

BUILD THE "INDUCTO-CRYS" RECEIVER

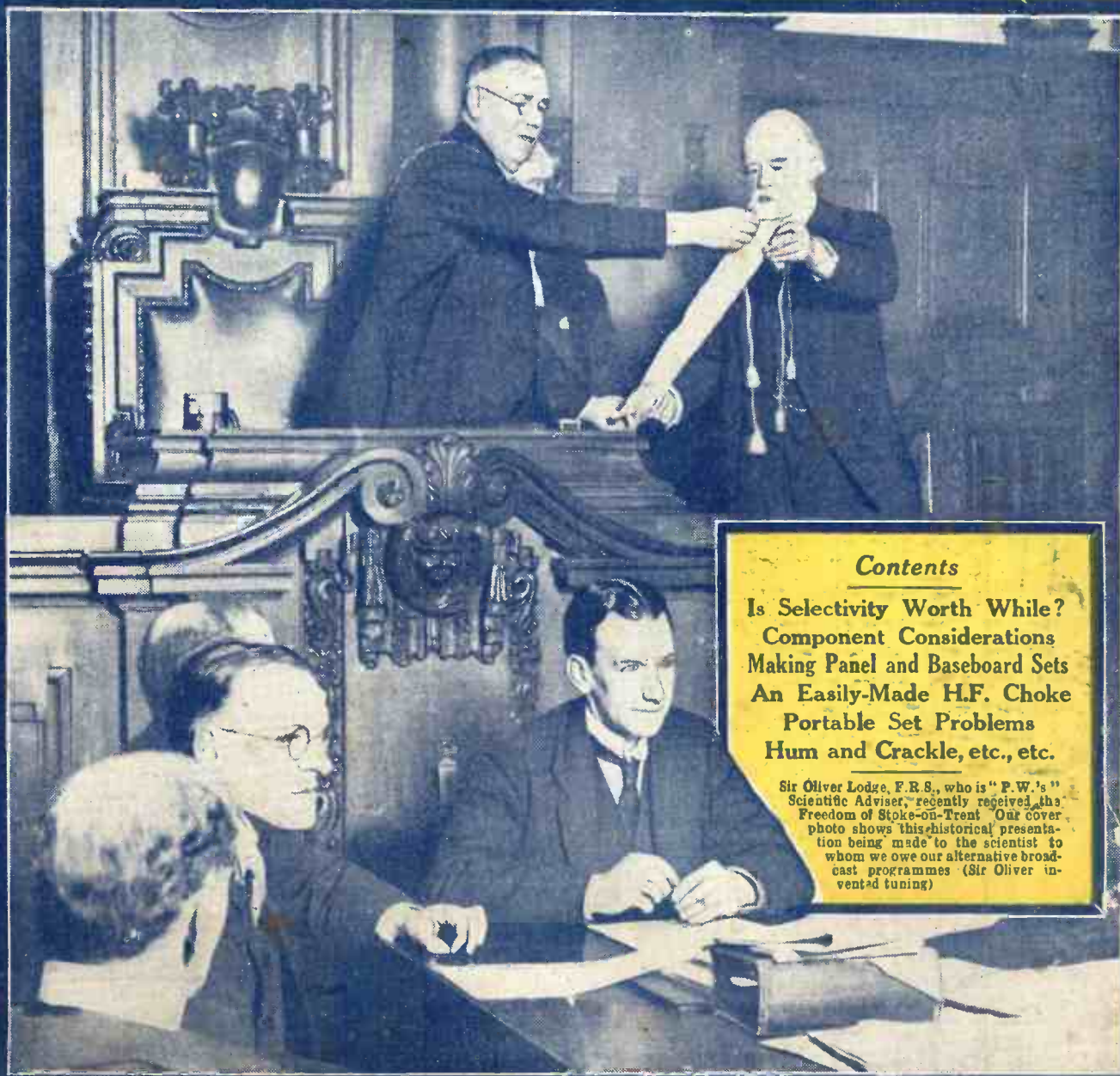
Popular Wireless

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INCORPORATING "WIRELESS"

April 7th, 1928.



Contents

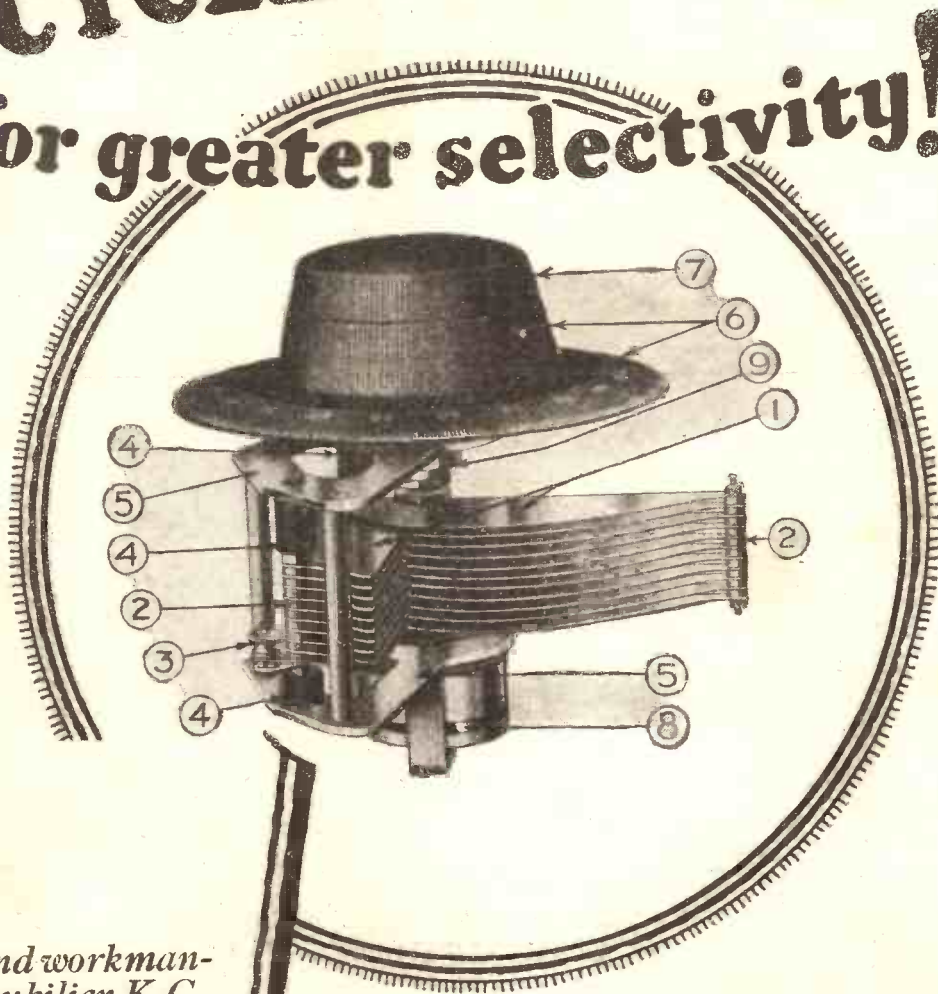
Is Selectivity Worth While?
 Component Considerations
 Making Panel and Baseboard Sets
 An Easily-Made H.F. Choke
 Portable Set Problems
 Hum and Crackle, etc., etc.

Sir Oliver Lodge, F.R.S., who is "P.W.'s" Scientific Adviser, recently received the Freedom of Stoke-on-Trent. Our cover photo shows this historical presentation being made to the scientist to whom we owe our alternative broadcast programmes (Sir Oliver invented tuning)

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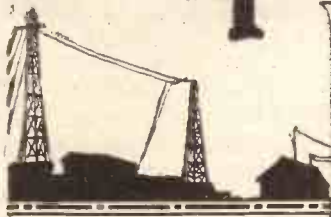
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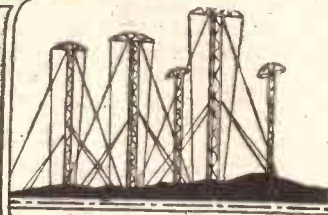


The Valves which improve any set

Popular Wireless



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RADIO NOTES AND NEWS.

“Tons of Money”—Watch Daventry—Machine-Made Programmes—Radio and Law—
 “Sydney Two Minus One”—Can You Get Milan?—The “P.W.” Wave-Trap.

The Future of Radio.

I HAVE just been reading a statement by some important man in the American gramophone interests, to the effect that radio has reached the peak of its popularity, the inference being that it will shortly begin to wane. Possibly that may be true of America the ever-restless—though I doubt it very much—but it is not true of this country or Europe generally.

More and More Fun.

A PART from the evidence of the mounting number of licences there is the fact that the possibilities of radio-broadcasting have by no means been exhausted. Both for listeners pure and simple, and for people like “P.W.” readers, there is more and more fun and interest in store; new stations, more alternative programmes, a wide-spread system of relays from abroad—all these will keep us busy for years. And it is not bold to predict that the reception of programmes from every continent will be a simple matter for clever amateurs in a few years’ time.

“Tons of Money.”

AS a brief but pregnant tail-piece to the foregoing remarks let me point out that for the year ending March next the B.B.C.’s gross income, apart from the results of any investments they may have made, will be about £880,000. Quite a handsome pittance to jog along with. Let us hope the money will be spent in such a fashion that even “Ariel” will be left to seek in vain the adulatory adjectives fitting to apply to the best broadcasts in the world.

Watch Daventry.

A SOUTHPORT reader has brought to our notice a note about Daventry in a French paper, which, if its contents are proved to be founded on fact, may lead to a minor sensation. As the French paper has begun a competition amongst its readers, the results of which will probably clinch the matter one way or the other, I will not at present disclose the point raised but will merely ask whether anyone in this country has noticed anything peculiar about Daventry’s “carrier-wave,” especially when modulation is not taking place? Will our correspondent kindly write further as promised?

OUR £1,000 TELEVISION CHALLENGE.

At the time of going to press with this issue of “Popular Wireless” we have not heard from Mr. Baird or the Baird Co. Should we not hear from Mr. Baird during the course of the next few days, our offer will be withdrawn. In any case, we feel that the Television “atmosphere” has now been considerably clarified—The EDITOR.

Machine-Made Programmes.

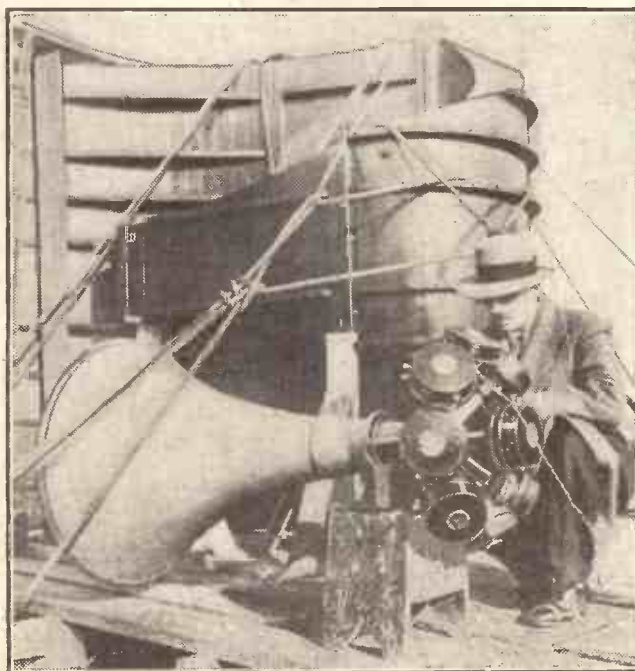
HAVE you noticed this? Once upon a time there was a spice of excitement in turning to the broadcasting column

of one’s daily rag to see what was to be “on” in the evening. But for some time past it has been borne in upon my mind that similar things have been happening at the same times of the same days of successive weeks. The weekly lay-out seems to have been standardised; there is a man in the B.B.C. with an imagination like a foot-rule.

Is Romance Dead?

READERS of history and Kipling will be filled with lore relating to the North-West frontier of India, and Roberts’ march from Kandahar to Kabul. Now consider that last month saw an enterprising King of the Afghans and his beautiful Queen actually inspecting the Beam station of the Marconi Company at Dorchester. Probably King Amanullah spoke learnedly of wave-lengths! What a mercy it is that there was no radio worth mentioning when Kipling wrote “The Drums of the Fore and Aft,” and “Kim.”

A GIANT LOUD SPEAKER.



The wooden structure in the background is a giant loud speaker designed for open-air work and crowd control. When connected to a microphone over a mile away, a whisper came back several seconds later as a stentorian bellow!

Radio and Law.

IT is reported that a signature sent by the commercial radio-facsimile process across the Atlantic to New York was judged by an American court to be illegal. This is painful! As radio has come to stay, and as the process of sending facsimiles by radio has also come to stay, it remains for some authority in America to pass an Act making signatures by radio legal. And that is all “there is to it.” Law must keep step with progress.

(Continued on next page.)

NOTES AND NEWS.

(Continued from previous page.)

More "Juice."

REPORT has it that Oslo and Vienna are to be augmented as to power. Oslo has 6 kw., and may be increased to 30 kw. According to ordinary rating, input from generator, this Marconi "Q" set has 6 kw., but "Geneva rating" puts it at 1½ kw., or the input to the anode of the oscillator. Vienna is supposed to have a power of 5-7 kw., rating unknown. Whatever happens, it's all grist to the English amateur's mill, though some say that there are already too many kw.'s slopping around for comfort.

Thrills of Yesteryear.

SOMEONE asked me the other day what was my strangest radio experience, and let loose a flood of reminiscences. I think the prize goes to the cat who favoured my overalls with six kittens, said overalls being 8½ inches from a running dynamo. Next comes the day when I picked up an enemy station, long sought, on a perfectly impossible circuit—and then the enemy kindly came overhead with bombs, a British machine or so went up to fight about seventeen of 'em, with no luck at all, and all we got was a confounded row, splinters, and jammed signals.

Thrills—Part Two.

AND when the man with the valve had decided to work told the Rear-Admiral to "shut up his row," as "—— was just coming through!" that was a thrill, if you like. Then there was that day when the aerial mast, of ship-steel, blew down and crashed across the station at 2 a.m. Six feet to the left—and some other "Ariel," would have been writing these Notes. And as a runner-up I may recall the day when the dago mechanic took all the resistance off the motor-generator and then put on full power; and the dago greaser put petrol into the water jacket of the engine; and the dago operator charged the battery wrong way round.

Can You Get Milan?

ACCORDING to a report from Italy's most important newspaper, Signor d'Annunzio, the Italian poet and novelist, has become interested in broadcasting and intends to propound a riddle to the world through the Milan microphone, and to give a prize to anyone who solves it. If life does not already hold enough riddles for you here is your chance. Who first thought of making the holes in macaroni and what is the use of them? In view of our climate, why did the Romans stay here for several centuries? Signor d'Annunzio is welcome to those two.

Some Nutty Numbers.

APRIL 6TH—2 L O and 5 X X. "Good Friday," by John Masfield. National Concert from Queen's Hall. April 7th.—2 L O and 5 X X. English Comic Opera, Manchester, "Merrie England." Make a note of that, lads! It's champion! April 9th.—2 L O and 5 X X. Service from York Minster. In the evening, service from Carlisle Cathedral. Same evening from 5 G B, service from Birmingham Cathedral. Easter Monday.—2 L O

and 5 X X. Our Mabel, in a burlesque rehearsal of "Dick Whittington" as performed by amateurs. This ought to be the usual "scream."

Are You Building a "Portable"?

MESSRS. FERRANTI, whose other name is Transformer, tell me that they have received a £130,000 order for the Scottish Central Power Scheme. Total weight, 1,200 tons, some of the larger transformers weighing 96 tons. They have also under construction a transformer designed for a working voltage of a million, for the National Physical Laboratory. Yet

SHORT WAVES.

A listener who wrote complaining of sepulchral noises from his loud speaker is advised to attend to the vaultage.—"News of the World."

He: "Now, my dear, you really understand how the set works, don't you?"
She: "Absolutely. But how often does the man call to read the wave-meter?"

The man who upset his accumulator all over the new carpet the other day certainly put it to the ACID test.

Johannie: I got Greece on the radio last night."

Mother: "Well, you wipe it off before your father sees it."—"Radio News."

ABSENT MINDED!

The man who locked his wife in the wireless room and took his loud speaker out for a walk.

THIS WEEK'S SHORT STORY.

Marion invited her young man home one evening to listen-in. But her young brother refused to go to the pictures, and so they—listened-in.

Many wives of wireless enthusiasts are complaining that they are being neglected for this new love of their husbands:

WIRELESS WIDOWS.

His chair is empty by my side,
A wireless widow, I;
He dotes no longer on his bride—
His battery is dry.

His voice is hushed, he speaks with signs;
The only sound one hears
Is a silly voice that heterodynes,
And drives me into tears.

I've sat alone each age-long night
Since this new craze began;
I'd almost rather see him tight
Than as a wireless fan.

As a lover he was most devout,
With a love that filled his soul;
But the wireless waves have washed it out—
He's up the aerial pole.
"Cosmos," in "News of the World."

this firm condescends to make transformers for the piffing radio sets of such as you and me!

More Queries.

E. G. H., an appreciative gent of Dover, adds to the queries I propounded recently as follows. "Where is Uncle Rex?" (Ans. In the pink.) "Where is the Daventry Quartet?" (Ans. Probably anywhere but in Daventry.) "Why didn't Reg. Foort start his recitals?" (Ans. Battery gone plut.) "Where is our Mabel?" (Ans. In a typing bureau, turning down proposals by the score.) "How is Unidyne pronounced?" (Ans. Unidine.) He wants more Unidyne circuits from Messrs. Dowding & Rogers. "Have I ever been in Dover?" I first trod the shingle in 1894, and have left the pier all too many times since.

Science in Bermondsey.

MR. G. ARCHER, Hon. Sec. the "Alma" Institute Scientific Society, whose meetings are held in the General Science Class of the Bermondsey Men's Evening Institute, begs a little space to say that the chief subject on the bill is wireless. And very nice, too! The fee is a bob a term, and you can attend on Mondays and Wednesdays from 7.30 p.m. to 9.30 p.m. at the Alma L.C.C. School, Southwark Park Road, Bermondsey, S.E. Address, Mr. Archer at 24, Reverdy Road, also Bermondsey, S.E.1.

The "Sydney Two Minus One."

A. J. F. (N. Finchley) states that he has made up "a one-valve version" of the "Sydney" Two, on which he can get 2 X A F and 2 X A D almost any evening. On the other hand, T. E. S. (Bolton) has added an extra stage (L.F.) and heard 3 L O playing the "Toreador Song." He then tuned in to 2 N M and was astonished to hear him broadcasting a gramophone record of the same song. S. E. B. (Tottenham) and J. J. (St. Ives), both report the reception of 3 L O's complete programme on the same day and at the same time on the "Sydney" Two.

Further Favourites.

AFTER the "Every-Purpose" Two, which swamped me with letters, come the "Variactor" Two, the "Hale" and the "Reinartz." F. P. (Bombay) reports extraordinarily good results from Europe on the "Variactor" Two, and being ambitious to repeat them on the L.S. is now making the "Economy" Five. R. C. C. (Blackheath) confesses to having had 3 L O on a "P.W." Reinartz (0-v-2) loud enough to be put on loud speaker. O. B. says the "Variactor" Two does away with the need for H.F. amplification and regional schemes.

Hale, All Hall!

A. S. (Manchester) gives the following results on his one-valve "Hale": "Most of the Germans, Toulouse, Prague and Madrid on the loud speaker after Manchester shut down. Twenty-two foreigners on 'phones before B.B.C. hours. Also WGY on 379 metres, with full programme on two occasions." He adds that the "P.W." "Hale" is a real wonder set and "P.W." a wonderful journal. And A. S. has wonderful judgment.

A "P.W." Wavc-Trap.

I WOULD bring to the notice of all dwellers near B.B.C. stations who suffer from such proximity the following proof of what can be accomplished with the "P.W." Standard Wave-Trap." W. J. K. A. (Edinburgh), using it on his three-valve set can completely cut out Edinburgh on 288.5 metres and receive Dundee on 294.1 metres. The local station is only four miles away from W. J. K. A.'s home at Colinton, where good old R. L. Stevenson once lived, I believe.

Over the Water.

THIS is just to wish luck to the "Irish Radio News," the first number of which lies before me. I cannot do its Editor the compliment of reading its contents all through, because one is apt to take alarm at a phrase like, "An raib tu ag an g carraigh." However, I hope all the ags and g's will be popular and that the compositor will bear up. ARIEL.



CONSIDERABLE time has been spent in endeavouring to develop methods of improving the selectivity of a crystal set without the usual great loss of sensitivity, and at the same time without unduly complicating the apparatus.

The arrangement which we have developed consists in essence of the following

LIST OF COMPONENTS.

- 1 Panel, 7 in. × 7 in. × ¼ in. (any good brand of insulating material).
 - 1 Cabinet to fit, 9 in. deep, with baseboard (any cabinet of about these dimensions will serve, since there is nothing very critical about the layout providing that due pains are taken to see that the coil is not cramped too close to the tuning condenser).
 - 1 Crystal detector (the original was quite a cheap cat's-whisker type purchased in a small wireless store, but if you intend to use this set seriously and as a provider of good programmes, it is well worth while to obtain a good one, such as one of the special semi-permanent types, or slow adjustment cat's-whisker type, a few examples being the Burndept, Brownie, Harlie, R.I.-Varley, etc.).
 - 1 Strip of ebonite, 4 in. × 1 in. × ¼ in., to carry the terminals.
 - 4 Terminals, either plain brass type, such as those in the original set, or of the very neat engraved pattern such as the Belling-Lee, Ealex, Igranic, etc.
- Material for coil (see text).
Tapping clip.
Wire for connections, sundry small pieces of wood, screws, etc.
One .0005 mfd. variable condenser, square law, or S.L.F. (Peto-Scott in original. Any good make).

features: There is a fully tuned secondary circuit, to which the aerial is auto-coupled in the now familiar manner, the aerial and earth being tapped across a portion of the coil.

Very closely coupled to this secondary is another winding across which the crystal and 'phones are connected, the necessary degree of close coupling being obtained by

 An efficient crystal receiver
 designed, built and described
 by the
 "P.W." RESEARCH DEPT.

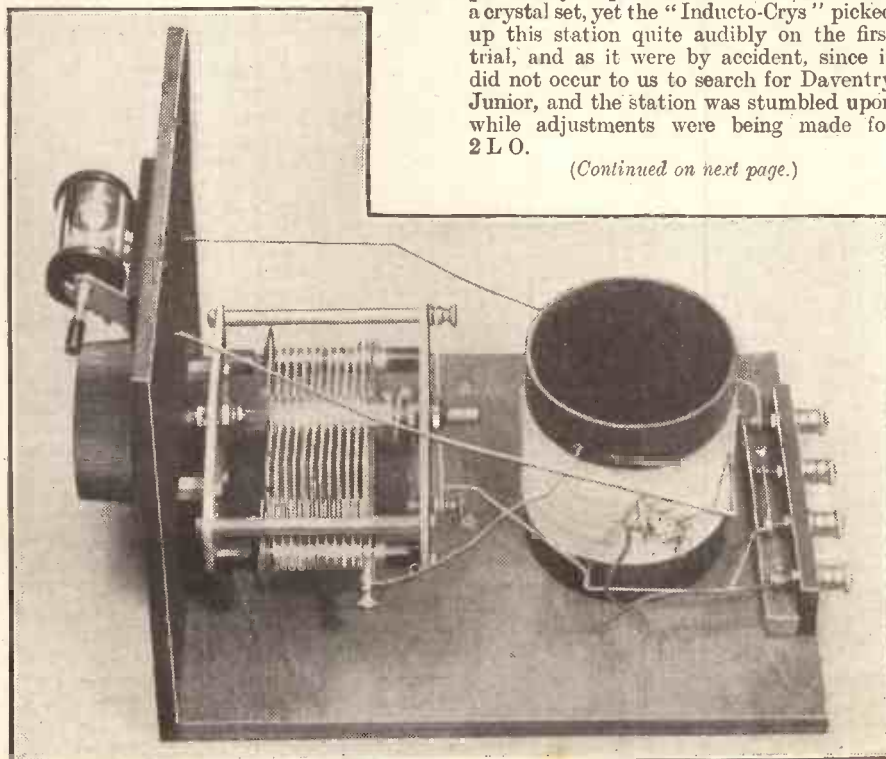
actually interwinding it turn by turn with the tuned secondary coil. The detector circuit is thus tightly inductively coupled to the main tuned circuit. In addition to the special feature of inductive coupling for the detector circuit, we have incorporated the principle of connecting the detector (in effect) across only a portion of the tuned circuit, which, of course, is a well-known device for improving selectivity.

You will, therefore, see that there is nothing very revolutionary about the "Inducto-Crys" arrangement, since it uses perfectly well-known principles, and its only claim to notice is that apparently it had not occurred to anyone to combine these devices in a set on modern lines, using up-to-date methods of coil construction, etc., and so the possibilities of the scheme had not been properly realised.

An Excellent Circuit.

As a matter of fact, the resulting circuit is one of very considerable merit, and some rather surprising results have been obtained on test. For example, on the aerial commonly used in the "P.W." Research Dept., in Farringdon Street, it is regarded as practically impossible to receive 5 G B on a crystal set, yet the "Inducto-Crys" picked up this station quite audibly on the first trial, and as it were by accident, since it did not occur to us to search for Daventry Junior, and the station was stumbled upon while adjustments were being made for 2 L O.

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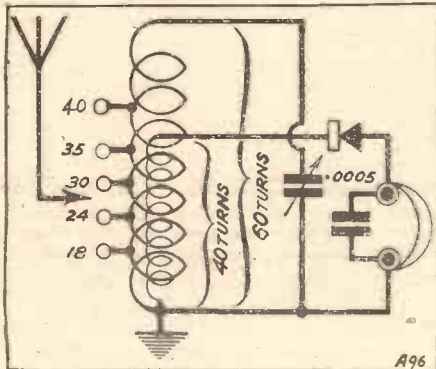
The whole of the components and most of the wiring can be seen in this view of the "Inducto-Crys."

THE "INDUCTO-CRYS."

(Continued from previous page.)

This first test was so promising that it was thought that it would be interesting to reverse our usual procedure of testing the set under extremely bad conditions, and to give the "Inducto-Crys" a chance of showing what it could do in really extremely favourable circumstances.

Accordingly, it was taken to a situation about seven miles south-west of 2 L O, and



there tried out on a very highly efficient aerial. Here it was found that a reading of about 75 microamps of rectified current could be obtained, which is an unusually high figure for any selective type of crystal receiver and, of course, represents extremely strong signals.

Interesting Tests.

Further, 5 G B gave good strong head-phone signals entirely without interference from 2 L O. As a matter of fact, when the necessary adjustments had been made, it was possible to tune in 5 G B and to run down the tuning scale over quite a considerable band of silence before 2 L O was heard on a lower dial setting.

Next came a more searching test, since it was well known that any good receiver will, on this aerial under favourable conditions, often give perceptible signals from

Langenberg, and a search was accordingly made for this transmission. Rather surprisingly, no sign of it could be found, but in the course of searching, a very faint signal was found quite close to the wavelength of 2 L O—it was indeed considerably interfered with by that station.

This was so weak that not a single word could be grasped, and it was only by means of the wave-meter that it could be decided that it was almost certainly Stuttgart, which has not previously been heard here on a crystal set. Obviously, it could not be claimed that this station had been logged, since the transmission could not be understood, and it was quite impossible to decide that it was even a station at all without the aid of the wave-meter (heterodyne type, giving a beat note on the carrier-wave). It must not be thought that it is claimed that the set would pick up Stuttgart, even under these very favourable conditions, but this is simply given as an indication that its sensitivity to weak signals is of quite a high order.

An Easy Task.

The construction of the "Inducto-Crys" receiver is very simple, and standard components can be used throughout, with the one exception that the coil must be wound for oneself. Any panel, cabinet, and baseboard of convenient size can be used, and obviously any good variable condenser may be employed which the constructor may chance to have on hand, provided that it has the correct maximum capacity, namely, .0005 mfd.

Obviously, this may be of the square law or straight-line frequency type, according to taste. Similarly, any good crystal detector can be used, but preference should be given to one of either the micrometer adjustment type or the semi-permanent type, since, with any sensitive and selective crystal set, it is always worth while to spend a little time getting a very favourable crystal adjustment, in order to take full advantage of the set's powers of picking up weak signals.

To meet the taste of the constructor who demands that even his crystal receiver shall be on modern lines, all terminals have been arranged at the back, on a little strip of ebonite, these

of course, being the pair for aerial and earth, and the pair for the telephones. The remaining details which must be given are those for the winding of the tuning coil, and here you will require, first of all, a piece of insulating tube for a former, and this should be 3 in. diameter, and about 4 in. long, to allow a convenient space at either end for finishing off the windings, and mounting the coil. The winding itself, of course, only occupies a space of a little over 2 in.

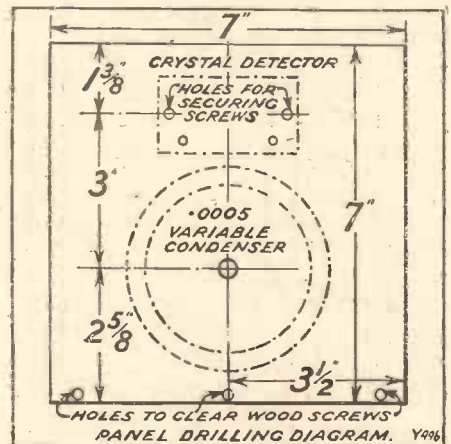
For the windings you will require some No. 24 D.S.C. wire, a 4 oz. reel being ample, and some No. 32 D.S.C. wire, 1 oz. of this being quite sufficient. The procedure in winding is as follows. Arrange the two bobbins conveniently on the table, and take the two ends of the wire and secure them

through two small holes $\frac{3}{8}$ in. from one end of the tube. Now proceed to wind on the two wires simultaneously, side by side and turn by turn, pushing the winding up closely with the thumb-nail, as it is put on. You will find that the fine wire almost fits into the spaces between the thick wire turns, so to speak, and that the double winding only occupies a little more space than a single winding of No. 24.

Making Tappings.

When you have wound on 18 turns, twist up a small loop in the thick wire, which will be used as a tapping point later, then carry on the double winding for another 6 turns, again make a loop, put on 6 more turns, make another loop, add 5 turns and make another tapping point, put on 5 more and make a final loop. These tapping points it should be noted, are all in the thick wire winding, the fine being carried on without any tapping points, until the end, where it should be cut off and the end secured, which can quite easily be done by binding under the next turn of the thick wire winding.

This is at the 40th turn. Now carry on the thick wire winding for a further 20 turns, and finish it off in the usual way by passing the ends through a couple of small holes in the tube. You will then have a



coarse wire winding of 60 turns in all, tapped at the 18th, 24th, 30th, 35th, and 40th turns, and interwoven with the first 40 turns will be a fine wire winding also of 40 turns. This fine wire winding is, of course, the inductively-coupled coil across which the crystal and telephones are wired.

Mounting the Coil.

The coil can be mounted in any simple fashion, the one used in our set being a little wooden cross-piece secured by means of two screws passing into it through the walls of the tube. The coil is then fastened down to the baseboard by means of a larger brass screw, passing down through the wooden strip. The original coil, by the way, was wound on the new black super Pirtoid, but, of course, any good insulating material can be used, one of the well-known formers such as the Radion, Becol, Ebonart, etc., being quite suitable, either plain tube or the ribbed type.

The remainder of the constructional work is simply a matter of wiring up and little can be said here. A few hints should be given, however, on the operation of the set,

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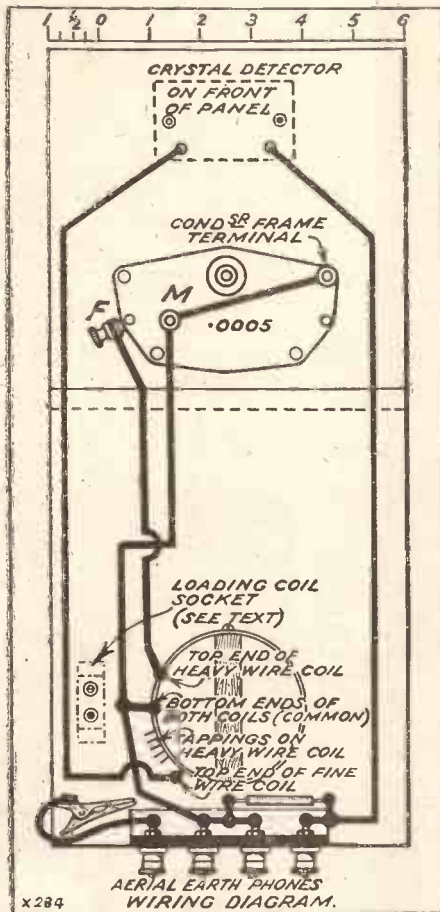
The panel has an exceedingly neat appearance, and the whole set is remarkably compact.

THE "INDUCTO-CRYS."

(Continued from previous page.)

and the first point to attend to is that of the adjustment of the aerial tapping clip on one or other of the tapping points which were made on the coil, which should, of course, be scraped bare so that the clip may make good contact.

You will find that the loudest signals are obtained by keeping the clip fairly high up, say on the 30 or 35-turn tapping, or even on the 40-turn tapping, for 5 G B, and it is to be noted that as the tapping



clip is taken higher, so will the condenser reading for the station you are receiving require to be reduced. A little test will soon show you which tapping gives you the best signals on the local station, but it must be noted that the higher the clip is placed on the coil, the lower will be the selectivity of the set, so that in some circumstances you may find it better to reduce signals somewhat to obtain the necessary sharpening of tuning.

The Detector Circuit.

The exact size of the inductively coupled crystal winding has some relation to the wave-length of the station you are desirous of receiving, and it is largely a matter of compromise, since you will desire to obtain good signals from both your local station and 5 G B, assuming that Daventry Junior

is within your range. The number of turns given is quite a good compromise, but if your main interest is in receiving one of the main stations with a wave-length below that of 2 L O you should reduce the crystal winding by 8 turns, and this is quite easily done after the coil is connected up and the set is working, simply by pulling off the windings to the desired number, securing it again by means of a dab of sealing wax or Chatterton's compound.

Of course, if you desire to make the set as interesting as possible you may quite well make tappings on the fine wire coil also as you wind the coil, and furnish the lead which normally goes from the detector to the upper end of the fine wire winding with a tapping clip, so that you can try different sizes. This is recommended for the more advanced constructor, who will no doubt find much interest in making this crystal set.

Simplifying the Set.

The original set was first made in this form and some interesting data obtained from it, but since it was realised that to many constructors this would seem an added complication it was decided not to incorporate it in the final design. An attempt was made on the contrary to find a number of turns which would represent a good compromise for most wave-lengths and most conditions. This latter point is an important one, since it must not be forgotten that these things are affected by quite a variety of factors, such as the efficiency or otherwise of the aerial and earth, and so on.

One or two final points. The design in its simplest form is only intended to take in stations between 300 and 550 metres, since it is found that a very large proportion of crystal-circuit users are not interested in 5 X X. This, apparently, is because such a very large proportion of our readers live in the London area, where 5 X X can be regarded almost entirely as a relay of the local, giving a separate programme only on relatively rare occasions.

If, however, you desire to be able to receive 5 X X the matter is very simple.

How to Receive 5 X X.

You will note on the wiring diagram that a dotted plug-in coil socket is indicated, and this can be wired up to take a loading coil if desired. This is what you will require to do. Observe that there is a short lead which starts at the bottom ends of both coils and is soldered to a point on the lead which runs from the earth terminal to the moving vanes on the condenser, and this should be cut, the two ends thereby formed being taken to the two terminal points on the loading coil socket. To receive 5 X X you will then require to plug in a No. 100 or 150 coil into this socket, according to the size of your aerial.

The position of the aerial tapping clip will then make very little difference, and you can use whatever point you find best for your local station. To receive on the shorter band of waves, it should not be forgotten that a shorting plug should be inserted in this socket in place of the loading coil. It should perhaps be pointed out that the special advantages of this circuit are found entirely on the shorter wave-band, where selectivity is of importance, and the reader who can receive

5 X X only should not, of course, trouble to build a set like this, since really he only requires a much simpler design.

By the way, there is one little detail which calls for trial in each case to get the best results, and that is the use of a fixed condenser across the telephones. This is

POINT-TO-POINT CONNECTIONS.

Earth terminal to nearest "phones" terminal to one side of the fixed condenser .0005 mfd., to the bottom ends of both coils (which are twisted together to form a common connection), and to the moving vanes and "earthing" frame terminals on the variable condenser.

Remaining "phones" terminal to one side of the crystal detector and to remaining end of fixed condenser.

Other side of crystal detector to the top end of the fine wire coil.

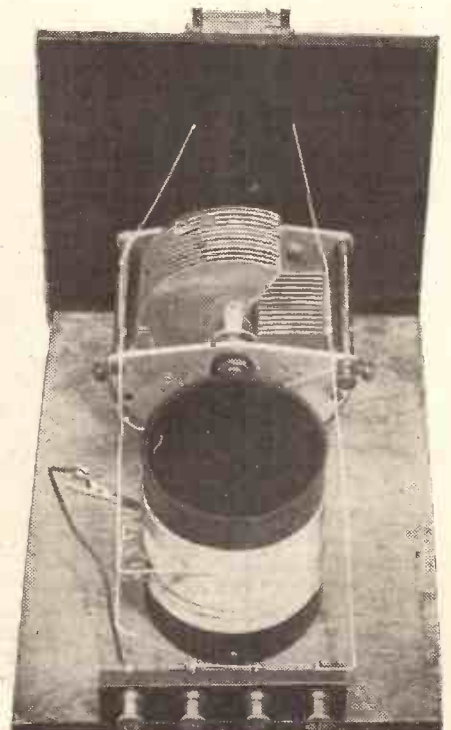
Aerial terminal to a tapping clip via a flexible lead.

Fixed vanes of the variable condenser to the top end of the heavy wire coil.

shown in the circuit diagram, and a position for it is indicated on the wiring plan, where one of the compact edgewise type is shown.

In many cases this is not necessary, and can be omitted, but it is worth trying, since with this particular circuit we found it to produce a distinct improvement with some types of 'phones. A capacity of about .0005 mfd. is suitable.

Since this component is optional it is not given in the list of components. Any good make can, of course, be used (Clarke Dubilier, Igranic, Lissen, Mullard, T.C.C., etc.).



This photograph should be used in conjunction with the diagram on the left when building the set.

"UNCLE MAC" OF THE B.B.C. —AND SOME DELIGHTFUL NONSENSE.

By THE EDITOR.

THERE must be many hundreds of thousands of children in this country who have listened with pleasure and excitement to the cheery broadcasts of "Uncle Mac," and, just as the many thousands of children who delight in Peter Pan are probably outnumbered by the many thousands of grown-ups to whom that Play annually appeals, so there must be many adult readers of POPULAR WIRELESS who have also listened to Uncle Mac with the greatest of pleasure and have wondered a little about him.

A Rare Personality.

A personality such as Uncle Mac's is rarely encountered in the broadcasting world these days, and probably not since the days of Arthur Burrows has there been a broadcaster of such wide popularity and of such appealing personality.

And so I am sure readers will be glad to hear that Uncle Mac (whose real name is Derek McCulloch) has written a delightful book called "Nonsericks," with illustrations in colour by Ernest Noble. In a Foreword, Mr. A. P. Herbert, of "Punch," says: "I have always looked up to the Olympians of the B.B.C.—gentlemen, nay, gods!—who every day harness the night-ingale, arrest a thunderstorm, capture Chaliapine, a Derby, or the Zoo, and introduce their prisoners to the listening millions, in those familiar, dulcet, and magnetic tones which seem to say 'This is nothing to us! We dwell among the miracles! Nature is our slave, and the Universe our audience.' And, therefore, I own, I was a little shocked to hear that one of these deities could become so human, and so low, as to be guilty of nonsense verse."

But to be guilty of nonsense verse these days is to be guilty of a crime which most people applaud, for there is nothing more delightful than real nonsense. And Uncle Mac has certainly been most delightfully nonsensical in his book, "Nonsericks."

Some Examples.

A cheery fellow is Uncle Mac, and directly you open the book and read his letter to his artist collaborator you realise you are in for a good thing. In writing an open letter to Ernest Noble, Uncle Mac says: "We shall be criticised, mon vieux (fr.), finger-pointed-at, I am afraid, and possibly abused. Yes, even placed upon the rack. (I was always partial to burnt toast.) People will nudge one another in trams and at Wembley, and will say stealthily, jeeringly, dramatically . . . "They did it! Hic! (Sorry!) omnibus sanitas, dust-cartus est! (This clean omnibus has now become a dust-cart), etc., etc."

"Nonsericks" is a collection of nonsense prose and limericks. The limerick, as Mr. Herbert points out in his Introduction, is one of the most difficult of all the difficult forms of literary composition. Uncle Mac's first limerick is as follows:

A Spaniard, from quaint old Madrid,
Once bull fought and bled—so he did.

Misjudging the pace,
He hurtled through space.
I regret that they've nailed down the lid.

And here's another:

Worse and Worse.
An Oberlieutenant of Munich
Grew much too rotund for his tunic,
So at last, in despair,
He sought a fresh lair.
And now in the Alps works a "funjich."

Uncle Mac becomes quite impossible when, under the title of: "The World We Live In," he writes: "Do you know that (1) It has been computed that there are over a million half-cubic miles of girders embodied in our British bridges? These do not include the two small stays on the left going over the Forth Bridge.

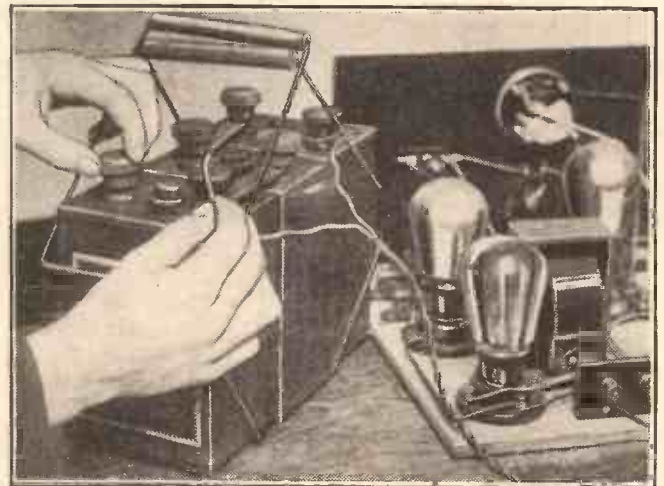
And if you want an example of sheer nonsense, here is another of Uncle Mac's efforts:

There are over thirteen million mouse traps in Greater London. Of these, 45 per cent are baited with cheese, 25 per cent with bacon rind, 10 per cent with other edibles, 10 per cent lying idle.

A "LEAD" TO FOLLOW!

There is a right way and a wrong way to disconnect a battery from the set. If you are wise you will undo the lead at the battery end, and not at the set's terminals, because, when wires remain connected to a battery there is a risk of "shorting," and consequent troubles.

DO IT THE "P.W." WAY.



(Query, find X given in round figures.)"

And lastly: "There are 200 monthly shifts of 5,000 healthy Russian charladies engaged in cleaning the Steppes annually."

Space will not permit a more detailed cribbing from this delightful book, except perhaps this last one:

A wireless expertlet from Bristol
In error, once swallowed a cristol (sic)*.

This caused oscillation,
So, in desperation,
He earthed himself—using a pistol.

* Afterwards, of course!

Terrible Experiences.

Now, the amazing thing about Uncle Mac's book is that, behind all his nonsense there is a war story of physical endeavour

and bravery which probably can find few equals even in the wonderful annals of bravery and endeavour of the Great War. Uncle Mac was barely eighteen years of age when he went to France. In the Battle of the Somme he was cut off from his company and fell in with four German stretcher bearers, who called on him to surrender, and then shot him in the eye with an explosive bullet at a range of twenty yards. The two stretchers which the Germans carried bore, not the wounded, but cargoes of grenades and loaded rifles. Before he collapsed Uncle Mac managed to get one of the Germans through the throat with a chance shot. He was left for dead and lay where he had fallen for three days and nights, and during that period stray shots wounded him in the shoulder, smashed his ribs, collar bone and shoulder blade. He eventually crawled back into our lines and was sent to hospital to be discharged nine months later as unfit for further service.

Well Worth Buying.

On being discharged, Uncle Mac promptly re-enlisted in the R.F.C. Since then he has undergone sixteen operations, most of them in Bavaria by a Bavarian doctor. Seeing that he was shot by Bavarian Red Cross soldiers, this seems rather like another bit of Uncle Mac's delightful sense of humour—and I am informed he is now about due for another operation.

Uncle Mac says: "I hope to live to see my book in print. It is my warped sense of humour, probably developed in hospitals,

that has made me write a nonsense book."

Well, the man who can write such a delightful nonsense book as Uncle Mac has perpetrated, after the experiences he has been through, is a very rare bird, and we are very glad to think that so far the B.B.C. have managed to tame him and keep him in the Savoy Hill cage.

"Nonsericks" is published by Methuen & Co. Ltd., at a price of 3s. 6d., and if any of our readers want a really good laugh, they can't do better than get hold of a copy of Uncle Mac's book. They might steal it and they might borrow it, but, in this particular case—and it isn't often one recommends such an honest course in connection with a book—the best thing to do is to spend 3s. 6d. and buy it!

ONE of these days there will no doubt be some sort of standardisation throughout the whole range of radio components. A move in this direction has, in fact, already been made. Humorously enough, the first component to be so honoured was the plug-in coil, an article which, in the course of time, had almost standardised itself and is now very dangerously near obsolescence.

When there is general standardisation the lot of the home constructor will be much easier. Until then, however, he must be careful in his choice of components, for with different makes they are liable to vary to a considerable degree, and these variations are not always confined to mere dimensions and shapes.

Take the so-called R.C.C. unit for instance. In its essentials this consists of but three items, an anode resistance, a grid condenser and a grid resistance. Yet some R.C.C. units incorporate other things as well, and it may easily happen that these other things might not agree with the circuit in which you desire to use the unit.

R.C.C. Units.

At least one well-known make of R.C.C. unit incorporates an additional resistance, this being included for the purpose of preventing high-frequency energy passing through the article into the L.F. valve. In many cases this would prove a beneficial addition but in other R.C.C. units one is liable to find a fixed condenser connected across one of the resistances for the purpose of by-passing high-frequency currents so that the device can be successfully employed in certain circuits. In other hook-ups such a condenser might prevent the receiver from operating. Again, should you be requiring to purchase an R.C.C. unit for a particular set, make certain that the condenser and resistances are of the correct values, for in this respect there is wide variation.

L.F. transformers appear to be settling down into a more or less stable condition of uniformity. Practically all L.F. transformers of good make are interchangeable, although in certain special circuits there is at least one make which proves awkward in that it has a fixed condenser permanently connected across its primary windings.

The enormous number of different valves that are on the market must prove very puzzling to the newcomer to radio, and no rules for his guidance in this matter can be laid down in a few words. There are valves which are labelled in accordance with their purposes which can only usefully be employed in certain definite positions.

COMPONENT CONSIDERATIONS



plug-in coils for the tapped varieties in order to introduce greater selectivity in the more old-fashioned types of sets. Such coils are not quite uniform and it should be remembered that the position of the tapping will influence the tuning range of any set.

But, generally speaking, the tapping that is used is taken from the centre of the coil or a point somewhat lower. Although it should be remembered that much depends upon the individual aerial and earth conditions, a 60-turn tapped coil will

provide practically the same tuning range as one of 40 turns used in plain parallel condenser tuning aerial position.

The main requirements for an L.F. choke—especially when it is used for the output circuit of a loud-speaker receiver—is that it should have ample inductance and should be able to handle a fair degree of current without saturation. Further, it should have a low ohmic resistance—something in the hundreds and certainly not in the thousands—of ohms.

Fixed Condensers.

There is no attempt at the standardisation of L.F. chokes as far as we can see but, nevertheless, the constructor is fairly safe so long as he confines his choice to those due to the better known makers.

Regarding fixed condensers, the constructor should not get into the habit of considering that the only factor of these that matters is capacity. Certainly this is the main feature in the majority of cases, but where a condenser is subjected to any big degree of voltage it must be of a more robust electrical nature than one used, for instance, in series with the aerial in order to sharpen tuning.

This is why mica fixed condensers are specified in a high-class L.F. amplifier for grid-coupling purposes. Such a condenser has to withstand a high voltage, therefore its insulation must be of mica or some such reliable material. And this question of strength and reliability in the fixed condenser is extremely important in the case of mains units.

In such a device, condensers guaranteed to have been tested at a voltage twice that of the mains with which the unit is to be employed should be chosen. These will be more expensive, but the outlay will be distinctly worth while.

In the description of POPULAR WIRELESS receiver designs ample details of all the necessary components are always given. If the reader takes careful note of the various specifications, it is not likely that he will find himself landed with unsuitable components, especially if he takes note of such points as have been dealt with.

 Some points you should bear in mind
 when buying components for your
 new set.
 By D. GLOVER.

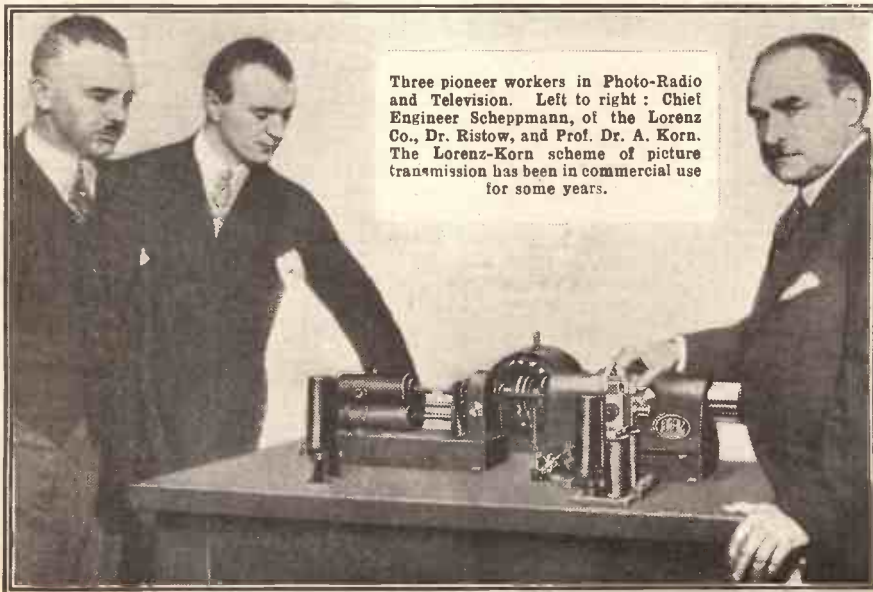
For instance, we have the super-power valve which is useless in the average set except in the last L.F. position, and the special R.C.C. types of valves are similarly limited in their uses. But in any case the labelling of a valve "H.F." or "L.F." is a very arbitrary business. There are many popular sets—the Cossor "Melody Maker," to name only one—which necessitates the use of a so-called H.F. valve in an L.F. position.

Then in some sets it is necessary to employ an "H.F." valve in a detector position, while in others this position needs an "L.F." valve or even one of an R.C.C. type.

Tapped Aerial Coils.

Certainly some simple means of classification and standardisation is very much overdue in respect of valves, and undoubtedly the basis upon which this will have to be done is to take the two separate important characteristics of the accessory separately and not endeavour to combine both under one general heading. Experienced amateurs choose their valves by their impedances and amplification factors.

Reverting back to the subject of coils, many amateurs are now replacing aerial



Three pioneer workers in Photo-Radio and Television. Left to right: Chief Engineer Scheppmann, of the Lorenz Co., Dr. Ristow, and Prof. Dr. A. Korn. The Lorenz-Korn scheme of picture transmission has been in commercial use for some years.



Practical hints on eliminating such noises.
By Dr. J. H. T. ROBERTS, F.Inst.P.

SOMETIMES you know the cause of the humming noises in your set, but it is beyond your control. Sometimes you cannot for the life of you find out the cause.

Interfering noises are often due to neighbouring electric-light mains, tramways, or electric motors in neighbouring shops and buildings, especially cinemas. Electric "flashing" signs are also a frequent source of trouble, as well as electro-medical and high-frequency apparatus (this more particularly in the vicinity of hospitals). Trouble is often due to an electric motor in the same building and in this case the trouble may usually be got over by connecting the casing of the motor to earth, by completely screening the motor with metal sheet or gauze and, as further precaution, by trying large-capacity condensers shunted across the brushes; remember that the commutator of a direct-current motor is often a very bad offender as regards interference in near-by radio receivers.

Local Disturbances.

Where the trouble is believed to be due to the electrical appliances in a near-by cinema theatre, it is often a good plan for a number of listeners in the district to get together and approach the management of

thing possible to avoid being a source of interference to neighbouring broadcast listeners.

Sources of Trouble.

Apart from attacking the trouble at its source, in the various ways indicated above, much can be done at the receiver itself. Perhaps the commonest recommendation is to connect the cores of the low-frequency transformers to earth, or even in some cases to H.T. positive. In severe cases the whole of the receiver may be screened, either in a metal case (such as a box of tinfoil or copperplate, preferably the latter) or by lining the cabinet of the receiver with metal foil or with thin metal sheet or gauze. Generally the amateur has an objection to screening the receiver heavily if he can possibly avoid it, as this detracts—or, at any rate, he thinks it does—from the sensitivity of the instrument.

It is, of course, particularly important that neither the aerial, the lead-in nor earth return should run parallel to or near to any electric cables or similar conductors.

Quite apart from the artificial causes of interference, such as the ones we have just

the cinema theatre (by a representative) with a view to having the cinema apparatus overhauled by a competent electrical engineer. Now that broadcast reception is so very popular, there should usually be little difficulty in getting the cinema management, if tactfully approached, to do every-

been discussing, there are many cases where trouble is caused by so-called "earth currents" which gain access to the receiving circuit by way of the earth connection. It is obvious that such causes of interference will be prevented if the earth return is dispensed with, and therefore it is a good plan in such cases to try the effect of a counterpoise earth instead of a true earth connection.

Counterpoise Aerials.

In many cases the amateur has not the necessary space at his disposal for the construction of a counterpoise as ordinarily understood, but an equivalent counterpoise, which is often very efficient, can be made by taking a length of, say, 30 ft. of rubber-covered (or otherwise well-insulated) wire attached at one end to the earth terminal of the set, and then laid around the skirting-board of the room in which the receiver is installed. The remote end of this length of wire should simply be insulated by covering with insulating tape. In many cases the use of a length of wire in this way, instead of an earth connection, will be found to have a most marked effect in cutting out humming and crackling noises, whilst in some cases it will even be found that signals are stronger and greater reception distances can be obtained. As regards this latter effect, however, it probably indicates that the earth lead which was previously being used was too long.

People living in flats sometimes make their earth connection to a water-pipe, whereas better results can often be obtained by taking a length of wire as mentioned above and either running it round the room or even hanging it out from a window.

Where an earth lead is used, if extraneous humming or crackling noises are troublesome you might also try inserting a condenser of very large capacity (2 microfarads, or more if possible) in the earth lead. Owing to the large capacity of the condenser, the tuning of the set will not be greatly affected, whilst the gain in freedom from interference is often very surprising. Generally, however, the use of a counterpoise will be found better than inserting a condenser in the earth lead.

WHEN a wireless receiver is installed in the home, naturally it is advisable to adopt some plan whereby the maximum amount of pleasure may be derived from it. The set may be capable of receiving many stations on the loud speaker or on the other hand suitable only for the local station and the two Daventrys (5 G B and 5 X X).

Station List Unnecessary.

Usually one member of the family is the "expert," and finds it quite easy to manipulate the tuning dial and bring in the stations, and after a short time he is able to remember the station settings on the condenser dial, such as 80 for Langenberg, 60 for Hamburg, 30 for Belfast, and so on.

Unless an accurate log-chart is kept, however, it very often becomes difficult for other members of the family, in the absence of the expert, to find the settings for even the local, 5 G B and 5 X X, without a good deal of fiddling, and in cases such as these I have recommended to friends the adoption of the following simple plan.

"SETTING" THE SET.

By H. J. B. C.

Three (or more, if desired) small dial indicators should be mounted on the panel such that when the zero marking on the dial is set against one of these indicators one of the three stations mentioned will be properly tuned-in, the volume of the signals then being regulated by the reaction control.

Extremely Simple.

The accompanying photograph illustrates the idea, and assuming the usual clockwise rotation for the condenser dial, we see portrayed the indicators mounted so that the three required stations can be found without any trouble.

The memory of the particular person who is anxious to use the set is not taxed, and the normal dial indicator, mounted in the

vertical position at the top of the dial, is still available for the expert.



Four stations are located here by four indicators. When the dial "0" is swept round to one or other of them the appropriate station is tuned in.

VERY few modern receiving sets are designed which do not include H.F. chokes in their lists of components. Every day the use of this component is becoming more general as its value in capacity-controlled reaction circuits, with their attendant advantages, is realised. Nobody will contest the statement that the Reinartz method of reaction control is far superior in smoothness of action to the semi-obsolete swinging-coil (magnetic) system.

To obtain the fullest advantages of capacity control it is essential that the H.F. choke functions as such, not as a coil with sufficient capacity to act as a small condenser, defeating the very purpose for which it is intended. It may not be out of place to bring to notice again, for the benefit of the beginner, the following.

In the ordinary swinging-coil type of circuit the amplified H.F. currents are fed back from the plate to the grid circuit by coupling the reaction coil to the grid-tuning coil, the closer the coupling the greater the amount of H.F. fed back, the only operating control of regeneration being the manner of separating the two coils.

We shunt the primary of the transformer or the 'phones with a small fixed condenser.

In capacity-controlled circuits the amplified currents (H.F.) are prevented from reaching the primary of the transformer by the H.F. choke, which is inserted between the plate and transformer primary. They find an alternate path via the variable condenser and reaction coil connected in series with it, the amount of reaction used varying according to the magnetic coupling of the two coils and the variation of the capacity of the variable condenser.

Simple Former.

The amplitude of the H.F. currents fed back to the grid circuit are controlled with a smoothness unobtainable with the swinging-coil method. The beginner will realise the necessity of keeping the H.F. choke at the lowest possible self-capacity. It would be impossible to construct a choke with no self-capacity, so it is obvious that steps must be taken in its construction to reduce the capacity to a minimum.

There are numerous chokes on the market available, those of several well-known makers being remarkably efficient, but for those members of the fraternity who prefer to make their own gadgets, the article to be described has given splendid results. The windings are sufficient to cover all wave-lengths up to 2,000 metres without resonance at any point. The ohmic resistance is not very high and when compared with the high impedance of modern transformer primaries is negligible.



AN EASILY-MADE H.F. CHOKE

A simple, yet efficient, component that can be made for a few pence.

By H. D. ALDRIDGE.

By dividing the windings into several groups, "peak" effect on certain parts of the wave-length scale are obviated. The whole choke and winding can be completed in about an hour, whilst the cost is about one shilling, less if one happens to have any suitable "scrap" available.

To make the choke, one requires a 2-inch ebonite or Paxolin former, about 4 inches long. Cardboard is not suitable, but an old phonograph cylinder record can be used, but will require more care in working on. A piece of ebonite about 3 in. square and a 1/4 in. thick will be required for the base; as well as two small terminals and soldering tags.

Marking and Cutting.

Fig. 1 shows how the tube is marked out with a scribe. A straight line is marked down the length of the tube, this line eventually being sawn straight down. Before sawing, mark two other lines, one on each side of this line, a quarter of an inch from it, as a guide for the depth of the grooves which carry the windings.

Next mark off the ten lines shown, keep-

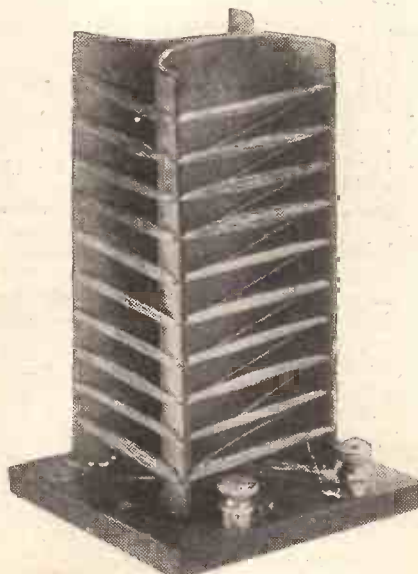
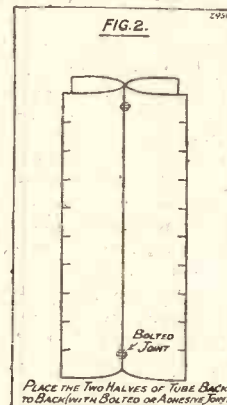
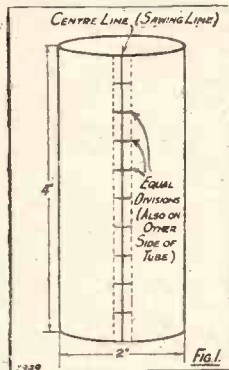
ing them equi-distant. Having done this, turn the tube round, and at the opposite side repeat the same marking operation. Care should be taken that the two halves of the tube will be the same size when sawn through. With a hack-saw or suitable instrument, cut down the centre line on each side, this will divide the tube into two halves. With the hack-saw, cut down each dividing mark to a depth of a 1/4 in. on both edges of the two halves. It will improve the after appearance of the choke if the edges are rubbed down with sand-

paper to remove all roughness, but the grooves must be cleaned out after doing this or they will choke up. The two halves are now placed back to back (Fig. 2) and joined together with a touch of glue or Chatterton's Compound. Alternatively, they may be fastened by small nuts and bolts at each end, as shown. The two pieces being suitably fastened together, the winding is commenced.

Either single silk-covered or enamelled 42-gauge wire or thereabouts can be used. In the original specimen 42 S.S.C. from an old army spark coil was used. Start at one end, leaving a couple of inches of wire to spare, and wind round the bottom series of grooves 60 turns. When this number has been wound on, carry the wire across to the second series of grooves and wind a further 60 turns. This procedure is repeated until all 10 sections are wound. The end of the wire is carried down between the two halves and brought out at the bottom, leaving about two inches spare. The base is very simple, two holes being drilled one at each side with the uppermost side countersunk to take two small screws for fixing to the baseboard.

For Baseboard Mounting. Two more holes are drilled at one of the other edges, one inch apart, countersunk underneath to take two small terminals or bolts as preferred. If terminals are used, it will be necessary to shorten the shanks. When mounting the terminals, it will be necessary to slip a soldering tag between the shoulder of each terminal and the uppermost side of the base.

To complete the construction, fix the bottom of the two halves of the tube to the base with strong glue or Chatterton's Compound, and solder each end of the windings to its respective tag. The result will be a choke that can be used with perfect confidence in any circuit where an ordinary H.F. choke is specified. It does not take up too much room, and is handy for baseboard mounting.



The complete choke makes a neat and efficient component.

TECHNICAL NOTES.

By Dr. J. H. T. ROBERTS, F.Inst.P.

R.C. COUPLING

AMPLIFICATION OBTAINABLE—A "LOUD" SPEAKER—CONDENSER VALUES.

R.C. Coupling.

RESISTANCE-capacity coupling for low-frequency amplification has become deservedly popular and is, in fact, increasing in popularity, partly owing to the development of suitable valves and partly to the purity of reproduction which is obtained with this system when suitable valves are available.

So much has been said in praise of resistance-coupling that many experimenters are apt to take it for granted that resistance-capacity coupling is perfect and that no distortion or other troubles can possibly arise when it is used. It is not, however, always so efficient in practice as it may appear in theory, and there are some points which ought to be watched carefully.

Amplification Obtainable.

It should be noted that the amplification obtainable per stage can never exceed the amplification factor of the valve. It therefore follows that a valve with a high amplification factor is desirable, but unfortunately such valves generally have also a high impedance, which is a disadvantage. An ideal valve for this purpose would be one with a high amplification factor and yet with a low impedance; in actual practice available valves represent rather a compromise.

Valves specially designed for resistance-capacity coupling can now be obtained having amplification-factors ranging from 35 to 50 and with impedances of 70,000 up to as much as 200,000 ohms. The total amplification obtainable depends also upon the resistance in the plate circuit. This must be fairly high, but it should not be so high as to cause too serious a drop in the voltage applied to the plate.

Since the advent of wire-wound resistances for this purpose this type of resistance is much in favour and these can now be obtained up to about 1 megohm, although naturally the price for these very high values of wire-wound resistance becomes somewhat high. Resistances of the usual grid-leak type, quite efficient in operation for most purposes, are obtainable in values much higher and are, on the other hand, much cheaper. As a rule, however, they have not the reliability of the wire-wound resistances.

Reaction is, of course, not so easily applied in a resistance-capacity-coupled set, and where it can be dispensed with, and anode-bend rectification used, much greater faithfulness of reproduction may be obtained.

A "Loud" Speaker.

A rather interesting demonstration of the loud speaker—or perhaps I should say the super loud speaker—was made some little time back over a number of New England (U.S.A.) towns, the people of which were suddenly surprised to hear a tremendous voice from out of the skies. As a matter

of fact "the voice from the sky," as it is called, proceeded from a giant loud speaker carried by an aeroplane, the whole arrangement being used for advertising purposes.

The last stage of the low-frequency amplifier employed a set of four Western Electric 1-kilowatt valves, fed at full voltage by a pair of wind-driven generators delivering 500 watts each. When the machine was 3,000 feet up, the sound could be heard and the speech understood over a circle of 5 miles radius. During a flight

**THE FLASH-LAMP BATTERY TEST.**

The method of testing a dry cell by the glow from a flash-lamp is a common one, but it is rather hard on the cell. The average bulb requires far more current than the cell's normal output, so a high-resistance voltmeter provides a less drastic visual indication of the cell's condition.

of about 5 hours it was estimated that 300,000 people heard the advertising messages.

Condenser Values.

Reverting to R.C. coupling, I must remind readers that if the condenser in the grid circuit of a resistance-coupled amplifier is too small it defeats one of the main objects of resistance-coupling, that is, the amplification of the low notes. This condenser is a series condenser through which the signals must pass and, if of too small a value, it offers a very high impedance to currents of low frequencies with the result that such low frequencies will be largely suppressed. The degree of this suppression at any given frequency depends on the capacity of the condenser and also on the impedance of the valve, as well as on the anode resistance and the grid leak of the valve following the condenser.

With ordinary values of these resistances and with the commonly used condenser capacities as often recommended, the suppression of the lower frequencies is by no means negligible. In fact, in some cases, due to wrong capacity of condenser, the advantage of resistance coupling may be lost and the quality may revert to the same level as that obtained with a poor transformer, with the added disadvantage of smaller volume.

Practical Considerations.

Since it is impracticable to use a very large condenser in the grid circuit, considerations of space and cost determine the capacity rather than technical considerations.

A condenser of 1 microfarad has been found to introduce a distortion of less than 1 per cent for the lowest audible note, whilst a condenser as small as 1 microfarad will not introduce more than 8 per cent suppression at 15 cycles and, of course, of much less at higher frequencies.

But a condenser of the 0.005 mfd. capacity value has been found by accurate tests, to introduce in some cases as much as 36 per cent suppression at 15 cycles and quite appreciable percentages (less, of

*(Continued on page 240.)***NEWS FROM SAVOY HILL.****FROM OUR OWN CORRESPONDENTS.****A B.B.C. CONSPIRACY?****THE RETURN OF ERIC DUNSTAN—THE MYSTERY OF "SPEED."****A B.B.C. Conspiracy?**

DESPITE the prevalence of fresh rumours about Sir John Reith's impending retirement from broadcasting, POPULAR WIRELESS has the best authority for saying that there is nothing whatever in the reports. This being so, why their persistence? It is believed that the reason is a sinister conspiracy against Broadcasting as well as against Sir John Reith. A prolonged attempt is being made to deprive the B.B.C. of its present executive head.

The Return of Eric Dunstan.

It speaks ill of the quality of observation of listeners that, only after he had been

back at the British microphone a month was the voice of Eric Dunstan recognised. Although the arrangement under which he is now taking his share of announcing is understood to be temporary, those who are qualified to judge unite in the view that India will see him no more. If this is bad luck for India, it is correspondingly fortunate for Britain. Dunstan is the premier announcer, following in the footsteps of Arthur Burrows.

The Mystery of "Speed."

There has been much speculation about the identity of the anonymous author of "Speed," the highly successful and original

(Continued on page 236.)

THE GAIETY OF THE MUSICAL COMEDY



60 volts (reads 66)	-	7/11
100 volts (reads 108)	-	12/11
60 volts (Super Power)	-	13/6
9 volts (Grid Bias)	-	1/6
4½ volt Pocket Battery	-	5d

You get it all so very perfectly—sparkling wit, catchy tunes—real revelry by radio. There is sheer unalloyed delight for you if you use the Lissen New Process Battery. Because everything is so distinct. This is due to the fine energy this battery yields, energy which is generated by a new chemical combination and process known only to LISSEN and embodied only in the LISSEN Battery.

The large cells of this battery have a remarkable oxygen content. The current flow therefore remains steady throughout the longest programme and it is sustained throughout months and months of use. There is never a trace of ripple, never a sign of hum. Every word of song, every note of music is clear and loud—**THE POWER LASTS IN A LISSEN BATTERY**, and your loud speaker utterance remains natural and true all the time.

You can buy the LISSEN New Process Battery from any one of 10,000 radio dealers. Show plainly by the way you ask for it that you mean to have a LISSEN and no other.



from
20 to 2,200
metres!

The
**BOWYER-LOWE
SHORT WAVE
RECEIVERS**

The LATEST Development

The Bowyer-Lowe Short Wave Receivers have created a reputation all over the world. They stand as the pioneer receiving sets of short wave wireless, remarkably efficient instruments that can be operated by the beginner.

Many B-L. Short Wave Set owners have asked us for a means for adapting their set for ordinary broadcast reception without disturbing its short wave efficiency. We are now pleased to announce that this can be easily effected by the simple fitting of one or two extra components as follows:—

No. 4 coil 190-520 Metres. List No. 308 . 7s. 6d.

No. 5 coil 500-1200 Metres. " " 309 . 8s. 6d.

No. 6 coil 1150-2200 Metres. " " 310 . 8s. 6d.

Adaptor and extra fittings with instructions " " 307 . 6s. 6d.

YOU CAN BUY THESE PARTS FROM ANY GOOD WIRELESS DEALER.

Particulars of the Bowyer-Lowe Short Wave Set will be sent on request.



**SHORT WAVE
RECEIVERS**

BOWYER-LOWE CO., LTD., Radio Works, Spring Road, LETCHWORTH.

SIX-SIXTY

**NO VALVE
LIKE IT**



BALANCE

EVERYTHING depends upon getting the valves in your wireless set to pull together.

You would not suddenly put Jack Hobbs, excellent cricketer though he be, into the Cambridge boat and expect him to pull stroke.

Why then buy an assortment of valves of different makes for your set and expect them to give balanced reproduction?

It is balance first and balance every time that you require amongst your valves, that is why you should fit a set of SIX-SIXTY Valves to your receiver without delay.

Ask your Dealer for SIX-SIXTY Valves by name and accept no other.

All types and voltages
from - - - 10/6

**SIX-SIXTY
GLOWLESS VALVES**

THE ELECTRON CO., LTD.,
122-124, Charing Cross Road, LONDON, W.C.2

Telephone: Regent 5336

"HULLO Imperial Emma Toc. Croydon answering. Understand Calais for Dover. Over!"

To the average listener this cryptic message may not have much intelligible meaning, but the pilot of the aeroplane "Emma Toc" (M.T.) gathers from it at once that Croydon Aerodrome has heard his message informing them that he is about to cross the Channel on his way to the London Terminal Aerodrome.

I was fortunate in being able to spend some time in the new Control Tower at Croydon before it was brought into official use. To say that I was interested in what I saw and heard would be to put it far too mildly.

Crossing "The Ditch."

Imagine hearing an aeroplane leaving Paris for Croydon. Hearing him speak to the French air stations; inform Croydon that he is about to cross "The Ditch"—as these airmen call it—and then to turn a knob and be able to read from a scale the aeroplane's exact bearing from the Control Tower where I was sitting!

On came the aeroplane, still talking to Croydon at intervals as he flew. Now over Dungeness: now Tonbridge: now Biggin Hill. As he passes each area, so the operator at Croydon tells him the weather conditions ahead of him.

Stuck on to a steel map in the Control Tower the Traffic Officer has a number of little steel-coloured magnets to represent the position of every aeroplane in flight. Our particular friend has now passed Biggin Hill, and in a few moments the air is full of the drone of his engine as he comes into sight across the meadow, turns, and swoops gracefully to earth.

It needs little imagination after this to realise how important and prominent a part wireless plays in the maintenance of the numerous air services which radiate from Croydon Aerodrome.

Double Direction-Finding.

When I was shown over the radio equipment there by Mr. F. S. Mockford, in local charge of Croydon Radio Services, I was amazed at the care which had been taken to bring the wireless equipment up to date and in accordance with the rest of the re-built aerodrome.

In the Control Tower Mr. Mockford carefully explained to me the working scheme.

There are two direction-finding receivers worked off the same aerial and receiving on different wave-lengths. In this respect the installation is unique; for never before has it been possible to work such a system efficiently.

Each receiver uses a total of 7 valves—4 H.F., Detector, and 2 L.F.—the total magnification obtained being something like 9,000! So sensitive are the receivers that the ignition of an



An interesting article on the new wireless control station at our leading air port.

By
A SPECIAL CORRESPONDENT.

aeroplane engine can be heard nearly a mile away even though both sets have been encased with metal!

Two operators are on duty at each receiver, and it is possible for these to either speak or Morse to the aeroplane they wish to communicate with, at will.

To do this, the Control Tower is connected by private land-line to the four 4 kw. transmitters at Mitcham. Normally, only three of these are in use; the fourth being "spare" in case of a breakdown.



The new control tower at the Croydon air port. This photo is taken from the roof of the main building, and clearly shows the Marconi D.F. aerials suspended from the 54-ft. centre mast.

I noticed that so far as these transmitters are concerned, every precaution has been taken to eliminate danger to the engineers in the room, for as soon as the protecting rail round the apparatus is undone, the power is automatically switched off.

Examining closely one of these transmitters, I was suddenly startled by a sharp clickety-clicking noise from just in front of me. This, I was told, was the operator at Croydon, nearly two miles away, working the relays which set the transmitter

in action.

Pointers on meters swung to and fro as he sent his message, but apart from this and the click of the relays, there was nothing to show that this silent machine was "talking" to someone, perhaps hundreds of miles away.

Well to the Fore.

This particular transmitter works exclusively on 1,400 metres and deals with the communication of route messages between the various air stations all over Europe. Just recently it was received (at R 7) on a loud speaker in Zurich, so evidently its aerial is radiating 13 amps. to some purpose!

It will be remembered that the old Croydon wireless station was designed by the Marconi Co.; this new arrangement has been planned by Air Ministry officials. The design has been carried out by the Marconi Co. and incorporates their latest improvements.

"Several thousand pounds," said Mr. Mockford, "has been spent on the new wireless plant." So evidently our air services, as in all other matters, intend to be well to the fore in radio communication.

ITEMS OF INTEREST.

The fact that the P.M.G. allows a 100-ft. aerial does not mean to say that the full 100 ft. is the ideal length.

* * *

Best results are generally obtained when the total length of the aerial and lead-in is about 75 ft.

* * *

When drilling holes which have to be in exact alignment it is better to use a rose bit (or a "counter-sink") rather than a drill to start the hole, as the multiple cutting edge ensures that the point of the instrument does not wander from the punched position, as so often happens when a drill is used.

* * *

Amongst the European stations employing lady announcers are Milan, Moscow and Berne.

* * *

Too much reaction is fatal to successful long-distance communication.

STATIC AT CYPRUS.

The Editor, POPULAR WIRELESS.
Dear Sir,—Having seen several letters from this part of the world in your excellent paper, I thought that it might interest you to know a little about reception out here. My set is a straight circuit, 1 H.F. (tuned anode), Det. 1 L.F. (transformer coupled). My aerial is a twin wire about 35 ft. high and 30 ft. long. I take my H.T. from the mains, using lamps as resistances to regulate the voltage. I can get Moscow, Stamboul and Zeesen at fair loud-speaker strength. There is another very powerful station which I have not identified but I think must be Angora. I can get 5 X X at about R 4-5 and 5 G B at about R 5-6. Fading is, however, rather bad with the short-wave Daventry (5 G B). Vienna comes in at excellent 'phone strength, together with about eight or nine other unidentified stations. As I hear that static is very bad during the summer out here, I am going to try building a short-wave set with which I hope to get 5 S W and 2 N M. I think that your scheme of publishing interesting letters is excellent. I have gained a great many valuable tips from these letters. Hoping I have not bored you.

Yours truly,
J. HART-DAVIS.

Skouriotissa, Cyprus.

"P.W." WAVE-TRAP.

The Editor, POPULAR WIRELESS.
Dear Sir,—I have been going to write to thank you sincerely for the above and "Disappointed's" letter in issue of March 10th makes it absolutely necessary.

I am 3 1/2 miles from 5 S C, and the pick-up effect on a solenoid coil in my set made it impossible to get through Glasgow within 20° of the reading of that station. When I switched on to the long wave, so much the worse, particularly if a big S.B. to all stations was on.

Now, with your wave-trap I can get through Glasgow any time I want within 5° of 5 S C, and anywhere on the long wave; and, frankly, it has increased our interest and pleasure in listening tremendously.

Have just received a letter from a friend to whom I passed on the data. He is one mile from 5 S C, and with the trap is delighted to have listened to 5 G B for the first time, with "perfect reception," as he puts it.

I wish to thank you sincerely. More power to your elbow.

Yours,
"DELIGHTED."

Cathcart,
Glasgow.

"A GOOD LITTLE ONE BEATS A GOOD BIG ONE."

The Editor, POPULAR WIRELESS.
Dear Sir,—Having been a constant reader of POPULAR WIRELESS for five years, I thought it would interest you to hear of an achievement of one from whom you have had no previous correspondence.

You doubtless remember way back in November, 1927, the experimental transmissions of the station 3 L O, Melbourne, on a 38-metre wave-length, on consecutive Sunday evenings at 6.30 p.m. Having previously succeeded in picking up 2 F C, Sydney, 2 X A D, 2 X A F, K D K A, 5 S W, Mr. Marcuse, and numerous amateurs, I sat down to try my luck on 3 L O, and picked up a carrier on approx. 38 metres, and true to time heard parts of the opening announcements followed by some orchestral selections, one of which was "The Volga Boatmen." As time went on the reception deteriorated, until I simply struggled to resolve the carrier, but was unable to do so, but I noted that this faded out at the appointed time, and naturally came to the conclusion that the station was 3 L O. I was astounded to read in my daily paper next morning the heading "Melbourne Not Heard," stating that the B.B.C. had failed to get it, also a number of our foremost amateurs, so I immediately sent this cutting with my own account to Australia and am delighted to say that I have received official confirmation, with a souvenir programme and leaflet "Some interesting facts concerning 3 L O, Melbourne." And I wish you to share in this achievement, as the set was built from your issues Oct. 24th, 1925-Nov. 21st, 1925. Mr. Simmonds' circuit built in form of Mr. Marcuse's receiver, a 0-v-1. My aerial is 60 feet in length, 30 feet high, L type. Wishing "P.W." every success.

I am, dear sir,
Yours truly,
H. B.

Derby.

THE "BARBER" CELL.

The Editor, POPULAR WIRELESS.
Dear Sir,—The "Barber" cell, described in "P.W." No. 293, can be easily and cheaply made for wireless H.T., is very efficient, and, properly made, will last many weeks.

Porous pots are not used, but a number of 1-lb. jam jars, of the stone variety, will be required—these are almost given away—a quantity of perforated zinc, plaster of paris, and some stout carbon sticks. The perforated zinc is cut to size—in this case 3 in. by 5 in.—and bent to form a cylinder; a spot of solder each end will hold it together; to this cylinder a wire lead is attached. In a smooth vessel place some

CORRESPONDENCE

STATIC AT CYPRUS

**THE UNIDYNE IN AUSTRALIA
P.W.'s £1,000 offer.**

Letters from readers discussing interesting and topical wireless events, or recording unusual experiences, are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

plaster of paris, add the saturated solution of ammonium sulphate, and, with an old dinner knife, stir to a rather sloppy paste. Take up some of the paste—as much as possible—and quickly plaster it round the inside of the zinc cylinder, about 1 in. thick; do the same with the outside. The plaster sets very quickly, and all that remains to do now is to place the cylinder in the jar, put a carbon stick in the centre of it and pour in permanganate of potash solution, adding a few drops of acid.

The cells can be put to use for H.T. straight away, and will be found to have a stubborn resistance to voltage drop. I have 20 cells at work and they give no trouble. Two or three such cells used in place of the small grid battery in my case have made a great improvement in reception.

Wishing you every success.
Yours faithfully,
J. G. N.

Stratford, E.15.

THE "ALL-PURPOSE" TWO.

The Editor, POPULAR WIRELESS.
Dear Sir,—Having read several accounts lately in "P.W." of readers' results on short waves with the "Sydney" Two, and other recently published circuits, I thought perhaps my results on what I suppose a good many would call a real old-fashioned circuit would be interesting.

My set is the "Every-Purpose" Two-Valve, published in "P.W." dated March 19th, 1927. I receive 2 X A D, 2 X A F, K D K A, P C J J with ease almost any time they are on, 2 X A D being loud enough to work an Amplion cone speaker at fair strength. I have also received 3 L O, Melbourne, on two occasions. On Sunday, the 11th inst., I received all the programme from this station at about 8.5 on 'phones, from 7.30 to 8.30 p.m.; and have written them for confirmation of same, as they asked for reports, etc. I have also received a score or more of amateurs, Radio L.L. and 5 S W.

The only alterations I have made in the circuit are: I use a 35 Tunewell coil as H.F.C. and I have a potentiometer across the battery, and an R.I. transformer with .0003 condenser across it.

Wishing you continued success, from an old reader.

Luton, Beds.

P. F. MINNEY.

AUSTRALIA FIRST TIME ON "SYDNEY" TWO.

The Editor, POPULAR WIRELESS.
Dear Sir,—I, like A. L. (whose experiences were recounted recently in "Radiatorial"), have built the "Sydney" Two, and I should like to say what excellent results I obtain from it.

I can get K D K A on 62 metres any evening, but on Sunday evening, February 19th, I went round the world on it in three hours. Commencing about 8 p.m., I immediately got 3 L O (Melbourne) on 32 metres, and when they had closed down at 8.30, I picked up F M 2 M C, Casablanca, Morocco. Then I picked up Paris (Radio LL).

About 10.30 I got 2 X A D (Schenectady, New York), which station I held until 11 p.m., when I

switched off. All these were at excellent strength on the 'phones, and the wave-lengths ranged from 21 metres to 61 metres.

In addition to these stations, I have also at various times received stations in Milan, Italy, and Portugal; and, also, let me say, I can receive 5 S W (Chelmsford) at any time. All this proves that the set is capable of a good tuning range. (I don't use the air-spaced condenser, as on the original set, but simply connect A direct to the coil.)

As a guide to any other "Sydney" Two enthusiasts, may I give the coil tappings which get the above stations? For K D K A (62 metres): "A" clip on extreme left-hand turn (looking at the coil from the panel), "E" clip 6th turn from left, "G" clip on extreme right turn. For 3 L O (32 metres): "A" clip on extreme left-hand turn, "E" clip 4th turn from left, and "G" clip 4th turn from right. For 2 X A D and 5 S W (21 and 24 metres): "A" clip 5th turn from right, "E" clip 3rd turn from right, and "G" clip on extreme right turn.

Last week-end I lent the set to a friend who had never seen a short-wave set before, and, following the above instructions, he was successful in logging K D K A, 2 X A D, 2 X A L, and 3 L O, as well as many European stations whose identity he did not know.

Trusting my letter will be of interest to you, and wishing "P.W." the success it deserves.

I remain, yours very faithfully,
HERBERT CALDERBANK.
P.S.—Please ask "Ariel" if I am entitled to a Naivo baronetcy, and convey my best wishes to him.
Mountsorel, Loughboro',
Lorecester.

THE UNIDYNE IN AUSTRALIA.

The Editor, POPULAR WIRELESS.
Dear Sir,—I am writing in praise of the Unidyne sets. Mine is a Det. and 3 L.F.'s, with its output usually connected to an Amplion Junior.

Perhaps it would be best to give my log of broadcasting stations to show the set's capabilities when connected to an aerial 150 ft. long and with an average height of 50 ft. Other DX stations heard on L.S. are 3 B B Java on 35 metres, and 2 A Q New Zealand (amateur) on 35 metres. Others on headphones are: Cape Town, Durban, J J O C, Japan, K Z R M, Manila, and amateurs in the states of the Commonwealth by the dozen.

Only last evening I had 3 L O on L.S., and there are still two months of summer to go. Not T.B.!

You may say that that is all very well for four valves, but one valve brings in, in winter, 5 C L, 5 D N, 3 L O, 3 A R, 2 B L, 2 F C, 4 Q G and 6 W F, without mentioning below 353 metres. In midsummer (January) I have heard 3 L O and 5 C L on one valve.

There are two or three points I wish to comment upon: The first is transatlantic DX programmes compared with the DX work of West Australians. London to W G Y, W B Z and W H A Z is about 5,000 miles, while Perth to Sydney is 2,000 miles approximately. A two-valve operator in London to hear the American stations is doing well, while one valve here hears 2 F C which is 5 kv. compared with W B Z and W G Y's 50 kv. 2 F C's signals have to travel over a 3,000-ft. mountain range and finally across 1,000 miles of desert. I have seen in "P.W." "Is H.F. Worth While?" For the average set, no. It is tricky to handle and is very awkward for short waves, although it is done. To the articles on "Wet v. Dry H.T." I say, "Get a Unidyne." I use 6 volts on the last stage, 4 volts on the other two L.F.'s, and none on the detector.

Not having left school, my time is limited for experimenting; but I always do the round of the stations. Wishing "P.W." every success.

Yours truly,
W. DRYSDALE.

Darlington,
West Australia.

"P.W.'s" £1,000 OFFER.

The Editor, POPULAR WIRELESS.
Dear Sir,—I have read with great interest and approbation your articles on Television, and sincerely trust you will not withdraw your offer until something definite in the way of a demonstration of the Baird system has been made before an impartial committee of competent scientists.

Yours truly,
G. EVANS.

London, W.1.

Station.	Wave-length.	Strength.	Power.	Distance.
G W F Perth	1,250 & 104.5	Full L.S.	5 kw. & 1 kw.	12 miles.
5 C L Adelaide	409	" "	5 kw.	1,150 "
5 D N	313	R 4	500 w.	1,150 "
3 L O Melbourne	371 & 32	Full L.S.	5 kw. & 5 kw.	1,450 "
3 A R	484	" "	5 kw.	1,450 "
2 F C Sydney	442	" "	5 kw.	1,800 "
2 M E	32	" "	?	1,800 "
2 B L	353	" "	5 kw.	1,800 "
2 B E	316	R 4	3 kw.	1,800 "
4 Q G Brisbane	385	R 6	5 kw.	2,000 "
7 Z L	535	R 4	3 kw.	1,650 "
2 X A F	32	Fair L.S.	?	12,000 "
2 X A D	22	R 5	?	32,000 "
R F M (Russia?)	60	Full L.S.	?	8,000(?) "
5 S W (Chelms.)	24	Medium L.S.	?	8,000(?) "
P C J J	30.2	—	—	7,500 "
Exp. Lab. Java	31.8	Medium L.S.	?	2,000 "

The stations logged by W. Drysdale on a Unidyne.

I HAVE been experimenting a great deal lately in the design of portable receivers, and in so doing have come across a number of minor problems which call for (and have had to receive!) solution. Trying out a large number of schemes, I have found some of them to be so simple that I am sure many readers of "P.W." will build a small, portable set when they know how easy and cheap it is to do so.

Of course, strictly speaking, any set is portable that can be lifted off the table and deposited on the floor, but we generally mean by a "portable" one that is self-contained, at least so far as the batteries are concerned. Most convenient of all are those that include H.T., L.T., loud speaker and aerial. Next come those which require the attachment of a simple exterior aerial and earth (or a separate frame), and lastly we have those which may contain the aerial but leave the speaker or other form of sound reproducer outside.

Making Frame Aerials.

The simplest and cheapest of all the portables to make is that which is designed purely for "headphone" work, since we do not need a great magnification of signals such as is required to reproduce by means of a loud speaker, and we thus get away from many of the problems of weight and size. The simplest arrangement of all, and one which I can thoroughly recommend, is that shown in the circuit, Fig. 1. It is not novel, but it gives astonishingly good results, is very cheap to make-up, and, so far as headphone work is concerned, it will meet nearly everybody's requirements. The circuit is, fundamentally, the popular Reinartz arrangement, followed by one stage of transformer-coupled note magnification. The main interest in this set concentrates around the frame aerial, which forms the only coil in the receiver. It is very simply home-wound, and can be fitted into the lid of the box or suit-case, or whatever one happens to use to carry the whole outfit.

For the wire one can use either single bell wire or, better still, single rubber-covered

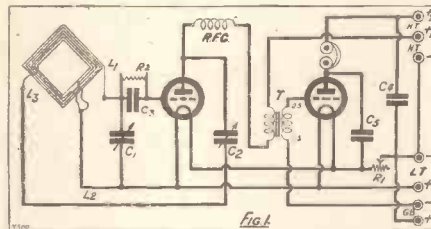
PORTABLE SET PROBLEMS



Some practical solutions to the many minor difficulties which may beset the constructor.

By PERCY W. HARRIS, M.I.R.E.

flex, which is obtainable from any electrician. Very suitable frames for general work can be wound on a former consisting of four pieces of wood glued together as shown in the illustration, Fig. 2, the sides of which are 16 in. long, while the flat pieces themselves are 2 in. wide. Three holes should be drilled as shown, the flexible wire taken and a knot tied about 8 in. from one end, the knot being tied *after* the wire has been taken through the hole in the frame.



Now wind fourteen turns with the turns touching, and then make a loop about 8 in. long and pass it through the second hole as shown, knotting it close up inside the former to hold it tight. Then carry on for another six turns, winding in the same direction, and pass the end of the wire through the third hole. This frame forms the complete tuning and reaction winding for the portable receiver. The beginning of the wire is the point L₁ in the circuit diagram, the loop portion is point L₂, and the end of the winding is L₃.

Practical Construction Details.

When you come to make up the set C₁ should be a .0005 mfd. condenser, C₂ a .0003 mfd., R₂ a grid leak of either 3 or 4 megohms (you will find this a better value than the conventional 2 megohms), R.F.C. is a radio-frequency choke of any of the well-known makes, T is a transformer in which the OS tapping is joined to the grid, and IS to grid-bias negative. The resistance R₁ is a filament resistance of the variable type, which controls *both* the valves. You will probably use 2-volt valves in a portable of this kind, and if you use a 2-volt

accumulator R₁ can be cut out, and its place taken by an on-and-off switch. If, however, you want to use two dry cells, then R₁ should be a 10-ohm filament resistance of the variable type, and should not be turned further on than is necessary to give good results, otherwise the life of the valves will be curtailed, for the maximum voltage given by a pair of dry cells is exactly one volt more than the maximum that should be given to a 2-volt valve.

C₁ is a Mansbridge condenser connected between H.T. positive 2 and negative; it is not essential, but makes for quiet working when the H.T. battery has been used for some time. C₅ is a .001 mfd. fixed condenser, joined between the plate of the note magnifying valve and L.T. negative.

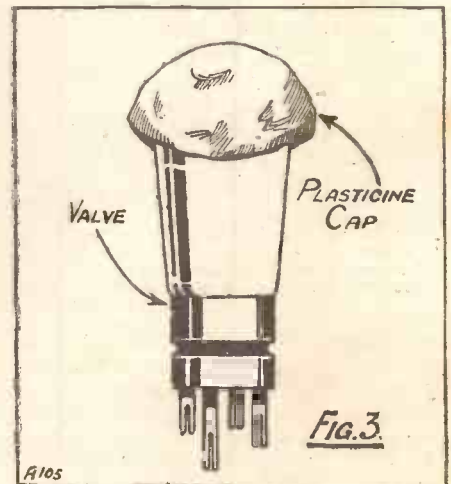
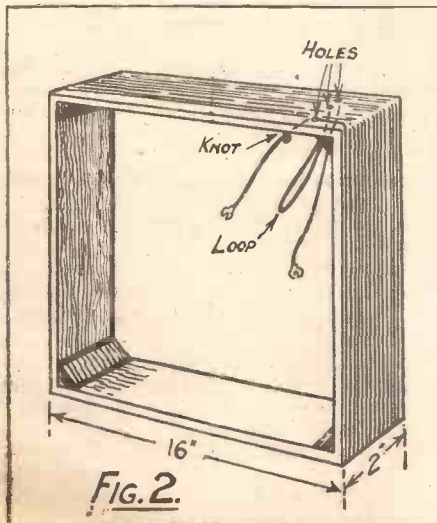
The set is operated just like the ordinary Reinartz set, reaction being obtained by variation of the condenser C₂. The reaction will be found very smooth and tuning is very sharp, so sharp, in fact, that if you do not turn the dial of C₁ carefully, you may miss a station altogether, even if it be loud. For this reason I strongly recommend that both C₁ and C₂ condensers have vernier dials.

Loud-speaker Receivers.

When we come to more pretentious sets, we have other problems to face. The addition of a further stage of note magnification will enable you to work a loud speaker with this set if the station which you wish to receive is not too far away, and with this arrangement loud-speaker results in the open air should be possible up to at least twenty miles from a main station, and, of course, at even greater distances from 5 G B. If conditions are favourable, main stations may be heard at more than twice this distance, and such a figure is quite a conservative one for normal working in daylight.

When we desire to work a loud speaker and to build it into the cabinet problems of space became important and the maker's ingenuity will be taxed to the utmost in how to arrange the parts in a box of reasonable size. The cloth-covered suit-cases or

(Continued on page 226.)



PORTABLE SET PROBLEMS.

(Continued from page 225.)

"week-end" bags which can be obtained so cheaply nowadays, are very light in themselves, and if the set is built on to a frame it can be used very satisfactorily for an inexpensive portable receiver.

Specially designed loud speakers for building into portable sets can be obtained from several makers, both in the cone and in the horn types.

The batteries in such a set can be arranged each side of the loud speaker, and one can use, as indicated, either an accumulator of the unspillable type or two dry cells. The trouble about dry cells is that two of them, which are necessary to work 2-volt valves are at least as heavy as an accumulator, and constant attention is required to the filament rheostat, which has to be adjusted each time the set is used, and, furthermore, there is a danger that the valves may be damaged by over-running their filaments. With the 2-volt accumulator the voltage remains steady for the whole duration of its useful discharge, and it is possible to dispense with the filament resistance and still be perfectly certain that the valves will not be overrun.

L.T. and H.T. Batteries.

Speaking of unspillable accumulators—most of them require very little electrolyte, and have a large space at the top so that when they are turned upside down the tubular gas vent is well above the surface of the liquid. In this way it is possible for the gas in the cell to escape and yet no liquid can get out. For this scheme to work satisfactorily it is essential that the makers' instructions regarding the filling of these

concerned, the larger it is and the higher the voltage the better reproduction you are likely to get, but as you will rarely require very loud signals, quite good results can be obtained with a battery of the 60-volt size. Batteries vary, of course, not only in their voltage but in their economical discharge rate. Thus you may have two 60-volt batteries, one twice as big as the other. If you can possibly get it into the set and do not mind the weight, choose the bigger every time, for you will get much more satisfactory working, and much longer life. Such batteries cost more than the smaller sizes but they are cheaper in the long run, for a battery which is twice the size will give at least three times the life.

"Microphonic" Troubles.

One of the big problems you will come "up against" when designing everything in the one cabinet, is the question of "microphonics." Although you may use, and indeed should use, anti-microphonic valve holders, you will find an irritating tendency to interaction between the sound waves from the loud speaker and the valves themselves, for they are used so close to one another. The trouble arises not from vibration transmitted through the bases of the valves but from powerful sound waves from the adjacent loud speaker impinging upon the walls of the valves, and setting up those irritating vibrations which we all desire to avoid.

In my experiments I have found two particularly useful ways of overcoming the difficulty, although, of course, it is only some valves which give this trouble, and others are quite free from it, thus necessitating no particular precautions. I found, however, in trying out dozens of valves in portable sets, that even in the one make and one type of that one make, considerable variations can be found. Thus I found that with a particular type of H.F. valve

then taken and pressed into a cup shape and this cup-shaped piece of plasticine pressed on to the top of the valve, when it is already in its holder. You will find this will cure many obstinate cases, particularly those valves which normally have a low note or ring. You will find it is only the

TESTING TRANSMISSIONS.



With a tiny frame aerial and a small receiving set, this engineer is walking round the Surrey Hills, taking careful notes of the transmissions from the new Air Ministry station at Mitcham.

detector valve, or in very bad cases, the first note magnifier which will require precautions of this kind.

The second cure is to line the inside walls of the box with a thick soft material, such as cotton wool, which gives a "dead" background, and prevents reflection of the sound waves. I have found a lot of trouble in relation to microphonic noises in built-in sets to come from reflection of the sound waves from the wooden walls of the cabinet. Wash leather, fixed lightly to the inside of the cabinet is also quite good. It should not be glued tight but made to adhere here and there with a dab of Chatterton's compound, or other similar adhesive.

Don't Eliminate Grid Bias.

Do not forget to use adequate grid bias in a portable set. Not only does it improve the quality very considerably, but effects great economy in the high-tension consumption and naturally your high-tension battery will last much longer in these circumstances. If your high-tension battery is tapped every one and a half volts, you can use the lower portion of this for the grid bias. The scheme is then to plug negative H.T. not in the negative socket but at that number of volts upwards from the negative socket that you require for grid bias. Thus if you require 9-volts grid bias on your output valve, plug in your negative H.T. at 9 volts *positive* and place grid bias negative in the negative socket of the H.T. battery. There is then no need to use a grid-bias positive, for the battery connection itself will provide this. For this scheme it is essential that L.T.—be joined to H.T.—in the set.

"RADIO-PHOTOGRAPHY IN THE HOME."



The reception of photographs by wireless is a very different proposition to television, and it is, in fact, becoming so simple and perfect (as recent daily Press articles show) that it is possible to design practical home receiving sets. Already in America there is a limited amount of broadcast photography "on air." Above is shown a typical receiving outfit.

cells should be carefully observed, for if too much liquid is put in the gases will drive the liquid out through the special tube provided for the gas escape, and will make a horrible mess inside your set, just when you least expect it.

So far as the high-tension battery is

two out of three would be comparatively free from microphonic trouble, while the third was very bad indeed.

The first precautionary measure is to buy a few penny sticks of plasticine and to roll this excellent material into balls about an inch and a half in diameter; each ball is

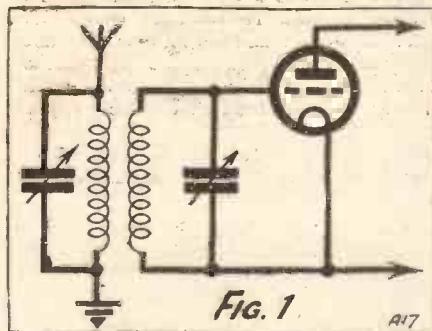
WHEN the experimenter sets out to make a new set, he naturally wishes to turn it out like a suburban villa, "complete with all modern improvements."

No one, nowadays, would omit a grid-bias battery, for example, or provide a common H.T. voltage for all valves. Similarly, it is very seldom that a set is now built with open-circuit aerial tuning. There is nearly always some device incorporated in the aerial circuit which is designed to improve selectivity. But is this worth while in a simple set?

Old Circuits.

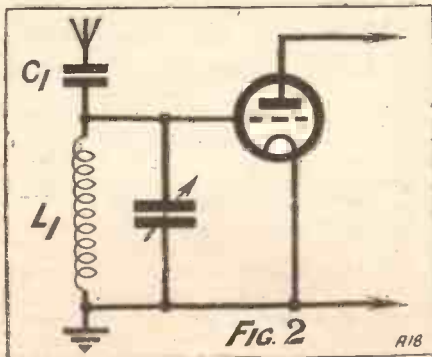
Four or five years ago the ether was less crowded, and the desire to "cut out the local" was much less general than the ambition to bring in the local.

When selectivity was desired in a set which had no high-frequency stage, the arrangement in Fig. 1 was used. It is, of course, quite a satisfactory arrangement,



but as it requires two coils and two variable condensers, instead of one of each, it is cumbersome.

The arrangement was not satisfactory if the first valve was a high-frequency valve, because it rendered the set so unstable that potentiometer damping had to be intro-



duced, and the efficiency of the H.F. valve was thus seriously reduced. This was before the days of neutralising.

Next in order of favour was the circuit shown in Fig. 2, C_1 being either a small fixed condenser of .0001 or .0002 mfd., or a variable condenser. C_1 was at one time regarded as an alternative means of tuning

IS SELECTIVITY WORTH WHILE?



there is any real advantage in selectivity. In some places, such as near Birmingham, where it is difficult to cut out 5 G B even when tuned to 5 X X, exceptional measures are necessary, and loose coupling or a wave-trap must be employed. But the number of listeners who suffer in this way is comparatively small. Most people can switch over from the broadcast band to 1,600 metres with confidence that their two stations will not clash.

Not Essential.

Why, then, is loose coupling incorporated in practically all detector and L.F. sets designed nowadays? The answer, I suggest, is that it does no harm, any-

how, and that it gives a measure of selectivity for ether-searching as an occasional amusement after eleven p.m. and late on Sunday afternoons. Moreover, where a poor aerial is employed, loose coupling

Can you cut out the local station?
If not, you should read this article.
By HUMPHREY PURCELL.

L_1 , but has since been recognised as unsuitable for this purpose. Nevertheless, it is an entirely satisfactory device for sharpening up the tuning of a circuit.

Developments of these devices are shown in Figs. 3 and 4. In Fig. 3, L_1 is an untuned coil, wound in such a manner that it is coupled to L_2 very tightly. It has usually about one-quarter of the number of turns in L_2 . In Fig. 4 the aerial is connected to a tapping on the inductance between the centre and the earth end of the coil.

H.F. Really Necessary.

These devices are undoubtedly useful in restricting signals to a limited space on the tuning condenser dial, and when a set is built to bring in distant stations, some arrangement of the sort is necessary. But

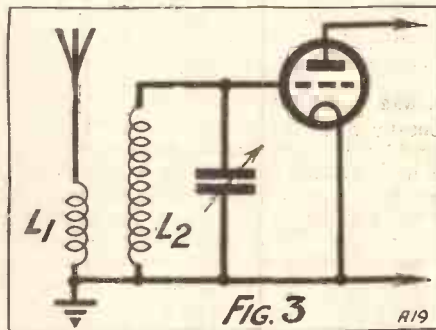
Best selectivity is obtained by using a stage of H.F. amplification.

it is not sufficient in itself. The only way to attain a degree of selectivity on the broadcast band that is worth anything at all, nowadays, is to include an efficient high-frequency stage in the receiver.

Distant stations can be brought in without a high-frequency stage, of course, and sometimes at great strength and without interference. But this is only true in favourable localities or under favourable conditions, and with the aid of reaction pressed to a point that is not really desirable. That is not selectivity.

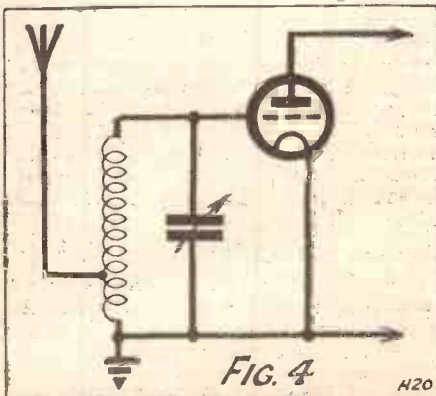
Local or DX.

If a high-frequency stage is not included, the set ought not to be looked on as a distance-getter on the broadcast band of wave-lengths. It is a listening-in set, and in a listening-in set it is doubtful whether



may give increased signal strength. But many who have reasonably good aerials and do not trouble about distant stations might just as well forget that there is such a thing as selectivity.

A degree of selectivity however, is useful in the N. and N.W. of London, where



5 G B is apt to interfere with the local station and vice versa if old-fashioned circuits are employed. The writer knows of several listeners who have had to use wave-traps or to alter their sets in order to do away with the certain amount of confusion that exists in some places between these two stations.

MAKING "PANEL-AND-BASEBOARD" SETS



Valuable Hints on the Design of Modern Receivers.
FROM A CORRESPONDENT.

IT is now almost universal practice to use a vertical panel, forming both the front of the receiver and the "dashboard," with a horizontal baseboard secured to it at the rear containing most of the "works." This is a decidedly convenient arrangement from all points of view, and it is hard to imagine a better assembly. Hence the standardisation of the skeleton of the receiver.

Now the panel and baseboard form a unit which is to the receiver what the steel girder framework is to the modern building. Bad workmanship and poor materials in either are certain to cause a lot of trouble after construction is finished. Unfortunately, the very simplicity of the panel and baseboard unit often leads to careless construction. If only for the sake of appearance and the constructor's self-respect, it pays to spend a little more care and thought and do the job properly, after which there will be no trouble from insulation leakage, warping of panels and baseboards, and general mechanical weakness.

In forming the panel-baseboard framework a pair of brackets is often used to maintain them at right angles. This, in my opinion, spoils the look of the set, but without brackets the assembly is not rigid. A mechanically strong assembly can be obtained, however, by raising the baseboard on battens, one at each end, and then screwing the panel to it and the battens. The height of the baseboard level should not exceed one-quarter of the panel height, and generally about a sixth is ample. This assembly is becoming quite popular with constructors because the raised baseboard permits of a good deal of wiring being carried out underneath, thus leaving more room on top.

Advantages of Wood.

Undoubtedly the best material for baseboards is plywood in some form or other. A piece of plain wood is highly unsatisfactory. Unless very well seasoned and dry it is bound to curl; throwing the panel out of alignment and causing a bad fit in the cabinet. For practically all classes of receivers a piece of six-ply, which usually has a thickness of $\frac{3}{8}$ in., is the ideal material. It is easy to work, extremely strong, remains perfectly flat, and does not split even if large screws are put into the edge. This material, in my opinion, should be standardised for all baseboards in wireless receivers.

From the standard sizes now sold it is usually possible to choose one of the right dimensions for the receiver to be constructed. Most of the published designs specify a standard panel.

Now the majority of modern receivers can be designed for a wooden or even a metal panel, so that insulation properties not being necessary it is rather extravagant to use expensive ebonite, especially if stock sizes are not available.

Bearing in mind that the panel should serve the sole purpose of providing a firm support for the main controls, while presenting an attractive appearance, the most suitable material is plywood, which is much stronger than a similar thickness of ordinary wood, while if of good quality it does not warp. Oak or mahogany faced three-ply takes quite a handsome finish, is quite rigid and easy to cut and drill. I have used such panels with every satisfaction for some time, and I am glad to see that specially treated three-ply panels are now being developed commercially.

Preparing Panel Materials.

In preparing wooden panels and baseboards of the above description it is not essential to have a large bench and a fully equipped workshop. Quite good work can be turned out on the kitchen table with a few ordinary tools.

Baseboards and panels in plywood should be marked out in pencil lines on the raw material, which should be slightly larger than the required size. These lines should be carefully set out at right angles and the surplus sawn off near to these lines. Then the edges are planed down to these lines with a small iron plane, and finished off with glass-paper. The panel face, if rubbed down with fine glass-paper, will take a better surface when stained or polished. Merely painting the surface of an oak-faced panel with some dark spirit stain will give a very good appearance.

If the circuit and the panel components permit of a capacity shield being placed behind the panel, a piece of thin zinc, slightly smaller than the panel should be cut out and secured with small screws to its back face. If this combination is laid on the bench or table with the wood panel face down, holes can be drilled through zinc and wood at one operation, all drilling points being set out on the zinc. For an all-metal panel the best material is sheet aluminium, which can be obtained cut to size. Holes

In the good old days it was quite a performance preparing the panel, which had to be trued up square from a piece of ebonite of indifferent quality. Now-a-days, we use first-grade ebonite panels already cut to standard sizes and finished with either a matt or a polished surface.

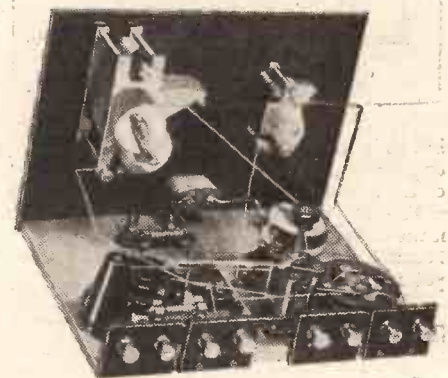
are quite easily bored with small twist drills or even larger centre-bits, as this metal is quite soft.

Other materials for the panel are metal and glass. Of the former, aluminium sheet about $\frac{1}{8}$ in. thick is a popular material, since it is cheap and fairly easily worked. The advantages of the metal panel are its greater mechanical strength, together with its possibilities as a capacity shield. By screening the entire receiver from the operator's hands, when tuning, hand capacity becomes a thing of the past. A material which should not be used for metal panels or capacity shields is sheet iron (tinplate), as iron is decidedly disadvantageous where H.F. currents are about.

Treating Aluminium

Finishing off the face of an aluminium panel is not quite so simple as with a wooden panel. In the raw state aluminium looks rather unsightly, and the best way is to give it an "engine-turned" effect, and then paint it with one or two coats of white shellac, without which its bright surface will tarnish.

The "engine-turned" effect is obtained by taking a small piece of fine emery paper, pressing it on the panel with the ball of the thumb, and giving a half turn. This produces a group of concentric circles. This process is then repeated at equi-distant intervals in parallel lines all over the panel, the groups slightly overlapping one another. This method of finishing the panel surface is very easily done, and the final appearance when lacquered is quite pleasing. Many of you will doubtless be familiar with this finish as imparted to aluminium carbodies and dashboards.



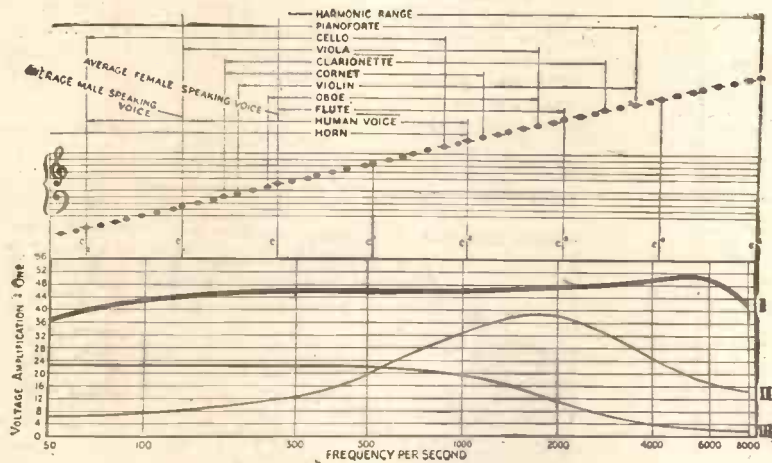
An example of careful and efficient lay-out.

Glass is not so widely used as other panel materials because of the difficulty of working it. A glass panel certainly adds a note of novelty to the set and is very nearly as good an insulator as the best ebonite.

With glass panels the difficulty of drilling holes in such a hard and brittle material is a stumbling block to many. However, special outfits for glass drilling are now sold, and these should go far to assist the enterprising amateur.

The best raw material is English plate-glass about $\frac{1}{8}$ in. thick. This can be obtained cut to size with the edges smoothed down. Drilling holes in glass is not difficult with the proper tools, success depending on care and patience. The bit is usually a piece of very hard steel with a sharp triangular point, the use of a lubricant, such as camphor dissolved in turpentine, being a necessity.

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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work, carried out with a view to improving the technique of wireless receivers. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS.

CONNECTING AN AMPLIFIER.

W. R. S. (Hoddesdon, Herts).—"I think I shall get an amplifier, as I know of one going cheap? Do I simply connect it up to set and batteries as marked, or are there any snags?"

There are two or three little points to watch in connecting up an amplifier, the first one being when it is for use with a crystal set. In this case, if there is no "E" terminal on the amplifier, try connecting a lead (externally) from its L.T. negative terminal to the

earth terminal on the crystal set. (This occasionally makes signals much louder.)

The second point arises when the amplifier is connected to a valve set. In this case the set itself should be inspected to see if its H.T. negative terminal is connected to the L.T. negative terminal.

Sometimes it will be found connected to L.T. positive instead, and if so the amplifier should be wired similarly. If it is not, do not connect up its H.T. negative terminal, but leave this without any external connection whatever.

The third point to watch is with amplifiers in which transformer terminals are marked "OP" and "IP". It often pays to try changing these two leads over, to see which way gives best results.

When connecting the batteries great care must be taken to connect L.T. only to its proper terminals. Apart from an accident here there is little to go wrong with an amplifier, and with ordinary care in use it will give good service and "speak up for itself" indefinitely.

LOSS IN CONDENSERS.

S. A. (Buckhurst Hill).—"What is meant by the 'dielectric loss' in a condenser?"

The "dielectric" of a condenser is the insulator that separates one set of plates from the other. Although the passage of oscillating currents "through" a condenser takes place with remarkable facility, yet at high frequencies a certain amount of energy is absorbed in the insulation or dielectric, and this is called a dielectric absorption loss.

When air is the insulator between the two sets of plates such a loss is negligible, and in a mica condenser it is trifling for all ordinary purposes. But in paper condensers the losses can be comparatively large, and consequently for some purposes mica condensers are often specifically recommended.

"A SORT OF FADING."

E. G. V. (Hollinwood, Lanes).—"My friend built the set first and got marvellous results; in fact, it was so good that he persuaded me to have a go at it, and lent me the blue print (the one given in the 'Modern Wireless' last month, showing the 'Melody Maker' in pictorial form). And I built it and got just as good results—in fact, better, I think—until a sort of fading started.

(Continued on page 232.)

"META" SOLID FUEL.

CONSTRUCTORS who have not gas stoves handy, or electric soldering irons to facilitate their soldering, should find "Meta" Solid Fuel useful. This unique substance is handled by Elmesan Limited, of 66, Victoria Street, London, S.W.1. It is supplied in tablet form and is white and, in appearance, similar to camphor or chalk. When a tablet is placed in one of the small stoves which can be obtained, or in a tin, and lit with a match, it burns with a hot blue flame like methylated spirits.

The substance does not melt or smoke, but just burns away until nothing remains. There is no ash at all and the metal in which it has been in contact remains bright and clean. The flame is hot and a small-sized soldering iron is brought to the correct temperature in about five minutes. Incidentally, the soldering iron itself remains in a clean condition. "Meta" appears to be a safe and efficient material.

AN "ALL-WAVE" TUNER.

Unless a receiver has a wave-change switch or some other similar facility for "all-wave" tuning on the front of the panel, most listeners tend to restrict their listening to one wave-length band. For straightforward sets there is much to be said for a tuner such as the Star Duplex Reactive Tuner manufactured by The Star Wireless Supplies, of Biggleswade. By means of one simple switch which operates beneath its dial, this tuner covers three ranges—200 to 400, 300 to 600, and 1,400 to 1,900 metres. This is using a .0005 mfd. variable condenser.

The tuner is a well-assembled component about the size of a large cup, the dial which



"META" SOLID FUEL—
AN "ALL-WAVE" TUNER—
THE "P.W." STANDARD
WAVE-TRAP, etc.,
etc.

* *

Traders and manufacturers are invited to submit wireless sets and components to the "P.W." Technical Department for test. All tests are carried out with strict impartiality in the "P.W." testing-room, under the supervision of the Technical Editor, and the general reader is asked to note that this weekly article is also intended to provide a reliable and unbiased guide as to what to buy and what to avoid.—EDITOR.

controls reaction and the aforementioned switch being at one end and at the other four terminals, two for reaction and one each for aerial and earth. The reaction control is smooth and effective and the wave-change switch operates reliably.

Tested in a two-valve set the tuner gave good results. There was no difficulty at all in finding the local station, 5 G B and 5 X X on the loud speaker, and one or two other stations. The retail price of this component

is 10s. 6d. and this compares very favourably with the cost of a coil holder and the necessary coils to cover the same wave-length bands. This is not the only type of tuner the Star people supply, they have several others, some of which are particularly suitable for use in Reinartz circuits. By the way, that one tested by us and listed as the Star Duplex Reactive Tuner has a very useful degree of selectivity.

(Continued on page 238.)

SWITCH ON TO THE ELECTRIC MAINS FOR ECONOMICAL H.T. POWER

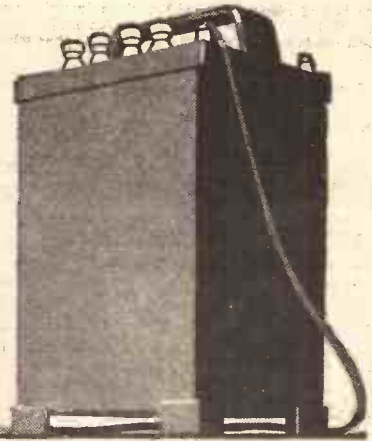
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 230.)

"The set will go splendidly for perhaps ten minutes, and then it will get lower and lower and start to distort a bit, and then suddenly down she goes away to practically nothing. After a bit it gets strong again, and then repeats the performance—a sort of fading, but not absolutely regular.

"The local expert said it was grid choking, and he changed valves and grid bias to cure it, but nothing doing. He says now that what it is beats him, but it certainly is not grid choking. So what is it? (Most of the parts have been used before, and photo enclosed shows them pretty well.)"

There is one other fault which gives trouble very similar to that caused by grid-choking, and we expect your set is suffering from this. It happens when an anode resistance (especially one of those not wire-wound) becomes defective internally, thus partially cutting off H.T. to one of the valves. In your case we suspect the .25 meg. leak connected between the plate of the detector and H.T. +. You are using an ordinary grid leak here, and probably it is "packing up" inside and interrupting the H.T. supply to this valve at intervals, thus giving rise to the "falling-off" effects. Try a new anode resistance, and we expect you will find the trouble disappear.

MILLIAMMETER CONNECTIONS.

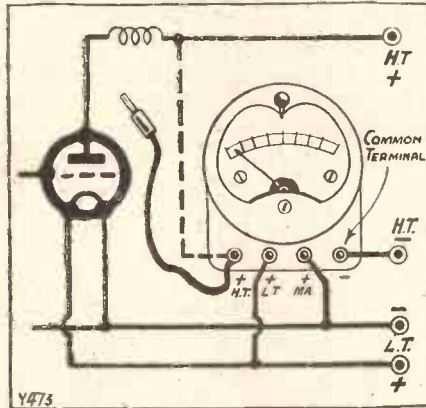
T. A. (Newmarket, Cambs).—"I want to fix a milliammeter permanently into the set to adjust the H.T. voltages correctly, etc. But I am not at all clear into which leads it should be inserted, and I am rather afraid that it would defeat its own object if it is much trouble to connect up—apart from the risk of burning it out. Is there an easy method?"

If you have not yet made the set it is an easy matter to arrange for sockets (which can be bridged instantly when not required) in the H.T. neg. lead, and in that to the plate of each valve. The milliam-

meter can then be joined in the neg. lead to check the total anode current of the set, or in the respective leads to check the consumption of the individual valves.

A still easier method is to use one of the metres specially designed for such set-readings. This type is fitted with a switch, and can be connected, as shown in the accompanying diagram.

Assuming that H.T. — and L.T. — are common in the receiver itself this lead can be broken and the H.T. — terminal joined to the common terminal of the meter, and the + mA terminal joined to L.T. —. This gives the total mA consumption for the H.T. battery when the switch is moved to that range. The L.T. + terminal of the receiver can now be connected to the L.T. + terminal of the instrument,



thus enabling filament voltages to be measured whenever desired without altering any leads (merely turn the switch to the appropriate position).

With a short flexible rubber lead connected to the H.T. + metre terminal high-tension voltages can be read very quickly by tapping on to the required receiver terminal. If desired, the H.T. + lead from the meter can be left permanently connected to the receiver terminal joined to the plates of the low-frequency valves (shown dotted in Fig. 1), since it is this voltage which must be kept of sufficient magnitude, in conjunction with adequate grid bias, to prevent distortion.

"OVER THE GARDEN WALL."

W. H. (Gloucestershire).—I have been a reader of POPULAR WIRELESS for some time, and have at my house an extremely good one-valve set. The reception on 'phones to the extent of four pairs is very good, and there is no distortion whatever.

"My neighbour has a crystal set, but he can cut me clean out when listening to 5 G B!

"Our houses are semi-detached, with the best room (dining room, sitting-room—combined affair) at the back of the house, with the window overlooking the garden. Both houses are exactly alike.

"Our aerials are practically parallel at a height of about 40 ft. above the ground, and at the house the distance between the aerials is about 5 ft. (being attached in both cases to a joint chimney stack, and at the far end to an aerial pole, the distance between the poles being about 10 ft.)

"Immediately my neighbour attempts to 'find a spot' while I am listening to 5 G B, my reception fades away. I know this is the cause, because I have found out by judicious watching, as he keeps his set on the window-sill, and as soon as I hear him 'scratching' I have popped out and have seen him at the window. What can I do to alter this, do you think, please?"

"My H.T. is good (new battery) and a new 2-volt accumulator is on my set. He does not know he interferes with me. If he did, in all probability he would do it more, because, whilst we are not enemies, we are not friends, having had differences of opinion with regard to his dog entering my garden, etc.

"I am thinking of making up a Mullard 'Master Three,' but if this is going to happen I don't feel inclined to do it.

"If you can give any help on the matter I should feel very much obliged."

(Continued on page 234)

DO YOU REALISE THE VALUE OF THIS CURVE?

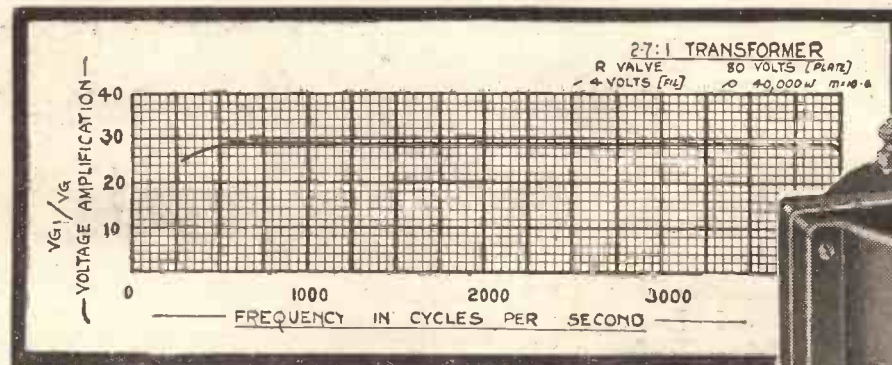
If you read the curve shown we don't need to tell you more about the Marconiphone "Ideal" Transformer. Its wonderful straightness speaks for itself. It means great volume added to your receiver without a trace of harshness or resonance. Every "Ideal" possesses a curve definitely guaranteed within 5% of the standard curve supplied with each instrument. Remember, too, the "Ideal" is guaranteed against electrical and mechanical defects for 12 months.

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Supplied in four ratios: 2.7 to 1, 4 to 1, 6 to 1, 8 to 1.

Price 25/- each model.

Send now, mentioning "Popular Wireless," for full particulars of all Marconiphone Wireless Apparatus.



MARCONIPHONE 'IDEAL' TRANSFORMERS



For your set
settle on an
Ethovox

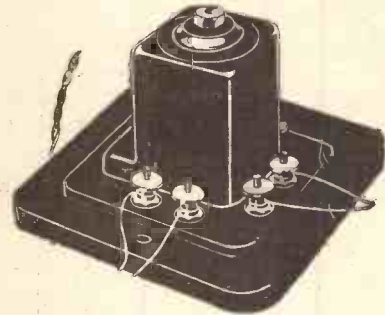


IF you are at all undecided about the loud speaker to buy for your set, go and hear an Ethovox. Consider its performance—its tone and volume are unequalled. Consider its price—it is the finest value in radio to-day. Consider the thousands of listeners who enjoy Ethovox reproduction—its reputation is "old established." Then consider the matter settled—and purchase an Ethovox for your set.

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Fit the
LOTUS Remote Control
to your Cossor Melody Maker



—and increase the enjoyment and comfort of good reception. Don't have a good set and restrict it to one room. Reception from your Cossor Melody Maker can take place in every room in the house—independently—simultaneously—and without interference, if you fit a Lotus Remote Control.

You can wire two rooms yourself in half an hour at a cost of a few shillings. Ask your retailer for a free blueprint or send a postcard to the makers.

For your Melody Maker you need:

- 1 Lotus H.T. and H.T. Relay,
- 2 Filament Control Wall Jacks,
- 2 Jack Plugs, 21 yards 30/-
- 4-strand wire
- Similar outfit but for set using H.T. Eliminator 45/-
- This wires two rooms. Each additional room, 7/6 extra.

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REMOTE CONTROLS

Recommended by the makers of the Cossor Melody Maker.

Made by the makers of the famous Lotus Buoyancy Valve Holders, Lotus Vernier Coil Holders, and Lotus Jacks, Switches and Plugs.

GARNETT, WHITELEY & Co., Ltd.
Lotus Works,
Broadgreen Road, Liverpool

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 232.)

This sort of trouble is due to the fact that the two aerials are placed too close together. Possibly your neighbour's aerial lies in the path between your own and 5 G B's; but, in any case, the fact that it is part of a tuned circuit, adjusted to the same wave-length, and coupled (out of doors) rather too closely to yours, makes interaction between the two inevitable.

The only way to improve matters is to separate the two aerials as far as possible. If they must both be at the back of the house, perhaps you could raise yours so that it does not run parallel? It might, even, be better to lower it than to leave it alongside his, because although it would not pick up so much as a higher aerial it would gather up all there is at the lower level, instead of having its supply cut off by the other aerial parallel to it.

If you can raise one end of it, and lower the other end, you would dodge some of this interaction, the whole idea being to get your aerial as far as possible "out of line" with his. In bad cases we have known of one neighbour having to resort to an indoor aerial, but probably this will not be necessary if you re-arrange yours as far as possible from his.

THE "HANDYMAN" TWO.

M. V. (Hampstead, London, W.8).—"I intend to alter my present 0-v-1 set so as to bring it into line with the description of the 'Handyman' Two. Everything seems to be quite straightforward except the coils.

"You mention the use of the wooden spacers which you say can be got from a packet of Glazite, but you omit to give the thickness or width; and as I do not use Glazite, but always bare wire, I am in ignorance as to the exact dimensions of these spacers.

"Also, you omit to give any instruction regarding the space between the secondary and reaction windings. Should the latter follow immediately after the former or should a space be left first? If so, how much?

"Re short-wave coils, you specify the use of an 8-ribbed former, and I happen to have

a couple of 6-ribbed Becol formers which I should like to use provided that efficiency would not suffer in any way. If this were likely I should prefer to purchase fresh formers.

"With respect to the reaction winding which you say should be wound in a sawcut, does this signify that the wire is wound merely *hank* fashion in a cut sufficiently deep to take it, or should it be arranged in a layer?"

The diameter of the "Glazite" rod is about $\frac{1}{4}$ in. —any $\frac{1}{4}$ in. (or thereabouts) wooden or ebonite rod will do.

On the "300-metre" coil a space of about $\frac{1}{4}$ in. is left between the end of one winding and the beginning of the other. The use of a 6-rib instead of an 8-rib former would not impair efficiency at all.

Each rib should be cut through so that a space is formed sufficient to take several turns of wire side by side. The reaction coil is then wound more or less evenly in these slots, until the requisite number of turns has been laid on.

IMPROVING SELECTIVITY.

K. L. Y. (Ilkeston, Notts).—"It is a crystal set, and I can pick up Nottingham very well indeed, and also Daventry 5 G B, but the only trouble is that when there is a talk at Daventry I can hear 5 G B's music, or when 5 G B is talking I can hear a trace of any music that is going on at Nottingham. It is not at all bad; I mean to say I can hear all right, but I would very much like to get rid of this trace of interference if it is possible by any simple means."

We note from the diagrams that you enclose that you are using one of the old-fashioned plug-in coils. In such a case one of the simplest methods of improving selectivity is by the use of a tapped aerial coil.

Such a coil has not only the usual two connections, but also a third terminal or other means of connecting it in circuit, the idea being to connect the aerial wire to this extra terminal. All the other connections are exactly as before, and the size of the coil is the same as formerly.

To use such a tapped coil to improve the selectivity of the set, simply plug it in the position formerly occupied by the aerial coil. Then disconnect the aerial lead from the aerial terminal and join it instead to the extra connection provided upon the tapped

coil. This should result in clearing away all trace of the interference, and it is probable that, if any, only the very smallest decrease in signal strength will be noticeable.

THE UNIDYNE.

F. R. (Peterborough).—"I have been very interested in the letters about the Unidyne which I have seen recently in the correspondence. As I am a fairly new reader I missed the description of this set, and I should very much like to know what sort of set it was."

The peculiarity of the Unidyne circuit was that it employed a four-electrode valve—that is to say a valve having two grids. One of these grids—the outer one—was connected to the input from aerial in very much the same way as the ordinary set nowadays. The inner grid terminal was taken to L.T. positive; and so sensitive was this arrangement that it obviated the necessity of using an H.T. battery.

As there was no high-tension voltage there was no danger of burning out the filament by means of crossed leads, and the set became extremely popular and successful, in spite of the fact that the choice of valves for it was rather limited. The circuit was invented by Mr. G. V. Dowding, the Technical Editor of "P.W." and Mr. K. D. Rogers, Assistant Technical Editor.

DAMPING DUE TO CRYSTAL.

D. E. N. (Appleborough, Norfolk).—"I know it is very old-fashioned of me, but I have an old one-valve-crystal-reflex receiver, and still get great fun out of it. I always understood that with a set of this kind the valve amplifies at high and low frequencies, and the crystal detects. But my set seems all wrong, for I have found that I can get much better results without the crystal making contact with the cat's-whisker. Why is that?"

The fact that your valve is detecting as well as amplifying is probably due either to the use of an unsuitable crystal, or else to incorrect H.T. or L.T. voltages. It would be worth while trying several different kinds of crystal detector, as you may happen to hit upon one which suits the set far better than the one you have in use at present. You will find also that the valve has a tendency to detect unless its voltages are adjusted critically—i.e., the L.T., H.T., and grid bias, if any.



Outstanding Advantages No. 1.

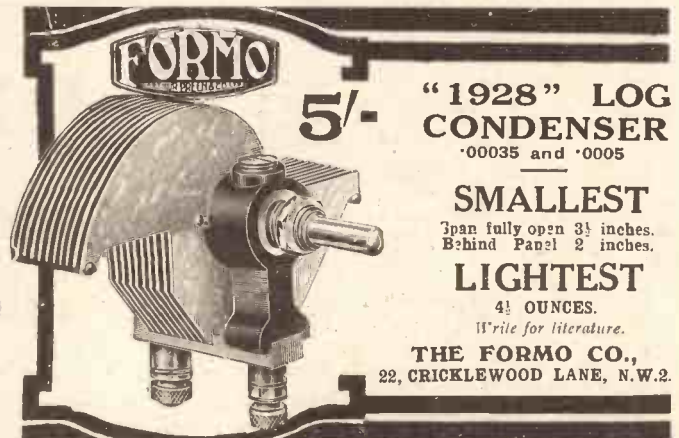
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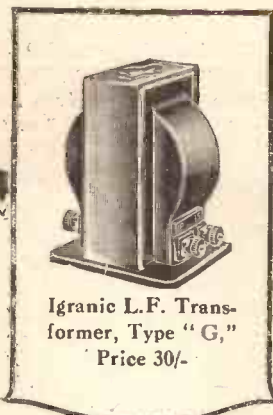


Igranic Triple Honeycomb Coil, Prices 2/9 to 16/-

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A set is only as good as its components

Send for the complete Igranic catalogue, List No. R34. It is brimful of components for better radio reception.



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You make certain of these essential qualities to a greater extent when you build these Igranic components into your set. They represent the highest standard of workmanship and materials in the radio world and are regularly used by experienced constructors because they guarantee *consistently* good results.



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GOOD NEWS FOR SET BUILDERS

In response to the urgent demand for first-class sets for family use, Mr. PERCY W. HARRIS, M.I.R.E., has now prepared the

Wireless Constructor Envelopes

The first two of this series are Now on Sale, price 1/6 per envelope (by post 1/9).

Envelope No. 1.—THE RADIANO THREE. A famous loud speaker set which you can build in an hour or two—no soldering necessary and a wide range of components to choose from.

Envelope No. 2.—THE CONCERT FOUR. Made of standard parts, all easily obtainable, this is a *highly-sensitive long-distance set*, giving *powerful reproduction of wonderful quality*. Covering both long and short wave-lengths, with a switch for 3 or 4 valves, it is essentially a *set to enjoy*, both in building and operation.

In these envelopes you will find every detail of the set simply explained; photographic reproductions and diagrams are included, as well as a full-size Blue Print.

NOW ON SALE ————— Price 1/6

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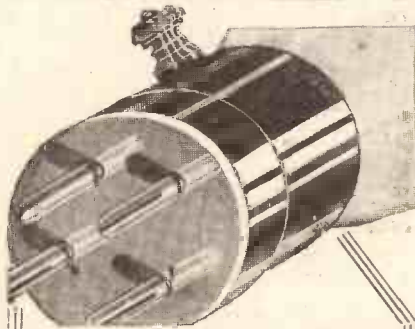
PRICES.
 Type "B." Bakelite insulated—8d. each.
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A.P. 4-ELECTRODE

The wonderful new valves for your set which only require half way usual H.T. yet give better selectivity and purer reproduction. They are sent on 3 clear days' approval against cash order.

The range also includes special patent 5-pin and 4-pin dull-emitter low-consumption valves for H.T.-less circuits. History and data of the A.P. family, together with reports by "Popular Wireless," "Amateur Wireless," etc., will be promptly sent upon receipt of your postcard.

ANELOY PRODUCTS.

38, Hindmans Rd. E. Dulwich, London, S.E.22
 Phone: New Cross 4074.

PLEASE MENTION "POPULAR WIRELESS" WHEN REPLYING TO ADVERTISEMENTS

NEWS FROM SAVOY HILL.

(Continued from page 220.)

Radio Drama which was given from London Studios on April 2nd. The considerable advance publicity which this play received was amply justified by the event. "Charles Crocker," POPULAR WIRELESS is able to announce, was none other than Mr. R. E. Jeffrey himself, the B.B.C. Director of Productions. "Speed" was at once an answer and a challenge to Cecil Lewis.

An Italian Programme.

Great things are expected of the next of the series of National Programmes arranged by Arthur Burrows at Geneva. This will be on Sunday, April 15th, when all British Stations will be given over to an afternoon of Italian Music. Rossini, Wolf-Ferrara, and Sinigaglia are among the composers whose characteristic works will be given. Heddle Nash will sing arias from operas by Verdi and Puccini. Mrs. Gordon Woodhouse will provide some seventeenth century harpsichord music.

Labour First Off the Mark.

It is stated in high Labour circles that, thanks to the promptness and astuteness of Mr. Arthur Henderson, the Labour Party will have the first say in the forthcoming bout by broadcast between representatives of the three political parties.

Labour was off the mark the moment the ban was lifted. Mr. Henderson applied for an opportunity for Labour to put its case for an early General Election. It is believed that this astute move took the other parties by surprise; but naturally, they would not leave the field to their relentless antagonists. Thus there is every prospect of red-hot political controversy over the microphone during May.

Tennis and Holidays.

Gordon Lowe talks on tennis (2 L O and 5 X X) on Saturday, April 21st at 9.15 p.m. A. B. Valentine will begin his special series of talks on holidays in Great Britain at 7.35 p.m. on the same night.

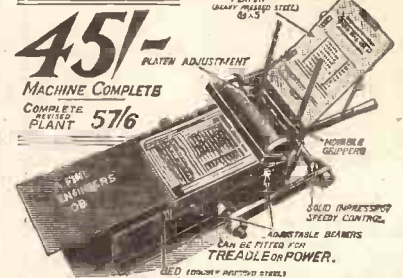
Some Personalities.

Three days before they sail for South Africa on April 20th, Sybil Thorndyke and her husband, Lewis Casson, are visiting the London Studio to present some famous wooing scenes from Shakespeare. On the same boat will be Muriel George and Ernest Butcher, those versatile singers of light comedy and folk songs, who for nearly four years have made regular appearances in the broadcast programmes. From South Africa, George and Butcher may go on to Australia, and it is interesting to hear that their contracts include a number of broadcast performances, for which their long experience promises great success.

A Newcastle Feature.

A charming little eighteenth century opera and one which deserves to be better known "No Song, No Supper," the libretto of which is by Prince Hoare and the music by Storace, with additional numbers by Claude de Ville, will be broadcast from Newcastle on Thursday evening, April 12th. Among the artistes are Alma Vane (soprano), Gladys Palmer (contralto), Ivan Firth (baritone), and Cyril Lidington (tenor).

ADANA AUTOMATIC SELF-INKING PRINTING MACHINE
 NEW ALL-STEEL SUPER-MODEL



The Machine that is Built from the experience of over 10,000 Users of the old Model.

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 Milliammeter, 0-36 Milliamps. Voltmeter, 0-6 and 0-120 Volts. Think of the advantage of this instrument. You can test your receiver for distortion. Find H.T. consumption. Test voltage of H.T. and L.T. Batteries. Accurate. Dependable. High Resistance.
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—Page 21, February, 1928.

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The enormous success of the "Nightingale" Cone Unit has been won on merit—because when used with these famous Sets and with other 3, 4, 5, 6 or 7-valve Receivers, the results show amazing value for money and demonstrate the superiority of "Bullphone" Loud Speaker Units.

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15/-

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With 4-inch Diaphragm.



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CONDENSERS**

are specified for the
COSSOR MELODY MAKER
and the only way to ensure the wonderful results this set can bring is to build faithfully to specification.

0003 MFD

APPARATUS TESTED.

(Continued from page 230.)

THE "P.W." STANDARD WAVE-TRAP.

As readers will remember, some few months ago the "P.W." Research and Construction Dept. produced a standard design of wave-trap. It was the result of some considerable experimenting, the main objectives being a simple, compact and effective device. The innovation was very favourably received and many reports have been to hand confirming its usefulness.

Recently, the London Electric Wire Co. & Smiths Ltd. have placed a version of the "P.W." Standard Wave-trap into production. Essentially it follows the original specification, and it carries with it the well-known "Lewcos" soundness of construction and excellence of finish. It is not anticipated that the design will be superseded for a very long time to come and constructors who pay 13s. 6d. for a Lewcos Standard Wave-trap can rest assured that they have in hand the best thing for eliminating the interfering "local."

AN AERIAL SAFEGUARD.

It is very essential that when a D.C. mains H.T. eliminator is used, the aerial should not be earthed while it is connected to the receiver. A double throw switch is essential. The "Marconiphone" combined lead-in tube and earthing switch fulfils these conditions and also complies with the insurance regulations which demand that the aerial should be disconnected and earthed outside the house, even although the control is from within.

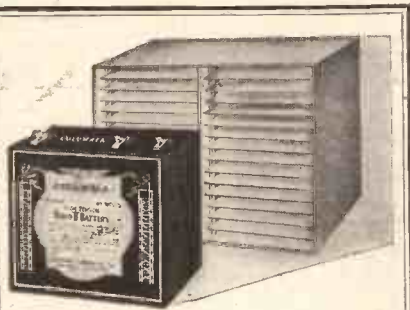
Additional to these very necessary requirements, this latest "Marconiphone" product has other points which will appeal to the practical listener. For instance, the switch is totally enclosed and the terminals are galvanised and capable of resisting corrosion. The large screw portion which passes through the window frame is moulded of high-class insulation material which remains unaffected by damp and other destructive elements. The price, which is 7s. 6d. will be regarded in the circumstances as quite reasonable.

A CHEAP VALVE HOLDER.

Messrs. Eric J. Lever (Trix) Ltd., of Clerkenwell Green, London, E.C.1, recently sent us samples of their new "Trix" valve holders for test. This "Trix" valve holder sells at 1s. 3d. and appears to be uncommonly good value for money. The design is quite conventional, the centre portion is cut away and has sunken sockets. On the base are four small terminals and accompanying soldering tags. On test we found the holder quite satisfactory, the resistance of the moulded material being of the necessary high order and the anti-microphonic properties of the device sound.

RESISTANCES AND CONDENSERS.

The Loewe Radio Company Ltd., of Tottenham, London, N., are supplying separately the resistances and condensers which form part of the internal structure of the Loewe valve. These resistances, which embrace all the usual values for grid leaks, and the condensers, are built into small vacuum tubes. The object of this is to provide them with complete protection against atmospheric influences. Those few specimens we have so far tested, we find very close to the rated values and evidently reliable components.



Columbia "Layerbilt"

A BATTERY AND A HALF

THE Columbia "Layerbilt" has a capacity 32/52% greater than any other battery of the same weight and size—in other words, it has about half as much again electrical efficiency. It will last much longer than the ordinary battery, and is by far the cheapest in the long run.

No waste space, no risk of broken or loose connections.

Used by all discriminating radio enthusiasts because of its performance and economy.

PRICE 25/-

Layer building is a process perfected at immense cost by the world's largest battery manufacturers, and the "Layerbilt" is sold under National Carbon Co.'s full guarantee.

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New Prices: Jars, 1/3. Sacs, 1/2. Zincs, 11d. Sample doz. (13 volts), complete with bands and electrolyte, 4/3, post 9d. Sample unit, 6d. 16-page booklet free. Bargain list free. **AMPLIFIERS:** 1-valve, 19/-; 2-valve, 30/-; 2-valve ALL-STATION SET, £4.—F. TAYLOR, 57, Studley Rd., Stockwell, London

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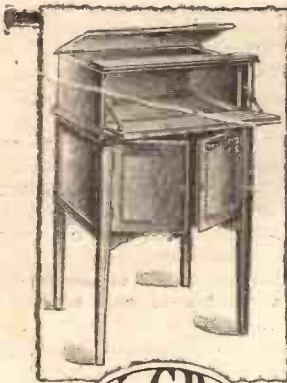
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Your set deserves a V. C. Bond Cabinet. It will not only add distinction to your room as a piece of furniture, but will add to the efficiency of your apparatus.

Our cabinets are made like that—experts in radio and cabinet-making contribute to the beauty of design and sound construction which has made them so popular.

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This combined bedroom chair and trouser-press is not only a piece of distinctive furniture, but a personal servant any man would appreciate.

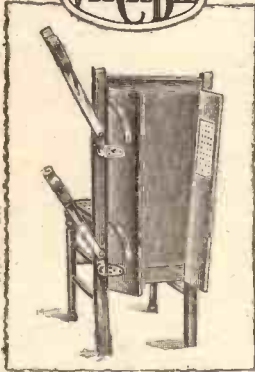
For full illustrated particulars of cabinets and chairs, write or 'phone to

Actual Manufacturers:

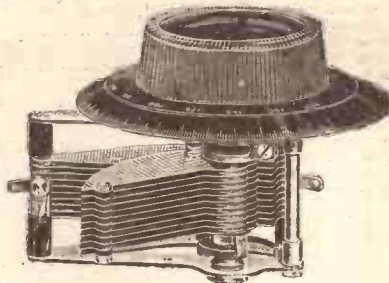
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61, The Grove, Mare Street, Hackney, E.8.

Telephone: Clissold 0883. Est. 1899.
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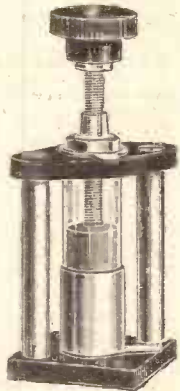


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The startlingly successful record of J.B. Condensers must prove to everyone what masterpieces of design and craftsmanship they are. Almost invariably, when a "Star" Receiver is designed by a radio expert, you find one or more of the J.B. models specified. Not once, mark you, but time and time again.

This is not a unique record, but it does prove the sterling worth of everything which bears the Trade Mark J.B.

Remember, when you are constructing your next Receiver—J.B., the condenser with a record that speaks for itself.



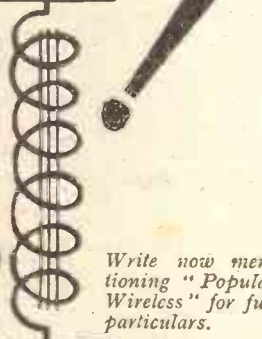
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Where your circuit says use an L.F. Choke be certain it's a Marconiphone if you want superfine results with complete reliability. The Marconiphone L.F. Choke is similar in design to the famous "Ideal" Transformer and undergoes the same rigid tests. Eminently suitable for L.F. amplification, for use in an H.T. supply Unit or Filter Circuit. Inductance 110 henries, D.C. resistance 2,000 ohms. Price 21/-

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A Precision Instrument of universal use, with an ingenious system of multipliers which enable full-scale readings of any value to be made over a wide range. One millivolt to 2,000 v., or 50 ohms to 50 megohms. Mirror double scale, jewelled, knife edge. A £10 De Luxe model for 55/-. Multipliers, 6/6 each. New A.C. Model now ready.



The **ACONEMETER**, Model VAC.3. In Case. Is a new Model for measurement of volts on Alternating Current, a 3-range instrument reading -150 v., 0-300 v., and 0-600 v. Price, inclusive of case, 75/-. Extra for 1,500 volt Multiplier, 44/-.
VARLEY DOUBLE-WOUND CHOKE COILS. Carry 60 m/a and fitted ebonite panel with terminals, ready for use in H.T. Eliminator Filter circuit from the mains. Bargain, 4/6. L.F. Iron-clad Chokes, 1/- each.

WESTERN ELECTRIC TABLE TALKER, 15/-, Cost 35/-. Cabinet Violina, 25/-.
BARGAIN RECEIVERS. Royalty paid. All first-class make. 2-Valve, No. 33 Marconi Lid Case, all waves, 50/-. 2-Valve Mark 32, 250 to 1,800 metres, £4. Western Electric 3-Valve, £6 5s. 3-Valve Aircraft, £4. Polar 4, Pol. Cab., £6 10s. 5-Valve R.A.F. with Valves, £5. 5-Valve Marconi De Luxe, £8. Sterling Surplus Anodized, £5 10s. Marconi R.B.10 Crystal and 1-Valve closed Cabinet. Complete with Valve, 22/6.

GRAMO. PICK-UPS. Magnetic Earpiece Units for making your own 40/- reproducer. Adapted with a little work. Only 1/2 each. Adapted Brown A ready for Pick-ups, 18/-. Magnets, Moving Coil L.S., 3/6.

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From No. 25 1/- to No. 500 4/-

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4 Coils Nos. 3, 5, 7, 9 .. 7/6

"P.W." Test Report, March 10:—"The fact that one of the first stations tuned in was 3 L O of Australia is ample proof that the coils are efficient."

If unable to obtain send P.O. 7/6.

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TECHNICAL NOTES.

(Continued from page 220.)

course, than the above-mentioned 36 per cent) at rather higher frequencies such as those actually met with in practice.

Disadvantages of Large Condensers.

It is obvious that a somewhat larger condenser capacity is desirable and for very selective sets a capacity of .01 mfd. should be used.

On the other hand, it is important to mention—or at any rate it is often argued—that a larger capacity condenser brings with it corresponding disadvantages, in as much as it "takes longer to charge up." Opinions differ, notwithstanding the above-mentioned tests, as to the desirability of using appreciably higher condenser values than those ordinarily recommended in this position.

The Radio Doctor.

In the current number of "The Proceedings of the Institute of Radio Engineers" is an excellent paper entitled "Servicing of Broadcast Receivers," by L. Manley and W. E. Garity, of the Radio Corporation of America. This paper comprises, in effect, a very exhaustive set of instructions for the inspection of radio receivers and for the diagnosis of defects and failures of all kinds. The paper is so long (it covers 25 pages) that it is impossible for me to give more than the very briefest account of the ground which it covers.

The failure of receivers is classed broadly under the following heads: Lack of operating experience on the part of the user; location; defective accessories; open circuit; short circuit; high resistance connection.

It is interesting to note the authors' suggested list of tools and apparatus which should be possessed by anyone undertaking the inspection and care of receivers. The list is as follows: Set of tested valves; multi-scale voltmeter of good quality; pair of headphones; large and small screwdrivers; small soldering iron; solder and non-corrosive flux; spare wire and tape; test leads with clips; pipe cleaners; large piece of cloth; set of high-tension and grid-bias batteries (small).

My readers will find it interesting to make out their own lists and see whether they agree with the authors' in regard to the list just given.

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THE leading descriptive writers of the day contribute to WONDERFUL BRITAIN, which is one of the finest pictorial records of historic places and beauty spots in the British Isles yet produced. When complete, it will contain no fewer than 1,500 photographs printed on delicately toned paper by the new phototone process, which imparts a rare beauty and richness of production.

A good idea of the interesting manner in which the work is arranged can be gathered by the contents of Part 3, now on sale. This part includes beautifully illustrated articles on the Bath Road of Yesterday and To-day; Histories of Chester and Shrewsbury; Tithe Barns and their Ancient Use; Sport and Pastimes Through the Ages and Scottish Brochs and Irish Round Towers.

WONDERFUL BRITAIN can be obtained from any newsagent, bookstall or bookseller. The first three parts are now on sale.

A.C. or D.C.?

Do you know a simple way for determining whether the electric supply in a house is direct-current or alternating-current?

The obvious thing to do is to go and examine the electricity meter, but that is not always possible; in any case, it is very handy to have a simple test.

If a neon lamp is switched into a lamp-holder and switched on it gives a ready indication as to the nature of the supply. If there is a permanent and noticeable difference in the glow from the two electrodes the supply is D.C., but if the two electrodes glow more or less similarly the supply is A.C. This test, however, is only applicable for the 200-250 volt range.

Probably the simplest test of all is simply to take any bright, straight object such as a metal pencil, and, standing in the light of an electric lamp, to move the object to and fro fairly rapidly.

If the current is alternating you will get a "cinema" effect, and will be conscious not of a single pencil but of a row of pencils side by side. This test requires just a little practice, but once you get the idea you can instantly distinguish A.C. from D.C. even by means of the light reflected in this way from your finger nails, moving the hand to and fro fairly rapidly.

A further test is to connect a high-resistance loud speaker across the mains and notice if there is a low hum or drone. This will be obtained with alternating current, whereas with direct current there may be a fairly high-pitch note, which is due to commutator ripple.

BELL'S WIRELESS WAX

RED and BLACK.

Highly Insulating. For Flex and Cable Ends. A Match Melts It. Does not Stick to Fingers.

Useful for filling holes in panels, etc.

Price 1/- per Stick or 10/6 per Dozen Sticks with directions.

To be obtained from all leading wireless dealers or post free 1/1 per stick from the manufacturers.

Sample stick, post free, 6d.

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THOUSANDS OF VALVES have been accidentally burnt out. Protect yours permanently, cheaply, with a "SAFETY-FIRST" WANDER PLUG.

Send stamp for descriptive list.

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The LITTLE CELLS that SATISFY

are now obtainable made up in 66 volts, e.g., 48 cells in a neat box. The Eton Primary Wet H.T. Battery is yours for 7/6, and 1/6 weekly to complete purchase price, 25/-. Cash price, 22/6. This is a special offer you shouldn't miss. Send 1/4 stamp for booklet giving full particulars to:—

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Price 1/6

Whatever you do don't miss the April double number of "Modern Wireless." It contains a 20-page special Solodyne Supplement, in which you will find useful notes on the 1928 Solodyne, details for modernising the original 1926 model, and full constructional details of a new

THREE VALVE SOLODYNE TOGETHER WITH 1/- BLUE PRINT FREE

The latter is for the economist—the man who wants a first-class Solodyne set for which he can use components already "on hand." Three distinct versions of this famous three-valver are given—three articles showing how the set can be made in different ways so as to absorb components you have already by you as "spares."

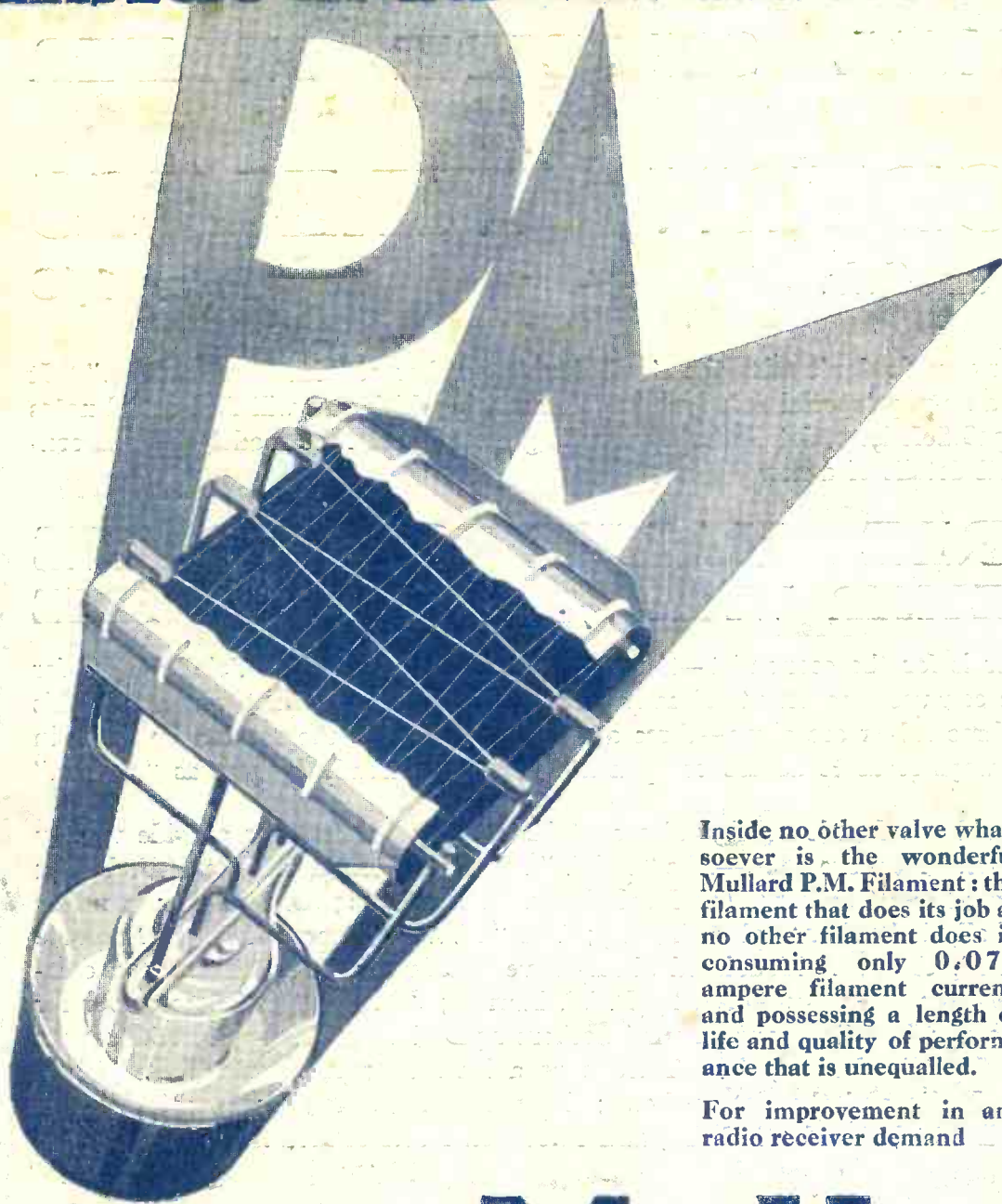
This magnificent double number also contains many other features of wide variety and interest. Here are a few—The "M.W." Station-Getter (a reliable H.F. Unit); The Perfect Loud Speaker; The Dual Nature of Electrons; One-Valvers (a useful survey of all kinds of one-valve circuits); The "M.W." "Avac" Unit (an Accurate Voltage A.C. Unit); A Modulated Short-Wave Oscillator; The Calibrator (a combined oscillator and wave-meter, by P. W. Harris); "3 S W" (a Three-valver for Short Waves); The Greyhound Four (another fine D X Receiver by C. P. Allinson); Selective Crystal Circuits; The Tetrode as a Detector; A Simple H.F. "Ohm-meter"; Radio and the Gramophone; Reception Realities; Automatic Volume Control; Latest News about Radio, and Television Notes of interest to all, etc., etc.

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Inside a Mullard P.M. Valve



Inside no other valve whatsoever is the wonderful Mullard P.M. Filament: the filament that does its job as no other filament does it, consuming only 0.075 ampere filament current, and possessing a length of life and quality of performance that is unequalled.

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