HOW TO MAKE

A Crystal Receiving Set

WITH

MECCANO

THE construction of a Crystal Receiving Set with Meccano parts is just as easy as is the construction of any of the hundreds of Meccano models, that boys all over the world build every day. A Meccano Receiver not only gives great pleasure by providing constant entertainment, but from it may be obtained a sound knowledge of the principles of radio reception.

The parts necessary to construct this set may be obtained complete in strong carton, price 15/-*. Those boys who already possess some of the necessary parts may complete their set by purchasing the other parts separately, at prices shown elsewhere in these pages.

Experimental Licence Necessary

It is important to remember that, in common with other receivers of the constructional type, this receiver may, at present, only be used with an experimental licence. Negotiations are now proceeding between the British Broadcasting Company and the Post Office, however, with a view to the issuing of a special licence under which these sets may be used.

The Meccano Receiver consists of three sections (1) Detector (2) Inductances and (3) Tuning Condenser, and is suitable for the reception of telephony and Morse code signals. The wave length is approximately 300 to 500 metres, but this may be varied at will by tuning. The limits of 300 to 500 metres may be increased, if desired, by adding more inductance discs.

The distance at which a crystal set will receive broadcast depends largely upon the nature of the country in which the receiver is situated, and the distance from the broadcasting station. With a good aerial broadcast should be easily received up to 20 miles from a broadcasting station. Morse signals may be received up to and exceeding 100 miles.

Assembling the Detector

The Detector is made by securing a single bent strip (23 Fig. A) and a flat bracket (24) to the mounting board; this forms the bearing for the detector arm (29). To the upper end of a 1" angle bracket (26), bolted to the board as shown, is bolted the cup (4) holding the crystal.

*Or with 2000 ohm single telephone receiver, 25/-

The detector arm (29) is then placed between the faces of the bent strip (23) with which it forms a universal joint, thus allowing the arm to be moved, until the best position is found on the crystal for the fine contact wire called the "cat-whisker."

The oscillations induced in the disc (39) are rectified by the Meccano Crystal, a new highly sensitive substance giving results considerably more efficient than those given by any other crystal. Not only may signals be received from greater distances with the Meccano crystal, but the signals are also very much clearer and stronger than when the other crystals are used.

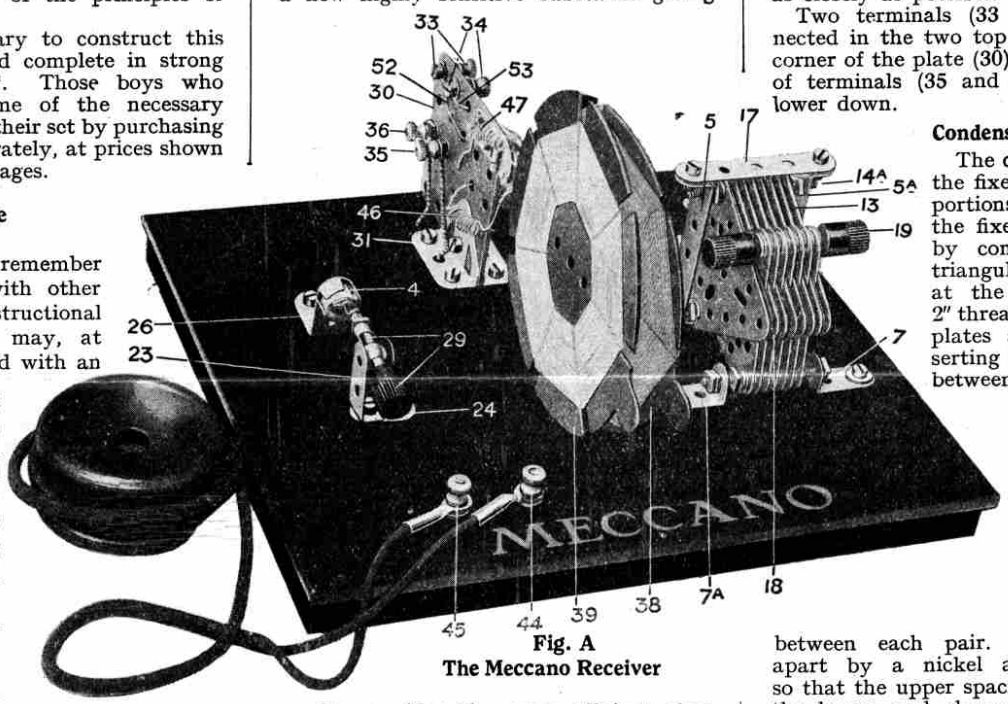


Fig. A
The Meccano Receiver

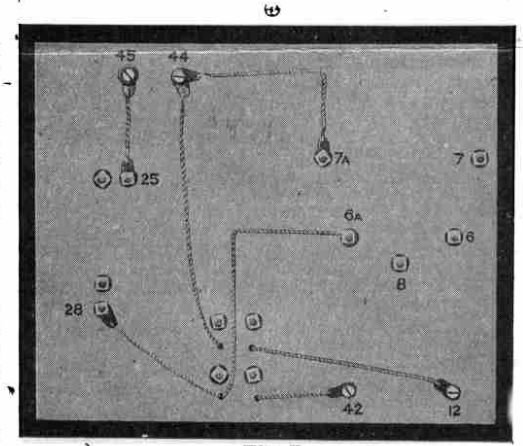


Fig. B
Underneath View of Mounting Board

Mounting the Inductances

To one corner of a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Special Fibre Plate (30) are attached two trunnions (31) one on each side of the plate as shown. At the upper corresponding corner of the same plate are attached the inductance discs (38 and 39) by hinges, so arranged that the discs may be brought together as closely as possible.

Two terminals (33 and 34) are connected in the two top holes of the outer corner of the plate (30), and a second pair of terminals (35 and 36) are connected lower down.

Condenser

The condenser comprises the fixed and the movable portions. First assemble the fixed portion (Fig. C) by connecting eight $2\frac{1}{2}"$ triangular plates together at the lower end by a 2" threaded rod (14). These plates are spaced by inserting two nickel washers between each plate, and clamped at each end by a washer and a nut. At the upper end a 2" threaded rod (14A) is used.

Before threading the rod through the plates two Triangular Fibre Plates are placed between each pair. They are spaced apart by a nickel and brass washer, so that the upper spacing is uniform with the lower, and clamped together in the same manner as the lower end. It will be noticed that in these Triangular Fibre Plates one of the corner holes is cut out, to enable them to clear the washers on the rod (14) in order to make a better electrical contact.

The triangular plates may now be fastened in position between two $2\frac{1}{2}" \times 1\frac{1}{2}"$ angle strips (5 and 5A). A $2\frac{1}{2}"$ strip (17) is bolted at the top, with a spacing washer at each end, and extra nuts (15) are threaded to both ends of the rod (14 and 14A) to centralise the plates. The strips (5 and 5A) are then secured to the board at 6 and 6A by two No. 6 B.A. bolts, with an insulating fibre bush between each angle strip and the board.

The movable portion (Fig. D) is composed of seven triangular plates threaded in a similar manner to those of the fixed portion. They have two nickel spacing washers at the top and bottom, but no Triangular Fibre Plates are used. This movable portion is then passed between the apertures between the plates of the fixed portion, connected to the $1" \times \frac{1}{2}"$ brackets (7 and 7A Fig. A) and locknutted on the outside of the same brackets.

(Cont. on next page)

A Meccano Crystal Receiving Set (*cont.*)

The insulating handles (19) may now be screwed on ; these allow of the position of the movable portion being varied without causing the contact of the operator's fingers to interfere with signals received.

Wiring

The wiring will be made clear by reference to Figs. A, B and E, and by remembering that Fig. B is an underneath view of Fig. A. From the aerial terminal 12 the wire 41 (Fig. E) carries the oscillations to the terminal 34 and from here through one end (53 Fig A) of the winding of the disc (38) through the winding to terminal 33 by the other end 52, and thence by the wire 43 to the earth terminal.

The impulses are induced from the disc 38 in the winding of the second disc (39) and carried through one end (47) of the wiring to terminal (35) and the wire (51) to the 'phone terminal (44). Thence through the other end (46) of the disc (39) to terminal (36) and wire 54 to the Detector terminal (28) through the crystal and detector arm (29) to terminal 25 and by wire 40 to the 'phone terminal (45). Another wire (54A) from terminal (36) also carries the impulses to the condenser (6A), thence through the condenser to 7A and by wire (54B) to the 'phone terminal (44).

Operating the Receiver

Having assembled the receiver and connected to aerial and earth wires, the movable portion of the condenser should be placed in about the centre of its arc of movement, and the inductance discs (38 and 39) brought close together. At the same time the detector arm should be gently moved, so that the "cat-whisker," or copper wire contact, selects the most sensitive point on the face of the crystal.

The "cat-whisker" should press only lightly on the crystal, the pressure being varied by the insulated handle of the detector arm, which allows a very fine adjustment to be made. When the most sensitive point is reached, the discs or the condenser (or both) should be moved until the signals or telephony are heard at maximum strength.

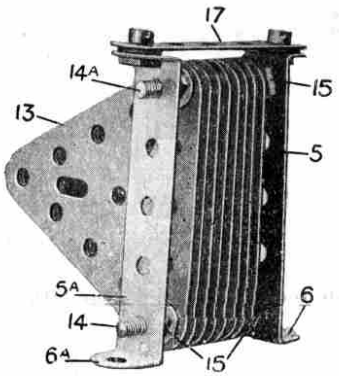


Fig. C. Fixed Portion

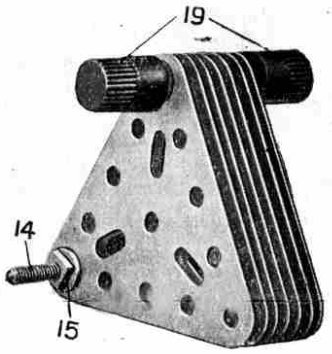


Fig. D. Movable Portion

Condenser

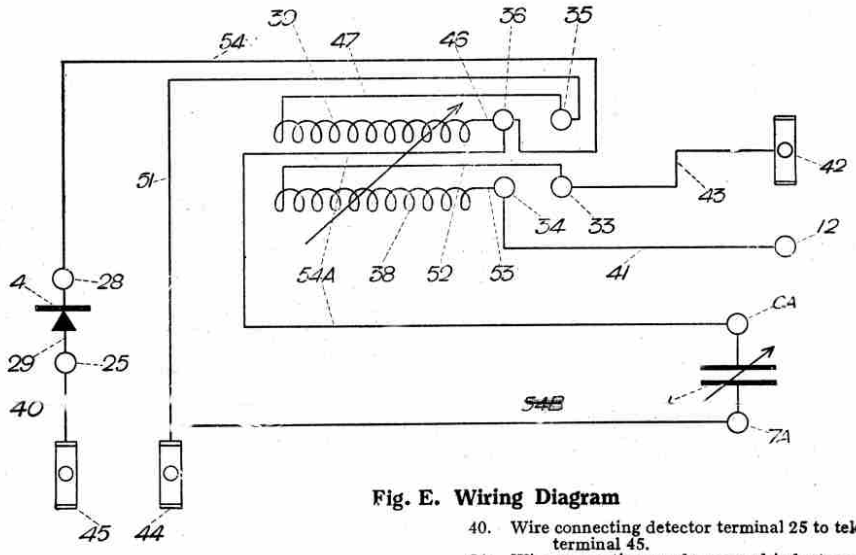


Fig. E. Wiring Diagram

1 & 7a. Condenser terminals.
12. Aerial terminal.
25. Detector-arm terminal.
28. Detector terminal.
29. Detector arm.
4. Crystal and cup.
35 & 36. Terminals for inductance disc 39 and connections.
33 & 34. Terminals for inductance disc 38 and connections.
38 & 39. Inductance discs.
40. Wire connecting detector terminal 25 to telephone terminal 45.
54a. Wire connecting condenser and inductance discs.
42. Earth terminal.
43. Wire connecting terminal 33 to earth terminal.
44 & 45. Telephone terminals.
46 & 47. Winding of inductance disc 39 connected to terminals 35 and 36.
51. Wire connecting terminal 35 to telephone terminal 44.
52 & 53. Winding of inductance disc 38 connected to terminals 33 and 34.
54. Wire connecting terminal 33 to detector terminal 28.

Meccano Radio Parts

		s.	d.
403	Insulating Triangular Plates, 2½" (for Condensers) ... ... each	0	1
404	Insulating Handles ... ,,	0	3
405	Brass Washers, 1/32" ... doz.	0	4
406	9" lengths 22G Bell Wire with Tags ... ... each	0	2
407	Inductance Discs, hinged (Wave length approx. 500 metres) ... ... pair	4	0
407a	Inductance Discs, hinged (not wound) ... ... each	1	0
408	Single Telephone Receivers (2,000 Ohms) ,,	10	0
409	Detector Arms, complete ,,	1	0
410	Crystals, mounted (complete with clips No. 411) ... ... ,,	1	6
410a	Crystals, mounted only ,,	1	3
411	Clips for Crystals ... ,,	0	3
412	Mounting Boards ... ,,	5	0
413	Condensers, complete ... ,,	5	6
414	Detectors, complete, as contained in outfit of parts RS2 ... ... each	3	0
415	Inductances, complete ... ,,	5	6
421	Sliding Contacts with Rods and Brackets, complete ,,	4	6
422	Sliding Contacts only ... ,,	1	6
423	Pointers for Sliding Contacts ... ... ,,	0	4
424	Rods, 5/32" Whitworth thread at ends ... ,,	0	4
425	Brackets for Sliding Contacts, right ... ... ,,	0	3
425a	Brackets for Sliding Contacts, left ... ... ,,	0	3
441	Detectors, complete, as fitted to Meccano C.R.S. No. 1 ... ... ,,	4	3
442	Detector Rods ... ... ,,	0	3
443	Sleeves for Detector Rods ,,	0	6
444	Cat Whiskers ... ... ,,	0	1
445	Ball Brackets with 6 B.A. Screws... ... ... ,,	0	4
446	Plain Brackets ... ... ,,	0	2
447	Glasses for Detectors ... ,,	0	4
448	Caps for Detector Glasses, Crystal Ends ... ... each	0	4
449	Caps for Detector Glasses, Detector Ends ... ,,	0	4
461	Inductances, complete with scales ... ... ,,	4	6
462	Inductances, wound ... ,,	2	3
463	Inductance Tubes ... ,,	0	4
464	Ends for Inductance Tubes ,,	0	6
465	Stay Bolts for Inductance Tubes ... ... ,,	0	4
466	Metric Scales ... ... ,,	0	6
467	Special Insulating Washers doz.	0	6
481	Hexagonal Nuts, tapped, 5/32" Whitworth thread ... ... ,,	1	6
482	Small Terminals, 5/32" Whitworth thread ... each	0	2
483	Large Terminals, tapped, 5/32" Whitworth thread ... ... ,,	0	2
484	Bifurcated Rivets ... doz.	0	2
485	Indication Labels (Phone, Earth and Aerial) ... each	0	1

Next Month we shall list Special Meccano Radio Parts in Brass and Fibre.