BAIRD TELEVISION AS WE SAW IT

Amateur Wireless And Electrics

SIXTY PAGES 3d.

Vol. XIII. No. 330 Saturday, October 6, 1928

Other Prominent Features of this Issue:

THE "HOME 2" :: THERMION LOOKS BACK AT THE SHOW
TRACKING TROUBLES :: WINDING "FIGURE 8" COILS

Registered at the G.P.O. as a Newspaper

Amateur Wireless and Electrics

The Leading Radio Weekly for the Constructor, Listener and Experimenter

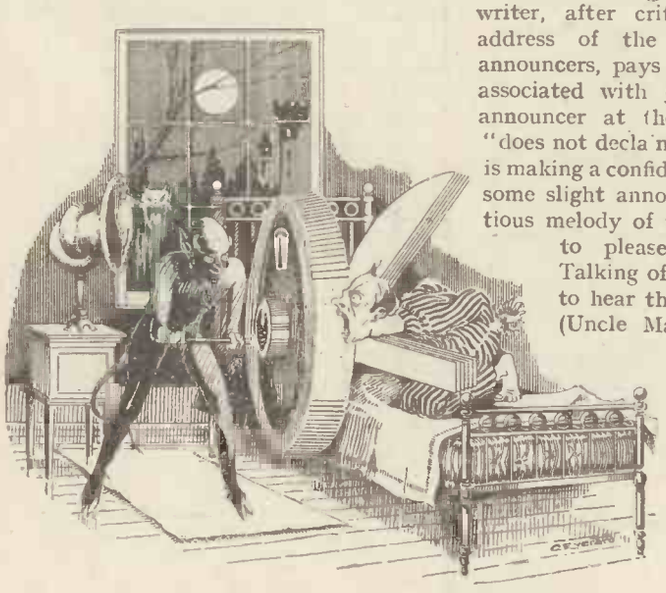
Edited by BERNARD E. JONES

Vol. XIII. No. 330 — Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E. — OCTOBER 6, 1928

Brighter Studios—The B.B.C.'s Side-show—Our Charming Announcers—Sir James Barrie—Fultograph in Germany—Next Week's Sets

Brighter Studios—Looking in at the new No. 3 studio at Savoy Hill (writes our B.B.C. correspondent), I was able to see the decorators putting the finishing touches on the new "futuristic" design for which Mr. Oliver Bernard was specially commissioned by the B.B.C. Gone are the drab grey drapings, now replaced by brightly coloured painted walls, backed by felt and arranged to introduce a pleasant amount of echo. The children's hours will be given from the new studio when it is ready in about a month's time, as well as chamber music programmes and ballad concerts.

The B.B.C.'s Side-show—Many visitors to the Exhibition expressed disappointment at the B.B.C. "side-show" which consisted of a series of cardboard models, depicting the growth of musical appreciation from "B.C. to B.B.C." The studio set up two years ago, when the listener could see some of his old favourites actually broadcasting, was a very much better idea, which, we suggest should be utilised again at next year's show.



OLYMPIAN DREAMS.—He *would* have the latest components

Sir James Barrie—Scottish listeners will be able to hear Sir James Barrie on October 15, when the ceremony of his reception of the Freedom of Jedburgh is to be broadcast. In view of the fact that this is Sir James's wireless debut, it is regrettable that the occasion is not to be an "S.B." broadcast. The B.B.C. explained to us that as the ceremony takes place in the afternoon they are unable to avail themselves of the G.P.O. long-distance land-lines, which, during the day, are required for commercial purposes. They point out that the only alternative will be the wireless link, involving unavoidable atmospheric mutilation which would probably mar quality considerably.

Our Charming Announcers—A Belgian writer, after criticising the manner of address of the Continental broadcast announcers, pays a great tribute to those associated with 5XX and 5GB. "The announcer at these stations," he says, "does not declaim; you would say that he is making a confidence. He does not change some slight announcement into a pretentious melody of words. He does not try to please, and thus he pleases." Talking of announcers, we are glad to hear that Mr. Derek McCulloch (Uncle Mac) has now returned to the microphone as a regular announcer.

The Fultograph in Germany—An experimental picture broadcasting service using the Fultograph system is, we understand, shortly to be inaugurated by the Berlin broadcasting station. From ten to twelve pictures a day will be broadcast during the probationary period. German and British listeners with Fultograph receivers will thus be able, in a few weeks' time to pick up line drawings from at least two different sources. Dr. Bredow, the German State Commissioner for broadcasting, states that the Fultograph is the simplest system yet devised and that the cost is comparatively low.

Television As It Is—On page 502 of this issue we give an authentic and independent account of the progress of the Baird television system. The article is of special value in that readers will now be able to gauge the exact state of the new science.

Next Week's Sets—Continuing with the good things of the new season, the AMATEUR WIRELESS Technical Staff will, next week, describe the latest thing in "straight" three-valve short-wavers. Preliminary details of a remarkably efficient modification of the Reinartz system, as embodied in a new two-valver, will be given by Dr. E. H. Chapman, who has given AMATEUR WIRELESS the benefit of considerable experience with this type of circuit. In a recent bench test of the new Chapman set we were greatly impressed with the sharpness of tuning—which, due to the new system, is not achieved at the expense of volume.

PRINCIPAL CONTENTS

BROADCAST ARTISTES IN PICTURE

WISH WYNNE.—One of the most brilliant entertainers in the B.B.C. programmes. Her songs and sketches have won world-wide fame, and on the variety halls of the world she is a comedy queen. She was heard by listeners very recently.

LEONARD GOWINGS.—Lately heard again from 2LO and other stations, Mr. Gowings, justly termed England's leading tenor, has long been a broadcaster. Few artistes can approach him for exquisite tone and clarity of diction.

HELENA MILLAIS.—No one will forget "Our Lizzie," the coster girl who was heard with John Henry and Blossom in the early days. Her sketches are always enjoyable. She is a Shakespearean actress, too, one of her finest roles being Katherine in "Taming of the Shrew."

VAUGHAN WILLIAMS.—Few modern composers are better known than Mr. Vaughan Williams, whose works have been made into special programmes for broadcasting. His best known works are "The Wasps," "A Shropshire Lad," and "On Wenlock Edge."

DORIS LEMON.—A noted artiste of the B.N.O.C., and in private life the wife of William Michael, also a well-known opera star; there are very few roles in which she has not scored success. One of her most successful is as Siebel in "Faust."

RICHARD STRAUSS.—The famous German composer whose name has become a household word because of the sheer originality and force of his work. Few listeners, perhaps, know his operas, "Salome" and "Electra," as it is usually his concert tone-poems that are heard.

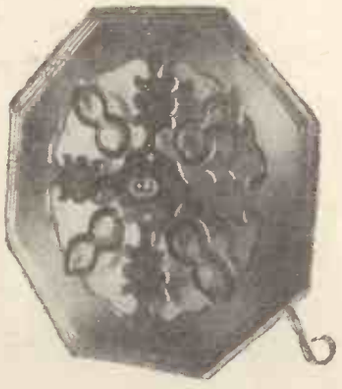
EILEEN ANDJELKOVITCH.—This brilliant Russian violinist has been heard from 2LO in works of Beethoven and Tcherniak, as well as during Proms. She has broadcast many times, and is famous for richness and power of tone, as well as wonderful technique.

PARRY JONES.—Another B.N.O.C. singer with a wonderful gift for interpretation, Mr. Jones was heard to best advantage in a recent Wagner-night Prom. concert. He has been heard both from wireless studio and opera stage; one of his best roles is in "Tannhauser."

LEILA MEGANE.—A great classical vocalist, Miss Megane has been heard at many concerts at the Wigmore and other concert halls. She has an exceptionally wide range and is a good broadcaster. She was recently heard from the National Concert of Wales, at Cardiff.

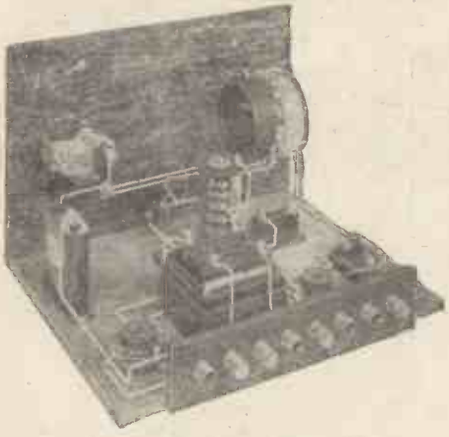
The HOME 2

A Simple Good Quality Loud-speaker Set for Family Use



By ARTHUR YORKE

AS its name was intended to suggest, the two-valve receiver I am about to describe was designed for home use. A few preliminary instructions to the non-technical members of the family will put them in the position of being able to tune in



A rear view of the "Home 2"

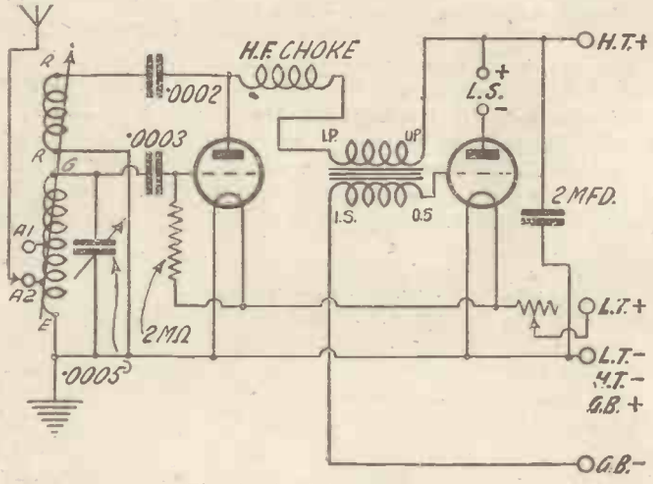
the local station and the long-wave Daventry on the loud-speaker without the slightest difficulty.

The main features in the design of the "Home 2" are, (1) good-quality loud-speaker reproduction, (2) all-wave tuning without coil changing and (3) a unique system of reaction.

Most readers will agree that pleasing reproduction is the greatest requirement of the "family" listeners, who judge a receiver simply by its results and not by the circuit incorporated.

Limiting ourselves to two valves (which is all a considerable number of listeners can afford) greatly restricts our method of coupling together those valves. In fact, for loud-speaker work there is only one practicable method to use a detector valve with reaction and couple it to a low-frequency amplifying valve by means of an inter-valve transformer. This arrangement, with suitably chosen valves, a good make of transformer, sufficient high-tension supply and a moderately good cone loud-speaker will provide a quality of reproduction that will not offend the ear of any but the most fastidious.

Everything depends on the choice of accessories and results will vary considerably according to the way in which the fundamentally simple circuit is interpreted in terms of valves, batteries and so on.



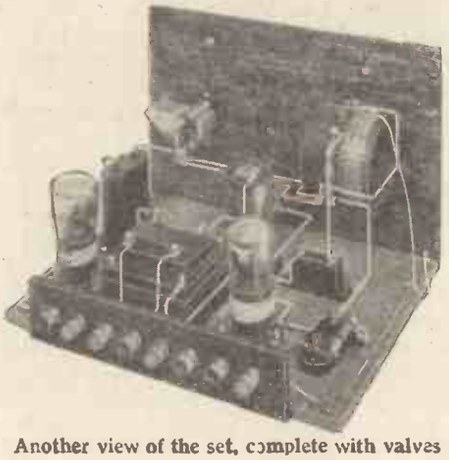
The circuit of the "Home 2"

All-wave tuning without coil changing is a definite requirement in a family type of receiver, if the greatest use is to be made of the long and short-wave transmissions without tedium.

Two Wave Bands

I have used the Wearite all-wave reaction tuner in the "Home 2" because it provides a simple means of covering the two wavelength bands of 250 to 550 and 1,000 to 2,000 metres. The tuner comprises two solenoid windings wound on an ebonite tube, inside which is arranged a smaller tube carrying a slotted reaction winding. The whole device is easily fixed to the panel and is provided with a dial for rotating the reaction winding.

A small auxiliary knob on this dial controls a spindle running through the rotor and stator sections of the tuner, contacts being arranged so that when this knob is pushed in the long-wave winding is brought into action and when pulled



Another view of the set, complete with valves

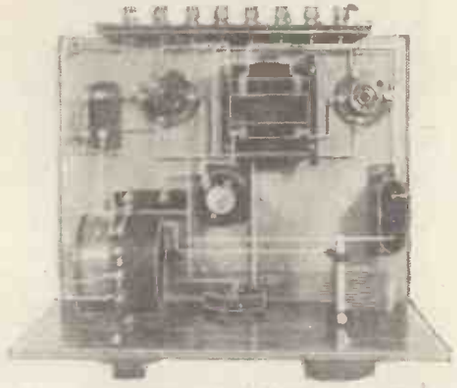
"THE 'HOME 2'" (Continued from preceding page)

out the short-wave winding is available.

The Wearite tuner avoids the trouble of changing tuning and reaction coils when a different wavelength band is required. Moreover, as two aerial tappings are provided, the selectivity can be varied according to requirements.

A Special Reaction System

Arising out of the use of this tuner is the



Few components are required as this plan view shows

inclusion of a special system of reaction, which can best be described as a reversal of the usual Reinartz system. Instead of a fixed reaction coil and a variable condenser I used a variable reaction coil and a fixed condenser. The tuner was intended to be used with magnetic reaction, but the increased smoothness of reaction associated with the Reinartz system can quite easily be obtained by the suggested modification.

As can be seen from the circuit diagram, a .0002-microfarad fixed condenser in series with the reaction coil of the tuner is shunted across the anode of the detector valve and earth.

The only extra component required with this special system of reaction, over and above those used with magnetic reaction, is a high-frequency choke, which has to be inserted between the anode of the detector valve and the primary of the low-frequency transformer. The .0002-microfarad fixed condenser would, in the ordinary way, be shunted across the primary to by-pass the high-frequency energy to earth and thereby assist magnetic reaction.

Now, however, it is used to by-pass the high-frequency energy through the reaction coil, the choke serving as a barrier to this energy. In my opinion the additional expense involved by the high-frequency choke is more than justified by the increased smoothness of reaction, which is actually just as good as with the orthodox Reinartz arrangement.

Apart from this reaction modification there is really very little that need be said about the theoretical circuit diagram. As usual, a .0005-microfarad tuning condenser is connected across the tuning coil. Rectification is obtained by the usual grid-leak and condenser connections and it is only necessary to point out that, as the earth end of the tuning coil is connected to low-tension minus, the grid leak cannot be shunted across the grid condenser but has to be connected between the grid and low-tension positive, otherwise the grid will be negatively biased.

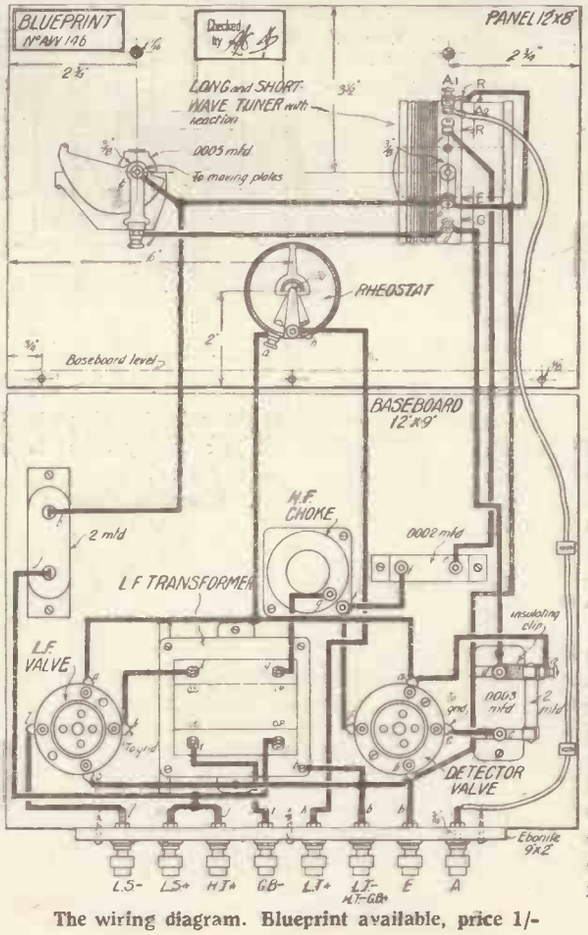
The low-frequency amplifying valve is coupled to the detector by means of the low-frequency transformer in the usual way. A filament rheostat wired in the positive low-tension lead controls the filament current of both valves.

A 2-microfarad fixed condenser across the high-tension battery may be considered as something of a luxury and can be omitted if expense is a great consideration. Only one high-tension positive terminal is provided so that both detector and low-frequency valve receive the same potential, which can be about 120 volts.

Turning now to the constructional aspects of the design I give below a complete list of the components and parts required.

Components Required

Panel, 12 in. by 8 in. and strip 9 in. by 2 in. (Raymond, Becol, Ebonart, Paxolin).



The wiring diagram. Blueprint available, price 1/-

Baseboard, 12 in. by 9 in. (Camco).

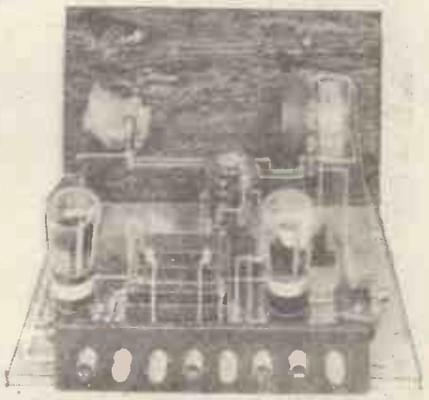
One .0005-microfarad variable condenser (Formo 1928 De-Luxe, Burndept, J.B., Ormond, Polar "Ideal").

All-wave tuner (Wearite type, W.G.2.)

7-ohm variable rheostat (Lissen, Igranic, G.E.C.).

Two dial indicators (Bulgin).

Two anti-microphonic valve holders (Trix, W.B., Wearite, Benjamin).



The construction is particularly simple

.0003-microfarad fixed condenser with series clip (Dubilier, Lissen, Graham-Farish, T.C.C., Trix).

.0002-microfarad fixed condenser (Dubilier, Lissen, Graham-Farish, T.C.C., Trix).

2-megohm grid leak (Dubilier, Lissen, Graham-Farish, T.C.C., Trix).

2-microfarad fixed condenser, (Ferranti, Dubilier, Lissen, Graham-Farish, T.C.C., Trix).

High-frequency choke (R.I. and Varley, Burndept, Wearite, Watmel, Trix).

Low-frequency transformer (3 to 1 ratio) (Bowyer-Lowe, Ferranti, R.I. and Varley, Lissen, British General).

Eight terminals marked, Aerial, Earth, L.T.—, L.T.+, G.B.—, H.T.+, L.S.+, L.S.— (Belling-Lee, Eelex, Igranic).

Connecting wire (Glazite).

Half a yard of thin flex (Lewcos).

When all these parts have been obtained the ebonite panel should be drilled to take the variable condenser, the Wearite tuner and the filament rheostat, which, as the illustrations indicate, are symmetrically disposed on the panel. Looking from the back of the panel, as in the reduced reproduction of the full-size blueprint, you will see that the variable condenser is on the left, the tuner on the right and the rheostat between these two. The panel with its components in position can then be screwed to the baseboard and the terminal strip which should have also been drilled to take the battery, aerial, earth, and loud-speaker terminals, fitted to the back of the baseboard.

(Continued on page 529)

Thermion Looks Back at the Show

YOUR THERMION'S first impression of Olympia, when he arrived an hour or so before the opening time on the first day, was that it wasn't going to be easy to see the show at all! From the doors away into the dim distance stretched a queue of enthusiasts, each prepared to spring off the mark like a sprinter as the clock struck eleven. Let me see, what was it the croakers said about wireless when broadcasting first started? They gave it about six months to live, I think! Anyhow, this year's queue began to form five hours before the Exhibition was due to open, and people were so eager to get in that they actually crawled under the big roller shutters as soon as these began to go up. Yes, on the whole, I rather fancy that the popularity of wireless will linger on for a few months yet.

The Best Show Yet

I knew before it opened that it was going to be by far the most thrilling show that we have yet had, for there were many surprises in store; but all my expectations were exceeded when it came to a tour round the stands. There was so much to see that I could have done with a fortnight instead of a week of Olympia.

It was only natural that a big proportion of the throng should have come with the television exhibit as its main goal. Television is by far the most wonderful thing that wireless has so far accomplished, and high hopes had been raised by preliminary announcements concerning the new apparatus. Not so very long ago, as the result of tremendous experimental work, combined with brilliant invention, Mr. Baird had got as far as being able to produce on a small screen a misty image that was just recognisable as a human face. To-day he can transmit and receive moving images of quite excellent quality. The progress made in twelve months is little short of astonishing. I don't, think however, that we have yet reached the stage at which television is sufficiently developed to become a hobby for the many. The apparatus is necessarily expensive and its current demands are very big.

To my mind, the most interesting of all the wonderful things to be found at the Exhibition were the new valves. Not everyone has realised that in the pentode we have made one of the biggest steps forward that have taken place since Lee de Forest first stuck a grid between the filament and plate of the original two-electrode valve. Don't imagine that the pentode was invented about three weeks ago and suddenly blossomed out in its perfect state at the Exhibition. It is the result of a very long series of painstaking experiments and represents the overcoming of astonishing difficulties in design and manufacture.

Two views of the Exhibition from the Gallery

The Valve of the Future

In some quarters there appears to be a tendency to regard the newcomer with suspicion and to advise the public to await developments. Well, I have been using pentodes for a great many months now, and I am satisfied that this, or something very like it, is the valve of the future. The only trouble is that it is exceedingly difficult to manufacture (just think what it means to fix in their exact positions one filament, three grids and a plate—and to make them stay put), and it is not likely that it will be available in any quantities for general use for some little time. The pentode certainly wants a good deal of H.T. current (somehow, I don't think it will go too well in portable sets with tiny dry batteries), but it does deliver the goods. As soon as we get a satisfactory output transformer for it—and this is promised speedily—we shall have a single valve capable of doing all the work of several super-power valves in parallel and of replacing all by its little self two ordinary L.F. stages.

There are some wonderful new loud-speakers. I have said more than once that one of the drawbacks to the early models of moving-coil speaker was that you needed a room about the size of a cathedral in order to give them full play. If you reduced the volume it ceased to deliver the low notes properly. The latest models will give the moderate volume that most of us want.

My Wireless Den

by W. JAMES

Some Weekly Notes for the Amateur and Experimenter

FROM what I have heard of amateurs' sets, I have come to think that too many of them do not worry sufficiently about the elimination of background noises. In a local-station set, these noises spoil the clarity of reception while in the case of the DX set, they make searching next to impossible.

The sources of noise are many, but a component that is often guilty is the grid leak. A good grid leak, of course, has a constant and definite value of resistance, but those that are not good seem to vary their resistance at a fairly low frequency—hence the noise.

As a rule, grid leaks are satisfactory, but now and again one meets a faulty sample; and if one is troubled by noises it is just as well to test this component immediately.

The simplest way, of course, is to try a substitute, but if a spare one is not to hand, short-circuit the old one with a piece of wire or with the hand. If the noises cease you have no further need to search.

Reaction Control

Jerky reaction is worse than no reaction at all. There must be no backlash, by which I mean that the receiver should begin to oscillate and stop oscillating at the same setting of the dial. In some receivers I have known the reaction control has been most unsatisfactory. As the control was tuned slightly the circuit has suddenly burst into oscillation and has continued to oscillate even when the control was turned back several degrees past the point where oscillation commenced. A circuit with such a feature is, in my opinion, next to useless, and I advise any listener who is suffering in this way to concentrate immediately on putting things right.

A corrective which I have often used with success will be understood by reference to Fig. 1. Here the grid leak is seen to be joined not to the negative or positive side of the filament, but to an intermediate voltage point on the grid-bias battery.

Of course, the circuit values should have been properly chosen in the first instance, but when it is inconvenient to make major changes this simple alteration is worth carrying out.

A "Popular Fallacy"

One often reads that a damaged transformer may be used as a choking coil in a receiver, but I am rather inclined to view this "tip" as a "popular fallacy!"

As a rule it is the primary winding which fails and if the ratio of the transformer is, say, 3 to 1, and the inductance of the primary is 40 henries the inductance of the secondary will be nearly 360. But, and this is the point, this value of inductance will only be obtained when the current passing through the windings is very small, and it would, therefore, be useless to use the secondary winding of the transformer as a choking coil, anywhere where it would have to carry a current in excess of about 1 milliampere.

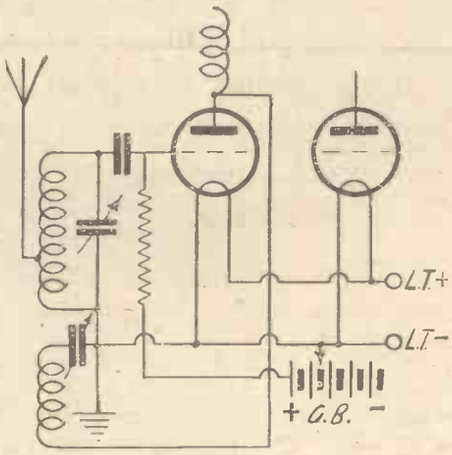


Fig. 1. A Method of Stabilising Reaction

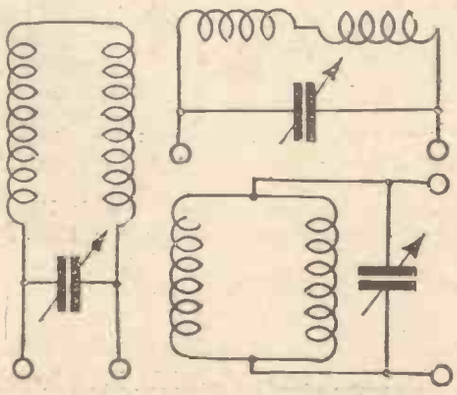


Fig. 2. Diagrams of Astatic Coils

It would be asking for trouble, for example, to use the secondary winding as a filter choke, since the current passing would be several milliamperes; the inductance would be considerably less than 60 henries and probably the wire would not stand the current for long.

A position where the transformer may be employed as a choking coil is in the anode circuit of the detector valve, when the detector is of the anode-bend type for then the current will be very small. When the leaky-grid-condenser method is used the current will be of the order of 2 or 3 milliamperes, which will be sufficient completely to spoil results.

Thus, say I, always consider before you retract a damaged transformer from your junk box with intent to use it in this way.

That H.F. Stage!

In the receivers of many amateurs, I regret to notice, the high-frequency stage is often a passenger. It complicates the operation, certainly costs money and performs no useful purpose. It seems to oscillate more than amplify.

With a little care an H.F. stage that really magnifies can be made. I usually obtain a pure radio-frequency magnification of at least 40, while the total amplification is in considerable excess of this owing to certain reaction effects which are present.

The trouble in many H.F. stages is due to inadequate screening while tuning coils should always be wound astatically as indicated in Fig. 2. Where there are only two coils, however, they may be of the ordinary type as long as they are mounted at right angles.

A Neat Arrangement

Of the many neat and attractive accessories I saw at the Show last week, one that particularly took my eye was a combined accumulator and charger contained in a nicely finished metal case. There was a switch on the case and two pairs of wires, one to be joined to the L.T. terminals of the receiver and the other having a plug adaptor to an electirc supply point. As I say, I liked it and ordered one on the spot.

The goodness of a valve—its value to you as a listener—is measured by what is known as "slope."

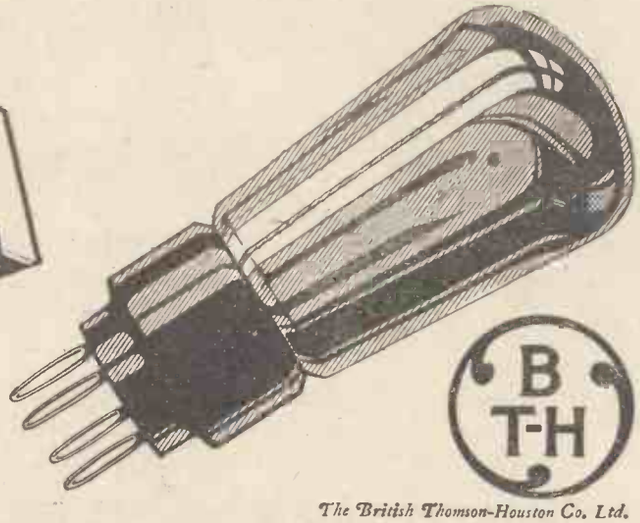
Mazda Nickel Filament Valves—because they, and only they, have nickel filaments—have higher slope values than any other valves of corresponding types. They are the best valves in the world, and are made in 16 types, covering every requirement of the 2, 4 and 6 volt user.

MAZDA

Steep Slope

NICKEL FILAMENT

VALVES



B T-H

Ask your dealer for the valves with the nickel filament. They cost no more than ordinary valves

3030

The British Thomson-Houston Co. Ltd.

On Your Wavelength!

If Winter Comes——

CAN spring (cleaning) be far behind? This doesn't seem to apply to wireless men, whose annual spring cleaning usually takes place shortly after the Radio Exhibition, just before winter comes. All of us stepped homeward from Olympia laden with catalogues, characteristic curves, and extravagant resolutions, convinced that our sets weren't quite so good as we thought. In order to bring our outfits up to date we have to buy this choke, that pick-up, and those valves—and possibly *the* loud-speaker. We wallow in the thought of all this self-indulgence, extravagance that we considered we deserved, all things being considered. Then we awakened with a start; and the conductor smiled as we alighted from the right bus going in the wrong direction.

" The " Loud-speaker

Which is "the" loud-speaker at this year's exhibition? Opinions differ on this point, some favouring one or other of the moving-coil loud-speakers, others preferring a special "super-balanced" reed-operated cone, and still others "plumping" for a common or garden cone. I am not going to say what I consider to be "the" loud-speaker at the moment. As a matter of fact, I haven't quite decided which of the new loud-speakers I like the best; but you may take it from me that the moving-coil loud-speaker has, at last, a rival or two.

Gramophone Progress

One of the most interesting talks of the week was that entitled "From Cylinder to Disc," a lecture with musical illustrations of the progress of the perfection of the modern gramophone and gramophone record. Examples of very early cylindrical records were played into the microphone on one of the early talking machines, and a most extraordinary noise it proved to be! It rather reminded me of a Sunday evening just before the B.B.C. commenced broadcasting in 1922, when the amateur transmitters made the ether hideous (though not unamusing) with their gramophone tests and near-scientific back-chat. "Them were the days"—when 2OM (Brentford) was the oracle of the aerial amperes in the London area, supported by 2ON (Walthamstow), 5CP (Ealing), 2SZ (Mill Hill), and 5HY (Finchley). And who could forget the shriek of partly rectified A.C. behind the telephonic transmissions of 5LP (Golders Green).

The Proms.

Sir Henry Wood has every reason to be pleased with the "tie-up" of the Promenade Concerts with the B.B.C. Even the most "anti-broadcasting" musicians have to admit that, in spite of the fact that this season's concerts having been on a somewhat higher level than that of previous years, the performances have never been so popular or well patronised. The suppression of the sickly royalty ballad and the publicity of the microphone have both helped towards the success of Sir Henry's efforts. Huge crowds have been turned away on Wagner nights, while the programmes of the three great "B's"—Bach, Beethoven, and Brahms—always attracted full houses. Most unlikely people seem to have fallen under the spell of one or other of the great masters. Your THERMION is not a musical man by training or scientific spoon-feeding, and even he has succumbed to the lure of Brahms. There must be thousands of other non-musical people who have also discovered that some of this so-called "high-brow" stuff is not really out of their depths.

More and More and More

As I write, the Exhibition attendance figures are not yet available; but, from what one saw of the throngs who came and went unceasingly all day and every day, they must have been easily a record. One very gratifying sign of the times was to be found in the number of foreign languages that one heard spoken, for this meant that buyers from abroad had come in numbers to purchase from our manufacturers. In previous years the industry has been severely handicapped both by the big royalties and by the limited licence, which altogether prohibited export to some parts of the world. Now that the reduced royalty scale has been adopted by the Radio Manufacturers' Association, British sets have a good chance of getting a firm hold all over the world. Our wireless trade has grown in just a few years from a turnover of half a million to one of about ten million pounds. It is, in fact, rapidly becoming one of our most important industries. An immense new field is opening now that trade can be done with so many more countries.

A Comparison

I was not able to go this year to the German Wireless Exhibition, which was held just a little before our own; but I had a long talk the other day with a friend who had spent some time at the Berlin show. His general impression was that the Germans can teach us very little with regard to wireless. In the matter of high-frequency amplification they are far behind. They undoubtedly *can* make sets that will give excellent quality—but somehow they don't seem to do so. It is curious to notice what extraordinarily bad reproduction the average German will stand, for all his well-known love of music.

German Components

There were heaps and heaps of loud-speakers at the German Exhibition, but very few that would be good enough to please the more critical ear of the British broadcast listener. Much of the apparatus on show struck my friend as antiquated; basket coils—now rarely seen here, except in museums—are in common use in Germany, and still find a ready sale. Swinging-coil holders, too, which most of us have not used for years, are seen both as separate components and as part of numbers of complete radio sets. Prices are very low, for royalties are small, but in many cases the craze for cheapness is reflected in the quality of the apparatus. There were some first-rate sets on view at prices getting on for the equivalent of £100, but there seemed to be few buyers. The Germans don't seem to be nearly so advanced as ourselves in the use of such things as mains drive, or screen-grid or pentode valves.

Are Frames Directional?

Every now and then we read articles showing how beautifully directional the frame is, but no sooner have we digested them than some expert comes along to demonstrate that they are hardly directional at all. He proves from experiments that he has made in his own home that you can turn the frame through "umpteen" degrees without reducing the strength of a transmission that has been tuned in. That seems to clinch the matter, does it not?

The Experimental Test

Really, it doesn't do so a bit. So much depends on the home in which the experiments are made. If you have a good deal of metal in the walls of the building, or if there is a whacking great outside aerial connected to it, you probably won't find that the frame is particularly directional. The real place to make experiments is out in the open air in some unscreened place. You will find that if you tune in a weakish transmission with a sensitive set, the aerial shows a very marked directional property. You may be able to turn it a few degrees one way or the other without making much difference but if you increase the movement you will notice that signal strength declines rapidly. With the long-distance set, when there are two stations on wavelengths very close together you can often cut out whichever you don't want by a slight turn of the frame, provided, of course, that the transmissions come from rather different directions.

Awarded the Biscuit

I really think that I must award the largest size in biscuits to the announcer of

On Your Wavelength! (continued)

WLW, the American station at Cincinnati, who gave out recently, "The orchestra will now play two classical pieces—set to music." The orchestra then obliged with syncopated paraphrases of Liszt's "Liebestraum" and one of Tschaikowsky's waltzes. Gee whizz!

Television in America

Much interest is being aroused in the States just now by various television systems which have been developed over there. Experimental transmissions are being made from quite a number of stations, whilst two, at least, promise regular services in the near future. KDKA is to begin in a week or two and WRNY (which is relayed on 30.91 metres by 2XAL) is to devote five minutes of each broadcasting hour to television. A short time ago WGY tried a big experiment which was moderately successful. A play was given in the studio whilst on a miniature stage tiny marionettes duplicated the movements of the actors. The actors were broadcast in the ordinary way and the puppets televised.

Film Transmissions

KDKA was also responsible for a very wonderful transmission. A cinematograph film was actually transmitted by wireless and reproduced satisfactorily by a station some distance away. All the transmissions made in America are still entirely experimental, and it should be pointed out that a television receiver will work properly only in conjunction with the transmissions made upon the system for which it is designed.

Now is the Time

As soon as summer begins to give way to the colder and darker autumn, wireless really comes into its own. There is a great deal of pleasure to be got out of listening in summer time (except in a phenomenally atmosphericky summer such as the last), but one can seldom obtain reception of real quality from distant stations during the lighter part of the year, owing to the amount of H.F. amplification that must be used and the sharpness of tuning that is required for DX work under difficult conditions. In autumn, winter, and early spring there are heaps of stations, both in this country and abroad, which come in so powerfully that the set need not be worked in a very sensitive condition so that quality is really obtainable.

A Suggestion

I am getting wonderful reproduction on the loud-speaker just now from Toulouse, Cologne, Munster, Kattowitz, and Budapest, to mention but a few. In a week or two matters will be even better, and then is the time that one really appreciates the variety of entertainment afforded by a big receiving set. If you cannot manage to build a big 'un this year, why not add a high-frequency stage to your present little 'un? It makes a world of difference to the pleasure to be derived from it. Or, if you already receive a good many stations on the telephones, think about fitting up a second L.F. stage which will enable them to go on to the loud-speaker. The addition of a good note-magnifying stage to an existing set means, as a rule, that any station which was previously of moderate telephone strength will now give loud-speaker reproduction.

AN OLYMPIAN ROMANCE

I met her at the Exhibition,
She filled me with surprise—
A perfectly enchanting vision,
A sight for tired eyes.

Her dial certainly was plain
Though when rubbed with a flannel
She had a highly finished stain
Upon her polished panel.

She was a most attractive witch,
For her I felt I'd die, sir,
What matter if she wore a switch—
It made her all the nicer!

I asked her if she'd like to wed
Or if she had a bias,
"She'd love you to," the salesman said
(The knowing Ananias!)

I took her home that very day,
She proved a great attraction,
But later I regret to say
There came a slight reaction.

At first she howled most dreadfully
Whene'er we chanced to roam, sir,
But now she's very pleased with me
For giving her an ohm, sir!

A Nasty Knock

The other day, on a visit to the Furzehill Laboratories, I found an apparently harmless-looking condenser standing in solitary isolation on the corner of a bench. There were two wires connected to it, but they did not seem to be part of any particular circuit, and, in fact, one wire was connected to the earth bus-bar running round the laboratory. So, cheerily like, I pushed my fingers across it and said: "What's this little beast doing?"

I discovered the next moment that it was doing something fairly useful—at any rate, to judge by the nasty kick that I got. I found, on looking into it, that the condenser was connected to a lead used to earth the metal framework of a dictaphone machine, and it happened that there was a leak on the motor or something, rendering the framework live. The result was anything up to 240 volts A.C. drifting through the condenser, or for the fraction of a second through yours truly.

'Ware Condensers

The drawback about experiences like this is that you cannot get really aggrieved with anybody else about it, because it is entirely your own fault; but it points the moral that apparently inoffensive condensers in earth leads of receivers having anything to do with electric-light mains, may, and are often, charged to give a healthy value, and the discharge of condensers through one's body is not a hobby which appeals to everyone.

A New Loud-speaker

I am looking forward to playing with one of the new Amplion loud-speakers. I heard a demonstration of this the other day, and it was certainly quite good in quality. Whether I altogether agree with the claims made that real moving-coil quality is produced is rather doubtful, but I am waiting until I can try the instrument for myself before I pass judgment. There is no doubt, however, that the makers have made a definite advance in the science of loud-speaker design. The ordinary loud-speaker has a tendency for the magnetic pull to increase as the distance of the reed from the magnet decreases; thus on a loud signal the reed will click on the magnet. The particular formation used in the new Amplion speaker arranges that the magnetic pull shall decrease as the reed comes closer—or, rather, that it shall remain constant.

These arrangements, coupled with the use of a very light mechanism, are claimed to result in a movement which is capable of responding to all variations in current, particularly the transient or very sudden changes, as a result of which the essential qualities and attack in a musical transmission are faithfully reproduced. As I say, we shall see and hear more about this loud-speaker, and I am reserving my comments until I have been able to try it for myself.

THERMION.

Tracking Troubles with the Milliammeter

By R. W. HALLOWS

FOR as little as fifteen shillings you can purchase an instrument which will enable you with small loss of time to track down almost any ordinary fault that occurs in the valve receiving set. The instrument is nothing more or less than the simple milliammeter, whose function it is to measure current flow in thousandth parts of an ampere. The most generally useful type for employment as a wireless sleuth-hound is a moving-coil instrument reading from 0 to 20 milliamperes. Fig. 1 shows the position in which it may be placed semi-permanently in the set. It will be noticed that when wired thus into the common negative high tension lead it is shunted by each of the high-tension battery condensers, C6, C7, and C8. It is most desirable that this should be done for otherwise the fact that the windings of the instrument possess both resistance and inductance may cause queer effects to occur.

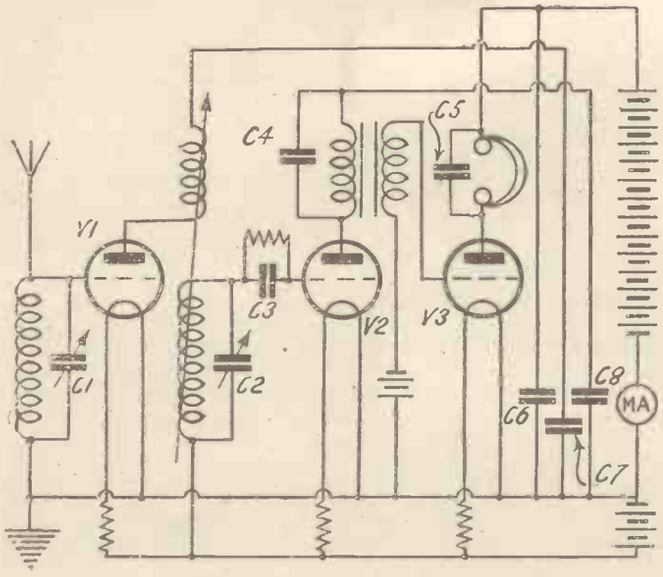


Fig. 1. Diagram showing position of Milliammeter

What the Meter Will Do

Now let us see what the milliammeter can tell us in the case of a break-down. When the instrument is first installed the current reading given for any particular set of valves when the set is working thoroughly well should be carefully noted and kept for reference. When the set refuses to function we glance at the milliammeter before doing anything else—except that we should be careful to see that the aerial and earth leads *are* connected up. Is the current reading less than it ought to be? If so either one of the batteries is run down or something is wrong with one, or possibly more, of the filament or plate circuits. We will suppose that the batteries are blameless. The next thing to discover is which valve is causing the trouble. Switch off all the valves and then switch them on singly one after another. The culprit will be discovered by the fact that the milliammeter records either no current at all or a microscopic amount when a particular valve is turned on.

Another way of carrying out the test is to remove all the H.T. positive wander plugs and to see whether current passes when each of them is replaced. If the replacement of any one of them fails to cause a flow of current, then the trouble has been tracked down to the plate or filament circuit of the valve which it serves.

Which of the two is it, plate or filament circuit? Before going on to investigate this, splay out each of the pins of the valve and try it again. Often there will be no need for any further trouble. But we will suppose that the milliammeter still declines to record any plate current. In the case of bright valves or of dull-emitters whose filaments give a visible glow it is easy to tell by inspection whether the valve is lighting up or not. Many dull-emitters, however, are of the glowless type nowadays, so that the eye cannot perceive a defect in the filament circuit. In these circumstances, it is best to make use of a flash-lamp as a tester. Fix a couple of flexible leads to it and hold the ends of these against the filament legs of the valve holder, being careful to remove the high-tension positive wander plug before you do so, so that there may be no possibilty of a short-circuit. If the lamp lights up all is well with the filament circuit.

Testing a Valve

We will imagine that the filament circuit of the offending valve is found to be intact. Is the filament itself broken? The milliammeter will tell us. Remove it temporarily from its position in the negative high-tension lead, and take the valve from its holder. Connect its positive terminal to the *plus* contact of a single dry cell. Attach a lead to the negative pole of the cell and another to the unoccupied terminal of the milliammeter. Hold the bared end of one of these against one of the filament pins of the valve and with the other lead touch the second filament pin. A kick on the part of the milliammeter needle shows that the filament is intact. The trouble then, must be in the plate circuit.

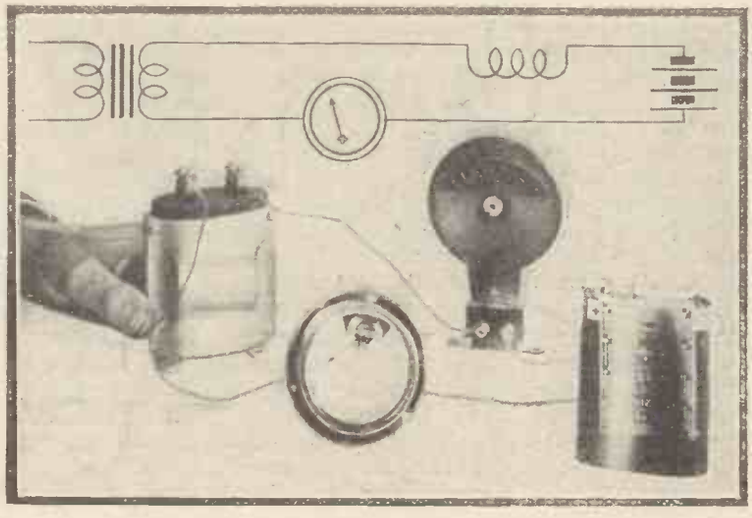


Fig. 2. Hook-up showing Method of Testing Coil

"TRACKING TROUBLES WITH A MILLIAMMETER" *(Continued)*

We will first of all make sure that the plate lead is not broken within the pinch or the bulb of the valve. This we can do by placing another valve in the holder and seeing what the milliammeter has to say about it. If there is now a current reading, the valve is undoubtedly at fault. If, however, the milliammeter still declines to register anything we know with certainty that there must be a breakdown or a disconnection in the coil, choke, transformer, primary, resistance, or telephone or loud-speaker windings, that acts as the plate circuit impedance. Here again the milliammeter will enable us to make sure.

Testing Components

Components of comparatively high resistance such as low-frequency transformers, low-frequency chokes, anode resistances, telephones or loud-speakers may be tested very simply. For L.F. chokes or transformer primaries use one or two dry cells—the sockets of the grid battery may be employed very handily. Connect one terminal of the suspected component to the positive terminal of the milliammeter. From the unoccupied terminal of the component take a lead to the positive terminal or socket of the battery. Connect the negative of the battery to the negative terminal of the milliammeter. If there is no break in the windings there should be a current reading. For high-resistance telephones or loud-speakers or the primaries of large transformers, the test is made in exactly the same way, but it is best to use a battery with a voltage of 4½ or 6. Test out anode resistances similarly, employing as much of the high-tension battery as is needed to give a reading of one or two milliamperes. To drive 1 milliampere through a resistance of 50,000 ohms, 50 volts are needed and so on.

Inductance coils and high-frequency transformers cannot be tested exactly in the way just described since the resistance of their windings is so small that an excessive amount of current would be passed even if only a single cell were used. Fig. 2 shows how tests may be carried out by making use of the primary of a transformer (which should itself first be tested) to cut down the current to reasonable dimensions by adding resistance to the circuit.

So far we have discussed particularly how the milliammeter shows up faults in plate or filament circuits. If, when the set refuses to function, the milliammeter shows its normal reading, or is on the high side, we must look for the fault in one of the grid circuits. Here is the way of finding out with the aid of the milliammeter which grid circuit it is. Try the low-frequency valves first of all, by the simple process of pulling out the grid battery wander plugs of each in turn. If these grid circuits are in good condition there will be an immediate large increase in the reading of the milliammeter. Should no rise in current take place when any grid battery wander plug is removed, then the trouble is definitely

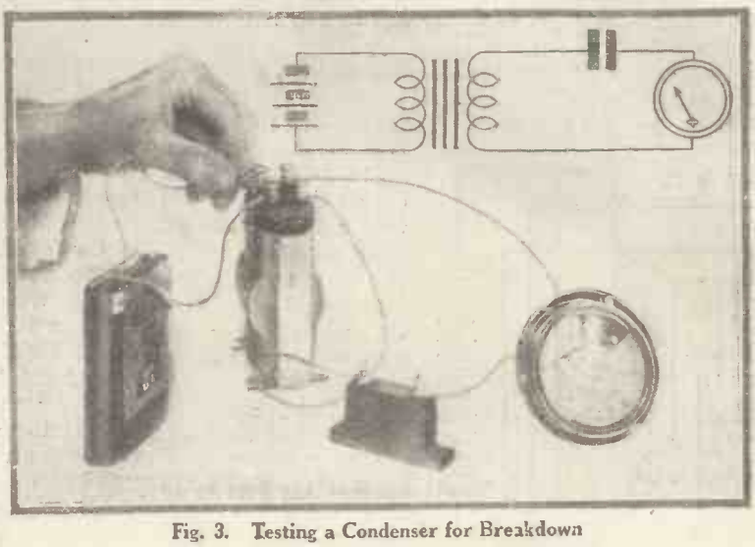


Fig. 3. Testing a Condenser for Breakdown

fixed in the grid circuit of the valve served by that plug.

Faults in the Rectifier

The rectifier can be tested on similar lines, though the process is slightly more complicated. Remove the grid leak and short-circuit the grid condenser. Remove the lead running from the lower end of the grid coil to low-tension positive or negative. Replace it with a piece of flex provided with a wander plug. Place this in various sockets of the grid battery one after another and notice whether the reading of the milliammeter varies as you do so. Should the grid circuit be intact, the instrument should show less and less current as the negative bias is increased by means of the grid battery. This test shows whether there is or is not a break in the wiring of the grid circuit or in the windings of the grid coil. Should no fault be found replace the grid leak, and if it is wired in shunt with the grid condenser repeat the test, first removing the wire short-circuiting this condenser. If the grid leak is intact there will be similar current variations when the wander plug is placed in different sockets of the grid battery. When the grid leak is wired direct between the grid and low-tension positive, test out by disconnecting the lead between the leak and L.T.+, replacing it with a piece of flex and using the grid battery as before.

The grid circuits of high-frequency amplifiers are tested on similar lines, the other valves being, of course, switched off. If there is a potentiometer, all that is necessary is to move its slider slowly from end to end of its travel, watching the milliammeter needle meanwhile. Current should rise as the slider moves towards its positive end and fall as it travels in the opposite direction. If, however, there is no potentiometer, disconnect the lower end of the grid coil from L.T. negative and with the aid of a piece of flex make use of the grid battery as previously described.

A condenser suspected of a short-circuit is easily tested by means of the milliammeter. Connect one of the high-tension positive leads to one of its terminals and attach to the other a short piece of flex provided with a wander plug. Insert the wander plug into a socket of the high-tension battery and switch on the valve served by the particular H.T. lead used. If the condenser is in good order there should be a kick at the instant of switching on, but after that the milliammeter should read zero.

To test a condenser for an internal disconnection proceed as shown in Fig. 3. If it is in good condition a condenser should pass alternating current, and we can produce alternations by making use of a low-frequency transformer in this way. One of the battery leads is fixed to a primary terminal of the transformer, but the other is held in the hand and brushed against the second terminal, thus making and breaking contact. At each make there is a whiff of current through the secondary in one direction, a flow in the reverse direction taking place as the circuit is broken. If the condenser is in good condition the milliammeter needle should therefore show a series of kicks as the loose lead brushes against the primary terminal.

It will be seen that there are very few defects in the wireless set that cannot be tracked down very rapidly by means of that smart little detective the milliammeter.

Experiments were recently carried out by the French naval authorities in short-wave wireless transmission on the sea bottom. Messages sent out by a submarine in the Bay of Biscay were clearly received in Holland.

Owing to the exceptional demands upon our space in this issue, we regret that it has been necessary to hold over the Letters to the Editor.

Three Exhibition Cameos

"Sketched" by J. G. Abrahams

Television, or the Different Point of View

IN a moment of generosity, as a result of a successful deal (he is a wealthy stockbroker), he presented his wife with a crystal set. On this evening she has dragged him to the Exhibition as she now wants a receiver "worthy of their home." He is hail-fellow-well-met with his friends and tells them "witty" stories. Contango and settling days for a long time have proved valuable alibis and plausible excuses for a late return home.

Seen at the Show—an outsize in transformers!

They have wandered to a serious-looking stand exhibiting a new process of television.

He (*hoping to drag her away to something cheaper*): "Hardly in your line, Bertha, is it?"

She (*seeking information and anxious not to be put off with a one-valve amplifier suggested by the salesman at another stand*): "But what is it, anyhow?"

He (*casually*): "O, one of those new-fangled things by which you can see what is taking place at a distance."

She: "How lovely!" (*To salesman*): "Is it wireless?"

Salesman (*a very superior individual*): "Yes, Madam, entirely controlled by radio. This instrument combines a wireless receiver, loud-speaker, gramophone pick-up and televisor."

He (*interrupting*): "An awfully complicated affair, Bertha. Now, over there I can see a——"

She: "But how wonderful! On settling days, Edward, I could switch this on and see you at work in your office. I could, couldn't I?" (*this to the salesman*).

The latter is about to mumble something, when the husband, whose heart skipped a beat at this vague possibility, chimes in: "Well, it's not yet quite so advanced as all that. But, perhaps one of these days, they may get these contraptions adapted to telephones, so that you can talk and see at the same time." (*He winks at the salesman who is far too superior to respond.*)

She: "I think, Edward, that——"

He (*rapidly*): "It might be awkward dear. Supposing I 'phoned your mother one evening and she was just having her—I mean that she had not left the bathroom. It would——"

She: "Edward! How indelicate! I wouldn't have such an instrument in my house at any price."

They pass on.

Radio—a Danger to Youth?

Scene: A gorgeously illuminated stand, replete with multi-valve receivers housed in ornate cases.

Dramatis Personae: Grandma, outsized and majestic with a loud voice and H. F. G. her favourite grandson. As an encouragement to a term's hard work, she has finally decided to give him a radio receiver.

H. F. G.: "Buggs Major told me that this was the place, Grandma." (*He draws nearer to the stall; the salesman steps forward*).

Grandma (*adjusting her lorgnette*): "Buggs—what a commonplace name! I hope, Arthur, you have more aristocratic friends. Ah, well . . . Nothing seems the same since the war."

Salesman: "May I interest you Madam, in these receivers? They are of the very latest type. Wireless without tears, Madam." (*He allows his face to slip and express the ghost of a smile, but Grandma, giving him a stony stare, precludes any further attempt at levity on his part.*) "Here you have six little levers." (*Conscientiously he switches each one up and down in turn; nothing happens, in view of the Exhibition regulations.*)

Grandma (*impatiently*): "Yes . . . well, get on, my man."

Salesman (*hurriedly*): "The various circuits having been previously adjusted to the wavelengths of the individual transmitters to which you desire to tune in at regular intervals," (*he stops to take a deep breath*)—"all you need do is to depress the particular lever, and by this means listen through the medium of the loud-speaker to concerts from, say, Madrid, Constantinople, Oslo, Hamburg, Prague, and Paris."

At the latter name Grandma (*metaphorically, of course*) has pricked up her ears. The face of her favourite grandson has suddenly brightened up, and evinces (what she considers) undue interest in doings of the French capital.

H. F. G.: "Buggs Major said that this was the best wireless set in the show; his father is a——"

Grandma: "What his father is does not in the least interest me, Arthur." (*To the salesman*): "You can guarantee this instrument, I presume?"

Salesman (*unblushingly*): "Most certainly, Madam. It has never been known to fail."

(*Continued on page 516*)

A fair listener snapped by the camera at Olympia

Mr. J. L. Baird.

BAIRD

At a time when almost the entire wireless public has been asking questions and mutually debating, on somewhat meagre information, the possibilities of Mr. J. L. Baird being able to provide a broadcast television service, it has been our fortune to be given three lengthy demonstrations by Mr. Baird himself, firstly of his colour television, then of his monochrome television as transmitted over a wire from one room to another, and lastly of television broadcast over a distance of a few hundred yards. In the following article we give our readers, as far as we can, a first-hand impression of what we saw, ignoring colour television and confining our attention solely to the ordinary monochrome system of television with which Mr. J. L. Baird's name has been associated for five years.

THE announcement that the Postmaster-General will raise no objection to the broadcasting of television and that, as a result of discussions now taking place between his officials and the B.B.C. it is considered likely that the latter will afford Mr. Baird facilities for the demonstration of his system from London or Daventry, (with a view to the B.B.C. stations in general attempting some sort of television service), lends especial interest to the many interviews which we of AMATEUR WIRELESS have had with Mr. Baird in recent months and to the demonstrations of the Baird system which have been afforded us during the last few weeks.

It is safe to say that within the past few years there has been no subject around which more uncertainty has existed than the state of the science of television. Those who ought to know have been divided into two camps, the one saying that its accomplishment with our present knowledge and apparatus was physically impossible, and the other maintaining that the progress that had been made pointed to both a rapid and commercial solution of the problem.

Many of our older readers will remember that as far back as five years ago AMATEUR WIRELESS was among the first to publish details of Mr. Baird's early apparatus, and we then indicated that though both apparatus and results were crude, there were distinct possibilities. Since then, from time to time, we have kept our readers informed of the progress that was being made and have maintained that the development was sufficient to justify our early impressions.

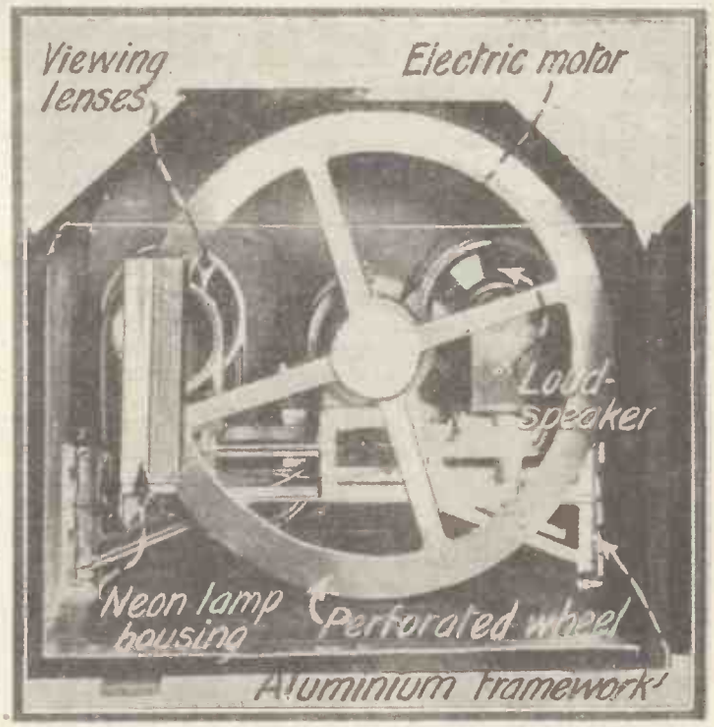
Public Demonstrations

To what extent those impressions were correct it is probable that a large number of our readers will have been able to judge for themselves from the demonstrations given in the Olympia neighbourhood to visitors to the Wireless Exhibition. Inevitably, owing to the large number of such visitors, the individual had to be satisfied with a cursory examination of the apparatus and with a very brief view of the transmitted image. We have been more fortunate in having been given opportunities of examining the apparatus in some detail and of viewing the transmitted image for twenty minutes or half an hour at a time. Our experiences, therefore, will be of interest both to those who attended the demonstrations near the Exhibition and to that larger public which, devoid of opportunities of personal investigation, is obliged to look to the Press for any criteria of judgment.

The Baird System

The outward form of the television receiver varies, but in general takes the form shown by the accompanying photograph. The receiver resembles more or less a large wireless cabinet, some 4 ft. or so wide. Of the two apertures in the front the left is occupied by the fret of a moving-coil loud-speaker and the right by a convex glass—a magnifying glass—about 6 in. in diameter. It is through this glass that the televised image is seen. The receiver is extremely simple and, apart from the wireless gear (an amplifier of not less than three valves), consists essentially of a neon lamp of Mr. Baird's patented design with a perforated wheel revolving in front of it. At the moment a perforation comes between the neon lamp and the observer's eye, the intensity of the glow corresponds with the amount of light passing through the corresponding aperture of the scanning disc of the transmitter on to a light-sensitive cell. That essentially is the Baird system.

Everybody knows that the scanning disc of the transmitter and the wheel or disc in the receiver contain a series of staggered holes. At the transmitting end the revolution of the scanning disc exposes in turn every portion of the scene or picture to a highly sensitive light-cell, the whole of the scene being traversed many times each second. Now, at the receiving ends the current, constantly altering in it,



An Interior View of the Baird Televisor

TELEVISION AS WE SAW IT

intensity owing to the action of that cell, affects the neon lamp and causes some twenty thousand fluctuations per second. The scanning disc at the transmitting end and the viewing disc, as we may term it, at the receiving end rotate in synchronism, with the result that the fluctuating light of the neon tube, as observed through the perforations, aided by the phenomenon which we call persistence of vision, creates through the eye of the observer a reproduction of the transmitted scene.

The Image

It has often been pointed out that one of the great difficulties of television would be the extremely small size of the received image. The image in the Baird receiver measures only an inch or so either way, but there is a system of two magnifying lenses through which the image is viewed, and these have the effect of increasing the apparent size to something like 3 in. by 5 in. or 6 in., increasing also, of course, the "grain" of the image, but not unpleasantly so. Owing to the convex surface of the outside lens not more than three or, four people can view the transmitted image at one time.

Wire Transmissions

In the first place, we will give readers our impression of the transmission by wire, which we saw at the offices of the company. The cabinet was of the kind illustrated on this page, its bottom part being occupied by amplifiers, rotary converter, etc. Two little controls were to the left of the viewing disc, that on the right being a synchronising control and the left a phase control. The supposed impossibility of synchronising the image in the absence of most elaborate arrangements has been the subject of many a conversation in technical circles during the last year or so, and it was therefore a surprise to us to learn that the whole of the synchronisation could be effected merely by turning a knob.

We tried the synchronising for ourselves and, after spending half a minute in getting the knack of it, had no difficulty in bringing the picture to "rest." We put rest in inverted commas because, in our short experience, we never saw the image quite still for many moments together. There is a certain amount of "hunting," in the nature of vertical swing, which results in the picture floating up and down in the viewing disc; this varies with conditions, and we were told that at times the picture is practically still. We saw it so ourselves for just a short period only.

The phase control, the second knob, the one on the left, places the picture centrally should it get too high or too low on the screen.

At first, we saw the familiar dummy as used by Mr. Baird in so many of his experiments. It soon gave way to a human face: that of one of the young engineers who is qualifying, we rather think, as a comedian—or, at any rate, to be the Eckersley or Uncle Arthur of television. This human face we viewed with all its varying tones or textures, but, of course, not in colours. In effect, it rather resembled a photographic enlargement of somewhat varying sharpness, the variation being caused by the person at the transmitter moving away from or towards the source of light. This suggests the presence at the transmitting end of a projecting lens.

In the course of synchronising one sees a very curious pattern in the televisor—lines of reddish or pinkish light dissolving one into the other in a rather fascinating way.

The quality of the image suggests, as we have said, that of a photographic enlargement, the likeness being quite unmistakable and the face, of course, being alive with movement. Such details as the whites of the eyes, the movement of the pupils of the eyes, the putting out of the tongue, and, in particular, the movement of the hand with fingers extended upwards and downwards across the face, are clearly distinguishable. The speech and song from the loud-speaker synchronised, of course, perfectly with the transmitted image, there being not the least technical difficulty in obtaining this result.

The picture transmission and the vocal transmission are transmitted at different wavelengths, but are caught by one aerial.

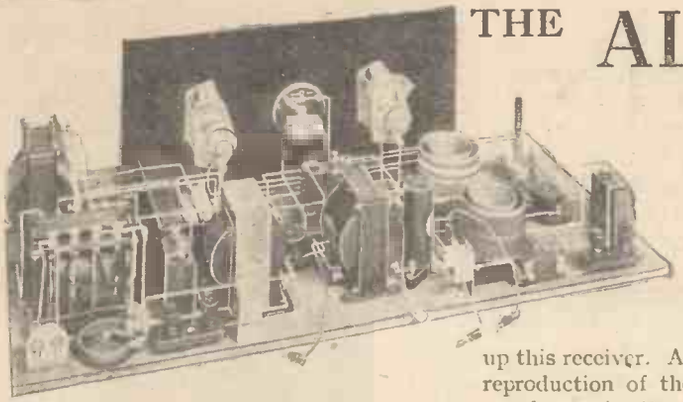
Any violent interruption or a knock on the receiver destroys the synchronisation, which, however, is speedily re-effected. As an instance that the image remains fairly constant once it is adjusted, Mr. Baird switched on the receiver after it had been out of use for a minute or so, and the image of the dummy appeared in almost perfect synchronisation and reasonably still. As to the exact method of synchronisation, we learned only that the speed of the electric motor is controlled by the knob and that, when once synchronisation is obtained, it is automatically "held." No details of the automatic arrangement were forthcoming.

We must emphasise that the image is instinct with life, and while obviously it is capable of improvement, we must state with pleasure that it is miles ahead of the televised picture of three or four years ago, when at the best we had a series of moving

(*Continued at foot of next page*)

The BAIRD Televisor

THE ALL-WAVE MAINS 3



A Straightforward Three, designed by the "A.W." Staff, employing "Q" coils, which takes its H.T. and L.T. supply from the A.C. Mains.

(Continued from Last Week)

UNLIKE the majority of receivers, the panel on the "All-wave Mains 3" does not extend the full length of the baseboard. As there are only the two tuning condensers and reaction condenser controls on the panel, the use of a longer one than that specified would be sheer waste. The cabinet into which the receiver is fitted has two wooden side panels to make up for the reduced length of ebonite panel, resulting in a highly attractive instrument. Those who already have a cabinet, or would prefer to obtain a cabinet of the more simple type, will have to extend the ebonite panel to the full length of the baseboard.

Constructional Details

The blueprint, price 1s. 6d., giving full constructional details, should be in the hands of every reader who proposes to make up this receiver. As shown on the reduced reproduction of the blueprint p. 426, the panel occupies the central position at right angles to the baseboard, and carries the aerial tuning condenser on the right, reaction condenser in the middle and H.F. transformer tuning condenser on the left (looking from the back of the receiver), as shown in the blueprint, which also indicates the spindle of the ganged "Q" coils, low down on the extreme right of the panel.

The complete baseboard assembly roughly divides itself into two, the larger section accommodating the three-valve receiver components on the right, whilst the smaller section on the left is utilised for the disposition of the H.T. eliminator components.

When the panel with its associated components has been mounted in position, the constructor will see just what room is left on the baseboard for the remaining parts. The two "Q" coils have running through them a common wavelength-changing switch spindle which necessitates accurate placing of the "Q" coils to ensure a smooth action of the small ebonite knob attached to the spindle projecting through the panel.

The "Q" Coils

The two "Q" coils must be placed the correct way round as shown by the blueprint. The H.F. transformer "Q" coil is near the panel and the aerial "Q" coil between this and the back of the baseboard.

The three five-pin valve holders to take the Cosmos A.C. valves are mounted in a line about half-way between the back and front of the baseboard. Round these are grouped the L.F. transformer, H.F. choke, neutralising condenser and other components. On the extreme right of the baseboard is a small strip of ebonite, mounted horizontally

(*Continued on page* 522)

"BAIRD TELEVISION AS WE SAW IT" (*Continued*)

blobs in which one could identify by courtesy the semblance of a face. Now we have the actual face—not as clear and distinct as it will be one day, but comparable, as we have said, with that of a face in a somewhat soft photographic enlargement.

As long as the transmission model does not move too quickly, but is content to incline his head to the right or left, or put out his tongue slowly or move his eyes with deliberation, the picture is not deranged and every movement is observable clearly.

Now that is all that need be said at the moment of wired television. What of television broadcast?

Broadcast Transmissions

At the third demonstration afforded us we spent an hour watching a broadcast image. The scene was a darkened room in the Engineers' Club in Leicester Square, London. The transmitter was on the roof of the Baird Television Company's offices in Long Acre, only a few hundred yards away. A 500-watt television transmitter was working on a closed circuit without aerial, the wavelength being 200. The transmission was admittedly a little improvised in its nature having been arranged for hurriedly. The receiving aerial in the Engineers' Club was a length of insulated wire running round three of the walls of the room. The wireless part of the gear left just a little to be desired; the tuning was not so sharp as it could have been, the effect of broad tuning being to rob the image of detail. The televisor receiver was not of the latest pattern; it had been used in many experiments, and was just a little the worse for wear and the effects of repeated rebuilding. In general style and design it resembled the receiver here illustrated, the control of the synchronisation and phase being exactly as already described.

The critic may say that the test was not a severe one—that the transmission over a few hundred yards is not to be compared with conditions which practical every-day television will be called upon to meet. Be that as it may, we have to place on record that the transmission, while not reaching the efficiency of the wired transmission, was in every sense enjoyable and reasonably successful. Making allowances for all the conditions, we should say that the broadcast image was from 50 to 70 per cent as good as the image in the wired transmission and that, using such transmitting apparatus as, for example, the B.B.C. could employ, it is to be expected that the broadcast image would be quite as good as in the previous demonstration. The detail was not quite so sharp, the likeness not so certain; but, in any case the image was a better one than we had expected to find. It remains to be seen whether the experimental transmissions which we hope the B.B.C. are about to put in hand will achieve better results.

The Future

Much depends on what happens when Mr. Baird's experiments are translated to a bigger field, and he will have the good wishes of all who admire a man who, through years of very mingled encouragement and discouragement, can hold tenaciously to a purpose. Mr. Baird remains what he was when first we met him five years ago—a charmingly modest, natural man. He would be the very first to claim that his system has not reached perfection, but no one can converse with him for many minutes without realising that he is confident of complete success. Surely, when we attempt to measure his progress by contrasting the results of four years ago with his achievement of to-day, we must agree that he has every reason for his faith.

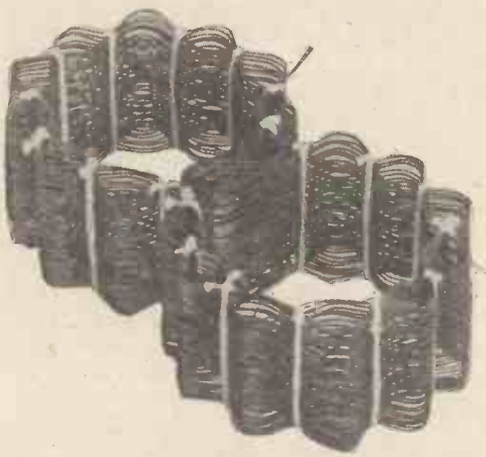
Radio facilities in Sweden are to be improved by the erection of a 10,000-watt broadcasting station near Horby.

Winding "Figure 8" Coils

An article describing a simple method of winding an efficient type of coil

By H. J. Barton Chapple, Wh. Sch., B.Sc.

THERE is on the market at the present time a wide range of coils of various shapes and sizes designed to meet the demands which have arisen in connection with receiver design. The ordinary plug-in coil has enjoyed a wonderful run of popu-



A Finished "8" Coil

larity and is still in vogue for the simpler types of sets. Added to this, however, we have the "fieldless" coils, which, as the

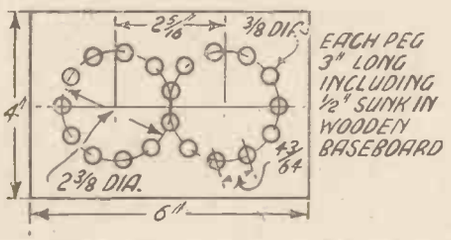


Fig. 2. Details of Winding Board

name suggests, are constructed to limit the external field to very small dimensions and thereby impart stability and efficiency to multi-valve receivers. Then there are

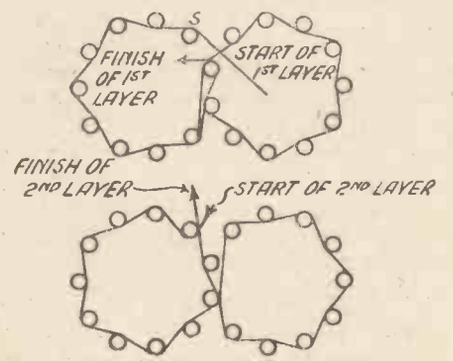


Fig. 3. System of Winding for Broadcast Waveband

astatic coils, air coils, solenoid coils, etc., all of which fulfil their particular function with a remarkable degree of efficiency.

Now, although we have such a wide choice open to the home constructor, there are still a large number of enthusiasts who take a pride in constructing as much of their own apparatus as possible.

A Special Design

The object of the present article is to show how a special winding board can be constructed, and by following the instructions given, very efficient "figure 8" coils may be wound which possess certain distinctive features worthy of consideration. In addition, by using only half the pegs available, it is possible to wind the more orthodox lattice-work coils without any difficulty. As a rule an ordinary plug-in coil or a plain cylindrical coil has a fairly large external magnetic field, and any means whereby this can be reduced generally results in an increased efficiency. One way of accomplishing this is to adopt an "8" pattern for the winding. This will be made clear by a reference to Fig. 1, where two cylindrical coils in juxtaposition are diagrammatically portrayed. By winding the turns on coil A in the opposite direction to those on coil B—say, clockwise for one and anti-clockwise for the other—then the resultant magnetic fields of each coil assist one another in the manner shown, and externally the stray field is reduced.

Another characteristic of the coils about to be described is that they require no coil former, the only addition being a binding of thread where the lattice formations cross on each layer. Naturally, the coils when made up in this bodyless fashion without formers must be handled with reasonable care, and if preferred, they can be mounted on a plug base to facilitate removal when any coil changing becomes necessary.

Making the Winding Board

Coming now to the actual coil winding board, only a small amount of material is required, but careful attention should be paid to the marking out directions given in Fig. 2. Procure a piece of wood, 6 in. by 4 in. by ½ in., and twenty cylindrical rods of ebonite or other insulating material, 3 in. long and ⅜ in. diameter. Referring to Fig. 2, it will be found necessary to draw a pencil centre line across the face of the wooden base. The small circles indicate the

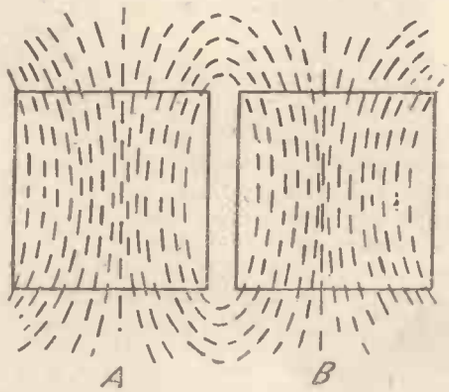
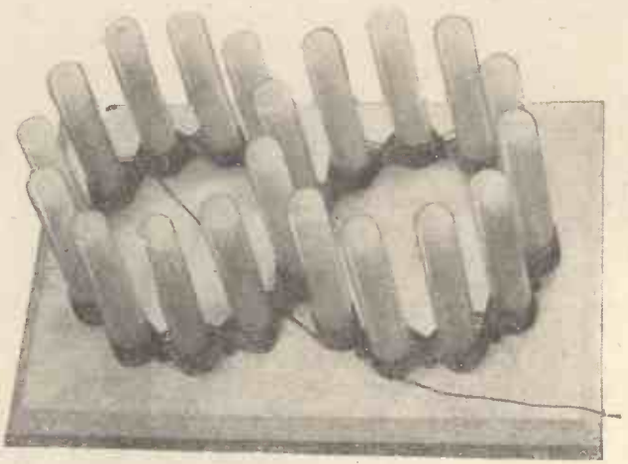


Fig. 1. The Lines of Force of a "Figure 8" Coil

positions of the pegs, and these lie on the circumference of two large circles, which, it will be noticed, overlap slightly. The centres of these two large circles are $1\frac{27}{32}$ in. from the edge of the board and have a diameter of 2⅜ in. Having drawn them, adjust the distance between your compass points to $\frac{43}{64}$ in. and, placing one point in



A Coil in Course of Winding

the intersection of the circle and centre line on the left-hand side (marked x in Fig. 2), mark off the centres of the small circles one on either side of the centre line. Now place the compass point in the new small circle centre and mark off the next circle, and so on round the two circles for the whole twenty centres.

"WINDING 'FIGURE 8' COILS" (*Continued*)

If the dimensions given are accurately followed, it will be found that the intersections of the two large circles coincide with two small circle centres, and this will serve as a check on your work. At these twenty marked positions, drill ⅜ in. holes (or very slightly under this diameter, if possible), so that the pegs can be forced into position, giving a 2½-in. vertical projection above the board surface. This completes the construction, the appearance of the finished article being gathered by an examination of the photograph showing one coil partially wound.

Starting the Coil Winding

Attention can now be turned to details of actual coil winding, which, of course, to the majority of interested readers, constitutes the most fascinating stage. It is not easy to portray in one diagram alone how this is done, so to simplify matters the operations are split up into sections to illustrate the winding stages. Having completed the one, two, three, or four stages, as the case may be, the layers are then repeated a number of times until the total number of turns are wound on. The actual wire to employ must be of large enough gauge so that the resulting stiffness will enable the coil to retain its shape in the absence of formers, and I have obtained excellent results with No. 26 d.s.c. wire.

For the purpose of illustration, two winding methods are given, but it will be readily understood that several interesting combinations can be effected with this skeleton arrangement. For the 250 to 550-metre waveband, one of the best formations is that shown in Fig. 3, (top and bottom). The peg marked s is the starting point, and a length of the wire should first of all be passed through a small hole in the board or wound round a peg on the right-hand side. Now, maintaining an even tension on the wire with one hand and holding the board in the other, or flat on the table, whichever appears to be most convenient, wind the first layer as indicated in Fig. 3 (top), the wire passing round the outside of pegs, round the inside of the next peg, and so on until a figure 8 is wound round the two sets of pegs. The start and finish of the wire are clearly shown, and then proceed to wind the second layer, as indicated diagrammatically in Fig. 3 (bottom). The coil is completed by following out these double layers a stage at a time, taking care not to strain the wire.

Each layer should rest on the next, and the positioning of the wire is assisted by pushing it into place with the fingers, and it is surprising how quickly one can follow the formation automatically and with deft fingers rapidly build up the coil. To cover the normal broadcast waveband, the total number of layers or double turns (Fig. 3 (one) representing a double turn) required is sixty, using the 26 d.s.c. wire.

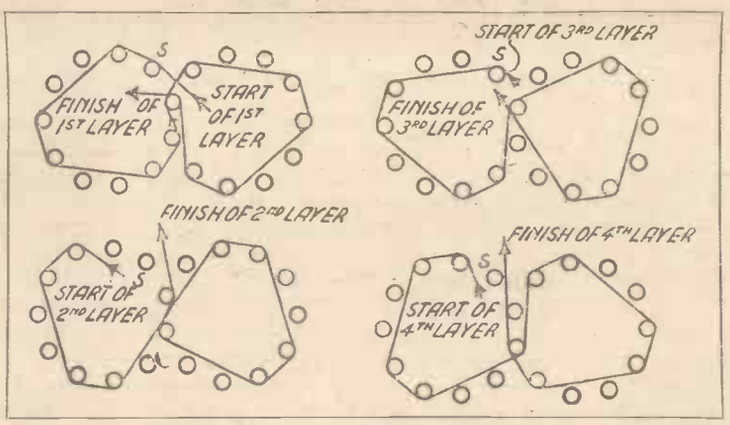


Fig. 4.—System of winding long-wave coils

Binding

When the coil has been completely wound, it is advisable to prise it slightly off the board, i.e., move it about a ¼ in. up the pegs by inserting a screw-driver under the wire crossing and levering with the screw-driver point and the board as a fulcrum. Now tightly bind thread twice round each wire crossing position as this will retain the coil formation and prevent the wire slipping when the coil is off the pegs. Having completed this, pull or prise the coil by degrees off the pegs, being careful not to use undue pressure and thus spoil the lattice work.

A coil wound to these instructions is illustrated in one of the photographs accompanying this article. On test in a receiver, the coil functioned excellently, and it will be obvious from the formation that there is a very low self-capacity. If it is desired, the coil can be mounted on an ebonite strip, 6 in. by ½ in. by ¼ in., with plugs or small terminals, it being necessary to provide a base with corresponding sockets if the first method is used.

Long-wave Coils

When it is desired to make up a coil suitable for the long waves, i.e., 1,000 to 2,000 metres, a different formation should be adopted, otherwise the height of the coil is likely to become too great if the Fig. 3 arrangement is followed. This will not be the case, of course, if a finer-gauge wire is used, but the original gauge suggested is about the best from a mechanical standpoint. To wind up a long-wave coil, therefore, the winding shown in Fig. 4 is to be preferred. It will be noticed by comparing the two diagrams that whereas in Fig. 3 the coil height is equal to the number of turns multiplied by the overall diameter of the wire and insulation, in the case of Fig. 4 the height is half this amount. Hence for large numbers of turns follow Fig. 4, whereas for the smaller numbers of turns adopt the Fig. 3 scheme or any other of a similar character that the constructor feels disposed to invent.

Examining Fig. 4, we see that a complete cycle of operations is not undertaken until four layers of turns are wound on the pegs, and the operations one, two, three, and four should be followed in the proper order. For the 1,000 to 2,000-metre band and using No. 26 d.s.c. wire, the number of turns or layers required is 160, that is to say, forty complete cycles. The coil should be finished off with binding thread and gently eased off the pegs in exactly the same fashion as for the coil described previously.

Mr. A. E. Bowyer-Lowe, Chairman of the Radio Manufacturers' Association

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Experiments are being made on the steamship *Mauretania* to develop a formula for an international radio medical code that will be understandable in any language. The object is to assist shipmasters whose personnel does not include a physician or surgeon.

Westinghouse officials state that the regular transmissions of motion pictures from KDKA will begin in a few weeks. The receiving apparatus, when produced commercially, will be sold through the Radio Corporation of America.

WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

WHOA, Censor! As one who is all for freedom of thought and expression—up to a point—I was rather alarmed at the tendency shown in one of the latest wireless plays. I refer to *The Greater Power*, "a drama for broadcasting by Frances J. Mott." It started well. There was an idea behind it all; but it was soon seen that the author had gone from liberty to licence. His expressions here and there were certainly not meant for the home.

◆ ◆ ◆

Why won't broadcast authors and artistes realise that they are appealing in the main to the home circle? You might say that it is no better than modern literature and modern journalism. The people who buy Sunday newspapers know what to expect and they have their choice. The same with literature. One soon gets to know the kind of author to avoid when the youngest member of the family can get hold of the book.

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In broadcasting it is another matter, and this was brought home to me by the rather mixed "audience" who heard this play with me.

Such expressions as "lousy," "louse," and the base suggestions when the seaman finds himself alone on the island with the woman were not only unnecessary, but indicated that the B.B.C. drama department is taking a definite turn downwards. This taint of vulgarity would kill any play, and certainly *The Greater Power* was not sufficiently striking to excuse these regrettable lapses.

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Like all melodrama, it was blood-curdling, they "lived happily ever afterwards," the long arm of coincidence being stretched as far as plays of this sort permit, but the acting of Gall, the inventor, and his "stage laugh" quite suited the purpose. Personally, however, I don't want to hear this play again, nor do I imagine do most listeners.

◆ ◆ ◆

I am always interested in intelligent criticism. The letter in AMATEUR WIRELESS from H.B.E. (Woking) was a case in point. The Wireless Military Band, to which I gave a mead of praise, does not appeal to him. But apparently he refers more to what they play than to their playing. Yet if he would compare their programmes with others played by the average military bands, especially those at the seaside, he would see that they have certainly got out of the rut. As for Callenders' Band, the Birmingham Police Band, and other outside bands, I think I have paid my tribute to them as occasion has arisen.

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The Wagner night at Queen's Hall was always the most popular of the week, but it was sad that Miriam Licette could not broadcast. Her deputy, however, did quite well; so did Walter Widdop, especially in his encore in the second half. Long live the Promenades!

◆ ◆ ◆

In this connection, listeners who have not managed to see a huge orchestra in action have missed a sight, and will not realise how much is lacking even in the best of wireless transmissions. The sweeping of a hundred bows, the tense faces of the members of the orchestra, the spiritual uplift of the audience, and last, but not least, conductors of the type of Sir Henry Wood, Sir Landon Ronald, and Sir Hamilton Harty—well, one must be present in order to feel the full effects of the power of music.

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A serious grouse:

That Birmingham announcer is often too much in a hurry. Aren't the train services in "Brum" as good as they used to be?

◆ ◆ ◆

The vicar who gives addresses from the Watford Parish Church belongs rather to the old school. His delivery is dull and monotonous. Why go all the way to Watford to hear that? It is a pity, because with some of the sentiments expressed by him I was completely in sympathy.

◆ ◆ ◆

Character by the sound of voice. Would you have imagined that Mr. Steuart C. Knox, who gives the appeal on behalf of the Mission to Seaman, was an M.A.? He sounded too seaman-like for a scholar.

◆ ◆ ◆

Doris Vane not only sings nicely, but also sings the right songs. True, we have heard "The Wayfarer's Night Song," by Easthope Martin, before, but it sounds fresh when she renders it.

◆ ◆ ◆

There is no doubt that listeners are going to have additional enjoyment in listening to improvised and controversial talks. Up to now I can only remember two, one besides Jimmie Thomas's, which made it great fun to listen-in.

I say "great fun" advisedly, because it is obvious that not everybody is going to agree with it. There may be some who will probably demand the censorship back again. My only objection to extemporary speeches is that they are usually very dull, because actually there are few people who can talk in a flowing, conversational manner. Personally, I don't mind an occasional expletive, providing it will pass muster by, say, the Canon of Southend.

Mr. Percy Scholes has resigned his position as music critic of the B.B.C. and music editor of the *Radio Times* in order to devote himself to other work, including the completion of a music encyclopædia for broadcast listeners.

A NOVEL FORM OF ADVERTISING

One hundred masked men in the costume of Klu Klux Klan parading through the streets of London, escorting the "mystery box" to the Radio Exhibition.

The "RANGER"

BECAUSE it lives up to and often exceeds the claims made for it, the screen-grid valve has come into favour in a comparatively short time after its inception. But the very virtue of the screen-grid valve, its high magnification factor, introduces certain problems that did not previously confront the wireless engineer. It was soon realised that, whereas the screen-grid valve offered the advantage of perfectly stable and considerable high amplification per stage, it did so at the expense of selectivity.

For with a given tuned circuit the selectivity of any particular tuning arrangement appears to be less with a screened-grid valve than with an ordinary valve, due to the relatively greater amplification.

New Method of Coupling

As a result of experiments along original lines we have evolved a method of coupling the screen-grid valve to the detector valve in such a way that, while a fair measure of selectivity is gained, a still greater advantage in the form of complete stability with simple screening is readily obtainable. For the present we feel that the average reader of AMATEUR WIRELESS will content himself with a receiver incorporating only one screen-grid valve and this being so, the type of screening required is of a simple nature and need not deter any constructor.

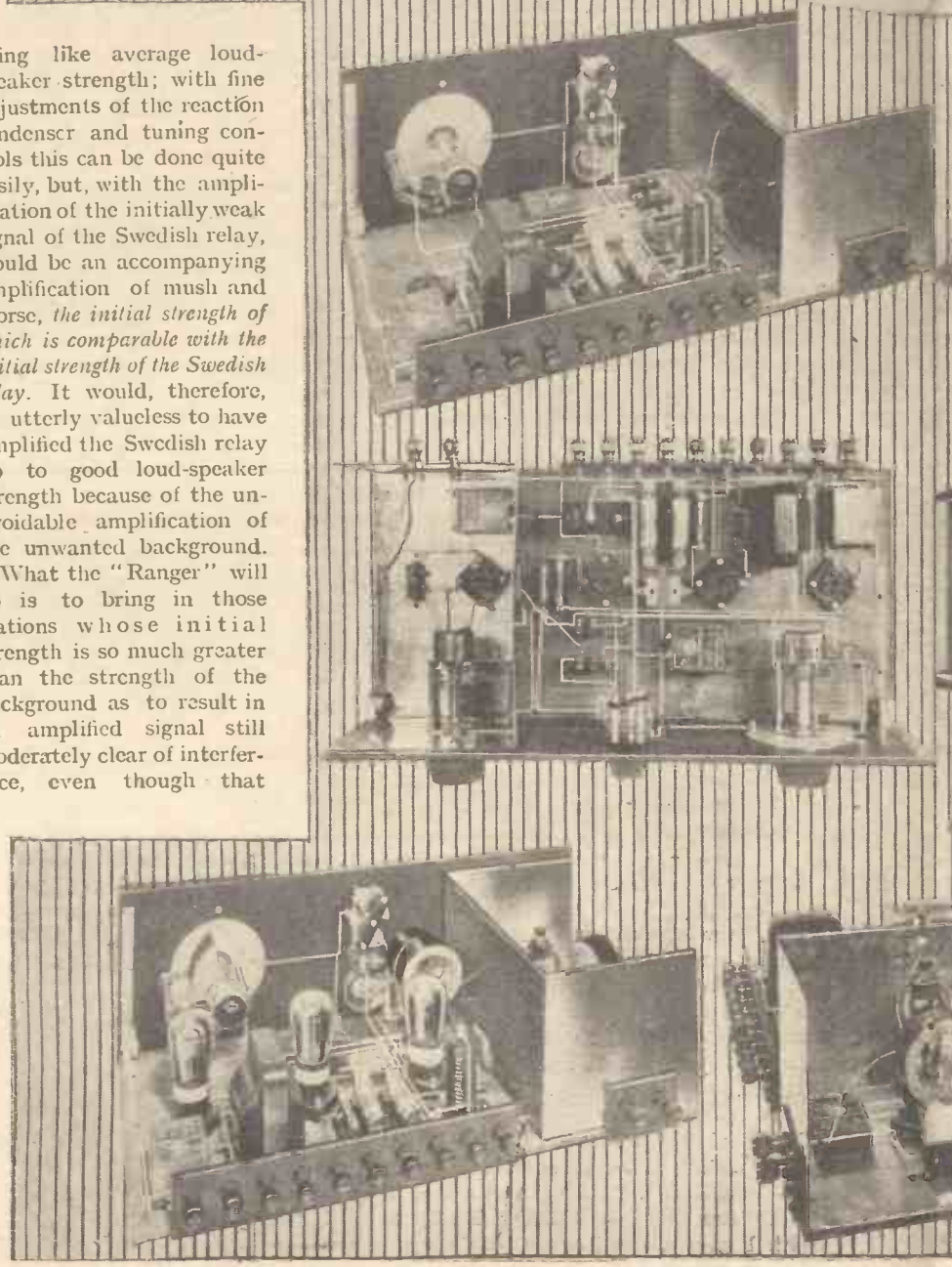
High Magnification

So great is the magnification, even with *one* of the latest screen-grid valves (such as the Cossor, Ediswan, Mullard, Six-Sixty, Marconi, and Osram types with the four-pin taps and insulated anode terminal on the top), that unless a short aerial is used, the signals from the local station swamp the tuning dial and the distance-getting advantages of the new valve are nullified. In practice it will be found that a small aerial will impart a measure of selectivity to the aerial tuning system or circuit. Whilst this is at the expense of a certain amount of sensitivity, the short aerial will, in conjunction with the super-sensitive screen-grid valve, give a combination of selectivity and sensitivity far above that possible with an ordinary high-frequency valve and long aerial.

Moreover, even with only one screen-grid valve the magnification is so great that the only limitation to range and volume is the atmospheric condition. For example, it is possible to tune in Budapest at good loud-speaker strength with the "Ranger" without magnifying to an annoying extent the inevitable background of mush and morse associated with the wavelength of that station.

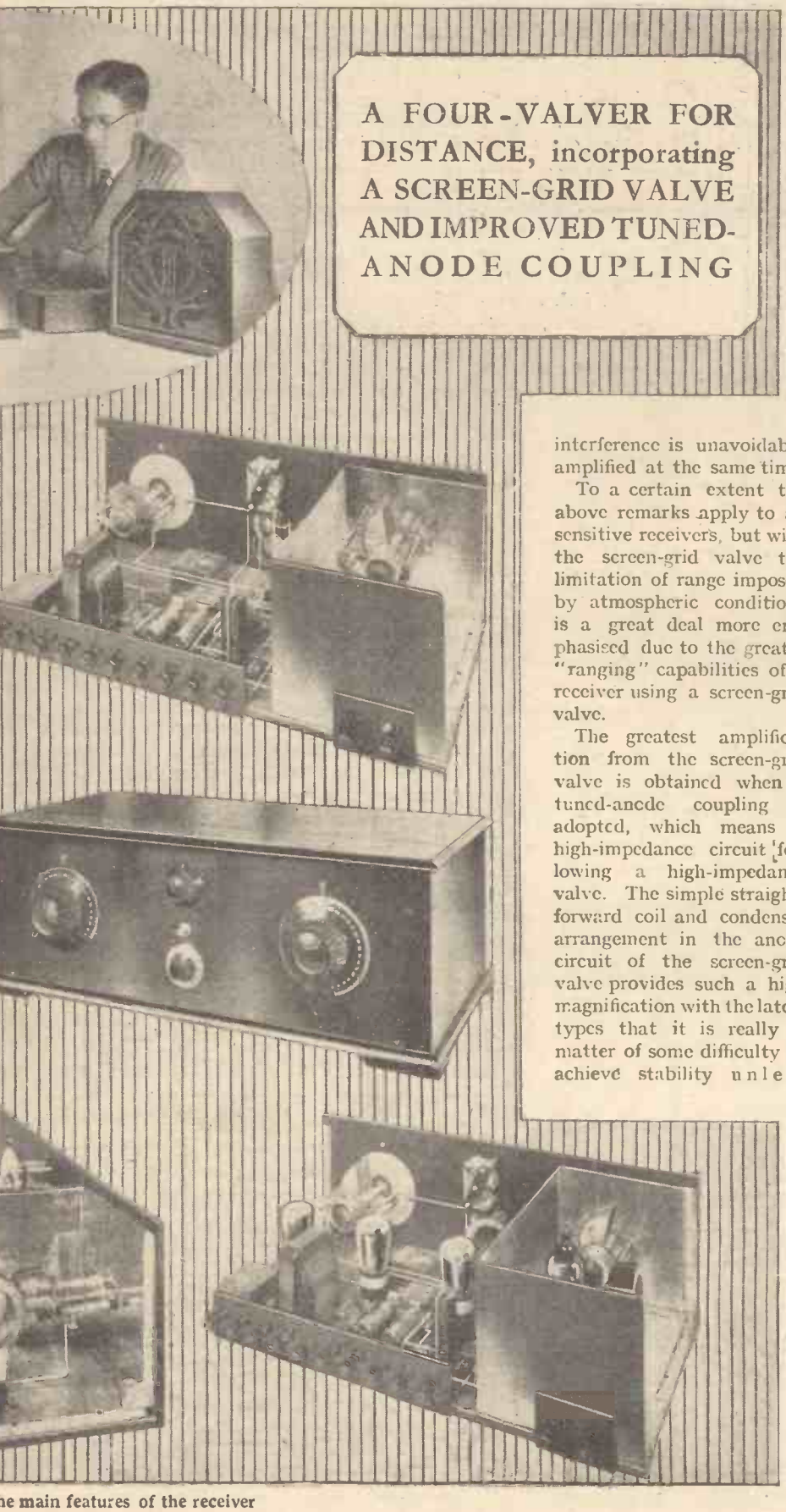
It is not outside the capabilities of the receiver to tune in a Swedish relay at something like average loud-speaker strength; with fine adjustments of the reaction condenser and tuning controls this can be done quite easily, but, with the amplification of the initially weak signal of the Swedish relay, would be an accompanying amplification of mush and morse, *the initial strength of which is comparable with the initial strength of the Swedish relay*. It would, therefore, be utterly valueless to have amplified the Swedish relay up to good loud-speaker strength because of the unavoidable amplification of the unwanted background.

What the "Ranger" will do is to bring in those stations whose initial strength is so much greater than the strength of the background as to result in an amplified signal still moderately clear of interference, even though that



The photographs above show all t

A FOUR-VALVER FOR DISTANCE, incorporating A SCREEN-GRID VALVE AND IMPROVED TUNED-ANODE COUPLING



he main features of the receiver

interference is unavoidably amplified at the same time.

To a certain extent the above remarks apply to all sensitive receivers, but with the screen-grid valve the limitation of range imposed by atmospheric conditions is a great deal more emphasised due to the greater "ranging" capabilities of a receiver using a screen-grid valve.

The greatest amplification from the screen-grid valve is obtained when a tuned-anode coupling is adopted, which means a high-impedance circuit following a high-impedance valve. The simple straightforward coil and condenser arrangement in the anode circuit of the screen-grid valve provides such a high magnification with the latest types that it is really a matter of some difficulty to achieve stability unless one resorts to excessive screening.

We have overcome this difficulty by centre-tapping the anode coil and taking the anode of the screen-grid valve to the centre-tap instead of to one end of the coil. In this way high magnification is retained, complete stability is ensured, and the associated screening is reduced to a minimum. No stabilising resistances are required and, of course, there is no "neutralising" to be done, as with a three-electrode valve.

A Sensitive Set

The truly remarkable sensitivity holds good over all the available wavelength channels, from 250 to 2,000 metres. Reaction effects can only be obtained by a definite application of Reinartz reaction, which incidentally adds to the sensitivity of the receiver and is not merely a "squeak" control.

At this point a reference to the complete circuit diagram will prove illuminating. Four valves are involved in the sequence of screen-grid valve, detector valve with Reinartz reaction on the anode coil, resistance-capacity-coupled low-frequency amplifying valve and transformer-coupled low-frequency amplifying valve.

Selectivity is moderately good, due to (1) the tapped aerial tuning coil, which can be either an "X"-tapped or centre-tapped type and (2) the centre-tapped anode coil. Listeners under the shadow of a powerful broadcasting station will require a wavetrap to cut out the local station when distant transmissions on wavelengths near to that of the local are tuned in. For example, when the "Ranger" was tested in south-west London it was not found possible to get Toulouse clear of 2LO's transmissions, unless a wavetrap was brought into service. From Langenberg upwards the distant transmissions were quite free from interference, the two tuned circuits in the receiver being quite adequate.

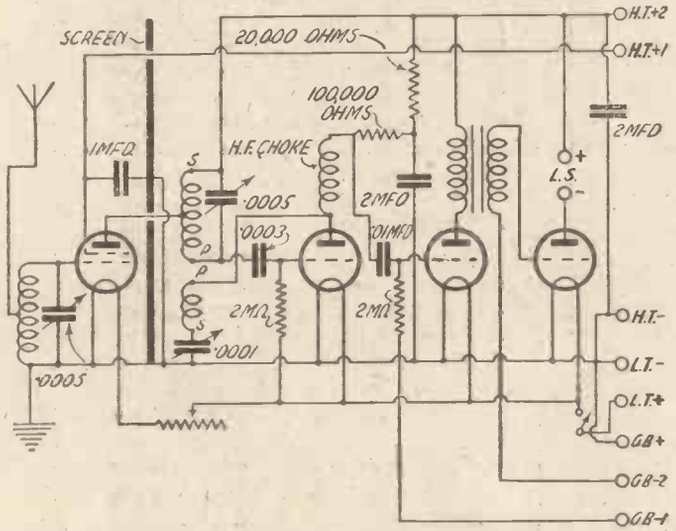
Those who are troubled by local station "swamping" are strongly recommended to try the long waves, above 1,000 metres, for, under the conditions of test referred to, at least four Continental stations, Hilversum, Radio Paris, Berlin, and Moscow, were all brought in at full loud-speaker strength, free from interference, without resorting to a wavetrap. The aerial, it should be emphasised, was a short indoor one.

The Circuit

Returning to the circuit diagram, it will be seen that to the right of the screen-grid valve is a vertical line, which represents the screening partition separating the components associated with the grid circuit of the screen-grid valve from those associated with its anode circuit.

"THE 'RANGER'" (Continued from preceding page)

The screen-grid valve, in an ordinary four-pin valve holder, together with a centre-tapped coil and a .0005-microfarad



The Circuit Diagram

tuning condenser, are separated by a three-sided screen from the remaining components.

The anode connection of the new screen-grid valve, brought out to an insulated terminal on the top of the bulb, forms a flexible wire link between the two compartments

List of Components

Ebonite or bakelite panel, 21 in. by 7 in., and two strips, one 12 in. by 2 in. and one 3 in. by 2 in. (Raymond, Becol, Pertinax, Paxolin).

Two .0005-microfarad variable condensers with slow-motion movement (Ormond, J.B., Burndept, Lissen, Polar "Ideal").

.0001-microfarad reaction condenser (Ormond, J.B., Burndept, Lissen, Polar "Ideal").

Four anti-microphonic valve holders (Formo, W.B., Benjamin, Igranic).

Three single coil holders (Lotus, Lissen).

Panel-mounting rheostat, 30 ohms (Peerless, Lissen, G.E.C., Igranic).

Push-pull filament switch (Igranic, Lissen, Trix, Wearite).

Two 2-megohm grid leaks with bases (Hunt's Polymet, Lissen, Dubilier, Graham-Farish, T.C.C.).

.0003-microfarad fixed condenser (Hunt's Polymet, Lissen, Dubilier, Graham-Farish, T.C.C.).

.01-microfarad fixed condenser (Hunt's Polymet, Lissen, Dubilier, Graham-Farish, T.C.C.).

1-microfarad fixed condenser (Hunt's Polymet type "A," Lissen, Dubilier, Graham-Farish, T.C.C.).

Two 2-microfarad fixed condensers (Hunt's Polymet type "A," Ferranti, Lissen, Dubilier, Graham-Farish, T.C.C.).

High-frequency choke (Lewcos, Lissen R.I. & Varley, Igranic, Burndept, C.D.M., Watmel).

Two wire-wound resistances, one 20,000 ohms and one 100,000 ohms, with holders (Ferranti, R.I. & Varley, Lissen, Dubilier).

Low-frequency transformer (Lissen Super, R.I. & Varley, Ferranti, Igranic, Mullard).

Copper screen of dimensions given next week (Parex).

Baseboard, 21 in. by 10 in. (Camco). Panel brackets (Bulgin, Raymond).

Two dial indicators (Bulgin).

Twelve terminals, marked: Aerial, Earth, H.T.+1, L.T.+, L.T.—, H.T.—, G.B.+, G.B.—1, G.B.—2, H.T.+2, L.S.+, L.S.— (Belling-Lee, Eelex, Igranic).

Connecting wire (Glazite).

2 ft. rubber-covered flex.

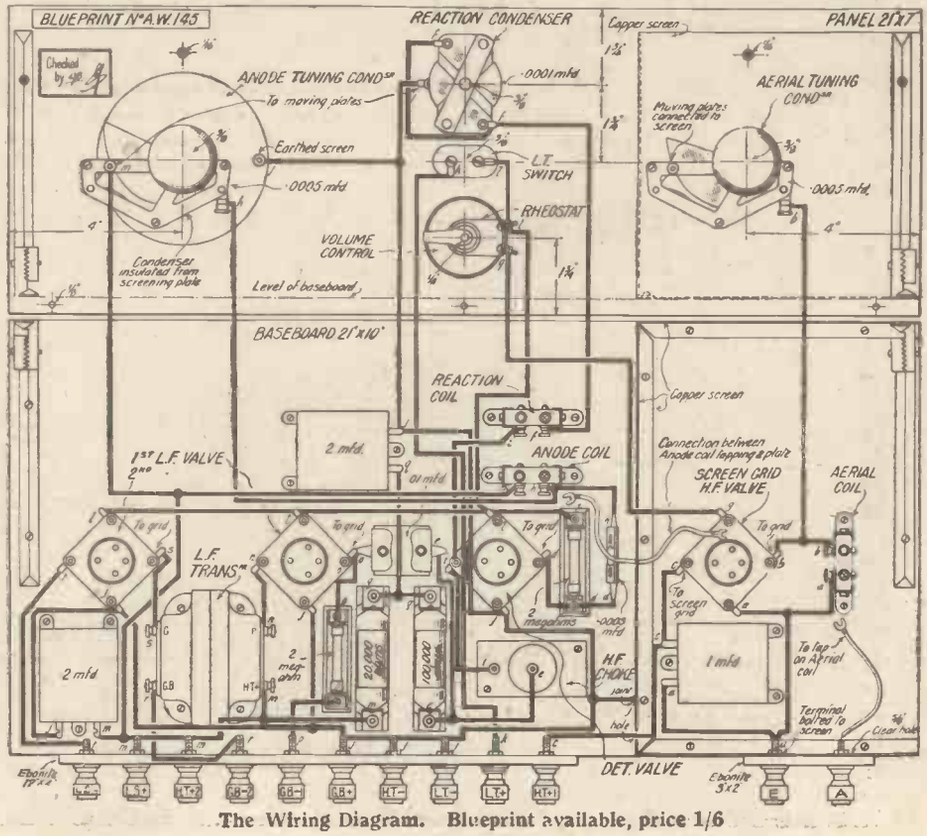
The anode coil, tuned by a .0005-microfarad variable condenser, is connected at one end of the high-tension battery, the other end going through a .0003-microfarad fixed condenser to the grid of the detector valve. The centre-tapped terminal connected to the anode of the screen-grid valve completes an eminently simple high-frequency coupling device. There is no difficulty in supplying reaction to this anode coil and there are obvious advantages in adopting such a procedure, for any local oscillations thus developed will not be reradiated, because the screen-grid valve intercepts the source of oscillation and the aerial circuit.

For reaction a coil and variable condenser in series between the anode of the detector valve and earth are provided, the coil being coupled in a fixed position with respect to the anode coil, and the reaction condenser varied to control the amount of reaction applied.

The moving plates of the reaction condenser are connected to earth so that fine adjustments of reaction can be made without hand-capacity effects.

The low-frequency part of the "Ranger" embodies the now standard sequence of resistance-capacity followed by transformer coupled amplifying valves. Between the detector and first low-frequency amplifying valves are the resistance-capacity coupling components. It will be noted that the anode resistance is divided into two sections of 100,000 and 20,000 ohms each, and that between the junction of these two resistances and earth is connected a 2-microfarad fixed condenser.

(Continued on page 533)



The Wiring Diagram. Blueprint available, price 1/6

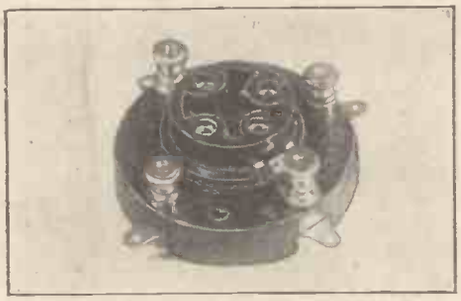
"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

Godwinex Valve Holder

WITH the delicate internal structure of modern valves, the importance of good valve holders cannot be over-estimated, particularly in the case of a detector valve. Not only must the valve be insulated from external shock by suitably springing, but the high-frequency losses in the holder should be reduced to a minimum if successful results are to be obtained on the ultra-short wavelengths.

A distinctive valve holder has been sent in for test by J. Dyson & Co., Ltd., of 5-7 Godwin Street, Bradford. The metal valve sockets are mounted in a neat brown insulated moulding, in which the dielectric between the sockets has been reduced as



Godwinex Valve Holder

much as possible. Metal springs bent over in the form of loops are soldered to the socket and terminate in soldering tags. The tags are fixed to an outer circular moulding by four terminals. The outer moulding forms a support for the inner portion of the holder when the valve is being withdrawn or inserted.

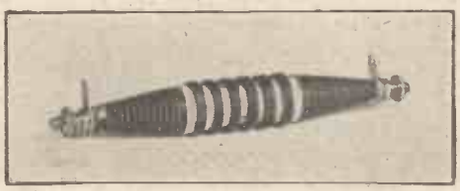
The insulation resistance between the terminals proved to be infinity, whilst the workmanship and finish are all that could be desired.

Wearite Short-wave H.F. Choke

A SHORT-WAVE choke should include efficient inductance to give the required impedance and a particularly low self-capacity. A high self-capacity would tend to by-pass the very high frequencies associated with low wavelengths.

A short-wave choke has been submitted for test and report by Wright and Weaire, Ltd., of 740 High Road, N.17. An examination of this component will reveal that the makers have taken the necessary precautions in the design in order to obtain adequate choking on low wavelengths. The winding is placed on a special former, consisting of a spiral slot, which increases in diameter towards the centre. Most of the winding is placed in five slots at the centre of the choke. A terminal is mounted on either side of the component, thus decreasing the self-capacity to a minimum.

On test in a short-wave receiver, the



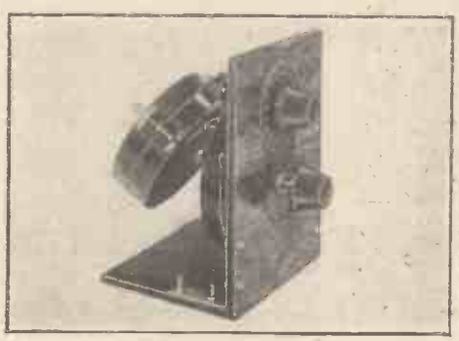
Wearite Short-wave H.F. Choke

choke acted efficiently on wavelengths varying from 10 metres up to 100 metres. At no point on this range did the component lose efficiency. The workmanship and finish are very satisfactory.

Tunewell Tuner

THE all-wave tuner is popular with a large section of the radio community that, rather naturally, dislikes plugging in short- or long-wave coils and altering reaction windings. One of these tuners has been submitted for test by Turner and Co., of 54 Station Road, N.11, who market Tunewell components.

In this unit, the main tuning inductance, which comprises a Tunewell coil, is mounted in an insulated container and a number of tappings are taken out to a switch controlled by an exterior dial. A further inductance encased in a second moulding hinges on the top of this coil and forms a reaction coil. The position of the reaction coil relative to the main tuning coil is controlled by means of a small knob which forces the coil to move away from the tuning inductance.



Tunewell Tuner

The tuner was placed on test in our laboratories in a simple two-valve set with one low-frequency stage. In order to obtain the requisite selectivity, the aerial was coupled on to this unit through a .0001-microfarad condenser. The tuning coil has been designed to allow this to be done. With a standard P.M.G. aerial it was found that the tuner would oscillate and receive on wavelengths varying from 300 metres up to 2,000 metres.

Signal strength and selectivity were good on all wavelength ranges, although the reaction demand varied somewhat between the high and low wavelengths; no trouble was experienced, however, in obtaining reaction sufficient to cause oscillation.

D.X. L.F. Transformer

RECENT advances in transformer design have shown that it is no longer possible to state the efficiency of a low-frequency transformer in terms of its physical dimensions. There are some small trans-

D.X. L.F. Transformer

formers which have better characteristics than larger types.

D.X. Coils, Ltd., of London, E.8, have recently placed on the market a low-frequency transformer which sells at the popular price of 8s. Primary and secondary windings are not mounted on formers, but are self-supporting and are housed inside a metal casing in the approved style on which primary and secondary terminals are placed in an accessible position.

The iron core provided is on the light side, from which it can hardly be expected that the instrument would have a high primary inductance, especially when the step-up ratio is 3 to 1. On test the primary inductance with a small polarising current of 2 milliamps was found to be 10 henries; thus when the component is employed under suitable conditions, the performance is good as regards reproduction and general transformation efficiency.

Baker's Selhurst Radio wish us to point out that owing to the wording of their advertisement in our September 29 issue it may not have been made clear, as was desired, that one of their instruments can be used in the "New-style Baffle Three."

More About the ACE of TWOS

Constructional details of this remarkable set, "the two-valver with the three-valve punch," were given in the two preceding issues. Our Technical Editor here gives further details regarding the operation of the receiver

THE operation of the "Ace of Twos" requires little comment owing to its extreme simplicity. Suitable valves were given in last week's issue, an H.F. or R.C. valve being used for the detector and one of the new pentode valves being employed for the last stage. The majority of pentode valves are made to suit 2-volt batteries, but the Mullard Company are also supplying a 4-volt pentode known as the PM24, which is a distinctly better valve and enables a 4-volt detector valve to be employed. Pentodes in the 6-volt series are not yet available, but all tests on this receiver were carried out with 2-volt valves, and the results quoted herewith were obtained with a Cosmos SP16B as detector and a Mullard PM22 as output valve.

A Pentode Not Essential

It may be remarked at this stage that if any reader does not wish to utilise a pentode in his receiver, he can use an ordinary power valve with every satisfaction. Preliminary testing, indeed, can be carried out with a power valve in the last stage, should there be any delay in obtaining a pentode valve. If this is done the power valve is simply plugged into the last valve socket and the flexible lead to which is connected to the terminal on the pentode valve is not used. Care should be taken, of course, not to allow this lead to straggle about the set, as it is connected to H.T.+, and if it touches the filament circuit a short-circuit will result. There is a fuse in the circuit to protect the valves, but it is not wise to run any unnecessary risk.

Broadcast Reception

For reception on the broadcast band, the "Q" coil switch should be placed in its appropriate position, the switch being to the left for the long waves and to the right for the short waves. Each station can then be tuned in in the normal manner, by rotating the tuning dial, using reaction as necessary. The tapping on the anode filter and the potentiometer controlling the grid leak on the detector valve should be adjusted until smooth reaction is obtained. The reaction condenser can be made to bring the receiver gently up to the oscillation point so that it slides into oscillation almost imperceptibly.

This is more particularly important on the short waves, but it will be found that a suitable setting can be obtained which applies throughout the whole range of the receiver, whether reception is being carried out on the broadcast band or on the short wavelengths. Generally speaking, the potentiometer should be about half-way round. If it is placed fully over to the negative end, the signal strength will suffer and the quality will be very thin and scratchy. The position which gives the most satisfactory results can easily be determined by the reader himself, and once the adjustment has been found it need not be altered.

Test Report of Stations Received on Loud-speaker

The dial settings refer to an S.L.F. condenser.

Condenser setting.	*Station.*	*Wave-length.*
	LONG-WAVE BAND	
169	Huizen	1,875
161	Radio Paris	1,765
150	5XX	1,604.8
129	Motala	1,380
112	Kœnigswusterhausen	1,250
96	Kalundborg	1,153.8
89	Warsaw	1,111.1
82	Hilversum	1,071
	BROADCAST BAND	
174	Vienna	517.2
172	Brussels	508.5
169	5GB	491.8
164	Langenberg	471.6
156	Brunn	441.1
151	Kattowitz	422
147	Berne	409.8
144	Hamburg	396.3
137	Stuttgart	379.7
130	2LO	361
118	Copenhagen	337
109	Dublin	319
100	Kœnigsberg	303.6
87	Cologne	283
84	Barcelona	277
57	Nurnberg	242
	SHORT-WAVE BAND	
	A.M.S.4	
16	2XAD	21.96
30	5SW	24
46	KDKA (8XK)	26.8
55	2FC (Sydney)	28.5
68	2XAF	31.4
71	3LO (Melbourne)	32
76	2NM (Marcuse)	33
114	KDKA	42.95
	A.M.S.9	
23	KDKA	42.95
34	Amateur (unidentified)	46
90	KDKA	63

Grid Bias

Regarding this matter of quality, the grid bias on the pentode should not be judged by ordinary standards. With a three-valve receiver it is customary to place about 3 volts on the first L.F. valve and from 9 to 12 volts on the second L.F. or output valve. This applies to signals of normal volume operating off a battery of 100 to 120 volts. The pentode valve, however, has a very high amplification factor, and in consequence will deliver the same volume output as an ordinary power valve with a much reduced grid swing. Consequently, if too much grid bias is placed on the valve it will be working towards the bottom of its characteristic and the quality will not be satisfactory.

Generally speaking, therefore, the grid bias requires to be somewhat less than with an ordinary output stage, and with a high-tension voltage of 100 volts a value of 6 volts grid bias will be found satisfactory. For somewhat higher voltages the grid bias, of course, should be proportionately increased. The makers, however, supply particulars with the valves as to the grid bias which should be used at various anode voltages, and these recommendations should be followed.

Selectivity

The receiver will be found to be selective for a single tuned circuit. At Elstree there was no difficulty in obtaining Stuttgart, which is fairly close in wavelength to London, without any trace of London. The effect of this, however, is that the tuning is sharp, and it is necessary to tune in somewhat carefully when looking for distant stations at first. After their positions have been found they can be tuned in again with ease and rapidity. In this connection it may be noted that there are two aerial tappings on the "Q" coil,

(*Continued on page* 524)

Build with BURNDEPT for reliability and results

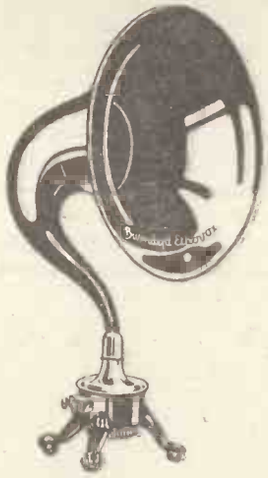
BURNDEPT components give constructors the finest opportunities to utilise the latest ideas in radio reception. Every article is the outcome of long research. Every piece of material and every finished product is subjected to the most rigorous test. Every Burndept line carries a *real* guarantee. That is why you can depend on Burndept for results *and* reliability. Ask your radio dealer to give you full particulars of the range.

WIRE-WOUND RESISTORS

These resistors are absolutely silent and maintain a constant value in operation. Suitable for R.C. coupling or for use in potential divider systems in battery eliminators, etc. All values from 500 to 250,000 ohms. In neat bakelite containers 2⅛ in. high. From 4/6 to 17/6 each.

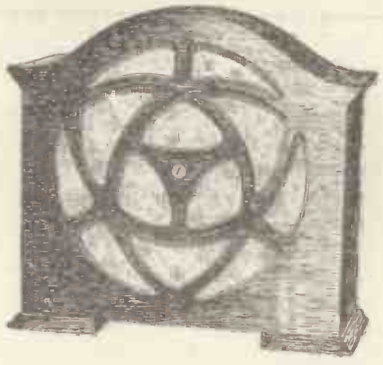
BURNDEPT COMPONENTS

ETHOVOX LOUD SPEAKER



Many listeners still favour the horn-type loud-speaker—purely a matter of tonal preference—and that is why the Ethovox is so popular. One of the oldest designs on the market, this reproducer remains practically unchanged in design because of the widespread approval it has received. Its excellent tone and volume are a constant source of delight.

Price .. £3.



CABINET CONE LOUD SPEAKERS

The compactness and rich tone of these Burndept Cone Speakers have won universal approval. The 12-in. cone gives exceptional volume and provides reproduction that has "perspective" and truly natural effect.

Standard Model, in oak or mahogany, £3.

De Luxe Model, with erinoid finish (in Tortoiseshell, Silver, Bronze, Marble, Mottle, etc.), £3 10s.

BURNDEPT WIRELESS (1928) LTD., BLACKHEATH, LONDON, S.E.3

London Showrooms: 15 BEDFORD STREET, STRAND, W.C.2

A.J.W.

RADIOGRAMS

FROM Monday, October 1, in a similar way to transmissions effected by Bergen (Norway) and Scheveningen-Haven (Holland), Daventry 5XX will broadcast every afternoon an east-coast fishing bulletin.

On the formal opening of the new Tyne Bridge on October 10, the speech by H.M. the King, and a running commentary of the ceremony will be broadcast by the Newcastle station.

André Segovia, one of the most famous Spanish guitarists of our time, will broadcast solos in a programme by the Virtuoso String Quartet to be transmitted by 2LO on October 8.

Charming Chloe, a ballad opera with music by Gerrard Williams, will form the main feature of the London evening programme on October 5.

Maeterlinck's *The Betrothal*, a dream-fantasy, which is a sequel to his famous play *The Blue Bird*, will be the second of the series of the World's Great Plays, to be broadcast by 2LO and 5XX, on October 10; from 5GB it will be radiated on October 8.

Tommy Handley, assisted by Marjorie Sedley will present to 2LO listeners on October 12, a new sketch by Charles Hand and Joyce Crocket, entitled *Selling a Ukulele*.

The Grand Cham's Diamond, a comedy by Alan Monkhouse, is to be given on October 14. The author was responsible for the brilliant post-war play *The Conquering Hero*.

On October 5, in the vaudeville programme, Tommy Handley will revive *The Disorderly Room*; other well-known artistes are also contributing to the evening's entertainment.

In the South of France radio is to be utilised, as in Canada, to assist in fighting the forest fires, which are so prevalent in that district. On the discovery of an outbreak, information is sent by telephone to the station of Marseille-Jetée, which in its turn passes on the news to the particular forest-ranger's hut in the area concerned.

October 20 will see a return to the London studio of Julian Rose and Nick Adams in their quarrelsome cross-talk; Ella Retford is another popular name to be found in this programme.

A new high-power broadcasting station is under construction on the Laksberg, a hill in the immediate neighbourhood of Reval (Esthonia). Its power will be roughly ten times that of the present transmitter; a relay station is also to be built at Dorpat.

Apart from the well-known short-wave telephony station at Hilversum (PCJJ), the Philips Laboratory at Eindhoven also operates nightly a short-wave telegraphy transmitter PBF5, between 7.40 and 11.40 p.m. B.S.T. on a wavelength of 41.3 metres.

Radio facilities in Sweden are to be improved by the erection of a 10,000-watt broadcasting station near Horby.

Successful experiments were carried out recently in the control of a ship by wireless. The ship used was an obsolete war vessel, the *Zahringen*, which was fitted with special aerials and receiving apparatus. Without a single person on board, the ship responded to over a hundred different orders given out from an aeroplane flying a long distance away. It is intended to use wireless control for hulks serving as targets in gun practice.

"THREE EXHIBITION CAMEOS"

Grandma (*generously*): "Would you like this one, Arthur?"

H. F. G. (*suddenly going red in the face, his heart beating at anticipation of possessing an instrument with so many levers and what-nots*): "Oh, I say, Grandma, you are a brick!"

Grandma: "I wish, Arthur, you would refrain from such a vulgar expression! Oh, very well, (*to the salesman*) take my name—Lady Dumbledash, Portman Square, and please send it to-day as my grandson resumes his studies to-morrow."

The salesman in a feverish scrawl jots down the information.

Meanwhile Grandma, who has been conjuring up very highly-coloured and imaginative pictures of the Moulin Rouge, Bal Bullier and Rat Mort, gives him a parting injunction:

"This lever (*she points with her finger*) is Paris, I believe? Just fasten it up securely, please."

"Nation Shall Speak Unto Nation"

Scene: Anywhere within the Exhibition precincts.

Smith junior, clerk to a shipping firm, has been entrusted with the job of piloting Herr Fitzenbangenstocher of the House of (space presents the printing of the full name of the firm, Ed.), wireless component factors at Berlin. Young Smith has been granted this signal honour, owing to the fact that he has assiduously followed the B.B.C. German course broadcast once weekly.

Herr Fitzen . . . (see above) possesses but little English, and Young Smith still totters in the foreign language. They pause at a stand on which are exhibited the thousand and one "necessities" required for the construction of a super-boostodyne.

Herr F. (*pointing with his hand, to a peculiarly shaped and complicated-looking gadget*): "Und was könnte das sein, mein lieber Freund."

Young Smith (*following the finger at the expense of the German sentence*): "Oh, das ist—it's a—wissen Sie—a" (*to the salesman in an undertone*): "I say, old chap, I know much more about a motor-bike than—what is the beastly thing?"

The salesman whispers.

Young Smith: "Mein Herr—it is—es est ein—you know (tries to explain with his hands) a *log-arithmetic* condenser."

Herr F. (*beams*): "Ya, Ya, das ve call ein Nieren kondensator."

Young Smith (*who has caught the word* Nieren, *and knows it means kidney, with a laugh*): "Yes, it's one of the same kidney."

(*Continued from page* 501)

They pass on round the stands until Young Smith getting anxious to go home to tea says: "Is there anything else you would like to see, or that I could explain?"

Herr F.: "Ich bitte Sie." (*He makes a fresh attempt at English*): "If you so good be would to show me die—vat ve call die *Schirmgitterroehrenschaltungen* (screen-grid circuits), von vitch your technische papers are vull."

Young Smith (*who has only caught the word "schirm"—umbrella—staggers at this attack, but manages to recover sufficiently to partly collect his mental German vocabulary*): "Sorry, old man, I didn't know it was raining, but we can——"

Herr F.: "Nein, nein. You understand me not. I vill egsblain."

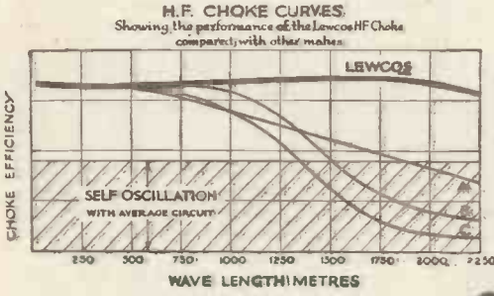
There follows a volley of "*Schirmgitterroehrenhochfrequenzstufe* and *Vorroehrenanordnungen*, reinforced by casual shots of *Zwischenfrequenzverstaerkungtransformatoren*, and *Schwingkreisspulen*.

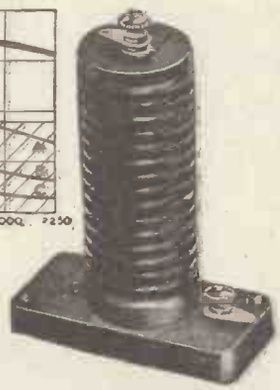
Young Smith totters, shivers, rocks under the discharge, clutches at a neighbouring stand—to the consternation of its occupants—the building swings round, all goes black and he slides to the floor in a dead faint.

J. GODCHAUX ABRAHAMS.

Use them in the "RANGER"

THE LEWCOS H.F. CHOKE—





This Choke prevents self Oscillation

The new LEWCOS H.F. Choke renders your receiver proof against self-oscillation throughout the whole range of wavelengths. It gives maximum efficiency on all wavebands from 20 to 2,000 metres.

The diagram shows the percentage choking effect of the LEWCOS H.F. CHOKE on all wavelengths from 20 to 2,250 metres, as compared with three other popular makes A, B and C.

Self-capacity 1.62 micro-microfarad *(N.P.L. test)*. **Natural Wavelength 5,200 metres** *(tested with Moullin Voltmeter)*.

Price 9/- each.

—and the LEWCOS Centre Tapped COIL

Pat. No. 271,384.

The high efficiency of this Litz wound Coil with guaranteed selectivity will enable you to tune in many stations not previously heard.

The LEWCOS Centre-tapped Coil embodies every quality that radio science demands,—namely Inductive Constancy, Low H.F. Resistance, Free Magnetic Field, Effective Contacts. Write for illustrated descriptive folder.

LEWCOS

Regd.

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MARCONIPHONE

radio simplicity for all

No replacements, no recharging, always ready at the turn of a switch—such is the convenience *and economy* of the new Marconiphone Power Units. New models especially designed for two- and three-valve receivers bring all mains power operation at a cost low enough to suit everyone's pocket. Or, if you want only to eliminate accumulator troubles, install the new, low-priced Marconiphone Trickle Charger.

Model D.C.4.

Model D.C.4. All-power Unit for Direct Current Mains

Designed for the two/three valve receiver, it entails little or no alteration to existing circuits. Wiring and resistances are entirely enclosed. Outputs available: H.T., 60v., 80v., 120v. L.T., up to .35 amp. G.B., 1½v., —1v., —6v., —12v.

One model only. Model B1154, for 200-250 volts. Price £5 5

Model A.C.4. All-power Unit for Alternating Current Mains

May be used in conjunction with Marconi Indirectly-Heated Cathode ("K") valves, or new Point 8 series for small receivers. New system of connection renders it absolutely safe in use. With power supply costs only 2d. per week. Outputs: H.T., 80v. and 120v., 15 milliamperes. L.T., 4v. 2 amps., and 1v. 2 amps. G.B., —1v., —6v. to 12v., —1½v.

One model only, 100-125v., and 200-250v., 40 cycles or over. Price (including valve and royalty. £4 15

Model A.C.4

Marconiphone Trickle Charger (Incorporating Westinghouse Metal Rectifier)

The low tension accumulator need never be run down when a Marconiphone Trickle Charger is installed. There is no need to debate whether to instal a 0.1-amp. valve or one of the new 0.25 Marconi Super Power Types which give such improved quality and volume.

Enclosed in a strong metal case with moulded top, this unit will deliver half an ampere to 2-, 4- or 6-v. batteries from mains of 100-125v. or 200-250 volts.

No. B1146. Model A, for 200/250-volt A.C. Mains.

No. B1145. Model B, for 100/125-volt A.C. Mains.

Both at frequencies of 40 cycles and over.

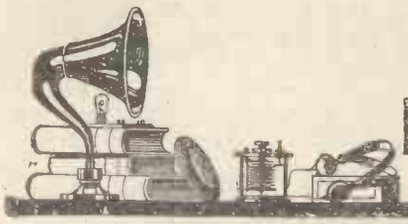
Price (either type) £2 9 6

Trickle Charger

Showrooms; 210-212 Tottenham Court Rd., and Marconi House, Strand, W.C.2

THE MARCONIPHONE COMPANY, LIMITED

(Dept. P), 210-212 TOTTENHAM COURT RD., LONDON, W.1



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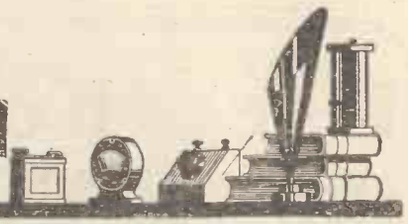


RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below. Address Queries—AMATEUR WIRELESS Information Bureau, 58/61 Fetter Lane, London, E.C.4

Technical Terms.

Q.—*Being a newcomer to wireless, I am at a loss to understand the terms and abbreviations used in technical journals. Can you advise me of any books dealing with technical terms and abbreviations?—R. I. (Edinburgh).*

A.—The information you require is given very fully in *Letts' Amateur Wireless Diary* (1929), obtainable from this office or from Letts' Diaries Co., Ltd., 160 Shaftesbury Avenue, London, W.C.2, prices 1s. 6d. and 2s. 6d. each net.

Crackling Noises.

Q.—*My receiver gives fairly good results, but as soon as I knock the panel of the set or thump the table upon which the receiver stands, crackling noises emanate from the speaker. I cannot locate any bad connections in the set. Can you suggest where the trouble is likely to be?—G. D. (Essex).*

A.—If you have been unable to trace a poor connection in your wiring, try the effect of carefully twisting and bending the valves in their holders from side to side. It is often the case that a loose connection exists between the springs and the terminals or sockets of spring valve holders. Tightening up the faulty contact should rectify the trouble, although in some cases it is very advisable to substitute an entirely new valve holder. If you cannot trace the trouble to a faulty valve holder or to other wiring connection, then possibly the faulty connection exists inside one of the transformers, coupling units, or even inside the loud-speaker. Unless you are thoroughly conversant with instrument design or mechanical work, we would advise you not to attempt to open up instruments to look for the trouble. Replacement of any component that appears at all doubtful will, in this case, be the best course to follow.—C. L.

When Asking Technical Queries

PLEASE write briefly and to the point

A Fee of One Shilling (postal order for preference) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

Pentode Valves.

Q.—*I have heard recently of a new valve called the pentode, which is intended for L.F. amplification and which, I understand, gives adequate amplification for loud-speaker work on its own and, in fact, must not be used with an amplifying valve, either in front of it, or following it. This being the case, can you tell me whether the single pentode valve will give sufficient amplification for the efficient operation of a moving-coil loud-speaker?—G. F. (London).*

A.—We have operated a moving-coil speaker from a three-valve set, making use of one screened-grid valve, an ordinary detector valve, and one pentode valve. We find that, provided a substantial supply of H.T. is available, one L.F. amplifying stage making use of a pentode gives adequate "punch" for the purpose.—L. C.

"ALL-WAVE MAINS 3"

(*Continued from page* 504)

by means of a wood screw passing through a small insulating bush into the baseboard. Aerial and earth terminals are mounted on this strip in a vertical position. The same procedure is adopted with the loud-speaker terminals, mounted on a strip near the other end of the baseboard.

The mains plug is mounted at the extreme left of the baseboard, and from this very short wires can be taken to the input terminals of the power transformer mounted near by.

The smoothing choke and two smoothing condensers, together with the ordinary four-pin valve holder for the U5 rectifying valve, the filament rheostat for controlling the current to the rectifying valve and the cathode potentiometer group themselves in convenient wiring positions round the power transformer. The grid-bias battery is mounted in two grid-bias battery clips in a central position at the back of the baseboard.

Wiring

In the process of wiring together the various components the constructor will find the blueprint absolutely invaluable since it gives point to point wiring details in a clear and precise manner that will be appreciated only by experience.

Special emphasis is laid on the necessity of using well insulated connecting wires such as the Glazite we recommend, since there are innumerable wire crossings where bare or badly insulated wiring would result in serious damage to the components involved. The only exception to this rule is where the grid bias leads are concerned which, in this case, are lengths of rubber-covered flex terminating in wander plugs and in the flexible lead from the "Q" aerial coil.

Special care is required in checking over the connections after the wiring has been completed. When the constructor has, however, satisfied himself that his connections agree in every respect with those indicated by the blueprint, preliminary tests may be undertaken with confidence.

The self-contained nature of the receiver will now become apparent, for apart from the necessity for a sixteen-volt grid-bias battery and the three Cosmos A.C. valves, there are no external accessories required unless one considers the loud-speaker and aerial and earth as such.

A Cosmos A.C./R valve is required in the valve holder nearest the eliminator components and two Cosmos A.C./G valves in the other two A.C. valve sockets. A U5 rectifying valve, as marketed by either the Marconiphone Co., Ltd., or the General Electric Co., Ltd., is required in the valve holder associated with the eliminator. The "Q" coils, covering as they do all wavelengths between 250 and 2,000 metres, obviate the necessity for a range of plug-in coils.

In our tests we proceeded as follows. After connecting up aerial and earth and loud-speaker, inserting the valves in the positions already mentioned and seeing that the grid-bias wander plugs were in approximately correct positions in the grid-bias battery (as indicated in the blueprint), the "Q" coil switch was turned to the right, thus providing us with tuning over the broadcast band of wavelengths, the mains plug was then inserted into a suitable wall socket. It was noted that whereas the U5 valve lit up immediately it took an appreciable time for the heaters in the A.C. valves to assume their characteristic red glow.

As soon as this happened, however, the set at once became "alive" and, without the slightest trace of hum, the local station, which in our case is 2LO, came in at such a volume that detuning was necessary. The high-frequency valve was completely neutralised, that is to say all signs of oscillating due to valve feed-back were eliminated, when the moving vanes of the neutralising condenser were about a fifth of the way in mesh with the fixed vanes.

The cathode potentiometer setting was not at all critical, though it was noticed that the temporary elimination of this component introduced a very decided hum when the receiver was in an oscillating condition. Over 20 stations were picked up on the broadcast band and long wavelength band in about half an hour after the receiver was first switched on.

"MORE ABOUT THE ACE OF TWOS" (*Continued from page 514*)

connected to terminals 3 and 4 respectively. On the actual receiver the aerial is shown going to terminal No. 4, but if any reader wishes to experiment he should try both of these terminals in order to find which one gives the better results.

Regarding the reception of short waves, two coils are made by the London Electric Wire Co. & Smiths, Ltd., namely, the AMS9, which tunes from 40 to 130 metres with a .0005-microfarad condenser, and the AMS4, which will give reception from 20 to 70 metres. In general, this latter coil will be found to be all that is required, since it will enable reception of 2XAD, 2XAF, KDKA, 2FC, and 3LO to be obtained without trouble. The first three of these stations, of course, are American, while the last two are Australian. In addition, there are various German, Dutch, and other short-wave stations working, not to mention 5SW (Chelmsford) and 2NM, the station operated by Gerald Marcuse at Caterham. In order to obtain details as to the various short-wave stations working, together with their times and wavelength, reference should be made to the short-wave charts which appear from time to time in AMATEUR WIRELESS. The last was in No. 322 (August 11 issue).

Operating Notes

For those readers who have not previously attempted short-wave reception, the following instructions will prove useful. The first business is to arrange that the receiver shall oscillate easily and smoothly, as already described. On increasing the reaction condenser, the receiver will start oscillating. Oscillation may be detected by a faint rushing noise in the loud-speaker, usually accompanied by a faint plop at the actual point where the actual oscillation commences. When the receiver is adjusted to its best position, however, it is rather difficult to distinguish the actual point where the transition takes place, the circuit sliding smoothly from the non-oscillating to the oscillating condition. This is the state of affairs which is required for the best reception, so that the set can be brought right up to the edge of oscillation, in which circumstances the detector valve is in its most sensitive state.

It is advisable to run over the dial slowly with the receiver in an oscillating condition. As the tuning condenser is increased it will be found that more reaction is required, and by a motion of the two dials together the receiver should be kept *just oscillating*. A large number of morse stations will be heard, some of which transmit high-speed telegraphy, which can be discerned as a very rapid brrrr. Other stations have a more musical note and transmit at slower speeds. A run over the dial in this manner will accustom the reader to the handling of the set on short wavelengths.

The particular point is that the receiver should be kept just oscillating. It will be observed that as the reaction control is increased beyond the point where the set just oscillates, the tuning is considerably altered and, at the same time, the signal strength, when the set is retuned to pick up the same station, is decreased. In searching, therefore, the set should be kept just at the oscillation point, when the carrier waves of the distant stations to be received will be obtained at their best strength. The resolving of the carrier wave is then a matter of comparative ease.

Searching

In searching for an actual telephony station, the tuning dial should be set approximately to the position shown on the accompanying test report. A variation of several degrees may be expected, owing to different aerial systems, but the dial settings given will serve to indicate the approximate positions at which the stations will tune in. Rotate the tuning dial very slowly, using the slow-motion arrangement and keeping the set just oscillating, as just described. The carrier wave of the required station will be heard without difficulty at fairly good strength, provided

(*Continued on page 526*)

"MORE ABOUT THE ACE OF TWOS"

(Continued from page 524)

conditions are satisfactory. Adjust tuning dial until the whistle of the carrier wave is very low and practically vanishes. Then reduce the setting of the reaction condenser slightly, which will be found to alter the note of the carrier wave. Again retune on the first dial to bring the carrier wave back to the original condition, i.e., on the zero point between the whistles which are to be found on each side. Continue to reduce the reaction setting, keeping the circuit tuned in in this manner until finally the oscillation will cease.

It is only on good nights that the speech is as clear as with an ordinary distant station, there usually being a certain amount of fading, this being somewhat rapid in character. At the same time, there should be no difficulty in hearing distinctly the announcements and the musical items. During a test of this receiver a talk from an American station on technical matters concerned with the screen-grid valve was heard and clearly understood from beginning to end.

Under certain conditions, there may be found to be a squeal a few degrees after the circuit has commenced to oscillate. This is noticeable particularly when the pentode valve is used and is not troublesome with ordinary valves. Since the squeal occurs after the set has started to oscillate, however, it will cause no difficulty in actual reception, being more annoying in searching than anywhere else. It is not a threshold howl and does not interfere with actual reception, but if the user finds it unpleasant he can try changing the detector valve, or, alternatively, he can connect a leak of about 1 megohm across the secondary of the L.F. transformer.

"The Motor Cyclist's Reference Year Book."—This publication is the first and only reference year book covering every phase of motor cycling; it is, in fact, the motor cyclist's "Inquire Within," and it has been compiled with the object of providing a complete guide to the pastime. Sections include records, trend of design, overhaul, law, purchase and insurance, addresses, index marks, carburettors, magnetos, the year's machines, timing, clubs, and a fund of useful information. Illustrations are given of all the principal machines and details of their most interesting features. No enthusiastic motor cyclist can afford to be without the host of facts and figures available in this handbook. The price is 2s. 6d., and it is published by T. C. Simpson & Co., Ltd., Arundel Street, Strand, W.C.2.

"THE 'HOME 2'"

(*Continued from page 488*)

After this the two valve holders, the low-frequency transformer, the high-frequency choke, the fixed reaction condenser, the grid leak and condenser and the H.T. battery condenser are fitted to the base-board with wood screws in approximately the positions indicated by the illustrations.

The Wiring

The last part of the work, and to my mind the most interesting, consists of wiring together the various components, which can be done with stiff lengths of Glazite wire. This wire, which is sold in 2 ft. lengths or in reels, requires stretching before bending if really neat connections are to be made. Here is a tip that I do not often see given in constructional articles. About one inch of the insulated sleeving is cut off from each end with a pen-knife or razor-blade so that each end of the length of wire is bared. Grip one end in a vice, taking care that only the *wire* is griped and not the covering and then grip the other bared end in a pair of pliers, taking the same precautions and pulling, until the wire inside the sleeving no longer "gives." Stiff, straight lengths of wire can then be bent to shape.

Wherever possible joints are soldered. Personally, I am not one of those who advocate pressure contacts, though I must admit that some constructors who fight shy of soldering find it a great temptation to adopt the alternative. The blueprint which can be obtained from the Blueprint Department, 58-61 Fetter Lane, E.C.4, will prove of special value in the wiring process. Each wire is lettered and all those wires marked *a* should be joined together first with one or as few wires as possible, then all those marked *b* treated in the same way and so on through the alphabet. In this way any possibility of overlooking a connection is avoided and at the finish you can be quite sure that the receiver is correctly wired up.

The two alternative aerial terminals on the tuner are marked "A1" and "A2" and to provide an easy means of trying these at will, a flexible lead from the aerial terminal terminating in a small spade tag is incorporated.

The combined grid leak and condenser, it should be noticed, is provided with three terminals, consisting of two condenser terminals and one grid-leak terminal. Comparing the blueprint with the circuit diagram you will see that one grid-condenser terminal is common to one grid-leak connection—that is why only one grid-leak terminal is necessary. But this grid-leak terminal is insulated from the other grid-condenser terminal as can be seen from the diagrams and for this reason the grid-leak terminal is held in position by means of an *insulated* clip clamped under the grid-condenser terminal going to the tuning coil.

(*Continued on next page*)

"THE 'HOME 2'"

(Continued from preceding page)

All that remains now is to select suitable valves and preliminary tests can then be undertaken. I refer you to the valve table giving recommended combinations of well-known makes. In addition to a 120-volt battery, a 9-volt grid-bias battery will be required as well as a 2-, 4-, or 6-volt accumulator, according to the voltage rating of the valves selected.

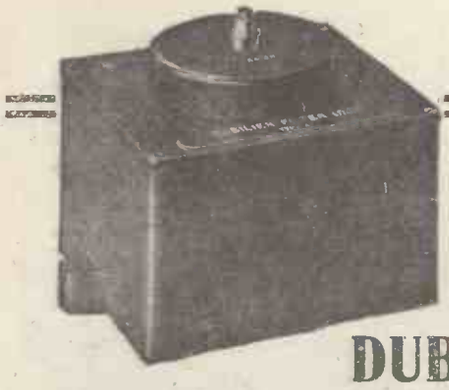
Before inserting the complete receiver, with valves, into the cabinet, the local station can, with advantage, be tuned in as a test of the receiver's capabilities. If you are situated near a main B.B.C. station, working on the broadcast band, pull out the auxiliary knob on the Wearite tuner, set the reaction coil at zero and slowly rotate the tuning condenser until speech or music is heard. (The rheostat should have been turned practically full on beforehand.)

Valves for the "HOME 2"
Some highly-recommended two-volt combinations

Make	*Detector*	*L.F.*
B.T.H.	GP210	LF215 P227
COSMOS	SP16/G	SP18/RR
COSSOR	210LF	230P
EDISWAN	LF210	PV225
MARCONI	DEL210	DEP {215 240
MULLARD	PM1LF	PM {252 2
OSRAM	DEL210	DEP {215 240
SIX-SIXTY	SS210LF	SS215P

If a short aerial is in use, the flexible lead should be connected to terminal "A1," whereas with a long aerial "A2" should be utilised. Long-wave stations can be tuned in by pushing in the small auxiliary knob on the tuner dial, and rotating the tuning condenser and the reaction coil in the usual way.

"Wireless Step by Step" by "Dictron" (Newnes, 2s. 6d.). In the words of the introduction, "the object of this book is to lead the reader, step by step, to an understanding of such of the principles of radio communication as will enable him to obtain the maximum enjoyment from his radio apparatus." We can say that "Dictron" has achieved this object in a highly readable way. From the fundamental facts of electrical engineering the reader goes lightly on through the basic principles of radio communication to simple explanations of the valve and wireless circuits. The transmitting side is also touched on and valuable information regarding auxiliary apparatus is given. We recommend this book to every listener.



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These are complete H.T. Battery Eliminators for use on D.C. mains, which, with the addition of an A.C. Rectifier, can be used with an A.C. supply. Four types are manufactured, having outputs and tappings as stated, and each incorporates an earth protection condenser.

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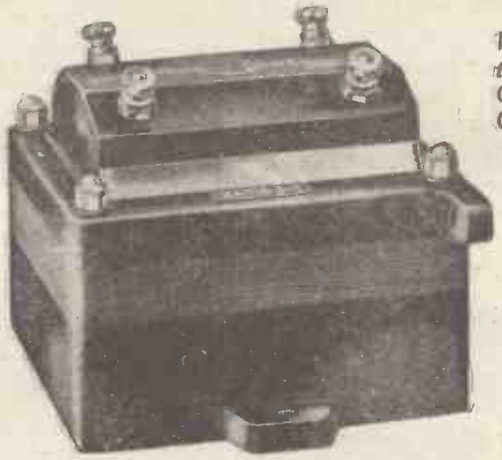

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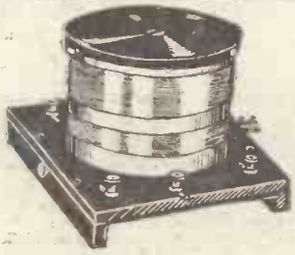

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Home Two (D. Trans)	AW146
"Q"-coil (D, Trans)	WM62
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British Station Three (HF, D, Trans)	AW122
Optional Two-three (D, 2 LF)	AW124
"Simpler Wireless" Mains Three (D, 2 LF)	AW126
Simplicity Screen-grid Three (HF, D, Trans.)	AW132
"Proms" Three (D, 2 RC)	AW137
Adaptable Three (D, 2 Trans)	AW139
New-style Baffle Three (D, RC, Push-pull) (Price 1s. 6d.)	AW143
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Glee-singer Three (D, 2 RC)	WM92
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Near and Far Three-Four (HF, D, RC, Trans)	AW113
Explorer Four (HF, D, RC, Trans)	AW120
Summer Time Searcher (2 HF, D, Trans)	AW128
Overseas Short-waver (HF, D, 2Trans)	AW133
The Ranger (HF, D, RC, Trans)	AW145
Station-finder (HF, D, 2 RC)	WM68
"Q"-coil 4 (HF, D, Trans, RC)	WM71
Gramo-Radio 4 (D, RC, 2 Trans, Push-pulled)	WM70
Screen-grid 4 (HF, D, 2 RC	WM77
Frame Aerial 4 (HF, D, 2 RC)	WM85
All-from-the-Mains Four (HF, D, 2 LF)	WM83
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Adaptor for above (6d.)	AW67a
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Add-on Distance-getter (HF)	AW117
Add-on Three (D, RC, Trans)	AW121
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Screened-grid HF Amplifier	AW138
Range Extender (HF Unit)	WM38
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Gramo-radio Amplifier (2v) (Trans, Parallel)	WM72

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HT from AC Mains	AW 73
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H.T. Eliminator for A.C. (200 v. output)	AW102
Hook-on Short-waver (Amplifier)	AW104
Moving-coil Output Unit	AW115
Anti-motor boating Unit	AW130
Knife-edge Wavetrap (6d.)	AW131
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Duplex diaphragm Loud-speaker	AW142
L.T. and H.T. Mains Unit (D.C.)	AW123
A.C. Battery Eliminator	WM41
Cone Loud-speaker	WM55
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AMATEUR WIRELESS 58-61 FETTER LANE, LONDON, E.C.4

"THE 'RANGER'"

(Continued from page 510)

In this way an anode filter is provided which will effectively prevent any tendency to "motor-boat."

There are two other blocking condensers incorporated in the "Ranger," one being the 1-microfarad condenser shunted across the screen-grid and earth and the other a 2-microfarad condenser shunted across H.T. + 2 and earth. These are valuable aids to stability and should not be omitted.

As a means of controlling the volume a separate filament rheostat wired in the positive side of the screen-grid valve filament proves highly effective. A filament on-off switch in series with filament rheostat and the low-tension positive terminal provides a master control for all four valve filaments.

A single high-tension positive terminal H.T. + 2 supplies all four anodes with H.T. potential. The H.T. + 2 terminal is for the screen-grid potential. With a 150-volt maximum supply the H.T. + 1 terminal can, if desired, be connected in series with a 50,000-ohm anode resistance to the H.T. + 2 terminal and the maximum H.T. applied.

As far as the theoretical considerations are concerned, the reader should now have a clear idea of the general scheme of things. The list of components required to build the "Ranger" is given in this article, and those who are sufficiently interested in the design to wish to duplicate it should obtain these components ready for next week, when the constructional details and operating hints will be given.

Some Results with the "Ranger"

Half an hour spent at the controls of this receiver one evening about a fortnight ago resulted in the following stations being brought in at full loud-speaker strength:

THE BROADCAST BAND

Station	Aerial tuning (left)	Anode tuning (right)
Rome	125	130
Vienna	148	152
Budapest	160	164
Radio Toulouse	100	110
German (unidentified)	118	125
5GB (Daventry)	140	144
Langenberg	134	138

THE LONG WAVELENGTHS

Radio Paris	125	128
5XX (Daventry)	110	100
Air Ministry	85	85
Berlin	72	71
Moscow	61	58
Hilversum	48	40

The aerial and anode coils were both No. 60 centre-tapped Atlas types, and the reaction coil a No. 30 untapped Atlas, for the broadcast band of wavelengths. A 250 centre-tapped aerial coil and a similar anode coil with a 75 untapped reaction coil covered the long wavelengths.

BROADCAST TELEPHONY

(Broadcasting stations classified by country and in order of wavelengths)

Metres	Kilo-cycles	Station and Call Sign	Power Kw.
GREAT BRITAIN			
24	12,500	Chelmsford (5SW)	20.0
252.1	1,190	*Bradford (2LS)	0.2
273	1,099	*Sheffield (6FL)	0.2
275.4	1,089	*Nottingham (5NG)	0.2
277.8	1,080	*Leeds (2LS)	0.2
288.2	1,041	*Edinburgh (2EH)	0.2
294.1	1,020	*Stoke-on-Trent (5ST)	0.2
294.1	1,020	*Swansea (5SX)	0.2
294.1	1,020	*Dundee (2DE)	0.2
294.1	1,020	*Hull (6KH)	0.2
297	1,010	*Liverpool (6LV)	0.2
306.1	980	Belfast (2BE)	1.5
312.5	960	Newcastle (5NO)	1.5
326.1	920	*Bournemouth (6BM)	1.5
353	850	Cardiff (5WA)	1.5
361.4	830	London (2LO)	3.0
384.6	780	Manchester (2ZY)	1.0
400	750	*Plymouth (5PY)	0.2
405.4	740	Glasgow (5SC)	1.2
491.8	610	Daventry EX (5GB)	24.0
500	600	Aberdeen (2BD)	1.5
1,604.8	187	**Daventry (5XX)	25.0
*Relay stations. **Relays 2LO.			
AUSTRIA			
253.8	1,182	Linz	0.5
272.4	1,101	Klagenfurt	1.5
277.8	1,080	Salzburg (under const.)	0.5
294	1,020	Innsbruck	0.5
356.7	841	Graz	0.5
517.2	580	Vienna	15.0
576.9	520	Vienna	0.75
BELGIUM			
220	1,360	Chatelineau	0.25
232	1,292	Schaerbeek	0.5
265	1,130	Louvain (under construction)	7.0
275	1,090	Ghent	0.5
508.5	590	Brussels	1.5
CZECHO-SLOVAKIA			
263.2	1,140	Kosice	2.4
300	1,000	Bratislava	0.5
349.2	859	Prague (Praha)	5.0
441.1	880	Brunn (Brno)	2.4
DENMARK			
337.4	889	Copenhagen (Kjobenhavn)	1.5
972	308	Soro	2.5
1,153.8	260	Kalundborg	7.0
ESTHONIA			
408.5	735	Reval (Tallinn)	2.2
FINLAND			
375.4	789	Helsingfors (Helsinki)	1.2
1,522.8	197	Lahti	2.5
FRANCE			
40.2	7,463	Lyon (PTT)	10.0
45	6,666	Agen	0.25
61.5	4,878	Radio LL (Paris)	1.0
158	1,899	Beziers	1.0
176	1,700	Tourcoing	0.3
210	1,428	Chambery	0.5
228.4	1,313	Biarritz	0.25
230	1,304	Ste Etienne	0.25
238	1,260	Bordeaux (Radio Sud-Ouest)	2.5
239.5	1,253	Nimes	1.0
245.2	1,238	Juan-les-Pins	0.7
245.7	1,221	Toulouse (PTT)	2.0
253	1,185	Montpellier	0.5
254.2	1,180	Rennes	0.5
267.3	1,122	Lille (PTT)	0.7
268	1,118	Strasbourg	0.5
273	1,098	Limoges (PTT)	0.5
286	1,048	Bordeaux	0.5
291.5	1,029	Radio Lyon	1.5
299.4	1,002	Vitus (Paris)	2.0
299.7	1,001	Agen	0.5
317.4	945	Marseilles	0.5
340	882	Le Petit Parisien, Paris	0.5
353	850	Algiers (PTT)	2.0
370	811	Radio LL, Paris	1.0
389.6	770	Toulouse (Radio)	5.0
416.6	720	Grenoble (PTT)	1.5
416	721	Rabat (Radio Maroc)	2.0
430	698	Lille (Radio Flandres)	0.25
458	655	Paris (Ecole Sup., PTT)	0.7
476.1	630	Lyons (PTT)	1.0
1,765	170	Radio Paris	8.0
1,850	162	Radio Carthage (Tunis)	2
2,650	113	Eiffel Tower (FL)	8.0
GERMANY			
14,84	20.210	Nauen (AGAI)	20.0
37.65 41.45 67.65	7,968 — 4,434	Doberitz (AFK)	5.0
51	5,882	Bergedorf (AFL)	3.0
236.2	1,270	Stettin	0.75
242	1,239	Nurnberg	3.0
250	1,200	Muenster	1.5
251.8	1,191	Cassel	0.7
254.6	1,178	Kiel	0.7
271.7	1,104	Danzig	0.75
273	1,099	Bremen	0.75
274.9	1,091	Dresden	0.75
283	1,060	Cologne	4.0
279.4	1,073	Kaiserslautern	1.5
297.3	1,009	Hanover	0.7
803.6	988	Koenigsberg	4.0
322.2	931	Breslau	4.0
329.7	910	Gleiwitz	10.0
366.3	819	Leipzig	4.0
379.7	790	Stuttgart	4.0
396.8	755	Hamburg	4.0
400	750	Aachen	0.75
429	699	Frankfurt-Main	4.0
471.6	636	Langenberg	25.0
483.9	620	Berlin	4.0
536.6	559	Munich	4.0
566	530	Augsburg	0.5
574.7	522	Freiburg	0.75
1,250	240	Zeesen	25.0
1,829	164	Norddeich	10.0
2,525	119	Berlin (News)	8.0
2,900	103	" "	8.0
4,000	70	" "	8.0
HOLLAND			
18.4	—	Kootwijk (PCLL) (Wed. 13.40 B.S.T.)	30.0
31.4	—	Hilversum (PCJJ)	25.0
340.9	880	Huizen (until 5.40 p.m.)	5.0
1,071	280	Hilversum (ANRO)	5.0
1,875	160	Scheveningen (5.45 to 6.0 p.m.)	7.0
1,875	160	Huizen (after 6.40 p.m. and on Sundays,	5.0
1,950	154	Scheveningen-haven	5.0
HUNGARY			
555.5	540	Budapest	15.0
ICELAND			
333.3	900	Reykjavik	1.0
IRISH FREE STATE			
319.1	940	Dublin (2RN)	1.5
401	748	Cork (5CK)	1.5
ITALY			
104	2,885	Milan	0.4
315.8	946	Turin	0.5
334	898	Naples (Napoli)	1.5
400	750	Bolzano	0.2
449	668	Rome (Roma)	3.0
547.4	548	Milan	7.0
JUGO-SLAVIA			
309.5	965	Zagreb (Agram)	1.25
460	652	Belgrade	.25
570	525	Laibach (testing)	5.0
LATVIA			
526.3	570	Riga	2.0
LITHUANIA			
2,000	150	Kovno	15.0
LUXEMBURG			
217.4	1,380	Luxemburg	0.25
NORWAY			
370.4	810	Bergen	1.0
400	750	Aalesund	1.0
412	728	Notodden	0.7
435.4	689	Fredriksstad	1.0
448	670	Rjukan	1.0
461.5	650	Oslo	1.5
500	600	Porsgrund	1.0
566	350	Hamar	0.7
2,041	142	Bergen	5.0
POLAND			
270.3	1,110	Lemberg (under construction)	10.0
343.2	874	Posen (Poznan)	1.5
422.5	710	Kattowitz	10.0
426.7	703	Wilno	1.5
567	529	Cracow	1.5
1,111	270	Warsaw	10.0
PORTUGAL			
250	1,200	Oporto	0.5
RUSSIA			
1,000	300	Leningrad	20.0
1,450	209	Moscow (Moskva)	30.0
1,700	176	Kharkov	15.0
SPAIN			
272.7	1,090	Oviedo (EAJ19)	0.5
277	1,083	Barcelona (EAJ13)	2.0
277.8	1,080	Cartagena	1.0
324.3	925	Almeria (EAJ18)	1.0
335	895	San Sebastian (EAJ8)	0.5
345	870	Barcelona (EAJ1)	3.5
374.5	801	Madrid (EAJ7)	2.0
400	750	Cadiz (EAJ3)	0.5
402.1	746	Salamanca (EAJ22)	0.55
434.8	690	Seville (EAJ5)	1.0
SWEDEN			
260.1	1,153	Malmo	1.0
278.8	1,076	Trollhattan	0.4
316.7	947	Falun	0.5
416.7	720	Goteborg	3.0
453.1	662	Stockholm	1.5
545.6	550	Sundsvall	1.0
720	416	Ostersund	2.0
1,190	252	Boden	2.0
1,380	217	Motala	30.0
SWITZERLAND			
410.5	731	Berne	1.5
588	510	Zurich	0.6
680	441	Lausanne	0.6
760	395	Geneva	0.5
1,010	296.9	Basle	0.25
TURKEY			
1,180	254	Stamboul	5.0
1,818	165	Angora	7.0

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

Oct. 9 De Courville's Hour.
" 10 *The Betrothal*, a play by Maurice Maeterlinck.
" 11 Hungarian national programme.
" 12 B.B.C. symphony concert (first of the season), conducted by Sir Thomas Beecham from the Queen's Hall.
" 13 *The Follies.*

DAVENTRY (5GB)

Oct. 8 *The Betrothal.*
" 9 Liverpool Philharmonic Society's first concert.
" 10 Light Irish music.
" 12 Music from the musical comedies and comic operas.

CARDIFF

Oct. 8 *The Vicar of Wakefield*, selections from the light opera by Liza Lehmann.
" 10 Vaudeville programme.

MANCHESTER

Oct. 11 *The Highwayman of Knutsford*, a ballad operetta.
" 13 Excerpts from musical comedies.

NEWCASTLE

Oct. 9 *The Bridge of Tyne*, a fantasy by Lt.-Col. Spain.
" 10 Opening of new Tyne bridge by His Majesty the King.
" 13 *The Follies.*

GLASGOW

Oct. 9 *From Dublin's Fair City*, by Dublin artistes, arranged by Seamus Clandillon.
" 13 *A Nicht wi' George*, devised and produced by Arthur Black.

ABERDEEN

Oct. 13 An old favourite programme.

BELFAST

Oct. 11 *Old Drury.*
" 13 Open-air programme.

Station WGBS (New York) has inaugurated a daily broadcast of "Lost and Found" announcements. It is thought the programme will be of much service to the public.

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Commissioner O. H. Caldwell, of the Federal Radio Commission in America, has suggested the use of the term "horse-power" instead of "kilowatt," in rating the power of broadcasting stations. By adopting this standard, he believes, the general conception of tremendous power now conveyed by the 50-kilowatt stations would be lessened somewhat. A horse-power equals 746 watts.

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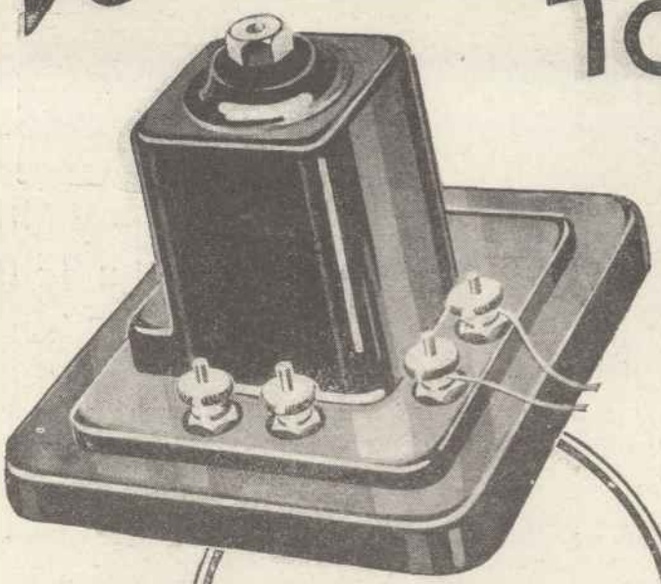

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THE MARK OF BETTER RADIO

Kingsway House, 103 Kingsway, London, W.C.2. Telephone: Holborn 5303.

Printed in England: Published by Bernard Jones Publications, Ltd., 58/61, Fetter-lane, London, E.C.4.
Sole Agents for South Africa: CENTRAL NEWS AGENCY, LIMITED. Sole Agents for Australasia: GORDON & GOTCH LIMITED. Saturday, October 6, 1928.