E8's contacts E7's are fixed, which when pressed, make contact with B1's in the base. Leads are connected to the E7, and also to the base.

SPECIFICATION			
Part No.		Part No.	
A1	1	N1	14
B1	11	U1	1
E1	1	U2	1
E7	2	S25	1
E8	2	W10	2
F13	1		

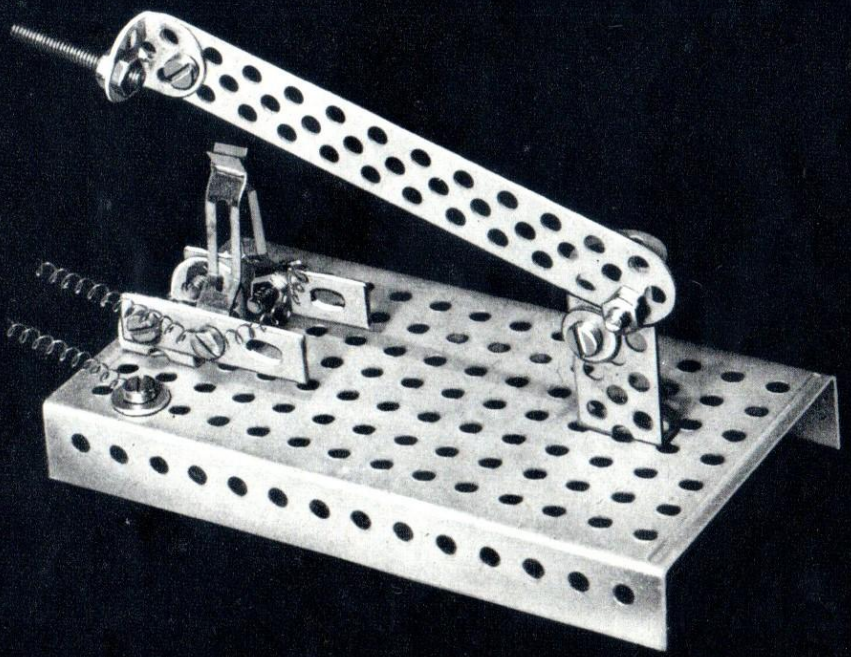
This switch can be used as a simple on-off switch with any of the models shown in the book.

CONSTRUCTION

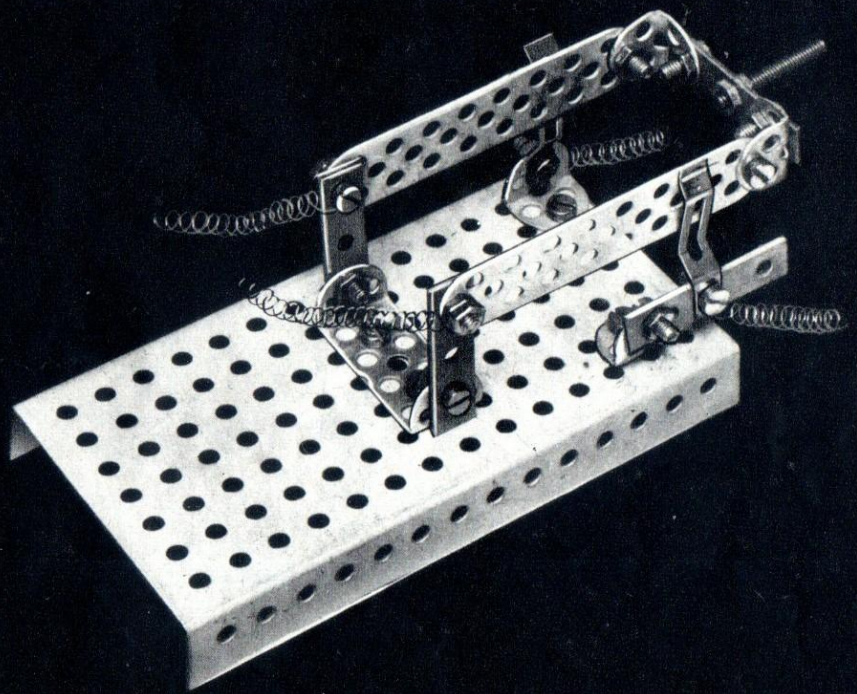
Contact is made in this switch by an F13 sliding between two E7's. A U2 is fixed to base E1. To this U2 an F13 is pivoted, and a stop made of B1, W10 and N1 is fixed to hold the F13 in a horizontal position. The two E7's are fixed to E8's, which are bolted to a U1 fixed to base. Note that the E7's press against the F13 when in the "on" position. One lead is joined to the E7's, and the other to the base.

Be sure all electrical connections are clean and tight.

SINGLE BLADE KNIFE SWITCH



DOUBLE POLE SINGLE THROW SWITCH



SPECIFICATION			
Part No.		Part No.	
A1	4	F9	2
B1	15	N1	19
E1	1	U2	1
E7	2	S25	1
E8	4		

This switch is used to break both the plus and minus of an electrical circuit.

CONSTRUCTION

A U2 is fixed to the centre of base E1 and carries two vertical E8's. Two F9's are loose-jointed to the E8's, the other end of the F9's are joined and insulated from each other by A1's and an E8, as shown. A handle S25 is fixed in the centre hole of this E8. Two contacts E7's are now fixed to the base. One E7 is fixed direct to base by an A1. The other is first fixed to an E8 which, in turn, is bolted to an A1 fixed to the base. Note that when the switch is brought over, the E7's press against the F9's.

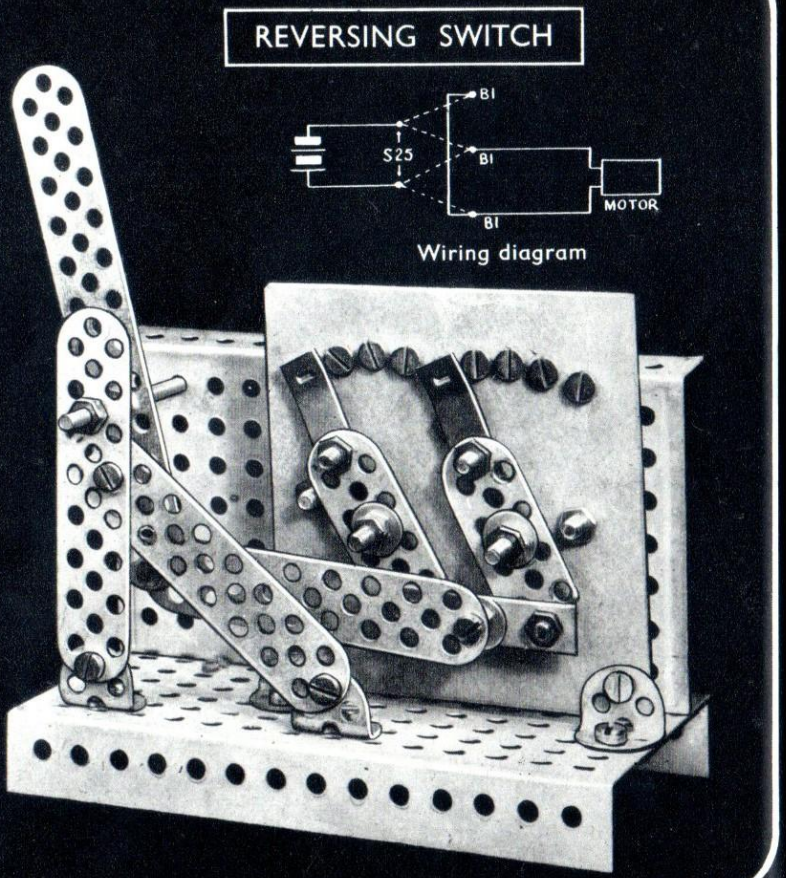
The battery leads are joined respectively to the pivoting bolts of the F9's. The leads which go to a motor, light or any other electrical apparatus are joined to the E7's.

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	E8	1	N1	48
B1	28	F5	2	S25	2
E1	2	F9	3	S55	2
E6	2	F13	1	W10	5

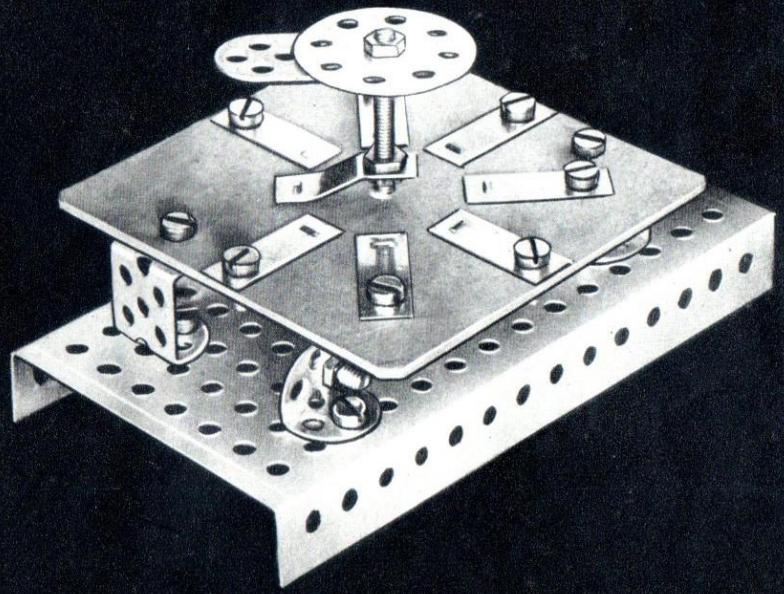
This switch reverses the flow of an electric current, and when wired to an electric motor (TRIX. 2051 Motor) will reverse the direction of rotation. Centre position is "off."

CONSTRUCTION

Two E1's are bolted at right angles as shown. A piece of card, thin plywood or bakelite is cut and drilled to template (page 98). Nuts and bolts are fixed in top row of holes, making sure that the nuts do not touch each other. Two S25's are fixed in the two centre holes of the template. A pair of contacts are now made by fixing E6's to the end holes of F5's and swivel on the S25's so that the E6's will wipe across the boltheads at the top of template. An E8 is loose-jointed to the end holes of the F5's. This is done by inserting the bolt through the F5 from the back, then a W10, a nut, now the E8, and finally another nut. Tighten the two nuts together so that the F5 is free to swivel, but the E8 is tight between nuts. Two N1/B1's acting as stops are fixed to template. An F9 is loose-jointed to the centre hole of the E8 in a similar way, but in this case the W10 is next to the E8. The whole switch assembly is now fitted to the E1's, by two A1's and one S55, as shown. The other end of the F9 is loose-jointed to an F13, which swivels on an S55. One bearing for this spindle is the top second hole of the vertical E1, and the other the third centre hole of F9, which is fixed to base by an A1. This F9 is braced by another F9, which is also attached to base by an A1. Wire up as in diagram.



EIGHT-WAY SWITCH



SPECIFICATION					
Part No.		Part No.		Part No.	
A1	1	E7	1	P29	1
B1	13	E11	2	S55	1
E1	1	F5	1	U1	2
E6	8	N1	21		

This is an eight position switch and when wired up, any of seven different circuits can be selected, in addition to the "OFF" position.

CONSTRUCTION

An S55 works in one of the centre holes of E1 and is locknutted underneath. An eight-pointed star wheel (not seen) made from two E11's is also fixed to this spindle on top of the base. This is similar to that used in the Electro Magnetic Counter Model shown on pages 60 and 61. An E7 is fixed to base by an A1 and notches into the star wheel at each eighth of a revolution. The template (page 98) is now cut and drilled from card, thin plywood or bakelite. Attach seven E6's as shown and fix to base by two U1's with the S55 through the centre hole. An E6 is now attached to the S55, so that when rotated, it will make contact with each of the E6's already in position on the template. A knob (P29) and pointer (F5) is fixed to the end of the S55. One battery lead is connected to the base and seven leads connected to the E6's. These leads are then connected to the various lights, motors, etc.

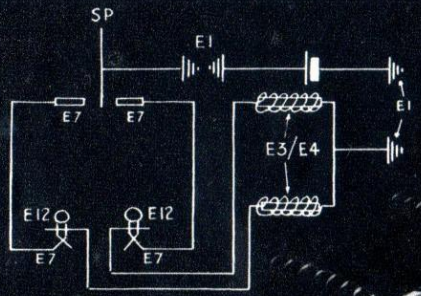
SPECIFICATION			
Part No.		Part No.	
A1	2	F5	1
B1	18	F9	2
E1	1	N1	25
E7	2	S25	1
E8	4	U1	1
E10	2	W10	3
E12	2	Sp	1

The model is similar to that shown on page 55, but has two bulbs attached. When the lever (Sp) is in contact with one of the E7's the point will be set and one of the bulbs will light. This arrangement is very useful when the point is out of sight of the operator as it indicates the position of the point blades.

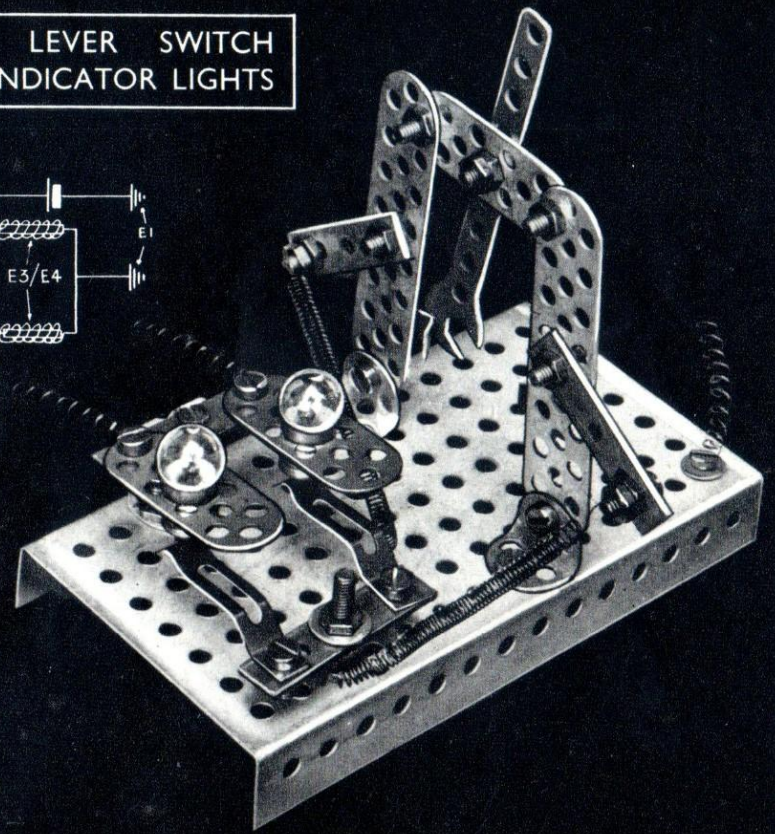
CONSTRUCTION

Bulb-holders E12 are fixed to an E8 which is attached to a U1 bolted to the base E1. E7's which make contact with the bulbs are fixed to another E8 which is joined to base by an S25 and N1's. Note that the E12's and E7's are insulated from the base. The E7's on the switch are connected to the E7's of the bulbs. The E12's are connected to the bobbins on the point setter. The battery is wired up as before, one lead going to the base of switch, the other to base of point setter.

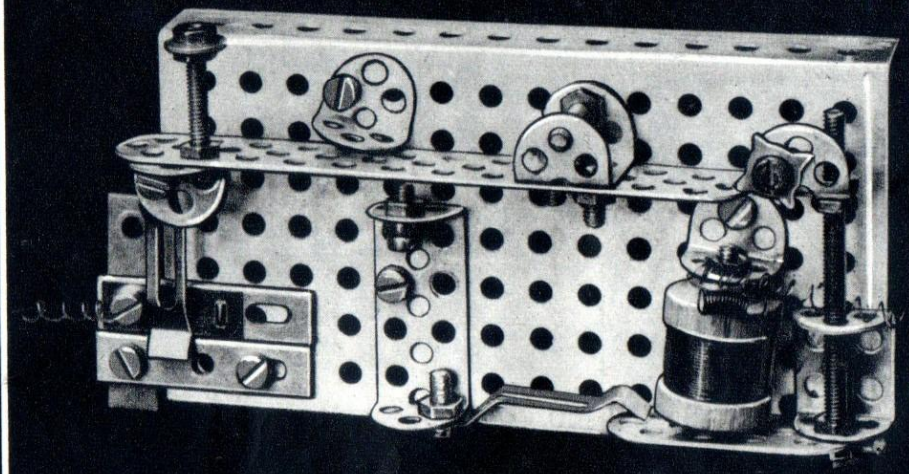
POINT LEVER SWITCH WITH INDICATOR LIGHTS

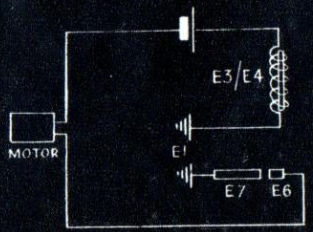


Wiring diagram



MAGNETIC CIRCUIT BREAKER





Wiring diagram

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	4	E7	2	S25	2
B1	14	E8	3	S55	1
E1	1	E11	1	U1	2
E3	1	F5	1	U2	1
E4	1	F13	1	W10	3
E6	1	N1	28		

A circuit breaker is used to prevent damage by overloading. In our model an electro-magnet is used to work a switch which cuts the flow of current when a short-circuit occurs.

CONSTRUCTION

Fix E3/E4 to E1 by A1. A U1 which pivots on a locknutted B1 in E1 carries an F5 fixed by S55. An A1 carrying an E11 is fixed to other end of S55. An F13 is bolted to a U1 working on S25 fixed to E1. Fixed to F13 by an S25 is an A1 carrying an E7. E7 rests on E6 bolted to E8, as shown, to prevent E6 touching E1. A U2 fixed to E1 carries an E7, which acts as return spring for F5. N1/B1 fitted in top of U2 acts as stop for F13. Wire up as in diagram so that one lead of E3 is earthed and other goes to battery. Other lead of battery goes to one terminal of apparatus in circuit. E6 is wired up to other terminal of apparatus. When short occurs, full current will flow through E3/E4, causing F5 to be attracted, which releases F13 held by E11, and so breaks circuit at E7 E6. To reset, lift F13 by S25 at end.

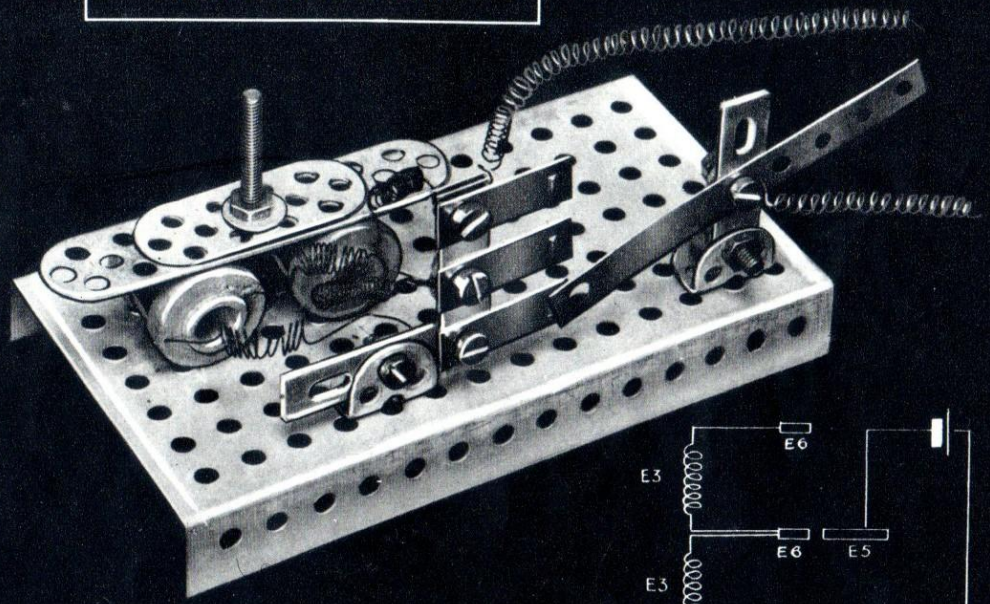
SPECIFICATION			
Part No.		Part No.	
A1	2	E8	3
B1	8	F5	1
E1	1	F9	1
E3	2	N1	12
E5	1	W10	3
E6	3		

With this unit it is possible to vary the speed of the Electric Motor 2051.

CONSTRUCTION

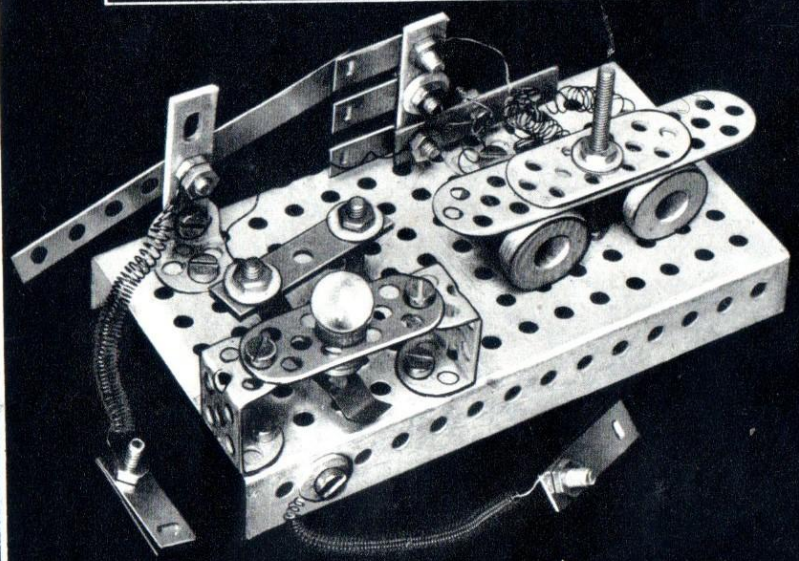
It is of similar construction to that on page 75, except that the light is omitted. The E3's are wired to the E6's in the same way, but the lead from the top E6 goes to the motor. The other motor connection is joined to one terminal of the battery, the other one is connected to the E5. When the E5 is in contact with the lowest E6, the two E3's are in circuit and the motor will run at a slow speed. When the middle E6 is in contact with the E5 only one E3 is used, therefore the motor will run faster, and when the top E6 is used both E3's are by-passed and the motor will run at its fastest speed.

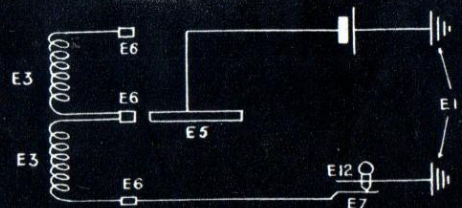
VARIABLE SPEED CONTROL FOR 2051 MOTOR



Wiring diagram

VARIABLE RESISTANCE FOR LIGHT





Wiring diagram

SPECIFICATION					
Part No.		Part No.		Part No.	
A1	2	E7	1	N1	28
B1	15	E8	4	S25	1
E1	1	E10	2	S55	1
E3	2	E12	1	U1	2
E5	1	F5	1	W10	5
E6	7	F9	1		

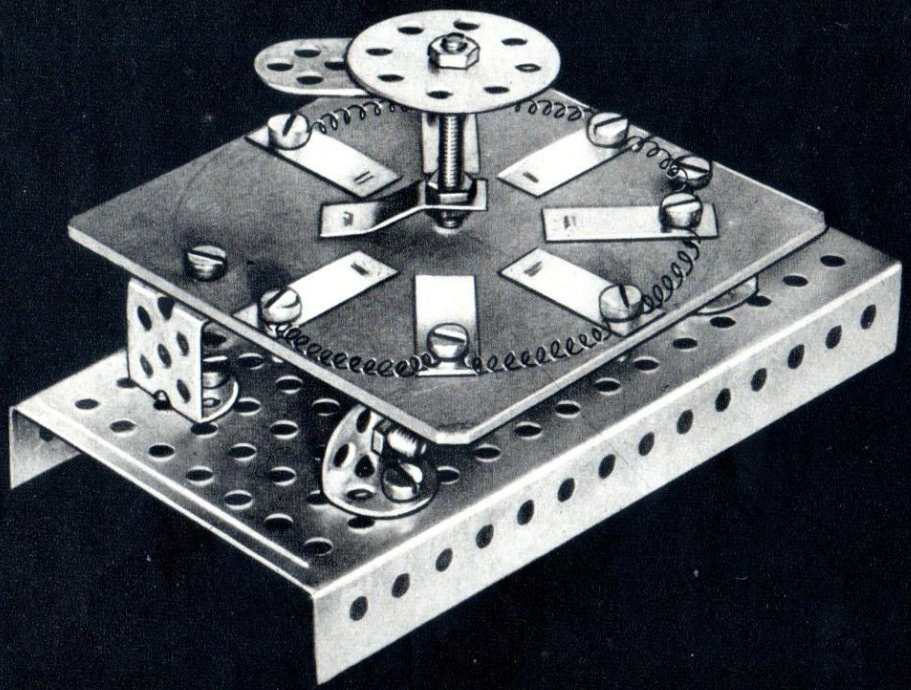
With this switch it is possible to light a bulb to three degrees of brightness. When the switch is in the dimmest position, current flows through the two bobbins E3, which act as a resistance, so making the light dim. When in the second position, current only flows through one of the bobbins, setting up half the resistance as before, therefore making the light brighter. In the third position current flows straight to the bulb, giving full power and brightness.

CONSTRUCTION

Two coils E3 are fixed to base E1 by strips F5 and F9 and held in the middle by an S55. The bulb-holder E12 is fixed to base with U1's. An E7 makes contact with the centre contact of bulb, and is fixed to an E8, which is attached to the base by an S25. Three E6's are fixed to an E8, as shown, and attached to another E8 which is fixed to base with an A1. It will be seen that the E6's are insulated from the base. The movable arm of the switch (E5) is also fixed, but insulated from base by pivoting in the centre hole of a vertical E8 attached to base by an A1. This E5 can be moved to make contact with the three E6's. One battery lead goes to the pivot bolt of the E5. One wire from each bobbin is connected to the centre E6. The other wire of one bobbin is joined to the lower E6, which is also connected to the E7 of the bulb. The top E6 is connected to the other lead of the bobbin. The other battery lead is joined to the base E1.

VARIABLE RHEOSTAT

SPECIFICATION			
Part No.		Part No.	
A1	1	F5	1
B1	13	N1	21
E1	1	P29	1
E6	8	S55	1
E7	1	U1	2
E11	2		



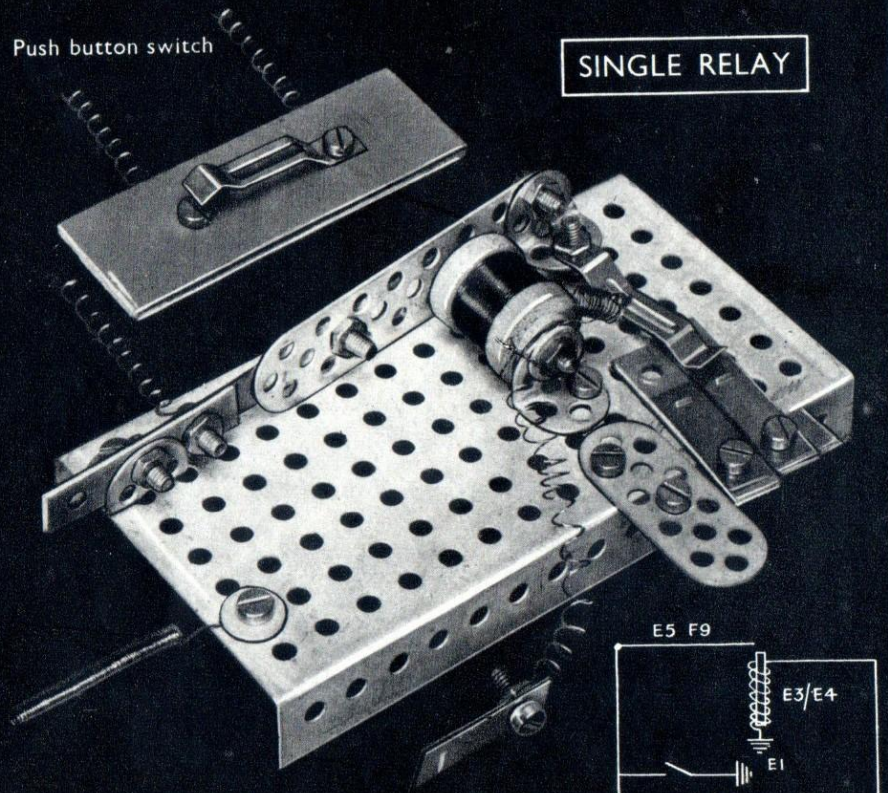
When the rheostat is turned to the first position, all the resistance wire is in circuit and the motor will rotate at its slowest speed. As the rheostat is turned, more and more wire is cut out so that the motor will increase speed.

CONSTRUCTION

The construction is the same as for the eight-way switch, but the wiring is different. In this case resistance wire is connected between each E6 as shown. The length of wire needed to reduce the speed of motor is first found by experiment and then cut into six equal lengths. Each length is now joined between the E6's. The positive battery lead is connected to the base E1. A lead is connected to the seventh E6 and joined to motor or railway track. The negative of battery is connected straight to the motor, or track.

To use this rheostat with the TRIX 2051 Motor seven feet (approx.) of 28 s.w.g. resistance wire is required.

SINGLE RELAY



Wiring diagram

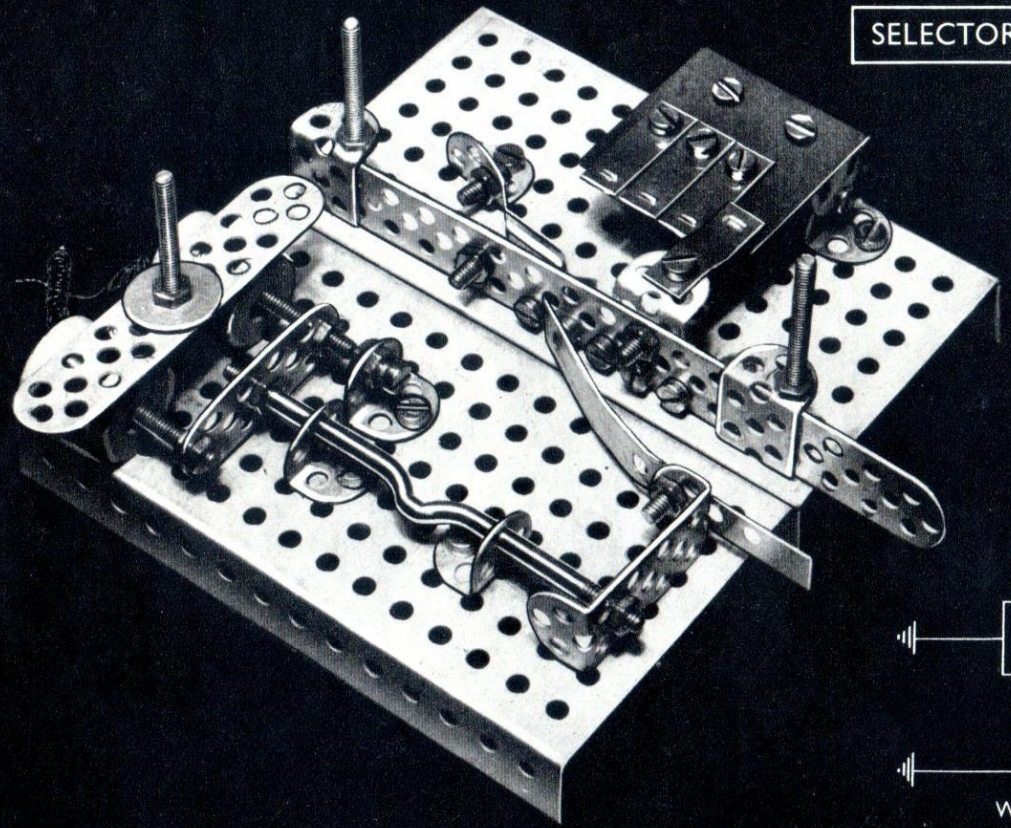
SPECIFICATION					
Part No.		Part No.		Part No.	
A1	3	E5	1	F5	1
B1	15	E6	4	F9	1
E1	1	E7	2	N1	16
E3	1	E8	4	W10	2
E4	1	E10	1		

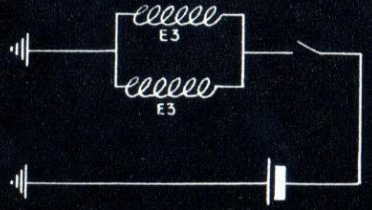
With this relay it is possible by momentarily pressing a push button switch to start an electric motor which will continue to run, or light a bulb, etc.

CONSTRUCTION

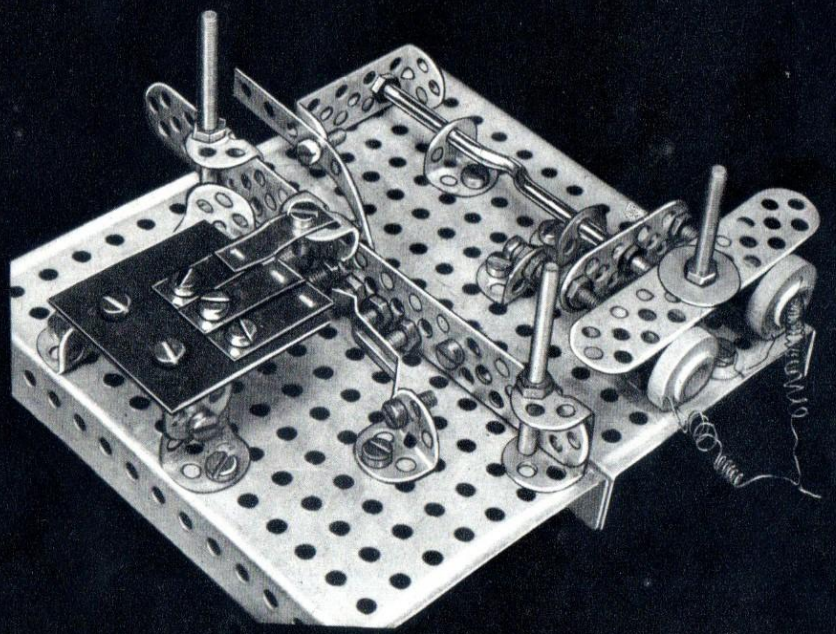
A strip F9 is fixed to an E5 attached to an E8 which is fixed to the base by an A1. Note that the F9 and E5 are not in contact with the base E1. Attached to the end of the F9 is an A1 carrying an E7 which slides on two E8's to which E6's have been fixed. These E8's are fixed to the base by a further E8 and F5. Note that the E6's and their fixing bolts are not in contact with the base. The bobbin and coil are fixed to base by an A1. When the bobbin attracts the F9 it moves the E7 into contact with the two E 6's so completing the circuit (see diagram). One lead of coil is earthed to base, the other goes to the relay battery. The other battery lead goes to the push button switch and also to the E5 on the relay. The switch is made from an E7 and is placed remote from relay. The other side of the switch is connected to the base E1. It will be seen that when the push button is closed current flows in the bobbin which attracts the F9, which makes contact with the core E4 and completes the other side of circuit and so maintains a flow of current in the E3.

SELECTOR SWITCH





Wiring diagram



Back view showing construction

SPECIFICATION							
Part No.		Part No.		Part No.		Part No.	
A1	8	E6	4	F9	1	U1	2
B1	30	E7	1	F17	1	U2	2
E1	2	E9	1	N1	48	W10	2
E3	2	E10	1	S25	2	W16	1
E5	1	F5	1	S55	3		

This switch enables you to select and operate any one of three different models or motors. The first press of impulse switch will operate one model. Second press stops the first and starts the second. Third press stops the second and starts the third. To reset, pull back selector arm.

CONSTRUCTION

Bolt together two E1's. Fix two E3's by F9 and S55 as shown so that centres of E3's are five holes apart. Two S25's fixed to F5 work in the E3's. F5 is fixed to E9 sliding in two A1's. Another A1 with N1's/B1 acts as stop. A U2 bolted to E9 carries an E5. Selector arm is F17 with N1/B1's in 7th, 8th, 9th, 10th and 11th holes. F17 slides in two U1's fixed to E1 by S55's as shown. An A1 is fixed in 8th top hole of F17 and carries E6. An E7 fixed to A1 bolted to E1 acts as spring for arm and notches in bolt ends of F17. Adjust E5 so that when S25's are drawn into E3's, it strikes against bolts and will push F17 forward one notch at a time. Cut template (page 98) and fix three E6's as shown. Fit to E1 by U2 and A1's so that E6 attached to F17 will touch other E6's in turn. Wire up as in diagram and note that each E6 is wired to a separate circuit. Use single impulse switch (see top part of photo on page 77) to operate selector switch. Place selector switch at 45 degrees to allow E9 to fall after each operation.

Pay special attention to adjustment and be sure all electrical connections are clean and tight.

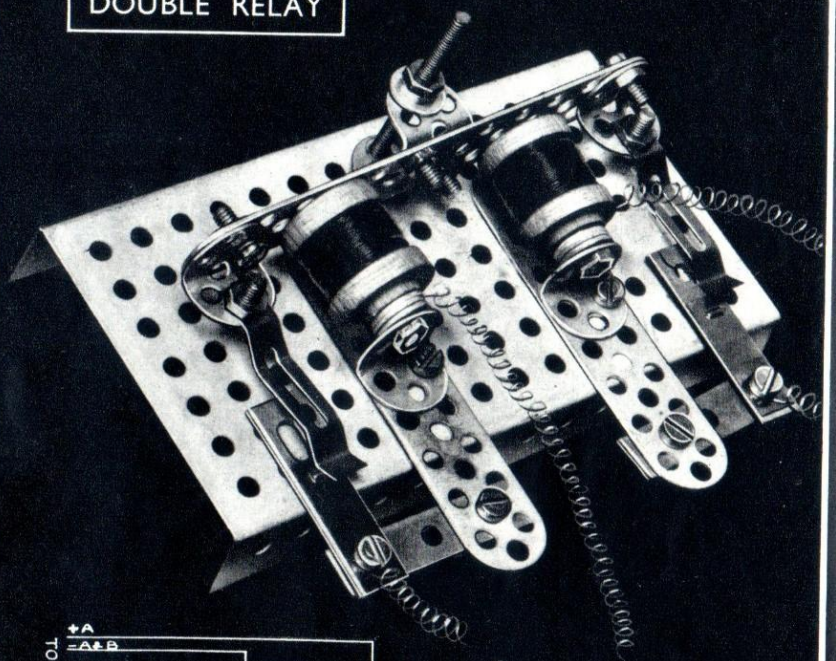
SPECIFICATION							
Part No.		Part No.		Part No.		Part No.	
A1	4	E4	2	F9	2	U1	1
B1	12	E6	2	F13	1	W10	9
E1	1	E7	2	N1	18		
E3	2	E8	4	S55	1		

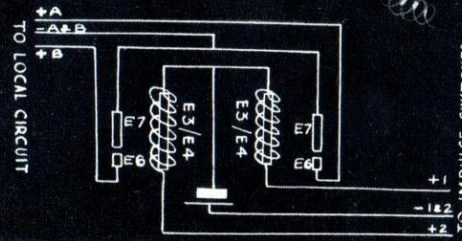
This electrical relay is operated by push buttons or impulse switches. When connected up to electrical models it enables different operations to be carried out by the momentary pressing of the impulse switch concerned. Several applications are shown in Part Three. Relay works on a low current line circuit whilst the models to be operated are on a local circuit.

CONSTRUCTION

The relay is built on an E1. A U1 is fixed to the middle of a horizontal F13, which pivots on the base by means of an S55 working in the U1 and held in position by locknuts. E7's are fixed to the end of the F13 by A1's. Bobbins (E3) and cores (E4) are fixed to base by A1's. Note the F9's between A1's and E1. These F9's carry the relay switches. To the second end hole of the F9's, E8's are fixed parallel to E1 and to these E8's other E8's with E6's are fixed at right angles and rest on the base E1 as shown. When the F13 is attracted by one of the bobbins the E7 makes contact with its E6, the other E7 being clear of its E6 and resting on the insulating strip E8. When the other bobbin is energised the reverse happens. Wire up as in diagram using impulse switch such as that shown on page 67. Note that the diagram shows the wiring for relay only; that for the switch being omitted as this varies for each particular application.

DOUBLE RELAY





Wiring diagram

PART THREE

MORE ADVANCED APPLICATIONS

This section of our Manual shows how you can apply the principles of Electricity and Magnetism given in Part One and the methods of control shown in Part Two to the building and operation of a range of fascinating working models.

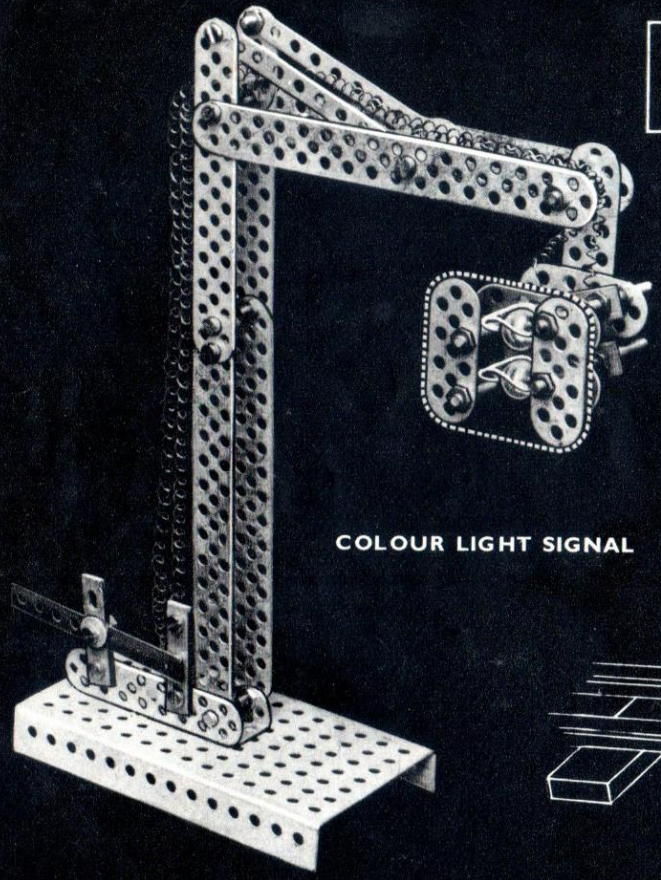
We have grouped these models into seven Projects. Each represents some general principle of electrical operation or control and is illustrated by one or more examples.

These projects and the examples given show the kind of thing that can be done with the Trix Unit System, but our space is limited and we cannot do more than indicate the possibilities.

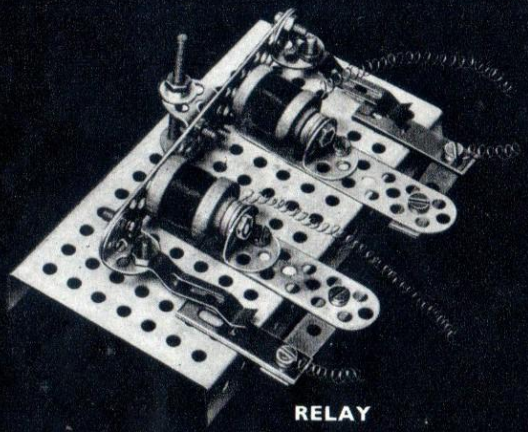
Indeed, our object throughout is to "Start you Building" and to show how the Trix System can help you to put into practice your own ideas.

PROJECT No. 1

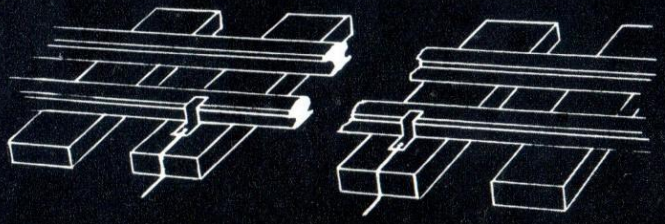
TRAIN OPERATED RELAY AUTOMATIC SIGNAL



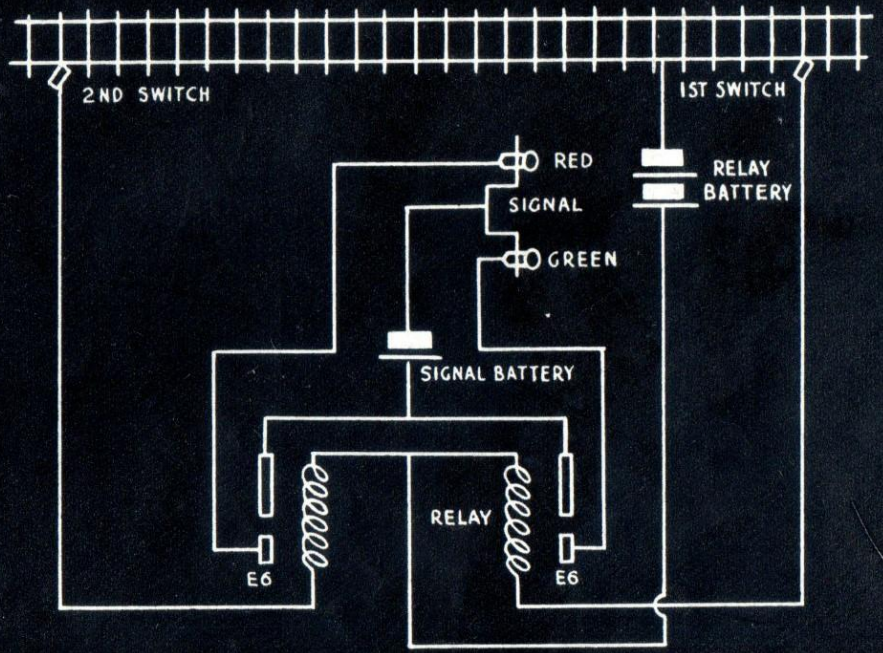
COLOUR LIGHT SIGNAL



RELAY



IMPULSE SWITCHES



WIRING DIAGRAM

PROJECT No. 1

Made with Tricy Trix PLUS 1 Unit A and 1 Unit B.

DESCRIPTION

This project shows how a relay is used to give automatic light signal control by a train. It is similar in principle to that on many Electric Railways.

OPERATION

Starting with the signal at green, as the train passes over the first contact, i.e. impulse switch, it operates a relay which automatically switches the signal to red. On passing over the second contact the relay is again operated, but this time the light is switched to green.

CONSTRUCTION

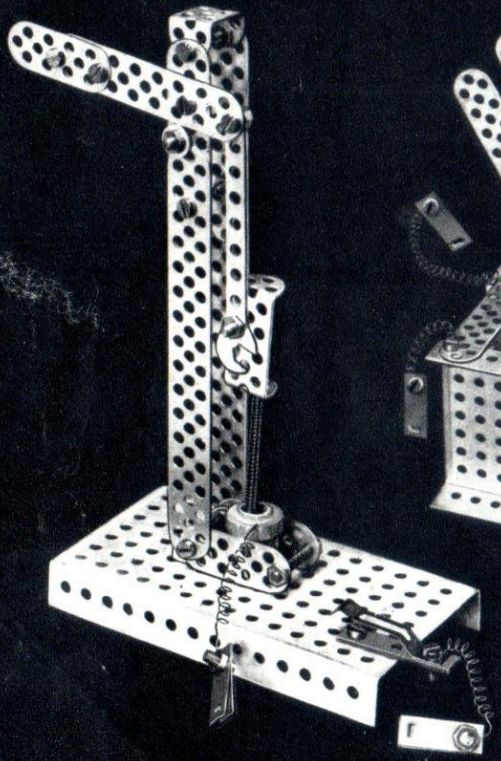
Build Colour Light signal (page 53), and Relay (page 80). Note that switch is not needed on base of signal as leads go to relay. Two simple contacts operate relay. Each can be made from E6 or piece of brass, tin, etc., and must be insulated from rail so that when train passes over, it is pressed on to the rail so making contact and completing the circuit. Position of first rail contact should be a train's length ahead of signal and the second at least two trains' length ahead of first contact. Follow wiring diagram carefully and note that signal and relay work a different circuit and batteries.

FURTHER APPLICATIONS TO "START YOU BUILDING"

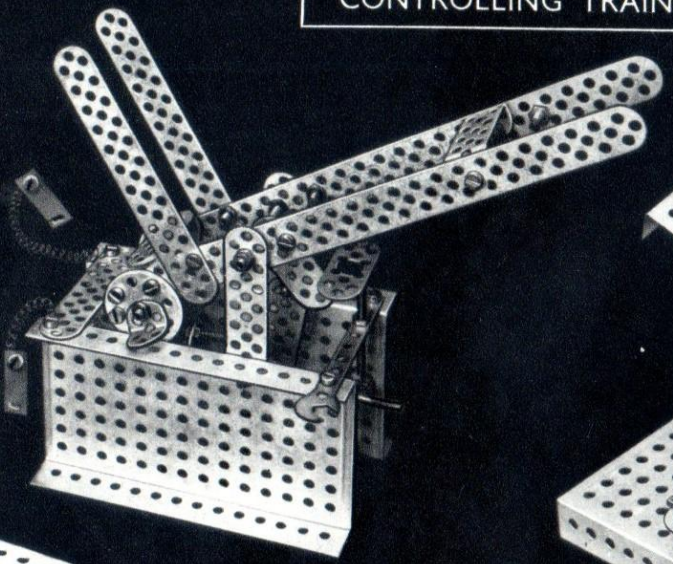
1. **A number of signals each controlled by signal ahead of it.**
2. **Signal controlling point setting.**
3. **Signal controlling power supply to rail section so that when signal is at "danger" current is shut off from track.**

PROJECT No. 2

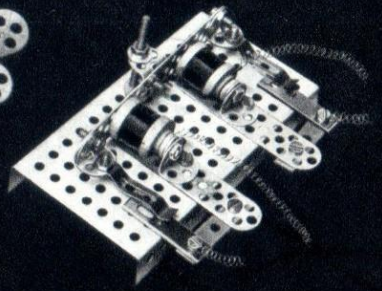
RAILWAY LIFTING BRIDGE
CONTROLLING TRAIN SIGNAL



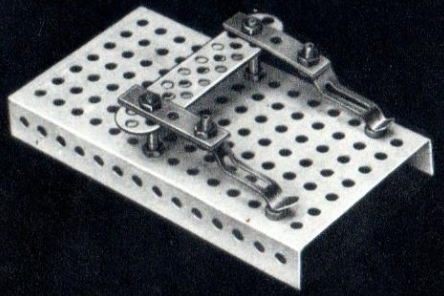
SIGNAL



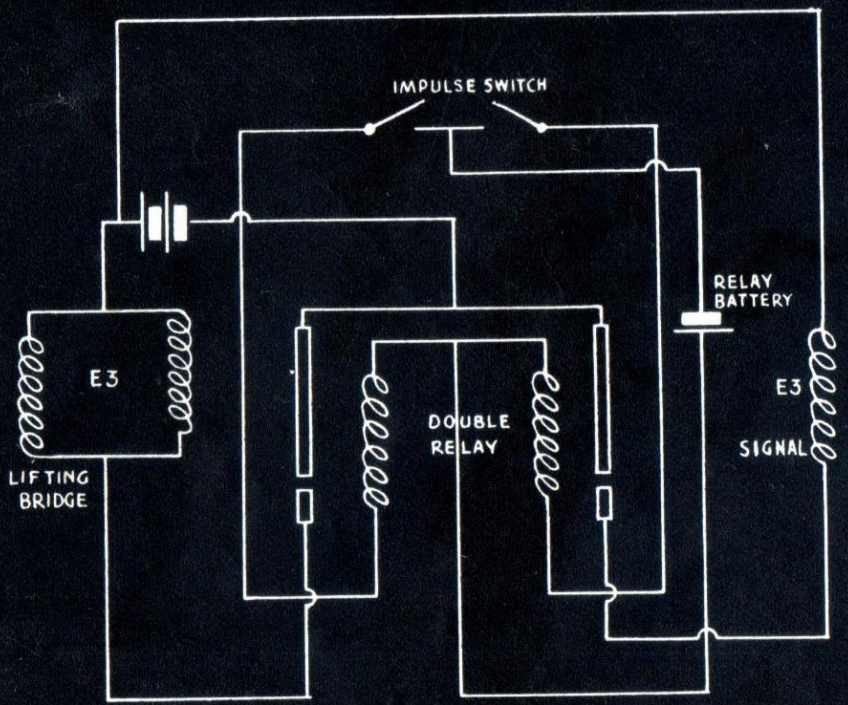
LIFTING BRIDGE



DOUBLE RELAY



DOUBLE IMPULSE SWITCH



WIRING DIAGRAM

PROJECT No. 2

Made with your Tricy Trix PLUS 2 Units A, 2 Units B and 3 Units E.

DESCRIPTION

This project shows how a signal is controlled by the raising or lowering of the bridge, and is an example of how relays are used on full size railways to give full automatic safety control.

OPERATION

When the train is approaching the bridge which is in the raised position, the signal is at danger and, directly the bridge is lowered, the signal will automatically show "line clear."

CONSTRUCTION

Build the Signal as given on page 19 and the Lifting Bridge as shown on page 58. The Double Relay and Double Impulse Switches are described on pages 80 and 67 respectively.

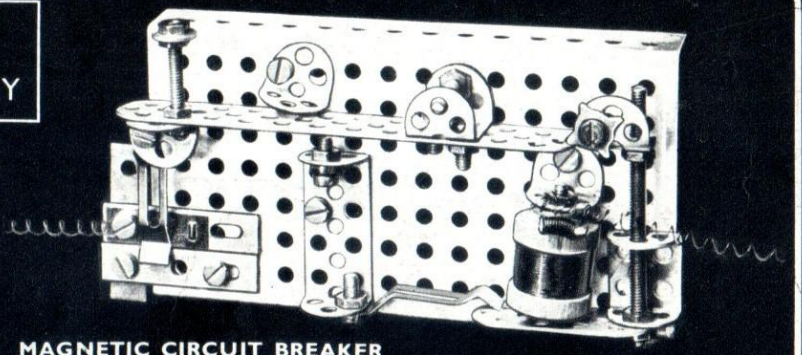
Follow wiring diagram carefully, noting that one side of relay works the bridge, whilst the other works the signal.

FURTHER APPLICATIONS TO "START YOU BUILDING"

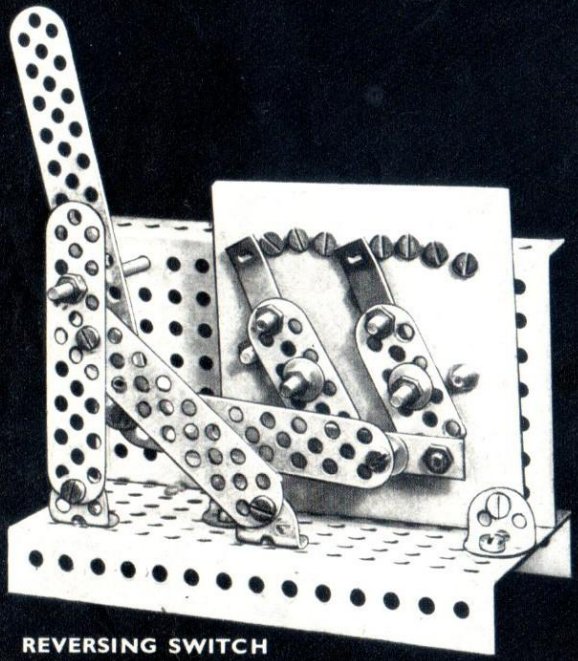
1. **Signal controlled Level Crossing.**
2. **Tower Bridge with automatic Traffic Lights.**
3. **Car operated Garage Doors.**

PROJECT No. 3

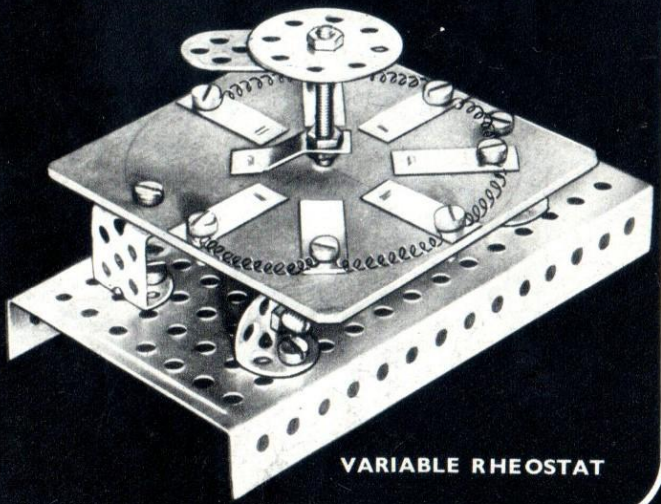
CONTROL PANEL FOR MODEL RAILWAY



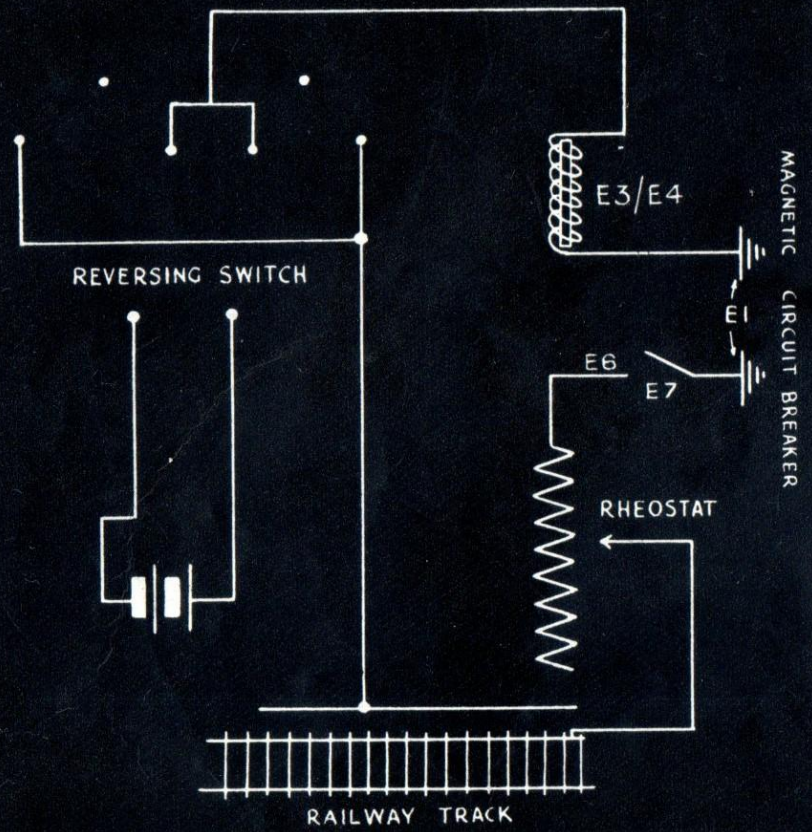
MAGNETIC CIRCUIT BREAKER



REVERSING SWITCH



VARIABLE RHEOSTAT



WIRING DIAGRAM

PROJECT No. 3

Made with Tricy Trix PLUS 1 Unit B, 2 Units E and 2 packets of nuts and bolts.

DESCRIPTION

In this project we show how the models on the opposite page can be grouped together to form a control panel for a model railway or operate any model with an electric motor.

OPERATION

The reversing switch is used to alter the direction of train, the rheostat the speed and the Magnetic Circuit Breaker prevents any damage which may result through a short occurring in the circuit.

CONSTRUCTION

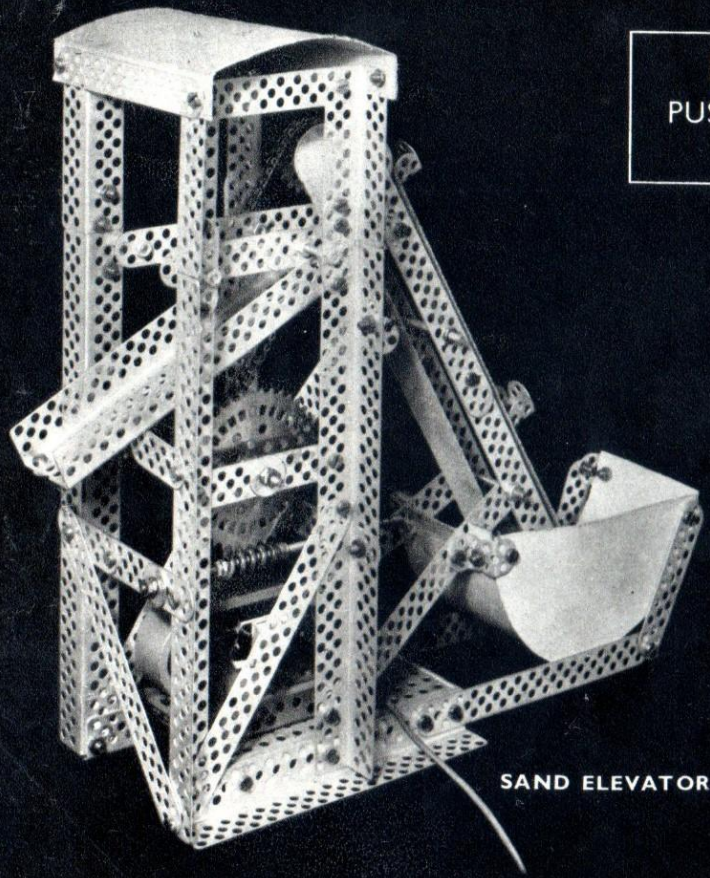
Build the Reversing Switch (page 70), Rheostat (page 76), Magnetic Circuit Breaker (page 73). These models can be screwed on to a base board for ease of operation and will form a complete unit. Follow wiring carefully.

FURTHER APPLICATIONS TO "START YOU BUILDING"

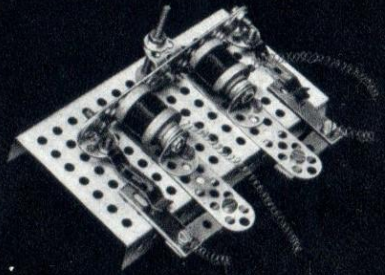
1. **Operation of Funicular Railway by remote control with safety overload cut-out.**
2. **Control of powerful motor operating heavy apparatus.**
3. **Operation of cranes and derricks by remote control from master cabin.**

PROJECT No. 4

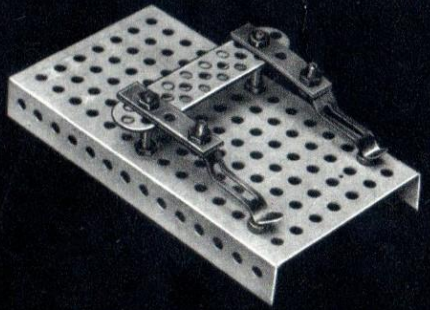
PUSH BUTTON CONTROL OF SAND ELEVATOR



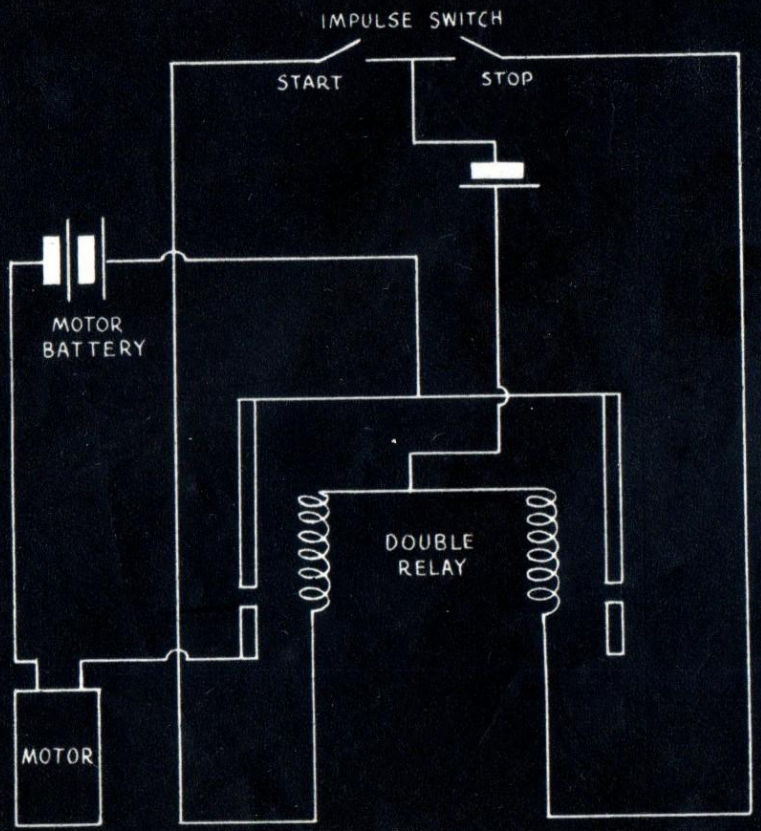
SAND ELEVATOR



DOUBLE RELAY SWITCH



DOUBLE IMPULSE SWITCH



WIRING DIAGRAM

PROJECT No. 4

Made with Tricy Trix PLUS 1 Unit A, 2 Units B, 2 Units D, 1 Unit G and Motor 2051.

DESCRIPTION

This project shows how large and heavy engineering machinery can be operated merely by pressing a button. Press-button control can be placed either on machine or in a remote position. This project is a typical example of the use of a relay operating on a line circuit to control a heavy motor working on a local circuit.

OPERATION

The double relay is wired to the model and when one side of the impulse switch is pressed the motor will start and on pressing the other side of switch the motor will stop.

CONSTRUCTION

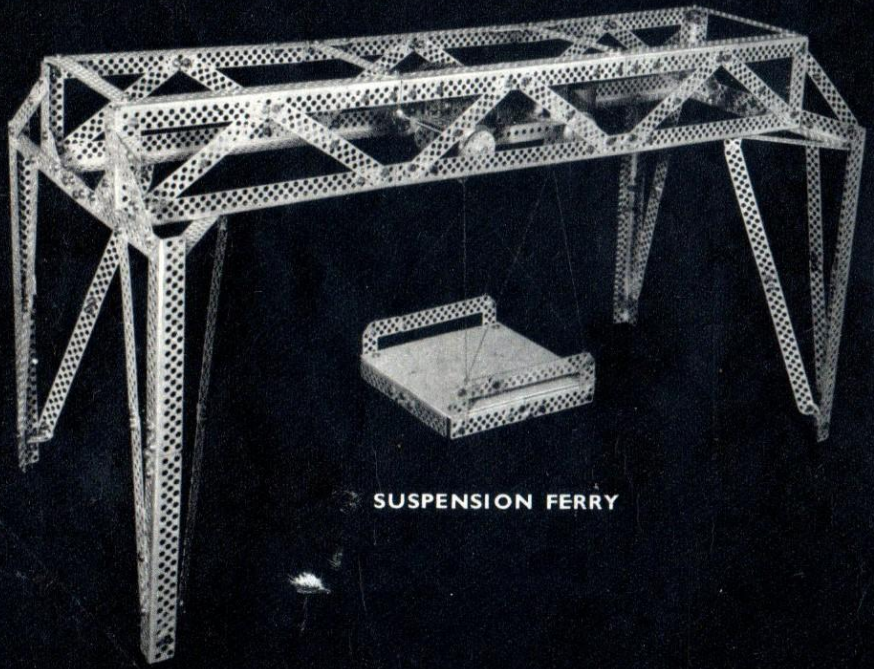
Build the Sand Elevator as described on pages 66-67 in the TRIX Complete ENGINEERING MANUAL, the Double Relay (page 80) and Double Impulse Switch (page 67). Wire up as in diagram and note the relay works from a different battery to that of the Sand Elevator.

FURTHER APPLICATIONS TO "START YOU BUILDING"

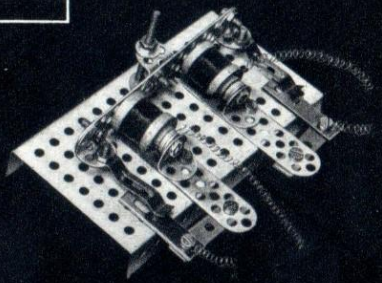
1. **Push-button control of Drilling Machine.**
2. **Push-button control of Power Hacksaw.**
3. **Remote control of Roundabout.**

PROJECT No. 5

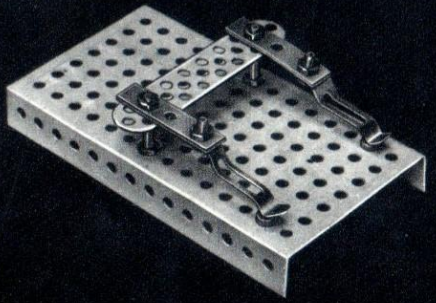
REMOTE CONTROL OF SUSPENSION FERRY



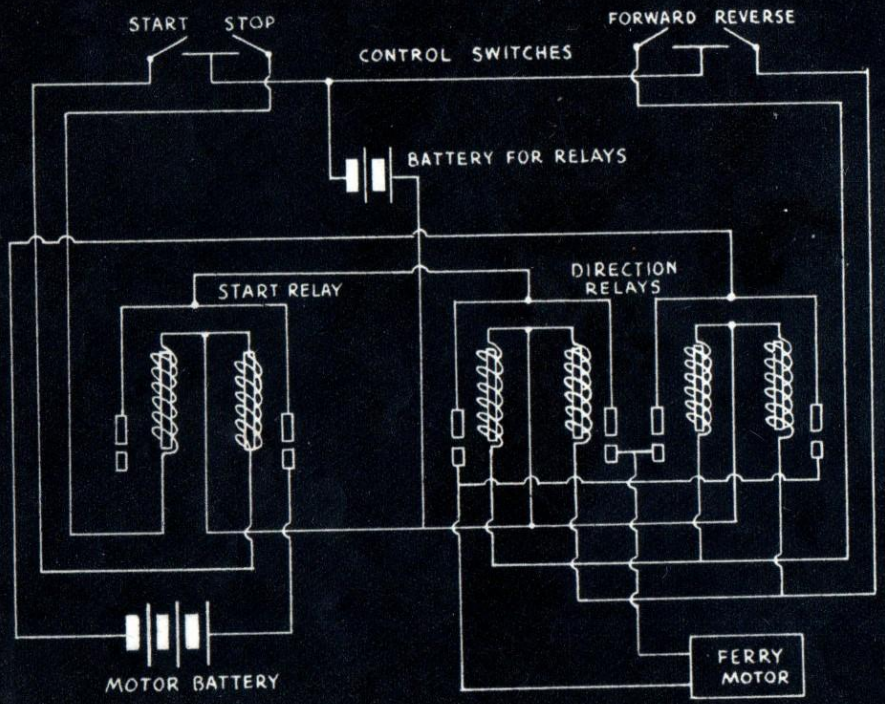
SUSPENSION FERRY



DOUBLE RELAY SWITCH



DOUBLE IMPULSE SWITCH



WIRING DIAGRAM

PROJECT No. 5

Made with your Tricy Trix PLUS 4 Units A, 4 Units B, 1 Unit C, 6 Units D, 6 Units E, 2 Units G and Motor 2051.

DESCRIPTION

This project enables you to have full remote control over the Suspension Ferry. By merely pressing a button you can send the ferry platform either backwards or forwards as desired.

OPERATION

One of the double impulse switches controls one double relay giving stop or start to the motor. The second impulse switch controls the two double relays giving directional control.

CONSTRUCTION

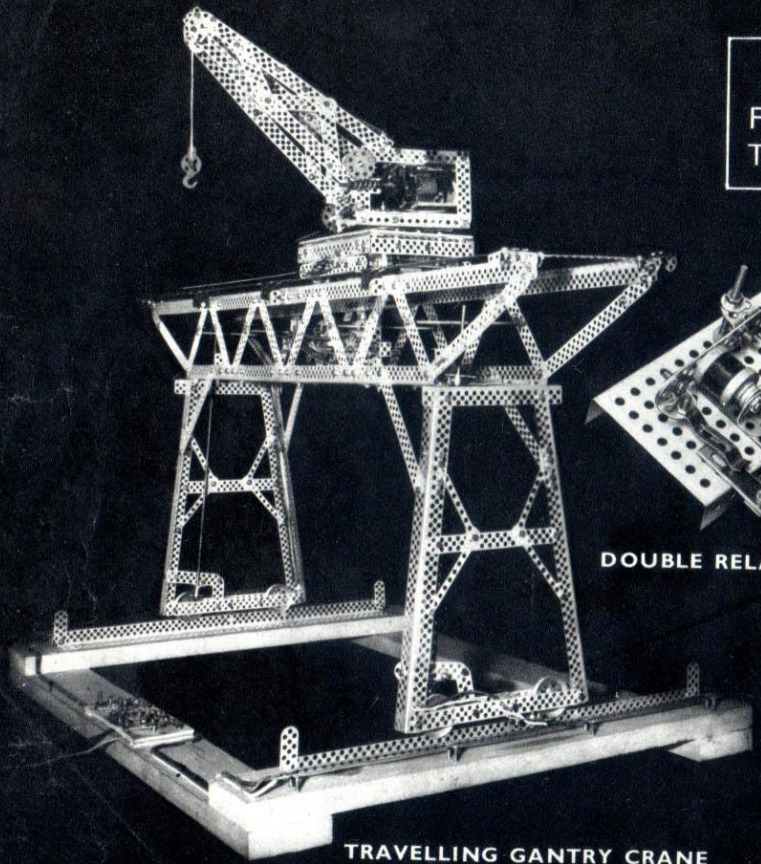
Build the Suspension Ferry as shown on pages 72 and 73 of the TRIX Complete ENGINEERING MANUAL. Make three Double Relay Switches as given on page 80 of this book and two Double Impulse Switches as shown on page 67. Follow wiring diagram carefully, noting that the two double relay switches which give directional control are wired to form one unit.

FURTHER APPLICATIONS TO "START YOU BUILDING"

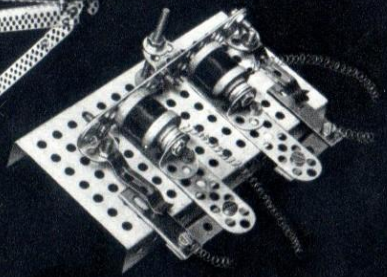
1. **Automatic Lift Control.**
2. **Cabin control of Dockyard Crane.**
3. **Remote control of Tower Crane.**

PROJECT No. 6

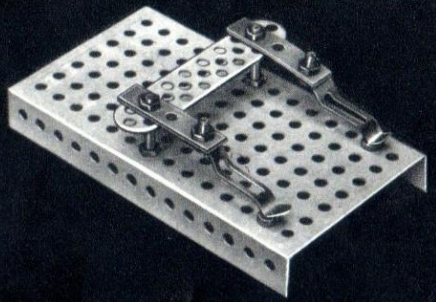
FULL AUTOMATIC CONTROL OF TRAVELLING GANTRY CRANE



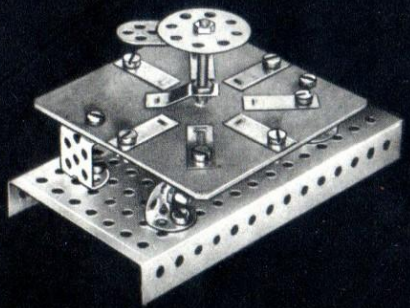
TRAVELLING GANTRY CRANE



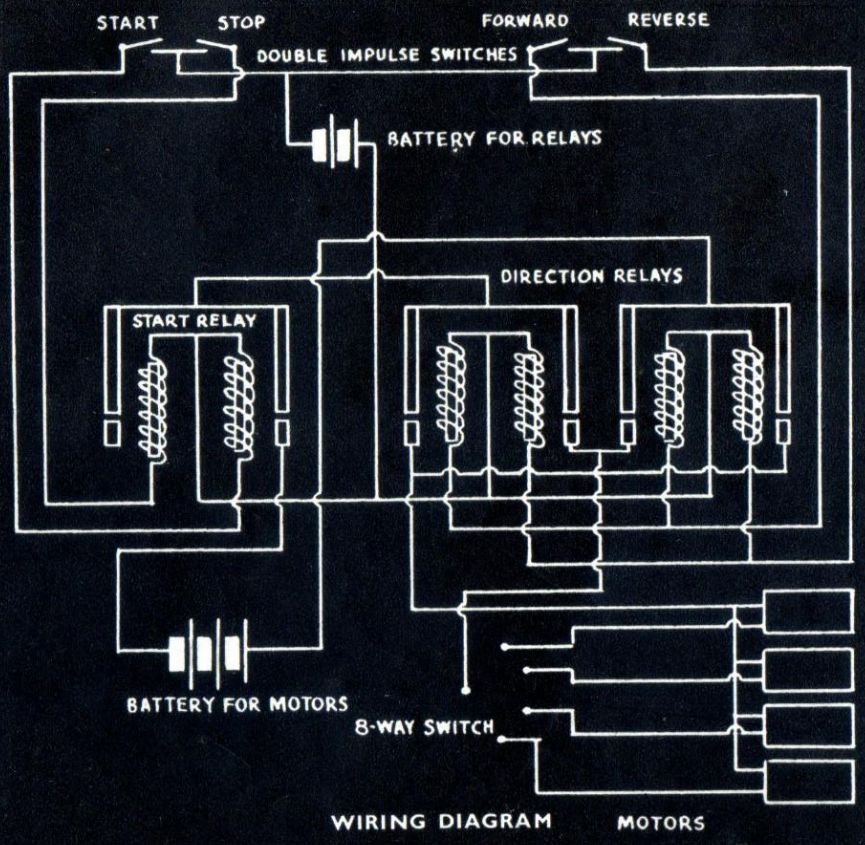
DOUBLE RELAY SWITCH



DOUBLE IMPULSE SWITCH



EIGHT-WAY SWITCH



PROJECT No. 6

Made with your Tricy Trix PLUS 9 Units A, 7 Units B, 3 Units C, 7 Units D, 9 Units E, 6 Units G and 4 Motors 2051.

DESCRIPTION

This project shows how a big crane can be controlled by merely pressing certain push buttons.

OPERATION

Each of the four motors in the Gantry Crane can be stopped, started and reversed by the use of the impulse switches and relays. Each individual motor is selected by the eight-way switch, noting that only four contacts are used.

CONSTRUCTION

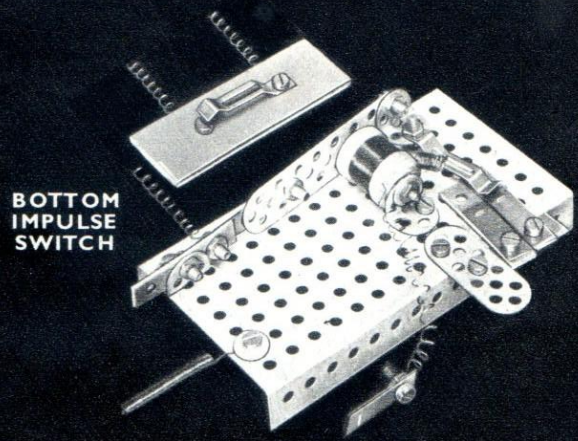
In addition to the Gantry Crane shown in the TRIX Complete ENGINEERING MANUAL, pages 104-108 build three Double Relays (page 80), two Double Impulse Switches (page 67), and one eight-way switch (page 71). The two relays which control the direction of motors act as a reversing switch and are wired to operate together, i.e. at one impulse of switch one bobbin of each relay will operate, so changing the direction of current. Note that the switches shown on the base of the Gantry Crane are not needed when the relays are used.

FURTHER APPLICATIONS TO "START YOU BUILDING"

1. **Press button control of Mechanical Excavator.**
2. **Remote control of Portable Jib Crane.**
3. **Automatic control of Mechanical Coal Cutter.**

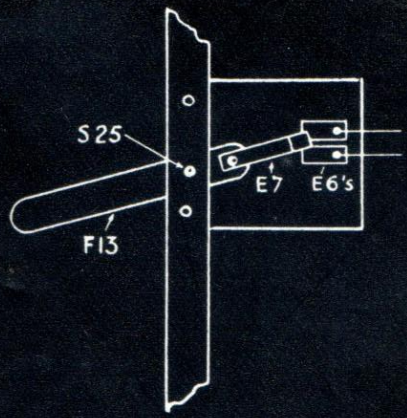
PROJECT No. 7

RELAY CONTROL FOR SELF-WINDING MECHANISM OF PENDULUM CLOCK



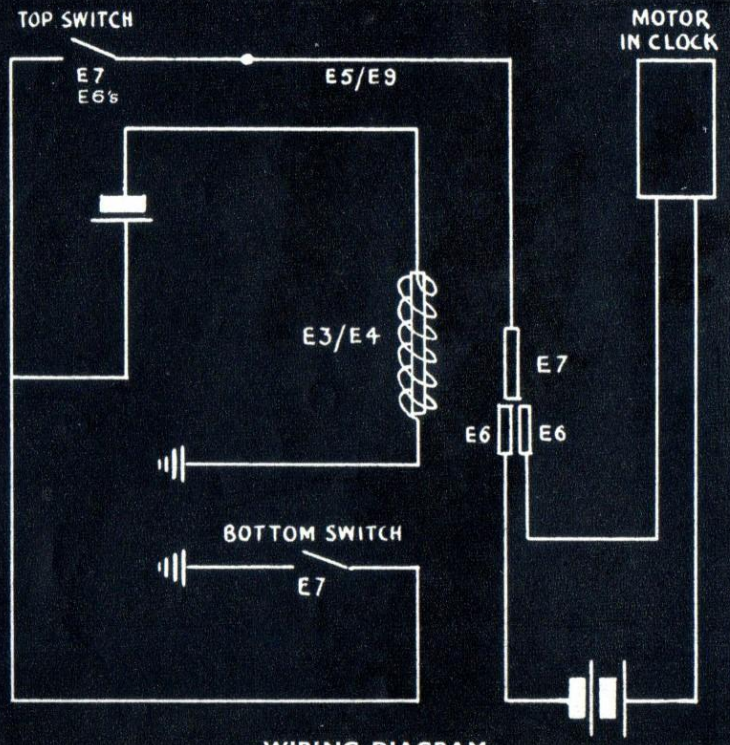
BOTTOM IMPULSE SWITCH

RELAY



TOP IMPULSE SWITCH

SELF-WINDING PENDULUM CLOCK



WIRING DIAGRAM

PROJECT No. 7

Made with your Tricy Trix PLUS 4 Units A, 16 Units B, 5 Units C, 22 Units D, 1 Unit E, 16 Units G and Motor 2051.

DESCRIPTION

This project shows how a relay is used to give full automatic electric control to the self-winding mechanism of a mechanical Pendulum Clock.

OPERATION

The relay enables operation of the self-winding mechanism to be carried out electrically instead of mechanically without altering the normal working of the Clock and weight.

CONSTRUCTION

The clock is built as described on pages 109-113 of the TRIX complete ENGINEERING MANUAL, but the switch is omitted from the weight as the relay takes its place. Build the single relay switch as given on page 77 of this book. Two switches are fixed to the pedestal, at the top and bottom respectively, so that the weight will operate each in turn. The bottom switch is made as shown in top illustration of page 77. It is normally in the "off" position so that as the weight descends it will close the switch completing the circuit and starting the motor. The top switch, made as shown on opposite page, consists of an F13 pivoted at one end and carrying an E7 which rests on two E6's. The E6's are fixed to a piece of card and wired up as in diagram. As the weight ascends it raises the F13 which breaks the contact at E7-E6, thus cutting out the relay operation and stopping the motor. As the weight descends the F13 will return to its normal position which completes the relay circuit ready for operation by the bottom switch.

The TRIX *complete* ENGINEERING MANUAL

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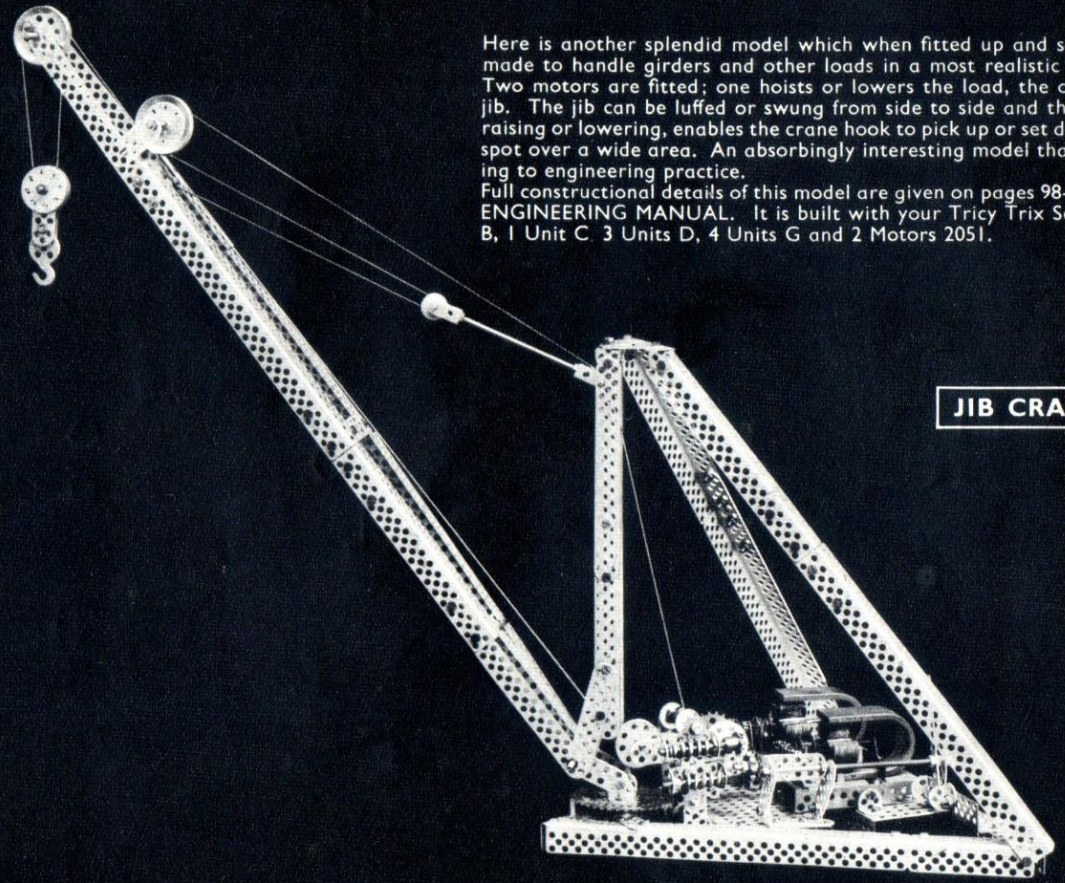
Two motors are fitted; one hoists or lowers the load, the other raises or lowers the jib. The jib can be luffed or swung from side to side and this, in conjunction with its raising or lowering, enables the crane hook to pick up or set down loads at any desired spot over a wide area. An absorbingly interesting model that works faithfully according to engineering practice.
Full constructional details of this model are given on pages 98-100 of the TRIX complete ENGINEERING MANUAL. It is built with your Tricy Trix Set PLUS 2 Units A, 1 Unit B, 1 Unit C. 3 Units D, 4 Units G and 2 Motors 2051.



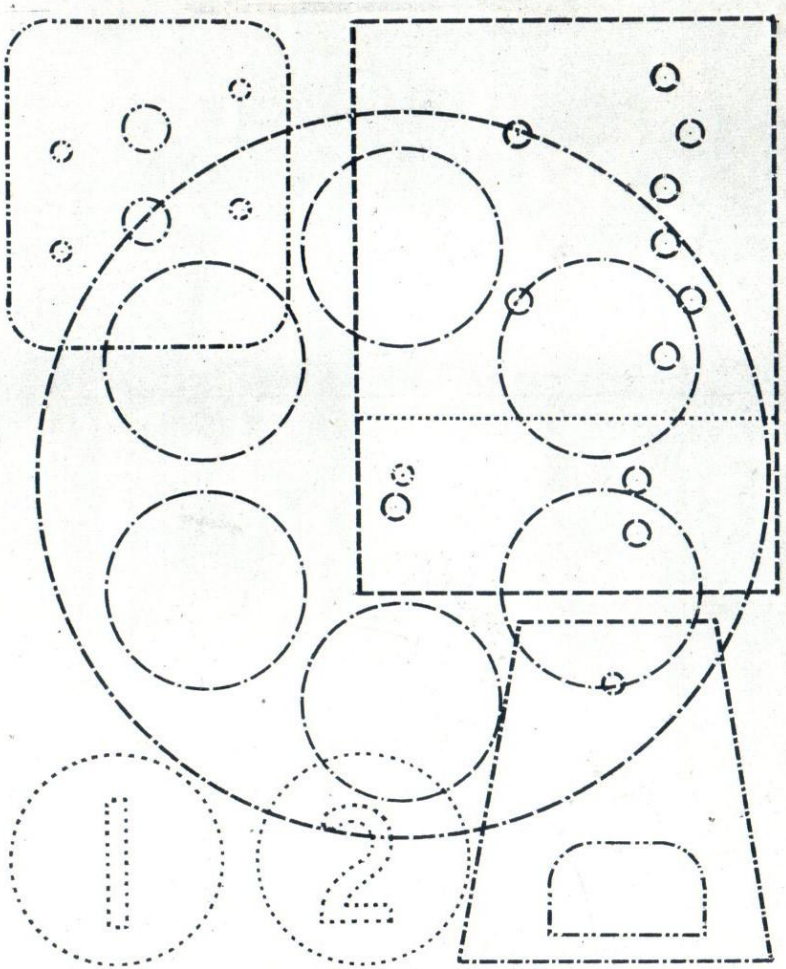
JIB CRANE

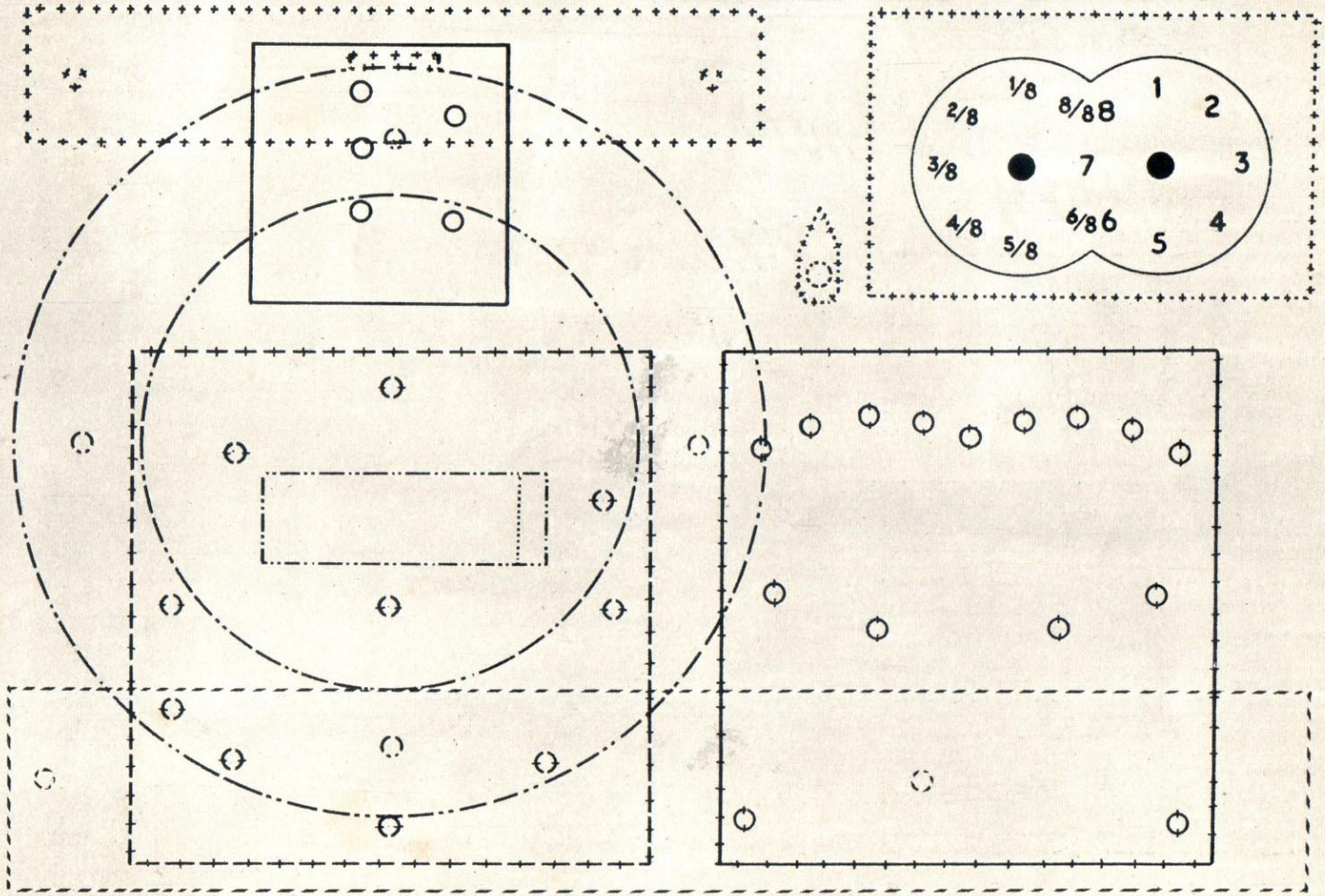
TEMPLATES

Here are the templates for models given in Parts 1 and 2. The key below shows which outline to use for any model. Select the correct outline and trace carefully on transparent paper. Paste on to card, plywood or other material. Cut out and fit.

KEY TO OUTLINES

MODEL	PAGE	PART	OUTLINE
Needle Telegraph	17	Indicator	+ + + + + + + +
Motor	18	Flywheel	– – — — · — — —
Windmill	25	Sails	— · — · — · — · —
	42		
Colour Wheel	36	Wheel	— · — — · — — · —
Colour Light Signal	52	Lamp Hood	
		Lamp Tube	— · — · — · — · —
		Lamp Plate	
Indicator Board	57	Numbers	----------
Lifting Bridge	58	Roadway	– – – – – – –
Magnetic Counter	60	Dial	+ · + · + · + · + · + · + · + · +
		Pointer	
Simple Switches Fig. 1, 2 and 3	67	Base	— — — — — — —
Reversing Switch	70	Back Plate	+ + + + + + + +
Eight-way Switch	71	Base	+ + + + + + + +
Variable Rheostat	76		
Selector Switch	78	Base	———





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