# The "R. R." Selective Crystal Receiver

## No Difficulties in Construction and Makes a Good Wave Trap

By "MEGOHM"

**Here is a first-class, easily constructed, selective crystal set. The "Record" crystal receiver, which was not, of course, designed for particular selectivity, can be easily converted by making a few slight alterations. Those who live within crystal range of two stations, and want to cut out one of them will be able to do so with this set.**

**This set makes a good wave trap for valve sets. Next week "Megohm" will give an article showing how this set can be used as an efficient wave trap. Owners of valve sets know how essential a wave trap is to satisfactory reception, and the details, which will be given next week, will make its construction a comparatively simple matter.**

This crystal set has been designed to add high selectivity to the efficiency of the "Record" receiver, which was not produced with any idea of particular selectivity. Users of that circuit will be familiar with the way in which the condenser may be rotated through perhaps twenty or more degrees either way without "losing" the station. Those who convert their "Record" to this hook-up by the necessary small additions and alterations will be surprised at the different action of the circuit. At its best selectivity, two miles from 2YA, the writer gets, if anything, more loudspeaker volume than from the "Record," but here is the difference—turn the dial one degree either way, and 2YA is only just audible; another degree and it has disappeared, even from 'phones. This result is attained by introducing auto or semi-aperiodic coupling into the circuit.

Many readers who live within crystal range of two stations and have hitherto been unable to cut out the nearest one, will be able to do so with this set, whilst interference from morse on certain wavelengths should be materially reduced. The plug-in method of varying the aerial coupling and detector connection will enable listeners to find which combination best suits their conditions and locality. Some will find probably that one station will come in best with a certain combination and another with a different one.

Within a few miles of a main station, good construction and a good aerial will give weak loudspeaker strength, sufficient for listening-in quite comfortably near to the speaker.

### ADAPTING THE "RECORD" SET.

Those who have already made the "Record" set according to specifications only required to purchase six-panel or valve sockets and three pins to fit them, and also procure about half a yard of single flexible insulated wire. Then a little work has to be done in the way of altering connections and putting four taps on the tuning-coil. The lower end of coil, instead of connecting to E terminal, connects to socket 6, left-hand 'phone clip, and moving plates of condenser. The aerial and earth terminals are now only connected to their respective flexes. The top of the coil is now connected only to socket 1 and fixed plates of condenser. The back end of the crystal is only connected to a flex. Check all connections so that they are just as shown in the diagrams.

### THE PANEL.

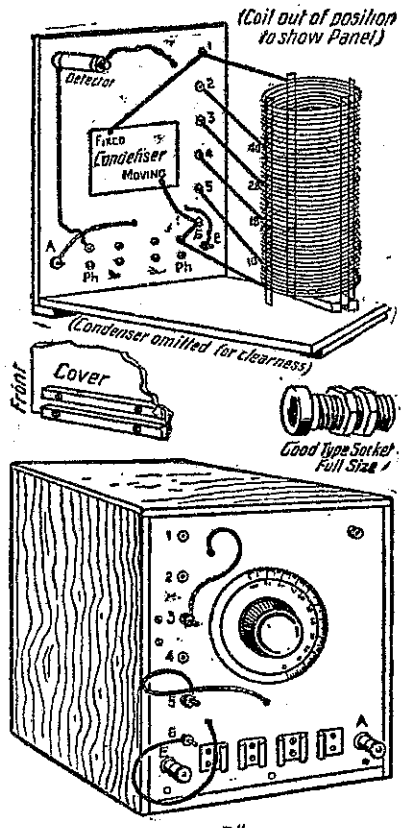
A piece of 3-16 ebonite six inches by seven inches is required for the panel, which is to be drilled according to the diagram. As the exact type of variable condenser to be used is not known, care must be taken before drilling the panel to see that room will be allowed for the condenser plates to rotate without catching or passing too near to the detector on one side, or the tap wires on the other. The detector may be placed as much in the corner as necessary.

### THE VARIABLE CONDENSER.

The capacity of the variable condenser is .0005 mfd., for which a neat knob and 3in. dial may be procured. A vernier dial is a good refinement, but not altogether necessary.

### THE BASEBOARD AND COVER.

Three-eighths of an inch will be a suitable thickness for the baseboard,




which will be the exact width of the panel. The depth from back to front may be seven or eight inches depending upon how much space the condenser requires. The coil may be placed slightly towards the side where the sockets are, but should not be much nearer to the cover than one inch. A batten is screwed under the baseboard at both back and front. The front one projects forward the thickness of the panel, as shown on inside view of the set. The back button is sufficiently short at each end to allow room for the guide strips inside the cover.

The cover consists of three sides and a top. On the inside at the bottom of each side two strips ¾in. square are screwed, so that the baseboard may slide in between them. The back might be made of ¾in. rimu, and the top and sides of three-ply, and finished with shellac and methylated spirits applied and polished with a rag, but individual tastes may please themselves in the exact construction of the cover.

### THE TUNING COIL.

Only a low-loss coil is worth while. No. 20's s.w.g. enamelled wire is to be used, and 54 turns should be put on. Where 4YA (Dunedin), 463 metres, is to be received, 58 or 60 turns will probably be necessary.

A cardboard cylindrical former 3ins in diameter and 5 or 6 inches long is required on which to construct the coil, the former being afterwards removed, leaving the turns of wire supported by only the four double strips of celluloid. The celluloid used for the strips is that used for motor-hood lights, the thicker the better. If scratched with a sharp point it breaks clean where the scratch is made. Now cover the former with a sheet of good paper, fastening by sticking the overlapping edge, but do not let it stick to the former anywhere. This is to prevent the coil sticking fast to the former. Cut four strips of celluloid, ¾in. wide, and length of the former. Lay the strips along the former at equal intervals, and fasten in place with twine by tying round the end of the former and the ends of the strips, this being done at both ends. A ball of twine the same thickness as the wire or a shade less is required. The twine and wire are fastened to a hole in one end of the former, and winding is proceeded with, the wire and twine being wound side-by-side tightly until the required number of turns has been put on. The end of the wire, leaving a foot over for connecting, is then fastened down temporarily. The twine is now carefully unwound from between the turns of wire. The wire is then fastened to the celluloid strips by a liberal application of cement made by dissolving chips of celluloid in liquid acetone, obtainable at the chemists. Another strip of celluloid is then laid over the cement and the coil put away until next day to set.

The former is removed by taking a sharp knife and cutting through the inside along one of the celluloid strips, when the two edges can be curved inwards, releasing the cardboard.

The coil may be fastened to the base by drilling the end of two opposite strips and screwing to the two ends of a strip of wood, which is screwed to the baseboard. The direction of the winding of the wire on the coil does not affect the working of the set.

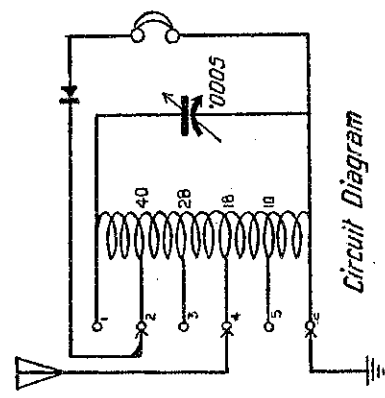
If the condenser has to be full in to give best tuning, then a few more turns must be added to the coil. With the auto-coupled coil, the length of aerial has not much effect upon the tuning. The coil is to be placed not to touch or be too near to either the case or the condenser.

### MAKING THE TAPS.

Four taps not less than 5 inches long have to be attached to the coil, reckoning from the bottom, at the 10th, 18th, 28th, and 40th turn. There are two ways of making these taps, one by taking some very thin copper sheet and cutting strips 1-8th-inch wide, with a small wider portion at one end to take a hole sufficiently large to go over the back of sockets. The wire on the coil is scraped clean all round the position of the tap working from inside and outside with a sharp knife, as all the enamel must be removed, a narrow strip of glass-paper also being of assistance. A small hook is then bent on the end of each strip, hooked round the wire, and soldered on. Another method is to twist up three pieces of 26's enamel wire, and, after scraping clean, hook the ends in place and solder on. The 20's wire is rather thick to pass between the turns, but it could be used by hammering the end flat.

### THE CRYSTAL.

A semi permanent crystal could be




used, but a carborundum cartridge is recommended, as it is always set for use, and eliminates all the worry of adjusting, and sometimes missing important items.

### GENERAL HINTS.

The wiring is clearly shown in the diagrams, and should present no difficulty. The same wire as used for the coil may be employed.

Solder all connections possible. The flex may be single lighting flex, or twin "bell flex," which is very pliable. the twin wires to be connected and used as one. The end to be attached to the pins may be soldered to a solder tag and then secured under the nut, screwing up very tight.

The 'phone clips are made from 28's hard brass ¾-inch wide by 1 5-8 for the centre ones, and 1 inch for the two end ones, curled round a 1-8-inch drill and adjusted to fit the thick part of 'phone tags. They are drilled and bolted to the panel as shown, with 1-8-inch brass bolts. When using one pair of 'phones, a tag goes in each of the two outer clips; two pairs, one tag in left-hand clip, one in next clip, tag of second pair in second clip from left, and other tag in right-hand end clip; three pairs, each pair of tags in two adjacent clips, but tags of the same pair of 'phones not to be put into the same piece of brass. Terminals can be used in place of the clips if desired. A loudspeaker would be connected in the same way as one pair of 'phones.

The above arrangement is for 'phones "in series," or all following one another. Sometimes for two pairs more volume is obtained by using them "in parallel." This can be tested by joining together the two left-hand clips with a piece of thin bare wire twisted round the curled portions, the right-hand pair being joined the same way. Then one, two, or three 'phones are connected by plugging one tip of each pair to the left and one to the right set of clips.

The secret of obtaining smooth action of the condenser dial is to cut a 1in. washer of felt and slip this over the spindle to work between the panel and dial. To secure the dial put the condenser plates full in, and fix the dial with 100 at top, making a white mark on the panel. When purchasing the condenser and dial, notice that the numbering on the dial runs in the direction, clock or anti-clock, to suit the condenser.

A small or medium-sized speaker would give better results than a large one, but the constructor is advised to borrow one in order to test the capabilities of the set.

### OPERATION.

In use, the most selective combination is with crystal plugged into socket 4, aerial 5, earth 6. With the crystal plugged in this position the set is much more selective than with it connected to the top of coil, the usual position. It should always plug in above the aerial pin. With earth in 6, its normal position, the lower the aerial is brought the more selectivity. Another combination is crystal 1, aerial 2, earth 3, less selective. Other combinations may be tried, and the best determined. For local use a "Ducon" gives good 'phone strength, or weak speaker, and tuning is very sharp, but results depend to some extent on the particular lighting circuit, and the one on which the test was made is not a particularly favourable one.

### MATERIALS REQUIRED.

The following is a list of parts required, with approximate prices:—

| | s. | d. |
|---|---|---|
| Ebonite panel, 3-16 by 7 by 6in.... | 3 | 0 |
| Variable condenser, .0005 mfd. ... | 13 | 0 |
| Dial and knob, 3in. ..... | 1 | 3 |
| 6 flush sockets, 3 pins ..... | 2 | 6 |
| Carborundum detector cartridge... | 7 | 6 |
| 2 terminals ..... | 0 | 8 |
| ¼lb. 20's enamelled wire ..... | 1 | 9 |
| Copper foil, sheet brass, celluloid, screws bolts, baseboard, etc. | 2 | 6 |
| | 32 | 2 |

# First Messages Put "Over The Air"

## Noah's Part In Modern Development

**Noah was the first person to "receive" a message "over the air," and as such should perhaps receive mention as one of the pioneers of radio. In a most interesting address from 3YA, Mr. L. Vernazoni, of the Christchurch Philatelic Society, gave listeners some details of the development of aerial communication, of which radio is the latest—and greatest feature. "Aerial communication," he said, "dates back many years. Balloons were utilised to send letters out of Paris in 1870, while pigeons carried letters from the Great Barrier Island to Auckland in 1898. Messages attached to arrows were shot into the besieged city of Potidoca in the fifth century before Christ, but probably the earliest recorded successful news-carrying flight was that made by Noah's dove.**

"As regards contemporary history, the very first aerial postal service was organised in France during the siege of Paris (1870-71). After the investment of the capital, hemmed in by a solid cordon of fire and steel, measures had toy be considered whereby the Government defending Paris could communicate with the Delegation at Tours, and, if possible, extend this power to the Parisians, to whom lack of all news from the outside world would become intolerable.

"Since September 22, 1870 (at this date postal communication from Paris was disrupted), it had been exceedingly difficult, well nigh impossible, for anyone to get through the Prussian lines, besides, the Seine was closely watched by the enemy. There was nothing left but a way by air, and it was in this direction that the efforts of the Government moved to connect Paris with the outside world. So it was decided to create a balloon post. On the other hand, it was vital that the provinces should be in touch with the capital. Though it was comparatively easy to leave Paris by balloon, to enter by the same means was quite another proposition. After attempts of all kinds, all fruitless, carrier pigeons taken by balloon from Paris were utilised, their wonderful instinct leading them home to the Parisian loft where they were bred. Therefore the aerial postal history of the siege of Paris embraces two distinct chapters.

"1. Balloon post, from Paris to the provinces.

"2. Pigeon post, from the provinces to Paris.

### MANNED BALLOONS.

"On September 26, 1870, the postal service of Paris decreed dispatch of mail to the provinces by balloon. The weight of a single letter must not exceed 4 grammes, the rate 20 c., and prepayment necessary. Letters dropped in Government boxes by private individuals were put into bags, secured and sealed, and sent off by balloon; on departure the aeronaut received the necessary instructions as to the direction and velocity of the wind, and time he would have to keep in the air so as to land beyond the enemies' lines.

"The balloon, falling anywhere on land, was immediately deflated, rolled up, packed in the car, mixed up with the cordage, rope, and various accessories, and then forwarded to Tours. The aeronaut, after delivering his mail to the post office nearest his landing place, also made for Tours, where he reported to the Delegation.

"Out of the 55 postal balloons which left Paris during the siege (the first was released September 23, 1870, and the last January 28, 1871), two were lost in the sea, six landed in Belgium, four in Holland, two in Germany, one in Norway, three were captured by the Prussians; all the rest fell in France after voyages more or less eventful. They carried 238 passengers and aeronauts, 10,000 kilos of letters and newspapers, 381 carrier pigeons, and 6 dogs.

### PIGEON POSTS—GREAT BARRIER ISLAND.

"We will now pass on to the pigeon posts between the Great Barrier Islands and Auckland. The Great Barrier Islands lie about fifty-six miles N.E. of Auckland, and during normal times the weekly mail service to the Islands fulfilled the requirements of the small populace of the group, some 400 people in all. About 1897, however, during the mining rush on the Islands, the usual Government service became quite inadequate, and pigeons were brought into requisition. With the usual mails it was always necessary to wait over a week to obtain a reply to the letters on account of the boat only waiting long enough at each wharf to unload passengers, cargo, etc. But with the pigeon post the birds were taken to the islands on the boat, and within one or two hours a reply could be obtained in Auckland.

"For the first twelve months of this service the letters were paid for in cash; but as the service was proving such a success, stamps were issued and the cost, which has been two shillings, was reduced to one shilling. At first it was not found such a success, stamps were issued and the cost, which had been two shillings, was reduced to one shilling. At first it was not found practicable to send messages from Auckland to the Islands on account of difficulties in training the birds, but this was overcome later on. On arrival at the lofts, the messages, of which each bird usually carried five, were placed in envelopes and addressed to the owners. In addition to the usual service, messages were carried for the New Zealand Government by the Postal Department and the Navy when ships were stationed at the Great Barrier group for torpedo practice. The service lasted, as far as is known, for about seven years.

"During 1899 an opposition service was started which ran things in a far more business-like manner. There were two mails per day, one leaving Auckland at 12 noon and the other leaving the Islands at 3 p.m. The rate was sixpence per message from the Islands and 1s. from Auckland. The stamps were triangular in shape and were of two values, 6d. and 1s. The colours were blue and red respectively and bore the words 'Great Barrier Island' (left side), 'Pigeongram' (on right), and 'Auckland' (below), with the letters 'N.Z.' in the two bottom corners and value in top corner. The centre of the stamp depicts a pigeon flying over a town carrying a letter in its beak. Great rivalry existed between the two services, and as far as is known both continued to carry letters till the end of the service.

"As regards the printing of all issues, great care seems to have been exercised, as of all the stamps I have handled, used and unused, no prominent varieties have been found.