# Mainly about Construction

BY "MEGOHM"

## Loose Coupled Crystal Circuits

### SELECTIVE AID GOOD FOR DX

ON February 17 was described a simple method of making spider-web coils on cardboard formers, and at the same time the construction of a one-coil non-tuning crystal set was described. In the following issue, the 24th, a crystal set with two-coil tuning was described.

A simple but more selective type of circuit is now to be described. With the use of a secondary tuning circuit it is often possible to obtain an increase in volume of signals over that obtained from a single circuit.

The diagram of the circuit is shown with a variable condenser for each coil, primary or aerial, and secondary. If only one station is to be received, the primary condenser can be dispensed with by tuning the coil to the station's wavelength by finding the exact number of turns. By adjusting another coil to suit another station this could also be tuned in without a condenser, by changing the coil.

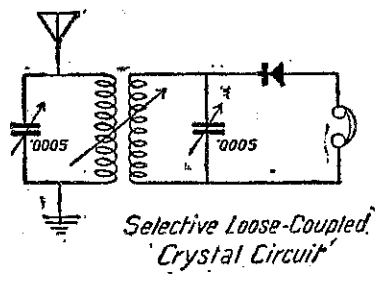
PLUG-IN coils can now be purchased very cheaply, and failing the usual type of holder, two plug-in bases could be procured, one to be fixed, the other to slide backwards and forwards on a small square of wood running in grooved strips.

Another method of obtaining fine tuning on crystal receivers is by using coils with taps connected to a switch, and a small capacity or vernier condenser to complete the tuning. There are at present on the market a number of five-plate variable condensers of good make, complete with knob and dial, that have been taken out of altered factory receivers. These are being retailed at a very low price, and are very suitable for tuning any coil that can be adjusted to be only a little short of the required wavelength. Spider-web coils similarly adjusted could also be used, a separate coil being provided for each station to be tuned in.

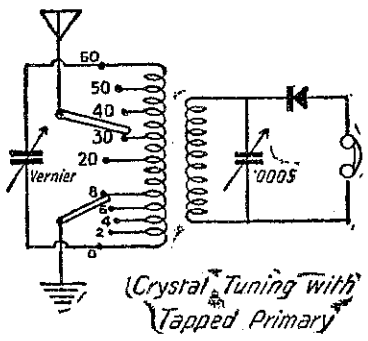
THE primary could conveniently be a .60-turn spider-web coil with taps as shown. When winding, a small loop is twisted in the wire at each tap and tagged with a piece of stamp edging to show the number of turns. A connecting wire is afterwards soldered to each turn to form the taps which are connected to the appropriate switch studs, which may be the heads of short brass screws in the baseboard. A switch arm is made from a strip of 18's brass sheet, drilled at one end to take a screw for pivot. The tapped coil is the fixed one, so that the taps present no difficulty.

The secondary coil may have 35 turns and may be tuned by a .0005 mfd. variable condenser. This coil mounting must be so arranged that its distance from the primary may be varied from close up or "tight coupled" to one or two inches away or "loose coupled." This may be accomplished either by a hinge arrangement or a sliding device of some kind. The connecting wires must not be too stiff or the coil may not "stay put." The gauge of wire for the coils may be 24's or 26's s.w.g., the former preferred.

THE winding of the tapped coil is carried out by putting on 40 turns with a tap at every ten turns, and to complete the 60 turns, 12



Selective Loose-Coupled Crystal Circuit



Crystal Tuning With Tapped Primary

turns are put on, then a tap, and a tap at every second turn to the end. By connecting these taps to switches as shown, any even number of turns that may be required is easily obtained. With such an arrangement it has been possible to dispense with a condenser, but a vernier is advisable for best results, and is connected "in parallel" across the two extreme ends of the coil. It is an advantage in crystal circuits to do as much tuning as possible with the inductance and employ condensers of as small capacity as practicable.

EITHER of the circuits shown will give good results on long distance if carefully constructed. By trial it is possible to adjust the number of secondary turns to suit stations near in wavelength so that only a vernier need be used for the secondary tuning, but the .0005 will be found more satisfactory, as it will cover the whole broadcast band.

## LOOP AERIAL OPERATION

### TWO SUITABLE CIRCUITS

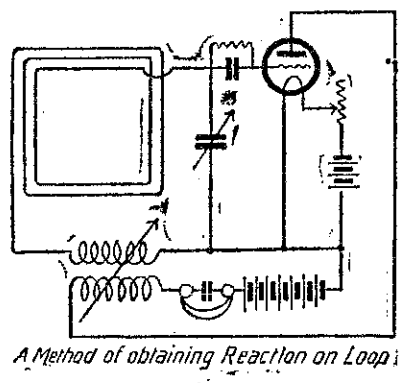
IN furtherance of the article on loop aerials given last week, two circuit diagrams are shown suitable for frame aerial operation.

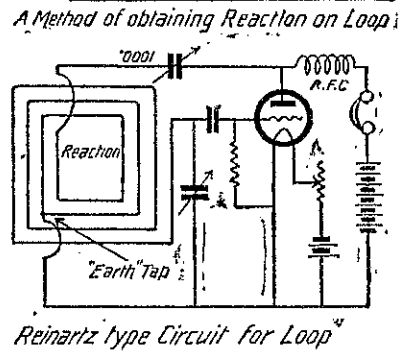
R.F. amplification is not an absolute necessity in loop operation, but it is necessary that all unnecessary R.F. damping be eliminated.

The Browning-Drake circuit is not very suitable for frame aerial operation.

#### REINARTZ REACTION.

WITH the tuning condenser across part only of the inductance, we get the Reinartz type of reaction, which has proved to be so effective in ordinary selective reception with outside aerials. Here a fixed reaction coil is wound continuously with, and in the same direction as, the main tuning inductance, either on to the same former or closely adjacent so as to be close coupled magnetically with the first. In other words, two or three turns of the loop are utilised to secure reaction. This is fed via a small variable reaction condenser from the anode of the detector valve, the high-frequency impulses being prevented by an efficient radio choke from passing to "earth" via the distributed capacity of the phones or transformer windings and H.T. battery in modern versions of the circuit. The reaction control is then carried out entirely by this small condenser; and with proper design of the circuit and with low-loss inductances it is of an extremely fine and, at the same time, manageable type. The number of


A Method of obtaining Reaction on Loop



Reinartz Type Circuit for Loop

turns required in the reaction coil is surprisingly small with valves of high amplification value and liberal electronic emission. The reaction condenser can be of low maximum capacity: .0001 mfd., the usual troublesome change in wavelength, with alteration of reaction coupling is then almost entirely avoided over the small range necessary for fine adjustment; whilst the reaction demands vary but slightly with frequency over the whole tuning range. This greatly facilitates "searching" in practice. A "super" circuit for loop operation will be given later.

#### QUERIES BY CORRESPONDENCE.

1. Every communication enclosing queries is to be addressed to "Megohm," Box 1032, Wellington, and must be accompanied by a stamped addressed envelope for reply by post.
2. Questions must be written so that a space is left in which the reply may be added.
3. No charge is made for replies.

#### An Information Service.

ALTHOUGH "Megohm" is at all times willing to answer queries, a large number have frequently to be dealt with in a limited time, with the consequence that replies involving much writing have sometimes to be shelved to await a chance to do them full justice. Readers are asked to note that this service is quite an optional one, and forms no part of the contract entered into when a subscription is paid.

Relations with queriists have so far been generally of a pleasant kind, and helping others in their difficulties has been an agreeable task, especially when letters have at times been received stating that the advice given has been effective. Inquirers are asked not to demand replies "by return," and not to get uneasy because they do not receive a reply for a week or two, as in the case of long distances considerable time is lost during transit each way.

## Tuning the Crystal Receiver

### GETTING THE BEST POSSIBLE RESULT

THE operation of setting the cat's-whisker and finding the correct wavelength for broadcast reception on a crystal set has always been looked upon as of so simple a nature that no one has thought it worth while to give the matter serious thought. We find, therefore, that whilst constructors and users of valve sets are given full and adequate advice on the correct method of procedure, the crystal user has been somewhat neglected on this particular point. It is the purpose of this article to rectify this omission.

I suppose we all realise that any increase or decrease of strength, however slight, is much more readily discernible on a weak signal than on a strong one, and yet how many of us act on the knowledge of this simple fact? We push the slider, turn the knob, plug in the basket coil (or whatever is necessary to find the correct wavelength on our particular set) to what we know from experience to be the best point for bringing in our local station, and then proceed to juggle with the cat's-whisker until we get what we think are the loudest possible signals.

#### WORKING ON WEAK SIGNALS.

DO we not always have an uneasy feeling at the back of our mind, spoiling our enjoyment of the programme or our pride in showing off our set to a pal, that what we believe to be the "loudest possible" is not really the very best of which our little receiver is capable?

When next you are preparing to enjoy your local station, employ the following method, and I venture to think that uncomfortable feeling of uncertainty will be entirely absent.

Start off as usual, but after having found the station required so place your cat's-whisker that only the very faintest signals are coming through. Now alter your wavelength finder up and down; if you find a better spot again adjust your cat's-whisker until the signals are only just discernible, and then try again for the best position of the tuner. In this way the exact spot can be found at which the loudest possible signals are discernible so far as the wavelength tuning is concerned.

Now we come to the setting of the cat's-whisker: Having carefully marked the exact position for the wavelength as found above, set the cat's-whisker to the loudest position which can be found, then "detune" the wavelength until the signals are at the very faintest point; next try for a better adjustment of the cat's-whisker, and when this is found, "de-tune" again for the faintest signals, and so on until the very best setting of the cat's whisker has been found. If you then switch back to the point previously marked for the best possible wavelength, you may feel confident that you have reached the "best possible' setting and can set down to 'enjoy the programme knowing that no amount of extra "fiddling" will bring better results.

THIS method of working on the weakest possible signal strength will be found the most advantageous one when testing the relative merits of various makes of crystal, and also for testing the best combination of crystal and cat's-whisker, and whilst on the subject of testing cat's-whiskers, here is a hint which has been found very useful.

Say you wish to find out whether a gold, silver, or copper whisker gives the best result with any particular crystal, fix all three whiskers into the detector in such a manner that they stick out at various angles. It is then only a matter of seconds to test each one in turn (using the weakest possible signals as outlined above) to ascertain which gives the best results.

Lastly, there is the annoyance of getting "shaken off" by the banging of a door or the thoughtless steps of those members of the family who do not share our enthusiasm for wireless.

After trying many gadgets, an enthusiast has found that by using a piece of silver wire (obtained from a jeweller) slightly thicker than the ordinary cat's-whisker (about 26 S.W.G.), and two inches long, tapering the end to a fine point with a file, and making up with a coil of large diameter (about twice as large as that in the usual cat's-whisker), a very fine and stable adjustment is obtained.

## POSITION OF THE LOUDSPEAKER

THE position in which a loudspeaker gives the most satisfactory sound effect depends almost entirely, of course, upon the type of sound projector embodied in the instrument.

Ordinary cone loudspeakers give a good general distribution of sound waves, and are, therefore, not sensitive, as a rule, to the position in a room in which they are worked.

Horn-type loudspeakers (and, to a certain extent, moving-coil speakers) have rather more pronounced "directional" properties, and are largely affected by the position of objects in a room.

When a horn-type loudspeaker is operated in a room containing many sound reflecting objects it is advisable to mount the speaker at a fair height from the floor. This prevents air-wave formations from being checked too much by tables, chairs, and so forth—a condition which is very likely to obtain when the loudspeaker is situated at the usual "table" height from the ground.